NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV1: 50B-0243 & 50F [FAP-01-50B] DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.0210	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	5	0.2200	1.1000
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	4	0.0500	0.2000
TOTAL NOTIFICATION APPLIANCES CURRENT			1.3000

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM

WHERE: I = CIRCUIT CURRENT

D = CONDUCTOR LENGTH (FT) ONE WAY

21.6 = A CONSTANT

CM = CIRCULAR MILS

VD = {(1.3A) (190FT) (21.64)}/4110 = 0.1.298V

%VD = {1.298V / 24V} X 100 = 5.409%

REMAINING VOLTS = 22.702

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

BATTERY CALCULATIONS FAP-01, -01A & -01D-50B

ITEM	DESCRIPTION	QTY	STANDBY CURRENT PER ITEM (AMPS)	TOTAL STANDBY CURRENT PER ITEM	ALARM CURRENT PER ITEM (AMPS)	TOTAL ALARM CURRENT PER ITEM
CP-35	FACP w/2ZN'S + AUD	1	0.1750	0.1750	0.5010	0.5010
PS-35	POWER SUPPLY	3	0.0000	0.0000	0.0000	0.0000
BC-35	BATTERY CHARGER	1	0.0450	0.0450	0.0300	0.0300
AA-30U	CLASS B BELL MODULE	1	0.0065	0.0065	0.0400	0.0400
AE-30U	CLASS B BELL MODULE	3	0.0065	0.0195	0.0400	0.1200
PM-32	MATRIX MODULE	3	0.0000	0.0000	0.0000	0.0000
SM-30	SWITCH MODULE	6	0.0000	0.0000	0.0450	0.2700
SR-30	2 RELAY MODULE	1	0.0000	0.0000	0.0450	0.0450
TC-30U	BATTERY TROUBLE	2	0.0300	0.0600	0.0150	0.0300
ZN-34US	SUPERVISORY MODULE	13	0.0100	0.1300	0.1100	1.4300
ZU-35	ZONE MODULE	14	0.0090	0.1260	0.1100	1.5400
ZU-35DS	ZONE MODULE/SD's	7	0.0090	0.0630	0.1100	0.7700
MOI	TRANSMITTER	1	0.1200	0.1200	0.1750	0.1750
MID	INPUT BOARD	5	0.0020	0.0100	0.0000	0.0000
PS-5A	POWER SUPPLY	1	0.0380	0.0380	0.0000	0.0000
TOTAL NOTIFICATION APPLIANCES CURRENT						2.8800
TOTAL SYSTEM CURRENT			STANDBY	0.7930	ALARM	7.8310

MIN. BATTERY CAPACITY = {(TOT. STANDBY CURRENT X STANDBY TIME) + (TOT. ALARM CURRENT X ALARM TIME)} X 1.25

MIN. BATTERY CAPACITY = {(0.7930 A X 24 HR) + (7.831 A X 0.083 HR)} X 1.25

MIN. BATTERY CAPACITY = {19.032 AHr + 0.65 AHr} X 1.25 = 24.6025 AHr

FACU POWER SUPPLY & BATTERY 50B MXL #1 – 12 AMP

SUPERVISORY CURRENT

DESCRIPTION	QUANTITY	MODULE CURRENT	EOL CURRENT	DEVICE CURRENT	TOTAL ROW CURRENT
MMB-1/2	1	0.175	0.024	0.132	0.331
MKB-2	1	0.005	NA	NA	0.005
TSP-40	1	0.070	NA	NA	0.070
NET-7 NETWORK CARD	1	0.030	NA	NA	0.030
NIM-1R	1	0.040	NA	NA	0.040
PS-5A	1	***	NA	NA	0.119
*** 25% OF 24V LOAD				TOTAL SUPERVISORY CURRENT	0.595

ALARM CURRENT

MXLR OCCUPANT NOTIFICATION APPLIANCE CIRCUITS	TOTAL CIRCUIT CURRENT LOAD
N/A	0.000
TOTAL ALARM CURRENT	0.000 AMP

SUMMARY

MINIMUM BATTERY CAPACITY = {TOTAL STANDBY CURRENT X STANDBY TIME} + {TOTAL ALARM CURRENT X ALARM TIME} X 1.25

MINIMUM BATTERY CAPACITY = {0.595 X 24 HR} + {0.0 X 0.083 HR} X 1.25

MINIMUM BATTERY CAPACITY = {14.28 AHR + 0.00 AHR} X 1.25 = 17.85 AHR

FIRE ALARM SYSTEM GENERAL FUNCTION CHART

(ALSO SEE 4B50BE168 & 4B50BE169)

SYSTEM EVENT / RESPONSE	ANNUNCIATE AT FACU	FIRE SIGNAL TO RECEIVER	TROUBLE SIGNAL TO LBNL RECEIVER	SUPERVISORY SIGNAL TO LBNL RECEIVER	OPERATE 50B NOTIFICATION APPLIANCES	OPERATE 50F NOTIFICATION DEVICES	OPERATE BANK 480 SUBSTATION BELL	ELEVATOR RECALL	RELEASE DOOR HOLDERS
50B FIRE CALL BOXES	●	●			●	●	●	●	●
50B HEAT DETECTORS	●	●			●	●	●	●	●
50B SMOKE DETECTORS	●	●			●	●	●	●	●
50B FIRE SPRINKLER WATERFLOW SWITCHES	●	●			●	●	●	●	●
50B FIRE SPRINKLER VALVE SUPERVISORY SWITCHES	●	●			●	●	●	●	●
50F FIRE CALL BOXES	●	●			●	●	●	●	●
50F FIRE SPRINKLER WATERFLOW SWITCH	●	●			●	●	●	●	●
50F FIRE SPRINKLER VALVE SUPERVISORY SWITCH	●			●					
BANK 480 SUBSTATION FCB & SD	●		●						
AC POWER FAILURE	●		●						
SYSTEM FAULT	●		●						

NOTIFICATION APPLIANCE CIRCUIT VOLTAGE DROP & POWER REQUIREMENTS

CKT AV2: 50B 1ST & 2ND FLRS [FAP-01-50B] DESCRIPTION	QTY	CURRENT PER ITEM (AMPS)	TOTAL CURRENT PER ITEM
WHEELOCK STROBE 15 cd	–	0.5010	0.0000
WHEELOCK HORN/STROBE 15cd	–	0.0000	0.0000
WHEELOCK STROBE 30 cd	–	0.0300	0.0000
WHEELOCK HORN/STROBE 30 cd	–	0.0450	0.0000
WHEELOCK STROBE 75 cd	–	0.0210	0.0000
WHEELOCK HORN/STROBE 75 cd	–	0.1100	0.0000
WHEELOCK STROBE 110 cd	4	0.2200	0.8800
WHEELOCK HORN/STROBE 110 cd	–	0.1750	0.0000
WHEELOCK HORN	–	0.0000	0.0000
AUTOCALL BELL	3	0.0500	0.1500
TOTAL NOTIFICATION APPLIANCES CURRENT			1.0300

VOLTAGE DROP (VD) CALCULATIONS

VD = {(I) (D) (21.6)}/CM

WHERE: I = CIRCUIT CURRENT

D = CONDUCTOR LENGTH (FT) ONE WAY

21.6 = A CONSTANT

CM = CIRCULAR MILS

VD = {(1.03A) (170FT) (21.64)}/4110 = 0.92V

%VD = {0.92V / 24V} X 100 = 3.834%

REMAINING VOLTS = 23.08

WIRE SIZE	CIRCULAR MILS
12AWG	6530
14AWG	4110
16AWG	2580
18AWG	1620
20AWG	1020

BATTERY CALCULATIONS FAP-01B & -01C-50

ITEM	DESCRIPTION	QTY	STANDBY CURRENT PER ITEM (AMPS)	TOTAL STANDBY CURRENT PER ITEM	ALARM CURRENT PER ITEM (AMPS)	TOTAL ALARM CURRENT PER ITEM
CP-35	FACP w/2ZN'S + AUD	1	0.1750	0.1750	0.5010	0.5010
PS-35	POWER SUPPLY	1	0.0000	0.0000	0.0000	0.0000
BC-35	BATTERY CHARGER	1	0.0450	0.0450	0.0300	0.0300
AA-30U	CLASS B BELL MODULE	2	0.0065	0.0130	0.0400	0.0800
AE-30U	CLASS B BELL MODULE	1	0.0065	0.0650	0.0400	0.0400
PM-32	MATRIX MODULE	5	0.0000	0.0000	0.0000	0.0000
SM-30	SWITCH MODULE	5	0.0000	0.0000	0.0450	0.2700
SR-30	2 RELAY MODULE	17	0.0000	0.0000	0.0450	0.7650
SR-35	8 RELAY MODULE	1	0.0000	0.0000	0.0210	0.0210
TC-30U	BATTERY TROUBLE	1	0.0300	0.0300	0.0150	0.0150
ZU-35	ZONE MODULE	4	0.0090	0.0360	0.1100	0.4400
ZU-35DS	ZONE MODULE/SD's	4	0.0090	0.0360	0.1100	0.4400
TOTAL NOTIFICATION APPLIANCES CURRENT						0.0500
TOTAL SYSTEM CURRENT			STANDBY	0.3415	ALARM	2.6070

MIN. BATTERY CAPACITY = {(TOT. STANDBY CURRENT X STANDBY TIME) + (TOT. ALARM CURRENT X ALARM TIME)} X 1.25

MIN. BATTERY CAPACITY = {(0.3415 A X 24 HR) + (2.607 A X 0.083 HR)} X 1.25

MIN. BATTERY CAPACITY = {8.1960 AHr + 0.0.2164 AHr} X 1.25 = 10.5155 AHr

FACU POWER SUPPLY & BATTERY 50B MXL #2 – 12 AMP

SUPERVISORY CURRENT

DESCRIPTION	QUANTITY	MODULE CURRENT	EOL CURRENT	DEVICE CURRENT	TOTAL ROW CURRENT
MMB-1/2	1	0.175	0.024	0.132	0.331
MKB-2	1	0.005	NA	NA	0.005
TSP-40	1	0.070	NA	NA	0.070
NET-4 NETWORK CARD	1	0.005	NA	NA	0.005
NIM-1W	1	0.150	NA	NA	0.150
D2300CP	2	0.050	NA	NA	0.100
PS-5A	1	***	NA	NA	0.165
*** 25% OF 24V LOAD				TOTAL SUPERVISORY CURRENT	0.826

ALARM CURRENT

MXLR OCCUPANT NOTIFICATION APPLIANCE CIRCUITS	TOTAL CIRCUIT CURRENT LOAD
N/A	0.000
TOTAL ALARM CURRENT	0.000 AMP

SUMMARY

MINIMUM BATTERY CAPACITY = {TOTAL STANDBY CURRENT X STANDBY TIME} + {TOTAL ALARM CURRENT X ALARM TIME} X 1.25

MINIMUM BATTERY CAPACITY = {0.826 X 24 HR} + {0.000 X 0.083 HR} X 1.25

MINIMUM BATTERY CAPACITY = {19.824 AHR + 0.000 AHR} X 1.25 = 24.78 AHR

NOTIFICATION APPLIANCE CIRCUIT CURRENTS

CKT AV1	50B-0243 & 50F [FAP-01-50B]	1.300
CKT AV2	50B 1ST & 2ND FLRS [FAP-01-50B]	1.030
CKT AV3	50B 3RD – 7TH FLRS [FAP-01-50B]	0.550
CKT AV4	BANK 480 SUBSTATION [FAP-01B-50B]	0.050
CKT AV5	–	–
CKT AV6	–	–
CKT AV7	–	–
CKT AV8	–	–
	TOTAL NOTIFICATION APPLIANCES CURRENT	2.930

PROFESSIONAL SEAL (IF REVISION, APPLIES ONLY TO REVISED WORK)

ISSUE (PROGRESS, ESTIMATE, BID, CONSTRUCTION, CONFORMED, REVISION, RECORD)

AS BUILT
–
–
09/23/13

REVISION NUMBER	DRAWN BY	CHECKED BY	APPR'D BY	DATE	REMARKS
–	LDD	LDD	MCD	09/23/13	AS BUILT

BLDG 50B, 50F FIRE ALARM FUNCTION CHART & CALCULATIONS

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UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY NATIONAL LABORATORY
FACILITIES DIVISION

DRAWN BY	LDD	DATE 9/23/2013
CHECKED BY	LDD	9/23/2013
APPROVED BY	MCD	9/23/2013
SCALE	AS NOTED	
DRAWING NO.	4B50BE353_	SHEET
PROJECT NO.	000000	1 OF 2