BUILDING XXXX DGP BATTERY SIZING WORKSHEET

FS20 DATA GATHERING PANEL (DGP)		SUPERVISORY CURRENT (A)			ALARM CURRENT (A)			^{1}TOT
MODULE TYPE	COMPONENT DESCRIPTIONS	QTY.	^{1}SUPERVISORY	^{1}S	# OF CIRCUITS	^{1}ALARM	^{1}A	^{1}S + ^{1}A : ^{1}TOT
L3 MODULE	L3 CONTROL LOGIC MODULE		X 0.150 =		1	X 0.000 =	0.000	
N2 MODULE	N2 W/ACC. RELAY BOARD, ANNUNCIATOR LIGHTS		X 0.120 =			X 0.220 =		
B1 MODULE	B1 W/ ANNUNCIATOR LIGHTS		X 0.100 =			X 1.000 =		
D2 MODULE	ACCESSORY RELAY MODULE (ALL 8 RELAYS)					X 0.320 =		
FS20 COMPONENTS TOTAL CURRENT LOAD (AMPS)								
FIELD DEVICES	DEVICE DESCRIPTIONS	QTY.	^{1}SUPERVISORY	^{1}S	# OF DEVICES	^{1}ALARM	^{1}A	^{1}S + ^{1}A : ^{1}TOT
TC804C	PHOTOELECTRIC SMOKE DETECTOR		X 0.000020 =					
SC716B 1027	MULTITONE SIGNAL WITH STROBE, 20-31V dc (BELL SETTING HI)					X 0.129 =		
SC813B 1037	ELECTRONIC STROBE, 20-31V dc					X 0.115 =		
SC806C	24 Vdc VIBRATING 6" & 10" BELLS					X 0.063 =		
SC716A 1003	MULTITONE SIGNAL, 20-31V dc (BELL SETTING HI)					X 0.014 =		
FIELD DEVICE TOTAL CURRENT LOAD (AMPS)								
TOTAL CURRENT LOAD (IN AMPS)								

L3 MODULE: SUPERVISORY CURRENT: 0.15 A; ALARM CURRENT: 0 A
POWER SUPPLY OUTPUT: 25.5-30 Vdc, 5.5 A MAXIMUM

N2 MODULE: SUPERVISORY: 0.12 A (PER MODULE); ALARM: 0.22 A (PER ZONE)
MAXIMUM 120 mA SUPERVISORY CURRENT AND 950 mA ALARM CURRENT
40 mA @ 24Vdc (EACH RELAY COIL)
50 mA FOR EACH ZONE ANNUNCIATOR

B1 MODULE: SUPERVISORY: 0.1A (PER MODULE); ALARM: 1.025 A (PER CIRCUIT)
MAXIMUM OF 1A PER ZONE (TOTAL OF 4 ZONES PER MODULE)

D2 MODULE: OPERATING CURRENT IS 40mA @ 24 Vdc PER RELAY
(^{1} ALARM VALUE OF 0.32mA IS USED FOR ALL CALCULATIONS)

BATTERY SIZING CALCULATIONS:

FOR 24 HOURS OF SUPERVISION, 5 MINUTES IN ALARM (PER NFPA 72, SECTION 1-5.2.6)

Ah = (IsTs + IaIs + Ia)) =
SAFETY FACTOR = × 1.25

BATTERY MUST BE SIZED TO PROVIDE A MINIMAL AMPERE-HOURS (Ah) = ___
AMPERE-HOURS (Ah) OF BATTERY THAT IS INSTALLED = ___

NOTIFICATION CIRCUIT CALCULATED LOAD (AMPS) (1)

BELL ZONE 1:	BELL ZONE 11:
BELL ZONE 2:	BELL ZONE 12:
BELL ZONE 3:	BELL ZONE 13:
BELL ZONE 4:	BELL ZONE 14:
BELL ZONE 5:	BELL ZONE 15:
BELL ZONE 6:	BELL ZONE 16:
BELL ZONE 7:	BELL ZONE 17:
BELL ZONE 8:	BELL ZONE 18:
BELL ZONE 9:	BELL ZONE 19:
BELL ZONE 10:	BELL ZONE 20:

	VALUES	
Is = TOTAL STANDBY (SUPERVISORY) CURRENT	___	
Ia = TOTAL ALARM CURRENT	___	
Ts = HOURS OF STANDBY REQUIRED	24	(24 HOURS OF SUPERVISION)
Ta = HOURS OF ALARM CONDITION REQUIRED	0.083	(5 MINUTES IN ALARM)

BATTERY TYPE: POWER PRO- QTY: 2

FS20 DGP POWER CALCULATIONS WORKSHEET

SCALE:

BUILDING XXXX DGP BATTERY SIZING WORKSHEET

FS90 DATA GATHERING PANEL (DGP) - PANEL 1 OF 1

MOTHERBOARD #1		SUPERVISORY CURRENT (A)			ALARM CURRENT (A)			^{1}TOT
CARD TYPE	MOTHERBOARD #1 COMPONENTS	QTY.	^{1}SUPERVISORY	^{1}S	# OF CIRCUITS	^{1}ALARM	^{1}A	^{1}S + ^{1}A : ^{1}TOT
CA	CA CONTROL BOARD		X 0.100 =		1	X 0.060 =	0.060	
AA	AA INITIATING BOARD (2 WIRE, 4 ZONES)		X 0.125 =			X 0.055 =		
AB	AB INITIATING BOARD (4 WIRE, 2 ZONES)		X 0.090 =			X 0.055 =		
BF	BF INDICATING BOARD (2 WIRE, 2 ZONES; 0.1A		X 0.045 =			X 0.050 =		
DC	FS90 DC ACCESSORY RELAY BOARD (4 RELAYS)		X 0.015 =			X 0.020 =		
LD	FS90 COMMUNICATION BOARD		X 0.050 =					
BATT. SUPERVISION	FS90 14506408 BATTERY SUPERVISION MODULE		X 0.050 =					
FIELD DEVICES	DEVICE DESCRIPTIONS	QTY.	^{1}SUPERVISORY	^{1}S	# OF DEVICES	^{1}ALARM	^{1}A	^{1}S + ^{1}A : ^{1}TOT
TC804C	PHOTOELECTRIC SMOKE DETECTOR		X 0.000020 =					
SC716B 1027	MULTITONE SIGNAL WITH STROBE, 20-31V dc (BELL SETTING HI)					X 0.129 =		
SC813B 1037	ELECTRONIC STROBE, 20-31V dc					X 0.115 =		
SC806C	24 Vdc VIBRATING 6" & 10" BELLS					X 0.063 =		
SC716A 1003	MULTITONE SIGNAL, 20-31V dc (BELL SETTING HI)					X 0.014 =		
MOTHERBOARD #1 TOTAL CURRENT LOAD (AMPS)								

MOTHERBOARD #2		SUPERVISORY CURRENT (A)			ALARM CURRENT (A)			^{1}TOT
CARD TYPE	MOTHERBOARD #2 COMPONENTS	QTY.	^{1}SUPERVISORY	^{1}S	# OF CIRCUITS	^{1}ALARM	^{1}A	^{1}S + ^{1}A : ^{1}TOT
CA	CA CONTROL BOARD		X 0.100 =			X 0.060 =		
AA	AA INITIATING BOARD (2 WIRE, 4 ZONES)		X 0.125 =			X 0.055 =		
AB	AB INITIATING BOARD (4 WIRE, 2 ZONES)		X 0.090 =			X 0.055 =		
BF	BF INDICATING BOARD (2 WIRE, 2 ZONES; 0.1A		X 0.045 =			X 0.050 =		
DC	FS90 DC ACCESSORY RELAY BOARD (4 RELAYS)		X 0.015 =			X 0.020 =		
LD	FS90 COMMUNICATION BOARD		X 0.050 =					
BATT. SUPERVISION	FS90 14506408 BATTERY SUPERVISION MODULE		X 0.050 =					
FIELD DEVICES	DEVICE DESCRIPTIONS	QTY.	^{1}SUPERVISORY	^{1}S	# OF DEVICES	^{1}ALARM	^{1}A	^{1}S + ^{1}A : ^{1}TOT
TC804C	PHOTOELECTRIC SMOKE DETECTOR		X 0.000020 =					
SC716B 1027	MULTITONE SIGNAL WITH STROBE, 20-31V dc (BELL SETTING HI)					X 0.129 =		
SC813B 1037	ELECTRONIC STROBE, 20-31V dc					X 0.115 =		
SC806C	24 Vdc VIBRATING 6" & 10" BELLS					X 0.063 =		
SC716A 1003	MULTITONE SIGNAL, 20-31V dc (BELL SETTING HI)					X 0.014 =		
MOTHERBOARD #2 TOTAL CURRENT LOAD (AMPS)								
TOTAL CURRENT LOAD (AMPS) IN PANEL								

IF THE SUPERVISORY CURRENT OF EACH MOTHERBOARD IS LESS THAN 2A AND TOTAL CURRENT IN ALARM IS LESS THAN 4A, USE INTERNAL POWER SUPPLY.

IF CURRENT REQUIREMENTS OF ANY MOTHERBOARD EQUAL OR EXCEEDS 2A IN SUPERVISION AND 4A IN ALARM, INSTALL WHEELOCK POWER SUPPLY CABINET AS REQUIRED TO REDUCE NOTIFICATION CIRUCIT LOAD ON MOTHERBOARD. 37

NOTIFICATION CIRCUIT CALCULATED LOAD (AMPS) (1)

BELL ZONE 1:	BELL ZONE 7:
BELL ZONE 2:	BELL ZONE 8:
BELL ZONE 3:	BELL ZONE 9:
BELL ZONE 4:	BELL ZONE 10:
BELL ZONE 5:	BELL ZONE 11:
BELL ZONE 6:	BELL ZONE 12:

BATTERY SIZING CALCULATIONS:

FOR 24 HOURS OF SUPERVISION, 5 MINUTES IN ALARM (PER NFPA 72, SECTION 1-5.2.6)

Ah = (IsTs + IaIs + Ia)) =
SAFETY FACTOR = × 1.25

BATTERY MUST BE SIZED TO PROVIDE A MINIMAL AMPERE-HOURS (Ah) = ___
AMPERE-HOURS (Ah) OF BATTERY THAT IS INSTALLED = 26

	VALUES	
Is = TOTAL STANDBY (SUPERVISORY) CURRENT	___	
Ia = TOTAL ALARM CURRENT	___	
Ts = HOURS OF STANDBY REQUIRED	24	(24 HOURS OF SUPERVISION)
Ta = HOURS OF ALARM CONDITION REQUIRED	0.083	(5 MINUTES IN ALARM)

BATTERY TYPE: POWER POWER-SONIC PS-0260 QTY: 2

FS90 DGP POWER CALCULATIONS WORKSHEET

SCALE:

UTILIZE FIRE ALARM CALCULATOR PROGRAM AT \LONDON\PANEL\FIRE ALARM\CALCULATIONS\ FACALCULATOR.XLS ON THE SANDIA FACILITIES SERVER FOR PERFORMING DGP POWER CLACULATIONS AND NAC VOLTAGE DROP CALCULATIONS.

FS20 DGP SPECIFICATIONS

SYSTEM CAPABILITIES 1

MAXIMUM OF 64 ZONES ARE MONITORED BY EACH CONTROL LOGIC MODULE (L3)
MAXIMUM OF 16 FIRE MODULES (N2) CAN BE MONITORED BY A CONTROL LOGIC MODULE (N2)
MAXIMUM OF 4 ZONES ARE MONITORED BY EACH FIRE MODULE (N2)

CONTROL LOGIC MODULE (L3) 5

OPERATING VOLTAGE (PRIMARY):	120V, 60Hz (+10-15%)
STANDBY POWER VOLTAGE:	22.5 TO 30.0V dc
POWER REQUIRED:	330 VA MAX. (POWER SUPPLY) 200 mA AT 24V (PRINTED WIRING BOARD)
POWER SUPPLY OUTPUT:	15 A (ACCESSORY OUTLET) 25.5 TO 30.0V dc (2.5V ac PEAK TO PEAK RIPPLE) 5.5 A MAXIMUM (0.1 TO 1.2A SHORT CIRCUIT)
SPACE REQUIRED:	ONE MODULE LOCATION
ACCESSORY OULET:	120V ac, 15 A NONSWITCHED
CONTROLS:	FLOAT/EQUALIZE (BATTERY CHARGER) TWO CIRCUIT BREAKERS
INDICATORS (FOR TROUBLESHOOTING):	AC POWER ON, GROUND FAULT, POLLING

STANDBY BATTERY MODULE (E) 2

MODELS:	E1: 10 AMPERE-HOURS (Ah) E2: ADDITIONAL 10 Ah (20 Ah TOTAL WITH E1)
BATTERY VOLTAGE:	24V dc
CHARGING VOLTAGE:	SUPPLIED BY CONTROL LOGIC MODULE (L)
SPACE REQUIRED:	ONE AND ONE-EIGHTH MODULE LOCATIONS (10 Ah) TWO AND ONE-QUARTER MODULE (20 Ah)

FIRE MODULE (N2) 3

OPERATING VOLTAGE:	22.5 TO 30.0 V dc (SUPPLIED BY CONTROL LOGIC MODULE "L")
ZONES PER MODULE:	FOUR (4)
INITIATING LOOP VOLTAGE:	20 TO 27V dc
CURRENT (MAX.)	120 mA PLUS DECTOR CURRENT (SUPERVISORY) OR 950 mA (ALARM) 40 mA AT 24V dc (EACH RELAY COIL) 50 mA FOR EACH ZONE ANNUNCIATOR
LOGIC OUTPUT LOADS:	MUST NOT EXCEED 150 mA AT 30 mA dc
INITIATING DEVICES (FIRE):	UP TO 25 TC100C AND/OR TC803B NO LIMIT ON N.O. OR N.C. CONTACT DEVICES
SPACE REQUIRED:	ONE MODULE LOCATION
NUMBER OF RELAYS:	FOUR POLARIZED RELAYS
CONTACTS:	TWO FORM "C" (DPDT) PER RELAY
INDICATORS (FOR TROUBLESHOOTING):	GROUP ADDRESS SCANNING

SIGNALING MODULE (B1) 4

OPERATING VOLTAGE (PRIMARY):	120V, 60 Hz
ZONES PER MODULE:	FOUR (4) ZONES UP TO 1A EACH
AUDIBLE DEVICES:	POLARIZED BELLS OR HORNS.
STANDBY BATTERY VOLTAGE:	22.5 TO 30.0V dc
POWER REQUIRED (PRIMARY SUPPLY):	330 VA MAX.
SPACE REQUIRED:	ONE MODULE LOCATION
INDICATORS (FOR TROUBLESHOOTING):	FOUR, LOOP ENERGIZED (RED)

ACCESSORY RELAY MODULE (D2)

OPERATING VOLTAGE:	22.5 TO 30.0V dc
OPERATING CURRENT:	40 mA AT 24V dc, PER RELAY
NUMBER OF RELAYS:	8
RELAY CONTACT CONFIGURATION:	TWO FORM C (DPDT) PER RELAY

FS90 DGP SPECIFICATIONS 20

FS90 SPECIFICATIONS

MOTHERBOARD (14505102) 21

PROVIDE EIGHT FUNCTION-BOARD SLOTS, EACH WITH AN ASSOCIATED TERMINAL BLOCK FOR FIELD WIRING. EACH MOTHERBOARD RESTRICTED TO 4A MAXIMUM INPUT POWER.
IF SUPERVISORY CURRENT OF EACH MOTHERBOARD IS LESS THAN 2A AND TOTAL CURRENT IN ALARM IS LESS THAN 4A, USE INTERNAL POWER SUPPLY (14505148).
IF CURRENT REQUIREMENTS OF ANY MOTHERBOARD EQUAL OR EXCEED 2A IN SUPERVISION AND 4A IN ALARM, INSTALL WHEELOCK POWER SUPPLY CABINETS 37, AS REQUIRED TO REDUCE NOTIFICATION CIRCUIT LOAD ON MOTHERBOARD

POWER SUPPLY (14505148-001) 27

FOUR MOTHERBOARDS FOR UP TO 32 FUNCTION-BOARD SLOTS; ONE CONTROL BOARD PER SYSTEM
REQUIREMENTS FOR ONE POWER SUPPLY WITH ONE MOTHERBOARD:
VOLTAGE: 120V ac +10%, - 15%, 50/60 Hz
CURRENT DRAW: 1.5A MAX.
POWER SUPPLY: 4A AT 28Vdc NOMINAL
BATTERY: 24Vdc

BATT. SUPERVISION MODULE: 32

MODULE (14506408) REQUIRED IF BATTERY SUPERVISION IS REQUIRED. MOUNTS ON STANDARD 14505148 POWER SUPPLY. EACH POWER SUPPLY/ BATTERY COMBINATION REQUIRES ONE BATTERY MODULE FOR BATTERY SUPERVISION. MODULE TESTS OUTPUT CAPACITY OF BATTERY EVERY 10 SECONDS. IF VOLTAGE ACROSS BATTERY DROPS BELOW 25.75 Vdc DURING THE TEST, A LOW BATTERY CONDITION IS INDICATED. CURRENT DRAIN IS 50mA
RECHARGE TIME IS LIMITED TO 90 PERCENT OF THE NORMAL RECHARGE TIME.
MAXIMUM BATTERY CHARGING CURRENT IS 4A.

CONTROL BOARD (CA) 22

OUTPUT:	COMMON ALARM OUTPUT TO ANY LOAD LESS THAN 100mA CONNECTED TO ANY NOMINAL 24 Vdc POWER SOURCE. COMMON TROUBLE OUTPUT TO ANY LOAD LESS THAN 100 mA CONNECTED TO ANY NOMINAL 24 Vdc POWER SOURCE. RESET OUTPUT TIME OF 15 SECONDS.
CURRENT LIMITS:	MAXIMUM CIRCUIT CURRENT IS 60 mA. MAXIMUM SMOKE DETECTOR STANDBY/SUPERVISORY CURRENT IS 6 mA.
CONTROLS:	SILENCE, ACKNOWLEDGE, RESET, PANEL TEST, AND MANUAL EVACUATION
INDICATORS:	ALARM, TROUBLE, SILENCE, LOW BATTERY, GROUND FAULT, DISCONNECT, POWER SETUP, AND RUN.

INITIATING BOARD (AB) 23

CURRENT LIMITS:	MAXIMUM CIRCUIT CURRENT IS 60 mA MAXIMUM SMOKE DETECTOR STANDBY/SUPERVISORY CURRENT IS 6 mA
DESCRIPTION:	TWO SUPERVISED (50 OHMS/60 mA MAXIMUM) FOR N.O. ALARM DEVICES.
CONTROLS:	DISCONNECT PER CIRCUIT
INDICATORS:	ALARM AND TROUBLE PER CIRCUIT, RELAYS ARE ENERGIZED

INDICATING BOARD (BF)

DESCRIPTION: 24	TWO-ZONE, TWO-WIRE, TWO-RELAYS. TWO SUPERVISIED CIRCUITS (2.0A MAX. PER CIRCUIT) TWO RELAYS WITH USER-SELECTABLE N.O. OR N.C. CONTACTS (2A, 30 Vdc MAX. RESISTIVE LOAD)
CONTROLS:	DISCONNECT PER CIRCUIT
INDICATORS:	ALARM AND TROUBLE PER CIRCUIT, RELAYS ARE ENERGIZED

COMMUNICATON (LD)

DESCRIPTION: 26	TONE, TWO/FOUR-WIRE (TLI BOARD) ALL TONE COMMUNICATION BOARDS HAVE A MAXIMUM LOAD OF 16 REMOTE DEVICES. FS90 TONE COMMUNICATION BOARDS SUPPORT 600 BAUD COMMUNICATION ONLY.
CONTROLS:	DISCONNECT PER CIRCUIT
INDICATORS:	ALARM AND TROUBLE PER CIRCUIT

ASSESSORY RELAY BOARD (DC)

DESCRIPTION: 25	FOUR UNSUPERVISED RELAYS (2A, 30 Vdc MAX. RESISTIVE LOAD), EACH WITH USER- SELECTABLE N.O. OR N.C. CONTACTS
INDICATORS:	CIRCUIT ENERGIZED

GENERAL NOTES

1. TO OBTAIN THE EXCEL SPREADSHEET TEMPLATE FOR THE DGP BATTERY SIZING WORKSHEET, GO TO THE SNL-NM FACILITIES SHARED DRIVE:\\london\panel\Fire Alarm OR CONTACT THE FIRE ALARM SYSTEM ENGINEER.
2. FOR EQUIPMENT LIST OF ITEMS ON THIS DRAWING, SEE STANDARD DRAWING NO. FA6001STD.

KEYED NOTES

1. ADD UP THE SUM OF THE CURRENT DRAW (^{1} ALARM) FOR ALL NOTIFICATION DEVICES ON A BELL ZONE CIRCUIT. THE MAXIMUM AMPERAGE PER BELL ZONE SHOULD BE LESS THAN 1AMP.

OBSOLETE - REFERENCE ONLY FOR EXISTING HONEYWELL SYSTEMS

DO NOT ISSUE FOR CONSTRUCTION.

REV	DATE	DESCRIPTION	DWN	CKD	APP
1	6/15/02	UDS MODS	EG	PS	
A	6/28/94	GENERAL REVISIONS	JEM	WJK	

P.O.
PROJECT NO.

U.S. DEPARTMENT OF ENERGY
KIRTLAND AREA OFFICE — ALBUQUERQUE, NEW MEXICO

SANDIA NATIONAL LABORATORIES

FIRE ALARM BATTERY CALCULATIONS

FIRE ALARM SYSTEM

FIRE PROTECTION — STANDARD

P.O.	
PROJECT NO.	
DRAWN BY	J.MARTINEZ
CHECKED BY	K.WELLS
SNL ENGR	
DATE	10/92
SIZE	D+
DRAWING NO	FA0001STD
SEQ.	

MICROSTATION FILE
FILE NAME: FA0001STD.dgn
REFERENCE FILES:

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