CHAPTER 7 Installation, Wiring, & Start-up

7.1 OVERVIEW

System installation is independent of whether modules were ordered separately or as part of a "packaged" CHEETAH control system. Skip instructions detailing installation of unused optional modules. Proper system design, installation, and check-out requires steps in this order.

7.2 System Design
7.3 Enclosure Installation.
7.4 Enclosure: Pull power, loop, relay, & audible wiring
7.5 Addressable devices: Pull initiating and notification wiring.
7.6 Addressable devices: Program address, install, and wire (except releasing).
7.7 System modules: Install and wire.
7.8 Install optional auxiliary devices
7.9 Configure system.
7.10 Checkout system.
7.11 Connect releasing hardware (after system check-out)

7.2 SYSTEM DESIGN

Prior to installation of modules, devices, or wiring, the system must be designed per applicable codes and other requirements. This involves selection of addressable devices, selection of optional modules, selection of device and module circuit functions, selection of general system options, and assigning addresses to devices. Recommended design methodologies include:

1.) Complete paper design using Appendix 4, Battery Calculation and Appendix 5, Configuration Forms, then subsequent programming into the CHEETAH CSC using menu options per Chapter 12.

<or>

Complete design using Cheetah Tracker computer program.

2.) Complete system documentation with wiring (or other logical) diagrams including address locations.

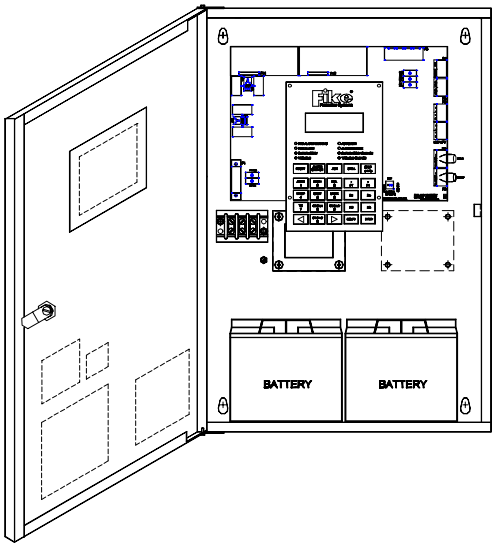
System design requires prior system training or thorough understanding of system operation as described in later Chapters and Appendices.

7.3 ENCLOSURE INSTALLATION

7.3.1 Main Enclosure

The CHEETAH enclosure includes a transformer assembly designed for either 120 VAC operation (-1) or for 208 or 240V operation (-2). The enclosure accommodates the CSC controller, other optional modules, and either a 7AH or 17AH battery pack. The enclosure is 21.125" tall x 14.375" wide x 4.0" deep with an additional .50" wide front lip to facilitate flush mounting. The enclosure's back plane has four tear-drop shaped mounting holes at 12.5" horizontal centers and 19.2" vertical centers. The door is easily removable (via two screws) from the enclosure during enclosure installation.
The enclosure shall be installed in a suitable location which is:

*Easily accessible and readily visible
*On a flat wall free from vibration
*In a clean and dry environment
*Not outdoors or in harsh environments.



7.3.2 33 A-H Battery Assembly Enclosure

If using the optional 10-2154 33 AH battery assembly enclosure, install it per the above requirements and within 20' of the main system enclosure.

10-2154-R	33 AH Battery Pack, Red Enclosure	20.15" x 10.15" x 5"
10-2154-G	33 AH Battery Pack, Gray Enclosure	20.15" x 10.15" x 5"

7.3.3 65 AH Battery Assembly Enclosure

The optional 10-2236 65AH battery assembly enclosure requires additional framing and support for installation. Install per the above requirements and within 20' of the main system enclosure.

10-2236-R	65 AH Battery Pack, Red Enclosure	27.25" x 15" x 7.25"
10-2236-G	65 AH Battery Pack, Gray Enclosure	27.25" x 15" x 7.25"

7.4 ENCLOSURE: Pull power, loop, relay, & audible wiring

Refer to Chapter 14 for Wiring Diagram Details.

Note: Complete wiring with AC Power off and locked-out. Likewise, remove F2 fuse from the CSC controller to ensure the battery assemblies cannot provide system power until wiring is completed and system is ready for checkout. Do not attach any initiators or other non-reversible electrical devices until the system has been proven to be fully operational.

7.4.1 Field Wiring/ Power Limited Requirements

Route all field wiring through the appropriate conduit knockouts, then to the appropriate circuit terminals. Provide adequate wire length to allow strain relief. CHEETAH terminal strips (including optional CRM4 and SPS modules) accept a single wire from 14 to 30 AWG.

These connections are non-power limited and shall be routed only in the enclosure's left side:

* CSC controller left side (P1) input power connections.
* SPS bottom side input power (P21) connections.

These connections are power limited and shall not be routed within 6" of the enclosure's left side to ensure segregation from the non-power limited wiring:

* CSC controller right half (P3-P9) connections.
* SLM (P11-P12) connections.
* SPS Auxiliary Out power (P22) connections.

Non-power limited wiring shall be limited to the enclosure's left side and shall be segregated from non-power limited wiring. These connections can be either power limited or non-power limited:

* CSC top left (P2) relay connections.
* CRM4 (P41 & P42) relay connections.

When planning the type of wire to be used, refer to National Electrical Code, NFPA 70. This information was derived from the 1993 edition. Stranded wire shall be tinned per NFPA70 and local requirements.

AWG	Stranding	Nominal Diameter	Uncoated Copper (Ohms / 1000')	Coated Copper (Ohms /1000')
18	1	0.040"	7.77	8.08
18	7	0.046"	7.95	8.45
16	1	0.051"	4.89	5.08
16	7	0.058"	4.99	5.29
14	1	0.064"	3.07	3.19
14	7	0.073"	3.14	3.26

7.4.2 AC Power & Chassis Wiring:

Applies to wiring to AC power strip & transformer in enclosure.

System AC line power must originate from a dedicated circuit at the main building power distribution center. The circuit breaker shall be equipped with a lockout mechanism and be clearly labeled as a "Fire Protection Control Circuit." Route line power to the system through dedicated grounded metallic conduit.

Ensure the power is compatible with the transformer assembly (120VAC, 240VAC, or 208VAC). Route the AC hot, neutral, and ground (chassis) wires into the enclosure and connect to the AC Power strip per the Chapter 14 wiring diagram. For 120VAC operation, connect the three wires directly to the terminal strip. For 208 or 240 VAC operation, connect the AC hot and AC neutral to the appropriate terminal strip connection, but connect ground chassis to the chassis standoff. When completed, verify continuity from chassis (green wire) to enclosure and to conduit.

7.4.3 Communication Loop Wiring

Applies to: a.) ASC P6-P7 wiring (Loop 1 & 2)
b.) SLM loop module P11-P12 wiring (Loop 3 & 4)

Addressable Circuit Wiring Limitation Calculations

The addressable communication loop has the following maximum wiring limitations:

(Includes +/S and -/SC wires combined)
Impedance, R = 50 Ω
Inductance, L = 1000uH
Capacitance, C = 1uF

Wiring limitations should be calculated for the above three factors and the **smallest value obtained should be the maximum feet of wire used**.

The chart below is an approximation of maximum wire distances with worst case calculations. If more wiring is needed, the exact calculations can be performed. After the chart is a listing of the formula's for exact calculations. Call FIKE for a more detailed explanation, if required.

FPLR CABLE

MFG	AWG	MAXIMUM TOTAL WIRE FOR + AND -LEG TOGETHER (FT.)				
NON-SHIELDED		1-25 DEVICES	26-50 DEVICES	51-75 DEVICES	76-100 DEVICES	101-127 DEVICES
GUARDIAN	18	3227	2500	2188	1914	1719
GUARDIAN	16	5163	4000	3500	3062	2750
GUARDIAN	14	6944	6400	5600	4900	4400
BELDEN 9571	18	3226	2500	2188	1914	1719
BELDEN 9572	16	5162	4000	3500	3062	2750
BELDEN 9580	14	5000	5000	5000	4900	4400
BELDEN 9582	12	5319	5319	5319	5319	5319
SHIELDED						
BELDEN 9574	18	3226	2500	2188	1914	1719
BELDEN 9575	16	5162	4000	3500	3063	2750
BELDEN 9581	14	5208	5208	5208	4900	4400
BELDEN 9583	12	5556	5556	5556	5556	5556

Resistive limitation

W(ft) = R * (1000/I)

R = 7000/[(0.58*S)+(30*N)] **50Ω MAX. (USE 50 EVEN IF CALCULATED VALUE IS GREATER)**

S = Sum of current scaling factors

Fike P/N	Device	Scaling Factor
60-1028	Thermal	1.35
63-1021	Photo	1.35
67-1032	Ion	1.35
55-019/020	FRCM	0.48
55-021	SOM	0.76
55-022	SRM	0.31
55-023	R2M	0.35

N = # of devices on loop **FOR 5 OR MORE DEVICES, N=5**

I = Cable resistance per 1000 ft.

AWG	Typical resistance per two conductor circuit
18	12.8Ω
16	8Ω
14	5Ω
12	3.2Ω

Inductive Limitation

W(ft) = 1000uH / L

L is the wire's Inductance per foot value.

Capacitive Limitation

W(ft) = 1uF / C

C is the wire's Capacitance per foot value.

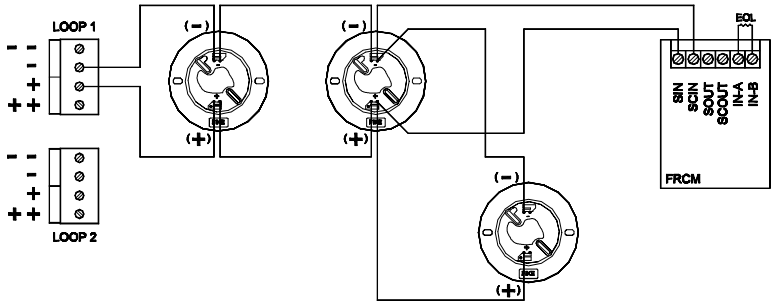
Note: Shielded cables usually list two capacitance values, use the larger value.

The circuit may be wired to operate with the characteristics of these NFPA signaling Line styles.

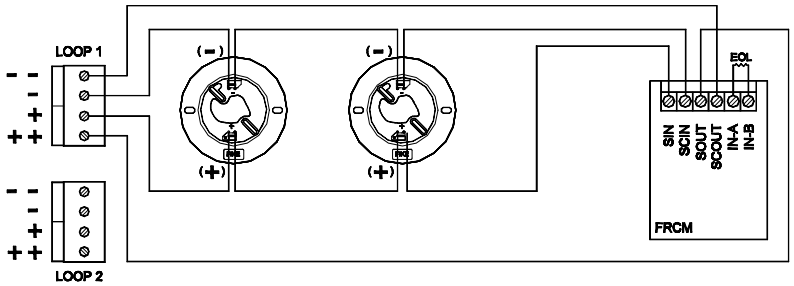
NFPA	Class/ Wiring Method	T-Tapping Allowed
Style 4	Class B/ Non-Redundant	Yes
Style 6	Class A/ Redundant	No

Loops are capable of supporting parallel branching for Style 4 since supervision is by means of device responses. Style 6 wiring assures loop operation even with a single wire break. Examples of wiring styles follow.

STYLE 4



STYLE 6



Complete loop wiring. Installation of sensor bases at this time is acceptable. If using a high voltage testing device to verify ground isolation, do not expose devices or modules to the high voltage. Verify wiring per the following:

1. Remove all sensor heads.
2. Verify no stray voltages exist on any field wiring prior to device installation.
3. Verify each conductor is free from shorts between all other conductors and chassis.
4. Measure loop impedance with a short across loop at point furthest from circuit start.

   For Class B, this is a short at last device

   For Class A, this is a short at panel (++ to — terminals).

Verify this loop impedance does not exceed 50 ohms.