ADDENDUM

Addendum No.: C1577M-A

Date: August 4, 2004

Manuals Affected: CM9760 Series Manuals – **C538M-A, C539M-A, C540M-B, C541M-C, C542M-B, C543M-A, C544M, C549M-A, C572M, C573M-D, C578M, C579M, C1501M, C1503M, C1510M-QS, C1510M-A, C1520M-B, C1528M-D, C1940M, C1941M, C1942M,** and **C1943M**

Manual Update: The CM9760-CC1 has been replaced with the CM9700-CC1 and the CM9760-MGR management software has been replaced with the CM9700-MGR management software.

Keep the following in mind when referring to the instructions contained in these manuals:

- The CM9700-CC1 contains the latest CC1 software (version 9.01 or higher), and is programmed with the new CM9700-MGR management software.

- Despite the difference in model numbers, the CM9700-CC1 functions the same as the CM9760-CC1 and most of the information in these manuals applies to version 9.01 (or higher) CPU.

- You can add the CM9700-CC1 to an existing CM9760 system if you upgrade the existing CM9760-CC1 units with the current software (version level 9.01 or higher).

  Software version 9.01 requires a minimum of 16 MB of RAM in the CPU. If required, you can upgrade the RAM in older CM9760-CC1 units using the software upgrade kit appropriate for your CPU.
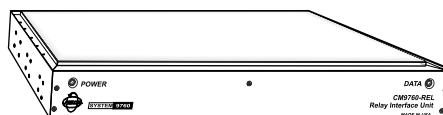
- Do not use the CM9760-MGR instructions contained in these manuals. Refer to the CM9700-MGR Getting Started Software Guide, on-screen help, or Online Help for instructions.

**CM9760-REL
System 9760®
Relay Interface Unit**

**Installation/
Operation Manual**

C538M-A (3/04)

CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

1.1 IMPORTANT SAFEGUARDS AND WARNINGS

Prior to installation and use of this product, the following WARNINGS should be observed.

1. Installation and servicing should only be done by qualified service personnel and conform to all local codes.

2. Unless the unit is specifically marked as a NEMA Type 3, 3R, 3S, 4, 4X ,6 or 6P enclosure, it is designed for indoor use only and it must not be installed where exposed to rain and moisture.

3. Only use replacement parts recommended by Pelco.

4. After replacement/repair of this unit's electrical components, conduct a resistance measurement between line and exposed parts to verify the exposed parts have not been connected to line circuitry.

The product and/or manual may bear the following marks:

This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.

This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

CAUTION:
RISK OF
ELECTRIC SHOCK.
DO NOT OPEN.

CAUTION:
TO REDUCE THE RISK OF ELECTRICAL SHOCK,
DO NOT REMOVE COVER. NO USER-
SERVICEABLE PARTS INSIDE. REFER SERVICING
TO QUALIFIED SERVICE PERSONNEL.
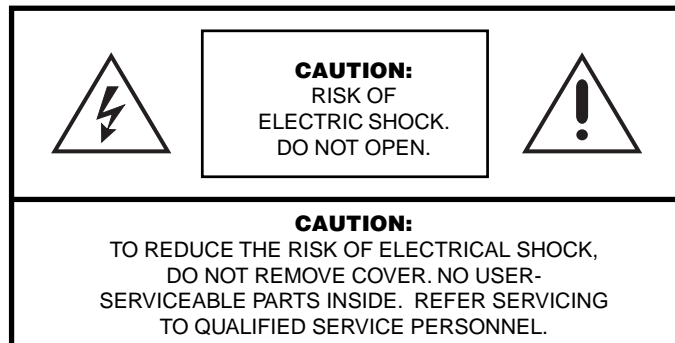
**Please thoroughly familiarize yourself with the information
in this manual prior to installation and operation.**

2.0 DESCRIPTION

The CM9760-REL Relay Interface Unit is an optional accessory of the System 9760®. The relay interface unit provides dry contact switching for direct or automatic control of peripheral equipment. The unit connects to any RS-422 COMM port on the rear of the CM9760-CC1.

Some of the more important features of the CM9760-REL are as follows:

- Each unit provides up to 64 single-pole, single-throw (SPST) contact outputs for operating different peripheral equipment.

- Relay output contacts may be configured for N/O (factory default) or N/C operation.

- With a handy "memory" feature, relay groups can retain or hold their pre-power loss contact position in the event of a power failure or front panel reset.

- Multiple units may be cascaded to extend the number of relay contact outputs controlled from a single port on the CC1 (over 5,000 relay outputs can be configured).

- The relay unit may be remotely placed up to 4,000 feet (1,219.2 meters) from the controller (RS-422 operation).

- The unit is powered by an auto-ranging power supply.

- The unit is a unique, one rack unit chassis (1.75 inches or 4.45 cm) accommodating multiple types of mounting.

2.1 MODELS

CM9760-REL   Single relay unit capable of controlling up to 64 relay contact outputs per unit. (CE)

3.1 FRONT VIEW AND DIP SWITCH ACCESS

Figure 1 illustrates a front view of the unit with its front panel removed. Power (green) and Data (red) LEDs occupy opposite ends of the unit's front panel. As illustrated, the removal of the five flat-head Phillips screws that hold the front panel in place allow access to the units three DIP switches and the reset switch. All other switches and connectors are on the rear of the unit.

3.1.1 DIP Switches

The relay interface unit has three 10-position DIP switches that configure the communication parameters for the unit as well setting the parameters for relay contact output operation. DIP switch functions are discussed in Section 3.3.2, DIP Switch Settings.

3.1.2 LEDs

The green POWER LED located on the left side of the front panel of the unit comes ON at power up.

The red DATA LED located on the right side of the front panel continually flashes on and off at a regular rate (about 1/2 second intervals) until the first valid command is received. The LED will not flash again until another valid command is received. In cascaded configurations, each relay unit only indicates receiving data when the data has the corresponding address of the unit. In other words, LED activity is address specific.

In addition, if power is cycled, if a DIP switch slide switch position is moved, or if a front panel reset occurs, the LED will again flash intermittently until the first valid command is received.
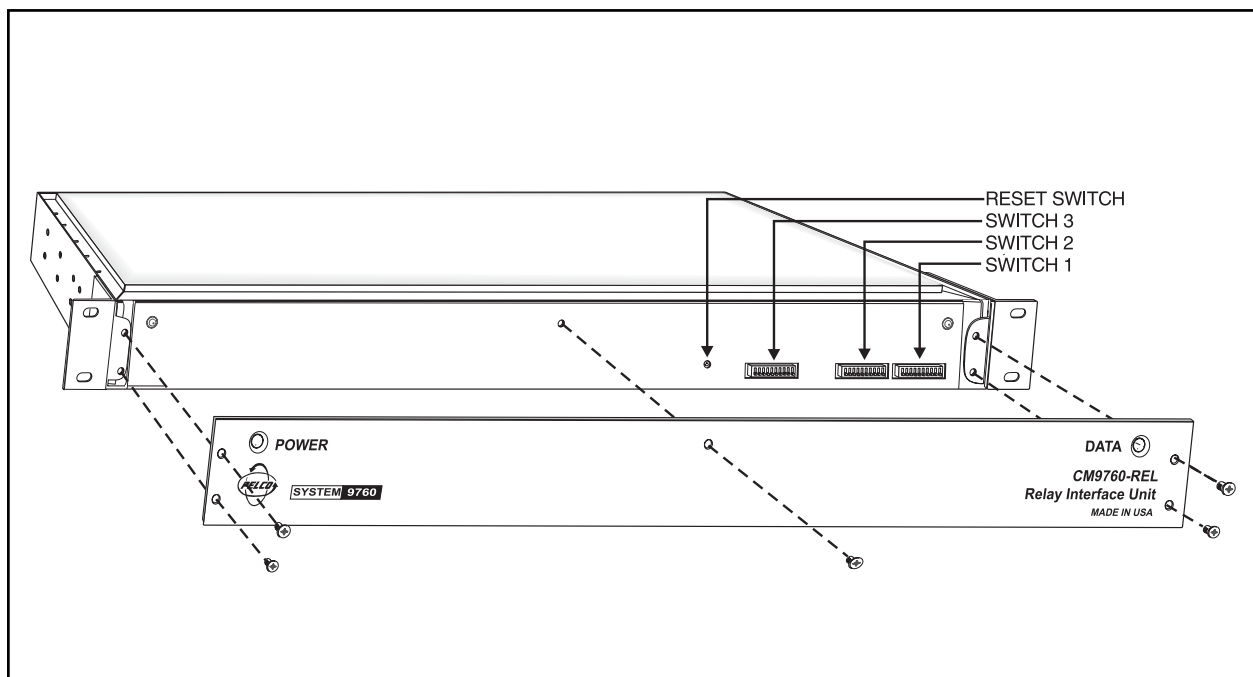
Figure 1. Front View with Panel Removal

3.2 REAR VIEW

The rear of the unit is illustrated in Figure 2. From left to right are the following:

1. Four blocks consisting of 16 contact pairs, each with mating plugs for the attachment of peripheral equipment. (Only the block for the first 16 contact pairs is shown with mating plugs.)

2. RS-422 input/output communication connectors (RJ-45 type).

3. One DB-9 connector (factory use only).

4. The grouped input power functions, consisting of input power terminals, a fuse and an ON/OFF switch.
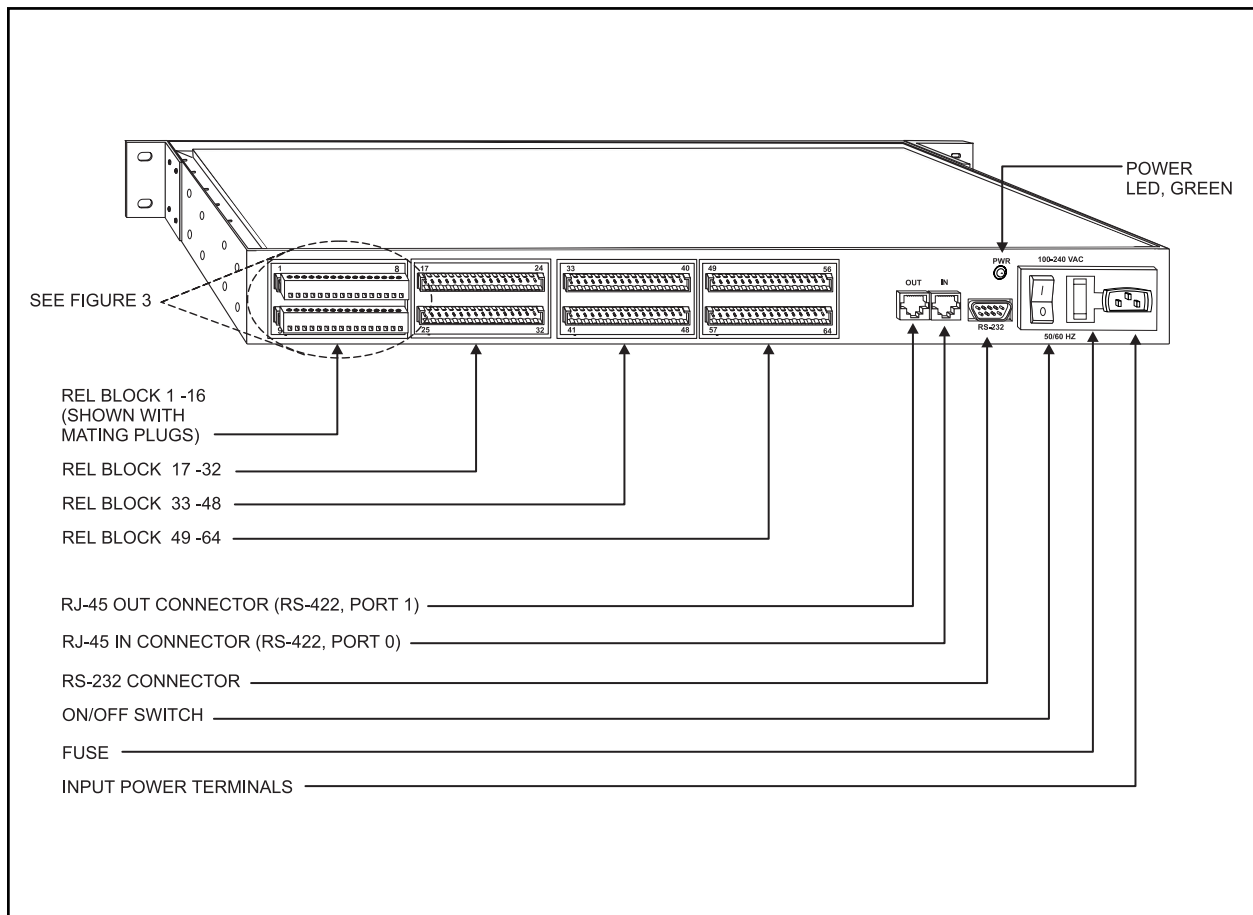
Figure 2. Rear View of the CM9760-REL

3.2.1 REL Contact Pair Connections

Physically, each relay block consists of 16 relay contacts and two mating plugs. Since a relay contact requires two terminal positions, each plug provides 8 contacts via 16 screw terminals.

To determine the screw terminal pin numbers for a particular contact, refer to Figure 3.
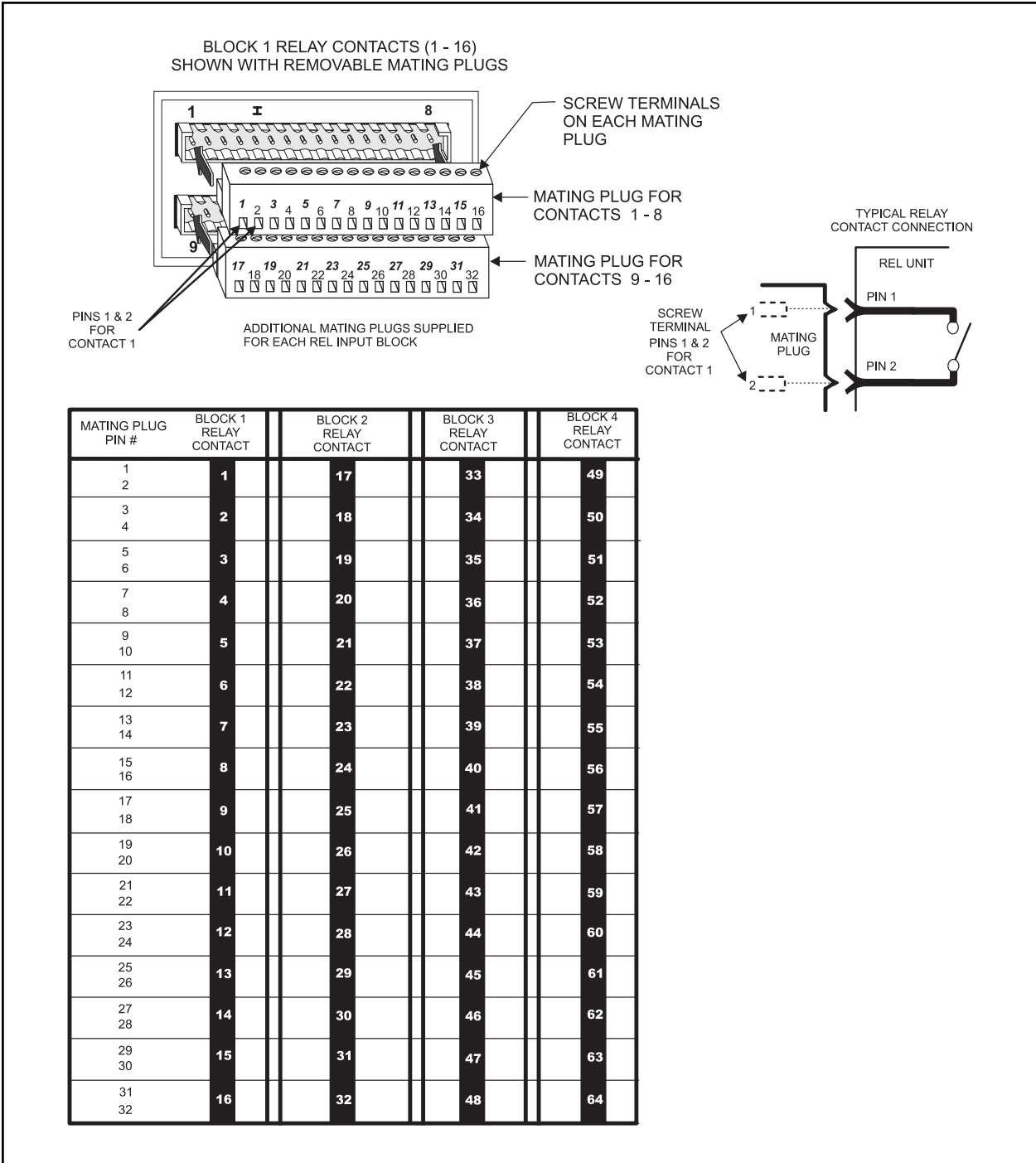
Figure 3. Relay Interface Contact Configuration

MATING PLUG PIN #	BLOCK 1 RELAY CONTACT		BLOCK 2 RELAY CONTACT		BLOCK 3 RELAY CONTACT		BLOCK 4 RELAY CONTACT	
1 2	1		17		33		49	
3 4	2		18		34		50	
5 6	3		19		35		51	
7 8	4		20		36		52	
9 10	5		21		37		53	
11 12	6		22		38		54	
13 14	7		23		39		55	
15 16	8		24		40		56	
17 18	9		25		41		57	
19 20	10		26		42		58	
21 22	11		27		43		59	
23 24	12		28		44		60	
25 26	13		29		45		61	
27 28	14		30		46		62	
29 30	15		31		47		63	
31 32	16		32		48		64	

3.2.2 External Relay Wiring Considerations

Components of external relay wiring are illustrated in Figure 4.

3.2.3 Communication Connectors

Communication to and from the unit is provided through two RJ-45 ports on the rear of the CM9760-REL. The ports are physically referenced as IN and OUT ports.

The RJ-45 IN connector allows the REL unit to be connected to an appropriate Sercom port on the rear of a CM9760-CC1 controller. This port is factory set for RS-422 communications.

The RJ-45 OUT female connector on the rear of the unit is always configured for RS-422 and is used for cascading subsequent REL units.

The RJ-45 connector pin-outs are illustrated in Figure 5.

3.2.3.1 DB-9 Connector

The rear panel DB-9 connector (factory use only).
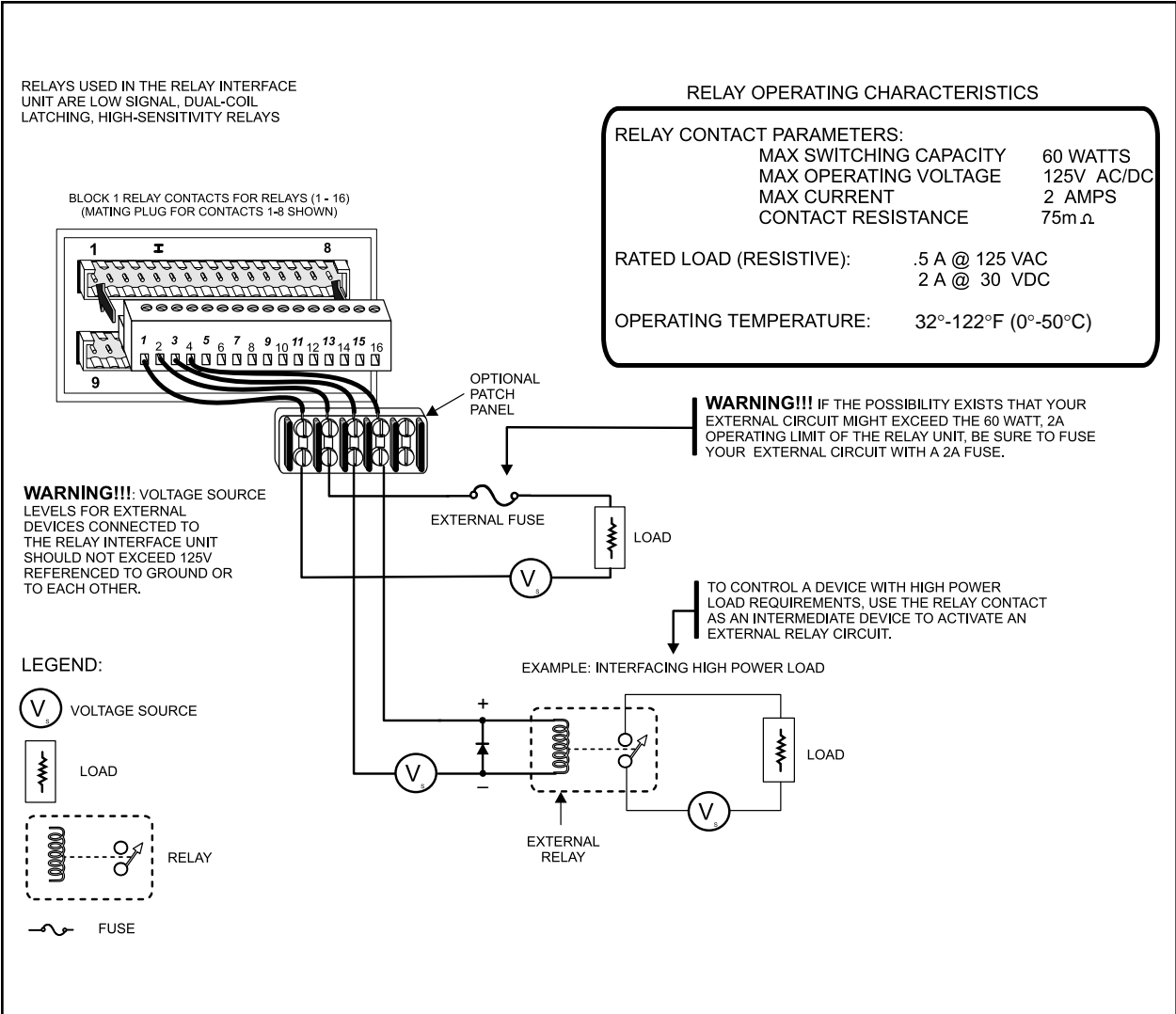
Figure 4. External Relay Wiring

3.2.3.2 RJ-45 Data Cables

Because both RJ-45 connectors have the same wiring pin-outs, they require the same "flipped" cable. In other words, the IN connector requires a "flipped" cable for connecting the first unit to the CC1, and the OUT connector requires a "flipped" cable for cascading other units. A "flipped" cable is as follows: Pin 1 of the cable at one end becomes pin 8 at the other end. Refer to Figure 6.

Note that the active pin-outs are associated with the outer four pins; namely, 1, 2, 7, and 8. All accessories on the System 9760 require that the "flipped" cable be used to attach peripheral equipment. This includes the REL unit.
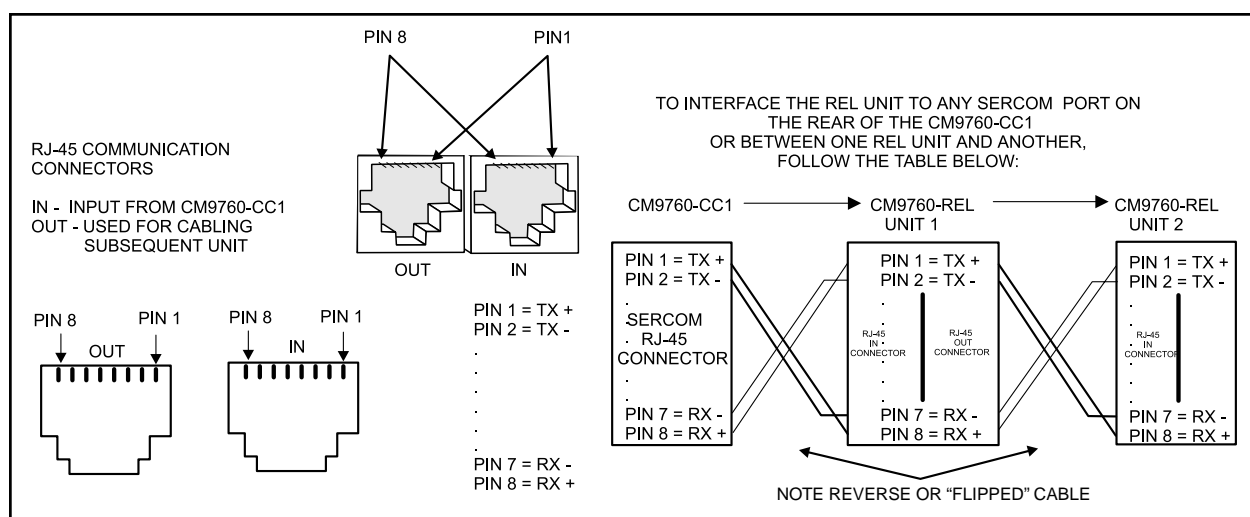
Figure 5. RJ-45 Pin-outs
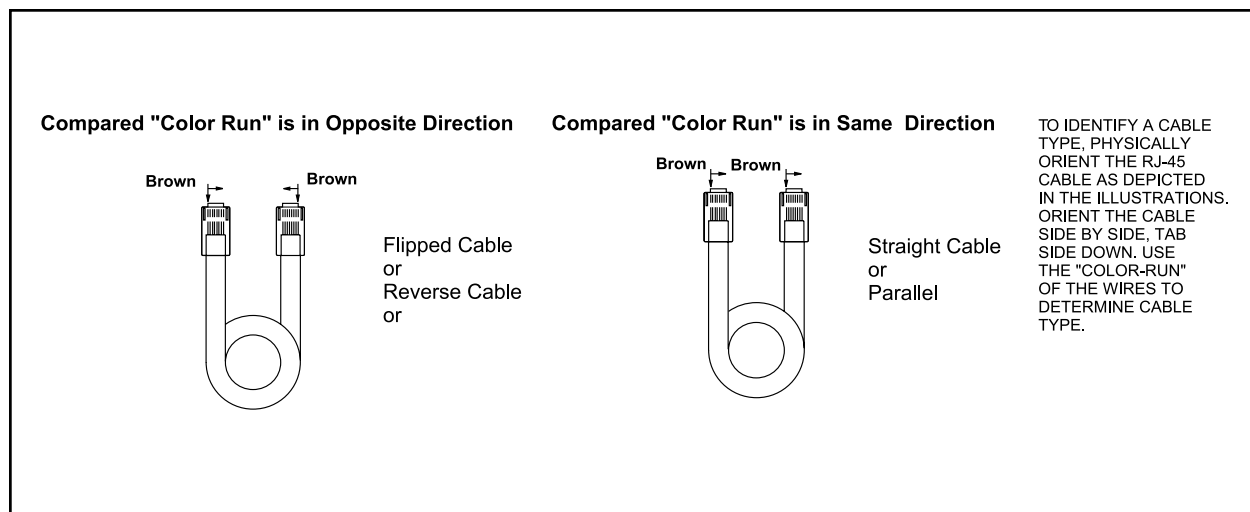
Figure 6. RJ-45 Cable Types

3.2.4 Power Connections

The CM9760-REL utilizes an auto-ranging internal transformer circuit that allows input power to range from 100-240 VAC, 50/60Hz. Associated with the input power is the power ON/OFF switch and the input power fuse. The fuse is easily changed as illustrated in Figure 7.
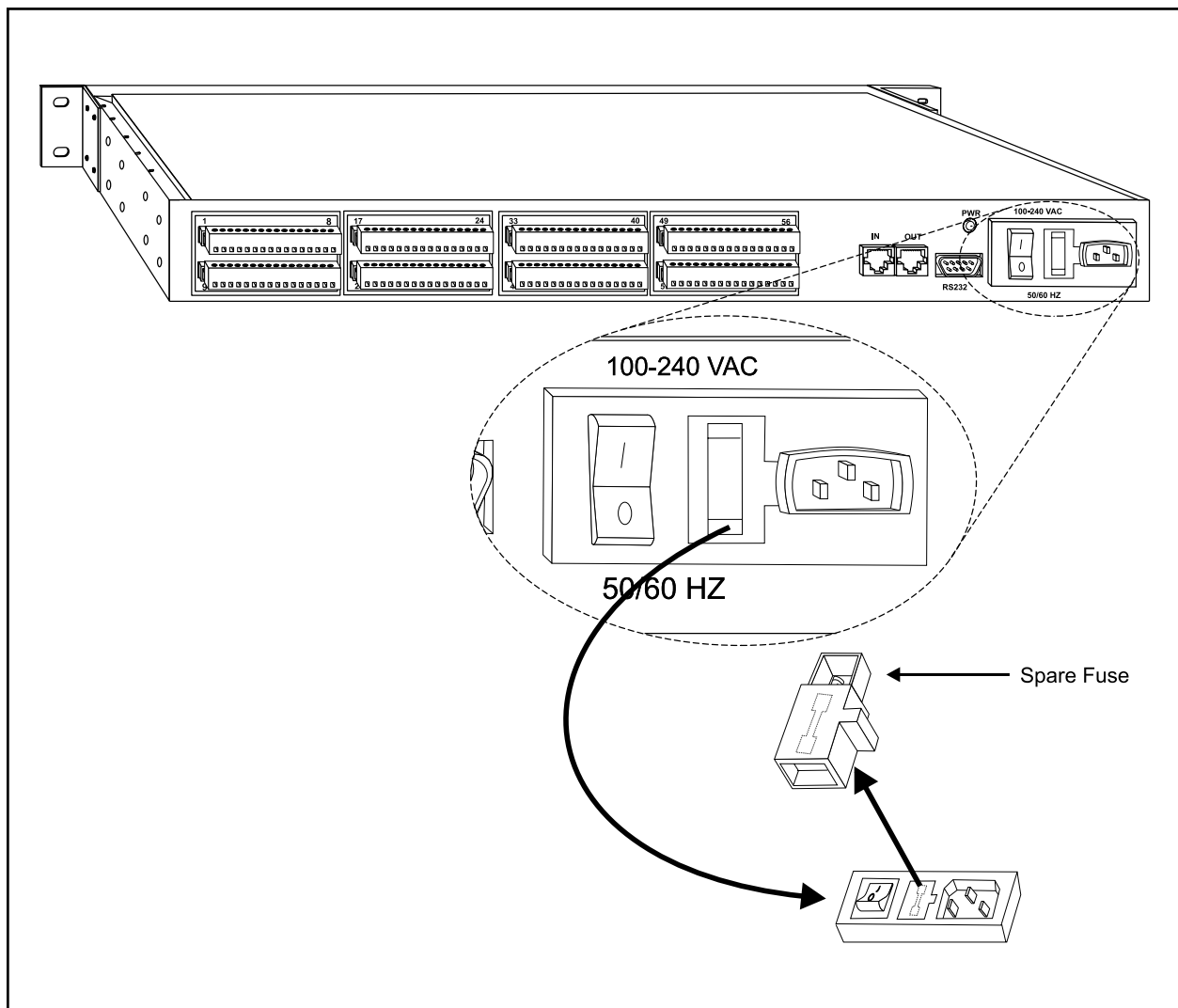
Figure 7. Power Input Fuse Replacement

3.3 SETUP

3.3.1 Preliminary Discussion

Unit reference:
One frame address
space spans 32 GPIs
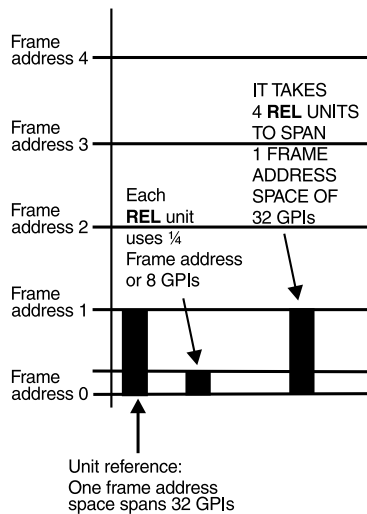
Figure 8. Relationship of Frame Address Space and the Relay Interface Unit

FRAME ADDRESSES

The IRC, VCRC, and the CM9760-REL Relay Interface Unit, all use software GPIs to activate control of external devices.

The number of GPIs required by each hardware device varies. The number of GPIs (General Purpose Interfaces) required by the REL is eight.

The address setting entered into the DIP switches, however, is based on what is called a frame address.

There is a direct numerical relationship between GPIs and frame addressing, which is as follows:

THE USE OF 32 GPIs SPANS ONE FRAME ADDRESS, REGARDLESS OF DEVICE TYPE USED (device types other than REL units also utilize GPI control).

Therefore a single REL, which uses eight GPIs, occupies only 1/4 of a frame address (refer to Figure 8).

This means that four relay units fit into one frame address space. To uniquely identify and address REL units within this frame address space, two additional address bits (sub-frame bits) are used (refer to Figure 10).

The frame address entered in the DIP switch for the REL (or any other device) serves as a STARTING point for the frame address space it needs. Once a starting frame address is entered, the REL can be thought of as allocating for itself the next eight GPIs or the equivalent 1/4 frame address space it needs to operate. The REL, of course, is unique in that when you have any grouping of REL units totaling four or less, they will all more than likely share the SAME FRAME ADDRESS, and differ only in their SUB-FRAME address bit settings.

ADDITIONAL REMARKS REGARDING FRAME ADDRESSES AND GPIs

One frame address is equivalent to the use of 32 GPIs. With a total of only 700 GPIs available, only 700/32 or 21.8 (rounded up to 22) frame addresses are needed. Frame addressing starts at "0", so frame addressing runs from 0 to 21, or 22 total. The layout of all 22 frame addresses and corresponding GPI ranges can be found in Table A.

THE RELAY INTERFACE MEMORY FUNCTION

SW3 DIP switch settings (SW3-3 through SW3-6) control what can be thought of as the contact "memory" function for the REL unit.

One would normally expect that when power is cycled (via a power failure or front panel reset) that the relay contacts would return to their default settings, which for the REL, would be determined by the normally open, normally closed (N/O, N/C) settings entered into DIP switch 2 (SW2-7 through SW2-10).

The additional DIP switch settings for the memory function allow you to override the default setting in the event power is cycled. With a switch setting of "1" (memory enabled), the contacts (in groups of 16) will retain the contact setting they had at the time power was cycled. For groups not enabled, the contacts will defer to their default values (per DIP switch 2 settings) if power is cycled (refer to Figure 10).

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*Figure 9 **does** illustrate that frame address settings:*
(1) Must be unique for each unit.
(2) Must follow the working rules listed.

When setting frame addresses on the front panel switches for a group of daisy-chained REL units, keep in mind a few working rules:

WORKING RULES

1. Start with frame address 0, which is associated with physical GPI 1, and work sequentially forward until all relay interface units are accounted for. Insure that frame address space is contiguous (see EXAMPLE ONE and TWO of Figure 9).

2. The physical order in which relay units are connected is irrelevant. In a cascaded situation, however, leftover REL combinations using less than one frame address space should be placed at the tail-end of allocated frame address space.

3. Do not overlap frame address spaces (see EXAMPLE FOUR in Figure 9).

4. Do not leave any open frame address spaces in the layout (see EXAMPLE THREE in Figure 9).

   For explanatory purposes, the setup in Figure 9 is used again in other parts of the manual to illustrate various aspects of REL configuration and setup.
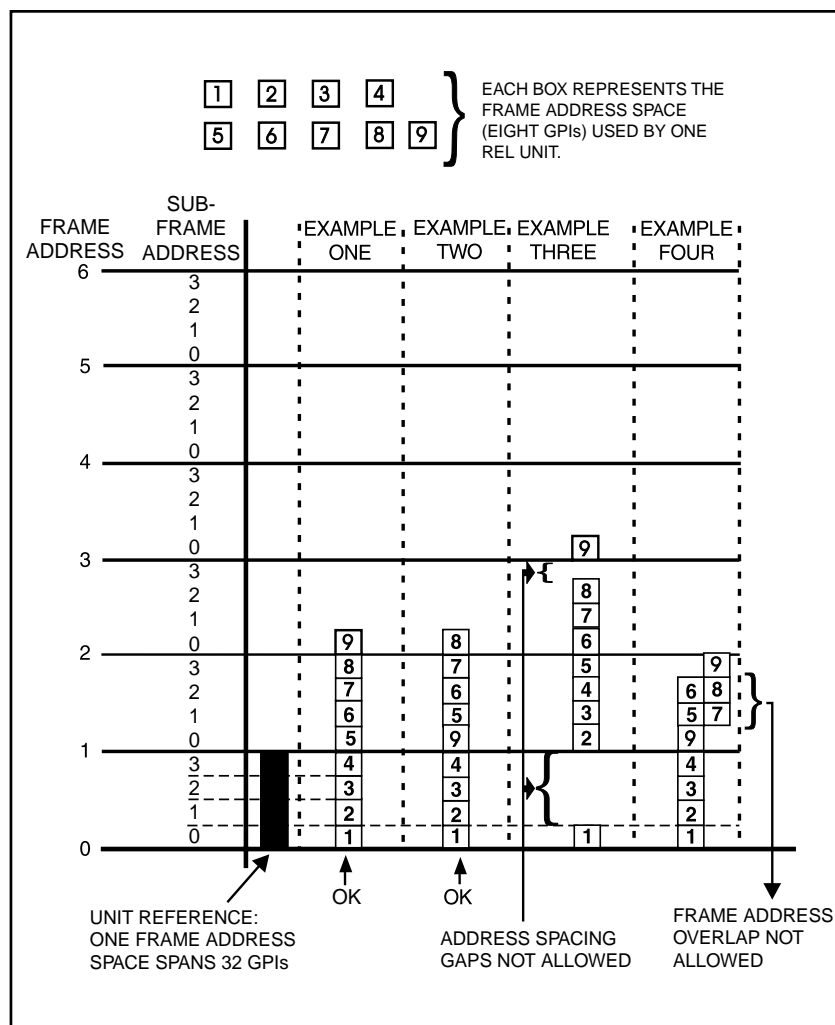
Figure 9. Relationship of Frame Address Space with Respect to Starting Address and the Relay Interface Units

3.3.2 DIP Switch Settings

DIP switch settings are illustrated and discussed in Figure 10.

SW3

NOT USED

CONTACT MEMORY SETTINGS (blocks of 16)
1=ENABLES MEMORY FUNCTION
0=RESETS TO DEFAULT
1-16 17-32 33-48 49-64

(REFER TO SECTION 3.3 FOR FURTHER DETAILS)

FRAME SUB-FRAME SETTINGS

SW2

NORMAL CONTACT SETTINGS (blocks of 16)
1-16 17-32 33-48 49-64
1=Normaly Closed
0=Normally Open

SW1

PARITY
EVEN 0
NONE 1

IN PORT 7
EIA
RS-232 1
RS-422 (DEFAULT) 0

POSITIONS 5, 6, 8, AND 10 ARE FACTORY USE ONLY AND MUST BE LEFT IN THE OFF POSITION (AS SHOWN)

OUT PORT 3 4
BAUD		
2400	0	0
4800	1	0
9600	0	1
19200	1	1

IN PORT 1 2
BAUD		
2400	0	0
4800	1	0
9600	0	1
19200	1	1

SUB-FRAME BITS	SUB-FRAME DECODE	FRAME ADDRESS BIT						COMBINED FRAME/ SUB-FRAME	ASSOCIATED GPI RANGE	REL UNIT AVAILABILITY (RUNNING TOTAL)
0 0	0	0	0	0	0	0	0	0_0	1 ·—→ 8	1
1 0	1	0	0	0	0	0	0	0_1	9 ·—→ 16	2
0 1	2	0	0	0	0	0	0	0_2	17 ·—→ 24	3
1 1	3	0	0	0	0	0	0	0_3	25 ·—→ 32	4
0 0	0	1	0	0	0	0	0	1_0	33 ·—→ 40	5
1 0	1	1	0	0	0	0	0	1_1	41 ·—→ 48	6
0 1	2	1	0	0	0	0	0	1_2	49 ·—→ 56	7
1 1	3	1	0	0	0	0	0	1_3	57 ·—→ 64	8

SWITCH POSTION LEGEND
■ ON="1"
▫ OFF="0"

SHOWN ABOVE ARE TWO CONSECUTIVE FRAME AND SUB-FRAME ADDRESS BLOCKS. A FULL LISTING CAN BE FOUND IN TABLE A STARTING ON THE NEXT PAGE.

Figure 10. DIP Switch Functions

Table A. Frame Address, GPI Range Association

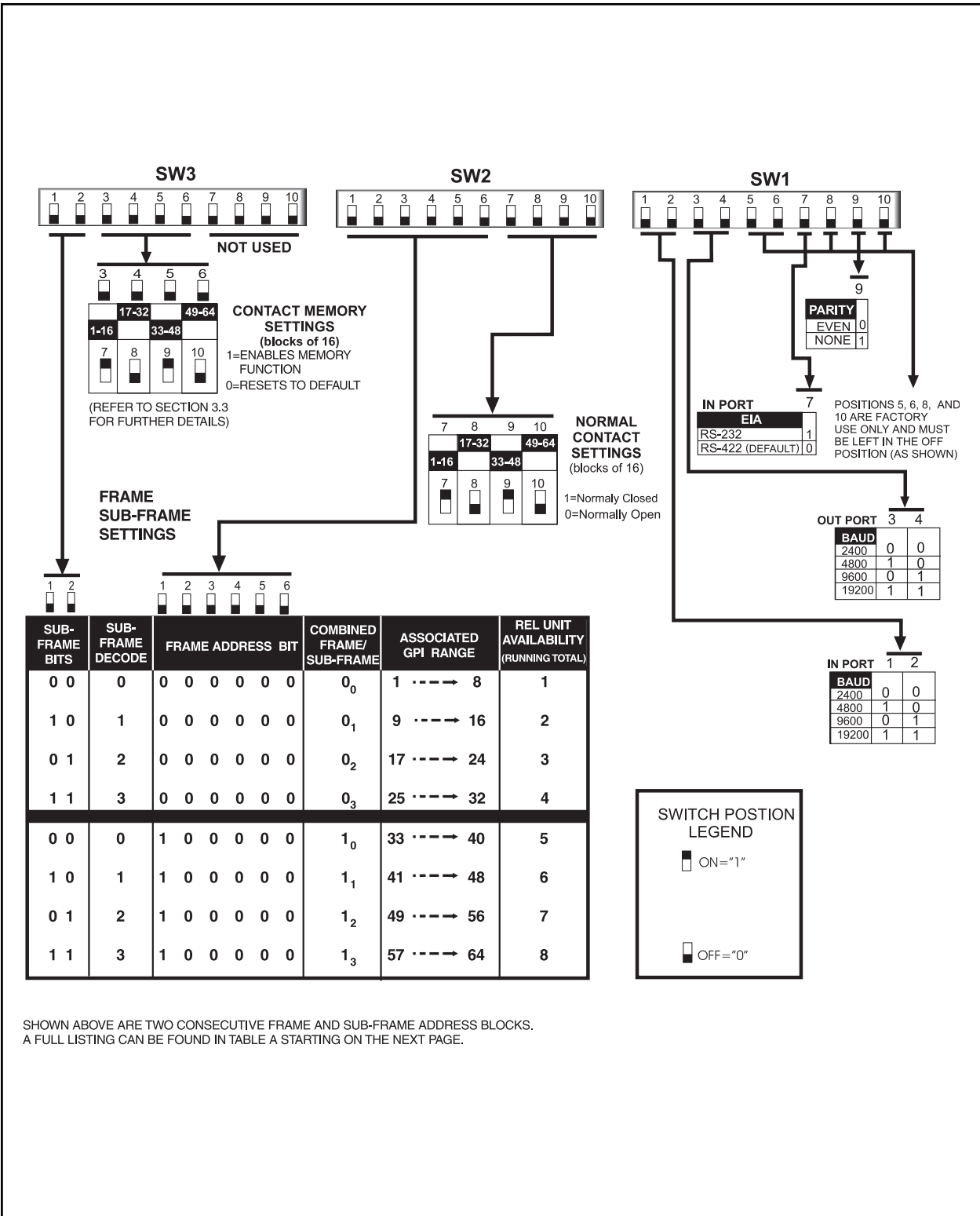| Daisy-Chained Relay Units Running Total	Frame Addresses SW2						Sub-Frame Addresses SW3		Combined Frame/Sub-Frame Addresses	Associated GPI Range Eight Required GPI #'s Associated with a Frame/Sub-Frame Address							
	1	2	3	4	5	6	1	2	FA/SFA	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0	0_0	1	2	3	4	5	6	7	8
2	0	0	0	0	0	0	1	0	0_1	9	10	11	12	13	14	15	16
3	0	0	0	0	0	0	0	1	0_2	17	18	19	20	21	22	23	24
4	0	0	0	0	0	0	1	1	0_3	25	26	27	28	29	30	31	32
5	1	0	0	0	0	0	0	0	1_0	33	34	35	36	37	38	39	40
6	1	0	0	0	0	0	1	0	1_1	41	42	43	44	45	46	47	48
7	1	0	0	0	0	0	0	1	1_2	49	50	51	52	53	54	55	56
8	1	0	0	0	0	0	1	1	1_3	57	58	59	60	61	62	63	64
9	0	1	0	0	0	0	0	0	2_0	65	66	67	68	69	70	71	72
10	0	1	0	0	0	0	1	0	2_1	73	74	75	76	77	78	79	80
11	0	1	0	0	0	0	0	1	2_2	81	82	83	84	85	86	87	88
12	0	1	0	0	0	0	1	1	2_3	89	90	91	92	93	94	95	96
13	1	1	0	0	0	0	0	0	3_0	97	98	99	100	101	102	103	104
14	1	1	0	0	0	0	1	0	3_1	105	106	107	108	109	110	111	112
15	1	1	0	0	0	0	0	1	3_2	113	114	115	116	117	118	119	120
16	1	1	0	0	0	0	1	1	3_3	121	122	123	124	125	126	127	128
17	0	0	1	0	0	0	0	0	4_0	129	130	131	132	133	134	135	136
18	0	0	1	0	0	0	1	0	4_1	137	138	139	140	141	142	143	144
19	0	0	1	0	0	0	0	1	4_2	145	146	147	148	149	150	151	152
20	0	0	1	0	0	0	1	1	4_3	153	154	155	156	157	158	159	160
21	1	0	1	0	0	0	0	0	5_0	161	162	163	164	165	166	167	168
22	1	0	1	0	0	0	1	0	5_1	169	170	171	172	173	174	175	176
23	1	0	1	0	0	0	0	1	5_2	177	178	179	180	181	182	183	184
24	1	0	1	0	0	0	1	1	5_3	185	186	187	188	189	190	191	192
25	0	1	1	0	0	0	0	0	6_0	193	194	195	196	197	198	199	200
26	0	1	1	0	0	0	1	0	6_1	201	202	203	204	205	206	207	208
27	0	1	1	0	0	0	0	1	6_2	209	210	211	212	213	214	215	216
28	0	1	1	0	0	0	1	1	6_3	217	218	219	220	221	222	223	224
29	1	1	1	0	0	0	0	0	7_0	225	226	227	228	229	230	231	232
30	1	1	1	0	0	0	1	0	7_1	233	234	235	236	237	238	239	240
31	1	1	1	0	0	0	0	1	7_2	241	242	243	244	245	246	247	248
32	1	1	1	0	0	0	1	1	7_3	249	250	251	252	253	254	255	256
33	0	0	0	1	0	0	0	0	8_0	257	258	259	260	261	262	263	264
34	0	0	0	1	0	0	1	0	8_1	265	266	267	268	269	270	271	272
35	0	0	0	1	0	0	0	1	8_2	273	274	275	276	277	278	279	280
36	0	0	0	1	0	0	1	1	8_3	281	282	283	284	285	286	287	288
37	1	0	0	1	0	0	0	0	9_0	289	290	291	292	293	294	295	296
38	1	0	0	1	0	0	1	0	9_1	297	298	299	300	301	302	303	304
39	1	0	0	1	0	0	0	1	9_2	305	306	307	308	309	310	311	312
40	1	0	0	1	0	0	1	1	9_3	313	314	315	316	317	318	319	320
41	0	1	0	1	0	0	0	0	10_0	321	322	323	324	325	326	327	328
42	0	1	0	1	0	0	1	0	10_1	329	330	331	332	333	334	335	336
43	0	1	0	1	0	0	0	1	10_2	337	338	339	340	341	342	343	344
44	0	1	0	1	0	0	1	1	10_3	345	346	347	348	349	350	351	352

(Continued on next page)

Daisy-Chained Relay Units Running Total	Frame Addresses SW2						Sub-Frame Addresses SW3		Combined Frame/Sub-Frame Addresses	Associated GPI Range Eight Required GPI #'s Associated with a Frame/Sub-Frame Address							
	1	2	3	4	5	6	1	2	FA/SFA	1	2	3	4	5	6	7	8
45	1	1	0	1	0	0	0	0	11_0	353	354	355	356	357	358	359	360
46	1	1	0	1	0	0	1	0	11_1	361	362	363	364	365	366	367	368
47	1	1	0	1	0	0	0	1	11_2	369	370	371	372	373	374	375	376
48	1	1	0	1	0	0	1	1	11_3	377	378	379	380	381	382	383	384
49	0	0	1	1	0	0	0	0	12_0	385	386	387	388	389	390	391	392
50	0	0	1	1	0	0	1	0	12_1	393	394	395	396	397	398	399	400
51	0	0	1	1	0	0	0	1	12_2	401	402	403	404	405	406	407	408
52	0	0	1	1	0	0	1	1	12_3	409	410	411	412	413	414	415	416
53	1	0	1	1	0	0	0	0	13_0	417	418	419	420	421	422	423	424
54	1	0	1	1	0	0	1	0	13_1	425	426	427	428	429	430	431	432
55	1	0	1	1	0	0	0	1	13_2	433	434	435	436	437	438	439	440
56	1	0	1	1	0	0	1	1	13_3	441	442	443	444	445	446	447	448
57	0	1	1	1	0	0	0	0	14_0	449	450	451	452	453	454	455	456
58	0	1	1	1	0	0	1	0	14_1	457	458	459	460	461	462	463	464
59	0	1	1	1	0	0	0	1	14_2	465	466	467	468	469	470	471	472
60	0	1	1	1	0	0	1	1	14_3	473	474	475	476	477	478	479	480
61	1	1	1	1	0	0	0	0	15_0	481	482	483	484	485	486	487	488
62	1	1	1	1	0	0	1	0	15_1	489	490	491	492	493	494	495	496
63	1	1	1	1	0	0	0	1	15_2	497	498	499	500	501	502	503	504
64	1	1	1	1	0	0	1	1	15_3	505	506	507	508	509	510	511	512
65	0	0	0	0	1	0	0	0	16_0	513	514	515	516	517	518	519	520
66	0	0	0	0	1	0	1	0	16_1	521	522	523	524	525	526	527	528
67	0	0	0	0	1	0	0	1	16_2	529	530	531	532	533	534	535	536
68	0	0	0	0	1	0	1	1	16_3	537	538	539	540	541	542	543	544
69	1	0	0	0	1	0	0	0	17_0	545	546	547	548	549	550	551	552
70	1	0	0	0	1	0	1	0	17_1	553	554	555	556	557	558	559	560
71	1	0	0	0	1	0	0	1	17_2	561	562	563	564	565	566	567	568
72	1	0	0	0	1	0	1	1	17_3	569	570	571	572	573	574	575	576
73	0	1	0	0	1	0	0	0	18_0	577	578	579	580	581	582	583	584
74	0	1	0	0	1	0	1	0	18_1	585	586	587	588	589	590	591	592
75	0	1	0	0	1	0	0	1	18_2	593	594	595	596	597	598	599	600
76	0	1	0	0	1	0	1	1	18_3	601	602	603	604	605	606	607	608
77	1	1	0	0	1	0	0	0	19_0	609	610	611	612	613	614	615	616
78	1	1	0	0	1	0	1	0	19_1	617	618	619	620	621	622	623	624
79	1	1	0	0	1	0	0	1	19_2	625	626	627	628	629	630	631	632
80	1	1	0	0	1	0	1	1	19_3	633	634	635	636	637	638	639	640
81	0	0	1	0	1	0	0	0	20_0	641	642	643	644	645	646	647	648
82	0	0	1	0	1	0	1	0	20_1	649	650	651	652	653	654	655	656
83	0	0	1	0	1	0	0	1	20_2	657	658	659	660	661	662	663	664
84	0	0	1	0	1	0	1	1	20_3	665	666	667	668	669	670	671	672
85	1	0	1	0	1	0	0	0	21_0	673	674	675	676	677	678	679	680
86	1	0	1	0	1	0	1	0	21_1	681	682	683	684	685	686	687	688
87	1	0	1	0	1	0	0	1	21_2	689	690	691	692	693	694	695	696
88	1	0	1	0	1	0	1	1	21_3	697	698	699	700	701	702	703	704

3.3.3 Software Considerations

NOTE: *When writing macros to control REL operation, keep in mind the following:*

The macro must reflect your actual equipment configuration; if you change the configuration, you must adjust the macro accordingly. For example, if a macro were written to control three RELs in a daisy-chain configuration and one of the RELs was subsequently removed, then any previously written macro that included these three RELs would have to be rewritten to reflect that change. Similarly, changing the frame address setting of any of the RELs is essentially the same as physically removing it from the configuration.

Access to the operation of specific devices connected to REL units using keyboards commands or macro operations depends on the GPI and the specific GPI ranges each REL unit is assigned. For this to be possible, the software GPI Define File must be configured using the MGR program. What follows is a brief introduction to the configuration of the GPI and COMM setup files that need to be programmed for successful REL operation. This introduction may not address other items that might be needed for your particular system operation. Consult your MGR manual and associated software for other specific or detailed information.

On a PC and monitor containing the 9760 MGR setup program, start the program and access the GPI File (GPI file). Refer to Figure 11.

Each GPI can control up to eight relays; we therefore need to configure eight GPIs to control the 64 relays on one REL unit.

1. Program the logical GPI numbers for all the physical GPI numbers that will be used. In most cases it is advisable to program the logical number to be equal to the existing physical GPI number.

2. For each associated GPI defined, configure individual relays as momentary or latching, depending on the application.

    R1 R2 R3   R8
    Latching ☑ ☐ ☑ . . .☑

    If the box is checked, it is latching; otherwise it is mometary (refer to Figure 11).

3. Define operator access, save the GPI file, return to the MGR main menu screen and press the tab to bring up the COMMS file (.SCP file). Refer to Figure 12.

4. In the COMMs file, assign an equipment number (PIN) of 17 to the port on the CC1 that will be used for communicating with the REL. Set the communication settings for 9600 baud and even parity. Save the COMMs file, back out of the MGR program and transfer all appropriate configuration files to disk and load these files onto the CC1 to which your REL configuration is attached. You should now be ready to operate your REL via direct control from the CM9760-KBD. For manual or automatic control of REL functions under macro control, consult the appropriate sections of the MGR manual.
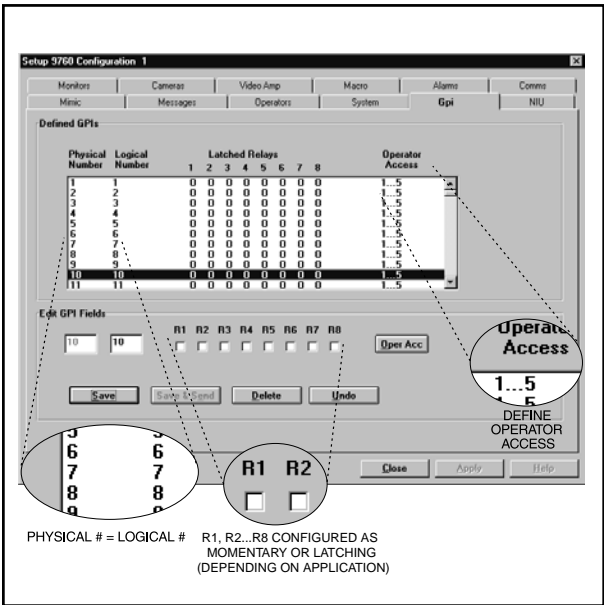

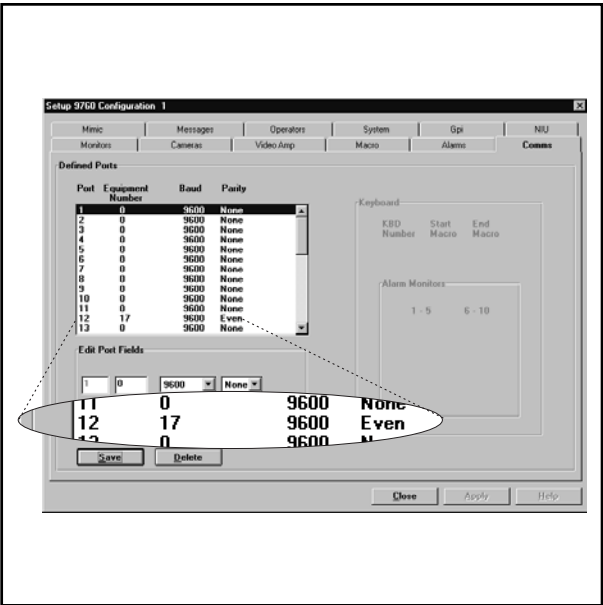**Figure 11.** Configuring the GPI Define File for REL Operation

Figure 12. Configuring the COMMS File for REL Operation

Physical installation of the REL unit is relatively simple, although various configurations are possible.

4.1 DIRECT RACK-MOUNT HOOK-UP

The REL unit mounts in a standard 19-inch rack and occupies only one RU (1.75" or 4.45 cm) of rack space (refer to Figure 13).

4.2 REMOTE OPERATION

The relay unit may be mounted to something other than a standard 19-inch rack by relocating the rack ears to another position. If it is desired to place the REL unit some distance from the controller (CM9760-CC1), the RS-422 communications from the relay unit to the controller should not exceed 4,000 feet (1,219 m).
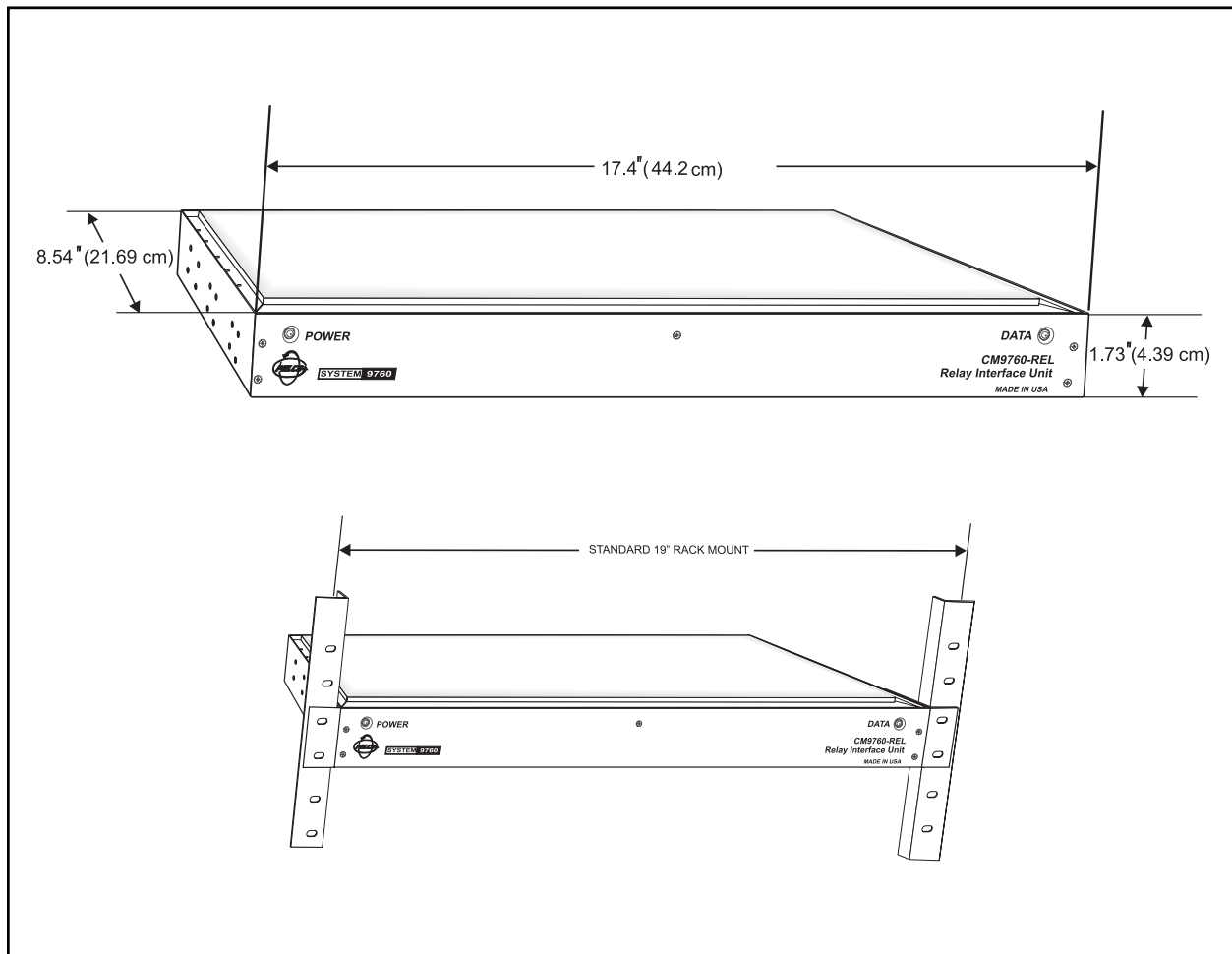
Figure 13. Unit Dimensions and Rack-Mount Installation

4.3 DAISY-CHAINING

Daisy-chaining occurs when more than 64 relays are required.

More importantly, each unit must be configured to have a unique address, referred to as a Frame Address. Frame addressing with respect to REL units was discussed in Section 3.3.1. What follows is a discussion about the physical hook-up of multiple REL units. System software supports up to 700 GPIs or 5,600 relays. Whether daisy-chaining two or multiple REL units, the first unit is connected from its "IN" connector to the CC1 and connected to the second unit through its "OUT" connector. Subsequent units are chained together in the same way.

NOTE: *Since VCRC units also utilize GPI addressing, they can be bussed together with REL units.*

Figure 14 illustrates the physical hook-up of two cascaded configurations, each containing nine REL units having the frame addresses illustrated in Figure 9.

Note that the physical order that any unit has in the configuration is independent of its frame/sub-frame address.

Also note that the remarks made in the previous section regarding RS-422 wiring run distances applies here when considering cables distance runs between daisy-chained units.
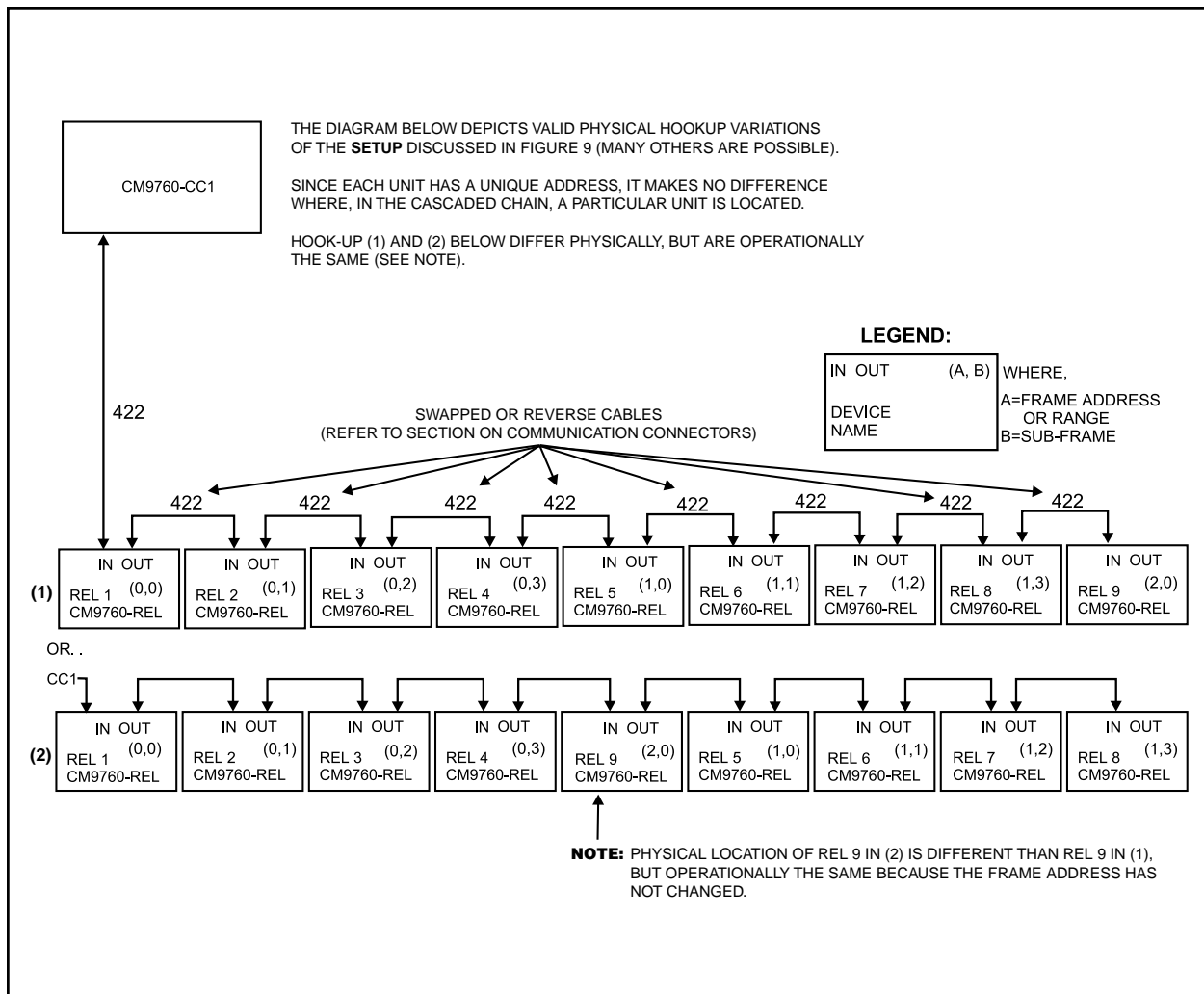

Figure 14. Relay Unit Daisy-Chain Configuration

5.1 OPERATIONAL OVERVIEW

The basic function of the REL unit is to allow the user/operator to control various peripheral equipment via relay contacts. Each REL unit processes and executes only commands with addresses that match that of the RELs (frame address). When an REL receives a command with an inappropriate address, it passes it on to the next unit (if applicable) via its OUT port.

When power is first applied to the unit, RAM is cleared and initialization routines are called. The power LED is lit, operational chips are configured, interrupt priorities are set and the Data LED starts flashing on and off at about 1/2 second intervals (refer to Section 3.1.2, LEDs). The unit is waiting for its first valid command.

5.2 OPERATING THE CM9760-REL FROM THE CM9760-KBD

Direct control operation of peripherals attached to RELs from a CM9760-KBD is relatively straightforward once you have determined which GPI to call and AUX to activate. In the next section, we discuss two methods for obtaining this information. Method 1 uses Figure 16 and Table A; Method II uses the CM9760-REL GPI/AUX CALCULATOR only (ignore VCRC references on the backside of the calculator).

5.2.1 Information Retrieval

OUR EXAMPLE: Assume you have five cascaded REL units and you wish to activate the peripheral device attached to relay 39 on REL unit 5.

What information do you need to know?
Where can you find the information?

First, you need to determine two things:

1. Which GPI to call of the 704 available.

2. Which AUX, associated with the GPI, to press.

Method I – Table A and Figure 15

Figure 15 is a physical representation of OUR EXAMPLE. We will also use it to recap the information needed to perform the steps illustrated in Figure 16.

First, the GPI range. Every REL unit is associated with a range of eight GPIs. In our sequential run of cascaded units, REL 5 has a GPI range of 33-40. (Had we instead been interested in REL unit 1, then the GPI range we would want would be 1-8).

The GPI range can be determined in a number of ways: (1) you may already have a list or (2) you can match the frame/sub-frame address on the physical REL unit with those listed in Table A and thus find the GPI range and (3), if you already know the frame/sub-frame address, you can use Table A alone.

Starting on the left in Figure 15, you can follow the line to the right of GPI 37 over to where it intersects with the AUX associated with relay grouping 33-40. GPI 37, therefore, is the specific GPI we need to accomplish our task. Of eight AUX associated with GPI 37, we can see that AUX 7 is the one we need. Follow the vertical line from AUX 7 up to where it intersects the associated relay numbers and you will find number 39.
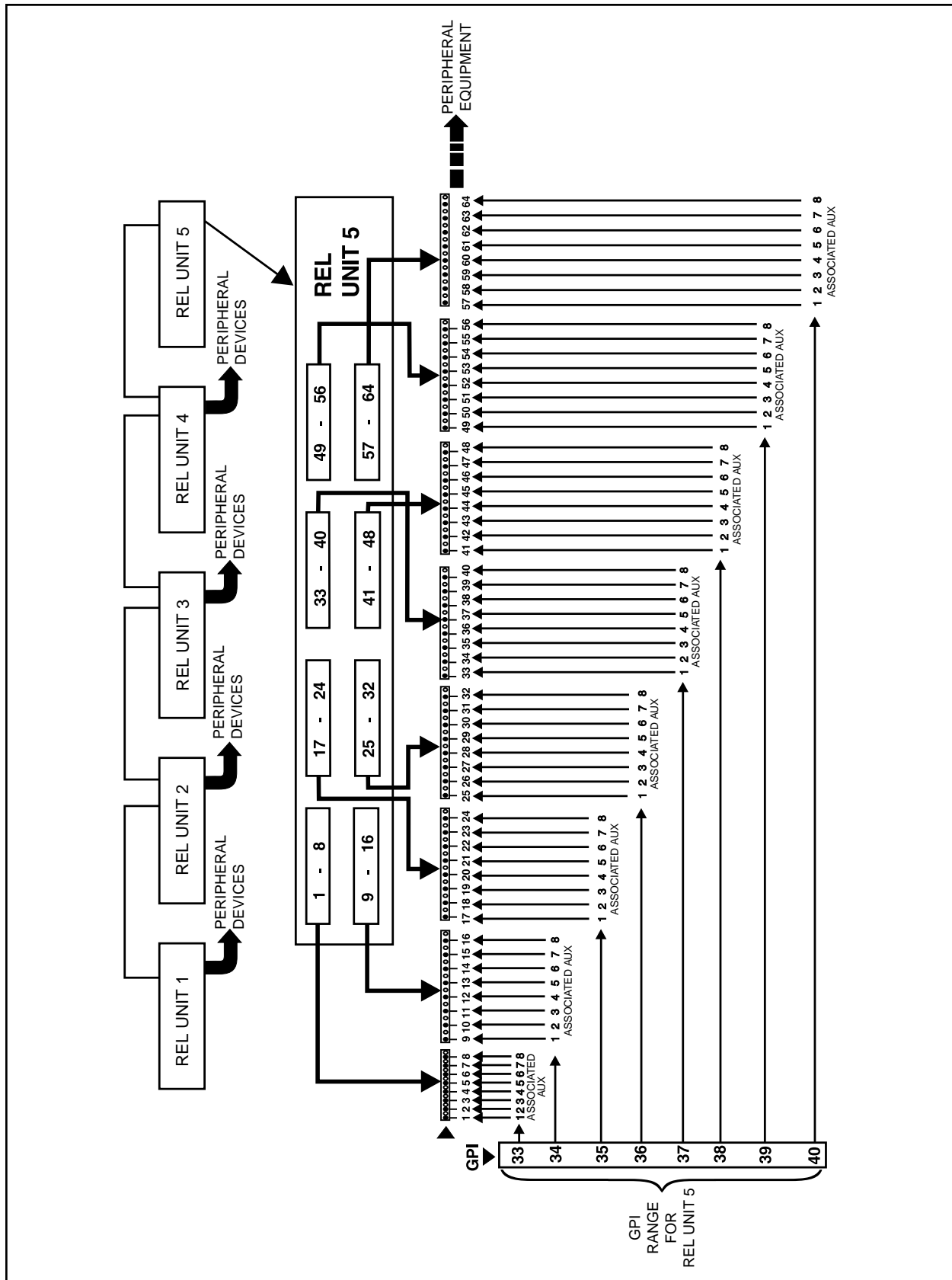
Figure 15. Physical Representation of Figure 16

Method II – The CM9760-GPI/AUX Calculator

If we revisit the EXAMPLE just discussed and illustrated in Figures 15, we can immediately find the information needed by direct read-off from the information boxes on the front of the calculator.

Move the calculator wheel until the number "five" appears in the Relay Unit # box. Go to the table to the right of that and locate relay 39 in the yellow highlighted box; travel to the left along that row and read off GPI 37 on the GPI Range slot. Next, read off the AUX needed by looking at the Associated Aux row and locate the Aux # directly above 39. You now have the information needed (call GPI 37, press AUX 7) to operate the desired relay from the 9760-KBD. Once the GPI and AUX information is at hand, control from the keyboard is easy. (Refer to Section 5.2.2, KEYBOARD OPERATION.)

<u>Other Operations Using the Calculator</u>
The CM9760-GPI/AUX Calculator comes in handy for operations other than obtaining the information needed for direct keyboard control operations.

Other uses might include the following:

1. As a reference for setting frame/sub-frame address switches when installing a group of cascaded REL units in a system installation. Just display each Relay Unit # in the order it is installed (1-5, say) and at each setting of the wheel, read off the frame/sub-frame Dip Switch readings and set the corresponding switches on the REL unit itself.

2. If you need to know the GPI range of a particular unit, move the wheel until the unit's DIP switch settings match those that appear in the calculator's frame/sub-frame address boxes. Directly read off the GPI range for the given REL unit.

3. Check on the validity of a GPI call.

4. Use the wheel while programming GPI and other related files to double-check the relationship of the GPIs being defined with respect to the relay actually being set up for use on which unit.

5. As an information source in troubleshooting situations.

5.2.2 Keyboard Operation

Using the specific GPI/AUX information obtained via Method I or Method II, it is possible to control the desired peripheral device from the CM9760-KBD.

Below are listed the steps needed to utilize this information for direct control operation from the 9760 keyboard.

Once the system is running and a keyboard is on-line, direct control of an REL is as follows (refer to Figure 16):

1. From the Default menu, use the keyboard keypad to enter the GPI number that contains the relay output you wish to activate (data obtained via Method I or Method II).

2. After entering the desired number, press the GPI button to bring up the GPI sub-menu.

3. The GPI sub-menu shows the first six of eight auxiliary function icons, corresponding to six relays associated with the selected GPI. Press the MORE button to see the remaining two.

4. Press the appropriate AUX function button directly below the desired Aux icon to activate the relay and associated peripheral device.

5. Repeat steps 1 through 4 to control additional devices.

NOTE: *Figure 16 uses the setup configuration of Figure 9 to illustrate the steps involved to activate relay 39 output on REL unit 5.*
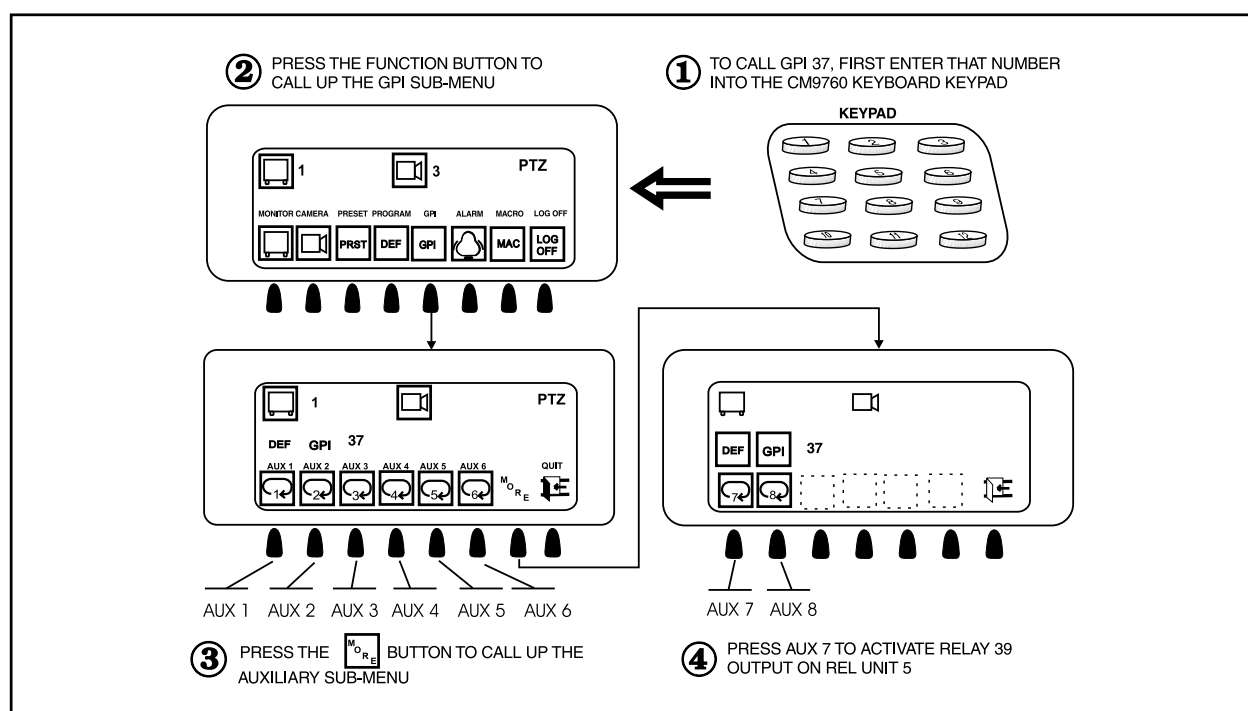

Figure 16. Controlling REL Output Contacts From the CM9760-KBD

ELECTRICAL

REL UNIT RELAY CONTACTS**

Parameters:	Maximum Switching Capacity	60 Watts
	Maximum Operating Voltage	125V AC/DC
	Maximum Current	2 Amps
	Contact Resistance	75 m ohms

Rated Load Parameters:	.5A @ 125 VAC
	2A @ 30 VDC

REL UNIT

Input Voltage:	Auto-ranging 100-240 VAC 50/60 Hz
Power:	Consumption: 30 vA, 5 watts

Data Ports
Input:	RS-422, RJ-45 connector
	DIP switch selectable baud-rate.
Output:	RS-422, RJ-45 connector.
	DIP switch selectable baud rate
Output:	RS-232, DB-9 connector
Indicators:	2 power LEDs, green
	1 data LED, red
Fusing:	500 mA, 250V

GENERAL

Dimensions:	17.4" W x 1.73" H x 8.54" D (44.2 cm x 4.39 cm x 21.69 cm)
Operating Temperature:	32°F to 122°F (0°C to 50°C)
Weight:	8 lb (3.63 kg)

MECHANICAL

Connectors
REL Input:	Four dual-header, 32 input connectors with mating plugs
Power:	3-wire, #18 AWG
RS422:	Two RJ-45 connectors
RS-232:	One DB-9 connector (factory use only)
Relay out:	One 3-pin header with mating plug

** For information regarding additional specified, known parameters, refer to specification sheets for relay type G6SK-2F-H from OMRON, if necessary.

(Design and product specifications subject to change without notice.)

7.0 WARRANTY AND RETURN INFORMATION

WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship for a period of one year after the date of shipment. Exceptions to this warranty are as noted below:

- Five years on Pelco manufactured cameras (CC3500/CC3600/CC3700 and MC3500/MC3600/MC3700 Series); two years on all other cameras.
- Three years on Genex® Series (multiplexers, server, and keyboard) and 090 Series Camclosure® Camera System.
- Two years on 100/150, 200 and 300 Series Camclosure® Camera Systems.
- Two years on cameras and all standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM6800E/CM8500/CM9500/CM9740/CM9760 Matrix, DF5 and DF8 Series Fixed Dome products.
- Two years on Spectra®, Esprit®, and PS20 Scanners, including when used in continuous motion applications.
- Two years on Esprit® and WW5700 series window wiper (excluding wiper blades).
- Eighteen months on DX Series digital video recorders.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico send the goods to:

Service Department
Pelco
3500 Pelco Way
Clovis, CA 93612-5699

If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico and are instructed to return goods to the USA, you may do one of the folllowing:

If the goods are to be sent by a COURIER SERVICE, send the goods to:

Pelco
3500 Pelco Way
Clovis, CA 93612-5699 USA

If the goods are to be sent by a FREIGHT FORWARDER, send the goods to:

Pelco c/o Expeditors
473 Eccles Avenue
South San Francisco, CA 94080 USA

Phone: 650-737-1700
Fax: 650-737-0933

REVISION HISTORY

Manual #	Date	Comments
C538M	12/98	Original version.
C538M-A	3/04	Revised Figures 2 and 10 to include RS-232 information. Revised *Specifications*. Updated *Warranty and Return Information*.