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Technical Practice

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LINE COMMANDER 6-CARD ENCLOSURE

Contents

1. General Description

1.1 PRACTICE In the event that this practice is reissued, the reason for the reissue will be given in this paragraph.

1.2 PRODUCT OVERVIEW The Line Commander 6-Card Enclosure is a prewired, wall-mounted enclosure intended expressly for installation of up to six Line Commander Modular System/Two or /Four circuit cards. The 6-Card Enclosure and circuit cards are compatible with the industry standard Type 10/Type 400 mounting arrangement.

1.3 PHYSICAL DESCRIPTION The enclosure consists of an aluminum outer case and an integral 6-position card shelf. A smoke-colored, Plexiglas front cover allows direct viewing of the circuit cards. The enclosure contains six 56-pin card edge connectors to mate with the circuit cards. Three 6-foot lengths of 25-pair cable are wire-wrapped to these card edge connectors. These cables terminate in one 25-pair plug and two 25-pair connectors. The enclosure wall mounts using three screws.

1.4 POWER REQUIREMENTS Power must be supplied to the enclosure. Each Line Commander Modular System/Two or /Four requires +24Vdc, filtered and regulated, 180mA maximum for operation.

1.5 FCC REGISTRATION NUMBER A completed Line Commander Installation has FCC Registration Number EPR5ZC-17935-OT-N. The ringer equivalence is 0.0B.

1.6 PART NUMBERS Please see the Specifications section for a listing of Line Commander items and part numbers.

2. Applications

2.1 PRIMARY APPLICATION The only application for the 6-Card Enclosure is to facilitate the installation of up to six Line Commander Modular System/Two or /Four circuit cards. The Line Commander is used to provide controlled access to standard 2-wire Central Office (CO) loop start telephone lines. The Line Commander Modular System utilizes plug in circuit cards to contain the main electronic circuitry.

3. Installation

3.1 WORDS OF CAUTION As with any product, installing the Line Commander 6-Card Enclosure requires a safety first approach.

Warning: Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch noninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

3.2 CHECKING FOR DAMAGE The 6-Card Enclosure, and all other Line Commander components should be inspected for damage immediately upon receipt. If damage is found, a claim should be filed with the shipper. Replacement components should be ordered if necessary.

3.3 POWER SOURCE A source of filtered and regulated +24Vdc, 180mA minimum is required for each Line Commander Modular System circuit card. It is best to provide enough power so that all six card slots can be used, even if the original installation will not use them all. A 1.2 amp power supply should be sufficient to power six cards. The power supply must contain internal fuses and/or electronic protectors to limit the maximum output current.

3.4 VALCOM POWER SUPPLY A +24Vdc power supply is available from Gordon Kapes, Inc. It is Gordon Kapes, Inc. Part Number 10302, and is made by Valcom, Inc., Valcom Part Number VP-4024B. This power supply contains two 2-amp fused outputs. Each of the outputs can, with current to spare, power one 6-Card Enclosure.

3.5 LOCATING THE ENCLOSURE The 6-Card Enclosure should be installed in a secure location that provides access to the telephone company provided RJ21X. The RJ21X will contain the CO telephone lines to be controlled by the Line Commander. Plug P1, which connects to the RJ21X, is linked to the enclosure via a 6-foot piece of 25-pair cable. Ensure that after the enclosure is mounted, this cable will reach the RJ21X jack.

3.6 MOUNTING The enclosure wall mounts using three screws. Included in the enclosure's shipping carton will be a paper mounting template. Use this template to simply locate and drill pilot holes for the mounting screws.

3.7 LINE COMMANDER CONNECTIONS All connections to the Line Commander are made via one 25-pair plug and two 25-pair connectors. Figures 1, 2, and 3 provide detailed connection information. Plug P1 is designed for direct connection with a telephone company-provided RJ21X jack. The RJ21X will provide the CO telephone lines to be controlled by the circuit cards. Connector C1 provides controlled tip and ring to the single line telephones, or other terminal equipment. C1 is configured so as to emulate an RJ21X. Connector C2 provides access to each circuit card's control panel, manual override, and power supply connections.

3.8 TELEPHONE LINES Plug P1 mates with the telephone company provided RJ21X jack. Ensure that the RJ21X implements the desired telephone line appearances. If Modular System/2 circuit cards are utilized, the RJ21X must have two unused pairs after every two pairs that connect to CO lines. The pairs must be "skipped" so as to correctly connect the CO lines to the circuit cards. Please Note: If the circuit cards are to be set for the reverse battery mode, it is very important that correct tip and ring polarity be maintained. In the on-hook state: ground should be on tip, nominal –48Vdc on ring.

3.9 LOCAL TERMINAL EQUIPMENT In most cases, the Line Commander will connect to 500/2500-type single line telephones. Connector C1 brings out the connections to the station telephones.

3.10 MANUAL OVERRIDE Connector C2 provides the connection points for the manual override functions (as well as for the control panels and power). The manual override functions can be implemented if desired. A normally open switch or contact should be connected to the MOR and MOR COM connections. When the contact closes (shorts), the Line Commander will be placed in the manual override mode. You can create a manual override group by bridging (connecting in parallel) the MOR and MOR COM connections of multiple circuit cards. There is no practical limit to the number of Line Commander Modular System circuit cards that can be part of your group. Ensure that all MOR connections are bridged together, and that all MOR COM are bridged together. Connecting the MOR connection of one circuit card to the MOR COM connection of another will cause one or more circuit cards to "lock" into the manual override mode. Keep MOR connecting to MOR, MOR COM to MOR COM and you'll be correct! Standard 24- or 26-gauge copper telephone cable is recommended to link the circuit cards to the location of the manual override switch or contact. Refer to the Specifications section of this practice for the maximum wire length allowed.

3.11 CONNECTING POWER Connector C2 provides the connection points for power (as well as for the control panel and manual override functions). Connect your source of +24Vdc and ground to the last two pairs of Connector C2. Use two pairs of wire to get more "copper" between the power supply and the enclosure. This helps reduce the voltage drop in the cabling.
Warning: DO NOT CONNECT –24VDC, –48VDC OR OTHER VOLTAGE! To prevent damage to the Line Commander circuitry, the +24Vdc power source must be turned off prior to inserting or removing a circuit card from the card edge connector in the mounting shelf.

3.12 CONNECTING TO THE CONTROL PANEL Connector C2 brings out the connections to the control panels (as well as the connections to the manual override functions and power). Four wires (2 pairs) are used to link each circuit card with its associated 2- or 4-channel control panel. Standard 2-pair or 4-conductor 24- or 26-gauge copper telephone cable is recommended. Refer to the Specifications section of this practice for the maximum wire length allowed. Be careful to connect the wires to the designated terminals.
Beware: *THE FOUR WIRES ARE POLARITY SENSITIVE.* If the wires are not hooked up in the correct sequence, the Line Commander will definitely not function—BE CAREFUL!

3.13 USING THE VALCOM VP-4024B POWER SUPPLY As previously mentioned, the Valcom VP-4024B power supply is available from Gordon Kapes, Inc. as Part Number 10302. Connecting its outputs to one or two of the 6-Card Enclosures is simple, yet the designations on the VP-4024B make it a bit confusing. The VP-4024B provides two 24Vdc outputs that are floating with respect to ground. Although the terminals are labeled "–24" and "GND", the outputs can be used in applications that required +24Vdc. Refer to Figure 4 for detailed connection information. The VP-4024B has two 24Vdc outputs, each of which can power one 6-Card Enclosure. For the first enclosure: one of the VP-4024B's "–24Vdc" connections should be connected to both of the first 6-Card Enclosure's "GND" connections. One of the VP-4024B's "GND" connections should be connected to both of the first 6-Card Enclosure's "+24Vdc" connections. If connection of a second 6-Card Enclosure is required, repeat this procedure using the other set of "–24Vdc" and "GND" terminals on the VP-4024B terminals. The VP-4024B's connection marked "LOCAL GND" will not be used. This screw terminal connects to the safety ground brought into the VP-4024B by the power cord; we will leave the power supply's 24Vdc outputs isolated from earth ground. If any of this is confusing please contact Gordon Kapes, Inc. technical support. At first, it was confusing for us too!

3.14 COMPLETING THE INSTALLATION Turn now to your Line Commander Modular System technical practice for more detailed installation information. That technical practice provides complete instructions for configuring, testing, and operating your system.

4. Specifications

Compatibility
Designed for exclusive use with up to six Line Commander Modular System/Two or /Four circuit cards.

Power Requirement
+24Vdc, filtered and regulated, 180mA maximum per circuit card

FCC Registration Number
For Completed Line Commander Installation:
EPR5ZC-17935-OT-N

Ringer Equivalence
0.0B

Environment
0 to 50 degrees C, humidity to 95% (no condensation)

Reliability
Refer to Line Commander Modular System Technical Practice

Interconnections
One 25-pair plug and two 25-pair connectors, each mounted on the end of a 6-foot 26-gauge solid copper telephone cable. (Six feet measured from exit point of the enclosure to the plug or connector body.)

Interconnection Functions
25-pair plug P1 connects to telephone company RJ21X.
25-pair connector C1 connects to single line telephones or other terminal equipment. C1 emulates an RJ21X.
25-pair connector C2 connects to control panels, manual override functions, and power.
Maximum Cable Lengths
Based on 25.67 ohms/1000' for 24-gauge
40.81 ohms/1000' for 26-gauge
Solid copper telephone type cable at 68 degrees F

Circuit Card to Control Panel
3000' of 24-gauge
1800' of 26-gauge
(Calculations based upon circuit card to control panel maximum resistance of 75 ohms per conductor)

Circuit Card to Manual Override Switch or Contact
Bridged connection of 25 manual override functions: 4600' of 24-gauge, 2900' of 26-gauge.
Bridged connection of 50 manual override functions: 2300' of 24-gauge, 1450' of 26-gauge.
(Based on circuit card to manual override switch maximum resistance of 3k ohms per conductor for a single circuit card)

Dimensions
8.5 inches high (21.6cm)
12.6 inches wide (32.0cm)
10.0 inches deep (25.4cm)
Compatible with industry-standard Type 10/Type 400 plug in circuit cards.

Weight
10.5 pounds (4.8kg)

Mounting
Wall mounts with two #14 and one #8 pan head screws.

Line Commander Part Numbers
6-card Enclosure: 20367
Modular System/2 Circuit Card: 20356
Modular System/4 Circuit Card: 20357
2-channel Control Panel: 20362
4-channel Control Panel: 20364
Control Panel Enclosure: 20358
4 Amp, +24Vdc Power Supply: 10302

5. Incorrect Operation

5.1 DIFFICULTIES Should problems arise in the operation of the Line Commander, review Section 3–Installation. Ensure that all connections have been made properly.

5.2 POWER SUPPLY POLARITY Most telephone equipment is powered by –24Vdc or –48Vdc. The Line Commander is a little different—it needs +24Vdc. Use a voltmeter to check the polarity of the power supply connections on the last two pairs of connector C2. Connecting power with the wrong polarity will not hurt the circuit cards or control panels; they are protected and simply will not operate. Installation with this power supply can be confusing; call Gordon Kapes, Inc. technical support for help.

5.3 LEDS The LEDs on the circuit card and the control panel are useful tools when troubleshooting the Line Commander. Use them to give you a system status check before proceeding to shoot trouble.

5.4 LINE COMMANDER ERROR INDICATIONS A Line Commander wiring error can result in all control panel ON and OFF LEDs being steadily lit. This is designed to alert the user of a problem. Service personnel should be informed if this condition occurs.

Note: All LEDs may briefly light when power is applied to the Line Commander circuitry. Only when all lights stay steadily lit is a problem likely. In this error mode, normal operation is not possible.

5.5 APPLICATION LIMITATIONS The Line Commander was designed to operate correctly with most types of telephone lines that utilize loop current. However, Gordon Kapes, Inc. does not guarantee that the Line Commander is compatible with all of these types of lines, or specific lines within the types. The functions of the installed Line Commander should be thoroughly tested before being placed into service.

6. Repair and Replacement

6.1 NOT SO FAST Statistically, most equipment returned to Gordon Kapes, Inc. for repair actually has nothing wrong with it. A telephone call to Gordon Kapes, Inc. technical support can often help to get the equipment operating correctly. We don't mind spending time with our customers getting a site up and running.

6.2 SEND IT BACK If you determine that one or more Line Commander components are defective, return for repair or replacement according to the Gordon Kapes, Inc. Warranty/ Repair and Return policy.

6.3 ONLY WE FIX IT In the event repairs are ever needed, they should only be performed by Gordon Kapes, Inc. or an authorized representative. For further information, contact Gordon Kapes, Inc.

7. Maintenance

7.1 ROUTINE MAINTENANCE The Line Commander 6-Card Enclosure requires no routine maintenance.

8. FCC Requirements

8.1 TYPE OF SERVICE Your Line Commander system is designed to be used on standard device telephone lines. The Line Commander connects to telephone lines by means of a standard jack called the USOC RJ21X. Connection to telephone company-provided coin service (central office implemented systems) is prohibited. Connection to party line service is subject to state tariffs. Hey dude, let's party!

8.2 TELEPHONE COMPANY PROCEDURES The goal of the telephone company is to provide you with the best service it can, within the constraints of receiving a good return on shareholder equity. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. If these changes might effect your service or the operation of your equipment, the telephone company will give you notice, in writing, possibly in advance,

to allow you to make any changes necessary to maintain uninterrupted service.

If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request. In certain circumstances, it may be necessary for the telephone company to request information from you concerning the equipment which you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the ringer equivalence number (REN) of the equipment which is connected to your line; both of these items are listed on the equipment label. The sum of all of the RENs on your telephone line should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be usable on a given line.

8.3 IF PROBLEMS ARISE If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given an opportunity to correct the problem and be informed of your right to file a complaint with the FCC. You have the right to remain silent, if you waive your right to remain silent...

Specifications and information contained in this technical practice subject to change without notice.

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Figure 1 Line Commander 6-Card Enclosure Plug P1: Connections to Telco RJ21X

Plug Pin	Cable Color	Description				Internally Wired to Pin Number
26	WH-BL	T	CO Trunk	1	Card 1	1-55
1	BL-WH	R				1-53
27	WH-OR	T		2		1-43
2	OR-WH	R				1-41
28	WH-GN	T		3		1-29
3	GN-WH	R				1-27
29	WH-BR	T		4		1-15
4	BR-WH	R				1-13
30	WH-SL	T	CO Trunk	1	Card 2	2-55
5	SL-WH	R				2-53
31	RD-BL	T		2		2-43
6	BL-RD	R				2-41
32	RD-OR	T		3		2-29
7	OR-RD	R				2-27
33	RD-GN	T		4		2-15
8	GN-RD	R				2-13
34	RD-BR	T	CO Trunk	1	Card 3	3-55
9	BR-RD	R				3-53
35	RD-SL	T		2		3-43
10	SL-RD	R				3-41
36	BK-BL	T		3		3-29
11	BL-BK	R				3-27
37	BK-OR	T		4		3-15
12	OR-BK	R				3-13
38	BK-GN	T	CO Trunk	1	Card 4	4-55
13	GN-BK	R				4-53
39	BK-BR	T		2		4-43
14	BR-BK	R				4-41
40	BK-SL	T		3		4-29
15	SL-BK	R				4-27
41	YL-BL	T		4		4-15
16	BL-YL	R				4-13
42	YL-OR	T	CO Trunk	1	Card 5	5-55
17	OR-YL	R				5-53
43	YL-GN	T		2		5-43
18	GN-YL	R				5-41
44	YL-BR	T		3		5-29
19	BR-YL	R				5-27
45	YL-SL	T		4		5-15
20	SL-YL	R				5-13
46	VI-BL	T	CO Trunk	1	Card 6	6-55
21	BL-VI	R				6-53
47	VI-OR	T		2		6-43
22	OR-VI	R				6-41
48	VI-GN	T		3		6-29
23	GN-VI	R				6-27
49	VI-BR	T		4		6-15
24	BR-VI	R				6-13
50	VI-SL	NC				
25	SL-VI	NC				

Figure 2 Line Commander 6-Card Enclosure Connector C1: Connections to Station Telephones

Plug Pin	Cable Color	Description				Internally Wired to PinNumber
26	WH-BL	T	Telephone	1	Card 1	1-51
1	BL-WH	R				1-49
27	WH-OR	T		2		1-39
2	OR-WH	R				1-37
28	WH-GN	T		3		1-25
3	GN-WH	R				1-23
29	WH-BR	T		4		1-11
4	BR-WH	R				1- 9
30	WH-SL	T	Telephone	1	Card 2	2-51
5	SL-WH	R				2-49
31	RD-BL	T		2		2-39
6	BL-RD	R				2-37
32	RD-OR	T		3		2-25
7	OR-RD	R				2-23
33	RD-GN	T		4		2-11
8	GN-RD	R				2- 9
34	RD-BR	T	Telephone	1	Card 3	3-51
9	BR-RD	R				3-49
35	RD-SL	T		2		3-39
10	SL-RD	R				3-37
36	BK-BL	T		3		3-25
11	BL-BK	R				3-23
37	BK-OR	T		4		3-11
12	OR-BK	R				3- 9
38	BK-GN	T	Telephone	1	Card 4	4-51
13	GN-BK	R				4-49
39	BK-BR	T		2		4-39
14	BR-BK	R				4-37
40	BK-SL	T		3		4-25
15	SL-BK	R				4-23
41	YL-BL	T		4		4-11
16	BL-YL	R				4- 9
42	YL-OR	T	Telephone	1	Card 5	5-51
17	OR-YL	R				5-49
43	YL-GN	T		2		5-39
18	GN-YL	R				5-37
44	YL-BR	T		3		5-25
19	BR-YL	R				5-23
45	YL-SL	T		4		5-11
20	SL-YL	R				5- 9
46	VI-BL	T	Telephone	1	Card 6	6-51
21	BL-VI	R				6-49
47	VI-OR	T		2		6-39
22	OR-VI	R				6-37
48	VI-GN	T		3		6-25
23	GN-VI	R				6-23
49	VI-BR	T		4		6-11
24	BR-VI	R				6- 9
50	VI-SL	NC				
25	SL-VI	NC				

Figure 3 Line Commander 6-Card Enclosure
Connector C2: Connections to Control Panels, Manual Override, and Power Supply

Plug Pin	Cable Color	Description			Internally Wired to Pin Number
26	WH-BL	Control Panel Terminal	1	Card 1	1- 1
1	BL-WH		2		1- 3
27	WH-OR		3		1- 5
2	OR-WH		4		1- 7
28	WH-GN	Control Panel Terminal	1	Card 2	2- 1
3	GN-WH		2		2- 3
29	WH-BR		3		2- 5
4	BR-WH		4		2- 7
30	WH-SL	Control Panel Terminal	1	Card 3	3- 1
5	SL-WH		2		3- 3
31	RD-BL		3		3- 5
6	BL-RD		4		3- 7
32	RD-OR	Control Panel Terminal	1	Card 4	4- 1
7	OR-RD		2		4- 3
33	RD-GN		3		4- 5
8	GN-RD		4		4- 7
34	RD-BR	Control Panel Terminal	1	Card 5	5- 1
9	BR-RD		2		5- 3
35	RD-SL		3		5- 5
10	SL-RD		4		5- 7
36	BK-BL	Control Panel Terminal	1	Card 6	6- 1
11	BL-BK		2		6- 3
37	BK-OR		3		6- 5
12	OR-BK		4		6- 7
38	BK-GN	MOR COM		Card 1	1-19
13	GN-BK	MOR			1-21
39	BK-BR	MOR COM		Card 2	2-19
14	BR-BK	MOR			2-21
40	BK-SL	MOR COM		Card 3	3-19
15	SL-BK	MOR			3-21
41	YL-BL	MOR COM		Card 4	4-19
16	BL-YL	MOR			4-21
42	YL-OR	MOR COM		Card 5	5-19
17	OR-YL	MOR			5-21
43	YL-GN	MOR COM		Card 6	6-19
18	GN-YL	MOR			6-21
44	YL-BR	NC			
19	BR-YL	NC			
45	YL-SL	NC			
20	SL-YL	NC			
46	VI-BL	NC			
21	BL-VI	NC			
47	VI-OR	NC			
22	OR-VI	NC			
48	VI-GN	NC			
23	GN-VI	NC			
49	VI-BR	+24Vdc			To all pin 17s
24	BR-VI	GND			To all pin 35s
50	VI-SL	+24Vdc			To all pin 17s
25	SL-VI	GND			To all pin 35s

Figure 4 Connecting Valcom VP-4024B Power Supply to One or Two 6-Card Enclosures