



## INSTRUCTIONS

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### **DLP1512JDH0204**

#### **Digital Transmission Line Relaying System with Single Phase Tripping**

#### **Introduction**

These instructions, GEK-106160 together with GEK-105549, constitute the complete instructions for the DLP1512JDH0204.

#### **DESCRIPTION**

This relay is similar to the standard DLP relay described in GEK-105549, EXCEPT for the following changes:

1. The ASCII function has been removed.
2. A PRINTER function has been added.

These two modifications result in textual **SUBSTITUTIONS**, **INSERTS**, and **DELETIONS** in the GEK-105549 Instruction Book. The reader should use this document (GEK-106160) to locate and implement specified changes in GEK-105549. Attached (final page of this document) is a **Document Coordination Guide** that helps the reader link these two documents together.

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### **SUBSTITUTIONS**

Substitutions are listed in the order that they appear in the GEK-105549 text. Chapter titles, section titles, and page numbers are given as a quick reference. Chapter, section, and sub-section titles appear in bold-face. Locate the affected sections and note the changes in the GEK-105549 book. Specific text to be altered is set off within the >> << symbols.

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#### **CHAPTER 3 - HARDWARE DESCRIPTION**

##### **3.1 Case Assembly**

- Delete >>ASCII<< and replace it with >>PRINTER<< in the following figures:

1. Figure 3-1 (page 3-2)
2. Figure 3-2 (page 3-3)
3. Figure 3-4 (page 3-7)
4. Figure 3-5 (page 3-8)

### 3.2 Electrical Connections and Internal Wiring

- Delete >>(ASCII)<< and replace with >>PRINTER<< (page 3-5).

## CHAPTER 8 - INTERFACE

### 8-1 Local Man-Machine (MMI) Interface Operation

- In Figure 8-1 a PRINT (PRT) key replaces the DASH (-) key (*see p. 16* of this document).
- Delete the DASH (-) Key section and replace it with the PRT (Print) Key section (*see INSERTS - p. 3 and DELETIONS - p. 12* of this document).
- Delete section 8-2 ASCII Interface and replaced with Section 8-2 Printer Interface (*see INSERTS - pp. 9-10 and DELETIONS - p. 12* of this document).

## INSERTS

Inserts are listed in the order they appear in the GEK-105549 text. Chapter titles, section titles, and page numbers are given as a quick reference, and the positions of the inserts are specified. Chapter, section, and sub-section titles appear in bold face. The text to be inserted is given directly below each respective section title and is set off by the >> << symbols. Locate the affected sections and note appropriate changes in the GEK-105549 book.

## CHAPTER 1 - PRODUCT DESCRIPTION

### 1-4 Other Features

#### Local Printer (\*NEW SUB-SECTION)

- Insert the following text between sections **Local Man-Machine Interface (MMI)** and **Oscillography** (page 1-15).
  - >> **Local Printer**  
 A local printer can be connected to the serial port PL-2 on the rear of the DLP1 case. When a local printer is connected, all events (*see Sequence of Events* below) are

automatically printed at the time of occurrence. In addition, other information stored in the DLP1 memory can be printed when requested via the local MMI, as described in *Chapter 8 – Interface*. <<

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## CHAPTER 4 - ACCEPTACE TESTS

### 4-2 General Relay Tests

#### Display and Keypad Tests (page 4-7)

- Insert step (9a) between steps 9 and 10.

>> 9a. The display prompt next is  
PRINTER TST?

If there is no printer connected, then press the 3/N followed by the ENT key. If there is a printer, press the 1/Y followed by the ENT key. The printout contains 40 characters that include the alphabet, the numbers 0 through 9, and the : = / . characters. Forty lines are printed.<<

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## CHAPTER 5 - PERIODIC TESTS

### 5-2 General Relay Tests

#### T2 - MMI Display Test (page 5-3)

- Insert an LED reference in the first sentence. The first sentence now reads

The MMI test is built into the software and tests the keypad, the display, >>and the LED.<<

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## CHAPTER 8 - INTERFACE

### 8-1 Local Man-Machine (MMI) Interface Operation

#### CLR (Clear) Key (page 8-2)

- Insert the following paragraph between the 2<sup>nd</sup> and 3<sup>rd</sup> paragraphs.

>> If the CLR key is pressed after the PRT key (with no other intervening key presses), printing is terminated. A printout can thus be halted at any time. <<

#### PRT (Print) Key (\*NEW SUB-SECTION)

- Insert the following text to replace the **Dash (-) Key** section (page 8-2) - (*see DELETIONS - p. 12* of this document).

**>> PRT (Print) Key**

The PRT key directs information to the printer instead of to the display. When information is sent to the display, only one item at a time is displayed. When information is sent to the printer, all items within a category (or, in the case of settings, all settings) are printed. When the PRT key is pressed, the characters PRT appear on the display.

While the DLP1 is printing, any other MMI commands may be entered, except for another print command. Pressing PRT again causes an error message to be displayed. Printing must be completed before another PRT command may be issued. To stop printing, once started, press the CLR key. <<

**SET (Settings) Key (pages 8-4 to 8-6)**

- Insert a reference to PRT (left-hand column, 2<sup>nd</sup> paragraph, page 8-4). This paragraph now reads

The key sequence for selecting a settings group is  
 SET {n} {ENT >>or PRT<<}  
 where n is the optional setting group number.

- Insert the following text between the 3<sup>rd</sup> and 4<sup>th</sup> paragraphs (left-hand column, page 8-5):

>> Pressing the PRT key displays PRT in the rightmost positions. All setting are printed, regardless of whether a setting number was entered. The printout is arranged by categories. <<

- Insert a reference to PRT (2<sup>nd</sup> paragraph, right-hand column, page 8-5). This paragraph now reads

Pressing any command key or the >>PRT,<< ↑, ↓, or CLR key instead of the ENT key retains the old value and the newly entered value is lost.

- Insert printer display information (attach to the end of the 4<sup>th</sup> paragraph, right-hand column, page 8-5). The complete paragraph now reads

The first time a setting is successfully changed, remote communication is inhibited from reading and changing settings in the DLP1. >>Also, the setting is reported on the printer as follows:

DATE/TIME  
 LOCAL - SETTINGS CHANGE STARTED.<<

**Disable Outputs (page 8-7)**

- Insert a printer display description onto the end of the “YES response” description. This text now reads

- A YES response displays the message

**OUTPUTS DISABLED**

the action is performed, the MMI LED turns red, >>and the printer reports the following:

TIME/DATE  
LOCAL - DISABLE OUTPUTS<<

**Enable Outputs (pages 8-7 to 8-8)**

- Insert a printer display description onto the end of the “YES response” description. The text now reads as follows:
  - A YES response displays the message  
**OUTPUTS ENABLED**  
 the action is performed, the MMI LED turns green, >>and the printer reports the following:  
 TIME/DATE  
 LOCAL - ENABLE OUTPUTS<<

**Trip (page 8-8)**

- Insert printer displays into the “YES response” text in step 3 of this section. This text now reads
  - A YES response causes the DLP1 to send a trip command to the selected breaker. When the 52/b contact reports that the breaker is open, then the message  
**BKR x TRIPPED**  
 appears on the display, >>and the printer reports the following:  
 TIME/DATE  
 LOCAL - MANUAL TRIP<<  
 If the 52/b contact reports that the breaker is not open, then the message  
**NOT TRIPPED**  
 appears on the display, >>and the printer reports the following:  
 TIME/DATE  
 LOCAL - MANUAL TRIP ATTEMPTED<<

**Close (pages 8-8 to 8-9)**

- Insert printer displays into the “YES response” text in step 3 of this section. This text now reads
  - A YES response causes the DLP1 to send a trip command to the selected breaker. When the 52/b contact reports that the breaker is closed, then the message  
**BKR x CLOSED**  
 appears on the display, >>and the printer reports the following:  
 TIME/DATE  
 LOCAL - MANUAL CLOSE<<  
 If the 52/b contact reports that the breaker is not closed then the message  
**NOT CLOSED**  
 appears on the display, >>and the printer reports the following:

TIME/DATE  
LOCAL - MANUAL CLOSE  
ATTEMPTED<<

**MMI Test (page 8-11)**

- Insert a printer reference into the first sentence. This sentence now reads

This category tests the display, keyboard, MMI LED, >>and printer.<<

- Insert the following paragraph directly after the first sentence.

>> Pressing the PRT key displays an error message, since this category does not have a printing option. <<

- Insert step 5 directly after step 4.

>> 5. The display prompts with  
PRINTER TEST?

- Press the 3/N key, followed by the ENT key, to skip the printer test and terminate the MMI test.
- Press the 1/Y key, followed by the ENT key, to test the printer. Patterns containing all printable characters are printed in all possible columns. <<

- Insert additional text into Table 8-12 (page 8-11). The completed table now reads

Key	Display
ACT	ACT:PASSWORD
9	ACT:9
ENT	#####NEXT?
1/Y	#####NEXT?YES
ENT	LED TST?
3/N	LED TST?NO
ENT	KEYBRD TEST?
3/N	KEYBRD TEST?NO
>> ENT	PRINTER TEST?
3/N	PRINTER TEST?NO <<
ENT	ACT:MMI TEST

*Table 8–12. Sample key sequence and display contents for a MMI test.*

**Fix Up Settings (pages 8-11 to 8-12)**

- Insert a printer display description into this section (top of page 8-12). The bulleted text now reads
  - Press the 1/Y key to recalculate the setting's CRC code. The message

**CHECK SETTINGS**

appears on the display >>and the printer reports:

TIME/DATE

LOCAL - FIXUP SETTINGS<<

**INF Key (Information) (page 8-13)**

- Procedure 3 has been modified to include the PRT key. Step 3 now reads
  3. Press ENT to display the first item or prompt in the category.
    - If the category contains a list of items, scroll through the list with the ↑ or ↓ key. Press the ENT >> or PRT << key when the desired item appears.
    - If the category contains prompts, respond to the prompt and press either the ENT >> or PRT << key to display the next prompt (if any). To leave the prompt sequence, press any Command key or the END key.

**Request DLP1 Status Information (pages 8-13 to 8-14)**

- Insert the following text relevant to the PRINT function directly after Table 8-16 (page 8-14).
 

>> Press the PRT key (rather than the ENT key, as above), to print the DLP1 status. Header lines similar to the following are printed first:

UNIT ID: 1234  
DATE: 07/12/90  
TIME: 10:23:44

The DLP1 then prints the status as follows:

- If the DLP1 is working properly and protecting the line, the DLP1 prints the following line:  
DLP STATUS: OK
- If there is a critical failure, the printer output is  
DLP STATUS: FAILURE  
with additional messages printed in the order given above.
- If there is a noncritical failure, the printer output is  
DLP STATUS: WARNING  
with additional messages printed in the order given above.
- If the DLP1 is working properly and not protecting the line, the printer output is  
DLP STATUS: PROTECTION OFF
- If the DLP1 is working properly and protecting the line but outputs are disabled, the printer output is  
DLP STATUS: DISABLED OUTPUTS
- If the DLP1 hardware is working properly but miscellaneous status information is present, the printer output is  
DLP STATUS: MISC

Table 8-17 lists the event messages printed by the DLP1. <<

### Request Fault Information (pages 8-14 to 8-15)

- Insert a reference to the PRT key in the following locations:

1. The last line of page 8-14

Press the ENT >> or PRT << key to display the prompt...

2. The first paragraph on page 8-15

Enter a number from 1 to 14 (where 1 is the most recent fault, 2 the second most-recent fault, etc.), then press ENT >> or PRT <<. If there is no valid...

- Insert the following text (bottom, left-hand column, page 8-15).

>> If PRT is pressed after the fault number is entered, the message  
INF: FAULT PRT  
appears on the display. <<

- Insert Figure 8-1a. Sample Printed Fault Report (*see p. 17* of this document).

### Request Present Values (page 8-15)

- Insert this paragraph between the 1<sup>st</sup> and 2<sup>nd</sup> paragraphs.

>> Press the PRT key to print the present values as illustrated in Figure 8-1b. PRT appears in the right-most display positions. <<

- Insert Figure 8-1b. Sample Present Values printout (*see p. 18* of this document).

### Request Events (\* NEW SUB-SECTION)

- Insert this section between Request Present Values and View Password (page 8-16).

#### >> Request Events

This category prints Sequence-of-Events information.

Press the PRT key to print messages similar to those in Figure 8-1c. PRT appears in the rightmost display positions. Pressing the ENT key displays an error message, since events can only be printed. <<

- Insert Figure 8-1c. Sample Sequence of Events printout (*see p. 19* of this document) into the end of this section.

### View Password (page 8-16)

- Insert the following paragraph directly after the first paragraph in this section.



>> Pressing the PRT key displays an error message, since the passwords can only be displayed. <<

#### Request DLP1 Model/Version (page 8-16)

- Insert the following text at the end of the first sentence. The complete first paragraph now reads

This category displays the DLP1 model number and the PROM version number.

>>Press the PRT key to print messages similar to those in Figure 8-1d. PRT appears in the rightmost display positions.<<

- Insert Figure 8-1d. DLP1 model and version number display (*see p. 19* of this document).

#### Station ID (page 8-16)

- Insert the following text directly after the 2<sup>nd</sup> paragraph of this section.

>> Pressing the PRT key displays an error message. The Station ID is printed, however, on all of the DLP1 reports. <<

#### Line ID (pages 8-16 to 8-17)

- Insert the following text directly after the last paragraph of this section (top, left - page 8-17).

>> Pressing the PRT key displays an error message. The Line ID printed is printed, however, on all of the DLP1 reports. <<

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## CHAPTER 8 - INTERFACE

### 8-2 Printer Interface (\*\* NEW SECTION – Replaces Section 8-2 ASCII Interface)

- Insert this section between sections 8-1 and 8-3 ; it replaces section 8-2 (pages 8-17 and 8-18).
- >> The pin-to-pin connections for the cable connecting the printer to plug PL2 on the back of the DLP1 are shown in Figure 8-1e. Virtually any ASCII printer with a serial interface may be used. The printer's serial interface must be programmable to 1200 baud, 8 character bits, 1 stop bit, and no parity. The printer's handshaking mode must be set to either XON/XOFF or DTR Ready. *The DLP1 printer port (plug PL2) is fixed at 1200 baud.* The DLP1 setting COMMPORT affects the baud rate of the RS232 port (plug PL1) but not the printer port.

**Recommended printer**

If the printer is to be installed permanently at the DLP1 location, then the thermal printer listed in Table 8–24 is recommended because of its temperature-range specification.

Description	Vendor
FP40 Printer	Radix
FC401 Single-Unit battery Charger	Radix

*Table 8–24. Recommended printer, cable, and paper.*

The addresses and phone numbers for the printer and paper vendors are as follows:

Radix Corporation  
4855 Wiley Post Way  
Salt Lake City, UT 84116  
800-453-5195  
Lord Label  
3435 W. Madison  
Skokie, IL 60076  
800-621-9301<<

- Insert Figure 8-1e. Pin connections for cable connecting printer to DLP1 (*see p. 20* of this document).

## CHAPTER 9 - SOFTWARE

### 9-1 DLP-Link Software

#### Modem Initialization string (\* NEW SUB-SECTION)

- Insert the following text between sub-sections **Dial type** and **Modem connection time** (page 9-14).

>> **Modem Initialization string**

To select this item, either click on it with the left mouse button or use the ALT-D hot key. This item allows the user to enter an additional modem initialization string. This string will be sent by DLP-LINK to the PC modem before dialing. Please consult your modem instruction manual for information on modem initialization commands.<<

## **DELETIONS**

Deletions are listed in the order that they appear in the GEK-105549 text. Chapter titles, section titles and page numbers are given as a quick reference. Text to be deleted is set within the >> << symbols. Locate the deleted text/sections and note the appropriate changes in the GEK-105549 book.

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## CHAPTER 1 - PRODUCT DESCRIPTION

### 1-4 Other Features

#### Password Protection (page 1-16)

- Delete the following references to ASCII port:
  1. >>and during ASCII port communications,<< (located in the first paragraph)
  2. >>A single view only password provides ASCII port security.<< (3<sup>rd</sup> paragraph)
  3. >>and ASCII port<< (last sentence of section)

#### Remote Communications (pages 1-16 to 1-17)

- Delete the following text (second paragraph, bottom of page 1-16).

>> A second DB-25 plug (PL-2) located on the rear of the case is provided for the following:

  - Connecting the DLPI to an IBM PC compatible computer using an ASCII protocol interface.<<
- Delete the last paragraph of this section (bottom of page 1-17).

>> The third port, PL-2, is also implemented with a separate UART. This port is never disabled and may be used when the other ports are active. The capabilities and use of the ASCII port are described in Chapter 9 - Software. Refer to Chapter 8 - Interface for details on the required cables.<<

#### Sequence of Events (page 1-18)

- Delete the reference to PL-2 in this section.

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## CHAPTER 2 - CALCULATION OF SETTINGS

### 2-2 Scheme-Independent Settings

#### Communication Port (COMMPORT) [1509] (page 2-11)

- Delete the reference to PL-2 (2<sup>nd</sup> paragraph, first sentence, page 2-11). This sentence now reads

“The baud rate setting must match the baud rate of the modem or serial device connected to the RS232 serial ports (PL-1 or the front port) of the system.”
- Delete the following sentence (final sentence, 2<sup>nd</sup> paragraph, page 2-11).

>> The DLP1 setting must match the setting of the ASCII device connected to port

PL-2.&lt;&lt;

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## CHAPTER 4 - ACCEPTANCE TESTS

### 4-2 General Relay Tests

#### Display and Keypad Tests (page 4-7)

- Delete the last sentence of step 8.
- 

## CHAPTER 8 - INTERFACE

### 8-1 Local Man-Machine (MMI) Interface Operation

- Delete the **DASH (-) Key** sub-section (page 8-2).

### 8-2 ASCII Interface

- Delete this entire section, including Figure 8-2.
- 

## CHAPTER 9 - SOFTWARE

### 9-5 DLP-ASCII Interface

- Delete this entire section.
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## FIGURES

The attached figures have undergone minor revisions or are additions. Drawings are attached in the order that they appear in the GEK-105549 book. They are listed below and attached to the end of this document for your convenience.

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1. Figure 1-6. (0216B3212) Elementary diagram.
2. Figure 1-6. (0216B3213) Elementary diagram.
3. Figure 8-1. (8043811) DLP1 MMI keyboard.
4. Figure 8-1a. Sample printed Fault report.
5. Figure 8-1b. Sample Present Value printout.

6. Figure 8-1c. Sample Sequence of Events printout.
  7. Figure 8-1d. DLP1 Model and Version Number display.
  8. Figure 8-1e. (0286A4821) Pin Connections for Cable Connecting Printer to DLP1.
- 

All other descriptions, calculations, testings and drawings shown in GEK-105549 apply equally to the DLP1512JDH0204.

- NOTES:
1. \* AUXILIARY OUTPUTS 3A, 50W, 250VDC MAX.
  2. \*\* CONTACTS ARE SHOWN DE-ENERGIZED. UNDER NORMAL CONDITIONS, CONTACTS ARE ENERGIZED.
  3. SEE GE DRAWING #0286A2774 FOR MECHANIC DEFINITION LEGEND.
  4. SEE GE DRAWING #0286A2925 FOR SYMBOL DEFINITION LEGEND.
  5. ----- USER CONNECTION.
  6. Δ CONTACT CONVERTERS OPERATE FROM 38.5VDC TO 300VDC.

GEK-106160

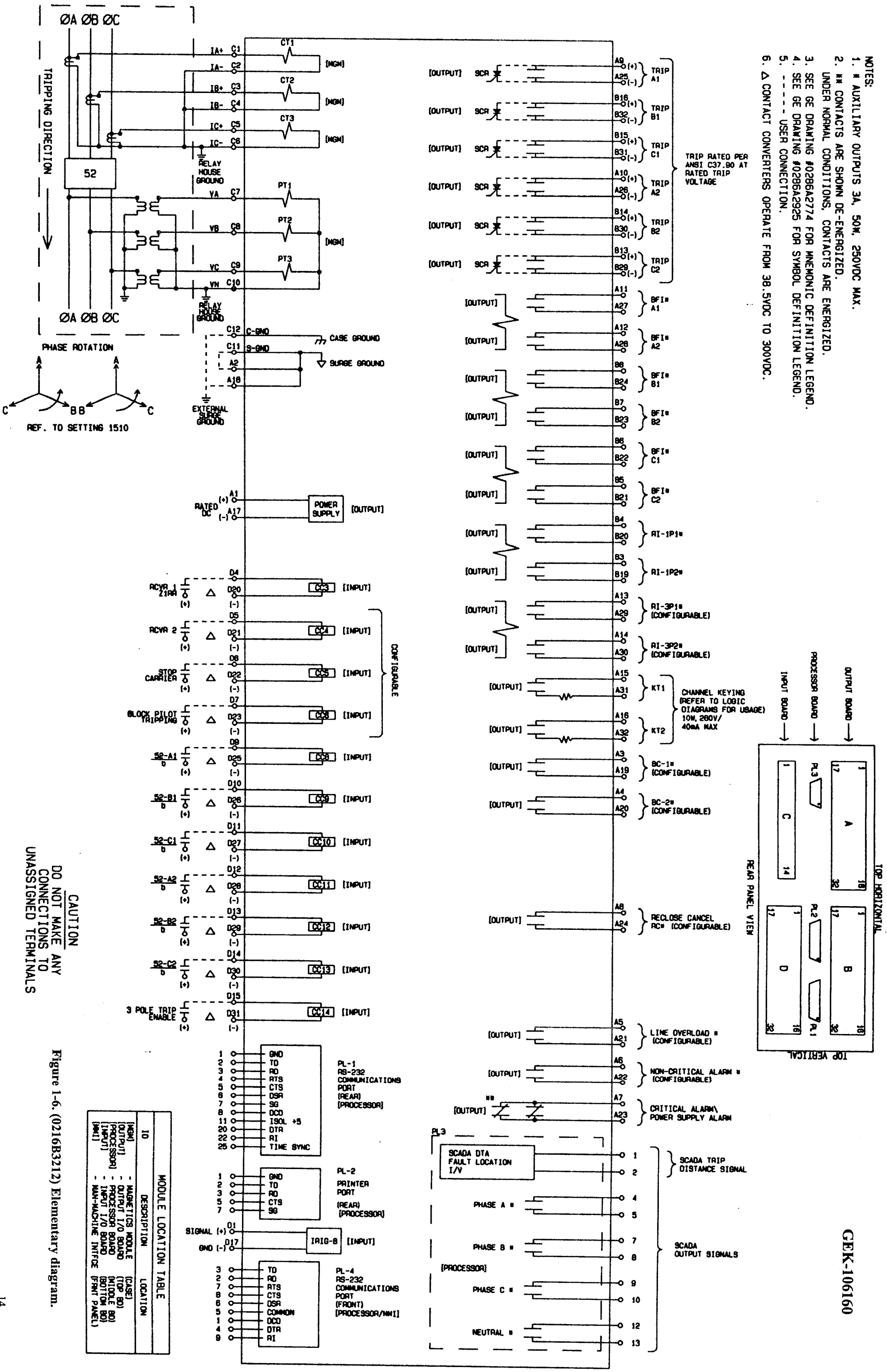
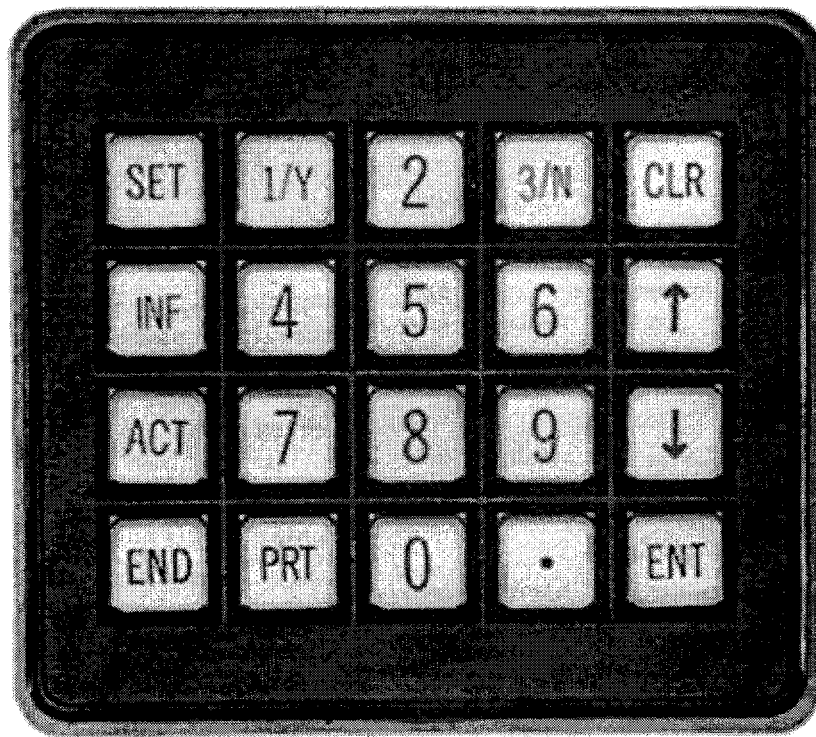


Figure 1-6. (0216B3212) Elementary diagram.





**Figure 8-1. (8043811) DLP1 MMI keyboard.**



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**FAULT REPORT**

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UNIT ID: 1234  
TRIP DATE: 07/20/90  
TRIP TIME: 13:01:23.205  
OPERATING TIME: 10 MS  
FAULT TYPE: AG  
TRIP TYPE: Z1  
DISTANCE: 34.3 MI

PREFault IA: 5.61 A  
PREFault IB: 5.23 A  
PREFault IC: 5.30 A  
PREFault IN: 0.51 A

FAULT VA: 51.2 V  
FAULT VB: 66.2 V  
FAULT VC: 67.3 V

FAULT IA: 15.34 A  
FAULT IB: 5.12 A  
FAULT IC: 4.96 A  
FAULT IN: 12.13 A

07/20/90 13:01:23.205  
TRIP SIGNALS ON

07/20/90 13:01:23.210  
TRIP CIRCUIT #1 ENERGIZED

07/20/90 13:01:23.210  
TRIP CIRCUIT #2 ENERGIZED

07/20/90 13:01:23.249  
TRIP SIGNALS RESET

07/20/90 13:01:23.261  
BREAKER #1 OPEN

07/20/90 13:01:23.261  
BREAKER #2 OPEN

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**Figure 8–1a. Sample printed Fault report.**

	UNIT ID:	1234	
	DATE:	07/12/90	
	TIME:	10:23:22	
IA = xxx.xx A			Note: Currents and voltages
ANGLE IA = xxx.xx			are RMS values and
IB = xxx.xx A			are either primary or
ANGLE IB = xxx.xx			secondary as the user
IC = xxx.xx A			selected.
ANGLE IC = xxx.xx			
IN = xxx.xx A			Note: Phase angles go from
ANGLE IN = xxx.xx			0° to 180° or -1° to -179°
VA = xxx.x V			referenced to phase A voltage.
ANGLE VA = xxx.x			VA must be present for this
VB = xxx.x V			function to operate.
ANGLE VB = xxx.x			
VC = xxx.x V			
ANGLE VC = xxx.xx			
Watts = xxxxxx			Note: Watts and Vars are
Vars = xxxxxx			primary or secondary.
BKR1 = OPEN			
BKR2 = CLOSED			Note: Signals are reported
PLC 1 SIG = ON			only for the number
PLC 2 SIG = ON			of breakers and carrier
PLC 1 STS = OFF			sets present in the configuration
PLC 2 STS = OFF			

**Figure 8-1b. Sample Present Values printout.**

```

                                EVENTS
UNIT ID:      1
DATE:        08/16/90
TIME:        04:40:19

08/14/90      00:57:49.783
TRIP SIGNALS RESET

08/14/90      00:57:11.072
TRIP CIRCUIT #1 ENERGIZED

08/14/90      00:57:11.069
TRIP SIGNALS ON

08/13/90      22:07:48.119
TRIP SIGNALS RESET

08/13/90      22:07:47.574
TRIP CIRCUIT #1 ENERGIZED

08/13/90      22:07:47/571
TRIP SIGNALS ON

```

**Figure 8–1c. Sample Sequence of Events printout.**

---

```

Station Id
Line ID
UNIT ID #
DATE/TIME (Hr:Min:Sec)
MODEL NUMBER = AAAAAAAAAA
PROM VERSION = AAAAAAAAAA

```

**Figure 8–1d. DLP1 Model and Version Number display.**

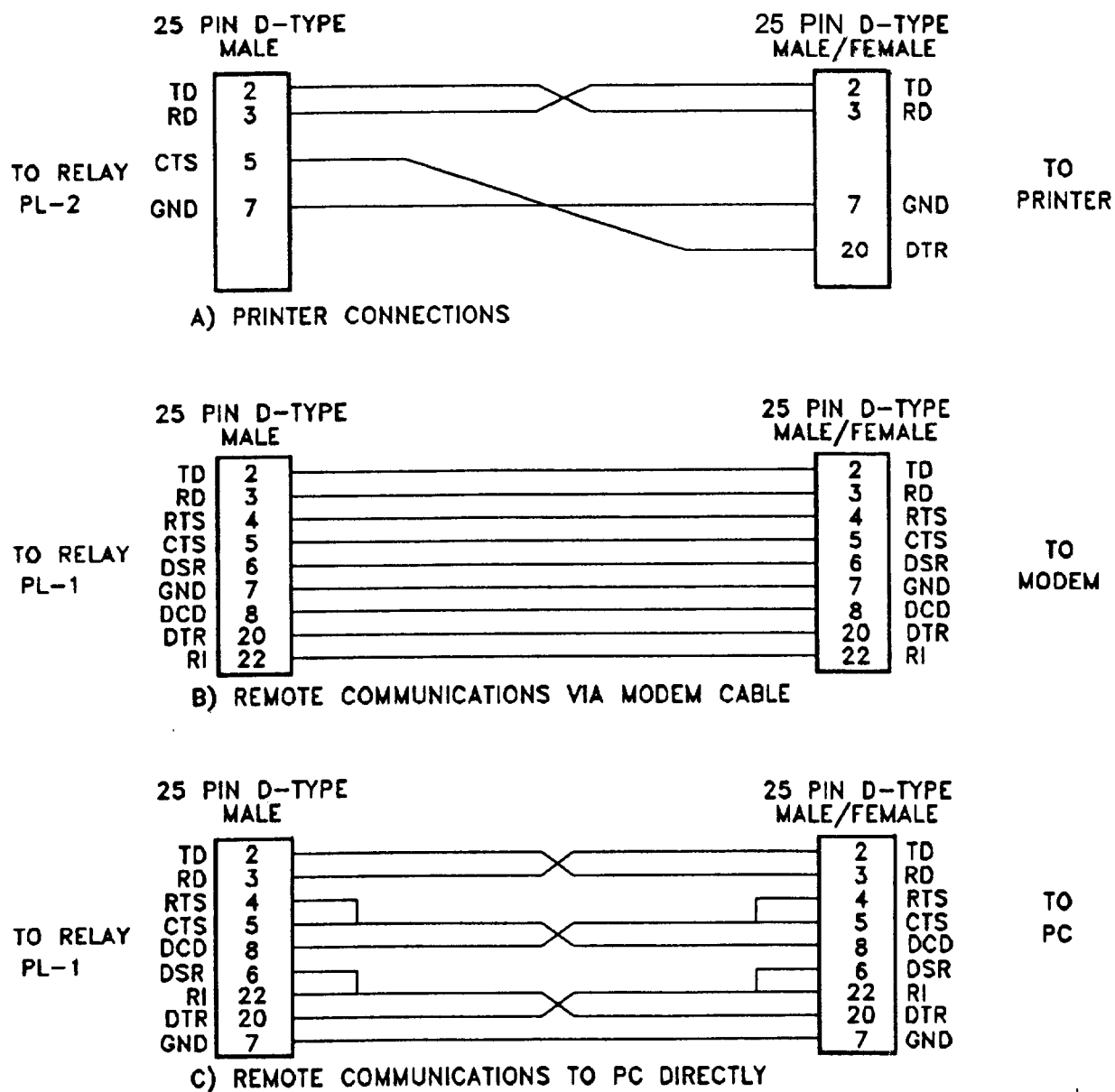


Figure 8-1e. (0286A4821) Pin Connections for Cable Connecting Printer to DLP1.

## Document Coordination Guide

This Document Coordination Guide is designed to guide the reader through the GEK-105549 and GEK-106160 books. Reference this sheet while reading the GEK-105549 text. **When a section is specified on this sheet, refer to the GEK-106160 book for more details.**

SUBSTITUTIONS	INSERTS	DELETIONS
	1-4 Other Features	1-4 Other Features
		2-2 Scheme-Independent Settings
3-1 Case Assembly		
3-2 Electrical Connections and Internal Wiring		
	4-2 General Relay Tests	4-2 General Relay Tests
	5-2 General Relay Tests	
8-1 Local Man-Machine (MMI) Interface Operation	8-1 Local Man-Machine (MMI) Interface Operation*	8-1 Local Man-Machine (MMI) Interface Operation
8-2 ASCII Interface	8-2 Printer Interface	8-2 ASCII Interface
	9-1 DLP-Link Software	
		9-5 DLP-ASCII Interface

\* Indicates a large number of changes in section.