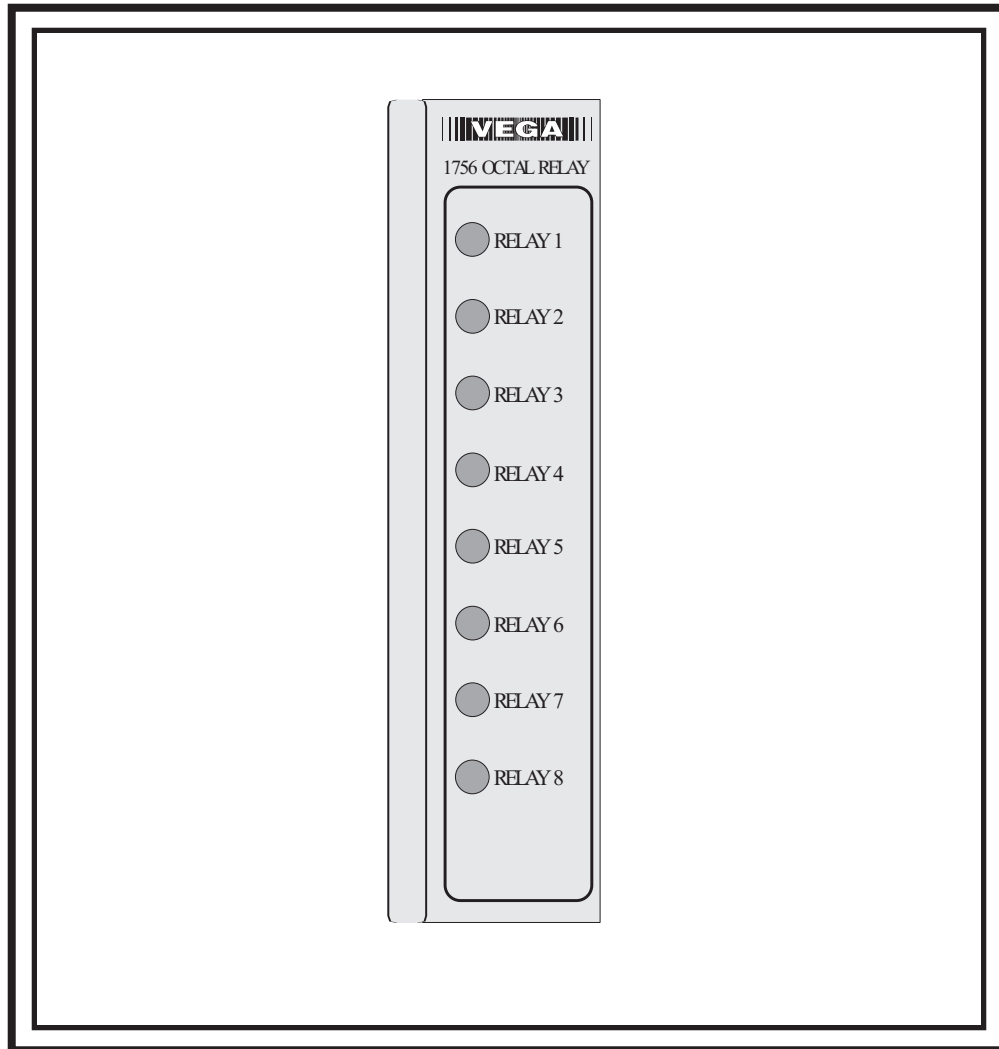




# 1756 Octal Relay

Service Manual



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## 1. Forward

This manual is intended for use by experienced technicians familiar with similar types of equipment. All the information required for installation, operation and servicing is included.

The manual is divided into sections for easy reference. Each section, although related, may be read independently without first reading the previous section. Any special equipment will be included at the end of the manual.

## 2. General

The Vega Model 1756 Relay Card is a general purpose card that provides a reliable means of remotely controlling a variety of customer specified devices. The card was intentionally designed to be flexible, incorporating E point jumpers which allow the user to operate the card without alteration, to perform various switching functions, or by changing the jumper configuration, to allow for user defined special functions. It plugs into a Tellabs, Type 10 or equivalent open frame rack and can be used in conjunction with any remote control console.

### 2.1 Standard Features

- . Six double pole double throw relays, with direct wiring to the card edge connector suitable for phone line pair switching.
- . Two double pole double throw relays, with one pole directly wired to the card edge connector, capable of switching signals.
- . Front panel LED indicators that illuminate when the corresponding relay is energized.
- . Low power input for active relay drive signals.
- . 12 V<sub>dc</sub> operation.

### 2.2 Optional Features

- . Jumper selected switched high or switched low inputs.
- . Relays 5 and 6 can have one pole isolated from the card edge connector by removal of 0 ohm resistor jumpers, and installing jumpers arranged for unique switching operation.
- . Relays 7 and 8 have one pole connected to E-points for unique jumpers to provide special operation.
- . Relays can be isolated and driven directly via E-point jumpers.
- . A universal circuit area, suitable for accommodating an ancillary user designed function.

## 3. Installation

<b>Caution - ESD Sensitive</b>
--------------------------------

This piece of electronic equipment contains electronic components known to be susceptible to Electro-Static Discharge (ESD). Precautions have been taken to avoid the effects of ESD, however the user is encouraged to promote safe handling techniques in the handling, storage and service of this equipment.

### 3.1 Introduction

The installation of the Octal Relay Card should be referred to experienced technicians familiar with similar types of equipment. Only basic hand tools are required to remove the card, change jumper settings as required, and for making connections of phone lines, signals and power.

### 3.2 Installation

Read this section thoroughly before attempting to install the card. Exercise care in order to prevent errors-wiring or damage to the equipment.

### 3.3 Inspection

Carefully unpack the equipment and inspect it thoroughly as soon as possible after delivery. If any part of the equipment has been damaged in shipment, report the extent of the damage to the Transportation Company immediately.

This unit has been inspected and adjusted to its recommended operation condition at the factory. Unless it has been handled roughly in shipment or otherwise abused or tampered with, it will require only connections to be wired for operation.

### 3.4 Mounting

The circuit card is intended for mounting in a Tellabs, Type 10 or equivalent open frame rack. Care should be taken during installation to prevent locating the card in a position adjacent to other equipment that generates high temperature or electromagnetic radiation to avert erroneous operation. Always provide an appropriate service loop on interconnecting cables.

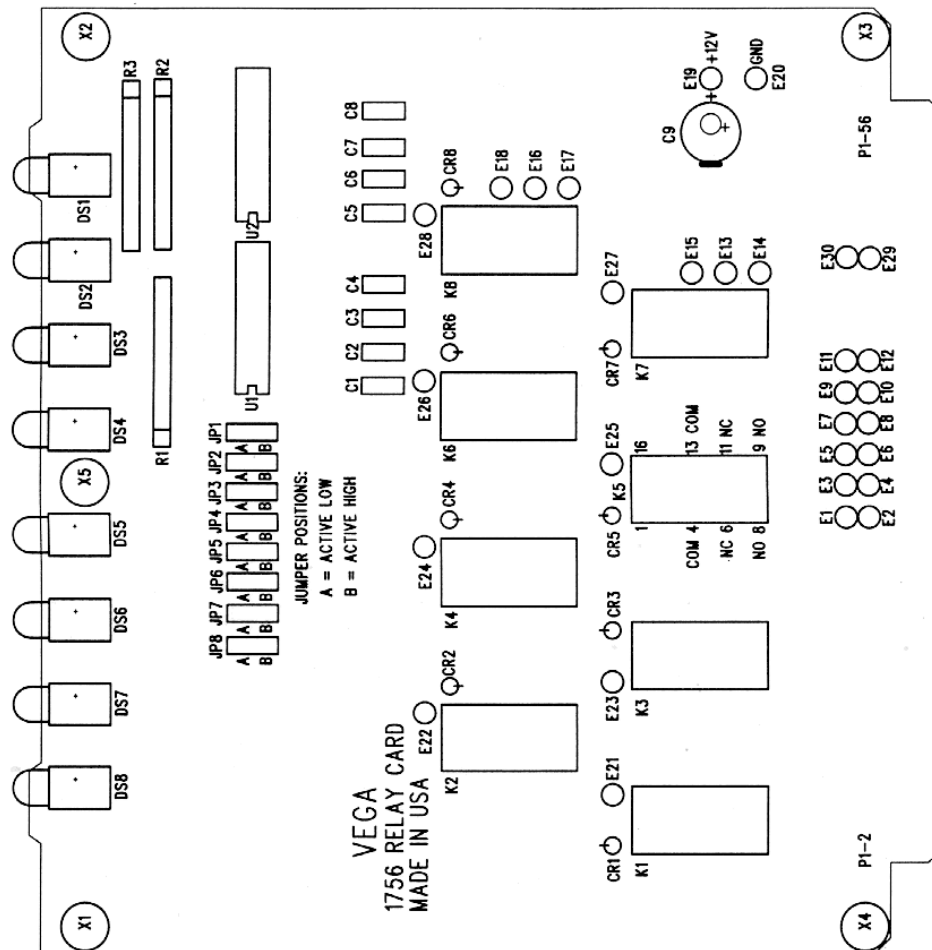
### 3.5 Access for Installation/Service

When installing into a Tellabs, Type 10 or equivalent open frame rack, ensure the front and rear of the rack have clear access for card installation and wiring.

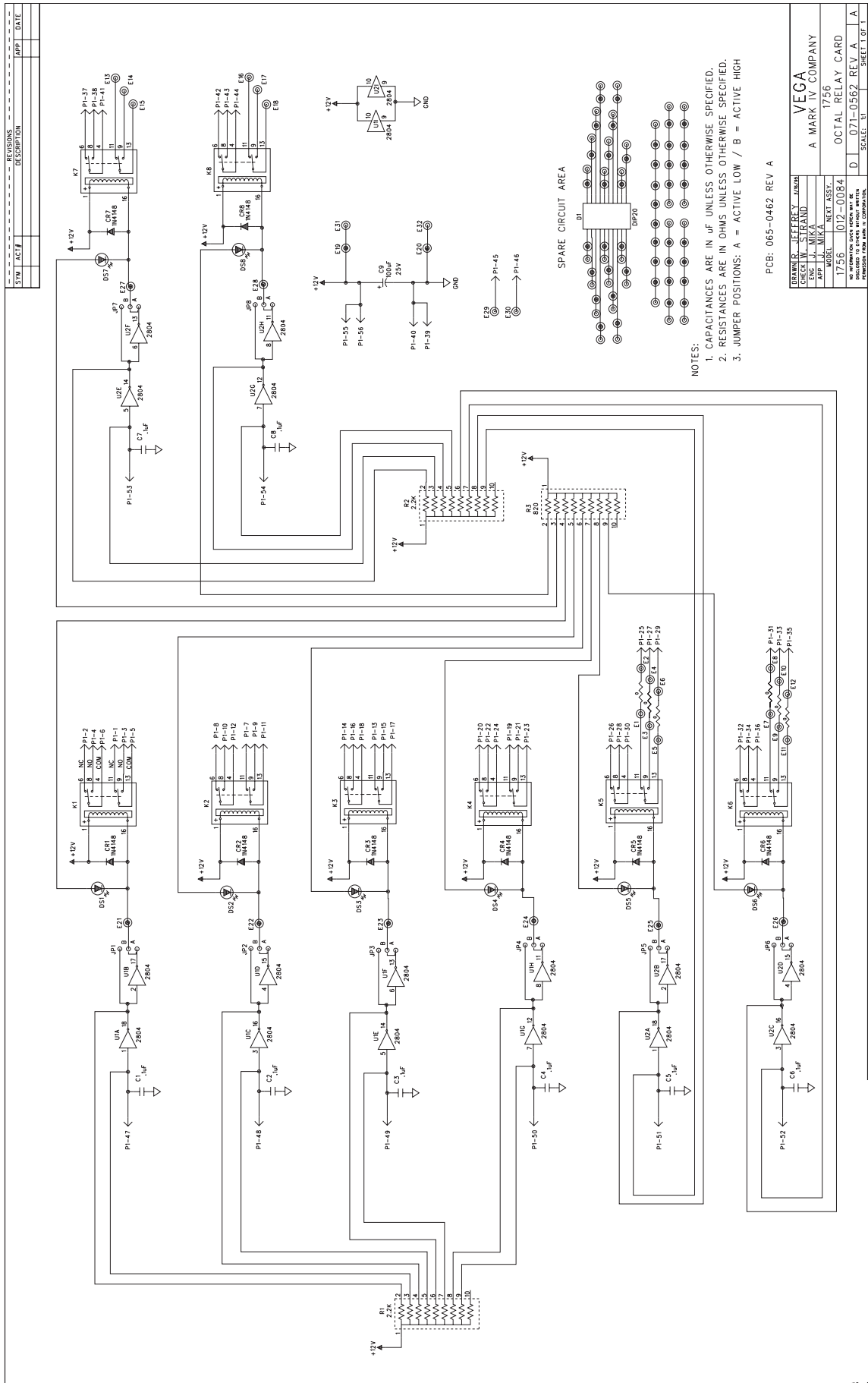
To service, remove the 1756 from the rack or place on a circuit card extension for access while troubleshooting.

### 3.6 Power

Primary power for the card is a regulated source of 12 V<sub>dc</sub>. Either a Vega supplied power supply can be used, or the customer can supply their own for the unit.



## 1756 Relay Components



- NOTES:
1. CAPACITANCES ARE IN UF UNLESS OTHERWISE SPECIFIED.
  2. RESISTANCES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
  3. JUMPER POSITIONS: A = ACTIVE LOW / B = ACTIVE HIGH

PCB: 065-0462 REV A

DESIGNED BY	JEFFREY J. MARK
CHECKED BY	STRAND
DATE	1/1/84
APP. I	MARK
MODEL	1756
NEXT ASSY.	012-0084
DESCRIPTION	OCTAL RELAY CARD
REVISION	D 071-0562 REV A
SCALE	1:1
SHEET	1 OF 1

## 4. Connections

**Warning - High Voltage! Remove Power Before Servicing!**

High voltage may be present on this card (if used for switching phone lines with superimposed DC current signaling) which could cause serious injury or loss of life. Only qualified personnel familiar with this type of circuitry should work on this equipment. To prevent injury, damaging the card or other equipment, remove power before making connections.

### 4.1 Power connections

Connect positive 12 V<sub>dc</sub> to pins 55 and 56. Connect the 12 V<sub>dc</sub> Return (normally ground) to pins 39 and 40. For best performance, use at least 20 AWG or larger wire for power connections.

### 4.2 Signal connections and card edge connector pin assignment

Refer to the schematic and the Table 1 on the next page (shows the 1756's pin assignments and has a blank for any customized functions that might be configured) for the appropriate pin number to make connections. Use at least 24 AWG wire for signal connections.

### 4.3 Special considerations for optional wiring

#### 4.3.1 E Point Jumpers

The 1756 may be customized (using E point jumpers) to perform specialized switching functions which accommodate a wide variety of applications. When using the E point jumpers, take care to document the jumpers installed, and to mark the card with a unique code that identifies the function and the changes made. A sheet has been provided on the next page for this purpose.

#### 4.3.2 Universal Circuit Area

The 1756 Octal Relay card has a provision for adding circuits in a universal circuit area located on the PCB. This area will accommodate up to a 20 pin IC, or a smaller IC and additional components for creating the desired circuit. i.e. The area can accommodate a 555 timer circuit for use as a delay for activating or dropout of a relay.

### 4.4 Securing the Connections

After all power and line connections are made, the wires should be neatly bundled and secured in place to prevent accidental breakage when in service. Use one or more of the cable guides supplied with the card rack, or tie in place with appropriate wire ties.

### 4.5 Interface Connector Numbering

The Tellabs (or equivalent) card cage interface connector pins may have a different numbering scheme than the 1756. Table 1 depicts the card edge pin numbers as shown in the schematic, which is also the same as one type of connector, followed by two alternate numbering schemes as used on other connectors. Diligently review the actual connections being used, to Table 1, to ensure proper connections are made for optimum performance.

Table 1. Card Edge Connector Pin Assignments

Card Edge	Alt #1 Conn.	Alt #2 Conn.	Function	User Connection
Solder Side				
1	A	A	Relay 1B-NC	
3	B	B	Relay 1B-NO	
5	C	C	Relay 1B-COM	
7	D	D	Relay 2B-NC	
9	E	E	Relay 2B-NO	
11	F	F	Relay 2B-COM	
13	H	H	Relay 3B-NC	
15	J	J	Relay 3B-NO	
17	K	K	Relay 3B-COM	
19	L	L	Relay 4B-NC	
21	M	M	Relay 4B-NO	
23	N	N	Relay 4B-COM	
25	P	P	Relay 5B-NC, E1/E2	
27	R	R	Relay 5B-NO, E3/E4	
29	S	S	Relay 5B-COM, E5/E6	
31	T	T	Relay 6B-NC, E7/E8	
33	U	U	Relay 6B-NO, E9/E10	
35	V	V	Relay 6B-COM, E11/E12	
37	W	W	Relay 7A-NC	
39	X	X	Pos. 12 Vdc Return (Gnd)	
41	Y	Y	Relay 7A-COM	
43	Z	Z	Relay 8A-NO	
45	A	AA	E29	
47	B	BB	Relay #1 Control Input	
49	C	CC	Relay #3 Control Input	
51	D	DD	Relay #5 Control Input	
53	E	EE	Relay #7 Control Input	
55	F	FF	Pos. 12 Vdc Input	
Component Side				
2	1	1	Relay 1A-NC	
4	2	2	Relay 1A-NO	
6	3	3	Relay 1A-COM	
8	4	4	Relay 2A-NC	
10	5	5	Relay 2A-NO	
12	6	6	Relay 2A-COM	
14	7	7	Relay 3A-NC	
16	8	8	Relay 3A-NO	
18	9	9	Relay 3A-COM	
20	10	10	Relay 4A-NC	
22	11	11	Relay 4A-NO	
24	12	12	Relay 4A-COM	
26	13	13	Relay 5A-NC	
28	14	14	Relay 5A-NO	
30	15	15	Relay 5A-COM	
32	16	16	Relay 6A-NC	
34	17	17	Relay 6A-NO	
36	18	18	Relay 6A-COM	
38	19	19	Relay 7A-NO	
40	20	20	Pos. 12 Vdc Return (Gnd)	
42	21	21	Relay 8A-NC	
44	22	22	Relay 8A-COM	
46	23	23	E30	
48	24	24	Relay #2 Control Input	
50	25	25	Relay #4 Control Input	
52	26	26	Relay #6 Control Input	
54	27	27	Relay #8 Control Input	
56	28	28	Pos. 12 Vdc Input	

## 5. Operation

### 5.1 Description

This module has eight relays with active control circuitry, which can be used to switch audio phone lines, or for general purpose switching.

Six of the relays are wired to the edge connector for use without additional wiring. Two of these relays can be modified to have connections from one pole routed to perform user defined special functions by removing zero ohm jumpers. Two relays have only one pole connected to the rear connector, and the other pole is routed to E point jumpers, for user defined special functions.

Front panel indicators provide visual identification of activated relays.

### 5.2 Operating capabilities

#### 5.2.1 Relay

Each relay has a configuration of a two pole, double throw switching. The contact rating of the relay is from low level audio signal, to 2 Amps at 30 Vdc max. It can also switch 0.6 Amps at 120 V<sub>ac</sub>.

#### 5.2.2 Active Output

For special applications, the ULN2804 Octal Driver output can be jumpered for use as an active open collector switched low output. The practical rating of this output for this application should be safely limited to: V<sub>CEO</sub>=30 V<sub>dc</sub>, I<sub>C</sub>=250 mA, V<sub>SAT</sub>=1.5V.

### 5.3 Controls and indicators

#### 5.3.1 Input control

Activation of the relay circuits can be performed by a switched low input via a transistor open collector or through a hard switch to ground.

#### 5.3.2 LED indicators

An LED indicator on the front panel is illuminated when the corresponding relay is energized, and off when not energized. This features allows for the easy identification of active relays while the card is inserted in the rack.

## 6. Theory of operation

### 6.1 General

Activation of the relays is accomplished by active circuits with a switched low input. A switched high input (jumper selectable) is available if required for special applications.

### 6.2 Control circuits

#### 6.2.1 Static Conditions

With no input applied, a pull-up resistor maintains a positive input to the ULN2804 driver. The driver inverts this high input to a low signal which is applied to the input of a second ULN2804 driver. The low input to the second driver is inverted, and the output of the second driver remains high. With the jumper in the "A" position, the relay is left de-energized.



### 6.2.2 Switched low input

When a switched low is applied to the input, the first ULN2804 driver inverts the low signal to a high, which is then applied to the second ULN2804 driver which in turn inverts the high input to a low output. With the jumper in the “A” position, the low signal energizes the relay and illuminates the corresponding front panel LED.

### 6.2.3 Switched high input

In special applications, a switched high input may be required to energize the relay. This implies that a switched low input will be used to maintain the relay in an unenergized condition. For this application, the jumper is moved to the “B” position. Operation is similar to the that described for the switched low input, except now the switched high will energize the relay and illuminate the LED.

## 6.3 Relay circuits

### 6.3.1 Relays 1-4

Of the eight relays, the first four (K1, K2, K3, K4) have both poles normally-opened and normally-closed switch contacts routed directly to the 56 pin card edge connector. The traces on the board simulate twisted pairs and therefore are conducive to 600-ohm audio line applications, however they may be used for other switching applications.

### 6.3.2 Relays 5,6

Relays K5 and K6 are wired as the previous four however the second pole of the relay is routed through E-point jumpers. The jumpers are installed as 0 ohm resistors and have the same configuration as the previous four so that they can be used for switching audio lines. One pole is wired direct and the other is wired through the resistors. These resistors can be removed and the user can configure the relay to perform a function as desired (as a relay tree or some other configuration).

### 6.3.3 Relays 7,8

Relays K7 and K8 have one pole wired directly to the card edge connector and the second pole wired to E-point jumpers. These jumpers can be configured to perform any function that the customer desires.

## 6.4 Spare Circuit Area

Included on this module is a spare circuit area that allows up to a 20-pin dual in-line package integrated circuit or component carrier to be installed with allowance for jumpering on the module to perform some logical function or additional feature the customer would like installed. For example, a 555 timer could be installed to create a timed relay function.

In addition, the 12V and ground termination's are provided with e-point termination's to allow jumpers from power and ground to be used with the spare circuit area. Two additional E-point jumpers are available, tied the card edge connector for additional input/output functions.

## Suggestions or Comments

If you have suggestions or comments concerning this manual, please mail or fax (402-467-3279) them to:

Vega Documentation  
Telex Communications, Inc.  
8601 East Cornhusker Highway  
Lincoln, NE 68507

## Warranty (Limited)

All Vega signaling products are guaranteed against malfunction due to defects in materials and workmanship for three years, beginning at the date of original purchase. If such a malfunction occurs, the product will be repaired or replaced (at our option) without charge during the three-year period, if delivered to the Vega factory. Warranty does not extend to damage due to improper repairs, finish or appearance items, or malfunction due to abuse or operation under other than the specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives the customer specific legal rights, and there may be other rights which vary from state to state.

## 1756 Parts List

VEGA PART NO	QTY	DESCRIPTION	CKT SYM
065-0462	1	PCB 1756 OCTAL RELAY CRD	C1 C2 C3 C4 C5 C6 C7 C8
071-0562	0	SCHEMATIC 1756 OCT RELAY	
110-1340	8	CAP CER .1MF SMALL	
112-1609	1	CAP ELEC 100MF 20% 25V	C9
132-0009	4	RES 1/4W ZERO-OHM JUMPER	R4 R5 R6 R7 R8 R9
			R3
138-0069	1	RNET CMN 9X820 SIP 5%	R1
138-0070	2	RNET CMN 9X2.2K SIP 5%	R2
161-0426	8	DIODE 1N4148	CR1 CR2 CR3 CR4 CR5 CR6 CR7 CR8
			DS1 DS2 DS3 DS4 DS5 DS6 DS7 DS8
161-0628	8	LED PCB QNT1 3/4 DIF GRN	K1 K2 K3 K4 K5 K6 K7 K8
180-0329	8	RELAY PCB 12V DPDT MDX12	JP1
			JP2 JP3 JP4 JP5 JP6 JP7 JP8
286-1766	8	CONN JUMPER PLUG	XP1-8 U1 U2
286-1772	.22	CONNECTOR 36PIN STRIP TIN	
425-0263	2	INT CKT ULN2804A	
817-0003	1	BAG POLY 10 X 12 FLAT	

## 1756 Octal Relay Specifications

**Operating Temperature Range:** 0°C to 60°C

**Power Requirements:** 11 to 16 V<sub>dc</sub> semiregulated  
200 mA idle,  
600 mA max- all relays energized

**Relays:** 8

**Relay Contacts:** 2 pole, double throw

**Relay Contact Ratings:** 2 A @ 30 V<sub>dc</sub>  
0.6 A @ 120 V<sub>ac</sub>  
Complies with FCC part 68, 1500V<sub>dc</sub> surge

**Input signal:** +12 V<sub>dc</sub> nominal, 10 mA, each circuit



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