



Model NEO-10

Version 1.0



Technical Manual

November 26, 2003

PN: 803968

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1 Introduction

The NEO-10 device is a network based Input Output device. Within its enclosure are 10 DPDT relays with all 6 contacts of the relays brought out to ports (Normally Open, Normally Close, Common for each half of relay). There are also 10 diode blocked inputs which can be used to monitor external events. The NEO sends out multicast packet bursts anytime a relay or input changes allowing for all users of the device to see status updates in real time. Actual control of the NEO is accomplished by a TCP/IP socket connection from the controlling console. Version 2.52 of C-Soft supports control and monitoring functions to support multiple NEO devices on the network. Later releases of software for the desktop VoIP capable consoles will support NEO as well.

In addition to the I/O functions of the device, NEO supports 10 channels of echo packet functionality. Echo Packet is a method of copying voice/data content on the network from and to multicast addresses. This features allows the Vega multicast scheme to operate on a network without having multicast enabled. Until the release of NEO, only the Vega C-Soft product has this capability which relied on the stability of the Windows operating system. With the release of NEO this capability is now embedded in dedicated hardware and software in a more robust package.

2 Connecting NEO to the World

NEO has a total of three different ports that are used to connect it to the world. Likely, the first port that will need to be connected is the RS-232 port.

2.1 RS-232 Port

The RS-232 port is used for initial setup purposes only. It is a standard DCE pinout allowing a straight through DB9 cable to connect it to a computer or other terminal device for setup. Default baud rate is 19200,N81.

2.2 Ethernet Port

The Ethernet Port is used for setup of the NEO as well as for its operation from the consoles. Control of its relays is handled through this port. The NEO sends multicast packets whenever status of one of its relays or inputs changes allow for all users of the device to see real time changes in parallel. The port supports both 10 and 100 Mbps operation of standard Cat 5 cable.

2.3 Relay/Input Ports

There are 10 RJ45 ports that are used to sense inputs and control external events. Each connector is connected to a DPDT relay. Both sets of poles are brought out to the connector allowing for two separate circuits to be controlled by a single relay. Figure 1 shows the pin out of the rear RJ45s. "Relay1" designates the pins on one half of the DPDT relay and "Relay2" the other half. The relays are rated for 1 Amp at 125VAC. The GND signal is the signal ground of the device. The INPUT pin is a diode blocked input that allows sensing of a logic signal. The input range is 0-18 volts. Exceeding the limits of either the Input or the Relays is a violation of the warranty. The manuals of the various Vega VoIP consoles should be consulted for programming the user interface buttons to control the relays and sense the inputs of the NEO-10.

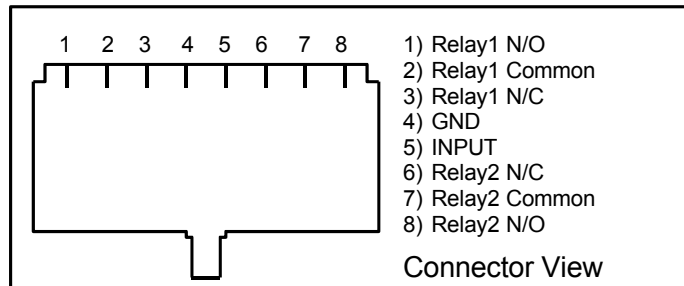


Figure 1-NEO RJ-45 Connector Pinout

3 Software Configuration of NEO

Setup of the NEO is almost entirely done using a web browser. The first step required during setup is to assign the IP and Mask addresses to the NEO, using either a WEB Browser or Hyper Terminal program if the assigned IP address is not accessible on your network.

3.1 Setting the basic IP information with Hyperterminal

As was mentioned before, all other parameters are setup by using a browser such as Netscape or Internet Explorer. Before connecting to the adaptor with the browser, an IP address and Mask that is compatible with the users existing network must be set. See your network administrator to determine the proper values. **Once these values have been set, the unit must be reset for them to take affect.**

To change the IP and Mask addresses using a Hyper Terminal program follow these simple steps;

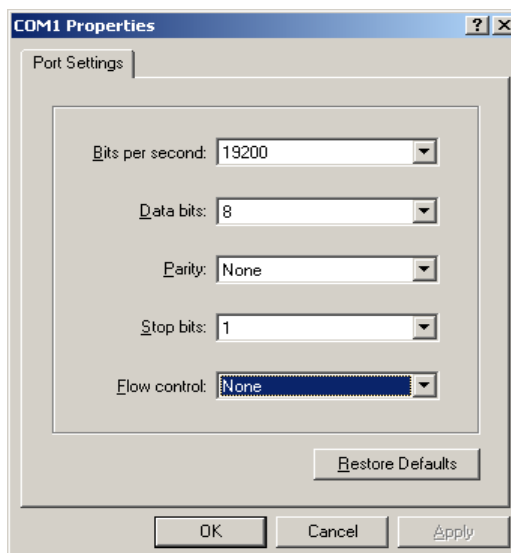
Connect the NEO serial port to your computer using a DB9 Serial cable.

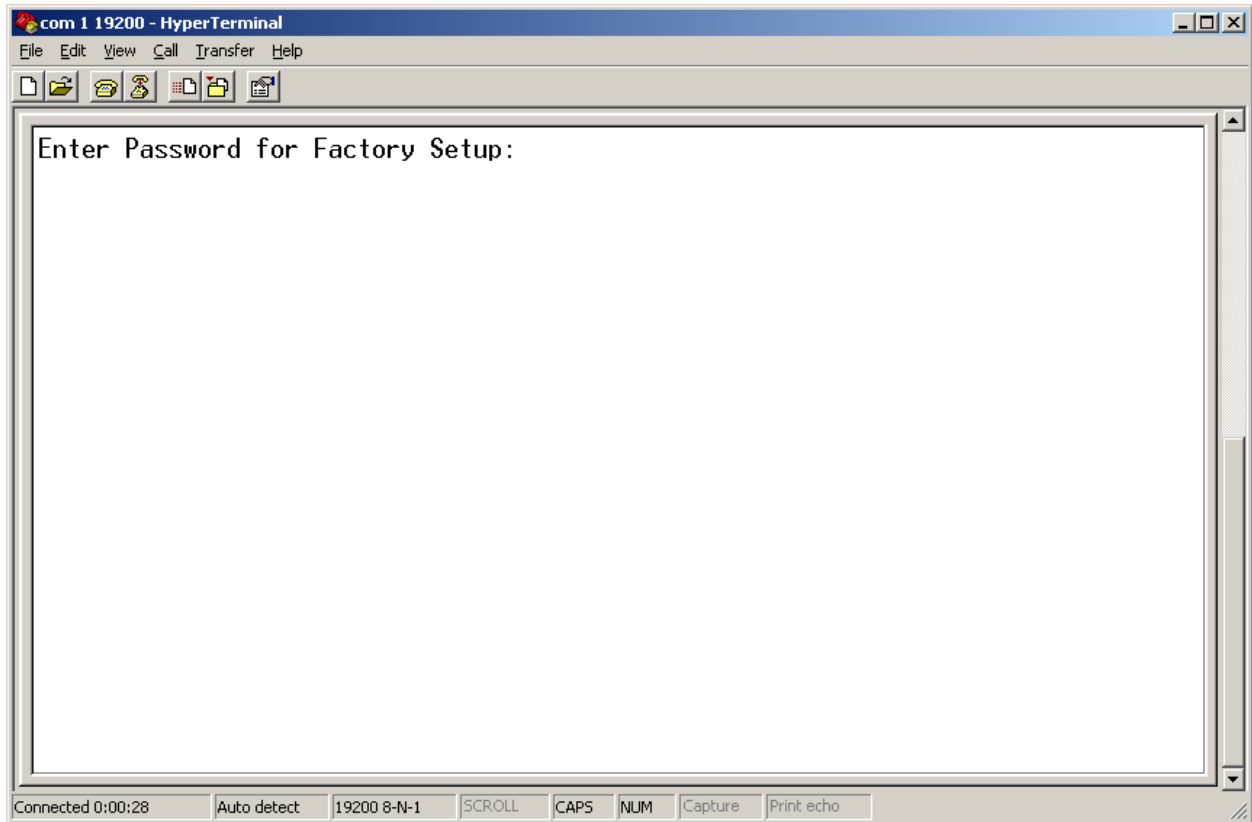
Load Hyper Terminal in your PC setting the name to COM.

Set Connect using COM1 or Serial port with cable attached.



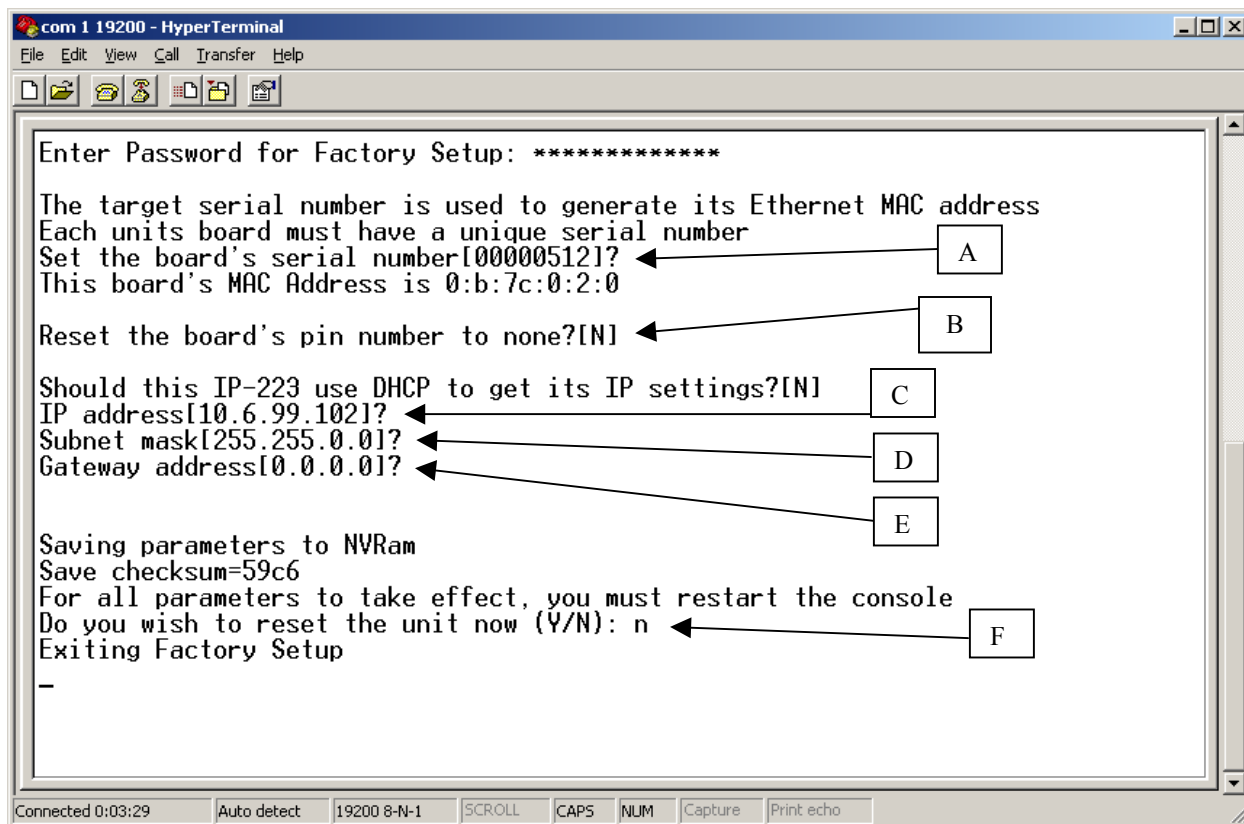
Set Baud to 19200 and Flow control to None.





At the main Hyper Terminal screen type uppercase S then <enter>.

Enter "technobabble" for the factory password.



A = The board serial number and case serial number should match.

B = Do you want to reset the PIN number programmed into NEO.

C = Current IP address, do you want to change?

D = Current Subnet Mask, do you want to change?

E = Current Gateway address, do you want to change?

F = Do you want to reset any of the above?

Once all parameters have been entered and saved, allow the unit to reset by answering Yes to the final question. The unit will reset in 10-20 seconds. Startup text will be sent to the serial port allowing verification of the setup parameters having been recorded correctly.

3.2 General Setup via Web Pages

The majority of the setup of the NEO is completed through the Ethernet port. Once the steps of 3.1 have been completed, a PC on the network can be used to gain access to the web page based setup of the NEO. In the URL window of Internet Explorer, type <http://X.X.X.X> where X.X.X.X is the IP address set in the previous section. An opening page will appear as shown in Figure 2. Clicking on the [Click to Enter] hyperlink will open the Basic Setup

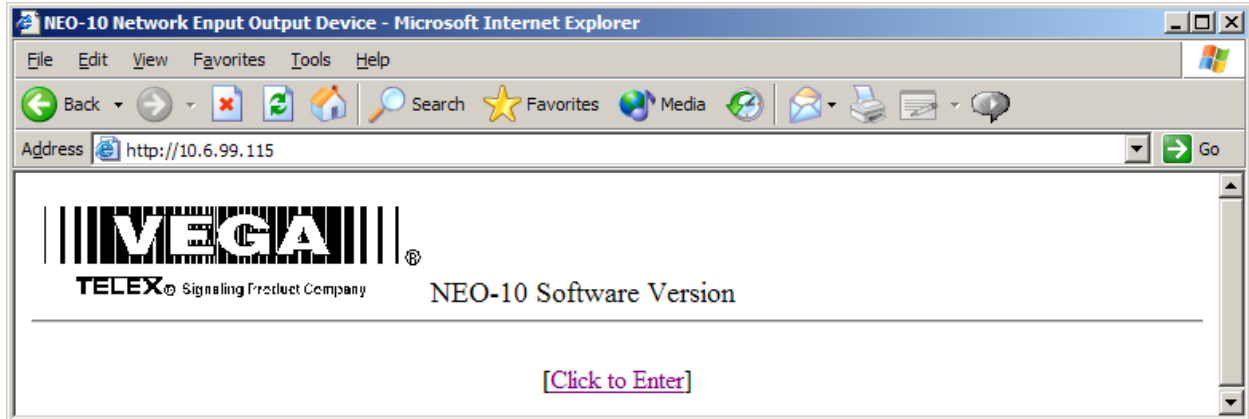


Figure 2-Opening Screen for web page setup

page shown in Figure 3.

3.3 Basic Ethernet Setup Screen

The parameters that can be set on the Basic Ethernet Setup Screen are as follows:

3.3.1 Use DHCP Server

This option, when checked will force the NEO to request a dynamic IP address when it is first turned on. Since it is important that the NEO always be located in a known location for all consoles utilizing it on the network, this should not be used as the normal operating mode. It is useful sometimes to determine the settings that might be used for a particular network or testing.

3.3.2 Unit IP Address

In addition to the method outlined in section 3.1, the base IP address can be changed from this screen.

3.3.3 Subnet Mask

Enter the subnet mask into this field. Obtain this information from your network administrator.

3.3.4 Gateway Address

The Gateway Address is the address to which packets are sent when the destination address of the packet is not on the same subnet as the NEO itself. Obtain this information from your network administrator.

3.3.5 DNS Addresses 1-3

Enter the DNS addresses provided by your network administrator. These are optional and not currently used.

Once all parameters are set, press the Submit button to send them back to the NEO from the web browser. The parameters are not updated until they are actually saved to EPROM, (Section 3.9)

NEO-10 Basic Ethernet Setup - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media

Address http://10.6.99.115/basic_ethernet_setup.htm Go

VEGA
TELEX[®] Signaling Product Company

| | | | |
|--|---|----------------------------|--------------------------------|
| Basic Ethernet Setup | Multicast Address Setup | Debounce | Echo Packet |
| Clone From Other Console | | PIN Change | Save to EEPROM |

Use DHCP Server:

(If using DHCP, below parameters will not be required)

Basic Ethernet Setup

IP Address Local Computer IP Addresses

Unit IP Address:

Subnet Mask:

Gateway Address:

DNS Number 1:

DNS Number 2:

DNS Number 3:

Figure 3 – Basic Ethernet Setup Screen

3.4 Multicast Setup

A single multicast address is employed by NEO for the purpose of updating consoles of changes in the Relays and

NEO-10 Multicast Port Number Setup - Microsoft Internet Explorer

Address <http://10.6.99.115/multicast.htm> Go

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[Basic Ethernet Setup](#) [Multicast Address Setup](#) [Debounce](#) [Echo Packet](#)
[Clone From Other NEO](#) [PIN Change](#) [Save to EEPROM](#)

Multicast I/O Broadcast Port Number Setup

I/O Update Broadcasts: **Multicast Address:** **Port:** **Channel Hops:**

Inputs.

Figure 4 - Multicast Port Number Setup

NEO sends out a single packet each time either a Relay is changed by any console or when an input changes due to external event. The Multicast Address is any address in the range of 224.0.0.0 to 239.255.255.254. A specific unicast address can also be used if only a single console is to be utilized. The Port number is a unique port to which the multicast packet will be sent. Channel Hops is the number of routers that the packet will penetrate before being stopped and allowed to propagate no further.

The Multicast Address and Port Number must match those set within the console. It is Okay to use the same Multicast Address and Port number in multiple NEO devices. The base IP address is used to differentiate the source of the I/O update. See the console documentation for more information on setting up NEO relays.

As in the case of all other web pages, the Submit button must be pressed to send the changes to the NEO under configuration.

3.5 Debounce Input Settings

The Debounce hyperlink will open the screen below.

NEO-10 Debounce Settings - Microsoft Internet Explorer

Address http://10.6.99.115/input_debounce.htm

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[Basic Ethernet Setup](#)
 [Multicast Address Setup](#)
 [Debounce](#)
 [Echo Packet](#)
[Clone From Other Console](#)
 [PIN Change](#)
 [Save to EEPROM](#)

Input Debounce Settings

Must be multiples of 20ms

| Input: | Debounce (ms): |
|--------|----------------|
| 1 | 60 |
| 2 | 60 |
| 3 | 60 |
| 4 | 60 |
| 5 | 60 |
| 6 | 60 |
| 7 | 60 |
| 8 | 60 |
| 9 | 60 |
| 10 | 60 |

Submit

Figure 5 - Input Debounce Settings

Each of the 10 inputs can have its own input debounce time. This is the amount of time, in milliseconds, that the input is allowed to stabilize from first change detection to final sampling. The timer resolution is only 20ms, so multiples of 20ms must be used. Other values will work, but give no finer resolution. Once all values have been set, press the Submit button to send the values to the NEO. Save to EEPROM to make them permanent, (Section 3.9).

3.6 Echo Packet

The Echo Packet function allows the system to operate on networks that do not support multicast. A typical application might be a number of radios spread throughout a network. Since multicast is not supported, the radio adaptors (IP-223s or C-6200s) are programmed to send packets to a specific static IP address; the IP address of the NEO-10 with Echo Packet enabled.

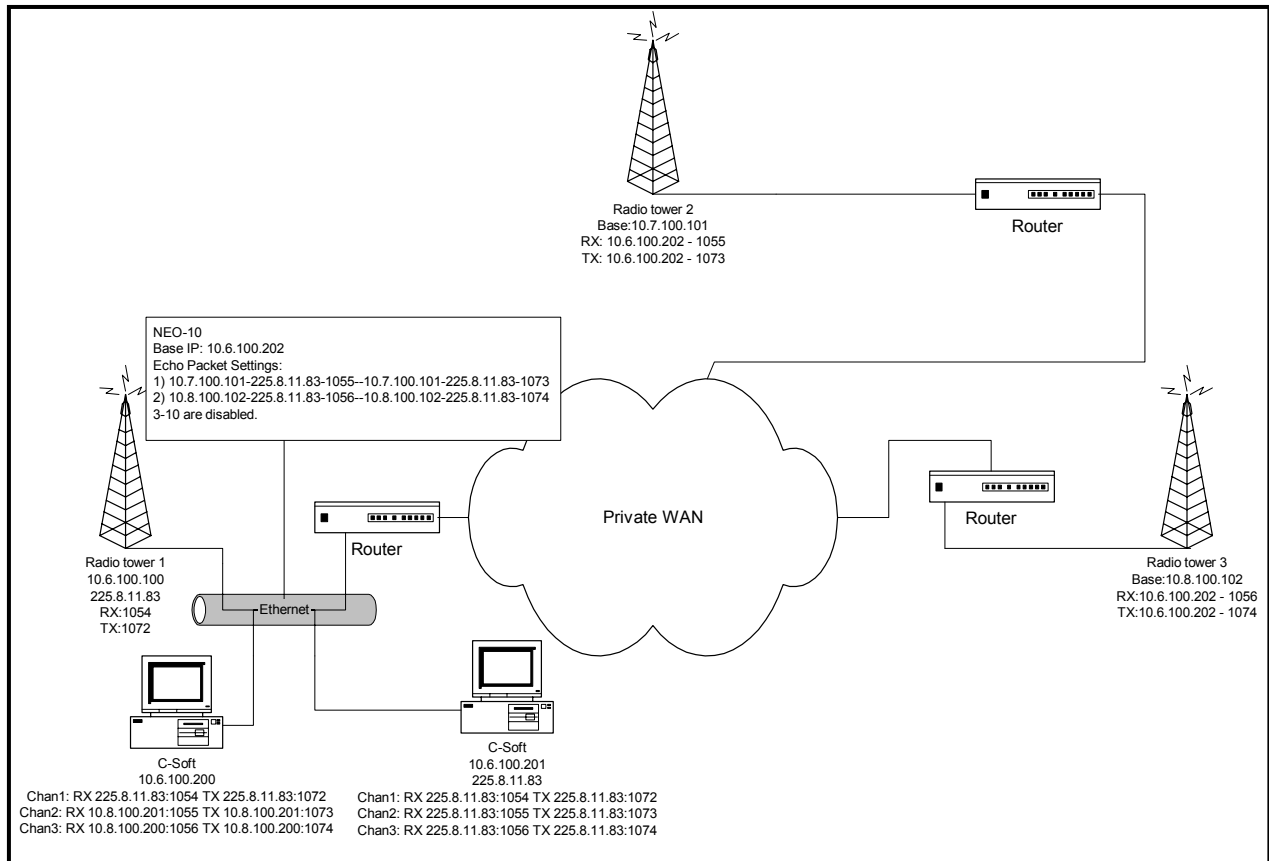


Figure 6-Echo Packet Setup Example

The Example shown in Figure 6 shows a typical usage of the NEO in an echo packet configuration. It shows three radios, two of which are on other subnets. Since multicast is assumed to be blocked, only unicast UDP is available to get audio two and from Radio Towers 2 & 3. The two C-Softs on the 10.6 subnet are able to monitor and control Radio Tower 1 using multicast. However to reach Radios 2&3 the C-Softs send their traffic to the multicast address, which the NEO then translates and sends as unicast to Radio 2 or 3. Receive traffic from Radios 2&3 are sent directly to the NEO which then translates the packets back to multicast so each of the C-Soft consoles can monitor the RX audio. This enables NEO to function as a gateway for other consoles on the same local network segment. The local consoles transmit and receive the multicast address only and NEO translates and sends the packets to the radio directly.

The setup parameters shown for each device on the network are an example only. The parameters of the NEO are delineated by a dash between each value. The values correspond to the entry fields, per line, of the NEO setup screen shown in Figure 7. Note that RX traffic is a single direction copy. Packets received are copied only to the RX MCast address. Note that traffic received to the RX multicast address will be recopied back out. Since there should only be one receive source on the network for a given channel, this should not present a problem. This is depicted by the arrow at the top of the Rx columns. TX traffic is bi-directional. Traffic received as multicast is sent to the unicast address and traffic received as unicast is copied to the multicast address. The ports are still used to delineate channels. Unused ports should not be enabled.

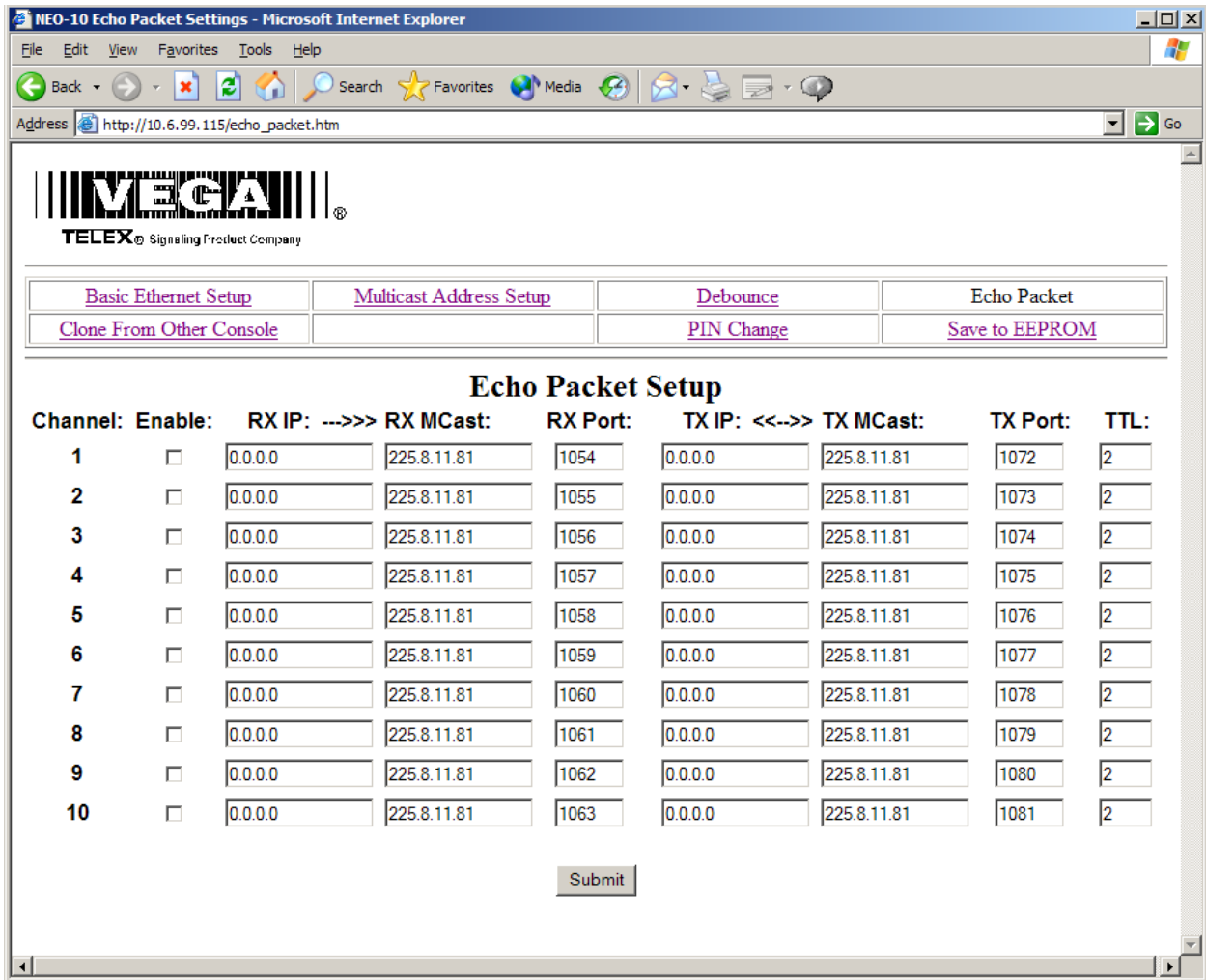


Figure 7 - Echo Packet Setup

3.7 Clone From Other NEO

The Clone function allows for the parameters of one NEO to be copied to another over the network. Simply enter the IP address of the unit to copy the parameters from and press the submit button. The parameters will be copied. The only parameters that are not copied are the PIN number, IP address, and Mask.

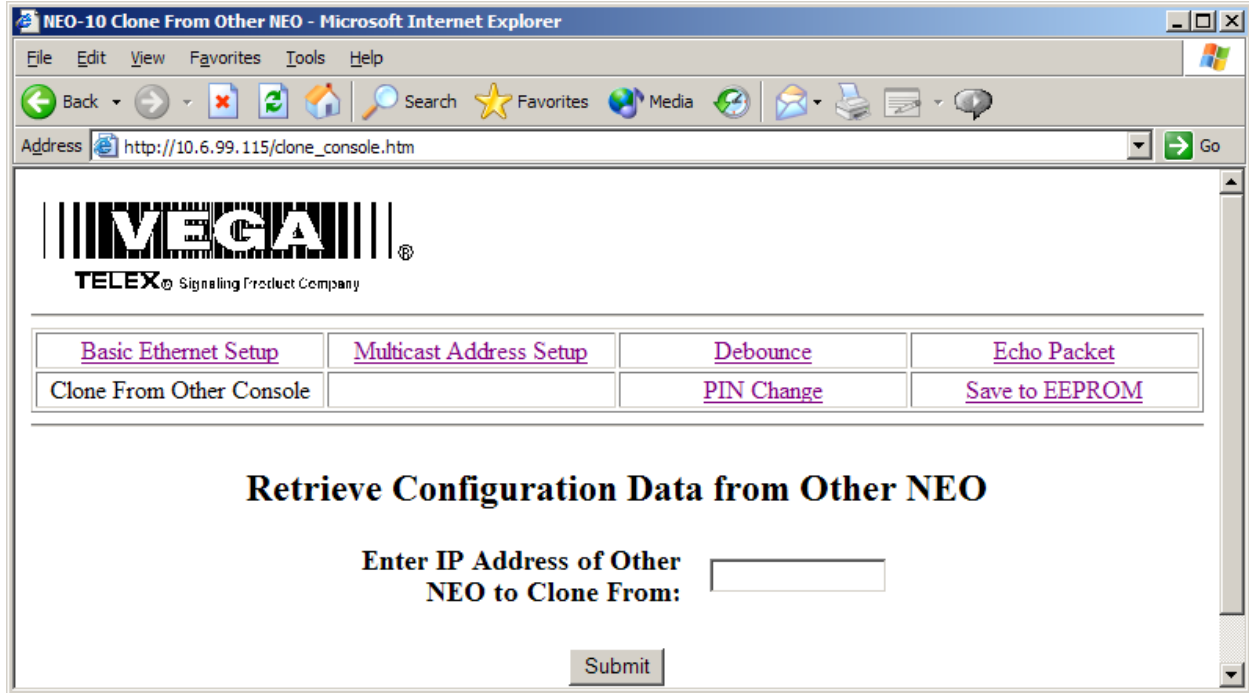
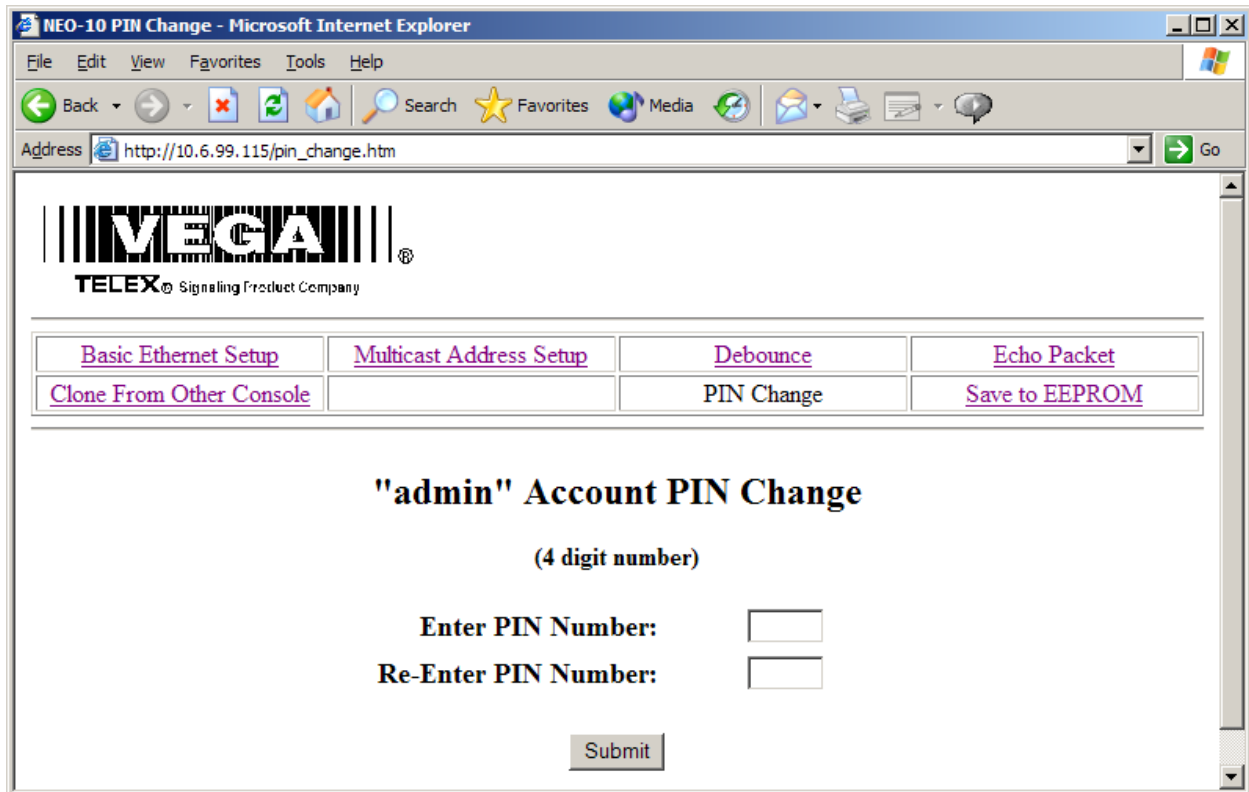


Figure 8 - Clone from Other NEO

3.8 PIN Change

The PIN number is the password required to enter the setup mode of the NEO. The default is no PIN number. The PIN number is a 4 digit number that must be entered twice and then submitted.



NEO-10 PIN Change - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Refresh Print Mail Stop

Address http://10.6.99.115/pin_change.htm Go

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| | | | |
|--|---|----------------------------|--------------------------------|
| Basic Ethernet Setup | Multicast Address Setup | Debounce | Echo Packet |
| Clone From Other Console | | PIN Change | Save to EEPROM |

"admin" Account PIN Change

(4 digit number)

Enter PIN Number:

Re-Enter PIN Number:

Submit

Figure 9 - Set PIN Number

3.9 Save Changes to EEPROM

As each group of settings are changed and submitted, they still must be saved to EEPROM to be stored permanently. Some settings require reboot of the device to take effect. These are primarily IP parameters.

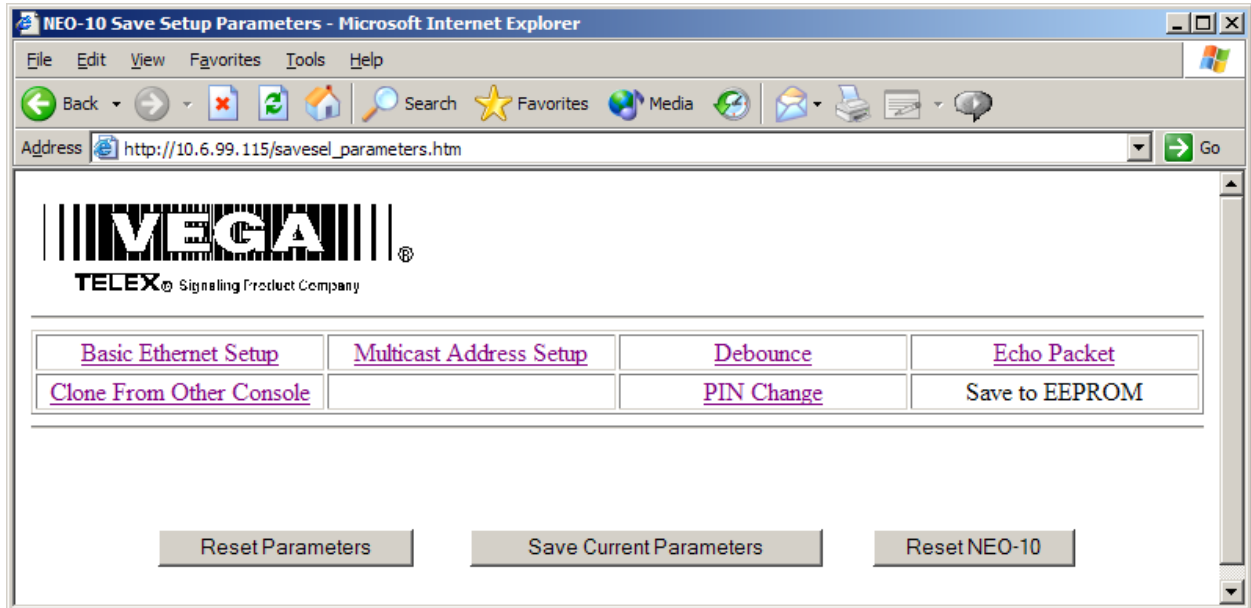


Figure 10 - Save to EEPROM

4 BILL OF MATERIAL AND SCHEMATICS

| | | | | | | |
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| APPROVALS: | DR BY: SBC DATE: 09/16/2003 | CHK: | APPD: | PROD: | REV LEVEL: | 1 |
| TITLE: | PCB ASSY, NEO-10 | | | | | |

| REVISIONS | | | | |
|-----------|-------------|--------|----------|------|
| REV | DESCRIPTION | ECO NO | DATE | APPD |
| 1 | PROTOTYPE | | 09/16/03 | |
| | | | | |
| | | | | |
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| | | DATE: 09/16/2003 | | | | | |
| TITLE: PCB ASSY, NEO-10 | | | | | | | |
| 1 | | | 14 | CAP | 10uf 16vTANT 3528 B | 102877065T | C1 C3 C11 C18 C19 C68 C71 C73 C74 C123 C124 C131 C162 C329 |
| 2 | | | 15 | CAP | 0805 0.1UF 25V +/-10% | 102881186T | C6 C7 C8 C9 C10 C12 C13 C29 C30 C56 C69 C72 C75 C330 C59 |
| 3 | | | 1 | CAP | 1000U,ELECTROLYTIC,LEADED | DO NOT PLACE | C15 |
| 4 | | | 1 | CAP | .001UF 0603 50V +/-10% | 102881717T | C150 |
| 5 | | | 2 | CAP | 22PF 0603 | 723482121T | C151 C152 |
| 6 | | | 4 | CAP | 1uF 25V 3216 TANT | 102877053T | C2 C5 C14 C60 |
| 7 | | | 1 | CAP | 1000U,ELECTROLYTIC,LEADED | 51821526 | C369 |
| 8 | | | 2 | CAP | 4.7UF TANT A SIZE | 102877067T | C38 C39 |
| 9 | | | 40 | CAP | .1UF 0603 | 723489101T | C4 C16 C17 C20 C21 C22 C23 C24 C25 C26 C27 C28 C31 C32 C33 C34 C35 C36 C37 C44 C45 C48 C49 C50 C51 C52 C53 C58 C63 C64 C65 C66 C67 C70 C87 C89 C127 C128 C136 C167 |
| 10 | | | 2 | CAP | 0805 330PF 50V +/-5% | 72341131T | C47 C57 |
| 11 | | | 2 | CAP | 0805 47PF 50V +/-5% | 72341121T | C54 C55 |
| 12 | | | 9 | CAP | 0.01UF 0603 25V +80/-20% | 723489100T | C40 C41 C42 C43 C46 C61 C91 C125 C129 |
| 13 | | | 2 | CAP | 6PF 0603 50V +/- 5% | 102879805T | C62 C137 |
| 14 | | | 1 | CAP | 1000PF 500V 1206 | 723538T | C88 |
| 15 | | | 1 | LED | RED SMT 0805 | 760532T | D1 |
| 16 | | | 2 | DIODE | SMT 4004 1A DIODE | 16016481SMT | D2 D3 |
| 17 | | | 1 | LED | GREEN SMT 0805 | 7605321T | D4 |
| 18 | | | 20 | DIODE | 1N914 DIODE SOT-23 | 58711000T | D5 D6 D7 D8 D10 D11 D13 D14 D16 D17 D19 D20 D22 D23 D25 D26 D28 D30 D32 D33 |
| 19 | | | 10 | LED | RT ANG. DUAL VERT. LED RED | 760506 | D9 D12 D15 D18 D21 D24 D27 D29 D31 D34 |
| 20 | | | 1 | FUSE | SMT FUSE WITH HOLDER 5A SLO BLC | 7101052T | F44 |
| 21 | | | 16 | FERRITE | 0805 FERRITE BEAD | 723511T | FB1 FB2 FB3 FB4 FB5 FB6 FB7 FB8 FB9 FB10 FB11 FB12 FB13 FB14 FB22 FB23 |
| 22 | | | 1 | FERRITE | COMMON MODE FB | 724039T | FB44 |
| 23 | | | 1 | CONN | EMULATION HEADER | 640125 | J1 |
| 24 | | | 1 | CONN | 20 PIN SURFACE MOUNT HEADER | DO NOT PLACE | J12 |
| 25 | | | 1 | CONN | CN-3PIN WEILAND | 2862050 | J2 |
| 26 | | | 10 | CONN | RJ-45 8 PIN RECEPT | 2862013 | J3 J5 J6 J7 J8 J10 J11 J13 J14 J15 |
| 27 | | | 1 | CONN | SHIELDED RJ-45 ETHERNET w/ LEDs | 640157 | J4 |
| 28 | | | 1 | CONN | RTDB9 | 640149 | J9 |
| 29 | | | 10 | RELAY | DPDT THU HOLE | 1800329 | K1 K2 K3 K4 K5 K6 K7 K8 K9 K17 |
| 30 | | | 20 | TRANSISTOR | MMBT3904 SOT-23 | 54671200T | Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 |
| 31 | | | 7 | RES | 0 OHM 0805 5% | 102506000T | R1 R2 R133 R143 R144 R145 R146 |
| 32 | | | 4 | RES | 75 OHM 0603 1% | 723481084T | R102 R104 R114 R115 |
| 33 | | | 1 | RES | 4.64K 0805 1% | 102515264T | R11 |
| 34 | | | 1 | RES | 53.6K 0805 | 102515370T | R12 |
| 35 | | | 1 | RES | 3.01K 0805 1% | 102515246T | R140 |
| 36 | | | 1 | RES | 301 1% 0603 | 723481146T | R141 |

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| | | DATE: 09/16/2003 | | | | | |
| TITLE: PCB ASSY, NEO-10 | | | | | | | |
| 37 | | | 10 | RES | 2.4K 0603 | 723488242T | R23 R24 R25 R26 R150 R181 R196 R371 R372 R373 |
| 38 | | | 4 | RES | 0 OHM 0603 | DO NOT PLACE | R16 R43 R53 R54 |
| 39 | | | 2 | RES | 15 OHMS 0603 | 723488150T | R162 R27 |
| 40 | | | 9 | RES | 10K 0603 | 723488103T | R17 R18 R32 R77 R78 R79 R15 R138 R6 |
| 41 | | | 2 | RES | 0603 OPTIONAL | DO NOT PLACE | R180 R195 |
| 42 | | | 1 | RES | 1.5K 0603 5% | 723488152T | R197 |
| 43 | | | 2 | RES | 0805 6.98k 1% | 102515281T | R29 R131 |
| 44 | | | 5 | RES | 0 OHM 0603 | 723488000T | R3 R4 R5 R139 R166 |
| 45 | | | 32 | RES | 0805 10K 100V 1% | 102515300T | R30 R31 R33 R60 R61 R70 R71 R72 R80 R81 R83 R86 R88 R89 R93 R94 R98 R101 R103 R105 R108 R109 R110 R113 R118 R119 R124 R125 R126 R130 R388 R389 |
| 46 | | | 30 | RES | 0603 1k 5% | 723488102T | R7 R8 R9 R10 R14 R28 R34 R36 R62 R69 R73 R74 R84 R85 R90 R91 R99 R100 R106 R107 R111 R112 R122 R123 R127 R128 R129 R134 R136 R137 |
| 47 | | | 15 | RES | 47 OHMS 0805 5% | 102506470T | R35 R37 R38 R40 R41 R42 R44 R45 R46 R47 R48 R50 R51 R52 R57 |
| 48 | | | 4 | RES | 0805 1k 1% | 102515200T | R39 R132 R135 R142 |
| 49 | | | 1 | RES | 22.1K 0603 1% | 723481333T | R49 |
| 50 | | | 2 | RES | 220 OHMS 0805 5% | 102506221T | R55 R56 |
| 51 | | | 2 | RES | 470 OHMS 0603 | 723488471T | R59 R58 |
| 52 | | | 1 | RES | 4.7K 0603 | 723488472T | R63 |
| 53 | | | 2 | RES | 30.1K 1% 0603 | 723481346T | R75 R13 |
| 54 | | | 1 | RES | 33.2K 1% 0603 | 723481350T | R76 |
| 55 | | | 1 | RES | 2.2M 0805 5% | 102506225T | R82 |
| 56 | | | 8 | RES | 0805 OPTIONAL | DO NOT PLACE | R87 R96 R97 R116 R117 R120 R121 R147 |
| 57 | | | 26 | RES | 56 OHMS 0603 1% | 723481072T | R92 R95 R157 R158 R159 R160 R161 R182 R183 R186 R188 R189 R190 R191 R192 R193 R194 |
| 58 | | | 1 | SWITCH | SMT TACT SWITCH | 700182T | S1 |
| 59 | | | 1 | XFMR | PE-68515L 10/100 ETHERNET XFMR | 730154S | T3 |
| 60 | | | 1 | IC | NET+50 | 760342 | U1 |
| 61 | | | 1 | IC | TC7S86FU | 760343S | U12 |
| 62 | | | 1 | IC | 512Kx16 FLASH ATMEL/AMD | 7603444PS | U13 |
| 63 | | | 2 | IC | SN74LVC541ADWR SMT | 760256T | U14 U18 |
| 64 | | | 2 | IC | MT48LC4M16A2-75 4Mx16 SDRAM | 760501S | U16 U17 |
| 65 | | | 1 | IC | 74HC00 QUAD NAND | 17-03-051986T | U19 |
| 66 | | | 2 | IC | LT1086CM-33 3.3V REGULATOR | 511155000S | U2 U28 |
| 67 | | | 1 | IC | MAX3232CSE S016 | 760349S | U20 |
| 68 | | | 2 | IC | SN74LVC574ADW SMT | 760257T | U22 U23 |
| 69 | | | 1 | IC SOCKET | PLCC SOCKET 44 | 539030044 | FOR U24 |
| 70 | X | | 1 | IC | 7032 NEO | 76026718PS | U24 |
| 71 | | | 1 | IC | SN74LVC541ADWR SMT | DO NOT PLACE | U25 |
| 72 | | | 2 | IC | 74LCX245 Bi-Directional 8bit Bus Chip | DO NOT PLACE | U26 |
| 73 | | | 4 | IC | LM317 ADJ REGULATOR, SMT | 760250T | U3 U4 U27 U29 |

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| | | Lincoln, Nebraska USA | | | | |
| APPROVALS: | DR BY: SBC DATE: 09/16/2003 | CHK: | APPD: | PROD: | REV LEVEL: | 1 |
| TITLE: | | PCB ASSY, NEO-10 | | | | |
| ITEM | NEW | QTY | TYPE | DESCRIPTION | PART NO. | DESIGNATOR |
| 74 | | 1 | IC | Intel LXT791ALC | 760533 | U49 |
| 75 | | 5 | IC | 74LCX245 Bi-Directional 8bit Bus Chip | 760255 | U5 U9 U10 U11 U15 |
| 76 | | 1 | IC | TC7S32FU | 760503S | U6 |
| 77 | | 2 | IC | TC7S08FU | 760504S | U7 U21 |
| 78 | | 1 | IC | TPS70102PWP | 760505S | U8 |
| 79 | | 1 | XTAL | 44.2368MHz 3.3V OSC | 780191S | Y1 |
| 80 | | 1 | XTAL | 25.000MHZ SMT | 780189S | Y5 |
| 81 | X | 1 | PCB | PRINTED CIRCUIT BOARD | 750679 | |
| 82 | | 1 | PASTE | SOLDERPASTE | BE738 | |
| 83 | X | 1 | REF | SCHEMATIC | 770865 | |

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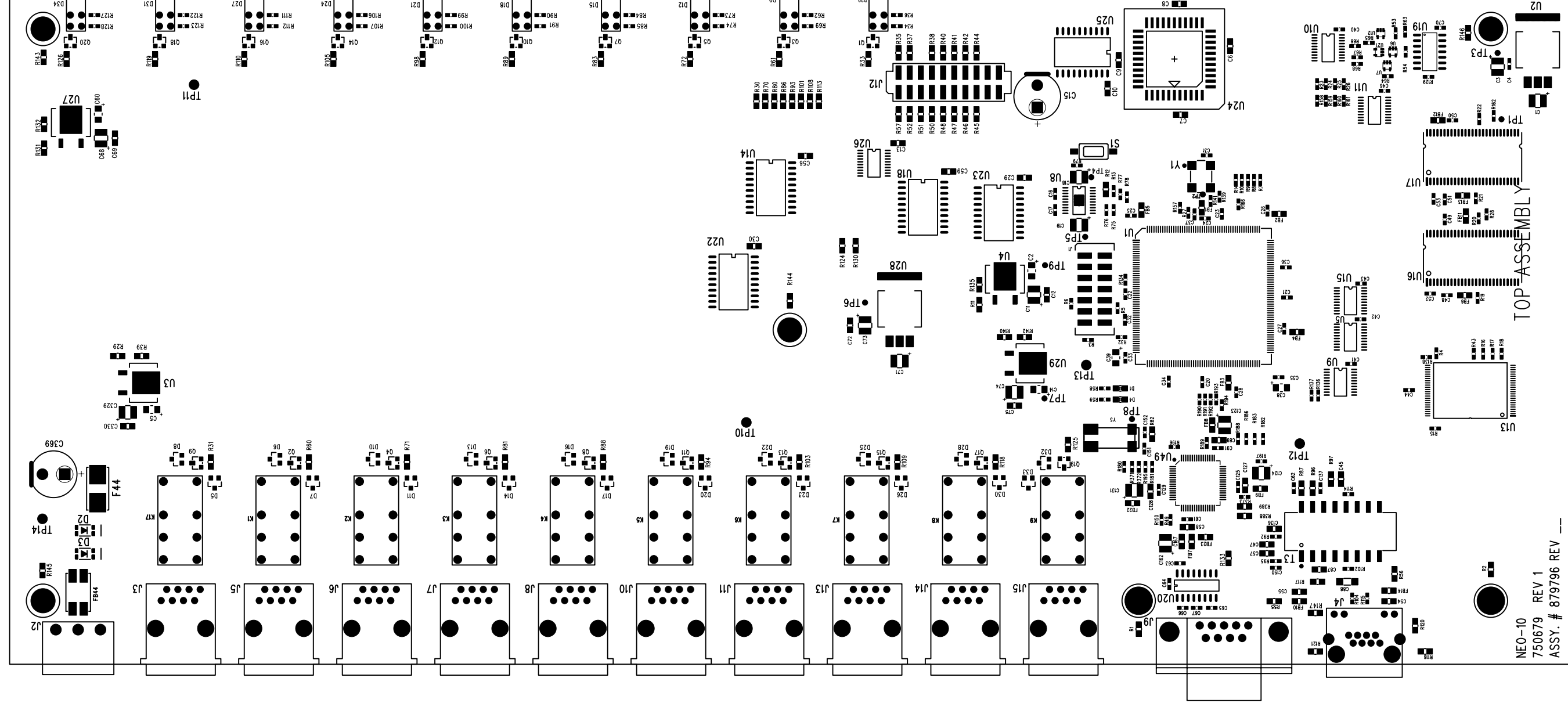
PART NO:
879796

APPROVALS
DR BY: SBC
DATE: 09/16/2003

CHK:
APPD:

PROD:
REV LEVEL: 1

TITLE
PCB ASSY, NEO-10



TOP ASSEMBLY
750679 REV 1
ASSY. # 879796 REV --

NEO-10
750679 REV 1
ASSY. # 879796 REV --

TOP ASSEMBLY

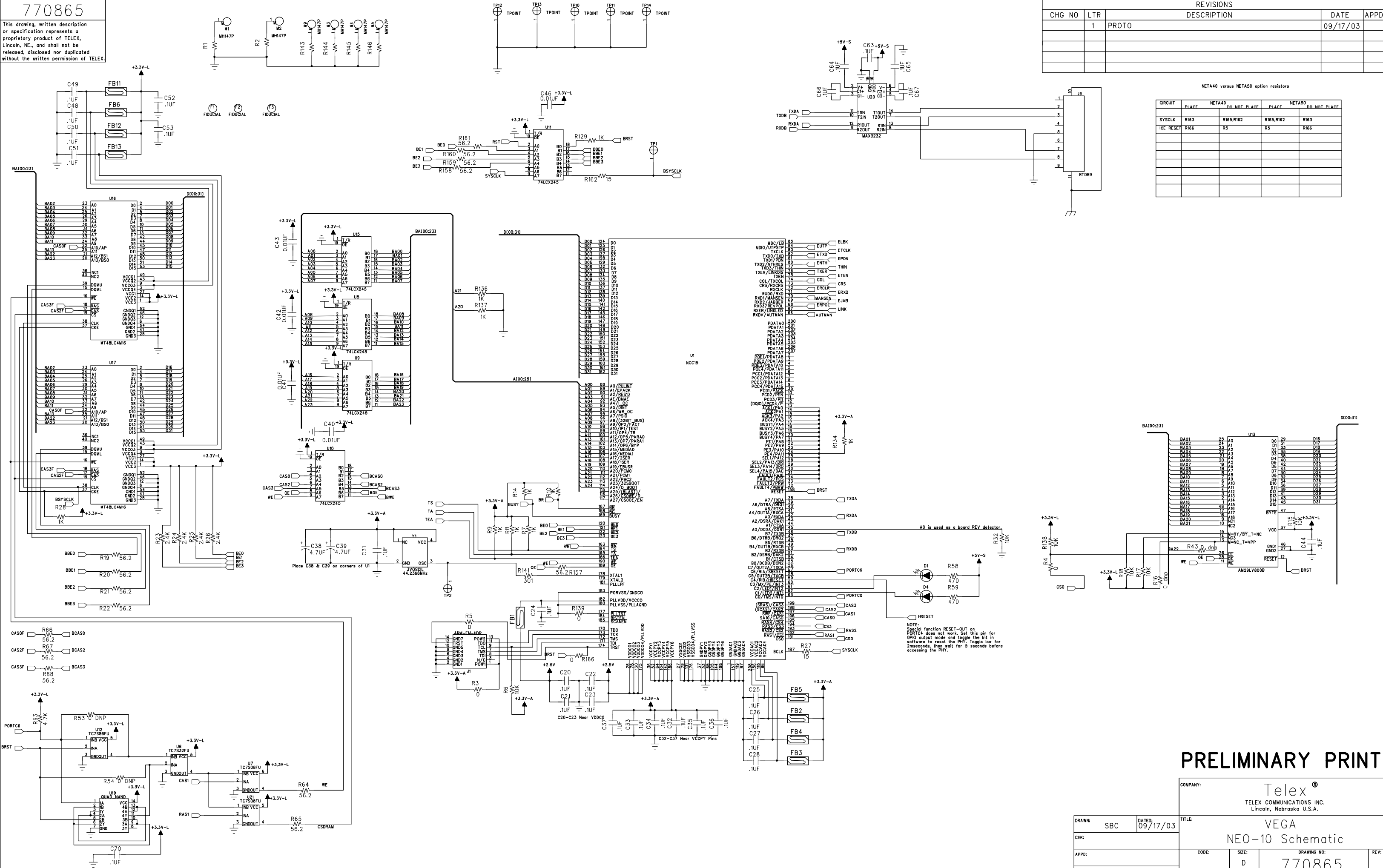
BE, LN

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| CHG NO | | LTR | DESCRIPTION | DATE | APPD |
|--------|--|-----|-------------|----------|------|
| | | 1 | PROTO | 09/17/03 | |

NETA40 versus NETA50 option resistors

| CIRCUIT | PLACE | NETA40 | DO NOT PLACE | PLACE | NETA50 | DO NOT PLACE |
|-----------|-------|-----------|--------------|-----------|--------|--------------|
| SYSCLK | R163 | R165,R162 | | R165,R162 | | R163 |
| ICE RESET | R166 | R5 | | R5 | | R166 |



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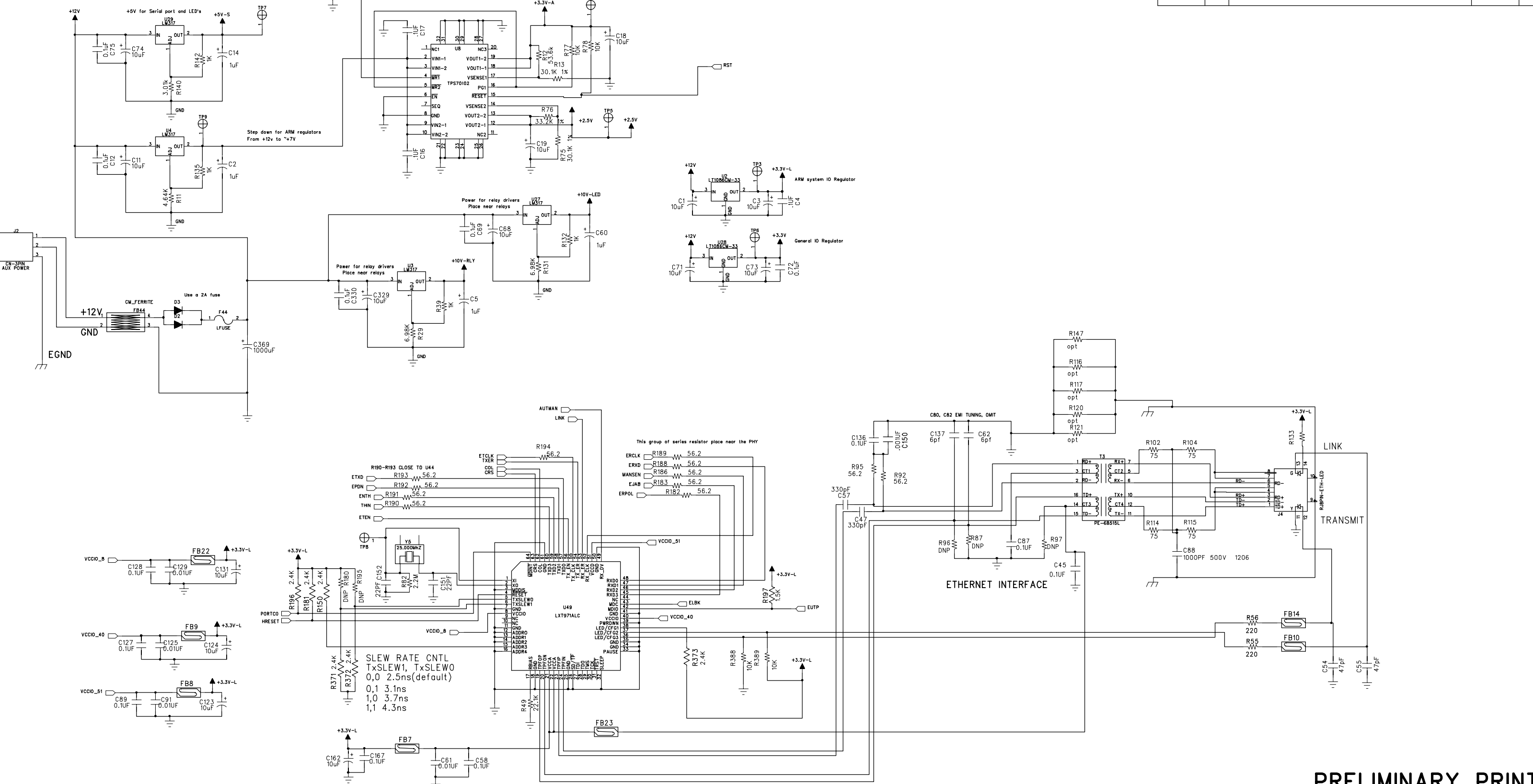
TITLE: VEGA
 NEO-10 Schematic

DRAWN: SBC
 CHECKED: [blank]
 APPD: [blank]
 PROD: [blank]

DATE: 09/17/03
 CODE: [blank]
 SIZE: [blank]
 DRAWING NO: 770865
 REV: [blank]
 SCALE: [blank]

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| REVISIONS | | | | |
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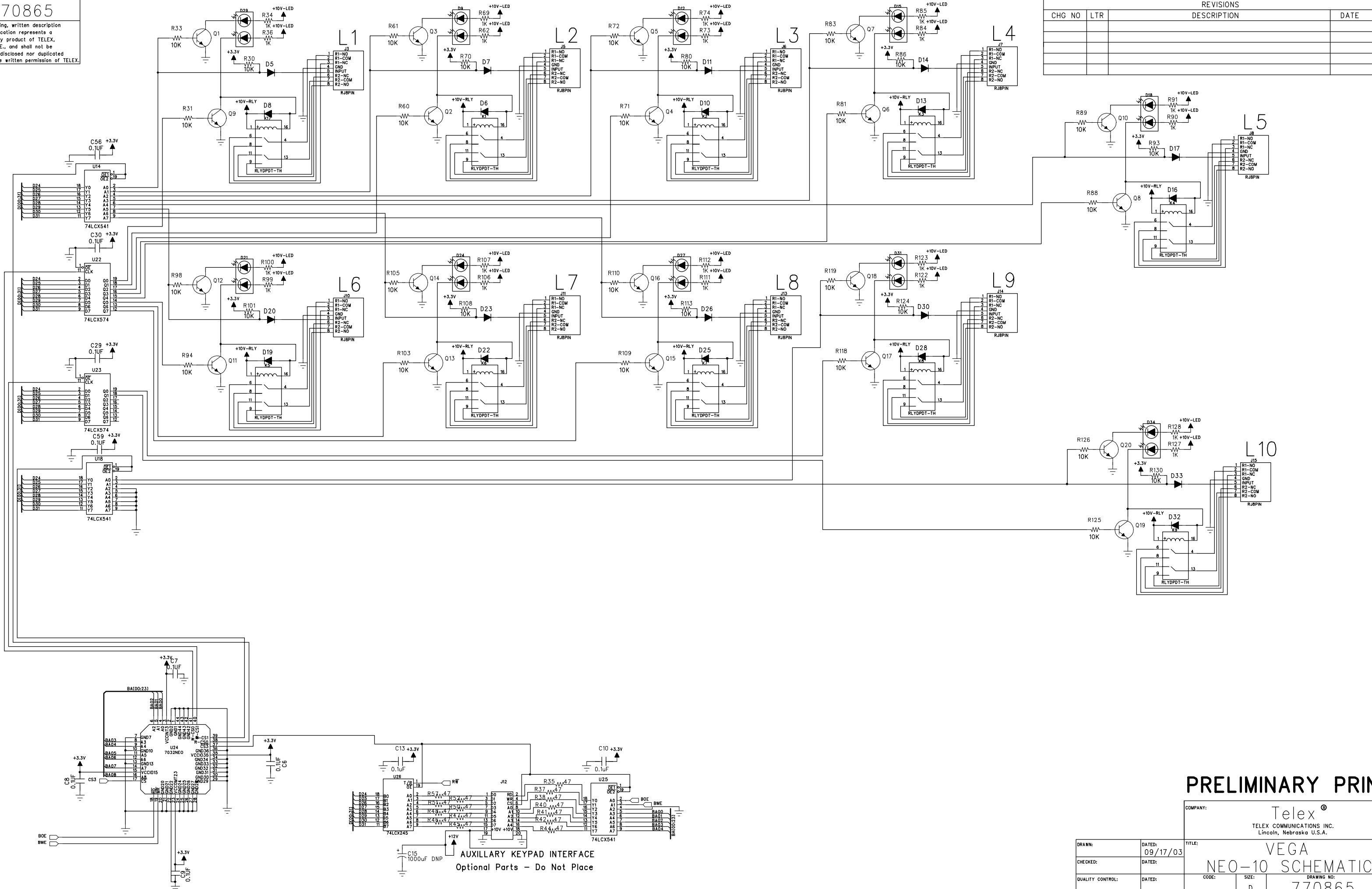
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| PROD: | | | |

| | | | |
|---------------------------------|-------|-------------|---------------|
| TITLE: VEGA NEO-10 Schematic | | | |
| CODE: | SIZE: | DRAWING NO: | REV: |
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| SCALE: | | | SHEET: 2 OF 3 |

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| CHG NO | | LTR | DESCRIPTION | DATE | APPD |
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TITLE: VEGA
 NEO-10 SCHEMATIC

| | |
|------------------|-----------------|
| DRAWN: | DATED: 09/17/03 |
| CHECKED: | DATED: |
| QUALITY CONTROL: | DATED: |
| RELEASED: | DATED: |

| | | | |
|--------|---------------|-------------|------|
| CODE: | SIZE: | DRAWING NO: | REV: |
| | D | 770865 | |
| SCALE: | SHEET: 3 OF 3 | | |

5 Warranty, Service, Repair, and Comments

Important! Be sure the exact return address and a description of the problem or work to be done are enclosed with your equipment.

Warranty (Limited)

All Telex Manufactured 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 Telex 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.

Factory Service Center

TELEX Communications, Inc.

Vega Signaling Products

8601 East Cornhusker Highway, Lincoln, Nebraska, 68507
Phone: (402) 465-7026 / (800) 752-7560 Fax: (402) 467-3279
E-mail: vega@telex.com, Web: www.vega-signaling.com

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