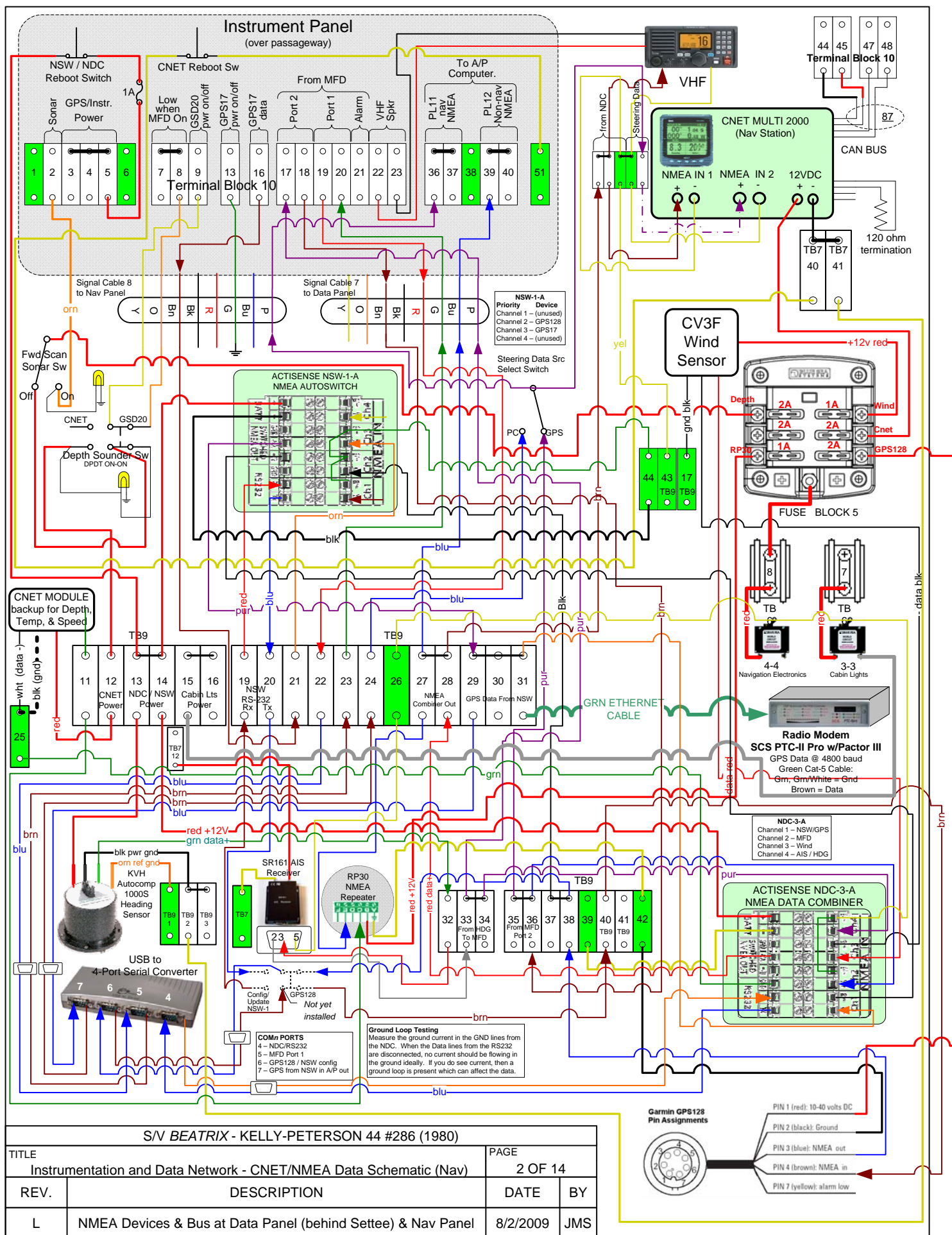
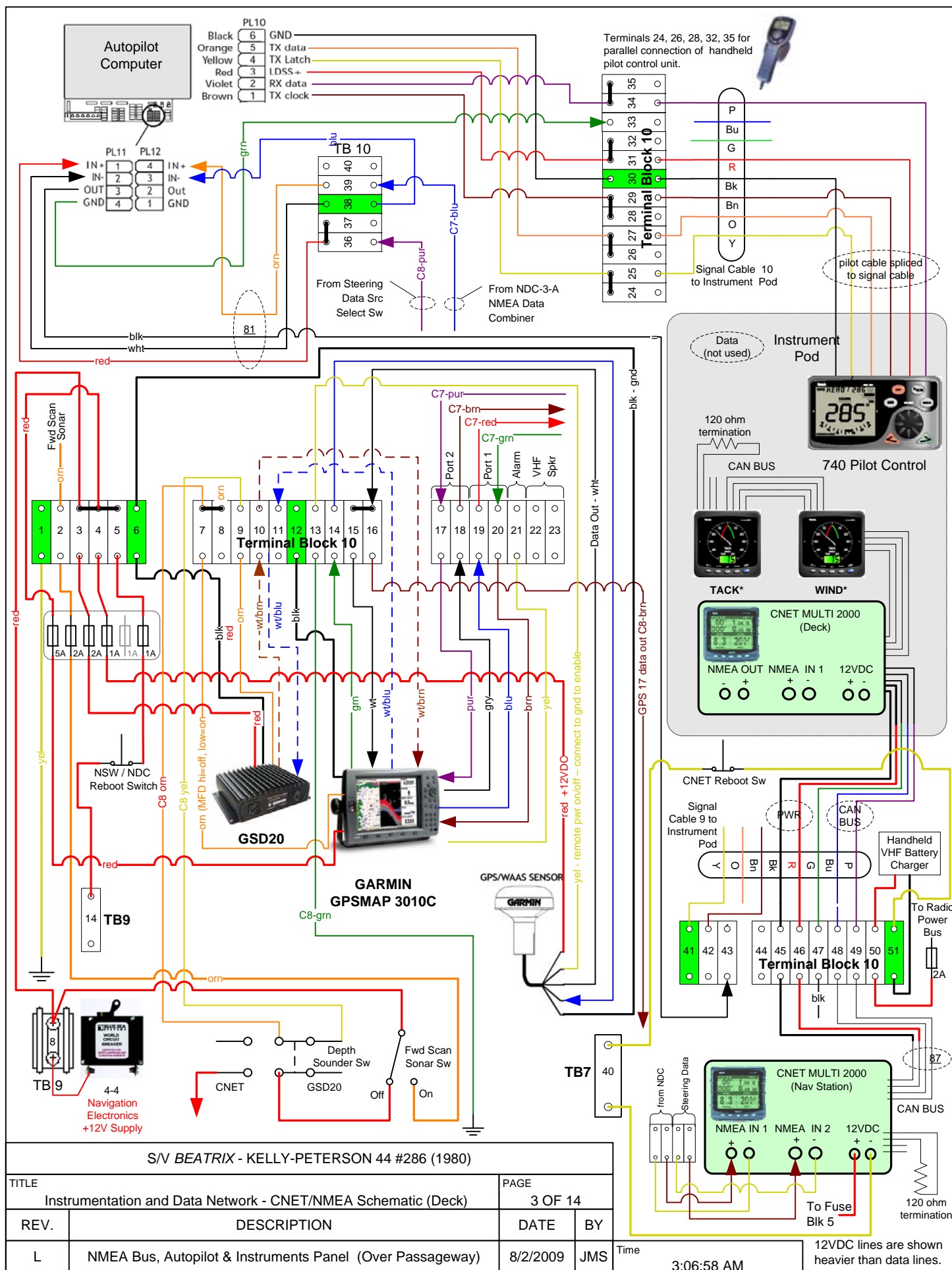


S/V BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
|--|---|----------|-----|
| Instrumentation and Data Network - RS232 & NMEA Data Flow Schema | | 1 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot, Multi-2000 Network, PCs & Instruments | 8/2/2009 | JMS |





BOTTOM

TOP

| |
|--|
| |
| NSW |
| |
| GPS 128 RS-232/NMEA |
| NMEA Input (unused) |
| NMEA Input from Depth/Speed Transducer |
| NMEA Input from Wind Sensor |
| |
| |
| To GPS Data Src Select Sw (purple) |
| From MFD Port 2 (brown) |
| Neg/Ground from Transducer |
| NEG to PC DB-9 (yel) |
| unused - reserved for 2nd computer COM port NMEA OUT |
| NMEA OUT from PC COM port DB-9 (pink) |
| unused |
| NMEA IN to COM port PC DB-9 (brown) |
| unused - reserved for 2nd computer COM port NMEA IN |
| GPS +12V Supply from Main Panel (REMOVE) |
| Data Panel Lights |
| NEG (YEL) connects to neg. main bus |
| |
| NEG to Nav Panel Steering Data In- (white) |
| |
| Data In to RP30 NMEA Repeater "F" terminal (orn) |
| Data In to RP30 NMEA Repeater "C" terminal (white) |
| +12V to Wind Sensor Interface Box |
| +12V to Depth Sounder Transducer |
| GPS +12V |
| 12V Outlets (+12V) |
| 12V Outlets (+12V) |
| Nav Lights Supply (+12V) |
| Tri Light (Red) |
| Anchor Light (Blue) |
| Windex Light (White) |
| Steaming Light (Black) |
| Stern Nav Light (Red) |
| Starboard Nav Light (Red) |
| Port Nav Light (Red) |
| KVH Heading Sensor Power Ground & Reference Ground |

| |
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| 10 |
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| 8 |
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| 5 |
| 4 |
| 3 |
| 2 |
| 1 |

| |
|---|
| GPS Cable Ground (Black) |
| to NC20 Ground wire (bare wire) |
| to USB Serial Converter |
| to NDC-3-A Data Combiner Input 1 (orn) |
| |
| to NDC-3-A Data Combiner Input 3 (blk) |
| to NDC-3-A Data Combiner Input 4 (brn) |
| |
| |
| (blue) to NDC-3-A Data Combiner Input 2 |
| (blue) to USB Serial Converter Port 10 |
| Gooseneck Nav Station Light neg |
| NEG |
| Signal Gnd/NMEA gnd from NSW |
| To Steering Data Select Switch (pur) |
| GPS Cable NMEA In (brown) optional |
| To Steering Data Select Switch (blue) |
| GPS Cable NMEA Out (blue) |
| Computer Power from 3-13 |
| |
| NMEA In Neg to Multi 2000 Deck 84 Green |
| NMEA Out Neg fm Multi 2000 Deck 84 Blue |
| NMEA In Pos to Multi 2000 Deck 84 White |
| NMEA Out POS fm Multi 2000 Deck 84 Red |
| |
| |
| |
| +12V to CNET Depth Module |
| +12V Outlets from CB3-8 |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| Anchor Windlass Pilot Light Ground |

PC
GPS

S/V BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
|--|--------------------------------|----------|-----|
| Instrumentation and Data Network - Terminal Blk 9 - Data/NavLights | | 4 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |

Terminal Block 9 is located in the aft locker behind the settee

TOP

[illegible][illegible][illegible]

| | | | |
|--|--------------------------------|--|-----------------|
| S/N BEATRIX - KELLY-PETERSON 44 #286 (1980) | | | |
| TITLE Instrumentation and Data Network - Terminal Block 10 - CNET/RADAR | | | PAGE 5 OF 14 |
| REV. | DESCRIPTION | | DATE BY |
| L | Cetrek Autopilot & Instruments | | 8/2/2009 JMS |

Terminal Block 10 is located in the Instrument / Alarm Panel on the cockpit bulkhead over the starboard passageway and connects the CNET, RADAR displays.

| C7 - SIGNAL CABLE 7 | |
|---------------------|---------------------------------------|
| RUN | Instrument/Alarm Panel to Nav Station |
| COLOR | DESCRIPTION |
| PUR | |
| BLUE | |
| GRN | |
| RED | |
| BLK | |
| BRN | |
| ORN | |
| YEL | |

| C8 - SIGNAL CABLE 8 | |
|---------------------|--|
| RUN | Instrument/Alarm Panel to Instrument Pod |
| COLOR | DESCRIPTION |
| PUR | Autopilot Control |
| BLUE | From Autopilot NMEA OUT to Multi-2000 |
| GRN | From Autopilot Signal GND to Multi-2000 |
| RED | Autopilot Control |
| BLK | Autopilot Control |
| BRN | Autopilot Control |
| ORN | Autopilot Control |
| YEL | Autopilot Control |

| C9 - SIGNAL CABLE 9 | |
|---------------------|------------------------------|
| RUN | Instrument/Alarm Panel to ER |
| COLOR | DESCRIPTION |
| PUR | |
| BLUE | |
| GRN | |
| RED | |
| BLK | |
| BRN | |
| ORN | |
| YEL | |

| C10 - SIGNAL CABLE 10 | |
|-----------------------|---------------------------|
| RUN | Pumps Panel to Main Panel |
| COLOR | DESCRIPTION |
| PUR | |
| BLUE | |
| GRN | |
| RED | |
| BLK | |
| BRN | |
| ORN | |
| YEL | |

| C11 - SIGNAL CABLE 11 | |
|-----------------------|-------------|
| RUN | |
| COLOR | DESCRIPTION |
| PUR | |
| BLUE | |
| GRN | |
| RED | |
| BLK | |
| BRN | |
| ORN | |
| YEL | |

| C12 - SIGNAL CABLE 12 | |
|-----------------------|-------------|
| RUN | |
| COLOR | DESCRIPTION |
| PUR | |
| BLUE | |
| GRN | |
| RED | |
| BLK | |
| BRN | |
| ORN | |
| YEL | |

S/V BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
|---|----------------------------|----------|-----|
| Instrumentation and Data Network - Signal Cables (Part 2) | | 6 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Signal Cable Function List | 8/2/2009 | JMS |

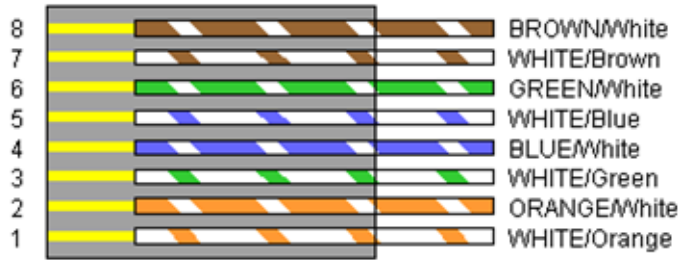
Note 1. Items marked with an asterisk (*) output battery negative. In the case of sensors, battery negative is the normal situation.

Note 2. Signal cables are Ancor 158010 Marine Grade 20 AWG 8-conductor shielded wire.

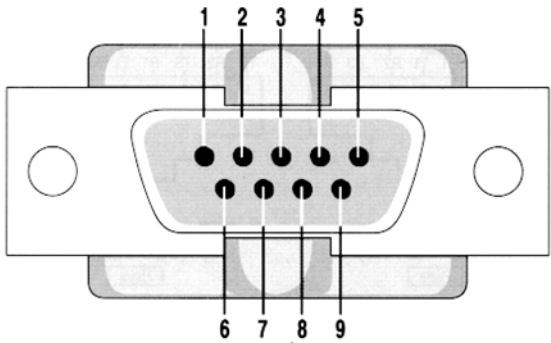
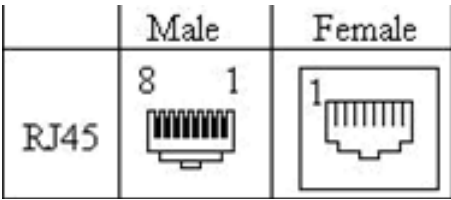
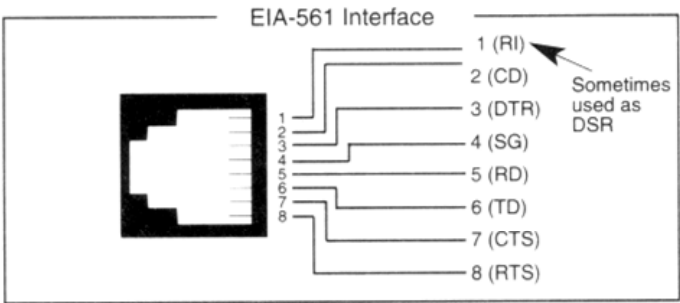
RJ45 Network Connector

| Pin No. | Wire Colour | Function |
|---------|--------------|----------------|
| 1 | WHITE/Orange | Transmit Data+ |
| 2 | ORANGE/White | Transmit Data- |
| 3 | WHITE/Green | Recieve Data+ |
| 4 | BLUE/White | None |
| 5 | WHITE/Blue | None |
| 6 | GREEN/White | Recieve Data- |
| 7 | WHITE/Brown | None |
| 8 | BROWN/White | None |

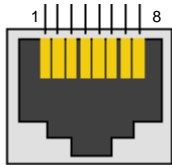
RJ45 Plug Colour Code
Contact Side - Tab is on Back



EIA-561 defines RS-232 on a modular connector. (For nonsynchronous applications only, since it does not provide for the synchronous clocking signals.)



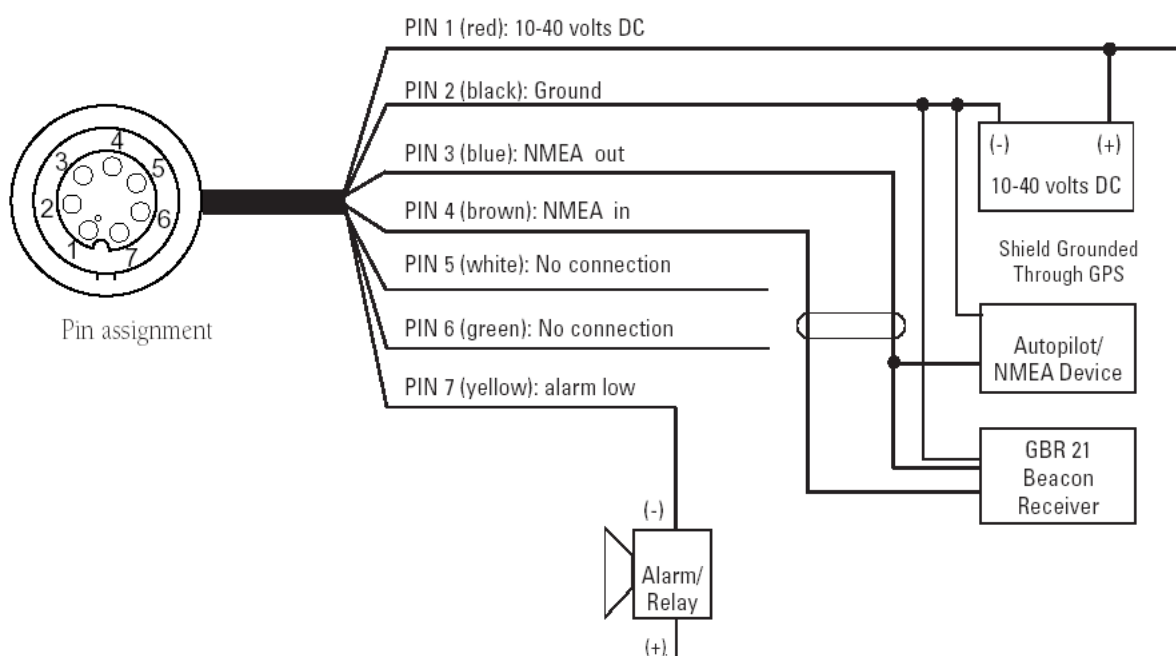
| Pin | Signal | Pin | Signal |
|-----|---------------------|-----|-----------------|
| 1 | Data Carrier Detect | 6 | Data Set Ready |
| 2 | Received Data | 7 | Request to Send |
| 3 | Transmitted Data | 8 | Clear to Send |
| 4 | Data Terminal Ready | 9 | Ring Indicator |
| 5 | Signal Ground | | |



RJ45



| | | | |
|--|--------------------------------|----------|-----|
| S/V BEATRIX - KELLY-PETERSON 44 #286 (1980) | | | |
| TITLE | | PAGE | |
| Instrumentation and Data Network - RJ45 Wiring | | 7 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |



| | | | |
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| S/N BEATRIX - KELLY-PETERSON 44 #286 (1980) | | | |
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| Instrumentation and Data Network - Garmin 128 GPS Wiring | | 8 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |

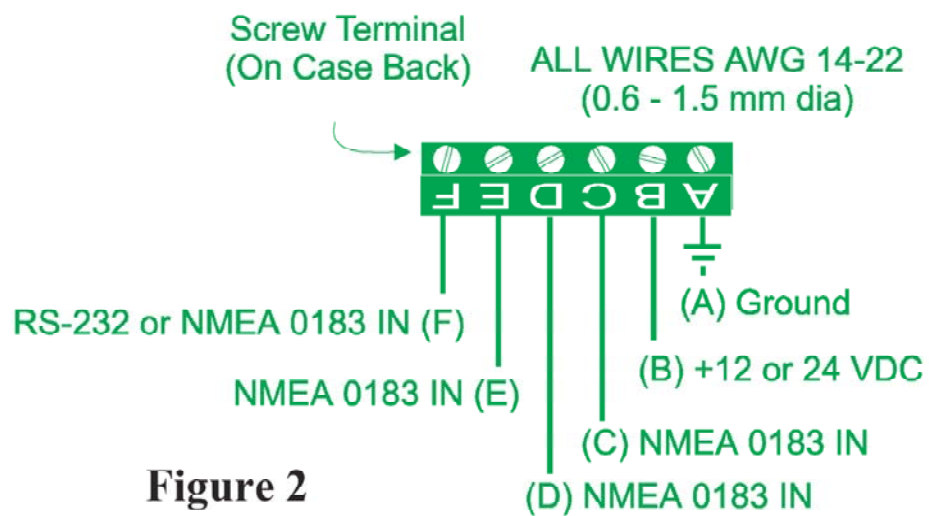


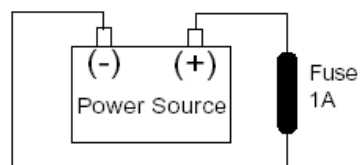
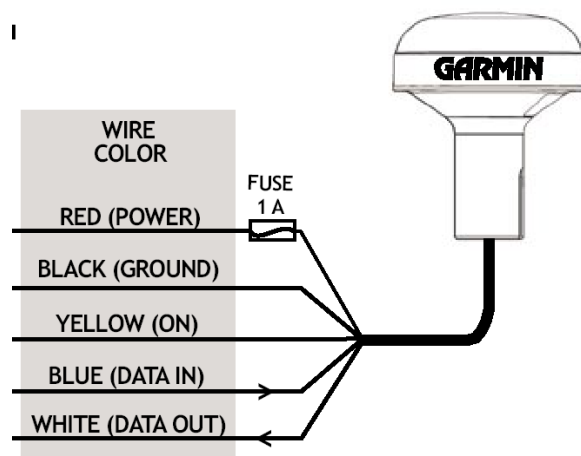
Figure 2

| | | | |
|---|--------------------------------|-----------------|-----|
| S/N BEATRIX - KELLY-PETERSON 44 #286 (1980) | | | |
| TITLE Instrumentation and Data Network - CH30 NMEA Repeater Wiring | | PAGE 9 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |

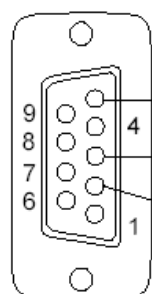
| PIN # | COLOR | FUNCTION |
|-------|-------------|---------------------|
| 1 | N/C | |
| 2 | N/C | |
| 3 | N/C | |
| 4 | WHITE/BROWN | PORT 3 DATA IN |
| 5 | WHITE/BLUE | PORT 3 DATA OUT |
| 6 | ORANGE | ACCESSORY ON |
| 7 | N/C | |
| 8 | N/C | |
| 9 | VIOLET | PORT 2 DATA IN |
| 10 | GRAY | PORT 2 DATA OUT |
| 11 | YELLOW | ALARM LOW |
| 12 | N/C | |
| 13 | WHITE | PORT 4 DATA IN |
| 14 | GREEN | PORT 4 DATA OUT |
| 15 | RED | DC POWER INPUT |
| 16 | BROWN | PORT 1 DATA IN |
| 17 | BLUE | PORT 1 DATA OUT |
| 18 | BLACK | GROUND (POWER/DATA) |

Power/Data (NMEA) Cable

GPS/WAAS SENSOR



GPS 16/17 Computer Serial Port Interconnection



DB-9
Serial Connector
(Female Pin Contacts)

PIN 5: GROUND

PIN 3: DATA OUT

PIN 2: DATA IN

(1) RED: POWER

(2) BLACK: GROUND

(3) YELLOW: REMOTE ON/OFF†

(4) BLUE: PORT 1 DATA IN

(5) WHITE: PORT 1 DATA OUT

(6) GRAY: PPS†

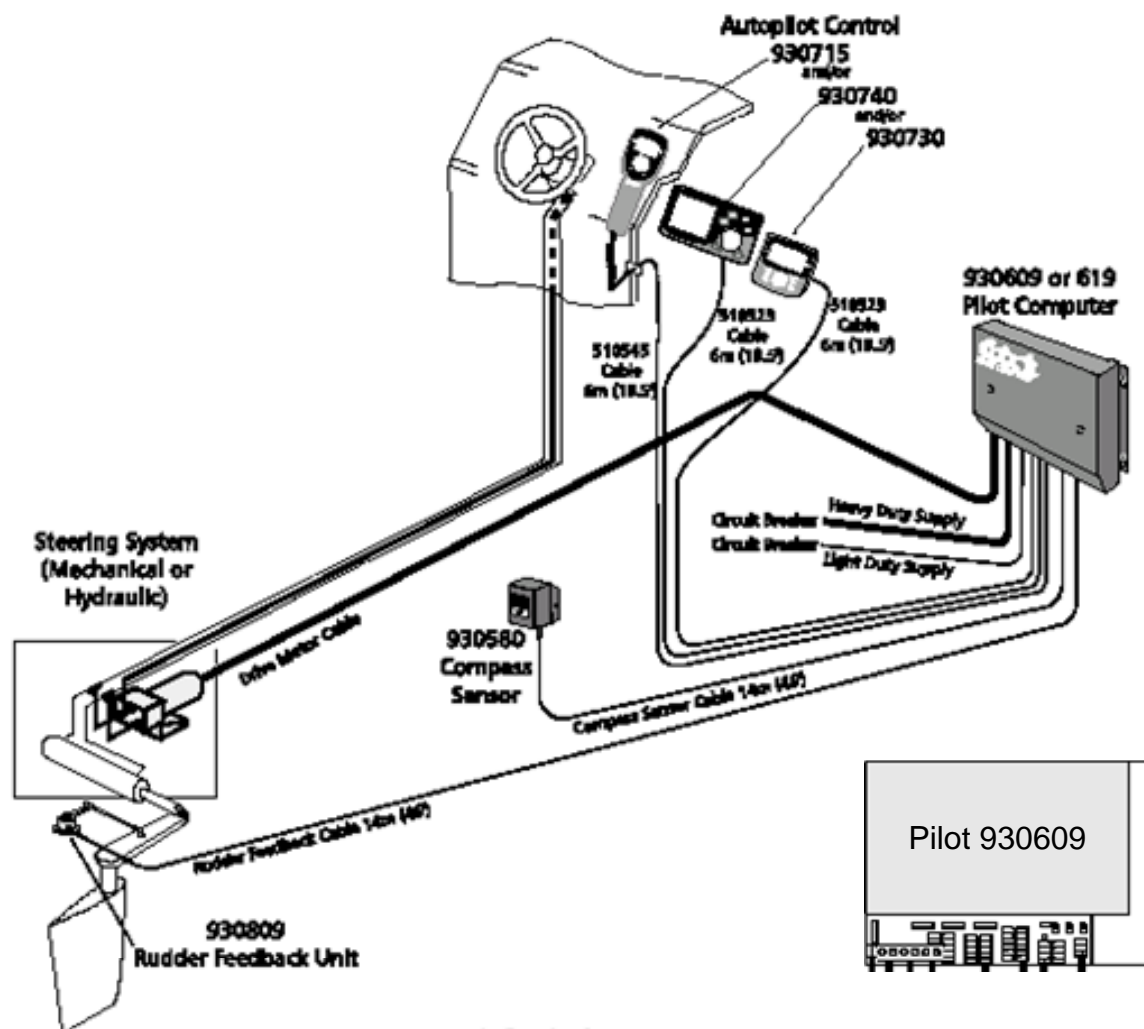
(7) GREEN: PORT 2 DATA IN

(8) VIOLET: PORT 2 DATA OUT†

GPS 16/17
Power/Data Cable

S/N BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
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| Instrumentation and Data Network - GPSMAP 3010C (MFD) Wiring | | 10 OF 14 | |
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A Basic System

715 Control Unit

740 Control Unit

| | | | |
|--|--------------------------------|------------------|-----|
| S/V BEATRIX - KELLY-PETERSON 44 #286 (1980) | | | |
| TITLE Instrumentation and Data Network - Instrument & Autopilot Install | | PAGE 11 OF 14 | |
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| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |

Connecting to NMEA devices

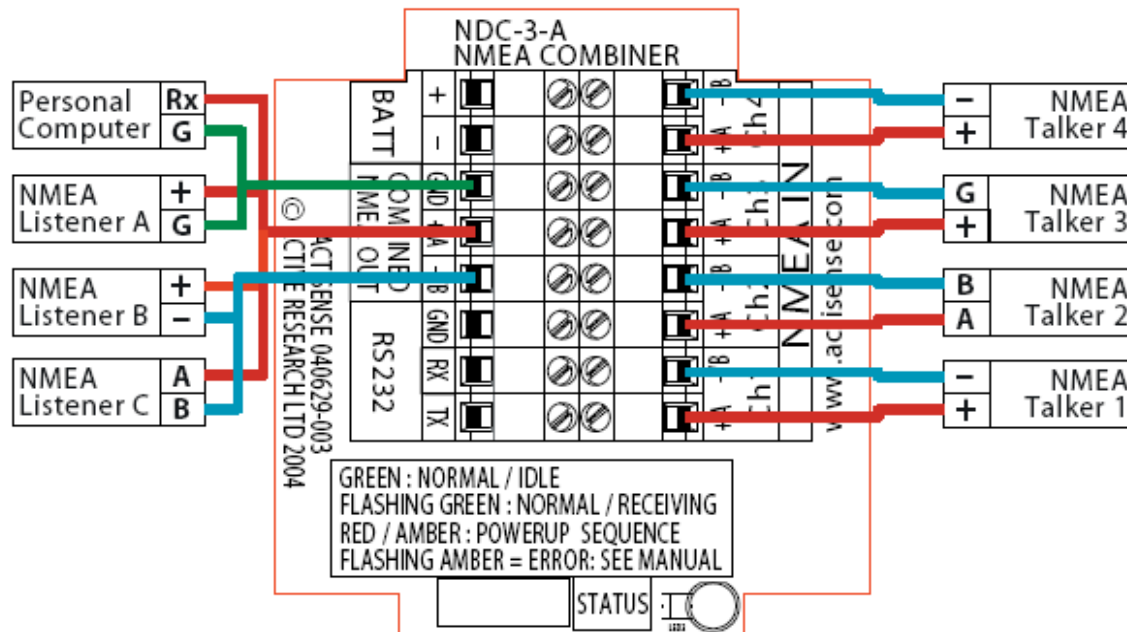


Figure 2 – NMEA 0183 connections

NMEA 0183 Inputs

The NMEA 0183 differential opto-isolated inputs are designed to handle a variety of NMEA 0183 device output specifications. Please determine (from device manufacturer's information) if the device(s) required to be connected to the Actisense™ NDC-3 conforms in full to the NMEA 0183 network communication standard. If it does not, the flexible Actisense™ NDC-3 inputs should still be capable of interfacing with the device, though this is not guaranteed.

The diagram above shows a typical installation with both fully compliant NMEA devices with differential inputs/ outputs, and non-differential output devices that output NMEA using the ground line as the "NMEA -" line.

NMEA Talker devices 1, 2 and 4: These devices conform in full to the NMEA 0183 standard. Devices 1 and 4 share the same connection ID's as the Actisense™ NDC, so connection is a simple matter of matching the ID's (refer to figure 2). Device 2 uses the RS485 convention connection ID's. Simply connect 'A' to '+/A' and 'B' to '-/B' (refer to figure 2).

NMEA Talker device 3: This device does not conform completely to the NMEA 0183 standard. However, by connecting '+' to '+/A' and its 'G/Ground' to the NDC "NMEA-" the NDC should be able to receive the NMEA data correctly.

NMEA 0183 Output

The NMEA 0183 buffered output is capable of driving up to 20 NMEA 0183 fully compliant listening devices, or a mixture of NMEA 0183 devices and a Personal Computer (PC) communication port.

NMEA Listener device's B and C: These devices conform in full to the NMEA 0183 standard and their connection ID's match that of the NDC.

Personal Computer: Whilst the RS-232 port is designed for connection to a PC, the NMEA 0183 output is also capable of being read by most PCs. Simply connect '+' to 'Rx' and 'G' to 'Gnd' on a standard D-type (probably male) connector.

NMEA Listener device A: This device does not conform in full to the NMEA 0183 standard. However, by connecting '-' to '-/B' and 'G/Ground' to 'Gnd' the device should be able to receive the NMEA data correctly, though this is not guaranteed.

Note:

1. Wire colours are for guidance only.

S/V BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
|---|--------------------------------|----------|-----|
| Instrumentation and Data Network - Actisense NDC-3-A Data Combiner Pg 1 | | 12 OF 14 | |
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| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |

Other Connections

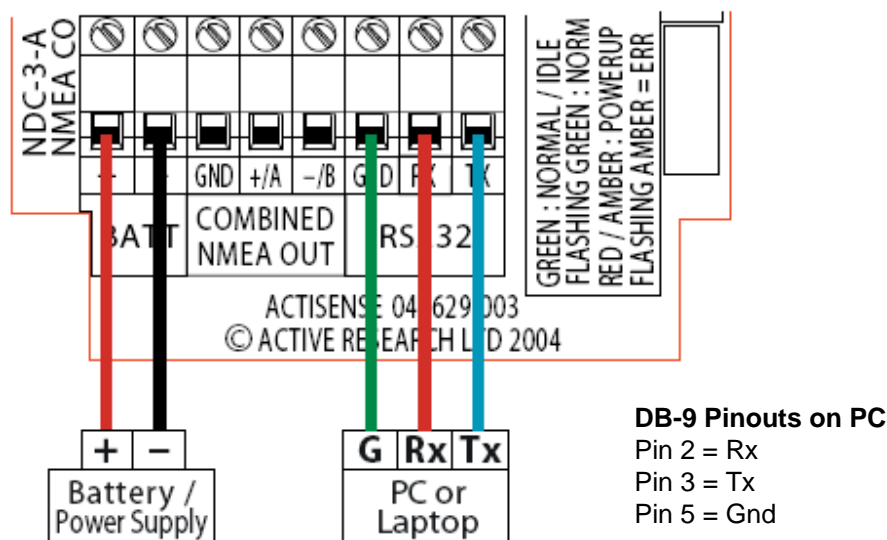


Figure 3 – RS-232 and Battery connections

Connecting to a Personal Computer

The RS-232 port can be connected to a PC communications port using a cable conforming to the following specification:

1. A D-type female (socket) connector for the PC end of the cable
2. A minimum of 3 cores are required in a shielded cable. Higher quality cable will naturally yield better performance / higher Signal-to-Noise Ratio. Most typical cables have two twisted pairs in this case, use one pair for the TX line and one pair for the RX line. Use the spare wire in each pair as a ground and connect the cable shield to ground only at the computer end.
3. The TX of the NMEA Combiner should be connected to the RX of the computer (pin 2) and the RX of the NMEA Combiner should be connected to the TX of the computer (pin 3).

Connecting to the battery supply

The Actisense™ NDC-3 should be wired to the vessel's battery supply in the most direct manner possible, to minimize interference from other electronic devices. The cable used should be of sufficient gauge to handle the power requirements of the Actisense™ NDC-3 (refer to the [Specifications](#) sections).

Diagnostic LED

| LED Colour / Flash Count | Mode / Error condition | Required user response |
|--|---|---|
| | Normal operation modes | The sequence below indicates a successful power-up of the NDC-3 and the commencement of data combining. |
| Red, No flashing | Start-up mode, No error | No response required. A normal operation mode that should last for no more than 1.5 seconds. Any longer indicates an error with the main program. |
| Red, No flashing | Flash updating mode, No error | No response required. LED will stay red for the duration of the flash update operation (using Flash Centre). Once operation complete, NDC hardware will be automatically reset. |
| Amber, No flashing | Initialise and self-test mode, No error | No response required. A normal operation mode that follows after the Start-up mode and should last for approximately 1 second. |
| Green, No flashing | Normal and no data mode, No error | No response required. A normal operation mode that follows the Initialise and self-test mode. Indicates that no error was detected during the self-test operation. Also indicates that no data is currently being received by the NDC-3 hardware. |
| Green, Flashing (1-10 per second) | Normal and data Rx mode, No error | No response required. A normal operation mode that indicates that data is currently being received (on at least one channel) by the NDC-3 hardware. Flash rate proportional to Rx rate. |
| | Error conditions | If the error persists the NDC-3 unit should be returned to Actisense™ (refer to the Contact Information section). |
| Amber, Flashing (Once every 4 seconds) | Error trap mode, EEPROM memory error | An error with the EEPROM memory has been detected during the self-test mode. Reset the NDC-3 hardware. |

S/V BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
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| Instrumentation and Data Network - Actisense NDC-3-A Data Combiner Pg 2 | | 13 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |

Connecting to NMEA devices

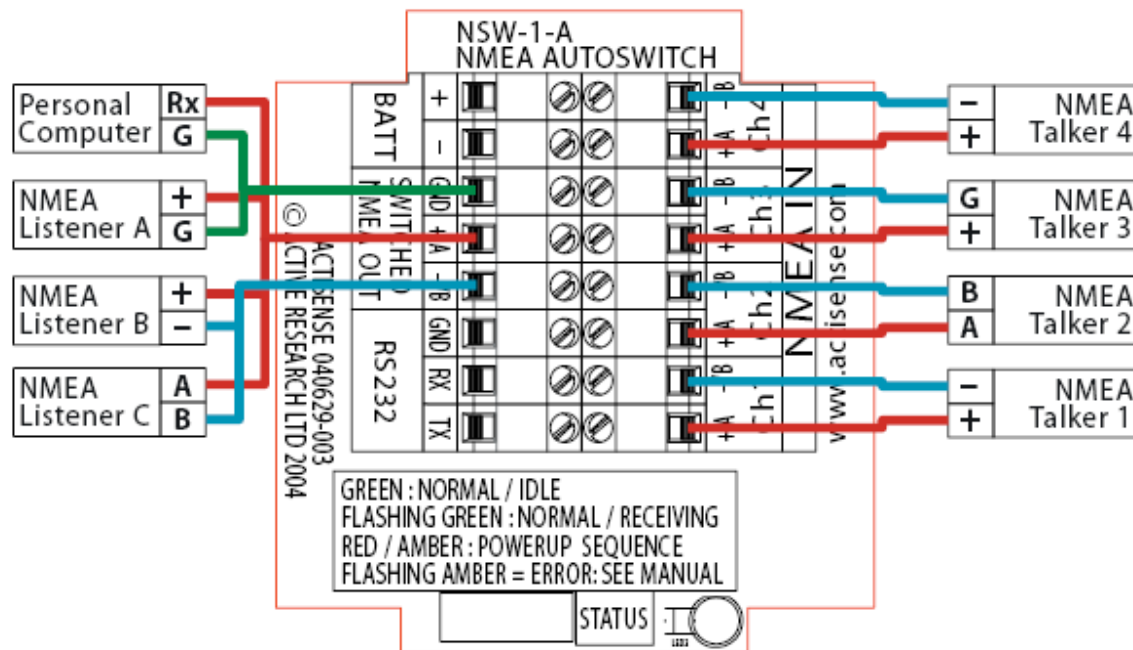


Figure 2 – NMEA 0183 connections

NMEA 0183 Inputs

The NMEA 0183 differential opto-isolated inputs are designed to handle a variety of NMEA 0183 device output specifications. Please determine (from device manufacturer's information) if the device(s) required to be connected to the Actisense™ NSW-1 conforms in full to the NMEA 0183 network communication standard. If it does not, the flexible Actisense™ NSW-1 inputs should still be capable of interfacing with the device, though this is not guaranteed.

The diagram above shows a typical installation with both fully compliant NMEA devices with differential inputs/ outputs, and non-differential output devices that output NMEA using the ground line as the "NMEA -" line.

NMEA Talker devices 1, 2 and 4: These devices conform in full to the NMEA 0183 standard. Devices 1 and 4 share the same connection ID's as the Actisense™ NSW, so connection is a simple matter of matching the ID's (refer to figure 2). Device 2 uses the RS485 convention connection ID's. Simply connect 'A' to '+/A' and 'B' to '-/B' (refer to figure 2).

NMEA Talker device 3: This device does not conform completely to the NMEA 0183 standard. However, by connecting '+' to '+/A' and its 'G/Ground' to the NSW "NMEA-" the NSW should be able to receive the NMEA data correctly.

NMEA 0183 Output

The NMEA 0183 buffered output is capable of driving up to 20 NMEA 0183 fully compliant listening devices, or a mixture of NMEA 0183 devices and a Personal Computer (PC) communication port.

NMEA Listener device's B and C: These devices conform in full to the NMEA 0183 standard and their connection ID's match that of the NSW.

Personal Computer: Whilst the RS-232 port is designed for connection to a PC, the NMEA 0183 output is also capable of being read by most PCs. Simply connect '+' to 'Rx' and 'G' to 'Gnd' on a standard D-type (probably male) connector.

NMEA Listener device A: This device does not conform in full to the NMEA 0183 standard. However, by connecting '-' to '-/B' and 'G/Ground' to 'Gnd' the device should be able to receive the NMEA data correctly, though this is not guaranteed.

Note:

1. Wire colours are for guidance only.

S/V BEATRIX - KELLY-PETERSON 44 #286 (1980)

| TITLE | | PAGE | |
|---|--------------------------------|----------|-----|
| Instrumentation and Data Network - Actisense NW-1-A NMEA Autoswitch | | 14 OF 14 | |
| REV. | DESCRIPTION | DATE | BY |
| L | Cetrek Autopilot & Instruments | 8/2/2009 | JMS |