

**MODEL 32500  
ELECTRONIC COMPASS**



**MARCH 2002**

**MANUAL PN 32500-90**

**R. M. YOUNG COMPANY**

2801 AERO PARK DRIVE, TRAVERSE CITY, MICHIGAN 49686, USA  
TEL: (231) 946-3980 FAX: (231) 946-4772



## 1.0 INTRODUCTION

The Model 32500 ELECTRONIC COMPASS measures magnetic heading and incorporates auxiliary inputs to measure signals from YOUNG sensors. Wind speed and direction sensors, temperature and humidity sensors, barometers and other meteorological instruments can connect directly to 32500 inputs. Two specialized wind sensor inputs and four general purpose voltage inputs convert measurements to high-resolution numerical values. Wind direction input may be combined with compass readings to obtain true direction.

Measurements are converted to RS-232 or RS-485 serial formats or calibrated voltage outputs. Both continuous and polled outputs are available. When polled, up to 16 units can be networked together. For marine applications the 32500 produces standard NMEA output sentences. Voltage output for wind speed and direction is available when the 32500 is connected to a YOUNG wind sensor.

## 1.1 INSTALLATION

The 32500 is supplied in a weather-resistant enclosure with a mounting adapter that fits 1 inch IPS pipe (1.34 inch nominal diameter). When used with the YOUNG Wind Monitor, the mounting adapter engages the Wind Monitor orientation notch. Refer to the WIRING DIAGRAM for electrical connection details and jumper settings. Place jumpers to select desired output format. Once installed, the compass must be calibrated to correct for local magnetic distortions caused by nearby structures. To calibrate the compass, follow the procedure outlined below.

## 1.2 SETUP

Operating mode may be set with simple jumpers or customized with software commands via serial connection. Settings are retained when power is removed.

### 1.2.1 COMPASS CALIBRATION

1. Remove cover from compass. Press and hold CALIBRATE button for 5 seconds. The CALIBRATE indicator will begin to blink. Refer to WIRING DIAGRAM to locate CALIBRATE button.
2. Slowly rotate vehicle on which compass is mounted. Steer vehicle in a tight circle and make TWO complete revolutions. Each revolution should take at least one minute. THE COMPASS MUST REMAIN LEVEL DURING CALIBRATION.
3. After two complete revolutions, press and hold CALIBRATE button until indicator stops blinking. Calibration is now complete. Calibration parameters are retained when power is removed.
4. Replace cover. Use this procedure to recalibrate compass at any time.

### 1.2.2 AUXILIARY INPUTS

The 32500 has two special inputs for wind speed and direction and four auxiliary voltage input channels for connection to other meteorological instruments like temperature and humidity sensors, and barometers. Measurements from the auxiliary inputs channels are converted to numerical values and sent in the selected serial output string. Refer to the WIRING DIAGRAM and SPECIFICATIONS sections for details.

## 1.2.3 JUMPERS

**W1 JUMPERS** The two W1 jumpers determine serial output format. The two jumper positions are designated A and B. Four possible jumper configurations and associated output format are listed below. The first three configurations set the 32500 output to a popular format without further intervention. The last configuration, SOFTWARE MODE, allows output format and other operating parameters to be set via a software Command menu. Refer to the WIRING DIAGRAM for jumper locations. Refer to the SERIAL FORMAT DIAGRAM for details regarding serial output format. The SERIAL COMMUNICATION section provides details about SOFTWARE MODE.

### JUMPERS SERIAL OUTPUT FORMAT

NONE	WS WD1 V1 V2 V3 V4 COMPASS WD2
A	RMYT for connection to YOUNG Wind Tracker
B	NMEA sentences (MWV-relative & XDR)
A & B	SOFTWARE MODE

The first 3 format selections override any software commands given in the above SOFTWARE MODE. See page 4 for detailed SERIAL OUTPUT FORMAT information.

**W2 JUMPERS** The W2 jumper pattern sets the output connection type. Only one connection type may be used at one time. Refer to the WIRING DIAGRAM drawing for jumper location and connection details.

### JUMPERS OUTPUT TYPE

VOUT	Calibrated output for wind speed and direction. 0-5000mV = 0-100 m/s 0-5000mV = 0-360 degrees
232	RS-232 full duplex serial input/output
485	RS-485 half duplex serial input/output

## 1.2.4 SERIAL COMMUNICATION

Both RS-232 and RS-485 connections are available. The RS-232 type is simplest to use and features full-duplex operation. The RS-485 option is a good choice in electrically noisy environments, in cases where the units must be networked, or in NMEA marine applications where the differential RS-485 signals are required.

The RS-485 connection is half-duplex meaning the 32500 cannot transmit and receive at the same time. Internal hardware and software automatically manage the transition from transmit to receive as needed. However, when using RS-485, be sure that any externally connected devices are also capable of managing the transition. YOUNG RS-485/232 converter modules incorporate this capability.

Three of the W1 jumper configurations set predetermined serial output formats without further setup or user intervention. When W1 jumpers are set for SOFTWARE MODE, operating parameters may be set via the 32500 Command menu using a simple serial communications program such as the popular HyperTerm or ProComm.

## 1.2.5 COMMANDS

To access the Command menu, with W1 jumpers set to SOFTWARE MODE, send three ESC (ASCII 27) characters to the 32500 in quick succession via the serial connection. The 32500 replies by sending the Command menu with these options:

#### COMMANDS

- B) BAUD
- C) CALIBRATE VOLTAGE
- D) DAMPING
- F) FORMAT
- R) RATE
- S) STATUS
- X) EXIT TO OPERATE MODE

NOTE: The RATE menu item does not appear when the output format is RMYT. In that case the rate is preset.

**BAUD** sets the serial communications baud rate.

NOTE: Selecting output formats NMEA or RMYT via W1 jumpers or the FORMAT menu item may change the baud rate without user intervention. Also, your serial communications program must always be set to the same baud rate as the 32500 or it will be unable to communicate.

#### BAUD RATE

- A) 1200
- B) 2400
- C) 4800
- D) 9600
- X) EXIT

**CALIBRATE VOLTAGE** is used to calibrate voltage inputs and external devices connected to the voltage outputs. This command should be used only by qualified technicians.

To calibrate the voltage inputs, apply full scale reference voltage to an input and select the menu item associated with that input. The standard full scale input for VIN1 and VIN2 is 1.000 VDC. For VIN3 and VIN4 the full scale input is 5.000 VDC.

Whatever voltage appears on the input when the menu item is selected will be recorded internally as the full scale value and used to scale all measurements on that input channel when the 32500 is in OPERATE mode. IMPROPER CALIBRATION WILL RESULT IN ERRONEOUS MEASUREMENTS.

Use menu items E and F to calibrate externally connected devices such as data loggers and chart recorders. To use items E and F, jumper W2 must be set for voltage outputs. See W2 JUMPERS for additional details.

OPTIONS A THRU D FOR  
QUALIFIED TECHNICIAN ONLY!  
IMPROPER USE CAUSES ERRONEOUS  
CALIBRATION DATA TO BE STORED.

#### CALIBRATE VOLTAGE

- A) VIN1 FS
- B) VIN2 FS
- C) VIN3 FS
- D) VIN4 FS
- E) VOUT ZERO
- F) VOUT FS
- X) EXIT

**DAMPING** sets the amount of averaging to use on compass measurements. When DAMPING is set to NONE or FAST, compass readings change quickly. When set to SLOW, the readings change more gradually and are often easier to interpret.

#### COMPASS DAMPING

- N) NONE
- F) FAST
- S) SLOW
- X) EXIT

**FORMAT** selects the serial output format. Formats RMYT and NMEA will automatically change the baud rate. See the SERIAL FORMAT DIAGRAM for details.

#### OUTPUT FORMAT

- A) DIAGNOSTIC
- B) RMYT
- C) RMY POLLED
- D) NMEA (KNOTS DEGREES(RELATIVE))
- E) NMEA (KNOTS DEGREES(RELATIVE) TEMP RH BARO)
- F) SPEED DIR V1 V2 V3 V4
- G) SPEED DIR(CORRECTED) V1 V2 V3 V4 COMPASS DIR(UNCORRECTED)
- H) NMEA (KNOTS DEGREES(TRUE))
- I) NMEA (KNOTS DEGREES(TRUE) TEMP RH BARO)
- X) EXIT

When RMY POLLED is selected, a prompt appears for entering a single character 'address':

```
ENTER SINGLE CHAR POLL ADDR [0-9, A-Z, a-z] : a
```

This is the address character that must be used when polling the 32500 for data. By using unique addresses, up to 16 units may be networked on the same RS-485 connections.

**RATE** sets the output rate. The RATE menu item does not appear when the output format is RMYT since, for that format, the output is fixed at 15 Hz. The 0.1 Hz output means that an output appears once every 10 seconds.

#### OUTPUT RATE

- A) 15 HZ
- B) 2 HZ
- C) 0.1 HZ
- X) EXIT

**STATUS** reports firmware version and other parameters. These values are used only by qualified technicians to assess the state of the 32500. A typical STATUS report appears below. Depending on output format, some items may be absent.

#### STATUS

```
YOUNG 32500 ELECTRONIC COMPASS v1.15
```

```
VIN1 FS: 3716  
VIN2 FS: 3715  
VIN3 FS: 4094  
VIN4 FS: 4095
```

```
FORMAT: RMY POLLED  
POLL ADDR: a  
OUTPUT RATE: 15 HZ  
BAUD: 9600  
OFFSET X,Y,RATIO: -251, 75, 847  
COMPASS DAMPING: SLOW  
WATCHDOG TIMER: ENABLED
```

### 1.2.6 POLLED MEASUREMENTS

When the serial output format is RMY POLLED, the 32500 sends data only when it receives a polling command that contains the unique address of the unit being polled. The command for polling is:

```
Ma!
```

where a = address character.

See the SERIAL FORMAT DIAGRAM for details on the data sent from the 32500 when polled.

### 1.3 MAINTENANCE

Like all quality measuring instruments, the 32500 Electronic Compass should be periodically recalibrated. The recalibration period depends on the application but once per year is typical. The unit may be sent to the factory or your distributor for recalibration. A copy of the calibration procedure is available to qualified technicians.

In order to compensate for local magnetic conditions, the compass calibration can take place only at the site where it is installed. **If the installation is changed, the compass must be recalibrated for the new conditions.** In addition to changing the actual installation, local conditions may also change by the introduction of iron masses or electrical machinery and thus warrant recalibration.

#### 1.4 WARRANTY

This product is warranted to be free of defects in materials and construction for a period of 12 months from date of initial purchase. Liability is limited to repair or replacement of defective item. A copy of the warranty policy may be obtained from R. M. Young Company.

#### 1.5 SPECIFICATIONS\*

##### Compass:

Resolution: 0.5 degrees  
Accuracy:  $\pm 2$  degrees (rms)

##### Wind Speed Input:

Sensor Type: AC Frequency Generator  
Sensitivity: 50mV p-p minimum  
Range: 0-2000 Hz

##### Wind Direction Input:

Sensor Type: Potentiometer  
Range: 0-5000mV = 0 to 355 degrees  
Excitation: 5000mV (limited to 5 mA)

##### Voltage Inputs (Auxiliary Sensor Inputs):

VIN1 and VIN2 0-1000mV  
VIN3 and VIN4 0-5000mV

##### Voltage Outputs:

OUT1 0-5000mV 0-100 m/s wind speed  
OUT2 0-5000mV 0-360° true wind dir  
(Uses compass measurement to produce true wind direction.)

##### Serial Output:

Full duplex RS-232,  
Half duplex RS-485 (25 mS switchover)  
1200, 2400, 4800, and 9600 baud  
8 data, 1 stop, no parity

##### Operating Temperature:

-50°C to 50°C

##### Power:

11 to 30 VDC, 40 mA

##### Mounting:

1 inch IPS (1.34 inch actual diameter)

##### Size:

4.75" (12cm) H  
0.87" (7.3cm) W  
2.12" (5.3cm) D

## CE COMPLIANCE

This product has been tested and shown to comply with European CE requirements for the EMC Directive. Please note that shielded cable must be used.

### Declaration of Conformity

**Application of Council Directives:** 89/336/EEC

**Standards to which Conformity is Declared:**

EN 50081-1  
EN 55022 (CISPR 22 class A)  
EN 50082-1 (IEC 801-2, 3, 4)

**Manufacturer's Name and Address:** R. M. Young Company  
Traverse City, MI, 49686, USA

**Importer's Name and Address:** See Shipper or Invoice

**Type of Equipment:** Meteorological Instruments

**Model Number / Year of Manufacture:** 32400/32500/2000

I, the undersigned, hereby declare that the equipment specified conforms to the above Directives and Standards.

**Date / Place:** Traverse City, Michigan, USA September 1, 2000



David Poinsett  
R & D Manager, R. M. Young Company

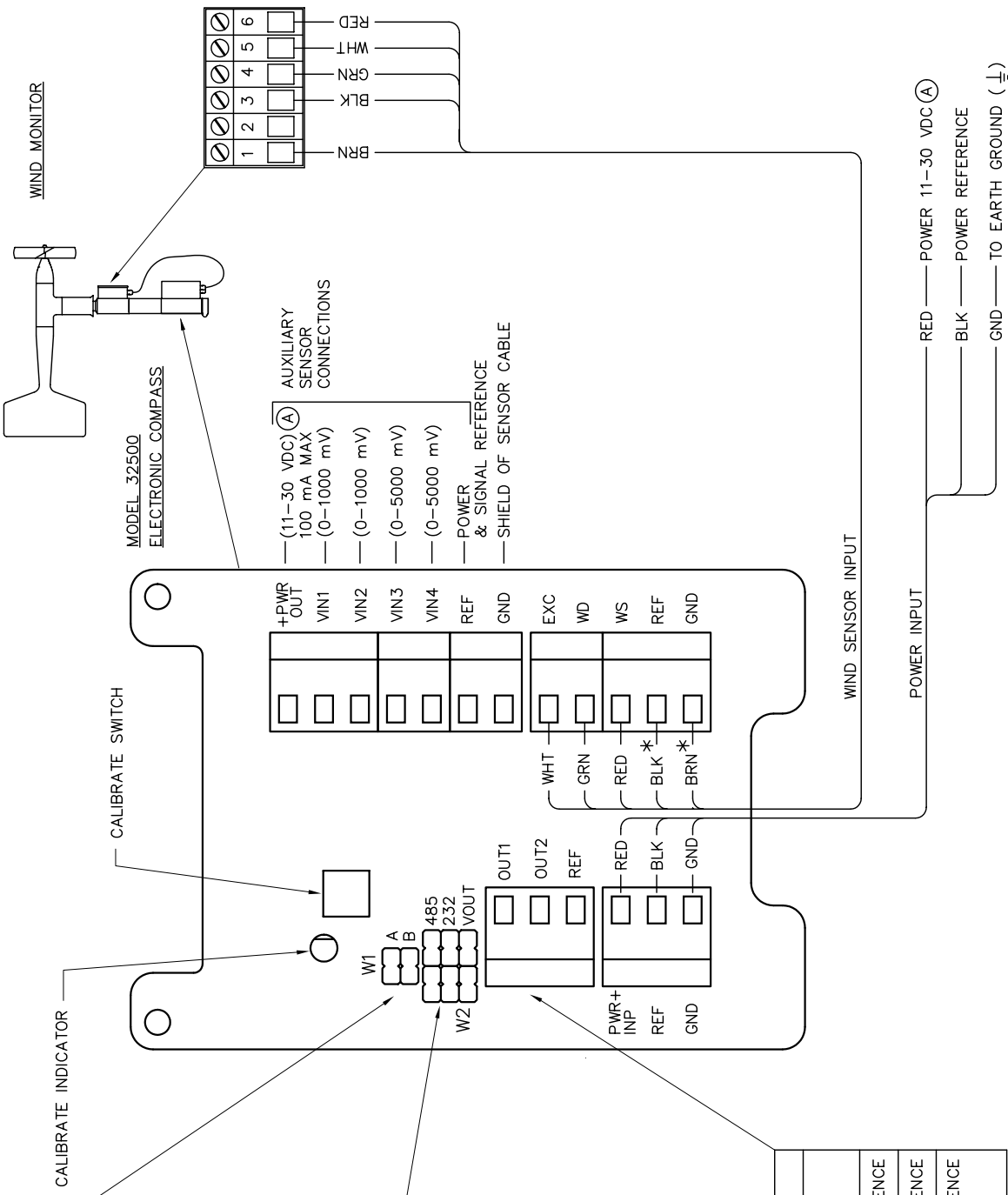




SERIAL FORMAT SUMMARY — JUMPER W1	
FORMAT	JUMPER POSITION
ASCII TEXT	o o A o o B
RMYT	o o A o o
NMEA	o o B o o
SOFTWARE (TECHNICIAN USE ONLY)	o o A o o B

OUTPUT TYPE SUMMARY — JUMPER W2	
OUTPUT	JUMPER POSITION
SERIAL RS485	o o 485 o o o o
SERIAL RS232	o o o o 232 o o
VOLTAGE 0-5000 mV	o o o o o o VOUT

OUTPUT TERMINAL FUNCTIONS		
SELECTED OUTPUT	OUT 1	OUT 2
RS485	(B)	(A)
RS232	RECEIVE	TRANSMIT
VOLTAGE 0-5000 mV	WIND SPEED 0-100 m/s	WIND DIRECTION 0-360*
	REFERENCE	REFERENCE
	REFERENCE	REFERENCE



(A) THESE VOLTAGES ARE THE SAME

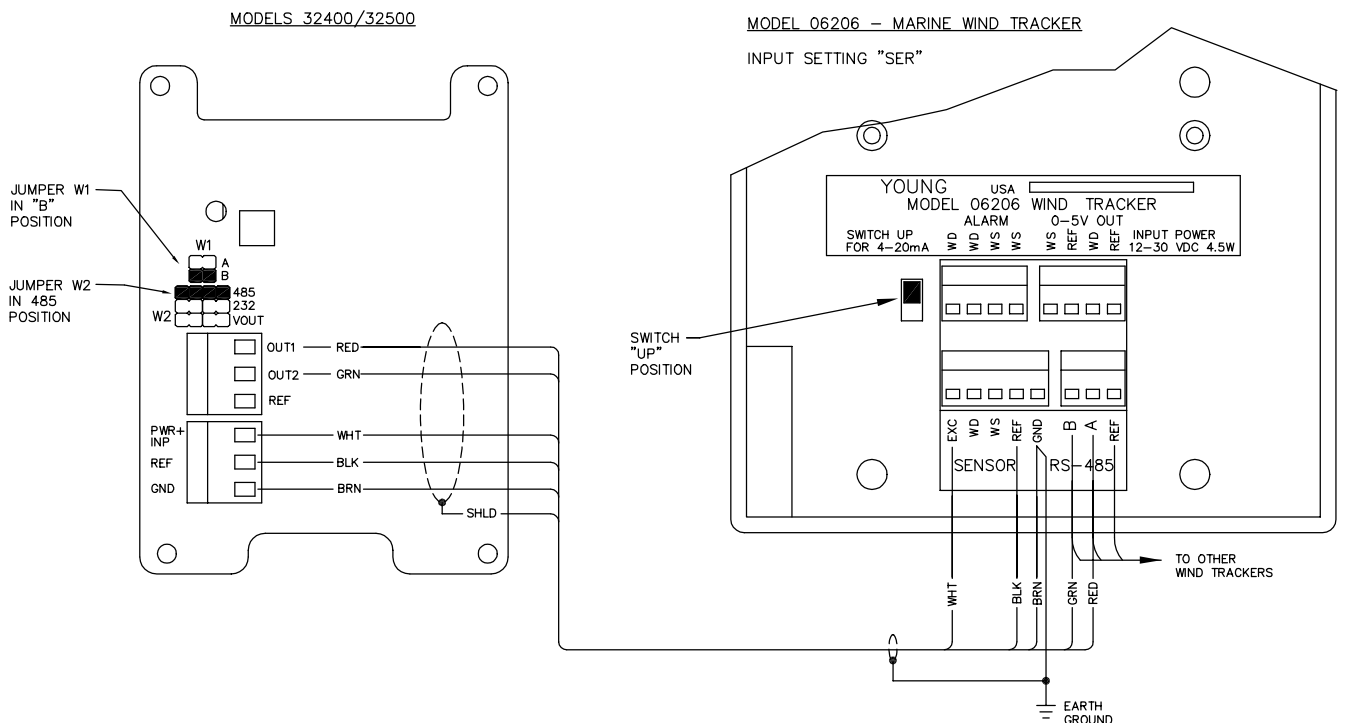
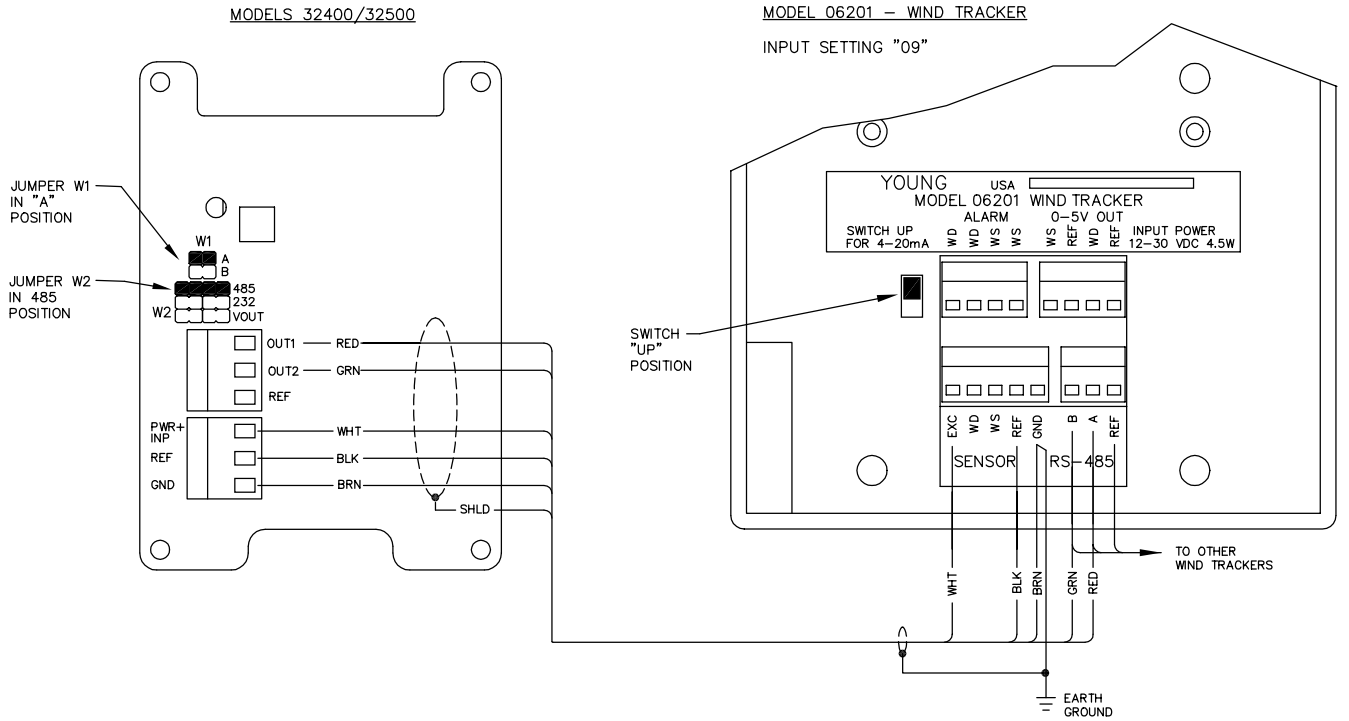
\* WIRING—WIND MONITOR—MA (MARINE VERSION)  
AS ABOVE WITH FOLLOWING EXCEPTIONS ON WIND SENSOR INPUT

MODEL 32500	DWG A	PRD 07-00
ELECTRONIC COMPASS	DWN KL	DWG 07-00
WIRING DIAGRAM	CHK <del>X.C.</del>	W32500
R.M. YOUNG CO. TRAVERSE CITY, MI 49686 U.S.A. 231-946-3980		

APPENDIX A

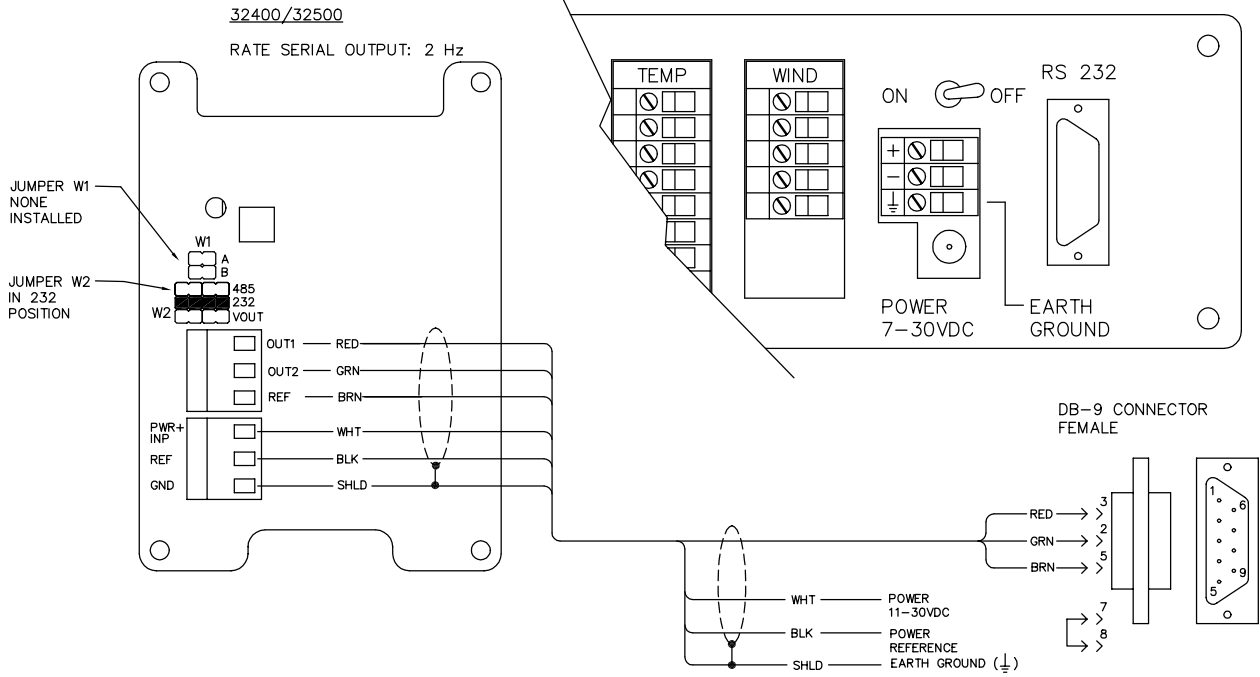
SERIAL OUTPUT WIRING DIAGRAMS

MODELS 32400/32500 USED WITH YOUNG DISPLAYS – TRANSLATORS OR WITH COMPUTER



**MODEL 26700 PROGRAMMABLE TRANSLATOR**

INPUT INSTRUCTION: "INP SERIAL"  
SET COMM/NUM ONLY INP: "YES"



**MODELS 32400/32500**

**COMPUTER**

FLOW CONTROL SET TO "NONE"

