



DECADE ENGINEERING

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BOB-II-COB and BNAB-COB Rev. 2 Documentation ~ June 25, 2001

BOB-II-COB modules offer a distance encoder interface in addition to most standard BOB-II features. The contents of a 5-digit internal count register may be preset or transmitted to a host computer on command. The host may process distance data and send it back to BOB-II-COB for display in video along with other desired data. Serial data communication speed is 9600bps only at this writing.

BNAB-COB provides a convenient host board for BOB-II-COB modules, including a 'true' RS-232 interface circuit and the necessary distance encoder interface hardware (an LS7084 or equivalent encoder interface IC).

These comments, taken together with existing BOB-II documentation and the BNAB schematic drawing, will serve as preliminary documentation for Decade's BOB-II-COB module and optional BNAB host board assembly, until a formal product release is available.

BOB-II-COB Hardware:

Module hookup is similar to standard BOB-II modules, but there are important exceptions. The complete pinout is given in the following table:

Pin	Description
1	Raw +12V supply (+8~16V acceptable), 65mA
2	Power supply ground and digital common ground
3	+5V ±5% auxiliary regulated DC output
4	Count direction control input, 5V logic
5	Do not connect
6	Do not connect
7	Count pulse input (falling edge sensitive), 5V logic
8	Transmit data output
9	Receive data input
10	CPU reset input (active low, bypass with .001~.01uF)
11	Do not connect
12	Do not connect
13	Do not connect
14	Reset flag output, goes low for about 15mS if CPU reset occurs. Pulldown resistor required if used.
15	Indicator output, pulls low if input video is missing
16	Do not connect
17	Do not connect
18	Do not connect
19	Do not connect

20	Video sync output
21	Character brightness control input, 1~3VDC range (ground unless control is provided)
22	Background brightness control input, 1~3VDC range (ground unless control is provided)
23	Optional transparency control pin (see text)
24	Connect to pin 26 (or transparency control)
25	Signal ground
26	Connect to pin 24 (or transparency control)
27	Video output shield ground
28	Video output, 1Vpp into 75 ohm cable
29	Video input cable shield ground
30	Video input, requires 1Vpp into 75 ohms

Note: The external brightness controls are activated simultaneously. Both pins (21 & 22) must be controlled if the use of either one is desired.

These are the important pin assignment exceptions, relative to standard BOB-II modules:

- Pin 9 is the serial receive data input**
- Pin 8 is the transmit data output**
- Pin 7 accepts the LS7084 clock signal**
- Pin 4 receives the LS7084 direction signal**
- Pins 12 & 13 must not be connected**

An optional character transparency control may be connected to BOB-II-COB in lieu of the wire link between pins 24 and 26. Hookup wiring must be short and direct, because the control wires carry wideband video at a relatively high impedance level. Use a 2K linear pot, and connect as follows:

- Pin 23: Counterclockwise end**
- Pin 24: Clockwise end**
- Pin 26: Wiper**

The video input (pin 30) can tolerate up to +2.5VDC bias mixed with incoming video. The video output includes some DC bias, about +1V when properly terminated downstream. Refer to the BOB-II FAQ (at our website) or contact Decade Engineering for additional information on these issues if necessary.

Refer to the BNAB schematic drawing for more details on module hookup.

BOB-II-COB Firmware:

Two new commands have been added to the standard BOB-II repertoire:

1. **{Pnnnnn}** is the distance register Preset command, where 'n' are ASCII decimal digit characters with MSD first. The LSD represents tenths of feet if your encoder supplies 10 cycles per foot. Five digits must be supplied by the host. If any of the five are not legal numbers, they will be interpreted as zeros.
2. **{Q}** is the distance Query command. BNAB returns a string formatted as: **{nnnnn<CR>}** where 'n' are same as above.

When powered up, BOB transmits **{OK<CR>}** to the host, possibly preceded by a few garbage characters. If an internal reset is forced by watchdog timeout, it does the same. The host must be able to accept this string at any time and take appropriate action. Note: This is a half-duplex system. Do not send characters to BOB while it is transmitting a response (or init) string. Also, observe the 5mS wait rule after sending a screen clear command.

A customer reported that a Query sent quickly after a previous Query would result in garbage data returned. If a 5mS delay was interspersed, correct data was consistently returned. This problem could have resulted from ignoring the rule stated above.

If the distance register is decremented (by the encoder) below 00000, it rolls over to 99999 and counts downward from there. If it's incremented above 99999, it rolls over to 00000 and continues upward.

To avoid a spurious clear in case of watchdog reset, BOB does not clear the distance register when initializing. The distance register contains garbage at power-up time, and garbage will be sent in response to a premature Query.

BNAB-COB:

The power connector (J6) center pin is +12V. The sleeve is grounded. Standard coaxial DC power plugs having ID of 2.1mm and OD of 5.5mm, such as *RadioShack.com* part number 910-0902, are suitable mating connectors.

Power consumption is less than 100mA, not including encoder supply current. Decade strongly recommends a power supply rated for **at least** 500mA, to minimize voltage sag at turn-on time and insure a clean BOB-II reset.

The data connector (P1) hooks up to a PC COM port with a straight-through (modem) 9-pin M/F cable assembly. A shunt plug, to pass serial receive data, must be installed at JPI pins 2~3.

J5 is for the distance encoder. Molex KK series 4-pin female plugs (e.g. 22-01-2047) are compatible. Connect an encoder with 5V (TTL) quadrature outputs. Swap signal phases to change count direction, if desired. J5 pinout follows:

1. **Power supply out to encoder (+5V)**
2. **Signal phase A input**
3. **Signal phase B input**
4. **Ground**

The power supply regulator on BOB-II can supply about 100mA maximum to external devices, and this is often sufficient for distance encoders. There are exceptions! Contact Decade Engineering if you need to use an encoder that draws higher current.

BNAB is designed to fit a Hammond 1598B series molded plastic cabinet. Custom front & back panels are not available at this writing.

The three trimmers along the front of the board **may** be made accessible to the equipment operator through small holes in the panel of your final assembly. It can be unwise to make the character and background brightness controls available to non-expert personnel because settings that render the system inoperative are possible.

BNAB-COB Operation:

BOB-II-COB modules are *almost* entirely controlled via commands and printable text sent through the serial port...

Slide the power switch (SW1) right to power up this system. An LED at D3 is provided to indicate power supply status. Slide SW1 left to turn power off.

The LED at D1 lights up if video is not present at the video input jack. BOB-II-COB automatically switches to internal video generation (Local mode) when this happens, unless the Local mode command has been sent. In that case BOB-II-COB stays in Local mode regardless of input video status.

VR2 adjusts character level, and VR3 adjusts background level, but only if your application program has sent the necessary command to enable them. Normal settings are near the center of rotation.

VR1 provides character transparency adjustment. Operation of VR1 does not depend on application programming. The normal setting is full clockwise, for maximum character visibility. Some caveats apply to the use of this control, and there's one case where it may be desirable to disconnect or remove VR1. See the BOB-II manual or latest BOB-II FAQ.