

CAN-Do! NET Controller

A Ready to use AMSAT-CAN Multiple Module Controller

Software by
KC0FTQ



CAN-Do! Net Controller (CDNC) is a Windows®-based Application written in C# which provides full control over any number of Widget-controlled Modules on the CAN bus, running at full satellite speeds. In addition to being used as a controller, CDNC can be used to monitor and log traffic on a CAN Bus where it is not the controller. Also, CDNC can be used as an off-line viewer of traffic which had been earlier captured by CDNC and saved to a file. Whether looking at traffic from a saved session or traffic just captured live, the full viewing capability of CDNC is available.

Features

- Logs all traffic seen on CAN Bus.
- All traffic is time-stamped.
- Logs can be saved for later (offline) viewing.
- Logged traffic is shown in many useful forms: In/Out bits and analog values in waterfall display, hex dumps of logged CAN traffic, waveforms for each signal (digital and analog), etc.
- Specialized control/status interface for each of Standard, Multiplex and Byte-pipe modes.
- All Widget Logs, Counters, and Status indicators are visible. Widget Logs can be cleared where Widget supports clearing them.
- Control all or a subset of all the Modules on the CAN Bus. Can effectively remove widget's from the Bus without unplugging Widget's from the CAN Bus cable.
- Two control modes supported: (1) UHU Identical (staged) and (2) Immediate change (live).
- Import and view logs written by UHU
- Supports all UHU built-in poll rates plus more (up to full 50Hz rate).
- Configurable CAN Bus address so NET Controller can exist on bus with IHUs, UHU, your own test programs, or even additional copies of NET Controller.

Ret #	Time	ID	Dbc	Mag	Len	Payload
201	0247.171875	0x2BB	59	0x2B	8	00 00 2B 00 00 00 2A 00
202	0247.171875	0x2E1	33	0x24	8	02 80 01 80 01 80 01 EC
203	0247.171875	0x29C	30	0x20	8	05 00 2E 00 F3 00 2E 00
204	0247.171875	0x2A1	33	0x2B	8	01 80 2A 80 F1 00 2A 00
205	0248.171875	0x01E	30	0x00	8	00 00 00 00 00 00 00 00
206	0248.171875	0x03D	59	0x00	2	00 00
207	0248.171875	0x021	33	0x00	2	00 00
208	0248.171875	0x27B	59	0x24	8	00 00 02 00 04 00 02 64
209	0248.171875	0x21E	30	0x20	8	00 00 00 00 00 00 00 00
210	0248.171875	0x28B	59	0x2E	8	00 00 2A 00 0C 00 2C 00
211	0248.171875	0x2EE	30	0x24	8	05 00 05 00 04 00 05 68
212	0248.171875	0x2E1	33	0x24	8	02 80 01 80 01 80 01 EC
213	0248.171875	0x29C	30	0x20	8	04 00 2E 00 F3 00 2E 00
214	0248.171875	0x2A1	33	0x2B	8	01 80 2A 80 F1 00 2A 00
215	0249.171875	0x01E	30	0x00	8	00 00 00 00 00 00 00 00
216	0249.171875	0x03D	59	0x00	2	00 00
217	0249.171875	0x021	33	0x00	2	00 00
218	0249.171875	0x27B	59	0x24	8	00 00 02 00 04 00 02 64
219	0249.171875	0x21E	30	0x20	8	00 00 00 00 00 00 00 00
220	0249.171875	0x28B	59	0x2E	8	00 00 2B 00 05 00 2B 00
221	0249.171875	0x2EE	30	0x24	8	05 00 05 00 04 00 05 68
222	0249.171875	0x2E1	33	0x24	8	01 80 01 80 01 80 01 EC
223	0249.171875	0x29C	30	0x20	8	04 00 2E 00 F3 00 2E 00
224	0249.171875	0x2A1	33	0x2B	8	01 80 2A 80 F1 00 2A 00
225	0250.171875	0x01E	30	0x00	8	00 00 00 00 00 00 00 00
226	0250.171875	0x03D	59	0x00	2	00 00
227	0250.171875	0x021	33	0x00	2	00 00
228	0250.171875	0x21E	30	0x20	8	00 00 00 00 00 00 00 00
229	0250.171875	0x27B	59	0x24	8	00 00 02 00 04 00 02 64
230	0250.171875	0x28B	59	0x24	8	05 00 05 00 05 00 05 68
231	0250.171875	0x29C	30	0x24	8	00 00 2B 00 0C 00 2B 00
232	0250.171875	0x2E1	33	0x24	8	01 80 01 80 01 80 01 EC

#	Time	Error	Decode
1	21:38:50	0x0004	RX w/Err: PcanErr(0x4
2	21:38:50	0x0004	RX Err: Status: PcanE
3	21:39:44	0x0004	RX w/Err: PcanErr(0x4
4	21:39:44	0x0004	RX Err: Status: PcanE

CDNC Overview screen (top), CAN Traffic log (right and low), with PCAN USB device error log (bottom-left).

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Built-in Widget Control Interface for each Mode

Example Byte-Pipe-Mode Control –n– Status page (to right):

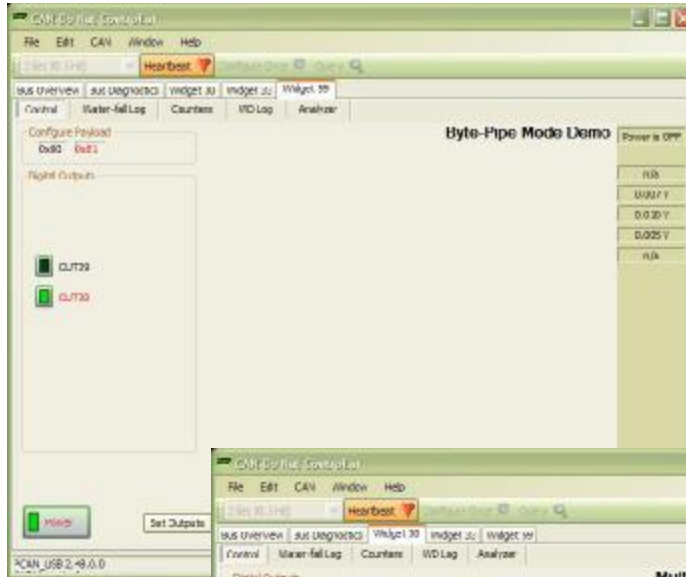
(in Grouped-changes mode)

Generally, on this page-type, controls are on the left and status displays are on the right.

In this case the OUT8 and OUT9 controls and Module Power are on the left. (Module power is big button, bottom-left, which contains an LED.)

In the vertical stripe on the right side, you can see (top to bottom) the Module power followed by user Analog Channels and finally are the system-reserved analog channels: Module current draw, Bias Voltage, and Module Temperature.

Modifying the controls on the left only manipulate the in-memory configure packet which is then sent at the next heartbeat. (Just like the IHU will do it.)

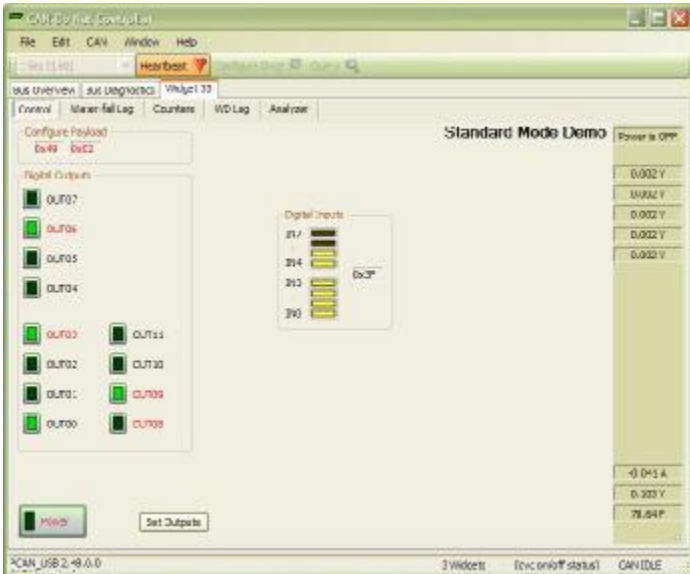


Example Standard-Mode Control –n– Status page (below):

(in Grouped-changes mode)

In Standard Mode there are 12 Digital Outputs (shown to left of screen and with Green LEDs) and 8-Digital Inputs (to right of screen with Yellow LEDs) along with the Module Power button.

All of the analog channels are shown on the darker banner to the right on these control –n– status pages.



Example Multiplex-Mod Control –n– Status page: (above)

(in Live changes mode)

In Multiplex Mode there are 63 Digital Outputs (Orange LEDs) plus Power Out (Green LED). There are also 64 channels of Digital Inputs (Yellow LEDs).

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Logs by Packet and by Configuration Event

Example CAN Bus Traffic Log display:

The packet log every packet received from the CAN bus and every packet sent by CDNC over the CAN Bus. Each packet numbered and time-stamped when first sent or as received.

The CAN ID is shown as well as our AMSAT IDs: Widget ID and Message Type (which are fields within the 11-bit CAN ID).

The times can be shown absolute (hhmm.fraction) or relative to the prior packet's time. (shown in picture to right).

The payload length is shown along with payload bytes shown in hex.

If any traffic is sent or received this log is updated (new packets are appended to bottom).

Msg #	Time	ID	Dir	Mag	Len	Payload
531	0	0x25E	30	0x24	8	05 00 05 00 05 00 05 68
532	15.0 mS	0x261	33	0x24	8	01 80 01 80 01 80 01 EC
533	0	0x25E	30	0x24	8	04 00 2E 00 F9 00 30 00
534	0	0x2A1	33	0x28	8	01 80 2A 80 F1 00 2B 00
535	46.0 mS	0x01E	30	0x00	2	00 00 00 00 00 00 00 00
536	0	0x03D	59	0x00	2	00 00
537	0	0x021	33	0x00	2	00 00
538	15.0 mS	0x21E	30	0x20	8	00 00 00 00 00 00 00 00
539	0	0x25E	30	0x24	8	08 00 08 00 08 00 08 68
540	0	0x27B	59	0x24	8	00 00 02 00 04 00 02 64
541	0	0x25E	30	0x24	8	04 00 2E 00 F9 00 30 00
542	0	0x25B	59	0x28	8	00 00 2B 00 30 00 2D 00
543	0	0x261	33	0x24	8	01 80 01 80 01 80 01 EC
544	0	0x2A1	33	0x28	8	01 80 2A 80 F1 00 2C 00
545	46.0 mS	0x01E	30	0x00	2	00 00 00 00 00 00 00 00
546	0	0x03D	59	0x00	2	00 00
547	0	0x021	33	0x00	2	00 00
548	15.0 mS	0x27B	59	0x24	8	00 00 08 00 04 00 02 64
549	0	0x25B	59	0x28	8	00 00 2A 00 30 00 2D 00
550	0	0x21E	30	0x20	8	00 00 00 00 00 00 00 00
551	0	0x261	33	0x24	8	01 80 01 80 01 80 01 EC
552	0	0x25E	30	0x24	8	05 00 0E 00 0E 00 0E 68
553	0	0x2A1	33	0x28	8	01 80 2A 80 F1 00 2B 00
554	0	0x25E	30	0x24	8	04 00 2E 00 F9 00 30 00
555	42.0 mS	0x01E	30	0x00	2	00 00 00 00 00 00 00 00
556	0	0x03D	59	0x00	2	00 00
557	0	0x021	33	0x00	2	00 00
558	0	0x21E	30	0x20	8	00 00 00 00 00 00 00 00
559	15.0 mS	0x27B	59	0x24	8	00 00 03 00 04 00 02 64
560	0	0x25E	30	0x24	8	05 00 0E 00 0E 00 0E 68
561	0	0x25B	59	0x28	8	00 00 2B 00 30 00 2C 00
562	0	0x261	33	0x24	8	01 80 01 80 01 80 01 EC

CAN Bus Traffic Log (relative time, time since last packet)

Example Standard-Mode Water Fall Log display:

The waterfall log (available for each mode) gathers the configure packet and the associated response packets and shows a single line of data for each of the packet-sets. New entries are added to this display as the packet sets are seen on the CAN Bus.

The logged entries can be shown as a push-down list where new entries added at the top, or a push-up list where new entries are added at the bottom.

One can navigate to the raw packets in the packet log simply by double-clicking on any single waterfall entry. When this occurs the packet log will appear (if it's not showing already) and the packet log display is scrolled to the newly highlighted packet.

#	OUT11:0	IN#	AIN4:A1B10				Module Current	Module Temp	
2	0000 0000 0000								
3	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
4	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
5	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
6	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
7	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
8	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
9	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
10	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
11	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
12	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
13	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
14	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
15	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
16	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F
17	0000 0000 0000	0000 0000	0.00	0.00	0.00	0.00	0.00 V	-0.04 V	74.42 F

Standard-Mode Waterfall Log

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Widget Logs and Diagnostics Fully Exposed

Example CAN Counters, Widget Info and (if Byte-Pipe Mode) Pipe Health indicator page:

The Byte-Pipe version of this page shows three sets of data:

- (1) the CAN Bus Error Counters (left)
- (2) Widget Information (middle bottom)
- (3) Pipe Health (right)

The Widget info data is read straight from FLASH on the Widget and shown here.

The CAN Bus Error Counters are the Widget's CAN Device error counts (bus errors/flaws as seen by the Widget.)

The [Read Counters] button will immediately send the request. Then, as replies are heard, the data is posted to this interface.

The Pipe Health section is sent in configure response traffic.

Many fields are hover sensitive and will show these balloon help banners when one lingers over the sensitive fields.

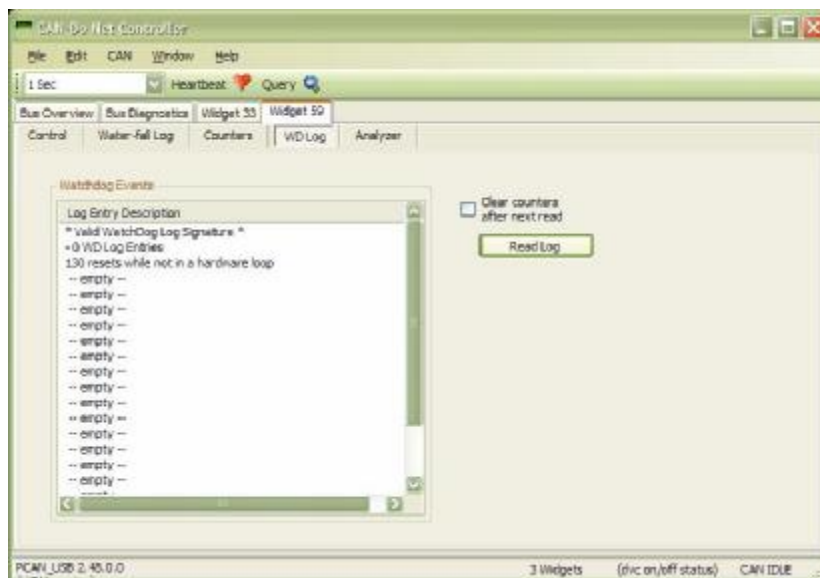


CAN Traffic Counters, Widget Info. And Pipe-Health Indicators

Built-in Widget Watch-dog log viewer page:

By pressing [Read Log] you can query the current Watch-dog event log (stored within the Widget) and the responses will be shown here.

You can also ensure that the Watchdog log is cleared after a read by checking the Clear Counters checkbox and pressing read.



Widget Watch-dog Log Upload and Interpretation

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System Requirements

CAN-Do NET Controller is distributed as a standard Windows®-based installer package.

The package is installable on Windows XP. It has not yet been tested on, but should work on, Windows 2000 as well.

It currently supports both the Lawicel CAN232 and the [Peak-System Technik](#)—PCAN USB CAN Interfaces.

Neither the Lawicel CAN232 or the PCAN USB interfaces are needed when using CDNC as an offline viewer. However, one of them must be used when controlling the CAN bus or when lurking and logging the traffic seen on the CAN Bus.

Availability

CAN-Do NET Controller is distributed as a standard Windows®-based installer package which is available as a free download from our project website. <http://cdnc.moraco.us>

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