NanoIO

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An FSK / CW interface based on the Arduino nano. Sketch includes an FSK modulator, a CW computer interface, and a CW iambic-A/B keyer.

FSK Specifications

- 5 bit Baudot
- baud rates 45.45, 50, 75 and 100

CW Specifications:

- 5 to 100 WPM
- dash/dot ratio adjustable 2.5 to 3.5
- in-line increment decrement WPM using ^ and | characters
- incremental size user adjustable

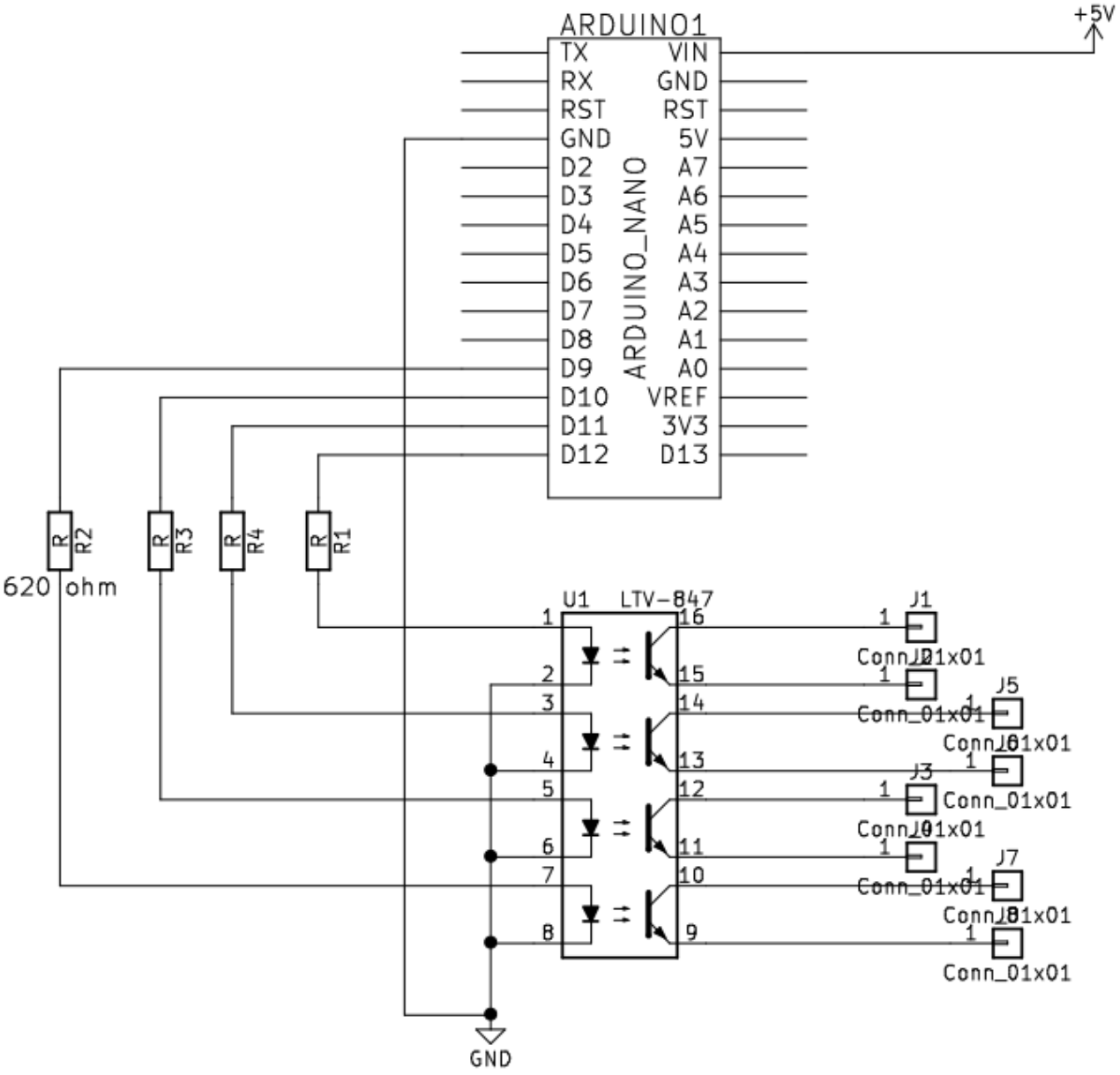
PTT signal generated by Arduino

Both

- an internal buffer of 200 characters is available for buffered transmit.

Hardware requirement

- Arduino nano or compatible (author used nano from Elegoo)
- LTV-847 quad opto-isolator
- 4 620 ohm ¼ watt resistor (should work with 500 < R < 820 ohm)
- suitable connectors to interface to transceiver



Default pin assignments defined in Arduino Sketch for the above circuit.

- D9 / PIN 9 – spare
- D10 / PIN 10 – PTT
- D11 / PIN 11 - FSK_PIN
- D12 / PIN 12 – CW

Default startup configuration

- nanoIO 1.0.1
- FSK: Baud: 45.45, Mark LOW
- CW: WPM: 18/18, dash/dot 3.00, incr 2, IambicA keyer
-

Computer Interface Command Set

USB serial command strings all begin with the tilde, ~, character

Cmd ~...

- C,c CW mode
- F,f FSK mode
- T,t CW Tune
- Snnns computer wpm 10...100
- Unnnu key (user) wpm 10...100
- Dnnnd dash/dot 250...350 (2.5...3.5)
- In CW incr (1..9)
- A,a IambicA
- B,b IambicB
- K,k Straight key
- 0 FSK mark = HIGH
- 1 FSK mark = LOW
- 4 45.45 baud
- 5 50 baud
- 7 75 baud
- 9 100 baud
- ? Show config
- W Write EEPROM
- ~ Show cmds

In line special characters:

Both:

- [PTT on
-] PTT off
- \ escape; clear internal buffer and set PTT off

CW:

- ^ increase computer wpm by increment value (default is 2) *
- | decrease computer wpm by increment value *
- % <SK>
- & <AS>
- + <KN>
- - <BT>
- < <AS>
- = <BT>
- > <AR>
- { left brace <HM>
- } right brace <VE>

* - the ^| wpm modifiers do not effect the paddle CW, just the computer CW.

for example, a CW string might contain:

- ~C~S24s[tu ^^5nn|| k]

1. Mode is changed to CW
2. Computer WPM is set to 24
3. PTT is set ON
4. The string “tu “ is sent
5. Computer WPM is increased by 2 increment factors
6. The string “5nn” is sent
7. Computer WPM is decreased by 2 increment factors
8. The string “ k” is sent
9. PTT is set OFF

PTT will enable before starting the CW transmission. PTT will disable after the last CW character (k) is completed.

nanoIO is a merger of code written by W1HKJ and:

tinyFSK, by Andrew T. Flowers K0SM
Iambic Keyer, by Steven T. Elliott

It expands the tinyFSK to include 100 WPM Baudot TTY. It shares a common set of control strings. The default wake up mode is FSK.

The keyer implementation is less robust than Steven's Iambic Keyer. It only provides Straight key, Iambic-A, and Iambic-B modes. It does add weighting to the key output. The key weighting and the computer CW weighting are the same. The current implementation does not have a tone output.

CW is generated from USB serial input strings and/or the paddle inputs. Paddle input overrides the serial string, but does not currently clear the string buffer. That could be changed, but the USB serial interface provides a very easy escape character to do just that.

Configuring the sketch for target hardware.

The nanoIO sketch can be used with one of four hardware designs

- MORTTY Version 2
- MORTTY Version 3
- HA2OS quad opto-isolator board
- W1HKJ quad opto-isolator board

MORTTY Version 2 shares a common output pin for both CW and FSK keyline. The user will have to swap FSK / CW line connectors when changing mode.

MORTTY Version 3 has separate output pins for CW, FSK and PTT keylines.

The W1HKJ and HA2OS designs also have separate CW, FSK and PTT keylines.

To select the h/w configuration when building the nanoIO sketch. Open the file config.h and uncomment the desired h/w design. The default is for MORTTY Version 3. A line is a comment if it begins with ‘//’.

```
//#define MORTTY-V2
#define MORTTY-V3
//#define HA2OS
//#define W1HKJ

#ifdef MORTTY-V2
// Configuration for MORTTY Version 2 circuit board0
# define FSK_PIN 11
# define CW_PIN  11
# define PTT_PIN 13
# define ST_Pin   4 // Sidetone Output Pin on Pin 4
// paddle input pins compatible with MORTTY board
# define LP_in    2 // Left Paddle Input on Pin 2
# define RP_in    5 // Right Paddle Input on Pin 5
# define DEFAULT_MODE CW_MODE
#endif

#ifdef MORTTY-V3
// Configuration for MORTTY Version 3 circuit board
# define FSK_PIN 11
# define CW_PIN  12
# define PTT_PIN 13
# define ST_Pin   4 // Sidetone Output Pin on Pin 4
// paddle input pins compatible with MORTTY board
# define LP_in    2 // Left Paddle Input on Pin 2
# define RP_in    5 // Right Paddle Input on Pin 5
# define DEFAULT_MODE CW_MODE
#endif

#ifdef HA2OS
// Configuration for HA2OS quad opto-isolator circuit board design
# define FSK_PIN 12
# define CW_PIN  10
# define PTT_PIN 11
# define ST_Pin   4 // Sidetone Output Pin on Pin 4
// paddle input pins
# define LP_in    5 // Left Paddle Input on Pin 2
# define RP_in    2 // Right Paddle Input on Pin 5
# define DEFAULT_MODE CW_MODE
#endif

#ifdef W1HKJ
// Configuration for W1HKJ quad opto-isolator circuit board design
# define FSK_PIN 12
# define CW_PIN  11
# define PTT_PIN 10
# define ST_Pin   4 // Sidetone Output Pin on Pin 4
// paddle input pins
# define LP_in    2 // Left Paddle Input on Pin 2
# define RP_in    5 // Right Paddle Input on Pin 5
# define DEFAULT_MODE FSK_MODE
#endif
```