Multi-Digi

User

Manual

Visit us at

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(preliminary)

Dedication:

This project and documentation is dedicated to my wonderful wife Gail, without whom I would not have had the support and push I needed from time to time to complete.

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Welcome

Thank you for your support! The Mach-1 Electronics Multidigi was created to enable Amateur Radio Operators a simple and easy to operate digital interface for current and future transceivers. With most current computer equipment losing the 'standard' serial port connectors in lieu of USB, and the reduction in number of said USB ports on newer mobile or laptop computers, the vision was to produce a device that would use only a single USB port, and provide the operator a bevy of devices with which to control and utilize various sound card modes. The end result is the Multidigi.

The Multidigi provides the Amateur Operator with the following:

- Two independent RS-232 compliant serial ports
- Two fully independent sound card devices
- Two independent sub ports for RTS/DTR switching
- Optional Relay output based on Operator configurable RTS/DTR signaling for external devices such as antenna switches or amplifiers, etc
- Downstream USB 2.0a compatible port for external devices

The Multidigi can operate two transceivers independently for contesting or shack operations, without the need of swapping cables from one radio to another.

The Multidigi is also fully isolated from the computers USB port to alleviate ground loop issues. There is no direct connection of any power, ground nor data lines between the radio and computer.

The Multidigi, having two independent sound cards built in, allows the operator to free the main sound system of the computer for tasks such as listening to music, watching videos, etc, while operating sound card modes such as PSK31. Also greatly reduces the chances of windows sounds creating QRM and unintended transmissions.

Supported Software

The Multidigi has been tested with the following rig control software:

- Ham Radio Deluxe Free version 5.22.38
- Omni-Rig
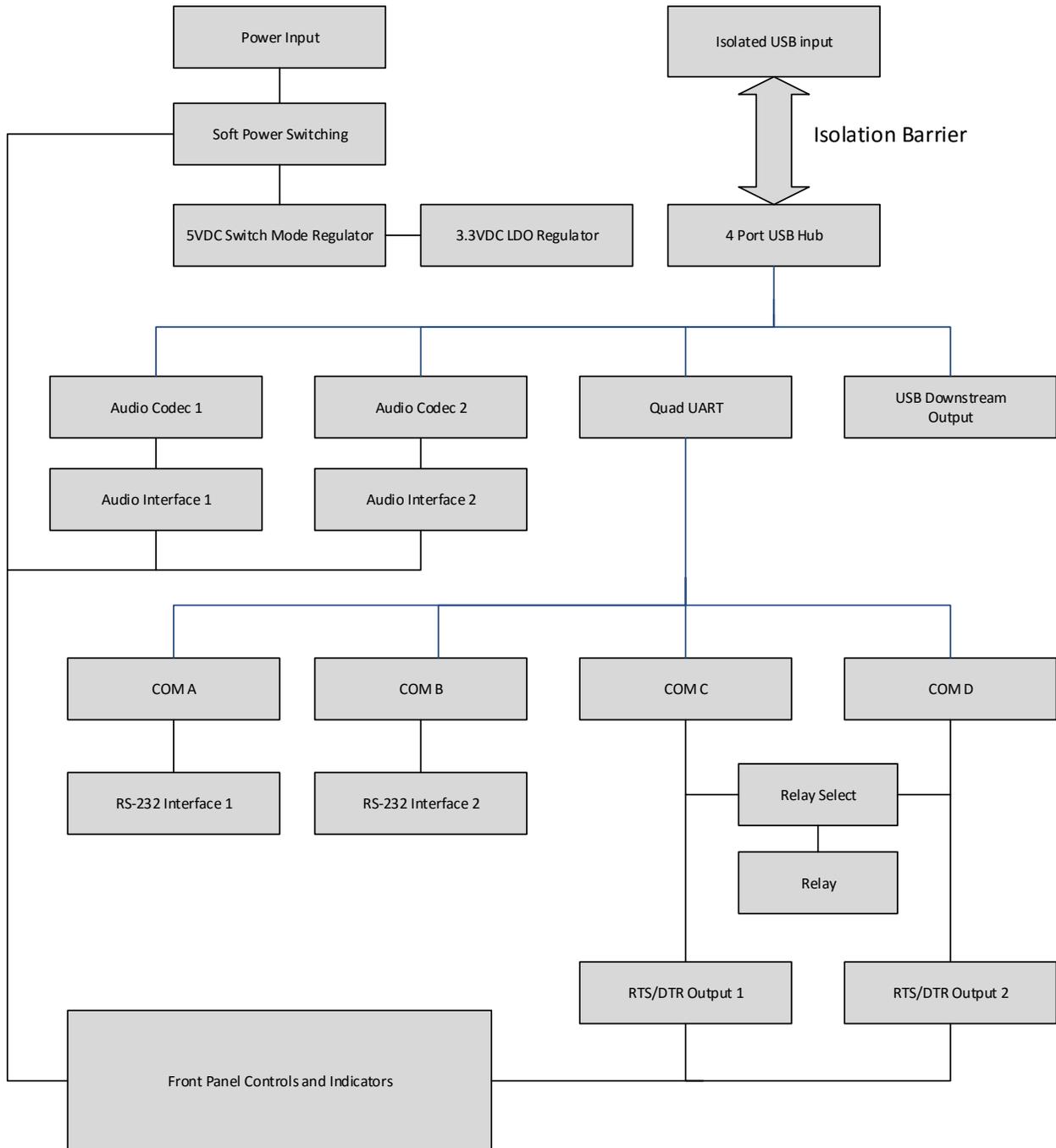- Hamsoft Rig Control Software

(expand list try other apps)

The Multidigi is also compatible with the following Sound Card mode software:

- WSJT-X
- JT-65HF
- FLDIGI
- MRP40 Morse Code
- Digital Master 780 (component of the HRD 5.22.38 package)
- WinPSK
- WSPR
- Digipan
- MixW
- MultiPSK
- Many Many More

Block Diagram

MultiDigi Block DIagram

Connecting the Multidigi

Power Input

The Multidigi is designed with a wide range input of between 10 and 15 volts DC or AC.

Most Amateurs have access to 12 volt DC supplies yet field operations may vary due to unique power sources such as wind, solar or generator sets. Power is supplied by a standard 2.1mm ID x 5.5mm Coaxial style power jack, there is no requirement for polarity, as the power input circuit includes a bridge rectifier that orients the polarity to the remainder of the device. The input voltage is also passed via a self-resetting fuse for the sake of safety.

USB Input

The Multidigi has an isolated USB 2.0 connection to the host computer. This connection is via a standard USB type B cable. The isolation ensures no physical connection of the power or ground between the host and transceiver eliminating ground loops, noise, and other interference issues. (in rev 3, beta unit is not USB isolated)

USB Output

The Multidigi includes a downstream USB Type A socket which can be used for any standard USB device such as a mouse, keyboard, thumb drive, etc. This port is powered from the Multidigi, not the host computer, and is capable of delivering 500ma of charging current for devices such as cell phones, mp3 players, etc.

RS-232 Serial

The Multidigi has two RS-232 serial ports via DB-9 connectors. The pinout and voltage levels are standard for RS-232 interfaces.

Audio

The Multidigi has two options for connecting audio to the transceiver. There is a choice of Mini Din-6 or standard 3.5mm (1/8") stereo plug. If using the stereo plug, the signals are as follows:

- Tip – Transmit Audio
- Ring – Receive Audio
- Sleeve- Ground

Audio (contd)

If using the Mini Din-6, the pinout is standard for Amateur use as follows:

- Pin 1 – TX Audio
- Pin 2 – Ground
- Pin 3 – PTT (Not implemented in beta)
- Pin 5 – Receive Audio

RTS/DTR Switching Ports

The RTS/DTR switching ports are independent COM port designators, connected via standard 3.5mm (1/8") stereo jacks, and are wired as follows:

- Tip – RTS
- Ring – DTR
- Sleeve – Ground

Relay Output

The auxiliary 10 Ampere relay is driven by COM C Serial port and is selectable via jumper JP6 to trigger from the RTS or DSR signal lines as needed. The jumper is configured by opening the Multidigi and orienting it as shown: (Demo Unit limited to 1A @ 12VDC or 0.3A at 120VAC)
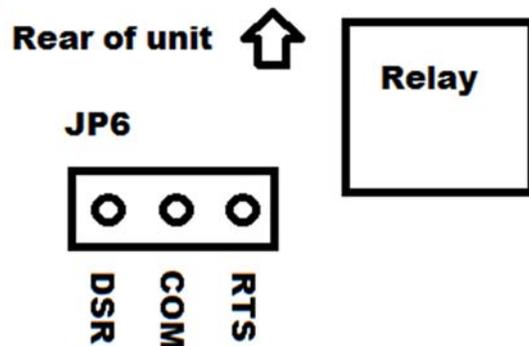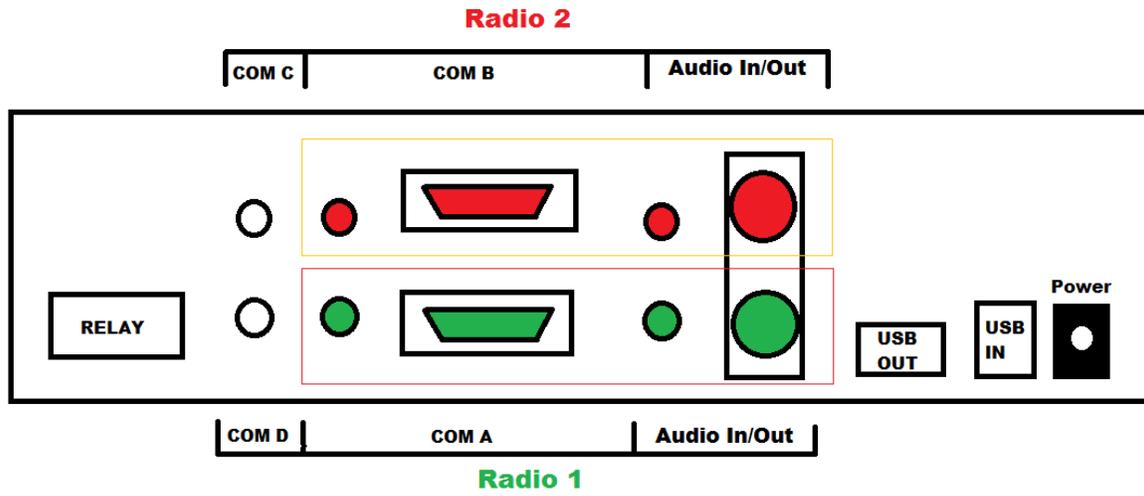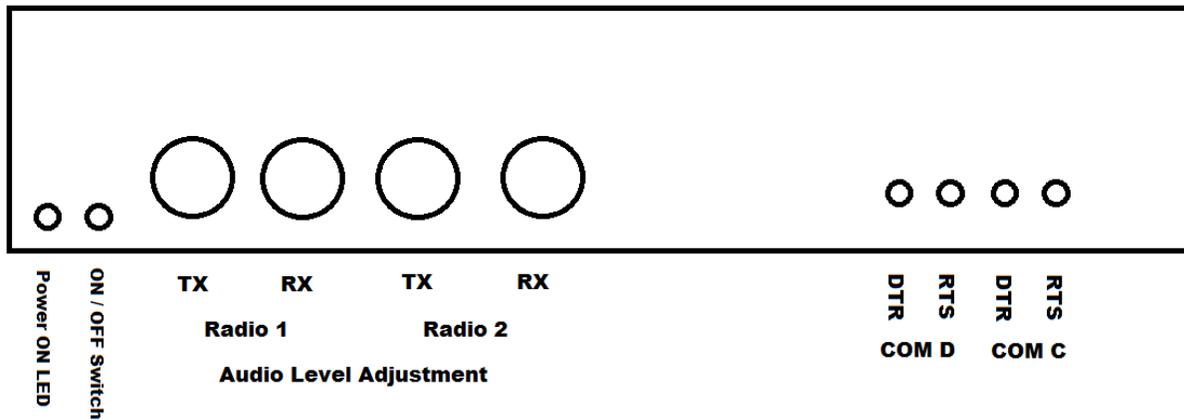

Driver Installation

The Multidigi was envisioned to be as plug and play capable as possible. The Audio interfaces utilize standard windows class drivers, and should not require any software to be installed.

The FTDI USB to Serial converter may require a driver download, if so the drivers are available on FTDI's website located at http://www.ftdichip.com/Drivers/VCP.htm The latest VCP drivers as of this writing are 2.12.16 and are fully tested to function properly. Be sure to follow FTDI's installation instructions if you encounter any issues.

Rear Panel Connections Diagram

Radio 2

| COM C | COM B | Audio In/Out |

RELAY

USB OUT

USB IN

Power

| COM D | COM A | Audio In/Out |

Radio 1

Front Panel Controls and Indicators

Power ON LED

ON / OFF Switch

TX   RX   TX   RX

Radio 1   Radio 2

Audio Level Adjustment

DTR   RTS   DTR   RTS

COM D   COM C

Multidigi on your system

The Multidigi will show up as several new hardware devices on your computer. Selecting the appropriate device in your software will be required for proper operation.

Windows Device Manager

On a Windows based computer, open the device manager by right clicking on the windows icon, and selecting device manager, your new devices will be listed as such:
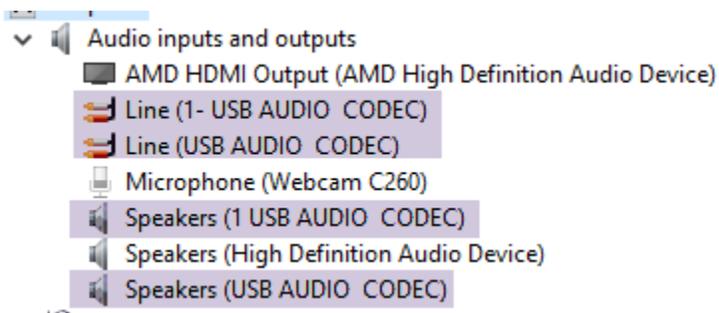
(Windows 10 device manager shown)
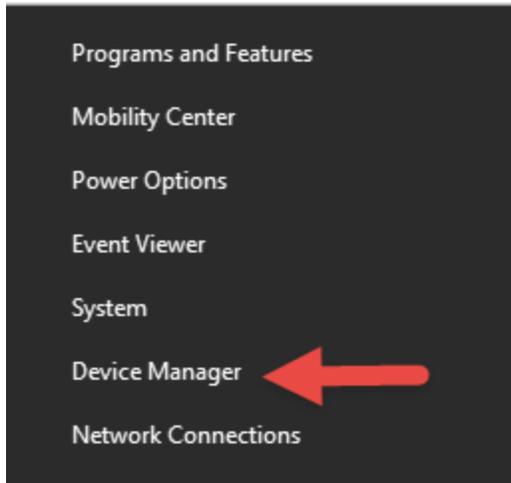
You should see 8 new devices listed on your system.

Audio Devices

Under Audio Devices, there will be 4 entries added

The USB AUDIO CODEC entries are for the sound interfaces on the Multidigi. Line and Line 1 are the Receive audio inputs from your transceiver. Speakers (USB AUDO CODEC) and Speakers (1- USB AUDO CODEC) are the Transmit audio output to your transceiver.

PLEASE NOTE: These numbers may vary if other sound devices already on your system utilize the generic USB audio endpoint driver built in to windows, and they also may change if you plug the Multidigi into a different USB port on your computer.

Audio Devices (cont'd)

        The Line and Speakers (USB AUDIO CODEC) are collectively a single component and are associated with the audio ports for Radio 1. The Line and Speakers (1- USB AUDO CODEC) are also a collective unit and are associate with the audio ports for Radio 2. These ports are independent of one another and are accessible from the Windows Sound System just as any other normal sound device. Just keep in mind that the LOWER numbered set is Radio 1, the Higher numbered set is Radio 2.

Com / Serial Ports

        The Multidigi utilizes a 4 port USB to Serial UART interface. These ports are available for a multitude of uses such as rig control, keying, switching, etc. There will be 4 new com ports listed in your device manager:
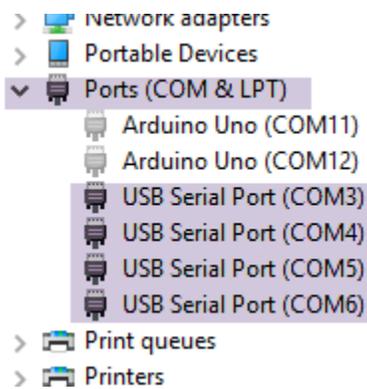
        The first two are associated with the RS-232 Serial outputs (via DB-9 connectors) to Radio 1 and Radio 2 respectively. The second two are associated with the RTS/DTR switching ports, as COM C and COM D respectively.

        The RS-232 ports are standard pin configuration and may be used as you wish. Ports C and D are TTL (5 volt) Positive logic, they can be used to switch a TTL Relay, as CW keying, or other low level switching duties.

Please Note: As with the Audio Ports, these numbers may vary on your system depending on your particular configuration, as well as by changing USB ports on the same computer. The lowest number port assigned to the Multidigi will be Radio 1, next Radio 2, and so on.

Software Configuration

There are many various software packages available for Amateur use. While this manual cannot hope to cover all of them, nor even your favorite one, they are usually similar in configuration. Below are a few examples to help you along. These examples are not any endorsement, recommendation, nor approval of any of these packages, they just happen to be what I use.

Ham Radio Deluxe v. 5.24.0.36

Rig Control

When you first start Ham Radio Deluxe (HRD) you will be asked to configure a new connection:
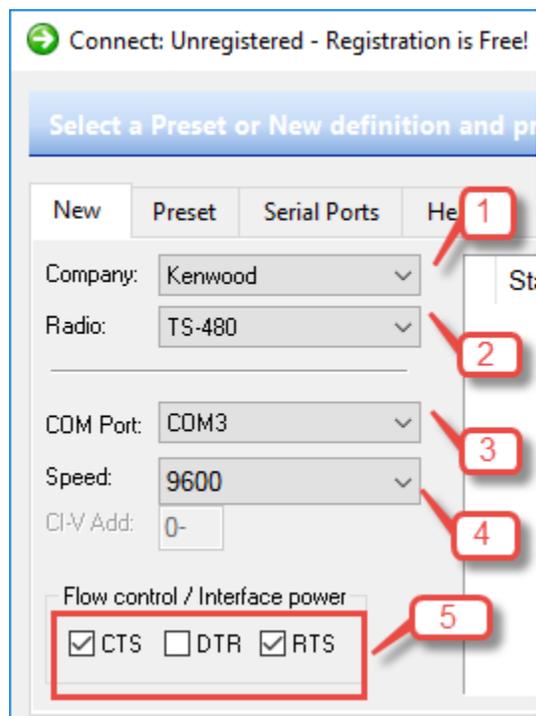
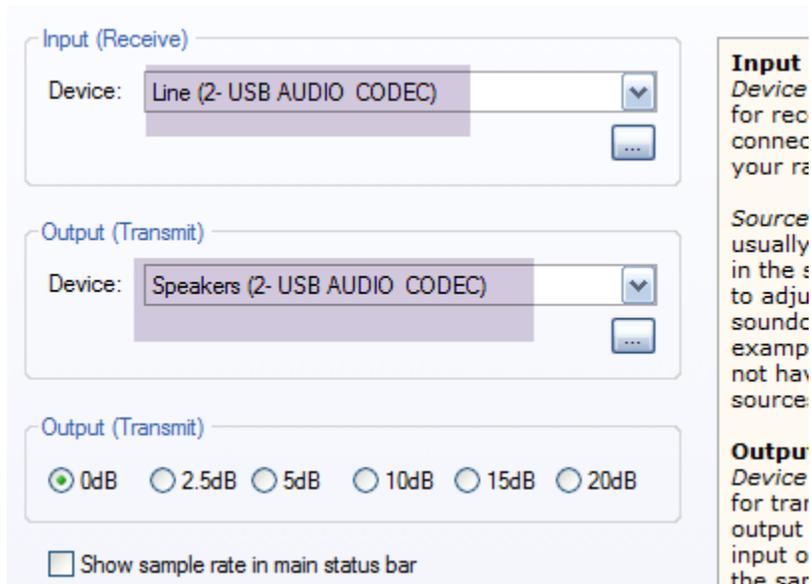Use selections 1 and 2 to select your Radio Manufacturer and Model.

If on Radio 1 port, select the FIRST numbered Com Port from last section, if using Radio 2 port, select the SECOND Com Port Listed in box 3. Check your radio's manual for the proper speed to select for the com port in box 4. Select Flow Control / Interface Power as your equipment requires in Box 5.

If your settings are successful, you will see HRD start as normal. If you are unable to connect, recheck your connections and settings to ensure they are correct.

Once you have HRD running (or whatever Rig Control app you prefer) you will next want to configure your Digital Mode software to access the new sound devices.

DM-780 (HRD Digital)

To select the appropriate Sound Devices in DM780, simply go to the Sound Card Configuration (Options > Soundcard) and select the devices:

Input (Receive)
Device: Line (2- USB AUDIO CODEC)

Output (Transmit)
Device: Speakers (2- USB AUDIO CODEC)

Output (Transmit)
● 0dB   ○ 2.5dB   ○ 5dB   ○ 10dB   ○ 15dB   ○ 20dB

☐ Show sample rate in main status bar

Input
Device
for rec
connec
your ra

Source
usually
in the s
to adju
soundc
examp
not hav
source

Outpu
Device
for trar
output
input o
the sar

Be sure the device numbers match, otherwise your TX and RX audio will not be on the same audio ports!

You can adjust the TX and RX levels easily using the front panel controls on the Multidigi as your needs dictate.

Now select your favorite mode, frequency, and have fun making contacts!

Thank you for your support!

73

Shawn

KD6OJI