

# MGL Avionics

## V16 Aviation band transceiver and A14/A16 Intercom system Digital audio and control Integration Manual

Full document is available for download  
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## General

Starting from firmware version V16 180222 (ddmmyy) and A14/A16 firmware release 7 (released on 18 February 2022) the A14 or A16 may be connected to one or two V16 transceivers in a fully digital manner eliminating the need for any audio wiring as well as PTT wiring between the devices.

In the case of using two V16 transceivers these will be referred to as COM1 and COM2.

Providing a digital link to transfer audio and control information dramatically reduces wiring effort while at the same time increasing resilience of the total system to undesirable audio effects caused by RF feedback or ground potential differences between devices or interference on audio signals in general.

As both transceiver as well as intercom are implemented with digital audio circuits the direct connection between intercom and transceiver in the digital domain eliminates the need to convert the audio signal into analog form and then back into digital on the other end of the cable. This significantly improves audio quality as well as hardens the system against interference.

**Note: As from 16 March 2022 firmware releases required are V16 160322 and A14/A16 release 9. These updates improve the link stability in some cases. Both V16 and A14/A16 units must be updated as there is a change in baudrate.**

## Document history

17 March 2022, second release. Changed baudrate and audio sample rate, added section on function of LED on both A14/A16 and V16.

18 February 2022, first release.

## Applicability

The digital connection between intercom and transceivers is only functional for MGL Avionics devices and cannot be used for any other manufacturers products.

In particular this applies to the MGL Avionics V16 transceiver and A14 as well as A16 intercom systems only.

## Description

Digital connection between Transceiver and intercom device is via RS232 port 2 on all devices.

In case of a single transceiver (COM1) the connection is:

Intercom RS232 port 2 TX ---> V16 COM1 RS232 port 2 RX

Intercom RS232 port 2 RX <--- V16 COM1 RS232 port 2 TX

In case of a dual transceiver (COM1 + COM2) the connection is:

Intercom RS232 port 2 TX ---> V16 COM1 RS232 port 2 RX

V16 COM1 RS232 port 2 TX ---> V16 COM2 RS232 port 2 RX

Intercom RS232 port 2 RX <--- V16 COM2 RS232 port 2 TX

All devices would normally share the same power supply ground. In this case there is no need for an additional RS232 ground connection and such a connection is not recommended as it would potentially introduce a ground loop.

Should intercom and transceivers be operated on individual galvanically isolated power sources then a RS232 ground connection is required between devices. Any ground point on any device may be used for this however any grounds marked as dedicated audio grounds should not be used.

## **PTT connections**

With the digital link, PTT connections **MUST** be connected to the intercom. The PTT information (for both COM1 and COM2) will be transferred to the transceiver(s) via the digital link.

You may connect the PTT wires to the transceivers in parallel but they will only be used by the transceivers if the digital link is not operating.

## **Setup**

Apart from providing the RS232 wiring, no further setup related to the audio and PTT connections is required. All audio signal levels to and from the transceivers are automatically set.

## **RX Volume**

With active digital link the RX volume is fixed to about 75% every time the link is established (typically once after power cycle). However from this initial setting the RX volume may be increased or reduced as needed. Any modified setting will be lost on a power cycle.

Any RX volume that was set with the digital link not active will retain its last value after a power cycle as usual.

## **V16 audio inputs and outputs**

With the digital link established the V16's audio output remains active.

The V16 microphone inputs are deactivated. Audio for transmission is sources exclusively from the intercom system via digital link.

All other audio functions of the V16 (such as the voice recorder/playback) remain fully operational.

All VOX functions of the V16 have no effect and are bypassed. The VOX functionality moves to the intercom.

Sidetone during transmit is available via the digital link. Note that this can be switched off in the V16 if so desired. Note further that the intercom itself has a side tone function that is configurable to bypass the radio completely if so desired.

It is recommended to leave the sidetone in the V16 enabled and to select the sidetone from

the transceiver in the intercom setup.

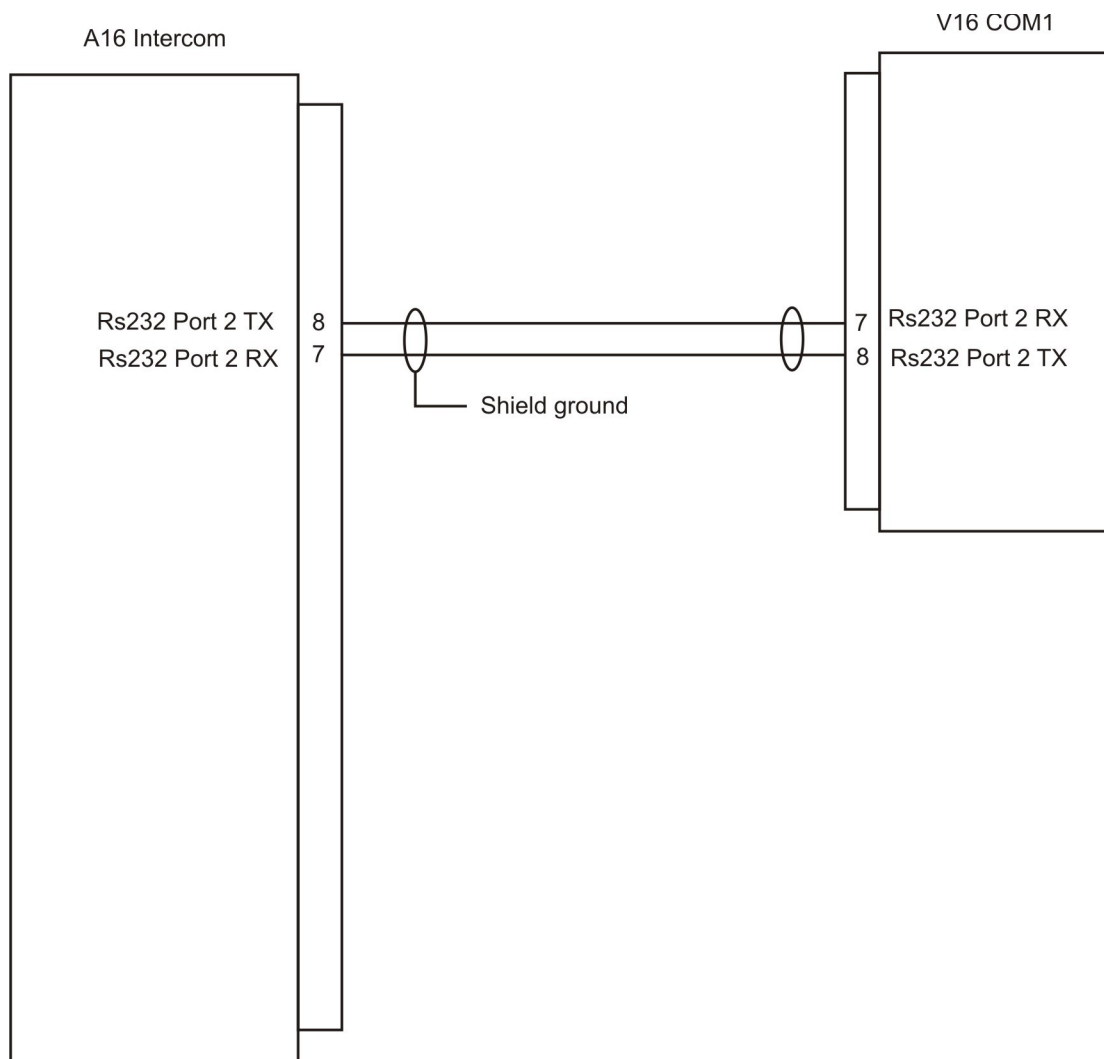
## Installation limitations

The RS232 link on port 2 will operate at high speed. Baudrate is 500.000 bits per second.

This limits the length of the cable that may be used. It is recommended to keep the length as short as possible and not longer than 3 feet (1 meter) for each connection.

If shielded cable needs to be used the length of this connection may need to be shorter. If you use shielded cable – please connect the shield to ground on one side only. Leave the other end of the shield unconnected.

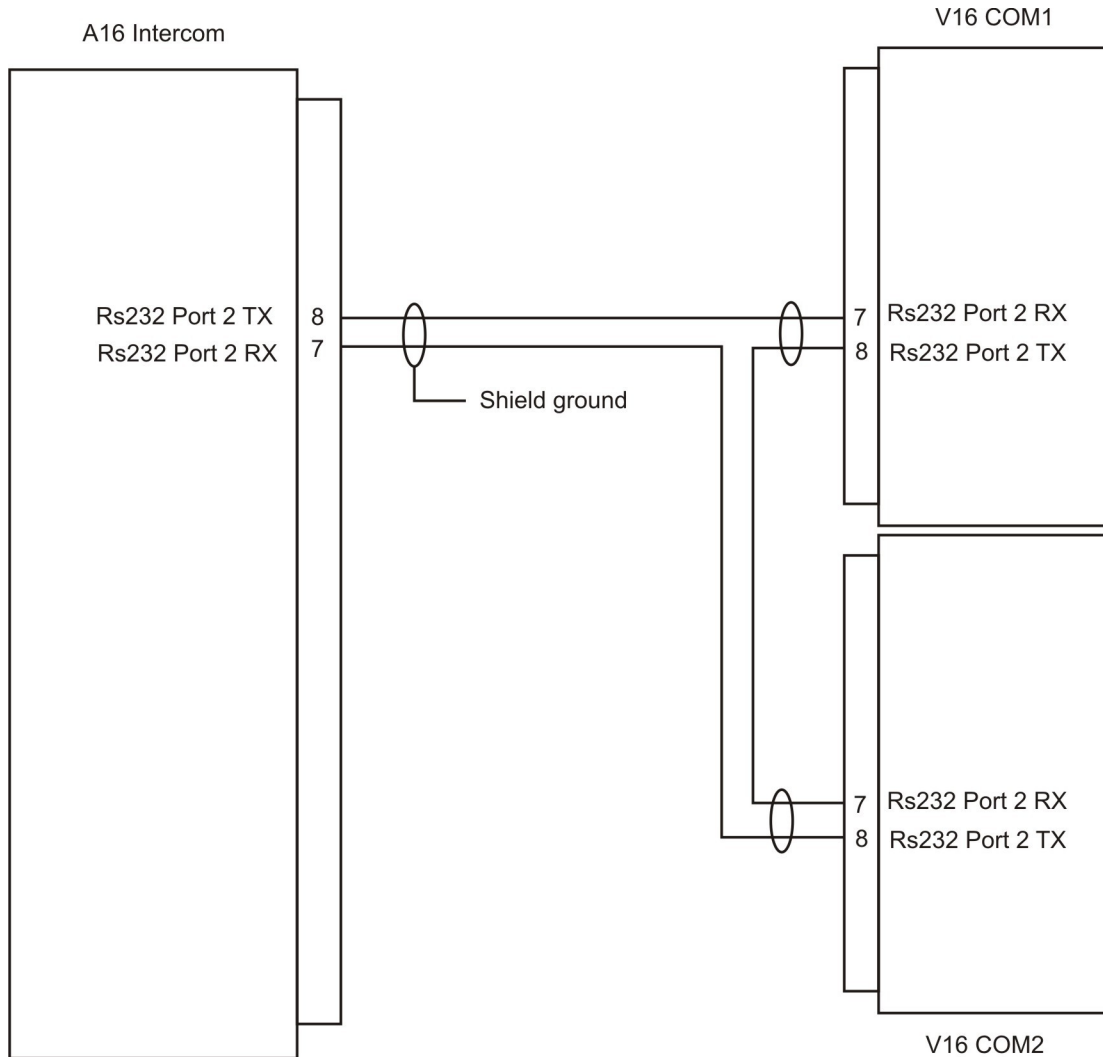
## Single COM transceiver wiring



In this configuration the V16 microphone inputs are not used and should be left unconnected. PTT inputs on the V16 also not used.

Audio output of the V16 remains active but is not usually connected to anything.

## Dual COM transceiver wiring



In this configuration the V16 microphone inputs are not used and should be left unconnected. PTT inputs on the V16 are also not used.

Audio output of the V16 remains active but is not usually connected to anything.

The position of the V16 in the wiring determines if it acts as COM1 or COM2. The V16 that has its RX line connected to the A16 TX line is always COM1.

### Audio signal flow

Audio originates in the intercom at 8,000 samples per second at a 16 bit resolution. In addition the state of its two PTT inputs is also included. This is the audio that would potentially be transmitted.

This audio is received by COM1. Its own audio, from the receiver or sidetone during TX is then added (as second independent digital audio signal) and both audio signals plus the PTT states are then sent by COM1 and received by COM2. COM2 then discards the audio from the intercom for further transmission and replaces that with its own. Finally the intercom receives both COM1 and COM2 audio signals as two independent signals.

The digital audio link in all cases relies on the intercom which sends its audio in digital format – if any transceiver receives digital audio on its RS232 port 2 it switches into digital mode and forwards the digital audio signal on its RS232 port 2.

Further information contained in the data stream allows the receiver of the digital audio stream to determine the source of the signal.

If a receiver of a digital audio stream no longer receives that stream it will revert back to its normal mode of analog operation.

## **Mixed operation**

It is possible to create a system with one A14/A16 intercom, one V16 using the digital link and a further COM or NAV/COM radio using a conventional analog audio connection.

In this case wire the intercom and V16 as shown for a single V16. This V16 will appear as COM1 in the interface controller (Razor or EFIS).

COM2 will remain available as an analog connection as shown in the intercom installation manual.

## **A14 vs A16**

Both A14 and A16 intercom systems behave identical as far as their COM1 and COM2 interfaces are concerned and everything stated in this document applies for both.

Differences between the two:

A16 has 6 microphone inputs, A14 has 4 microphone inputs.

A16 has two dedicated NAV radio inputs. A14 does not have these inputs but AUX inputs can be used instead for this (A14 has two analog inputs less).

A16 has a dual circuit audio output system (both stereo). One output is for the PILOT circuit, one for the PAX circuit. A14 has a single audio output circuit (also stereo) – both PILOT and PAX share the same output signal for headsets.

## **A16/V16 LED with digital audio link**

From V16 firmware release 160322 and A14/A16 firmware release 00009 the function LED light is used as a diagnostics indication to assist with the digital link.

Under normal (no digital link) operation the LED functions as normal. It flashes once per second (0.5 seconds ON, 0.5 seconds OFF).

If the RX pin on RS232 port 2 on any device detects the audio link the LED will give a double flash (0.12 second ON, 0.13 second OFF, 0.12 second ON, 0.63 second OFF).

If the link loses sync due to a disturbance or loss of data the LED will perform a RAPID continuous flash for a minimum duration of 3 seconds (even if the link fails only for a single audio sample).