

Headsets

INCORPORATED

DRE-205e

2-place extendable stereo portable
AIRCRAFT INTERCOM SYSTEM

OPERATIONS MANUAL



Headsets Incorporated
Sales: 806-358-6336
Technical: (562)695-7054 wilsonmines@dslextreme.com
www.headsetsinc.com

The **DRE-205e** is a portable stereo intercom designed for both portable and built-in applications.

Benefits for both portable and built-in use:

- extendable to a 4-place or 6-place system by plugging in another DRE-205e intercom (2 maximum) through jacks on the side
- isolate mode, accessible by pressing the volume knob (to isolate from other intercoms or any source connected via the EXTension jacks)
- ability to defeat music muting (accessible by pressing the squelch knob)
- phone interface is standard (works with many cell phones)
- stereo, and automatically compatible with any mix of stereo and mono headsets
- High capability squelch
- no deterioration in sound quality as the batteries wear down
- low-battery warning with the light flashing faster as the batteries get weaker
- stuck-mic monitoring and alarm system (flashing LED, and beep in earphones)
- music input jack allows the use of iPod or CD player for in-flight entertainment.
- music is automatically muted by incoming ATC and/or microphone input
- automatic fail-safe, in the event of power loss to the intercom, pilot can still use radio output for recording off the intercom

New features specifically intended for built-in use:

- optional brackets for mounting
- ability to bring in audio signals (alarms) from instruments
- jacks for aircraft power and instrument inputs connect on the sides out of sight, behind the panel.

Note: Installation manual (for use in built-in applications) is separate.

TABLE OF CONTENTS

| | |
|--|----|
| Basic Connections for Portable Operation | 4 |
| Volume | 5 |
| Squelch | 5 |
| Radio Reception | 7 |
| PTT, PTT-Stuck Warning, and Transmitting on the Radio | 8 |
| Automatic Fail-Safe Mode | 10 |
| Stereo Music and Music Muting | 10 |
| Cell-phone Connection and Use | 11 |
| Audio or Video Recording | 11 |
| Extending the Intercom to 4- or 6-place, Plus Isolate Mode | 12 |
| Batteries, Battery Life, and Low-Battery Indication | 13 |
| Using Aircraft Power instead of Batteries | 14 |
| Accessory Input (External Signals in Installed Units) | 14 |
| Specifications | 15 |
| Technical Support | 15 |
| | |

We encourage you to read this manual entirely so that you may enjoy the full capability of your new DRE-205e intercom. Thank you for your purchase.

BASIC CONNECTIONS FOR PORTABLE INTERCOM USE

The cable coming out the left end of the intercom has general-aviation plugs, .25" for earphone signal coming from the aircraft radio, and .21" for the mic and PTT signals going to the radio. Plug these into the pilot's headset jacks that are installed in the aircraft, or, in the case of a hand-held radio, into the adapter provided by the radio's manufacturer as shown in Figure 1.

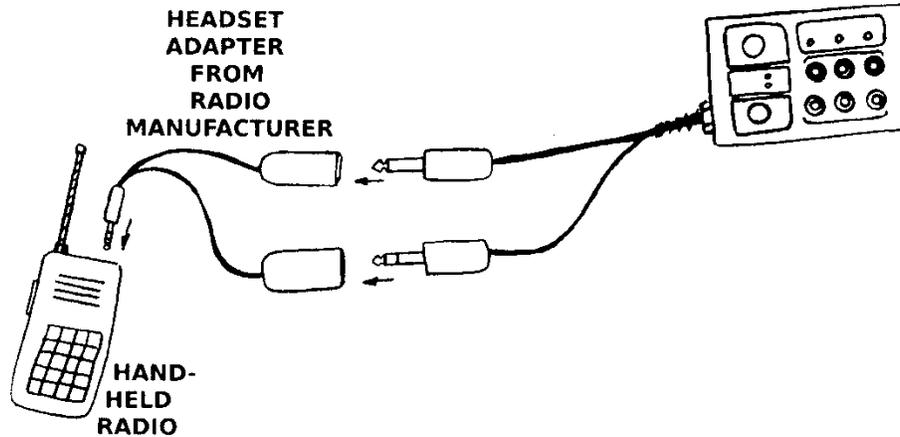


Figure 1. Direct connection to hand-held radio, using either the radio's PTT or plugging portable PTTs into the intercom.

The plugs of the headsets always connect directly into the front of the intercom in the Mic and Ear jacks, even if you have portable PTTs. The male plug of a portable PTT, when used, is connected to the PTT jack in the front of the intercom. The female connector on the portable PTT will not be used. This is shown in Figure 2 on page 8.

A possible exception to the PTT connection is covered on pages 8 and 9 in the section called "PTT, PTT-STUCK WARNING, and TRANSMITTING ON THE RADIO."

Other connections will be addressed in the respective sections of this manual. These include music input, cell phone, audio output for recording, auxiliary power, and intercom extension. Connections for audio input and output for use when the intercom is to be installed are covered in the separate **Intercom Installation Manual**.

VOLUME

To adjust the volume, start with both headsets' volume controls turned all the way up. Then adjust the volume on the intercom, radio(s), entertainment system, etc. for the person hardest of hearing or with the least-sensitive earphones. If the volume gets too loud for the other person, it can then be adjusted down with the headsets volume controls. **There should always be at least one headset with its volume control(s) turned all the way up.**

What the intercom volume knob affects:

- how loud you hear your own voices
- how loud you hear the cell phone
- how loud you hear the voices of those connected to extension intercom(s)
- how loud you hear audio annunciators from other instruments

The volume knob does not affect:

- radio volume, either transmitting or receiving
- music volume

(These are controlled at the radio and music source.)

If you have two or three intercoms linked, the volume knob on each intercom controls only the volume heard by the two people whose headsets are plugged into that particular intercom. It does not affect how loudly they come across in the other intercom(s). It only affects how loudly they hear themselves, others, their own phone, and possibly auxiliary inputs.

There is no compressor/limiter circuit in the 205e.

The volume settings of audio enunciators from instruments are further addressed in the installation manual.

SQUELCH

The DRE-205e intercom has a separate squelch circuit for each mic input. Although there is only one squelch control, the threshold it establishes is fed to the individual squelch circuits, which act according to their respective mic signals, independent of other mic signals. When one mic is used, the separate squelch circuit for the other mic prevents ambient noise from being transmitted.

In any environment loud enough to need an intercom, we do recommend that you keep your headset microphone right up to your lips to get the best signal-to-noise ratio and best squelch operation. In severe noise situations, the mic's windscreen should be close enough that your bottom lip occasionally touches it.

Some headsets made today have microphones that are too sensitive for the noisiest environments. These mics will overload, and distort the signal before it reaches the intercom. The TSO requirement for mic sensitivity is so high that it often makes TSO'ed headsets unusable in the loudest aircraft. The DRE headsets we sell offer a near-optimum combination of audio quality, noise-canceling, and sensitivity. You will find this in the DRE-6001 headset.

The DRE-205e can squelch up to six volts peak-to-peak of noise at the microphone inputs, with useful headroom left over. This is more than the useful range of most headset mics.

Set the squelch as low as it will go without it occasionally being triggered by aircraft noise. With your DRE intercom, you will be able to talk in a relaxed voice in most aircraft. You will not need to force your voice like you normally would in loud environments.

Using a small foam windscreen on the microphones will relieve unintentional squelch activation by heavier breathing in lower-noise conditions, or by wind from a vent or open cockpit. In any situation, the windscreen will give the benefit of greatly reduced pops and blasts from some sounds of speech, like the "p".

Noise cancelling headset mics usually have holes in the back as well as the front. There is a common temptation to cover the holes in the back in order to reduce the noise coming from the back. The mic needs the holes on both sides to be unobstructed for it to do its job of canceling noise. Note: The passive noise-cancelling in microphones is not the same as the active noise-cancelling mentioned earlier referring to earphones. They are unrelated.

It has always been advisable to use matched headsets if possible with an aircraft intercom to make its squelch work best; but with the DRE-205e intercom, problems arising from mixed headset brands and types are minimized.

Note:

If you use the portable intercom in aircraft that already have built-in intercoms (e.g., if the built-in intercom is not as good), turn the built-in intercom's volume all the way down, and its squelch all the way up so it won't be activated. Otherwise the pilot's mic signal will go through the built-in intercom and be fed back to the 205e with a lesser quality and appear to take away control of squelch.

RADIO RECEPTION

Radio reception always comes through, to both pilot and copilot, regardless of volume or squelch settings, battery strength, muting mode, isolate status, or even whether the intercom is powered up or not. Radio reception will also always mute the active music input. It will not mute the intercom.

If the radio side tone volume is too loud it is the radio that will need adjustment. The intercom does not have a separate side tone circuit for the radio. Pressing your PTT does not make the intercom do anything different with the signal. The difference is that when you transmit, the radio feeds your voice back to you as well, and the radio's side tone level might be set much higher than the intercom's volume. You can check that by transmitting with the intercom turned off. The radio will normally have a screwdriver adjustment for side tone.

The intercom's volume control does not affect the radio volume, either transmitting or receiving. Set the radio volume at the radio.

PTT, PTT-STUCK WARNING, and TRANSMITTING ON THE RADIO

First: The plugs of the headsets always plug directly into the front of the intercom into the Mic and Ear jacks, even if you utilize portable PTTs. The headsets' mic plugs **will never** plug into the female connector of a portable PTT for use with the intercom. (Plugging in there won't hurt anything, but it won't work right.)

There are several configurations for using portable PTTs.

If the copilot needs to be able to transmit, his PTT must be plugged into the front of the intercom. This enables the intercom to route his mic signal to the radio. Leave the female connector of the portable PTT unused, as shown in Figure 2. The pilot's PTT can be plugged into the front of the intercom as well, or he can use a built-in PTT.

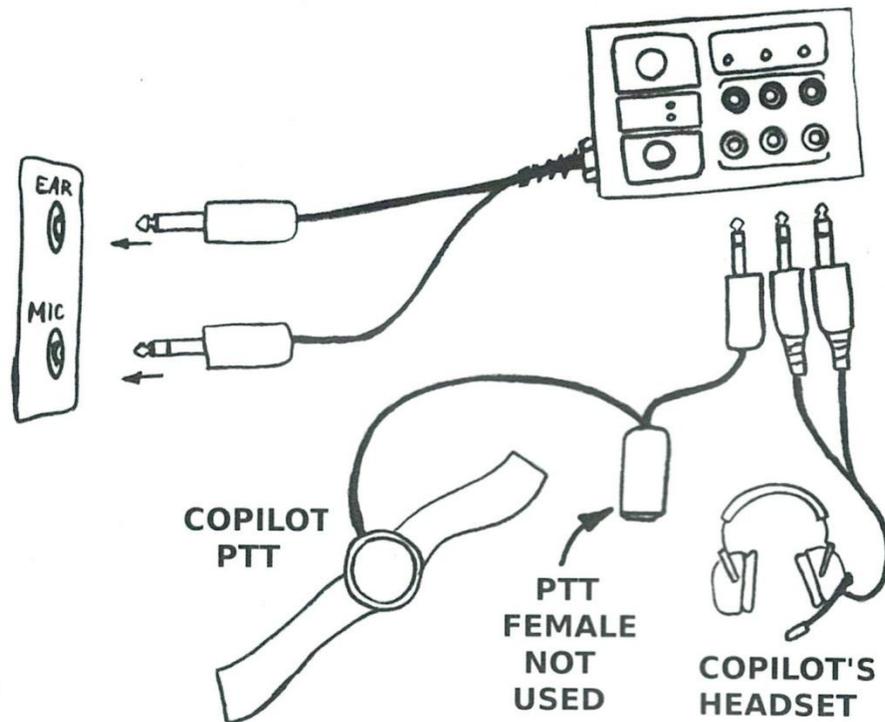


Figure 2. Copilot headset and PTT connection.

Intercom shown plugging into aircraft panel.

Pilot's connections can be similar, or he can use a built-in PTT.

If only the pilot needs to transmit, he can use one of the PTT possibilities listed above, or, install a portable PTT between the intercom and the radio. In this case, the smaller plug (microphone) on the intercom's radio-interface cable will plug into the PTT's female connector and the PTT's male plug connects to the radio. See Figure 3 next page.

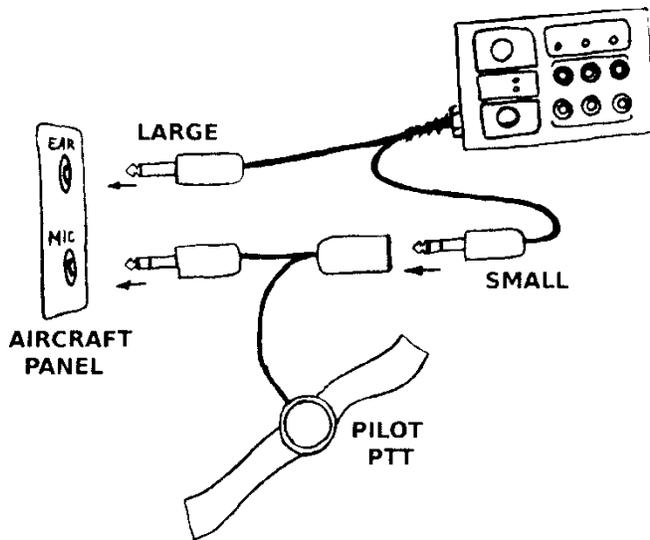


Figure 3. Best way to connect a portable PTT for pilot-only transmit.

If you are using a hand-held radio with a headset adapter, then the intercom plugs into the radio adapter. If only the pilot needs to transmit, the male plug of a PTT connects to the radio adapter and the mic (small) plug connects to the jack on the PTT.

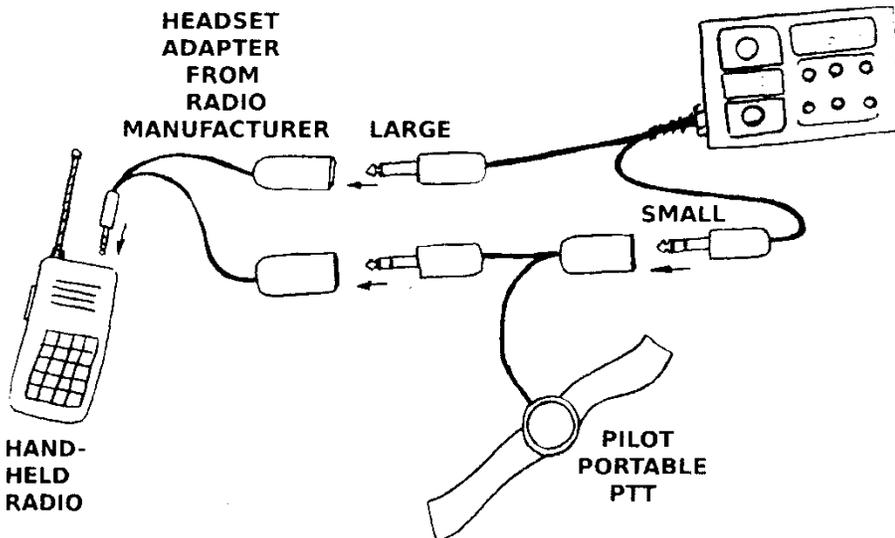


Figure 4. Connecting with a hand-held radio.

In all cases PTT priority goes to the copilot. This arrangement accomplishes three purposes: it allows a CFI to override a student's transmission, it increases battery life, and it allows the pilot full use of the radio even if the intercom were to fail. The only time both PTTs would be pressed at once would be when a CFI (in the copilot's position) is overriding a student's transmission.

The red LED on the intercoms face plate begins to flash if a PTT is pressed for more than 20 or 25 seconds, or if a PTT malfunction arises. At the same time, there will be an audible beeping in the in the pilots and co-pilots earphones. The 205e will also disable the co-pilot's PTT while the PTT-stuck warning is activated.

AUTOMATIC FAIL-SAFE MODE

In the event the DRE-205e intercom is turned off or loses power for any reason, the earphones are automatically disconnected from the intercom's output and connected to the input from the radio. This allows the pilot to have full use of the radio, without doing any manual switching. The copilot will not be able to transmit, but he can hear the radio.

STEREO MUSIC and MUSIC MUTING

The DRE-205e allows you to enjoy stereo audio through the use of an audio player connected to the Music jack located on the face plate of the intercom. To listen to audio, connect a cable with a 3-conductor 3.5mm plug on each end to your audio player and to the jack labeled "MUSIC" on the front of the intercom. Various retailers have cables that will work. Radio Shack (www.radioshack.com) stock numbers 42-223 (3 feet long) and 42-435, 42-2387, and 42-2607 (all three 6 feet long) should all work fine. You do not need shielding or gold plugs, just three conductors.

An audio source connected to the Music jack will have the lowest priority in the intercom. The audio from this jack will drop into the background (due to Auto Muting) when there is other audio input such as radio or talk on the intercom. When the radio or intercom talk is gone, the music fades back in smoothly. On the 205e however, you can choose to over ride the auto muting function. This setting is selected by pressing the squelch knob like a pushbutton. For safety reasons, radio reception will still mute the music, and accessory input (i.e., audio enunciators from instruments, or an installed intercom) will as well; but intercom, phone, and extension intercoms will not.

If the intercom is not in continuous-music (auto mute override) mode, the entertainment will be dropped into the background by:

- Intercom conversation
- radio reception
- audio from extension intercom(s)
- accessory input audio
- cell phone audio

There is no visual indicator for the mute override showing on or off.

Unlike the radio input, the music input **does** boost the signal level, approximately tripling it. This is to compensate for the fact that many of the small personal stereos put out a signal voltage that is inadequate for driving aircraft headsets.

If you wish to listen to a non-stereo sound source using stereo headsets, you will normally hear it in only one ear. To get the mono program material into both ears, one remedy is to use an adapter plug such as Radio Shack catalog number 274-882 at the source end, or 274-374 at the intercom end of the connector cable.

The intercom automatically accommodates any mix of stereo and mono headsets, without requiring adapter plugs on the headsets.

CELL-PHONE CONNECTION and USE

The DRE-205e features a cell-phone interface. This is for both making and receiving calls. It will work with many phones on the market, but not all, due to phone differences between manufacturers. If your phone is one that doesn't work with it, there may be an adapter available at stores carrying cell-phone accessories.

The volume control on the intercom **does** affect the volume of the incoming phone audio, but to get a good balance you may need to turn the phone's own volume control up or down.

AUDIO or VIDEO RECORDING

The "REC OUT" jack on the front panel of the intercom provides output for recording all the audio passing through the intercom. This output is suitable for most low-level, low-impedance mic inputs as well as high-impedance line inputs on a recording device. The audio that the connected headsets hear is what will be recorded, even if the intercom is not on. (If the intercom is not on, you can still hear the radio.)

The Rec Out output, just like the headset output, is stereo, and can be used with either mono or stereo loads, regardless of whether the headsets plugged in are stereo or not. A good use for this output is in-flight video recording.

EXTENDING the INTERCOM to 4- or 6-PLACE, plus ISOLATE MODE

You can use two 205e intercoms connected together for a true 4-place intercom. The cable needed to connect 2 or more intercoms together is available from Headsets Inc. (Pt. No. DRE205eEXT). ***A standard music patch cable will not work for this!*** The last paragraph of this section tells how to make one. Use the cable to connect the intercoms together at their EXT I or EXT2 jacks on their left sides. The EXT I and EXT2 jacks are two separate but identical I/O ports, so it does not matter which one is used. (Note: If the intercom is installed in a panel, these jacks will probably be hidden.)

Similarly, you can use three 205e intercoms for a true 6-place. Make the same connections as above for the additional intercom, plus a third cable to connect the two extension intercoms together.

Each intercom can use separate phone and music sources, as well as accessory inputs and/or communication radio. The only thing that gets shared over the extension connections is the intercom audio from the headset microphones. None of the other audio sources at any given intercom will be heard on the other intercom(s). The music-muting mode of one intercom will also not affect the other intercoms.

To isolate one intercom from the others, use the ISOLate mode. To select ISOLate mode, press the volume knob. Press the knob again to cancel ISOLate mode. There is no visual indication for the ISOLate mode on the intercom front panel.

The EXT1 and/or EXT2 jacks on the left side of the 205e intercom, in addition to intercom extension, could, be used for a second or third radio. The installation manual covers this in greater detail. The signal output from the intercom is on the tip of the connecting cable plug, and input to the intercom is on the center ring of the connecting cable plug. The sleeve of the connecting cable plug is ground. There is no requirement to use both input and output. You may have an application that needs only the inputs, or only the outputs. The input and output can also be unrelated; i.e., the input comes from one device and the output goes to another. Unused contacts should be left unconnected.

If you make your own EXTension cables (such as to use right-angle plugs), here's what you need to know. All intercoms' EXT1 and EXT2 jacks put their signal out on the tip of the plug, and return the input on the center ring. Make your cable so that the tip of one plug goes to the center ring of the other, and vice-versa. The sleeve is ground at both ends, so this one connection does go straight across. Using shielded cable is preferable for long runs, but may not be necessary for short ones. Either way, you need three conductors total, whether or not one of them is a shield.

You will need two 3.5mm 3-conductor phone plugs.

BATTERIES, BATTERY LIFE, and LOW-BATTERY INDICATION

The expected duration of a fresh pair of 9V alkaline batteries should be approximately 12 hours, with two stereo headsets and some form of audio input full-time. Lithium batteries will provide a longer duration but cost more to purchase.

Various conditions will affect that battery life. Using mono headsets will reduce the life slightly, but not using music or other constant audio will extend the duration.

We recommend replacing the batteries together. It is not required to install two batteries, but two batteries working together will provide greater than twice the duration provided by a single one. If you only replace one battery at a time, the stronger one will do all the work until it reaches the level of the weaker one, then they will drain together and you will receive fewer hours per battery. **We do not recommend this method.**

When the batteries have approximately 1/3 of their life left, the low-battery LED on the front panel will begin to flash, starting at once every five seconds. As the batteries discharge, the flashing will accelerate until it reaches approximately one flash per second and the intercom goes into fail-safe mode (discussed on page 10). This is the only visual indication of battery life remaining. If the intercom is left on after it enters fail-safe mode, the flashing will continue to accelerate until it reaches approximately four flashes per second. Once the batteries are too exhausted to generate the flashing, the red PTT-warning LED may be on full-time. If the batteries' voltage is not at least 6.2 volts under load, the intercom will not come out of fail-safe mode when you turn it on.

To replace batteries, push the drawer up to release the catch and allow the spring to push it slightly out. With no battery in the drawer, you will have to pull the drawer out with your fingernail. Put the new battery into the drawer with the terminals away from the spring, observing the polarity as printed in the bottom of the drawer. The drawer will not close completely if the battery is installed incorrectly. A battery installed backwards will not damage the intercom, but it will not work either.

Be sure to turn the intercom off at the end of the flight to avoid depleting the batteries. Take care that the volume knob does not get bumped out of the "OFF" position in your flight bag as this will allow the batteries will run down.

USING AIRCRAFT POWER INSTEAD of BATTERIES

The DRE-205e can be connected to the aircraft power via the supplied power cable. This is accomplished by plugging the power cable into the right side AUX POWER INPUT on the intercom and the other end into a cigarette lighter power socket. The 2.1 mm connector on the power cable will push in and then the nut is tightened down to prevent the power cable from disconnecting accidentally. Connecting the DRE-205e intercom to aircraft power will automatically transfer power dependence to the aircraft. If that connection were to fail for any reason, power will again be drawn from the batteries, even if the power cable is not unplugged. **The green LED labeled "AUX PWR" / "LOW BATT" will always be on while auxiliary (aircraft) power is applied, even if the intercom is turned off. If you don't see the green LED lit continuously, then there is no auxiliary power supplied to the intercom.**

Average current drain through the auxiliary power jack is around 70mA when the intercom is turned on and has two headsets plugged in. If the fuse in the cigarette lighter plug on the auxiliary power cord provided with the DRE-205e ever needs replacement, replace with a standard 3AG 2-amp fuse. **(Do not install a larger amperage fuse than recommended).** If power is applied to the auxiliary power jack, there will be approximately 13mA of current drain when the intercom is turned off. If the master switch does not cut the power to the cigarette lighter, disconnect the auxiliary power cord when you leave the plane to prevent battery drain of the aircraft battery.

The auxiliary power input is designed for both 12V and 28V aircraft. Spikes should be kept under 50V.

ACCESSORY INPUT

The 3.5mm 3-conductor Accessory (ACC) input phone jack has no outputs, but instead has two separate but identical input channels, one on the tip and one on the center ring with the sleeve as ground. Do not confuse these two channels with the left and right of a stereo input. Although the intercom is stereo, these two inputs are not intended for music. They are two separate but identical monophonic inputs, and both supply both ears of each headset. They are intended to be used as inputs from, for example, a GPS or engine monitor. Audio from either of these inputs will be heard even in the ISOLate mode (which disconnects the EXTension ports), and will mute music regardless of the muting mode.

SPECIFICATIONS

Note: These are actual measurements from a 205e. Frequency responses are at the -3dB points.

Music:

| | |
|-----------------------------|--|
| gain: | 2.8 non-inverting |
| input impedance: | 1K Ω |
| frequency response: | 18Hz-40kHz |
| THD at 1Vrms out and 400Hz: | TBD (was 0.25% @ 1kHz, 2Vrms output on 244e) |
| signal-to-noise ratio: | 78dB |
| music muting: | 20 dB |
| channel separation: | 60dB @ 1kHz |

Radio:

| | |
|---------------------|-------------------------|
| gain: | 1 (with unit on or off) |
| input impedance: | 500 Ω |
| frequency response: | 14Hz-40kHz |

Intercom:

| | |
|-------------------------------|--|
| maximum mic input: | 10Vp-p without clipping (with low vol setting) |
| mic input frequency response: | 100Hz-7kHz |
| isolation in ISOLate mode | 74dB @ 1kHz incoming, 61dB outgoing @ 1kHz |

Output:

| | |
|--------------------------------|---|
| Maximum output signal voltage: | Automatic mono/stereo compatible, intended for common G/A earphones of 75 to 300 ohms per ear 8V peak to peak at earphones |
|--------------------------------|---|

Accessory inputs:

75K Ω , designed to accept instrument audio in primarily the optional built in configuration

Phone interface:

designed to plug into cell phones with a miniature corded earphone/microphone pair

TECHNICAL SUPPORT

If you have questions, need help, or repair service, contact Garth Wilson, the designer of the intercom, at wilsonmines@dslextreme.com, or (562)695-7054.