

Which Radio did that Call come from Indicator +

Radio audio Mute module



Introduction:

PART 1: With many radios on the bench listening for activity, when someone does call you, which radio did it come from? I am often in the next room and hear the call but don't know which microphone to reply with. Our small group had started to add at the end of the call which band the call had been made on.

By using coloured LEDs, this unit will flash a **Blue** LED for a few minutes to indicate the last radio that received a call. Of course if multiple radios are receiving, their LEDs would also indicate. Some may say that continuously flashing lights are a distraction but flashing LEDs would not occur unless a condition needing to be noted happens anyway. **Blue** would be chosen because it will be out of the ordinary and will be more noticeable.

If two radios receive calls, the first one (oldest) could light up **Blue** and maybe the second or most recent could **flash Blue**. That way you could tell which radio received first or the most recent call. After several minutes of no audio, all LEDs would extinguish.

PART 2: Another problem with so many radios receiving at once is when having a conversation on one radio; it would be nice to shut the other radios up temporarily. We do this now by turning down the volume. Unfortunately when I do this, like others I forget to turn the volume back up again and I miss calls until I realise what has happened.

Solution: Well one solution anyway is to use this device which can solve both of the above problems.

Specifications:

Controlled by an AVR ATTiny processor.

Each module is a standalone unit so a user can have one or two or more by daisy chaining them and connecting 13.8v to only one module in the chain.

Linking is via Cat 5/6 patch leads – readily available in varying lengths.

Individual module Mute time can be up to 10 minutes set in programming mode.

Individual module Display time can be up to 30 minutes set in programming mode.

Radio speaker connections – standard 3.5mm in and out.

4 or 8 Ohm speaker outputs can be used.

Radios with voltage on the speakers **MUST** use an isolation transformer as audio detect circuit is unbalanced and will cause damage.

A resistor is connected across the audio input to present a load to the audio amplifier output of a radio in Mute mode and also in the event the output speaker is disconnected.

LED colours and indications:

Blue ON = there was audio in the last 5 minutes (default) on an unmuted radio.

Blue Flashing = most recent audio (at least 4 seconds) on an unmuted radio.

Red ON = muted radio.

Red Flashing = audio now received on muted radio.

Features:

Built with individual modules for each radio. Use one or many.

Daisy chain units so they communicate with each other by data lines common to all.

One button on each module to mute / unmute that radio for the preset time or mute / unmute all radios.

Audio needs to be present for at least 4 seconds before it registers as the most recent audio.

After the display time, all indications cease unless more audio is received.

A trimpot in each module can bridge the contacts relay to allow low volume monitoring instead of complete mute.

Simple programming of mute and display timers.

Many modules can be daisy chained together.. Power is connected via the first module in the chain and is delivered to each module via the data link cable.

There are 5 Modes of display for each of the modules:

0. Indicated by no LEDs showing.
Idle with no audio input and unmuted.
1. Indicated by a Blue LED showing.
Unmuted with audio having been received within the last 5 (default) minutes.
2. Indicated by a Blue LED flashing slowly.
Unmuted with audio received within the last 5 (default) minutes and being the most recent module to have received at least 4 seconds of audio.
3. Indicated by a Red LED showing.
Muted with no audio. At the end of the mute time, Mode 0 will be automatically set. (unless audio was detected whilst in Mute mode in which case Mode 1 will be set. A trimpot (marked on the PCB as "Monitor Level" can be adjusted to allow a small amount of audio to the speaker so that the radio may be monitored.
4. Indicated by a Red LED flashing quickly.
Muted but with audio being received now. This only indicates while audio is actually present. If the mute timer expires while audio is being received, Mode 1 will be automatically set. If the audio lasts more than 4 seconds, Mode 2 will be set. If the mute timer expires and audio was received within the last 5 (default) minutes but not currently, Mode 1 will be automatically set. The Blue LED will glow until the remainder of the 5 (default) minute timer has expired.

The AVR processor if mounted via a socket can be unplugged to facilitate updating of software should new features be added.

The module can be built into any case desired by the constructor or use the RJ45 double block which comes supplied with two RJ45 sockets along with the plastic case.

Two adjustments are available; one for the audio input sensitivity level and a second for the audio monitoring level which allows low level monitoring while in mute mode.

Operation

POWER ON:

When powered ON, each module will flash for several seconds to give time for all inputs and outputs to initialize. After this the modules are ready for operation.

PROGRAMMING:

Two timer values (in minutes) can be changed in each module; the amount of Mute Time and the time the Display will show that audio was received – the Display Time.

With power disconnected, Press and hold the button on the module to be programmed; then connect power.

The LED will begin to quickly flash alternate Red and Blue. This indicates Program mode.

Now release the button. The LED will now slowly flash alternate Red and Blue. If you want to view the Mute Time setting, wait until the LED glows Red, then press the button briefly. After a short delay the Red LED will flash to indicate the current number of minutes that the module will mute. At the end of this display the LED will quickly flash Red three times then return to Program Mode. If you want to change the Mute Time setting, press and hold the button when the LED glows Red. The LED will quickly flash Red three times. Continue to hold the button and the LED will begin to slowly flash Red to indicate the new number of minutes for mute. When the required number of minutes has flashed, release the button. The LED will again flash Red to confirm the number of minutes that have been stored. At the end of this confirmation display, the LED will quickly flash Red three times and the value will be stored in memory. The default setting is two minutes. The maximum number of minutes is ten. At ten, the value will be automatically stored in memory then confirmed. The module will return to the first level of programming with the LED alternating between Blue and Red. The module will remain in programming mode until the power is disconnected and reconnected.

If you want to view the Display Time, while in programming mode, wait until the LED glows Blue, then press the button briefly. After a short delay the Blue LED will flash to indicate the current number of minutes that the module will display. At the end of this display the LED will quickly flash Blue three times then return to Program Mode. If you want to change the Display Time setting, press and hold the button when the LED glows Blue. The LED will quickly flash Blue three times. Continue to hold the button and the LED will begin to slowly flash Blue to indicate the new number of minutes for display. When the required number of minutes has flashed, release the button. The LED will again flash Blue to confirm the number of minutes that have been stored. At the end of this confirmation display, the LED will quickly flash Blue three times. The default setting is five minutes. The maximum number of minutes is thirty. At thirty, the value will be automatically stored in memory then confirmed.

The module will return to the first level of programming with the LED alternating between Blue and Red. The module will remain in programming mode until the power is disconnected and reconnected.

MUTE / UnMUTE individual module:

Press the button briefly on the module to be muted. The LED will glow Red. The mute timer as set in Program Mode will be started. The timer will automatically switch the module back to the unmuted mode if no audio has been received within the last 5 (default) minutes and will set the Blue LED to display that audio was received within the last 5 (default) minutes. A trimpot can be adjusted to allow a small amount of audio to be heard in the speaker if monitoring is required while in Mute mode. Anti-clockwise gives more monitor audio.

Press the button briefly to unmute a muted module. The Red LED will go off. If the last audio received was within the display timer setting, the LED will glow Blue for the remainder of the Display Time, then go off. This shows that audio was received within the last 5 (default) minutes. If an Unmute all modules (see below) is performed from any module, the same will apply.

MUTE / UnMUTE all modules:

Press and Hold the button on any module that is not muted until the LED flashes Red once on that module. This allows the user to MUTE all other modules except the one currently being used.

Press and hold the button on any module which is already in Mute mode to force all modules to unmute including the module on which the button is pressed. See note in previous section regarding unmute and the Display Time.

If audio is received on a module, the Blue LED will glow if the module is in idle or unmuted mode. If in mute mode, the Red LED will flash rapidly. If the button is pressed to take the module out of mute mode, the Blue LED will remain glowing until the 5 (default) minute display timer has expired. If 4 seconds of continuous audio is detected while the Blue LED is glowing, the Blue LED will begin to flash slowly to indicate this was the most recent module to receive audio. If any unmuted module receives 4 seconds of audio, it will communicate this to all other modules and cause them to stop showing Mode 2. If audio is received simultaneously on multiple modules, the flashing Blue LED can change from one module to another until one is finally the last to receive audio. The Blue LEDs on these modules will stop glowing and the modules resume idle mode 5 (default) minutes after the last audio is received on each module.

Setting up the modules.

Linking Modules together:

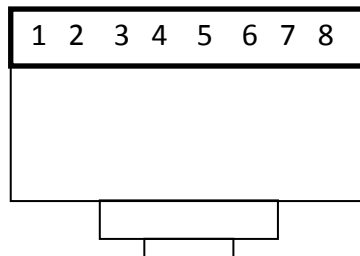
Modules can be used without linking or groups of module can be linked. The system was designed for all modules to be linked but will work with just one module.

Each module has 2 x RJ45 – 8 pin sockets. As they are wired pin for pin, there is no IN or OUT. Modules can be linked with 8 way flat cable with RJ45 connectors at each end or by using computer patch leads. Try to keep all leads as short as possible to avoid RF induction problems. Flat cable may cause more problems than computer patch leads which have twisted pairs inside the sheath. One module at the end of the chain will need to have 13.8v connected to one of its connectors. By cutting a patch lead, you can access the required wires. Make sure any unused wires are insulated. All other linked modules will obtain power from this connection.

The connections for the 8 pin RJ45 connector are as follows:

1. No Connection
2. Earth
3. + 13.8v
4. Earth
5. No Connection
6. No Connection
7. Inter Module Comms Link
8. No Connection

For clarification of the pin numbering of an RJ45, the accepted standard is shown below: The diagram assumes you are looking at the front of the socket with the locking pin facing down.



There are however 2 standards for patch lead colour codes. As long as both ends are terminated the same, it does not matter.

Pin 1.	White / Green	(White / Orange)
Pin 2.	Green	(Orange)
Pin 3.	White / Orange	(White / Green)
Pin 4.	Blue	(Blue)
Pin 5.	White / Blue	(White / Blue)
Pin 6.	Orange	(Green)
Pin 7.	White Brown	(White / Brown)
Pin 8.	Brown	(Brown)

Note that the difference is a swap of the coloured pairs on 1 & 2 and 3 & 6.

Therefore +13.8 will be connected to a White / Orange or a White / Green depending on which type of patch lead you have.

Audio Connections:

Speaker connections need to have the earth identified before connecting via the module. All newer radios will have the shaft of the 3.5mm speaker connection as earth. However older commercial radios may have a floating speaker connection so that the earth wire is not readily identifiable. Check with an Ohmmeter to make sure which side is earth and connect appropriately to the shaft on the module audio sockets. Several models of ex commercial radios (ie Motorola) may have both of the speaker connections above earth and connected to a supply rail. It is important that an isolation transformer is connected between the radio and the module in this case. 8 Ohm to 8 Ohm transformers are obtainable but 600 Ohm to 600 Ohm ones can be used and are more easily found. Connect a resistor of about 10 Ohm across the side connected to the output of the radio.

Mounting the Modules:

If you decide to screw the modules to a bench surface, ensure that you use countersunk screws so as to prevent shorting of tracks or components on the underside of the PCB when it is installed in the base.