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Belkin Tunecast II FM Transmitter Mod

by Corrugator Supercilii on January 18, 2007

Table of Contents

| Belkin Tunecast II FM Transmitter Mod | 1 |
|--|---|
| Intro: Belkin Tunecast II FM Transmitter Mod | 2 |
| Step 1: How to gut the TuneCast | 2 |
| Step 2: The anatomy of a Belkin TuneCast II | 2 |
| Step 3: What you would see in your brandnew TuneCast, the 'Before' | 3 |
| Step 4: How to boost the FM Transmission power | 3 |
| Step 5: Hmm How about a longer audio cable? | 4 |
| Step 6: Now to remove the TuneCast auto-power down | 4 |
| Step 7: Modding the case to fit the switch | 5 |
| Step 8: Just to prove that everything still works and fits snugly! | 5 |
| Step 9: Finally! The finished product! | 6 |
| Related Instructables | 7 |
| Advertisements | 7 |
| Comments | 7 |

Intro: Belkin Tunecast II FM Transmitter Mod

Belkin is a popular manufacturer of cheap and cheerful computer accessories, having singlehandedly made the USB hub sexy! One of their more popular product hitching the iPod popularity ride, is the Tunecast II FM Transmitter.

It is only earlier this year (2007) that FM transmitters like these became legal in the UK, ignoring the fact that savvy netizens have already brought theirs from eBay.

This modification improves the transmission range and remove the 'feature' of auto-power down when no audio signal is present. It certainly sets you up as resident pirate radio DJ of your block and allows you to jam the loud radio listener on a bus or train!

Please note that this is a rehash of something that was done before 'instructable' came along. No more the delay now for the good stuff!

Product link:

http://catalog.belkin.com/IWCatProductPage.process?Product_Id=263200



Step 1: How to gut the TuneCast

Those ever efficient Taiwanese manufacturer manage to secure this piece of gadget with just a single screw, if you're handy with a screwdriver, that's the job done!

The first image shows the location of the screw (ignore the switch for the moment, that comes later), the second one shows where to a gentle pry will open it, note the plastic latch.





Step 2: The anatomy of a Belkin TuneCast II

Here's the back of the TuneCast, the IC is a FM transmitter from Rohm, a Japanese semiconductor company.

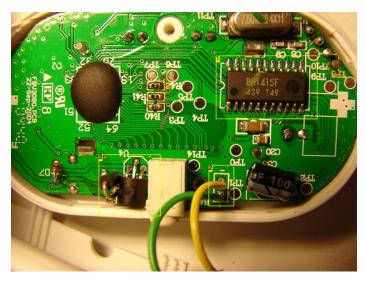


Image Notes

- 1. BH1451F FM Transmitter IC
- 2. Battery power inputs
- 3. 5V linear regulator and reverse voltage diode protectionn

Step 3: What you would see in your brandnew TuneCast, the 'Before'

Here's a series of photos of the same TuneCast, thankfully with everything still attached.





Image Notes

- 1. Wire Identification Blue: Antenna White: Audio Left Channel, 'Tip' Yellow: Audio Right Channel, 'Ring' Black: Ground, 'Sleeve'
- 2. Here's where the transistor to keep the TuneCast on without the presence of a audio signal
- 3. The pesky inductor that attenuates the transmission power output

Step 4: How to boost the FM Transmission power

Well... Not to boost the power, more like removing the attenuation.

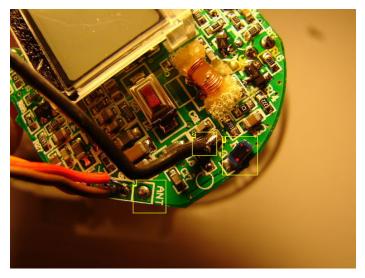
This step involves a bit of handy soldering which may be a bit tricky.

Should you dare proceed, the procedure is easy enough, simply bypass the tiny inductor. If you refer to the previous step, you would have notice a blue wire soldered to the PCB via hole, conveniently labeled 'ANT', remove this and stick it directly to where the black wire is on the photo below, the inductor can be left connected to one end, just in case you wish to revert the changes.

An adequate length of this black wire for the antenna can be a quarter of the transmission wavelength, in this case, a minimum of 3e8/108e6 * 4 (c = f * lamda), about 70cm.

Now if you wish to take it further, get a telescopic antenna! I have devised a neat way of attaching the antenna, see second photo.

If you live in the UK, Maplin Electronics (www.maplin.co.uk) has a selection of antenna for CB radio



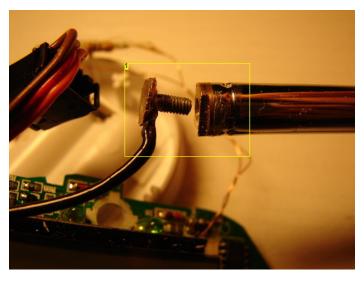


Image Notes

- 1. Inductor to bypass
- 2. Reattached antenna wire here
- 3. Unsolder blue wire from here

Image Notes

1. A screw-on fitting for telescopic antenna

Step 5: Hmm... How about a longer audio cable?

Yup, the TuneCast has a really weedy short audio cable, not very nice if you decide to place the FM transmitter by the window, so your neighbor 4 floors down can listen to your collection of the latest break-beats!

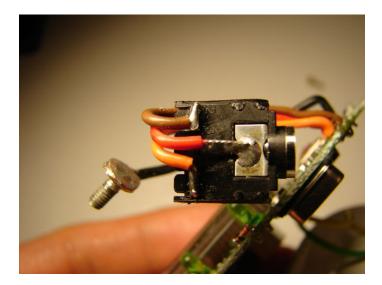
The solution is to replace the stereo plug with a plug that is small enough to still fit the TuneCast package.

The photo below shows the new stereo plug add-on feature, if you're doing the modification, do note the correct channel, refer to the photo in step 3 for the correct connections.

A brief description:

The white wire is the 'tip' of the plug, which is the left channel, the yellow wire connects to the 'ring' or middle bit of the plug, which is the right channel, the black wire is the ground.

Suitable stereo socket can also be found in Maplin Electronics.



Step 6: Now to remove the TuneCast auto-power down

Basically the TuneCast automatically power down when there's no audio signal for about a minute, this is great since the number of transmission channel is limited, not so great when you are flipping through your 60GB of music selection looking for right song and then a blast of static comes on! Ouch!

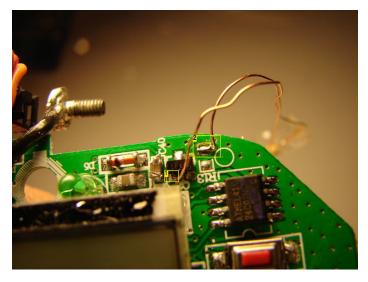
This step is a bit trickier, it involve adding a switch, a resistor and some wiring.

The idea works by biasing up the bit that turns on the TuneCast when a audio signal is present. Although the transmitter is battery powered, many of the ICs on the device requires a higher operating supply voltage, this is done with a boost converter, boosting its internal supply to around 5V, where it is kept permanently 'on', which partly explain why your TuneCast is dead after a few days even if you're not using it, pretty dismal, but great for this modification!

Note on the photo below, the two point in which the wires are attached is where you need to modify (incidentally, this is at the top right end of the PCB, on the LCD side). I choose to use enamel wire, which has a coat of thin insulating enamel/plastic, simply scrape the ends to allow soldering.

The second image is a drawing of the circuit connection.

As promised, with this feature allows you to 'swamp-out' a typical commercial FM station within 2 to 3 meters of the transmitter and enjoy the peace and quiet. Not dramatic but enough to convulse the listener into fiddling with the radio tuner. ;)



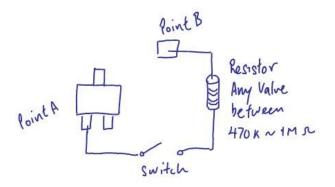


Image Notes

- 1. Point A, top left 'leg' of SMD transistor
- 2. Point B, boosted supply voltage

Step 7: Modding the case to fit the switch

Now that you have done the tricky bit, here's the horrible bit! Wedging a tiny switch into the TuneCast casing. Any kind of on/off bistable switch is suitable, except for momentary monostable push switch, of course the smaller the better, the one I use is massive, but you do with what you have.

With a fair bit of filing and drilling, the end result is show in the photos below.





Step 8: Just to prove that everything still works and fits snugly!

What you would have done if you had dare ventured! It's alive!







Step 9: Finally! The finished product!

To take it further, you can make a plastic clip mount with a mini-camera tripod and you have your own FM base station!







Related Instructables



Belkin TuneCast 3 Antenna mod... by twocvbloke



Belkin 6 FM **Transmitter Antenna** modification by twentyknots



Tunecast Auto Universal by solis365



Convert Belkin FM Transmitter from Battery Power to Car Power by darc



xmas-box: Arduino/ioBridge internet controlled **Christmas lights** and music show by noelportugal



Ghetto In-Ear Monitor System WillTheRescue

Comments

50 comments

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natong says:

Why we can't use the old blue cable? have to use the new one.

Feb 19, 2015. 5:37 PM REPLY

May 8, 2014. 6:58 AM **REPLY**

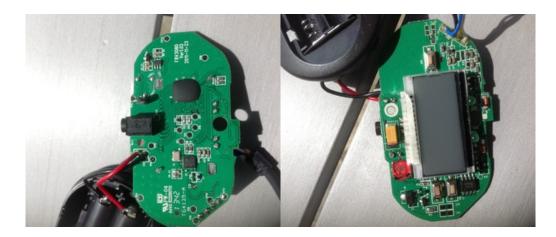


Daerken says:

I know it's a bit late for asking something about your tutorial. Thing is they have released a new version of belkin tunecast transmitter II and it seems that they have removed the BH1415F. I am trying to find which pin is source of the antenna but I have no good results. If someone could help with the photos I have uploaded it would be awesome!

Thanks

Daerken





RealNisiba says: Hello Daerken,

Did you find any solution

Jan 28, 2015. 3:11 PM REPLY



Daerken says:

Hello,

Jan 28, 2015. 5:39 PM REPLY

As I said I just replace the wire that were used as an atenna by a real one (of about 70 cm) which gave me a signal significantly better. However I did not find the attenuation component. Today you can find very cheap and powerful fm transmitter on Internet from different countries where they have no law on fm transmitter power. Unless you really want to touch to the electronic which is not easy, you will gain time and have a way better fm transmitter by bying a cheap new one.

Ciao,

Daerken



RealNisiba says:

Jan 29, 2015. 2:18 PM **REPLY**

OK. I tried that by just contacting the antenna by a wire (from an unused ethernet cable), but I can not hear any difference in signal quality.



HefLuc says:

Jun 25, 2014. 4:53 AM REPLY

Daerken, I'm having the same problem as you. Have you found a solution? Please let me know!

Thanks,

Luc



Daerken says:

Jun 25, 2014. 6:49 AM **REPLY**

Hi HefLuc,

I soldered an antenna to the output (blue wire on my picture) and it works way better now but only because the default "antenna" is very bad. However I did not find the resistor that reduces the signal...

If someone does, please share it!

Daerken

johanes.morris says:

Hi.

Nov 26, 2014. 1:21 PM REPLY

Did you find the resistor that reduces the signal in the revision 1.02 of Belkin Tunecast 2?

Mine transmitter looks exactly the same like in the pictures attached by Daerken.

Thank you for help:)

okakar says:

May 17, 2014. 9:41 AM REPLY

http://obaidkakar.blogspot.com/2014/01/fm-transmitter-from-car-mp3-player-6.html



Darkcobra0 says:

The Corrugator, this is a great Instructible!

Nov 1, 2010. 1:52 AM REPLY

I used a different method to boost the output power, which will work not only for the Belkin Tunecast, but for ANY transmitter which uses a BH1415F, or even any other Rohm FM transmitter chip. Instead of trying to figure out what components were involved in the filter/attenuation network, I used a soldering iron and a toothpick to lift and disconnect BH1415F pin #11 (RF output) from the board. Then I soldered a quarter-wave wire antenna directly to the pin, which gives direct access to the maximum possible output power. Make sure the wire is secured so an accidental tug won't rip the pin off the IC; I used a generous application of super glue to attach the wire to the board near the connection. If a transmitter uses a different Rohm FM transmitter chip than the BH1415F, look up the datasheet to find out which pin is RF output.

The real gold in this Instructable is the auto power-off disable. I've been using this transmitter to listen to music from my computer anywhere in the house, and have been looking for a good way to disable the auto power-off. Up until now, I've been doing it by running a separate copy of Winamp that plays a subsonic or ultrasonic burst for two seconds, every 30 seconds in a loop. It worked, but on some radios you could hear a slight distortion when the burst played. This may still be a useful option for people who aren't comfortable soldering, or who have a different transmitter.

I just performed your auto power-off disable mod, and it works great! Though I did make one change. The pad you're getting power from appears to be active only once the transmitter is powered up, which still requires an initial audio input. So instead, I connected the transistor pin through a 1M resistor directly to the positive pin of the DC power jack. If you're looking at the board from the LCD side, with the power connector on the bottom, it's the second pin from the left between the large SMD capacitor and the LCD (verify it with a voltmeter if you're unsure you have the right one). The transmitter now turns on immediately when power is applied, and stays on indefinitely; regardless of audio input.

Finally, one more tip. Loop the power and audio input cables a few times through a ferrite toroid filters out hum and hiss. You can use one toroid, but it's easier to use two, one for each wire. The more loops, the tighter the windings, and the closer to the transmitter, the better it works. A clamp-on style ferrite should work almost as well, though I haven't tried. Obviously, don't loop your antenna through a ferrite, as this will attenuate the signal. If you haven't added your own separate wire antenna, skip the toroid for the audio cable, as it contains the antenna.

With these changes, I'm very happy with the performance of this transmitter; and its range and quality rival any consumer or kit transmitter I've tried for less than \$100.



3of5 says:

Mar 7, 2014. 8:55 AM REPLY

I was wondering, will the mod you did work at 300 feet? I am wanting to build a transmitter that will work at or over 300 feet and transmitt through the whole house.



jhettenhouser says:

Nov 18, 2011. 8:48 AM REPLY

I've tried this variant on two tunecast II's and the results are wonderful. Thanks both to you and the instructables parent.



Corrugator Supercilii says:

Nov 1, 2010. 2:28 AM REPLY

Wow, thanks for the generous updates and mods! I am sure somebody will find it useful too.

A bit about the Rohm FM chip... Before these iPods, many FM transmitters came in kit form, and the Rohm chip was the first to be highly integrated and made it easy to build these. And I think you could get single chip (with earphone amps) FM radio tuner too.

It is a great little FM transmitter isn't it. In terms of fidelity, if you get it right, FM transmitter still kind of sound better than Bluetooth speakers. Heh, kind of please there's still a purpose for this old instructable. Cheers!

samander says:

Jan 5, 2014. 7:13 AM REPLY

What's the range on this hacked transmitter? I am looking to start my own pirate radio station and I need to do it cheaply.



jamesmount says:

Jul 31, 2013, 10:06 PM REPLY

Hello i am jamesmount

According to me if u want to increase the power for transmitting the signal.for this we decrease the frequency... because frequency is inversely proportional to wavelength, i hope if we are working in this principal your problem will be solve as soon as... for more information visit http://www.broadcastdepot.com/



tvane1225 says:

Sep 20, 2012. 11:01 AM REPLY

if you increase the voltage to the unit using lets say a 9 volt battery, will that increase the effective range of the transmission?



internicht says:
Won't let me post pictures - trying again...

Aug 23, 2012. 7:09 AM **REPLY**



internicht says:

Aug 23, 2012. 6:54 AM **REPLY**

Good and clear instructions - but my layout is a bit different, with what I think to be the inductor vertical instead of horizontal.

I tried a reception test just touching a contact attached to a wire to various components (starting from what I think was the chip-side of the inductor) but could not improve reception.

The only thing that did was the lower right pin of the chip on the rear (marked 1 on first pic below), so I soldered my wire to that. Now I get reception up to about 25m away through several brick walls (having got about 5m out of the box if I was lucky). My wire is about 1.5m long, and I didn't experiment for the optimum length, as it works (and this is to be used inside a house anyway).

As for the auto power-off mod, that went wrong too! I fluffed the solder a bit to the top-right contact point, and it seemed to disappear leaving no metal to contact. Doh! After a bit of experimentation, I found that the same lower right leg of the other component (marked 2 in pic below) when jumpered to the

resistor right next to it (marked 1 in pic) put the Tunecast into an always-on state. I settled for that, as again this is to be used in the home, it only uses about 2w, and I am powering it from a transformer anyway so I don't have to mess about with batteries.

Thanks for the guide anyway!

Ihj734017 says:

May 14, 2012. 11:56 PM REPLY

Alternate Antenna Method: instead of adding a separate wire for the antenna, install the 3.5mm headphone jack and solder one end of a small piece of wire (you can use the blue wire that used to be the antenna) to the inductor bypass point and the other end to the ground on the headphone jack. The ground wire on the line-out cable used to hook up your mp3 player, will now act as an antenna; the longer the cable the better the signal. This works best when the cable is spread out



FM Transmitter says:

Dec 30, 2011. 11:23 AM **REPLY**

Hey this is pretty cool! Does it broadcast as far as the WH FM Transmitter ? I heard it goes up to 150 feet.



pigmeat says:

Apr 18, 2008. 7:01 AM REPLY

I have a Belkin copy, by a company called Sansai (see image) and it works great, but I'd like to modify it with guidance from your instructable post. My only problem so far is getting the damn thing open. Unlike the Belkin this thing has no screw and I had a hell of a time trying to pry it open (without success). Has anyone here managed to open one of these? If so, how did you go about it?





uhclem says:

Nov 8, 2011. 2:35 PM **REPLY**

To open:

Slip a metal putty knife or screwdriver blade between the darker (or may be metallic) oval trim and the plastic case and pry it off. There are three screws underneath. Remove them and you're in.

It looks to me like they put the FM signal on the ground, so your USB cable and your audio cable are acting like an antenna. Probably best to find the RF output pin and connect directly to that.



uhclem says:

Nov 9, 2011. 1:41 PM REPLY

I just tried out my Sansi-type transmitter and the results are excellent. I attached a pair of clip leads end-to-end to the ground point and got a clear signal from one end of the house to another. I bet you could cover 1000 ft outdoors with a clear line of sight.



italodisco71 says:

Jul 7, 2011. 12:30 PM REPLY

Don't need to open.. if you put usb power with a big cable (70+cm) you can do emit in 100 meter!



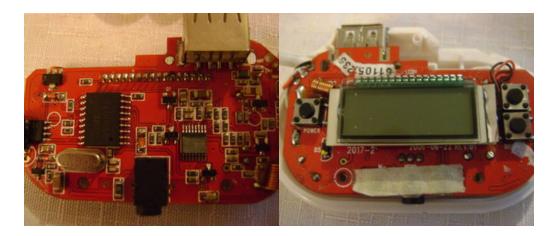
wilvan says: Hi Pigmeat,

Feb 16, 2011. 6:48 PM REPLY

Is been a while since this trheat was open, anyways I have the same gadget and like 'mdphoenix" mentioned is correct about opening it.

Now I have a question of my own, not sure if the gadget is the same circuitry is yours.. I need to find the tiny inductor and bypass it to attache antenna.

Thanks and Regards Wil.





wilvan says:

Hi Corrugator, any idea about this item and its boost mod?

Thanks and Regards Wilson



Corrugator Supercilii says:

Mar 19, 2011. 4:11 PM REPLY

Feb 17, 2011. 8:47 PM REPLY

Sorry wilvan, it is not possible to see what happening on the circuit without a bit of hands-on, really can't help you...



Corrugator Supercilii says:

Feb 17, 2011. 1:34 AM REPLY

You have to reply to PIGMEAT not me my dear, PIGMEAT wouldn't get your message if you send those bacon to me.



richms says:

May 28, 2008. 4:10 AM REPLY

I don't know if you have got anywhere with this, but the one pictured is a hugetide c-007B - the black cover with the < O and > buttons will come off (held on with tape) and there's 3 screws under it. I am still playing with defeating the auto power off on mine, when I have some luck I will post an instructable here



pigmeat says:

May 30, 2008. 1:23 AM REPLY

Thanks for this. I have since got another model with a screw and have opened it up. Yet to do any mods as other projects are more urgent.



mdphoenix says:

May 27, 2009. 6:51 AM REPLY

Out of curiosity, what DO the < o > buttons do on yours? I don't have them, but the spaces for them are under my bezel.



mdphoenix says:

May 26, 2009. 2:31 PM REPLY

I know this is a year old but: I have a similar unit. Mine is made by iWave though. The gray bezel around the front comes off and the screws are under there. My board was different but I could still locate the attenuating inductor just above the antenna solder joint. Good luck.



michel23 says:

Aug 22, 2011. 12:12 PM REPLY

Just did this mod, on another board.

The first experiment was to extend the antenna. I cut the blue antenna line at 2cm. Soldered a line of 80cm to it. Result: worse than the original tunecast2.

Second experiment: I removed the old antenna (just ripped it off) and soldered a new line to the board on another position, see picture below. Much better result than my first experiment, however, I cannot tell if it's better than the original tunecast2.

Please do not laugh at my soldering technique/result, I'm not very good at this i'm afraid:-)

Third experiment. Note that this step cannot be undone. Using a knife, I cut away that small white thing below my new antenna. It did not seem to make things better or worse. I forgot to make a picture of this, and currently I'm too lazy to reopen the device and take a picture

Tomorrow I'll drive 200+km and will let you know if it made things better or not.

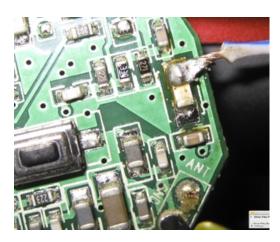
Michel



michel23 savs:

Aug 23, 2011. 12:46 PM REPLY

Result: it seems to make no difference at all, compared to the original tunecast. Still a lot of noise during playback. I cannot recommend this at the moment





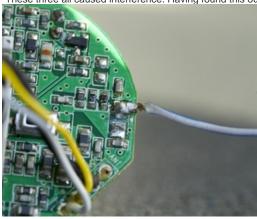
michel23 says:

Oct 8, 2011. 7:24 AM REPLY

Initially, it did not seem to make much difference. However, the following made this work fine:

- * I drilled a hole to lead the antenna out of the enclosure directly
- * Make sure that the sigaret lighter in your car is tightened securely so it cannot move
- * make sure that the antenna cable and the power cable are separated well.

These three all caused interference. Having found this out, it makes the Tunecast useable.



Capfl2k5 says:

Feb 6, 2011. 10:40 PM REPLY

this worked wonders for my little el cheapo 6 dollar transmitter i picked up at a truck stop on a road trip. it wouldnt so much as cause static on an empty station unless it was tucked in the corner of the windsheild by the antenna. But my question is will this shorten battery life any?



Kurk231 says:

Jan 24, 2011. 8:06 PM REPLY

Good Instructable, good pictures and very good details too. The method I used for boosting the signal was as simple as bridging the Inductor (the slightly iridesent black box thingy to the far left of the LCD display) with a wire soldered to either lead, effectively bypassing it without removing it from the PCB. Worked great for me, I've tested it up to 20 feet without adding a new antennae to the FM tuner. I wouldn't be surprised if it's signal strength stays strong even farther than that. Obstructions kill the signal though, if testing with a home stereo's radio, you will find that clear line of sight is key outside of about 2.5-3 meters from the receiver so walls are an issue.



ferrall says:

Apr 8, 2009. 4:37 PM **REPLY**

I did this on my wife's Tunecast, and now it works great. (or atleast part of it) Before, if you were around a city, you would need a lot of luck to find a good station. Now, I can beat out most of the non major (local) stations! Thatsk. What I did (if any one wants to know) I used a good soldering iron, and some VERY thin gold wire (did at work under a microscope) and just made a shunt around the Inductor that you ripped out (ripped up). It works great, and turned it from almost useless, to very effective. I am now trying to do it to my brother in-laws Belkin TuneFM. (this one is much more difficult to open, and the components are much smaller and closer space. If I get the chance, I will post pictures.



wjie20 says:

Jan 7, 2010. 11:27 AM **REPLY**

Hi, was wondering if you have succeeded on the TuneFM? Because I'm also trying to mod mine. Would appreciate if you would guide me in to this.



ferrallI says:

Jan 10, 2010. 2:39 PM REPLY

I have tried to do it with the TuneFM. But it did not work.

I am going to try again once I get some time. I will post something here if I get it to work. (there are inductors in different places, so I do not know that I did the right one)





maizesmagikarp says:

Nov 20, 2010. 7:02 PM REPLY

Actually, I found that soldering the antenna lead to the grey box-like object directly to the left of the old antenna lead gives better results.



Lumpy Carpet says:

Feb 17, 2008. 3:44 PM **REPLY**

Sorry if this might be a stupid question, but couldn't one soldier the blue wire to the new connection point and see results?



scratchr says:

Apr 27, 2010. 4:21 PM REPLY



Joby1664 says:

Nov 7, 2009. 3:38 PM REPLY

My Tunecast was different to the one in the example when I opened it. I couldn't find the inductor so I soldered the antenna to one of the legs of the transmitter chip which seemed to be producing the signal. Will this produce the same result or have I made a mistake?

can't see the equivalent components to bypass the auto shut down either.





Joby1664 says:

Feb 22, 2010. 1:56 AM REPLY

The tune cast is a piece of junk anyway. I bought this transmitter in the end, http://www.ccrane.com/radios/fm-transmitters/fm-transmitter.aspx. It's outstanding, plus it's incredibly easy to moify, see here:

http://www.xmfan.com/viewtopic.php?t=3257

They even shipped it to me in the UK with no problems. I would really recommend it 100%.



ewfw says:

Feb 3, 2010, 4:58 PM REPLY

Good old instructables never die. I have been searching the net for a transmitter. The reviews on the tunecast are pretty weak, but so is the competition. What would you say the effective range of this is after the modification? I want to use this to broadcast a metronome wirelessly to my band.



lordjohnnym says:

Dec 25, 2009. 11:02 AM REPLY

mpalins.

the british electronic chain store.

finally someone who mentions stuff you can buy in the UK.

most instructables are american or written for americans.

i bought one of thes transmitters from Tesco, for 7 quid last week, and it seems that the best quality is at the bottom on the fm band, and the best signal is at the top.

ive been also looking for some way of extending the arial, to give it extra range. i was going to increaser the output wattage, but i remembered that it might blow the diodes.

anyway, what i find funny, how mine is technika, and your is belkin, and they both look near enough the same, and have near enought the same layout.

good instrictable otherwise, keep it up. ;)



darkfreedom2 says:

Dec 15, 2009. 9:34 PM REPLY

I performed the antenna mod on my friend's tunecast. We are able to broadcast about 45 feet each direction in the cnc machine shop we work in. We now operate a shop radio station off my ipod during the work day.



Ω

Does anyone know anything about this iWave FM Transmitter? I bought it at ross and it had a Car usb adaptor thing that came with it. Here are some pics. I will post pics of the inside later. It has a clock, thermometer (I can see a Fahrenheit thing on the lcd but it displays Celsius. The product didn't have an instruction manual in it so if anyone knows how to change it to Fahrenheit please tell me). It even has a led flashlight: D.



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