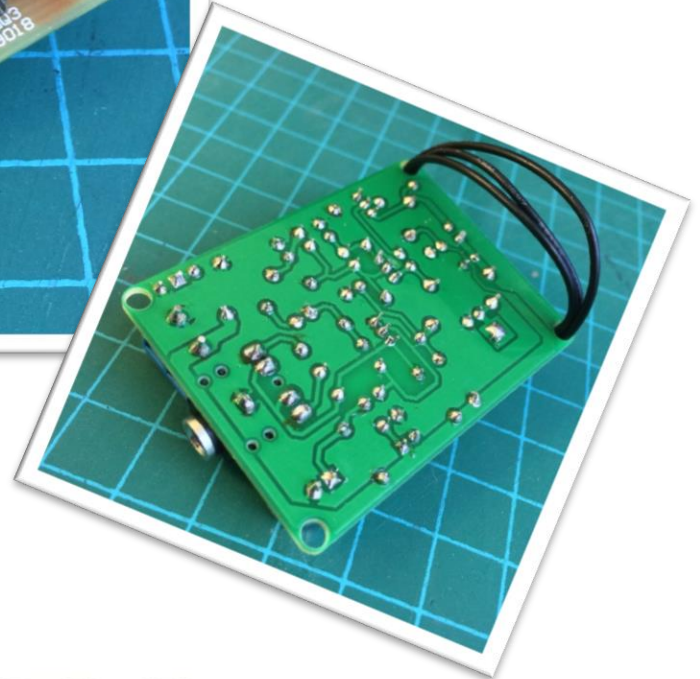
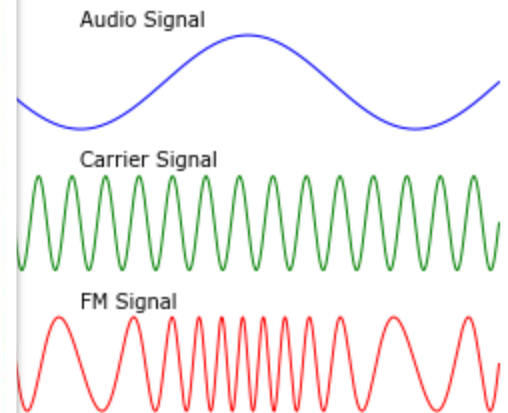
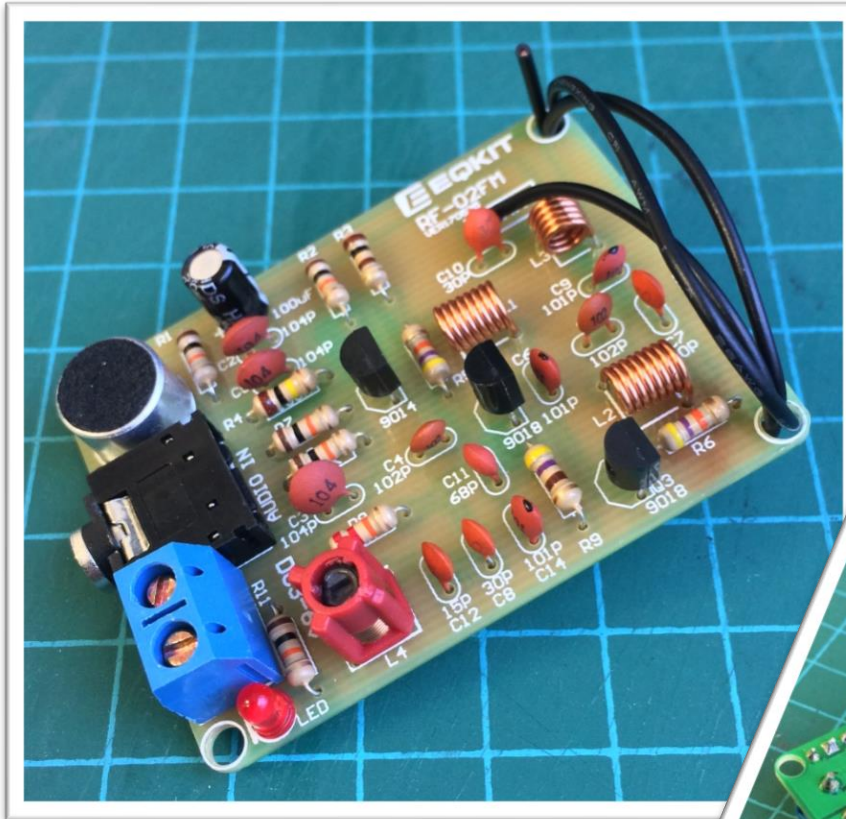


# FM Transmitter and MP3 Repeater D.I.Y. Kit

Part Number: **AK-275**



**ABRA**  
www.abra-electronics.com

## 1. Description:

This kit is consisted of all the components required to build a low-power FM transmitter and MP3 repeater module. It is designed to function using simple electronic components; therefore, no integrated circuit (IC Chip) is required. Due to its simplicity and low power consumption, it can be used in a variety of indoor and outdoor applications using batteries or a power supply.

### Application Examples:

- In-car
- Home sound systems
- Indoor facilities with limited cabling requirements  
Such as: Bars and Restaurants, Fitness Centers, Indoor Sports Centers, Waiting Rooms, Car Washes and Service Facilities, Correctional Facilities, Group Meetings and Presentations
- Small outdoor areas  
Such as: Camping, House parties, Boat Parties, Bus tours, Halloween or Christmas Displays, Businesses with Drive-Through, Truck-side Advertising.

### Recommended Power Sources:

- 3x AA 1.5V Batteries (in series)  
OR
- A DC power supply with a 3 to 6VDC output and a current limited up to 15-20mA

The transmitter broadcasts a modulated FM signal that contains audio over a frequency range of 88 to 108MHz. This audio signal is an analog signal that carries the input audio from the on-board microphone or the 3.5mm audio socket. Due to being low-powered, this transmitter has a short range of 5 to 50 metres (16-164 feet) which depends on the input voltage, physical obstructions, interference and elevation.

This is a D.I.Y. kit that requires soldering through-hole components on a single-sided printed circuit board. It is designed for users with minimal soldering tools and skills. You must insert the components on one side of the board and solder the leads on the opposite side. The assembly process should take anywhere between 10 to 20 minutes.

## 2. Specification:

- **Required Input Voltage:** 3 – 6VDC
- **Current:** 5 – 15mA
- **Power:** 15 – 90mW
- **Transmission Frequency:** 88 – 108MHz
- **Range:** 5 – 50m (16 – 164ft.) – depends on the input voltage and type of environment
- **Antenna Type:** 300mm Single Flexible Wire
- **Microphone Sensitivity:** 0.5m (50cm) – assuming the input being a typical human voice (85-255Hz)
- **Maximum Audio Input:** -15dB
- **PCB Dimensions:** 54 x 41mm
- **Package Weight:** 15g (½ oz)

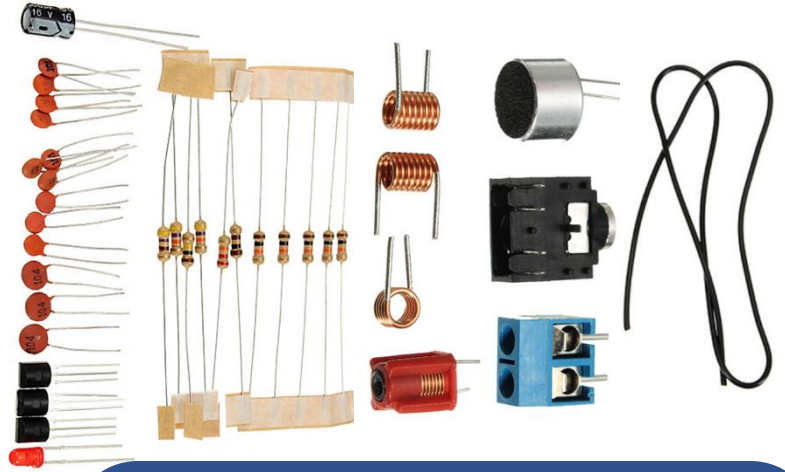
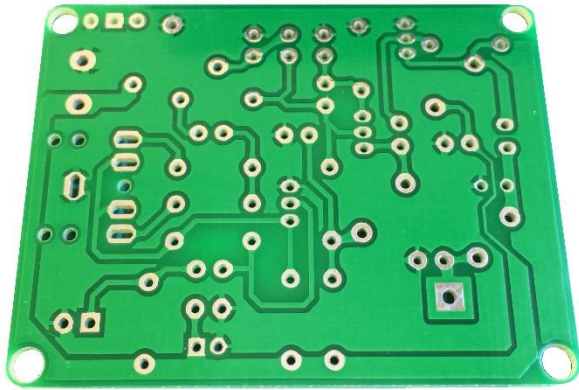
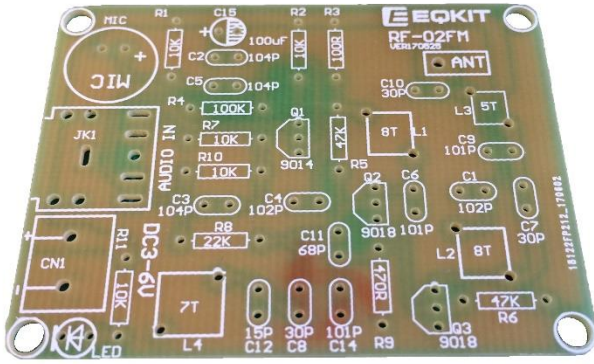
### 3. Advantages and Features:

- Easy to assemble and use
- Low price
- Power Efficiency
- Large operating range
- Small and lightweight package
- Low potential for electrostatic discharge (ESD) damage due to lack of IC components
- Two input types (MIC or 3.5mm Audio Socket)
- User-friendly PCB layout with precise silkscreen labelling

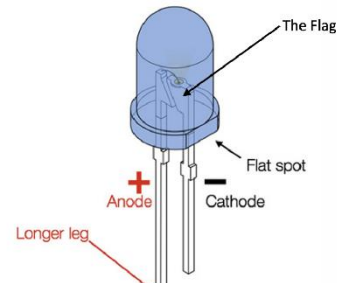
### 4. Bill of Materials

This package includes **38** pieces which are listed below along with their labels and quantity.

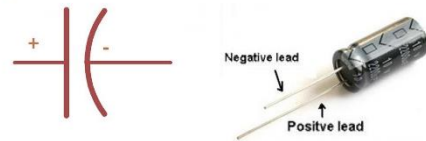
Component	Label on PCB	Value / Type	Quantity
Resistors	R1, R2 ,R7, R10, R11	10K $\Omega$	5
	R3	100 $\Omega$	1
	R4	100K $\Omega$	1
	R5, R6	47K $\Omega$	2
	R8	22K $\Omega$	1
	R9	470 $\Omega$	1
Ceramic Capacitors	C1, C4	102(1nF)	2
	C2, C3, C5	104 (100nF)	3
	C6, C9, C14	101 (100pF)	3
	C7, C8, C10	30 (30pF)	3
	C11	68 (68pF)	1
	C12	15 (15pF)	1
Electrolytic Capacitor	C15	100 $\mu$ F	1
Inductors (Coils)	L1, L2	8T	2
	L3	5T	1
Variable Inductor	L4	7T	1
Transistors	Q1	S9014 NPN	1
	Q2, Q3	S9018 NPN	2
LED	LED	3mm Red	1
Microphone	MIC	10x7mm Electret Condenser	1
Audio Socket	JK1	3.5mm 5-pin Dual Track	1
Screw Terminal Block	CN1	KF301-2 2-Pin Plug-in	1
Wire Antenna	ANT	300mm 22AWG Flexible Copper Wire	1
PCB	RF-02FM	Single-sided Through-hole	1



Pay attention to the LED polarity.



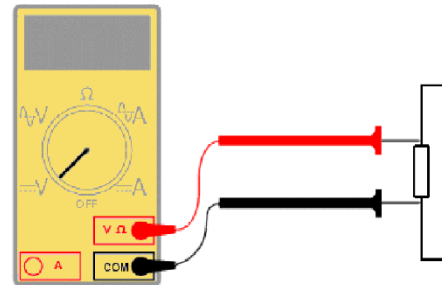
Pay attention to the electrolytic capacitor polarity.



\*\*Ceramic capacitors do not have polarity.\*\*



\*Optional\*  
Use a digital multimeter to measure the resistor values and test the LED.



A 3xAA battery holder is included in the kit.

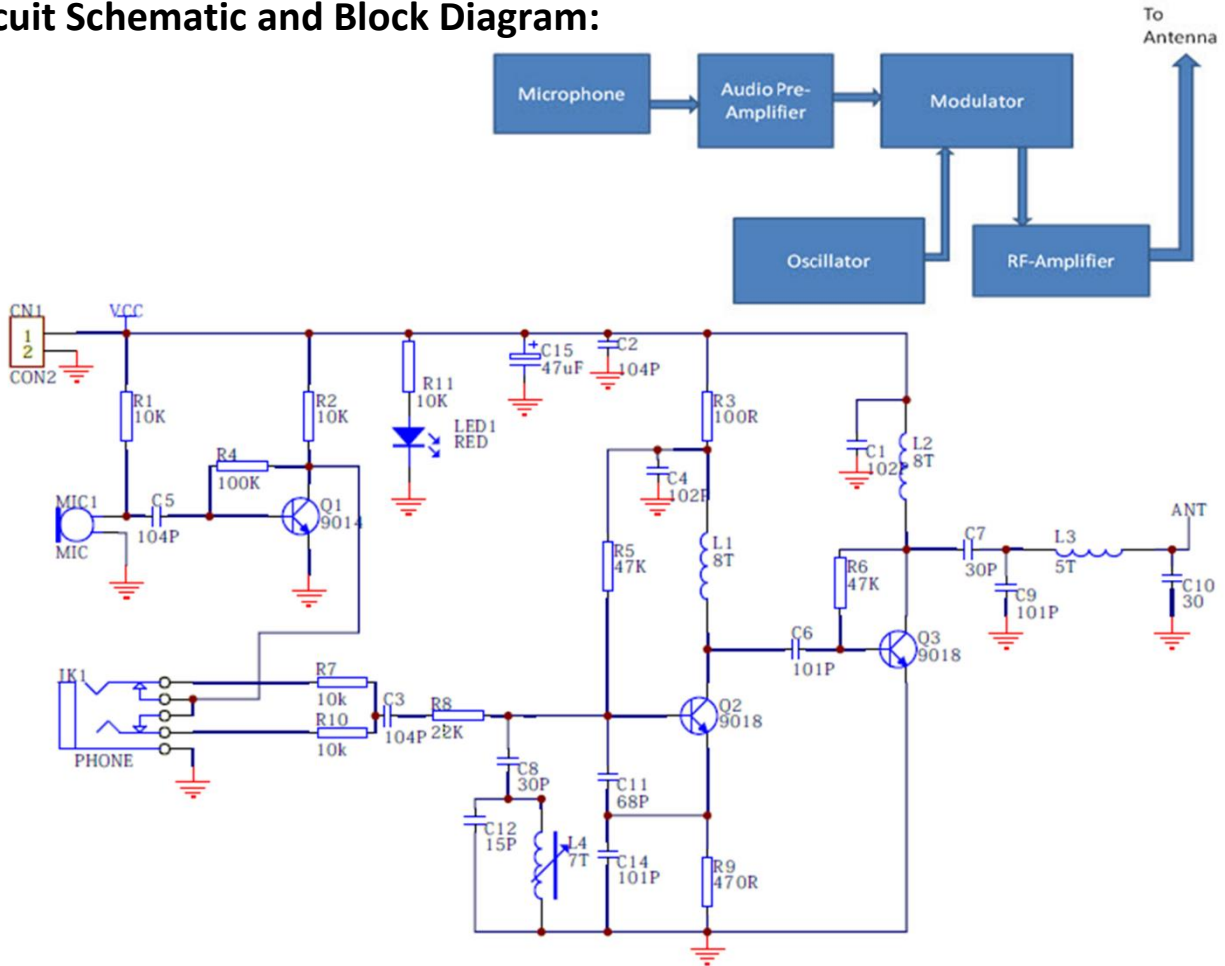


optional component (not included):

Male-to-Male 3.5mm Stereo cable  
ABRA part number: CAB530-3-GN



## 5. Circuit Schematic and Block Diagram:

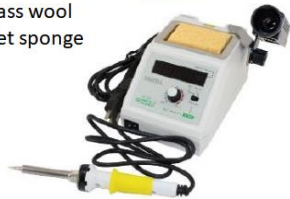


## 6. Assembly:

- 1) In order to assemble the module, you need the following tools:

**Must Have**

Temperature Adjustable Soldering Iron  
A variety of soldering tips  
Brass wool  
Wet sponge



60/40 or 63/37, Tin-Lead Solder



Flush Cutters



Needle Nose Plier or Tweezers



Wire Stripper



Lint Free Cloth



\*It is recommended to have some isopropyl alcohol and a fine soldering brush handy to clean off the excess flux on the circuit board when the soldering is done.

Recommended

Isopropyl Alcohol



Soldering Brush



Rosin Flux Pen or Paste



**\*ATTENTION\* DO NOT USE RUBBING ALCOHOL, IT WILL DAMAGE THE COMPONENTS.**

- 2) Open the package and verify the components. (refer to section 4. Bill of Materials)
- 3) Lay down all the components on your workbench and proceed to the next step.
- 4) Prepare your soldering tools.
  - a) Use an appropriate tip for the application. Also, make sure the soldering tip is clean. Gently use a brass wool or a brush to clean the tip when needed. Another way of cleaning the soldering tip is to use a wet sponge.



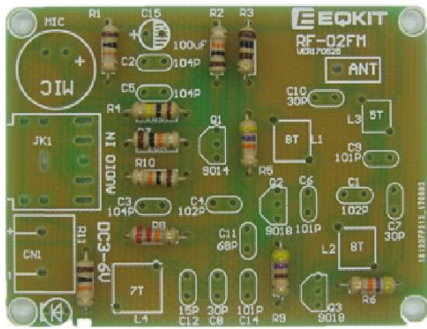
- b) The soldering iron temperature depends on the type of solder used. If you are using a typical **60/40 lead solder**, depending on the thickness the temperature should be set anywhere between **370 to 500 °F (187 to 260 °C)**. If you are using a lead-free solder, increase above temperatures **by 40 to 70 °F (5 to 20 °C)**.

**\*ATTENTION\* HIGHER TEMPERATURES WILL DAMAGE THE COMPONENTS ALONG WITH THE CIRCUIT BOARD.**

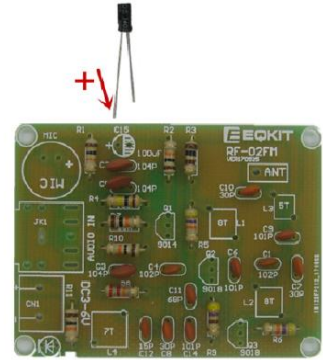
**\*ATTENTION\* DO NOT TOUCH THE SOLDERING IRON TIP WHEN IT IS HOT.**
- c) It is recommended that you clean the board with a fine brush, isopropyl alcohol and lint-free cloth to get rid of any pre-existing residue, glue or dirt. This way the solder will create a better joint with the copper surface.
- d) Have your flush cutter, needle nose plier or tweezers handy.
- e) Having a roll of paper tape helps you to keep the components in place when soldering on the bottom side of the board.
- f) Have a rosin flux pen or paste handy. Adding flux to the pads before soldering the components makes the wetting process easier by letting the melted solder to flow better on the pad and create a better joint.

**\*ATTENTION\* SOLDERING SHOULD BE DONE IN A VENTILATED AREA. BREATHING SOLDER FUMES WILL HARM YOU.**

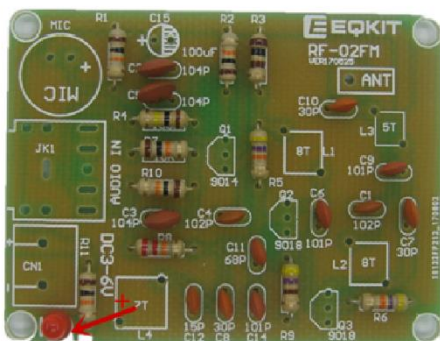
1. Insert the resistors on the PCB and solder the leads on the bottom side of the board.



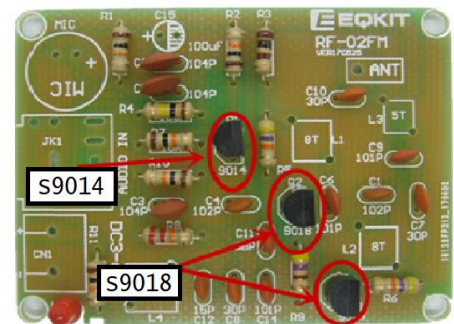
2. Insert all the capacitors and solder them onto the board.



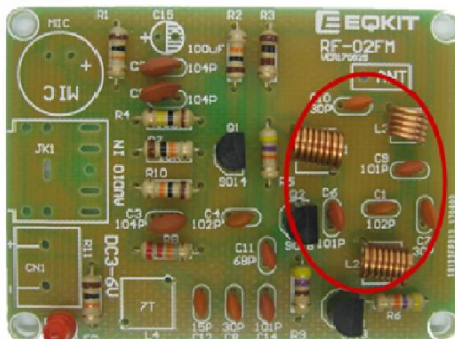
3. Solder the LED on the board. Pay attention to the polarity.



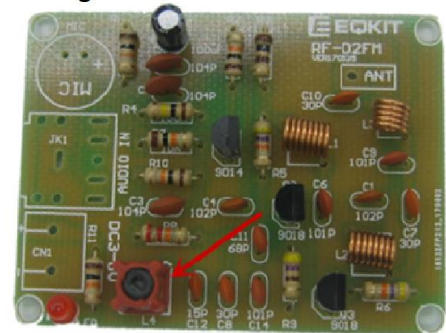
4. Solder the NPN transistors on the PCB. Pay attention to the labels and the orientation.



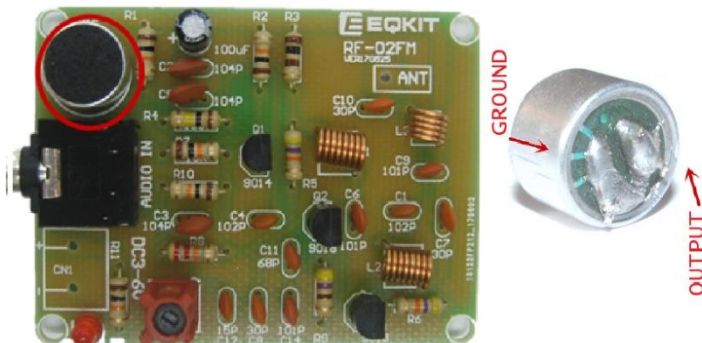
5. Solder the inductors (coils).



6. Solder the variable inductor on its designated location.



7. Solder the MIC onto the PCB. Refer to the pinout.



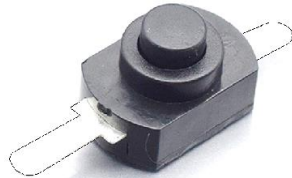
8. Place the audio socket and the terminal block on the board and solder them.



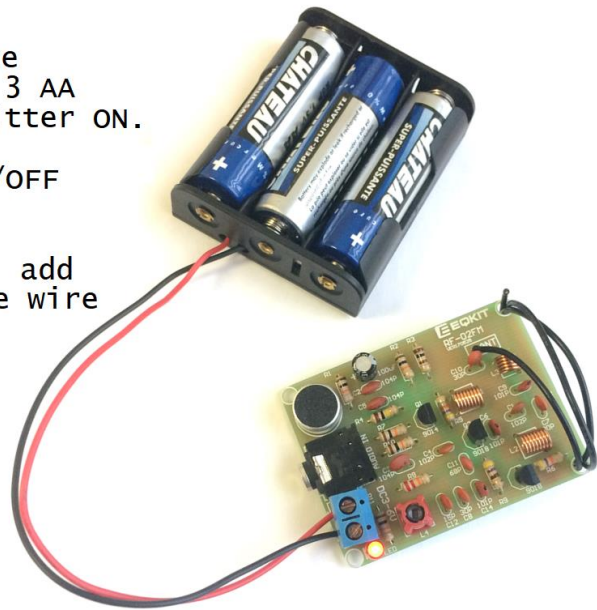
9. Connect the battery holder to the screw terminal block and insert 3 AA batteries to turn the FM transmitter ON.

Some battery holders have an ON/OFF switch and some don't.

If needed, you can purchase and add an inline switch on the positive wire (red) of the battery holder.



ABRA part number: SW-FLIGHT



Now that the device is ready to be used, set your FM radio receiver to a low frequency (i.e. 88.1 - 90.1MHz) then adjust the frequency on the transmitter by turning the variable inductor (L4) with a small flat head screw driver until they both match.

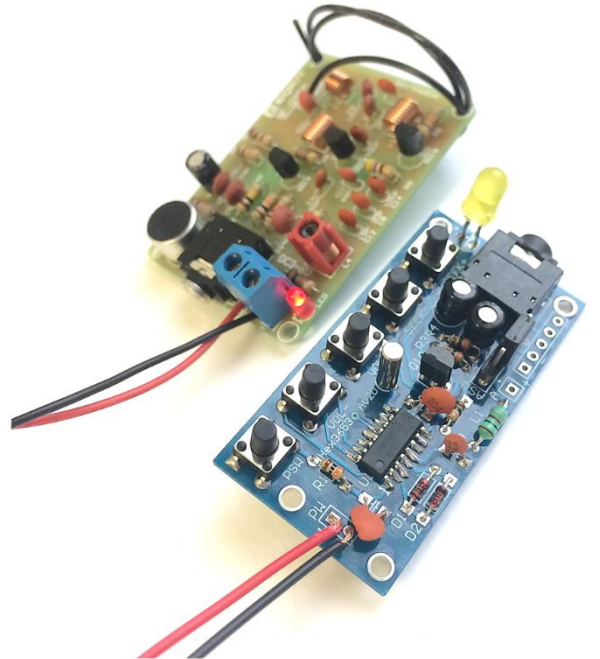
Use the MIC or connect the audio socket to an MP3 player, iPod or cellphone to transmit the audio over the desired FM frequency.

**\*\*PLEASE NOTE THAT THE MIC AND THE AUDIO SOCKET DO NOT WORK AT THE SAME TIME\*\***

Practice your surface mount and through-hole soldering skills and complete your collection with a D.I.Y FM Receiver Module Kit!

Visit <https://abra-electronics.com/> or ask our representatives.

ABRA part number: AK-270



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