

# TA7642 AM Radio Project

## ZS6CAQ & ZS6AZP

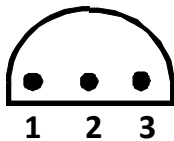
### Background

When LM Radio began broadcasting on the Medium Wave Band again, nostalgia struck me hard – remember the old days of the LM Hit parade etc? I just had to get a receiver going to listen to the broadcasts. I dug out a little receiver I had built many years ago using the now obsolete ZN414 device – a complete MW radio with only three “legs” the same overall size as a BC107 transistor, which gave ample headphone volume when followed by a single transistor audio amplifier.

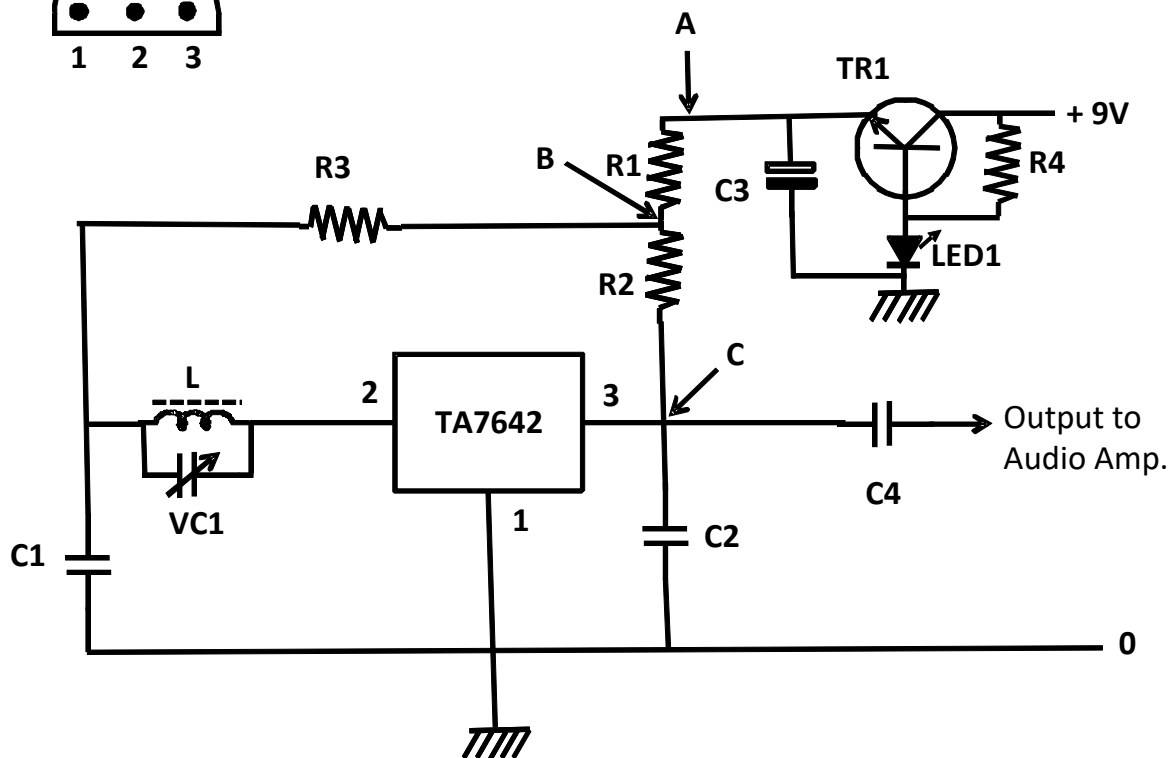
Things have now moved on – the ZN414 has been replaced by the TA7642 device, and decent headphones are fairly rare, and precious items. After chatting to Johan ZS6CAQ, it was decided that we would see if we could make a usable radio out of the TA7642 and follow it with the LM380 audio amp project launched by the club a year or two ago.

It was found that the TA7642, having greater RF gain than its predecessor, the ZN414, was a bit more difficult to use and the design needed careful attention to avoid instability and to deal with the issues of lack of selectivity and sensitivity. The circuit shown below was the result of a lot of optimisation and provides very good performance considering it is, in fact, a very simple TRF (Tuned Radio Frequency) Radio with only one stage of tuning.

### Top View of TA 7642



### Circuit of TA7642 AM Radio



A,B & C refer to voltage measurement points referred to later

## Component List

### Capacitors

C1	0.01 $\mu$ F disc ceramic
C2	0.1 $\mu$ F disc ceramic
C3	10 $\mu$ F electrolytic
C4	0.47 $\mu$ F any type!
VC1	350 to 500pf max. capacity – can be either a modern polyvaricon or air-spaced unit from an old valve radio

### Resistors

R1	1k $\Omega$
R2	1k $\Omega$
R3	100k $\Omega$
R4	1.5k $\Omega$

### Inductor

Ferrite rod, together with its coil from a defunct old style Transistor radio which covered the MW band. Alternatively a home-wound coil on a ferrite rod. The length of the ferrite rod and number of turns (start with about 70) required, will determine the frequency band covered – some experimentation will be required to be able to tune the signals readily available on the MW band, namely Radio Veritas, Radio Pulpit, LM Radio and some station broadcasting in Chinese. More stations are available at night when the D layer attenuation drops.

### Miscellaneous Components

TR1	Almost any NPN transistor, BC 107 used on prototype
LED1	Any common Red LED

### Description of Circuit Operation.

As mentioned previously, the heart of the circuit is the TA7642 device which is a one chip AM radio circuit. The device basically consists of an AGC (Automatic Gain Control) controlled RF stage, a detector stage and some AF amplification. The gain of the TA7642 is voltage sensitive, so that, in strong signal areas less supply voltage is needed to obtain correct AGC action. Incorrect adjustment of the AGC causes a strong station to occupy a much wider bandwidth, causing the RF stage to saturate, and reduced AF output.

After much experimentation on the bench and many internet searching, the final circuit shown evolved, ticking the boxes in respect to stability, selectivity, sensitivity and AGC action. It can be observed that the AGC feedback resistor (R3) is fed by a voltage divider provided by R1 and R2. The voltage supply to the chip is kept constant by a simple voltage regulator circuit consisting of TR1 with a constant base bias voltage provide by a red LED instead of a low voltage zener diode. In this way a single 9volt battery can be used to supply both the “radio” section and an add-on AF amplifier stage.

### Measured Circuit voltages on Prototype

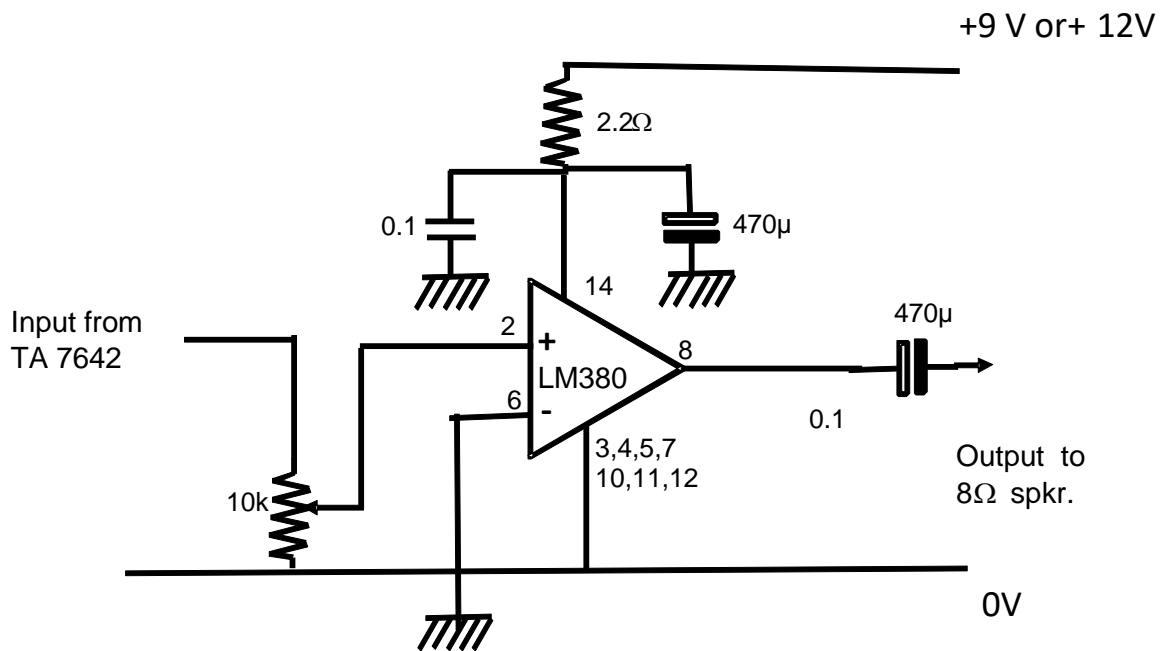
Measurement Point	Voltage when tuned to LM Radio	Voltage when no station tuned in
A	0.983 V	0.988 V
B	0.868 V	0.897 V
C	0.752 V	0.806 V

## Suggested Add-on AF Stage

This is one circuit of many versions which can be used to provide loudspeaker output. This circuit is based on the LM380 project introduced by the club some time ago.

### Simplified Lab Audio Amplifier (LM380 -14)

Voltage gain = 50



Note 1 : no connections made to pins 9 & 13 of LM380 !

#### References:

Basic Circuit – thanks to Dr. Google – unspecified origin

Voltage Regulator section – Darren Yates , AM Receiver , Silicon Chip Mag (Aus) September 1994

TA7642 information – Manufacturers Date Sheet

LM380 information – AUDIO/RADIO HANDBOOK – National Semiconductor

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