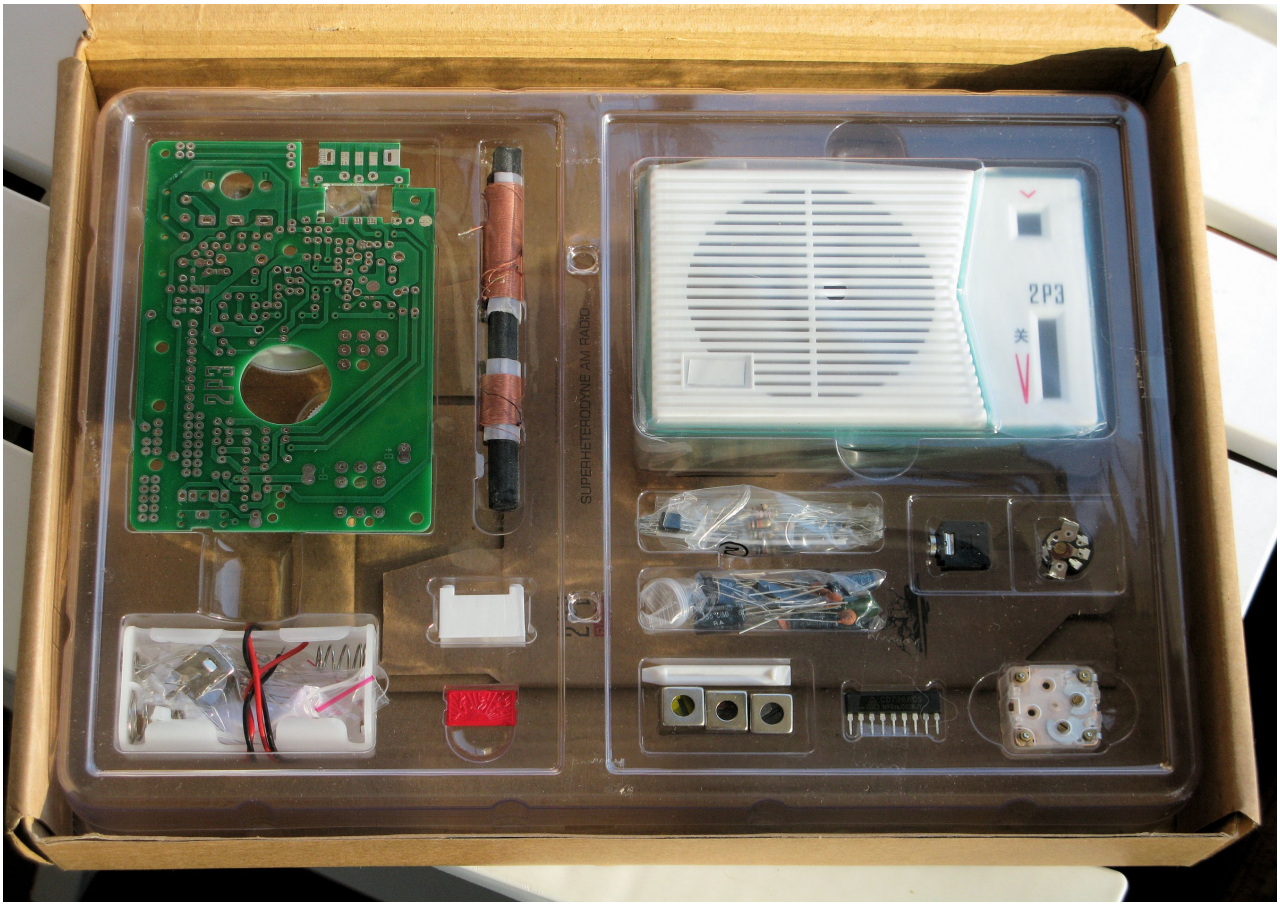
I learned about a little AM radio kit by Tecsun that I simply had to have. I've found recently that letters to Santa are most successfully executed as emails to my wife, and ideally should include a web link to the desired item to avoid elf-error. This technique worked splendidly for me, and the following box was under my Christmas tree:

First, a little background. According to the instruction sheet, and some Tecsun websites, transistors were being manufactured in China as early as the 1960s, and experimenters were getting hold of these and making little radios. Someone produced a case called the "2P3" for housing these projects. While semiconductor production was in place for military purposes at that time, I am surprised that there was experimenter and hobby semiconductors available then. But I suppose my view of the China of that era was

formed by black & white TV images from Nixon's China trip in 1972; of throngs of people keeping the streets clear of snow using brooms, to let the mass of commuters on basic bicycles pass.

I found online a photo of an original 2P3, next to a completed Tecsun 2P3.

The photo below shows what's inside the Tecsun box:



Did you take a good look at the cover of the box in my first picture? You may have missed a little historical detail. Above our intrepid little engineer, who sits focused on his work with loosened tie and soldering iron in hand, is a portrait of the Chairman himself, exhorting our young friend to complete his work well for the glory of the Party and the People.

I have a couple little projects in the queue before getting to this, but I plan to bring it to a BADX meeting when its completed, with a little luck, maybe at Paul's February dinner.

For those interested, the next two pages show some diagrams from the instruction manual, which is actually one large sheet of paper, two sides.

– Gary

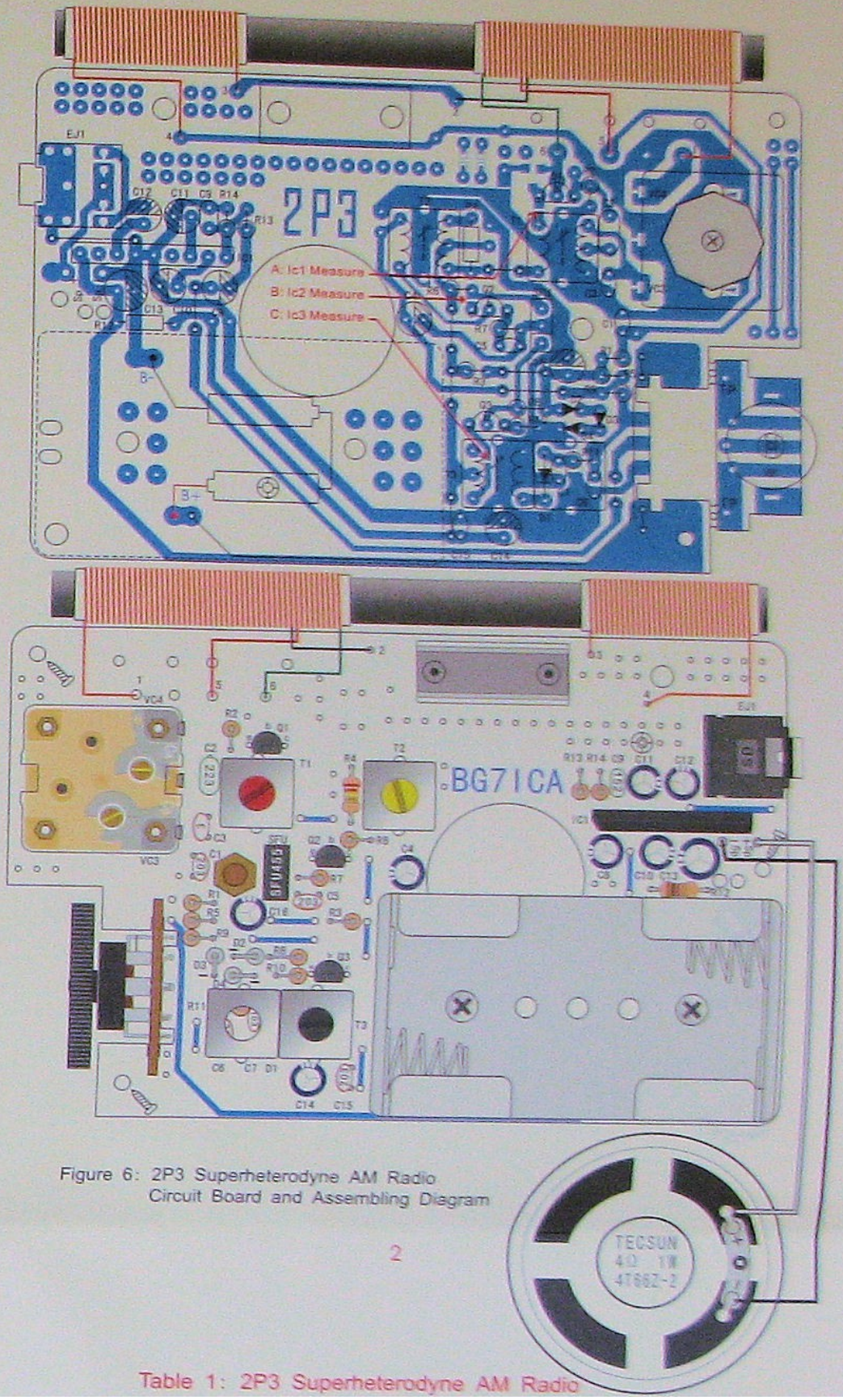


Figure 6: 2P3 Superheterodyne AM Radio
Circuit Board and Assembling Diegram

Table 1: 2P3 Superheterodyne AM Radio

To Fulfill a Dream . . . . . .

2P3

Superheterodyne AM Radio DIY Instruction Manual

In mid 1960s, due to a steadily available stock of domestic made transistors, there was a huge DIY wave of transistor radios in China. The big issue for a DIY transistor radio is how to make it look good, the 2P3 transistor radio case was made to fulfill this huge demand.

The 2P3 case is delicate and exquisite, once on the market, it is warmly welcomed. Many people saved money to get one case, and made many different versions of DIY radios, ranging from one-transistor regenerative AM radio to six-transistor superheterodyne AM radio, fulfilled their dreams of assembling a DIY radio with beautiful machine made case. However, there were people who bought the 2P3 case, but due to various limitations was not able to get all needed components thus unable to finish their project.

Half century went on, many DIY radio hobbyist still have a fond memory of the 2P3 case. When they chatted about DIY radios, 2P3 is always on their center of topic. People who finished their 2P3 project are proud of their achievements and people unable to finish it felt left behind. But today the 2P3 case is very hard to find, rarely surfaced specimen becomes a Collectors hot grab and fetches a lot of money. Thus, to find one 2P3 case becomes a new dream today.

Responding to many hobbyist appeals, we recreated the 2P3 case, designed a superheterodyne AM radio circuitry suitable for DIY project, together with all the components as a DIY kit, make it available for both old hobbyist to fulfill their dream, and new DIYers to hone their tinkering skills.

Figure 1: 2P3 Superheterodyne AM Radio (Front)

Figure 2: 2P3 Superheterodyne AM Radio (Back)

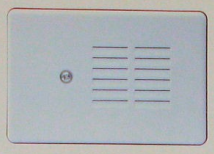
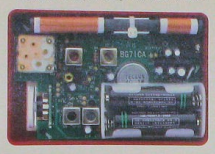


Figure 3: 2P3 Superheterodyne AM Radio (Internal)



2P3 Superheterodyne AM Radio Working Principal

Specifications:
Frequency range: 530kHz~1620kHz
DC supply: Power requirements : DC 3 V, two R6 (size AA) batteries
Sensitivity: <1mV/m
Maximum Output: 120mW
Quiescent Current: 7mA

Working Principal:

1. Mixing circuit: Mixing circuit is broken down into three sections, Input tuned circuit, local oscillator and mixer. Magnetic antenna inducts radio signal, feeds into a tuning circuit comprised of variable capacitor VC4 and L1, where the signal frequency identical to the tuning circuit resonance frequency is selected and inducted on L2, this process is called "tuning". L2 feeds the tuned radio signal into the base of mixer Q1 (S9018). Q1 has two functions:

A. Local Oscillator: Q1 working with VC3, C2 and T1, generate an equiamplitude sine wave at a frequency 455kHz higher than the tuned radio signal.

B. Mixer: Q1 mixes L2 inducted radio signal with local generated oscillator signal, a 455kHz intermediate signal (IF signal = Local Oscillator signal - tuned radio signal = 455kHz) is selected to pass the IF transformer T2, in fact, plural frequencies are generated but T2 is tuned at 455kHz so only 455kHz IF are passed and all other frequencies are filtered. The 455kHz IF is then fed to the IF amplifier stage.

2. IF Amplifier: In order to obtain enough gain, 2P3 has two IF amplifiers, comprised of Q2, Q3 and peripheral components. 455kHz IF signal passes T2, amplified by Q2, passes 455kHz ceramic filter CF1 and feeds into Q3 for second stage IF amplification. Amplified IF signal passes T3 then feeds into detector stage.

3. Detector: When radio signal transformed into 455kHz IF signal, only carrier wave frequency changes, audio signal riding on carrier remains unchanged, but this IF signal is not audible by human ears, it must pass a detector to separate audio signal from its carrier, this detector is carried out by diode D1 (1N60) and peripheral components.

4. Automatic Gain Control: After passing detector D1, IF is filtered by C7, R11, part of it feeds through C6, R9, C4 to be stepdown and filtered, providing a negative bias to Q2. When radio signal is stronger, higher IF output causing Q2 to reduce amplification; it works reversely when signal is weaker, hence stronger and weaker stations will have relatively similar volume.

5. Audio amplifier: Part of detector output feeds to Audio amplifier IC1 (CD7368) through C8, to be amplified and fed into speaker.

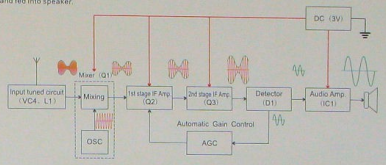
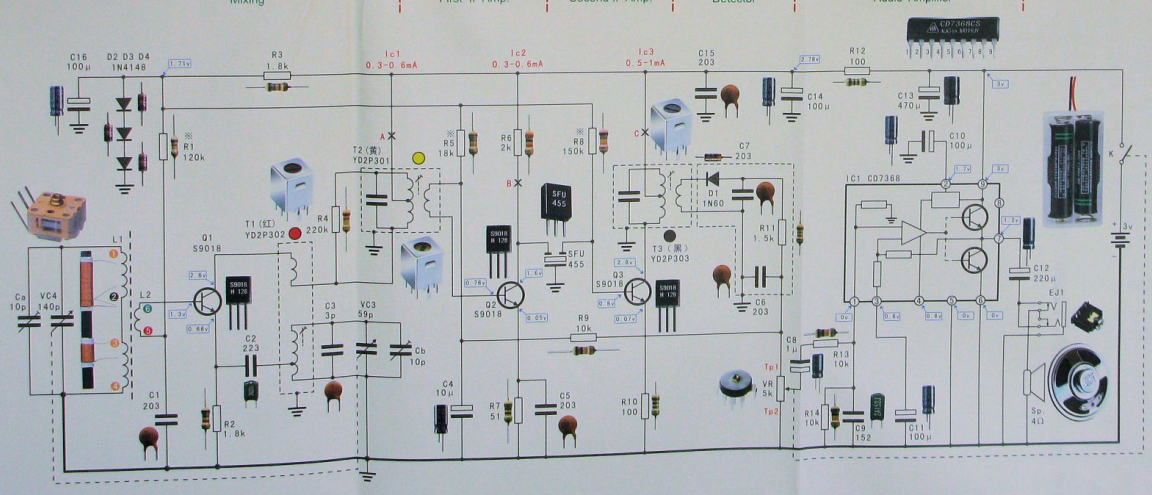


Figure 4: 2P3 Superheterodyne AM Radio Block Diagram



Note: 1. Resistors with numbers only, their unit are Ω, e.g. 100=100Ω.
2. Resistors with ※ (R1, R5, R6), their value are determined after measurement of Ic1, Ic2, Ic3
3. Voltage measurements are DC against ground, measured on 3v DC supply, for reference only.

Figure 5: 2P3 Superheterodyne AM Radio Schematics

TECSUN ELECTRONIC IND. LTD.