

# Memoirs of

## The SONY ICF-M780N is a DSP radio.

Submitted on **24 February 2018**

Sony Radio ICF-M780N.

<http://www.sony.jp/radio/products/ICF-M780N/>

Since the end of production, Amazon's price has risen to the premium price.

**SONY ICF-M780N – Amazon**

<https://amzn.to/3tvHinL>

The product description says "FM/AM/Radio NIKKEI PLL Synthesizer Portable Radio" and is a very understatement. Mono, no tone control. The only feature that stands out is the timer function.



I immediately disassembled it.

Small built-in transformer. The fact that you don't need an AC adapter is very good for a home radio.



Main substrate.



This is a complete DSP radio. It's not a so-called PLL radio. There is not even one of the IF filters, and it is a type that processes digital signals with LSI for demodulation by direct conversion. Looking at the chip block diagram, I don't think it's even a PLL system. It says Automatic frequency control (AFC), but there is no description of the PLL, and it seems that the frequency originating from the station is adjusted to the received signal, but it does not say that there is a loop in the phase comparison. I don't know the details, but it's a DSP radio that is no longer even a PLL radio.

\* It is unclear whether the AFC of the DSP chip is a PLL (phase comparison feedback control) or frequency tracking by a method other than PLL. Maybe it's a PLL, but there doesn't seem to be an oscillator or divider to use as a reference for comparison, and I think it's highly likely that digital processing is not a "phase comparison" after all. It seems that digital signal processing can be done as much as possible without using analog phase comparison to extract the center frequency and carrier of the signal. Let's get rid of the assumption that all digital display radios are PLL systems. (It seems that there is even a validator type analog OSC + digital frequency counter radio → "tuning [method: liquid crystal display analog tuning](#)" radio)

\* Technically, even if it is tonchinkan, the world is a PLL type who can select a station decisively with a button or the like, "a guy who selects a station with a stepless dial (whether it is DSP input VR or OSC VC)" is an analog type, "(whether it is a PLL count value or an OSC frequency

display) the display is digital anyway" is digital, "At least the demodulation is DSP, and analog demodulation + AF stage DSP ( It's not just a sound quality equalizer" is defined as DSP.

- The independent board on the right is the heart of the radio, a receiver module on which the receiver chip is mounted. THE CHIP SURFACE SHOWN ON THE MOUNT IS "3460 / DBCX / .724" AND SILICON PABS<https://jp.silabs.com/> The Si4734/35 AM/FM/SW/LW radio receiver Si4734-D60. DSP radio chip with shortwave and FM stereo also implemented. If you connect the microcomputer controller and AF amplifier to this, the radio is complete. In the past, analog radios used SONY's special function ICs in IC radios, and it was true to It's a SONY, but in today's DSP radios, an external receiver chip is the main performer.

Datasheet

<https://www.silabs.com/documents/public/data-sheets/Si4730-31-34-35-D60.pdf>

- It seems that a preamplifier and diode clamp are included without directly connecting the antenna to the receiving module to ensure sensitivity and safety. In the standard circuit of the data sheet, it is okay to connect directly to the chip, but that is the implementation of the manufacturer's product.

Perhaps it is around the controller microcomputer that is shielded for noise suppression. If you don't remove the solder, you can't see inside. There is no doubt that the LCD display and receiver chip are controlled, but further details are unknown.

- The land with "LW" notation in the upper right corner of the receiving module has not been implemented. This is probably for the [overseas model ICF-M780SL](#).

- The antenna is a long bar antenna, but it does not double as a tuning coil of analog radio, but looks like a simple micro antenna. There is a "LW" notation near the left side of the bar antenna, but the coil is not mounted.

I thought that if I tinkered around the controller a little, I would be able to SL and receive shortwave other than NIKKEI, but I don't know the identity of the controller or farm at all, and LW cannot be accepted as it is without parts. I thought it would just be a struggle. I don't want the FM band to become the world standard of 80-108MHz. Before that, there was no place where amateurs would tweak a little and make adjustments.

Found the service manual for ICF-M780N. Surprisingly empty. It only has an AC code and manual part number. This radio has no place to adjust even for an electrician.

<https://servicemanuals.us/sony/audio/icf-m780sl.html>

Digital radio has failed, but the digitization of radio has not stopped. This is also the trend of the times. I thought that if shortwave other than NIKKEI was received with this performance, the [ICF-SW7600GR](#) could be discontinued. If possible, there is also a white version like the XDR-55TV. → SW7600GR seems to have been discontinued this month. Gassho. Following Panasonic, Sony seems to be heading towards the end of **true** analog machines.

→ I tried to disassemble it further.

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This model is of the highest quality radio. The station selection is at the touch of a button, the volume and sound quality are sufficient, and the sensitivity and selectivity are the highest. It also has an on and off timer, and the design is good. Retro BCL radios and tube supermarkets are good, but easy, convenient, and high-performance DSP radios are the standard for modern radios. Compared to the ICF-801, the M780N is better in terms of operability, sensitivity, and noise. There is no harsh 9kHz beat. Image reception does not occur around FM complementary broadcasting. The difference is the sound quality (a matter of taste) and battery life (the M780N battery lasts enough, and if you have a pair of batteries for emergency use, there will be no problem at all). On the other hand, the ICF-801 has a great [FM image reception](#), and the AM also has a strange [twin-peak characteristic](#) and multiple peaks of synchronization, making it difficult to tune both coarse and fine movements. Compared to the ICF-EX5MK2, the sound quality and FM sensitivity are higher than that of the M780N. AM does not have synchronous detection, but the difference with DSP processing is so close that you can't tell if there is a difference, and there are not so many experiences that synchronous detection has helped with AM broadcast reception in the first place, and if you ask whether you want to listen to broadcasts that are buried in noise or interfered with neighboring stations on a daily basis even at the expense of sound quality, the answer will be which is better. It is also good that there is less background noise compared to the 801 and EX5. Both the ICF-801 and EX5 have terrible background noise, and the M780N is much quieter. In addition, the variac and deceleration mechanism alone cannot compete with the operability of the digital selection station, and the directivity of the bar antenna and the high sensitivity of reception cannot be fully utilized unless it is a marker oscillator, and it is only a hindrance to delicate tuning. The M780N, which is cheap in the current model, has only one step (9kHz difference) without synchronous detection, and China International Broadcasting 1044kHz and CBC Radio 1053kHz can also be separated properly by adjusting the null direction and there is no beat. The ICF-801, a high-rated radio with a premium price, cannot do this.

In addition, no matter how sensitive a receiver is, it is not possible to receive radio waves that cannot be received, which was common knowledge for Hamm, so "the EX5 is the best radio because the bar antenna is the longest. I changed my delusion. Every time I stand on 5channel, the length of the bar antenna is posted (<http://lavender.5ch.net/test/read.cgi/kaden/1465053750/4> While plausibly writing as of 2016/4/10 at the beginning, I wonder if you intend to mix the ultra-old BCL models that were discontinued ten years ago at the top and take the mount of your favorite antiques Kuga and EX5. If you care about the difference between the EX5 and M780N by only a few centimeters, you should do something about the [external antenna system](#). And how to crunchy tune an antique home appliance radio with only a long bar antenna, the current DSP [communication type receiver](#) There is no way that it can compete with a properly outdoor reception antenna in terms of total sensitivity and selectivity, and there is no hope that it will be superior in terms of sound quality to a stereo tuner with a decent antenna and speaker. I guess I just want to love my favorite antique radio by despising people who enjoy it on current radio rather than listening to the contents of the broadcast. Also, the auditory hallucination reviews of those who say that the digital display with the CPU on the radio is not a noise source, and the old model of analog

tune is the best, are also correct. I don't see the point of trying the current DSP machine in an environment where it is normally used, and putting down the delusions one by one that can be understood in one shot. In addition, AM [broadcasting will end in a few years](#), and the medium-wave bar antenna will be a dedicated antenna for dog [HK](#) and [Tokua](#), so if you master [한글](#) and [ordinary](#) by then, the proud long bar antenna will be useful.

If you want to mess with the old BCL radio instead of listening to the broadcasts and struggle with money, operation, and time, you can do as you like, because it's a hobby. If you want to listen to the current broadcast easily, there is no problem with the M780N.

It doesn't matter at this time, but even if the watch is accurate and left unattended, there is little deviation. The M780SL is not a no-brainer to call it "DigitalClockRadio."

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The ICF-M780N is controlled by the controller of the microcontroller even if the DSP chip itself supports SW / LW, so it is unlikely that it can be easily modified unless the controller side supports it, but the type of DSP radio that does not use the controller can be easily modified. I would like to see if ICF-506 can be modified using this method. The chip uses a variable resistor divider for tuning, but it is simply implemented as a simple input encoder and does not directly work on the internal circuitry of the VCO or frequency converter. (Resistor voltage divider circuit → A/D → position detection → frequency converter, DC [receiver](#) reception frequency is fixed)

#### **Modify the Panasonic RF-P155 and listen to shortwave broadcasts.**

<https://mzex.wordpress.com/2018/08/06/13201/>

Unlike the → P155, the ICF-506 is a Si4831 without SW function, so it seems impossible to convert to short waves. If it can be replaced with the Si4835 with the same shape and pinout, it will be able to support short waves. In this kind of radio, the body and the speaker are competing today, so chip replacement and amplifier replacement may be a modification method. Even with the Si4831, there are various things that can be done, such as stereoization, toncon function addition, and external antenna addition.

<https://www.silabs.com/documents/public/data-sheets/Si4831-35-B30.pdf>

Category : [Wireless, Electrical and Electronic](#) Author: [mzex](#) [permalink](#) [<https://mzex.wordpress.com/2018/02/24/12466/>]

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