

A TALE OF TWO ALINCO's - DJ-V17 & "The Trick"

(H. Holden. 2025)



Some years ago I bought a pair of Alinco DJ-V17 VHF radios from a local supplier. They were touted as brand new items.

After a few months of use, one of them failed in receive mode. It caused some confusion at the time because the party with the failed one, on receive, was unaware that their receiver had failed. The squelch was set so there was no background noise. They simply assumed that the other party (me) was not transmitting. I could hear them transmit and after a while it became clear to me, that they must not be receiving my transmissions, which had me wondering if my transmitter had failed. But the bar graph that shows transmission and the red light on my unit was working.

Ultimately when I recovered the other radio, indeed it was stone deaf in receive mode. I contacted the supplier and they did not seem too surprised about it. They said it probably just required a "Crystal Filter" unit replaced and to send it back to them for repairs. I did not warm to that idea at all because I don't like others repairing my radios because I cannot be sure of the standard of workmanship.

I negotiated a little and a technician in their workshop said he would send me a filter unit. But, I think what happened later he was told by his Boss that he was not allowed to do that and that the unit had to come in to them for service.

I was busy at the time and put the two radios into storage, where they must have remained for at least 5 years. Recently I got them out to investigate what had gone wrong.

The unit which had failed on receive, was still defective, the other unit apparently working perfectly.

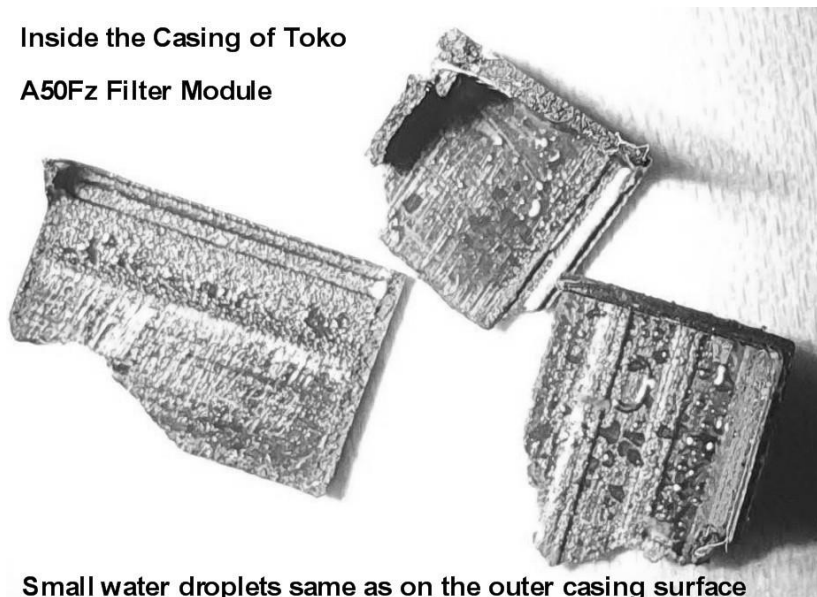
The defective unit - cause failure on receive:

On disassembling the defective unit I found something odd had happened to a 450kHz ceramic filter module. Its casing was wet with multiple small water droplets on its plastic surface. This is a photo of another similar unit affected, where it was found that for some reason, the casing on these Toko filter units was Hygroscopic. It turned out that this was a known pathology for these modules:



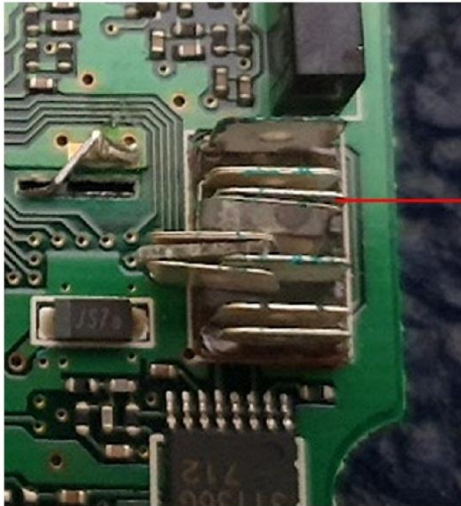
I cut the plastic shell off the module to inspect its insides (the reason for doing that rather than unsoldering it is explained below) There were also water droplets on the inside of the plastic casing too:

**Inside the Casing of Toko
A50Fz Filter Module**



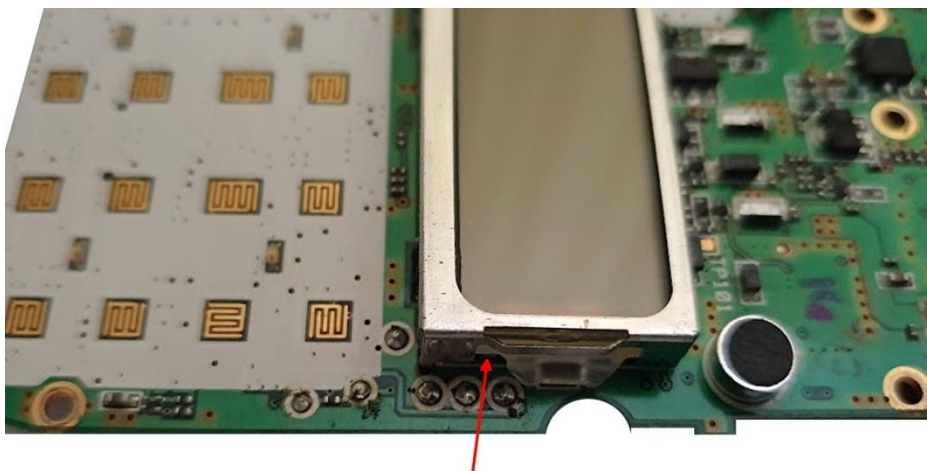
Small water droplets same as on the outer casing surface

In addition, after removing the ceramic elements I found green corrosion on some of the connector plates which were in opposition the the ceramic segments:



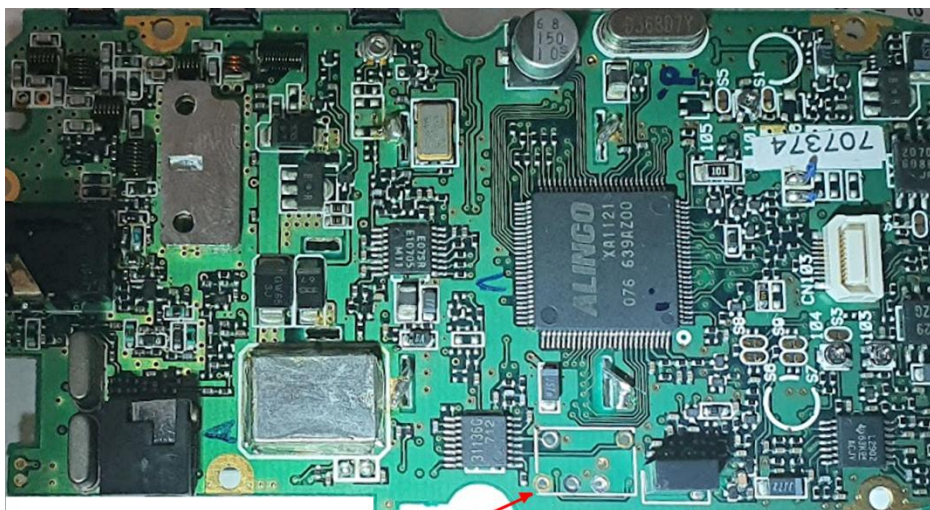
Green corrosion found between some of the metal connector plates and the filter elements.

To unsolder the Toko filter assembly requires access to its 5 pins. It is a through-hole part. Unfortunately one of the pins is hidden under the LCD module, which means that the LCD module must be removed. I thought better of this myself with the philosophy of leaving everything else as undisturbed as possible.



One of the Filter Module's solder connections hides under the LCD display

Therefore, I decided to avoid having to remove the LCD module and instead initially remove the filter module from the pcb top surface, by cutting it up and removing the pins one by one from the top:



Filter module removed from pcb top surface to avoid having to remove LCD module on the other side.

Replacement Modules:

The Toko module has now been replaced by others.

ALFYM450F (Case label A50Fz) Toko

LTM450FW

CFWM450F (Case label W50F) Murata

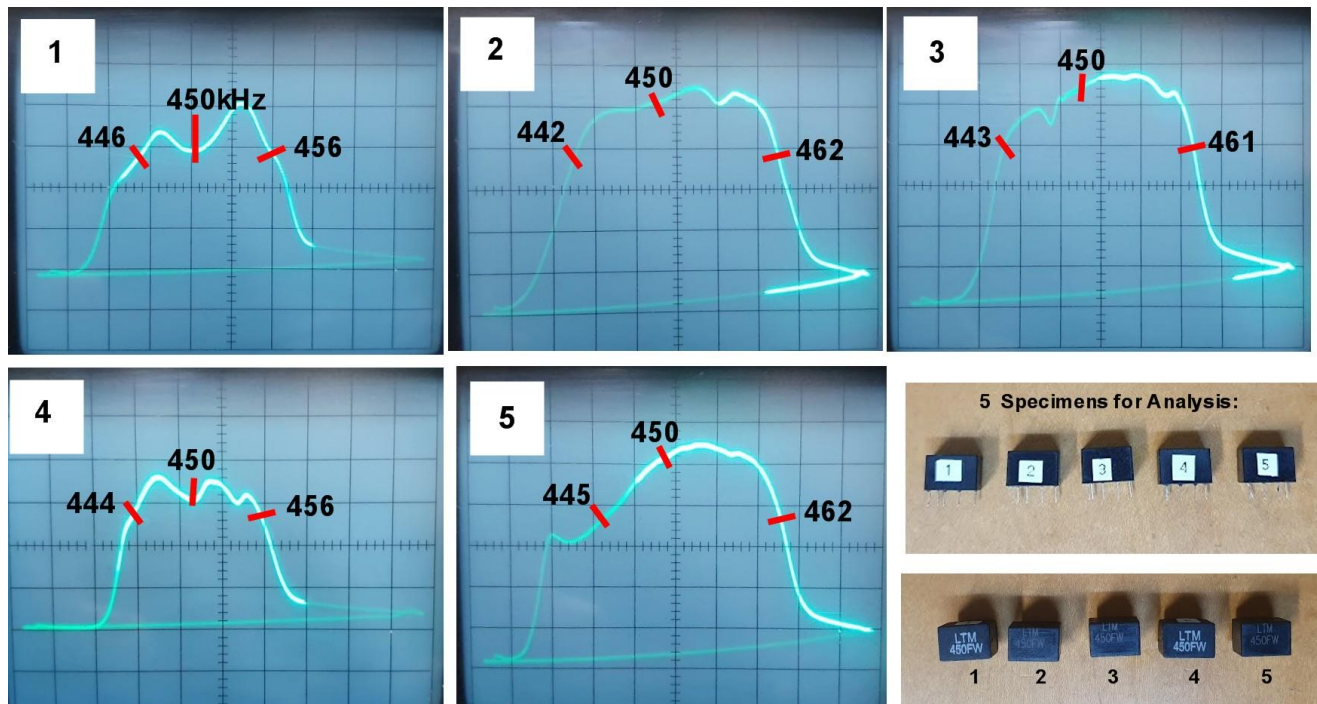
These 450kHz Ceramic filter Modules, all with an F suffix, have a +/- 6dB bandwidth.

Murata Global Part Number	Old Model Number	Centre Frequency Fc (kHz)	6dB Bandwidth (kHz) min	50dB Bandwidth (dB @ kHz)	Attenuation Fc ±100kHz (dB) min	Insertion Loss (dB) max	Pass Band (kHz)	Inband Ripple (dB) max	Inband GDT Deviation (µs) max	Input/Output Impedance (ohms)	Operating Temperature Range (°C)
CFWLB450KBFA-B0	CFWM450B	450.0	±15.00	±30.00	35	4	±10.0	3.0		1500	-20 to +80
CFWLB450KCFA-B0	CFWM450C	450.0	±12.50	±24.00	35	4	±8.0	3.0		1500	-20 to +80
CFWLB450KDFA-B0	CFWM450D	450.0	±10.00	±20.00	35	4	±7.0	3.0		1500	-20 to +80
CFWLB450KEFA-B0	CFWM450E	450.0	±7.50	±15.00	35	6	±5.0	3.0		1500	-20 to +80
CFWLB450KFFA-B0	CFWM450F	450.0	±6.00	±12.50	35	6	±4.0	3.0		2000	-20 to +80
CFWLB450KGFA-B0	CFWM450G	450.0	±4.50	±10.00	35	6	±3.0	2.0		2000	-20 to +80
CFWLB450KHFA-B0	CFWM450H	450.0	±3.00	±9.00	55	6	±2.0	2.0		2000	-20 to +80
CFWLB450KJFA-B0	CFWM450I	450.0	±2.00	±7.50	55	7	±1.5	2.0		2000	-20 to +80

Specifications											
LTM 450											
Part number	AW	BW	CW	DW	EW	FW	GW	HW	IW	HTW	
Center frequency (KHz)	450±2.0	450±2.0	450±2.0	450±1.5	450±1.5	450±1.5	450±1.5	450±1.0	450±1.0	450±1.0	
Insertion loss (dB) max	4	4	4	4	6	6	6	6	6	6	
Pass band ripple (dB) max	2	2	2	2	2	2	2	2	2	2	
6dB bandwidth (KHz) min	±17.5	±15	±12.5	±10	±7.5	±6	±4.5	±3	±2	±3	
40dB bandwidth (KHz) max	±35	±30	±24	±20	±15	±12.5	±10	±9	±7.5	±9	
Stop band att. ±100KHz (dB) min	40	40	40	40	40	40	40	40	40	60	
Input/output impedance (Ohm)	1000	1500	1500	1500	1500	2000	2000	2000	2000	2000	

I bought some replacement filters on eBay, part number LTM450FW, two from one supplier and 3 from another. I wondered about the quality of them both electrically and physically. The original hygroscopic Toko part had a more or less clip in base and did not appear to be well hermetically sealed. On the other hand the newer LTM prefix parts are sealed up with a hard black resin.

I decided it would be a good idea to test & Sweep them. So I set them up with a sweep generator with low level signals, matched the input and outputs to 2k and amplified the output up to over one volt peak using an AD8056 RF capable Op amp and fed that to a standard diode detector arrangement. The results from the 5 modules are shown below:



I was quite surprised with the variations seen. Units 1 & 4 with the White markings obviously had higher insertion losses than the other units where the output amplitude under the same test conditions was lower for modules 1 & 4 than the others. Yet with those ones the band-pass appeared a little narrower and one might have expected it to be higher.

Each unit is unique in its exact band-pass characteristic, much like a fingerprint. It must be difficult with the multiple ceramic elements these contain to make them identical. I decided to fit number 4 to the radio despite the higher insertion loss I fancied its band-pass profile. This cured the radio's receive mode fault.

THE TRICK:

I was pleased to find that the plated through holes in the pads for the ceramic filter module were close to 1mm. This means I could use a trick that I once developed to replace components on a 2 layer board's top surface alone. The technique can save many hours work especially for complex boards in items such as Oscilloscopes etc where it can be a major job to remove the board.

The method only works (for a low profile result) when the holes are 1mm diameter or very close. I wanted to do this so as to avoid having to remove the Liquid Crystal Display module to gain access to one of the pins of the Filter Module hiding below it.

Machine pins from sockets can be used to make repairs and make sockets for items such as DIL IC's on one side of a pcb alone, however, in this form, they are too tall and cannot be used if the part must sit low profile.

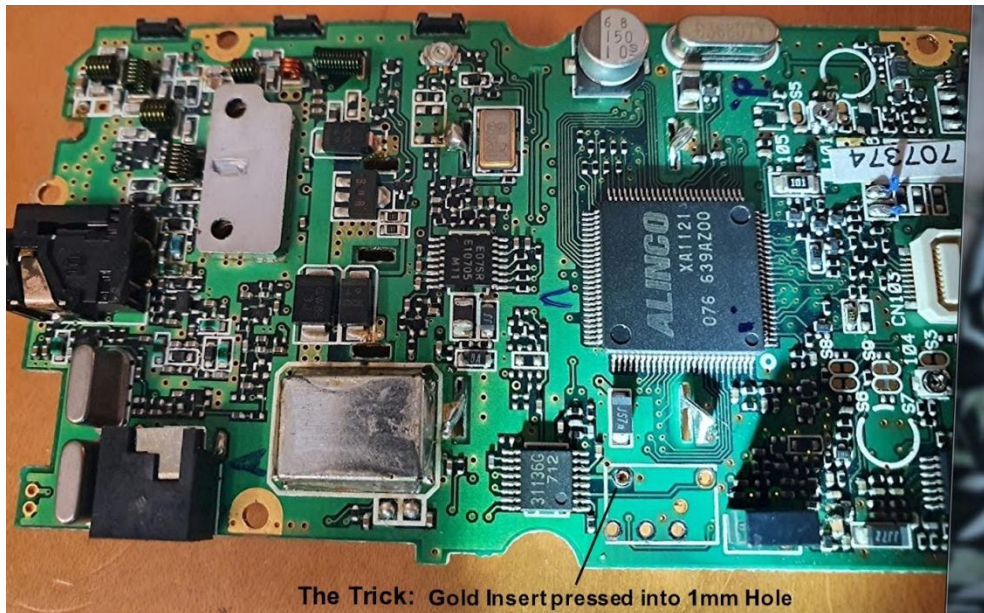
Firstly a Machine Pin assembly is removed from an IC socket by cutting away the plastic. The assembly contains a miniature Gold plated 4 prong spring contact system that hides within it:



Acquiring the part above is the easy bit. The more difficult part is recovering the internal Gold plated contact assembly without damaging it. I do this in my mini-Lathe by machining the outer shell until it just breaks through. Then the Gold plated insert is recovered undamaged:

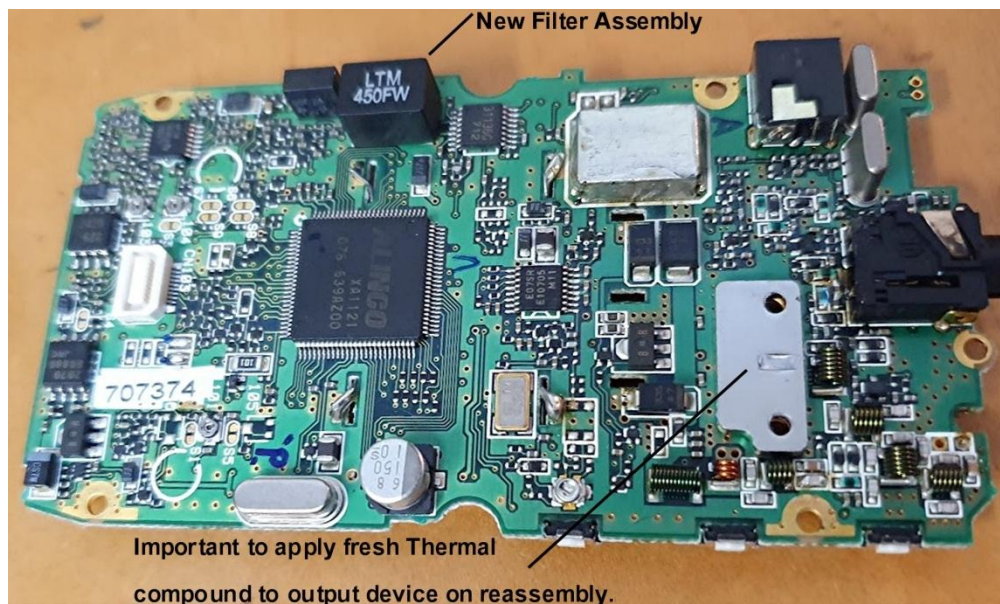


These “inserts” are just over 1mm diameter and are a very firm press fit into a 1mm hole. No soldering is required due to the press fit. The photo below shows this insert fitted:



When the Filter Module is inserted, it is easy to feel very good tension on the single pin (which is the module's input pin)

All 5 contacts could have had these insets fitted, so as to make a module that could unplug, but since the other 4 contacts in this instance were easily accessible, I simply soldered them from the other side of the board for this particular repair.



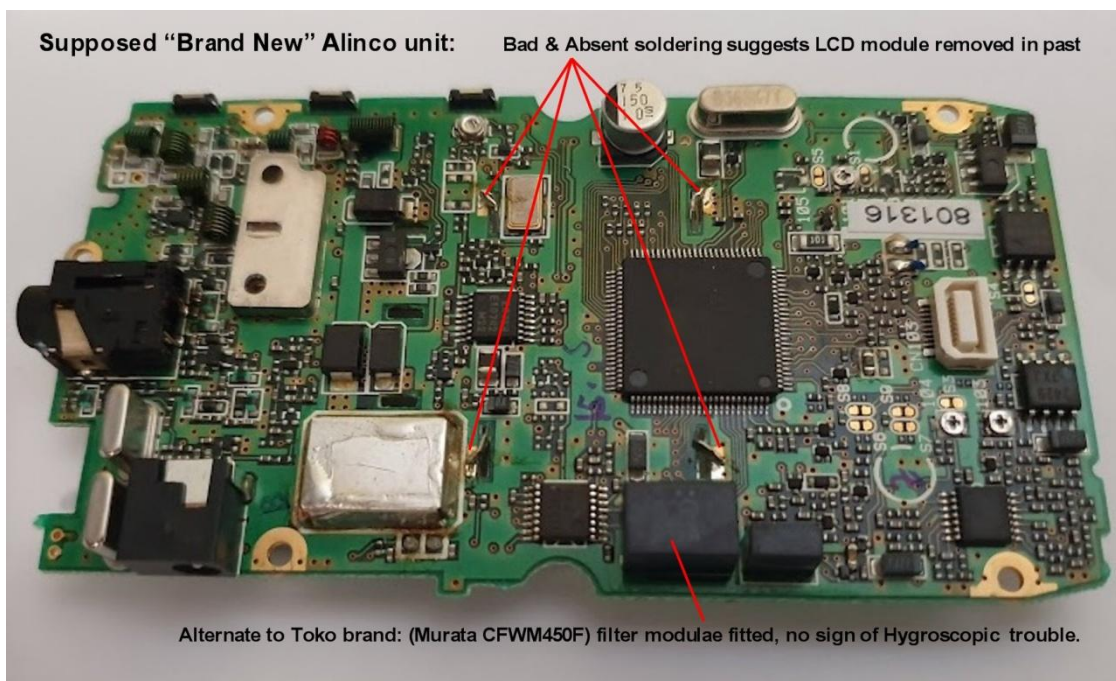
The other working radio:

Since one module had failed in one unit, I decided to replace the one in the working DJ-V17 radio.

However, when I opened this supposedly “new” radio up, I was very surprised to find that the radio had been worked on by a Technician in the past, even though it was sold to me as Factory New. Then very close inspection showed some wear marks on the unit.

I assume it was probably a warranty claim radio, where the first owner had it fail on them. I could see right away that the LCD module had been removed in the past because of the poor soldering and additional flux present. The original Toko module had already been replaced with a Murata module. It was obvious this had been done. This also explained why this radio was still working and had not gone the same way as the other radio.

However the supplier of these radios must have known that the Toko module would become problematic at some point soon in the other radio. Not a wonder they did not seem surprised when I called them up and explained one unit had failed on receive mode.



Summary:

It is an interesting and peculiar the pathology in the original Toko A50F 450kHz ceramic filter modules. It is as though the plastic of the housing material is heavily contaminated with a moisture absorbing salt or another type of hygroscopic compound. This creates corrosion inside the unit and affects the physical contact to the ceramic elements.

When you buy new radios you don't expect that they would have been units that had failed in the past and been repaired by someone else in the past. And that the supplier also knew that the other radio was likely to do the same thing in the near future.

Ideally, when this problem was initially detected with the Toko ceramic filter modules, all of these affected radios if not sold yet, should have been returned to Alinco for factory repairs, where the soldering standard is often better than in some service shops and the performance of the radio re-verified on their factory test equipment. However, economy dictates that often other things than the ideal scenario happen. Certainly if this had been done, I would not have been sold a repaired radio masquerading as a new one, and another new radio with a Filter Module in it, known to fail in short order.
