Restoration of a Zenith Transoceanic Clipper model 8G005
By Doug Crompton, WA3DSP

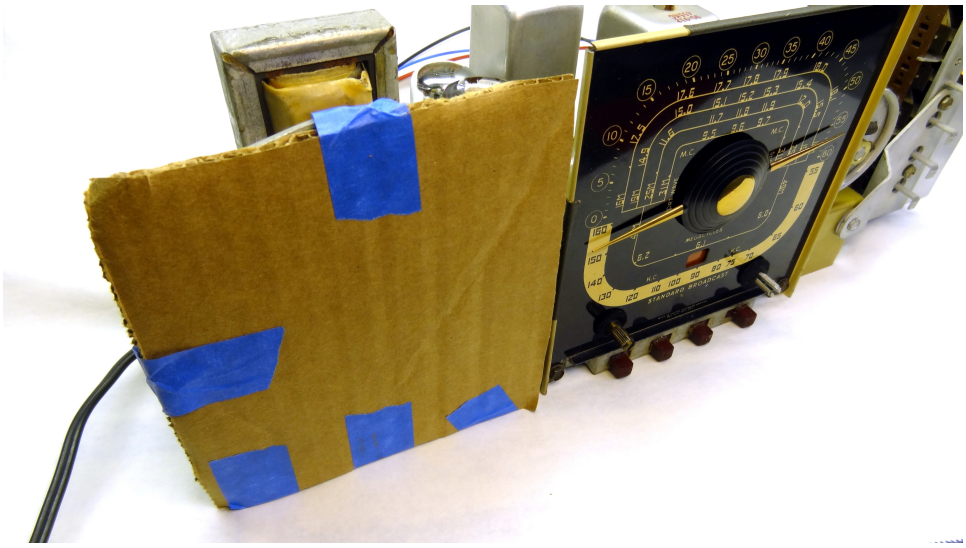
This photo shows the restored and operational radio. Below I take you through the process of electrical and mechanical restoration.

This page last updated 3/20/2021

The Zenith Transoceanic receivers were produced from 1942 to 1981 in many different models that spanned the technology of the time. The model described here, the 8G005, was produced in 1948/49 and uses 1.4 volt filament Loctal tubes as well as a 7 pin miniature 117V filament rectifier. There are seven Loctal tubes with their directly heated filaments in series. There is no power transformer and although the B- is isolated for safety reasons you should still use an isolation transformer when servicing this radio. It was designed to run from the AC line or A and B batteries which were stored in a compartment below the radio. Since these batteries are no longer available there are sources of replicas made up of D cells and 9V batteries in series. The series filaments of the 8G005 require nominally 9.8V @ 50 milliamperes. The B+ is nominally 90V @ 40 Milliamperes. Today these voltages could also be produced from a simple inverter circuit for the 90V and a regulated supply for the 9.8V derived from 12V for portable use. At the time this radio was developed 12V was not a standard as most cars were 6V systems. The radio draws 150ma when run from a 121V AC line.

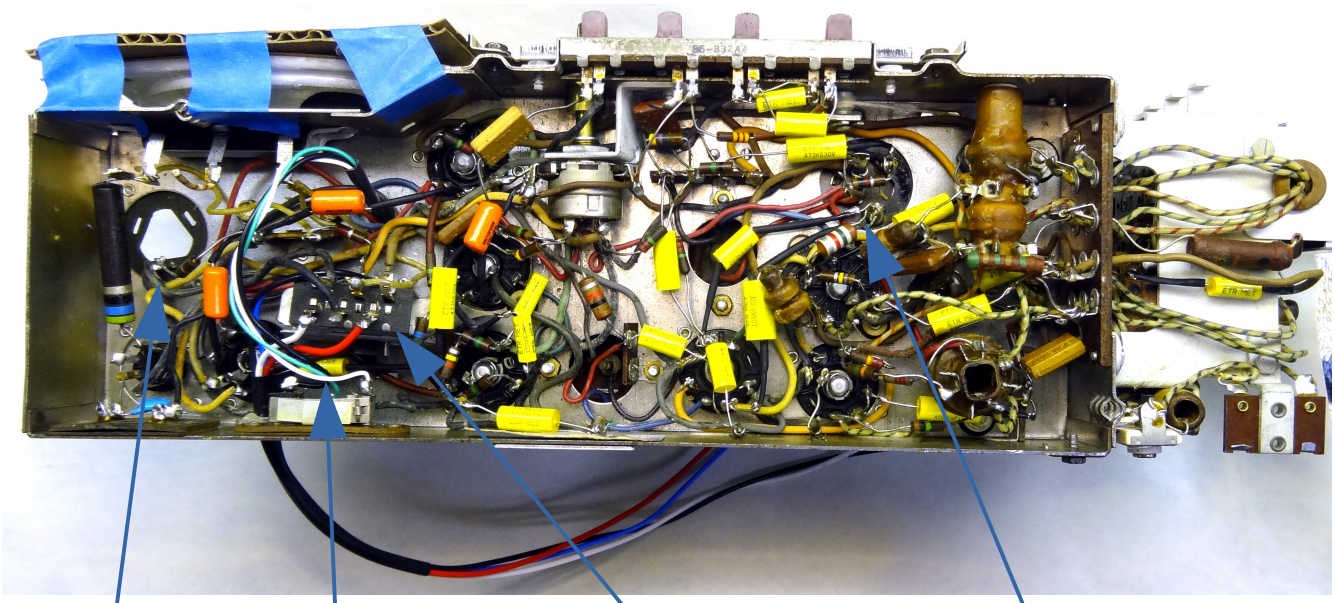
My Transoceanic was in what I would describe as good shape considering its age. Nothing was broken and most everything minus the batteries were there. I do not remember where I got this radio but it became part of my collection many years ago and was stored away in a cabinet. I was born in 1950 so this radio is just a little older than I am. That fact combined with two friends who had Transoceanics and had restore theirs I decided to pull it out of the cabinet and do my own restoration.

The first thing I did was remove the chassis which was very easy. Remove the volume and tuning knobs from the front panel, disconnect the cabinet antenna and whip antenna, and remove the two screws holding the chassis which can be accessed through the two holes on the bottom. Once the chassis is removed the very first thing you want to do is protect the speaker. In the process of replacing parts you will be moving the chassis around and invariably if it is not protected you could damage it. This photo shows a piece of cardboard cut to fit over the front and taped with painters tape. Leave this on until you are ready to reinstall the chassis.



Chassis removed and speaker protected ready for restoration.

The next photo shows the bottom of the chassis after most of the problem capacitors have been replaced as well as some wiring to the batteries and speaker. The two electrolytic cans have yet to be replaced. Some of the original wiring used was rubber covered solid wire which can turn brittle. I had to replace some lengths which went up to the speaker and out to the external batteries and was in bad shape. This is noted below. When I replace wiring I use Teflon wire.

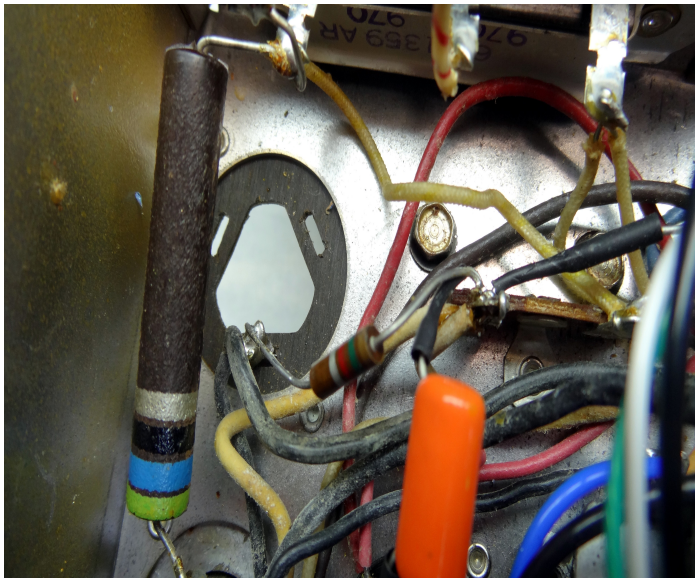


Can electrolytic removed

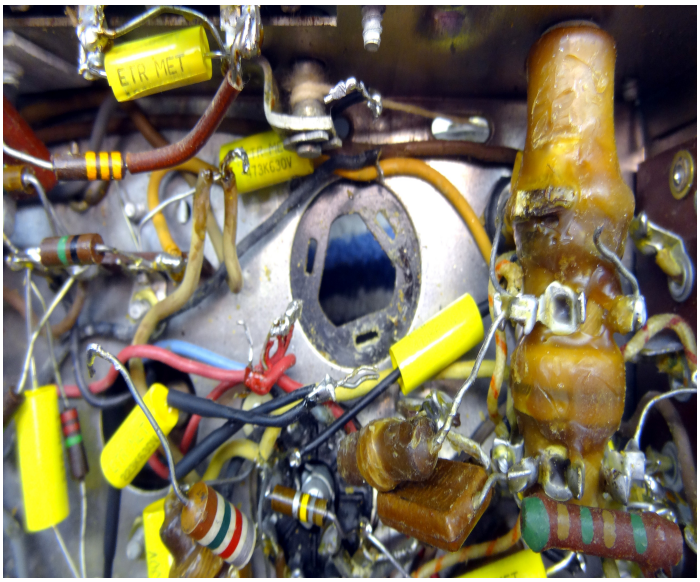
New speaker wires installed

AC/Battery switch unscrewed for availability to contacts. New battery wires installed

Can electrolytic before removal



40/20/10uf Electrolytic removed

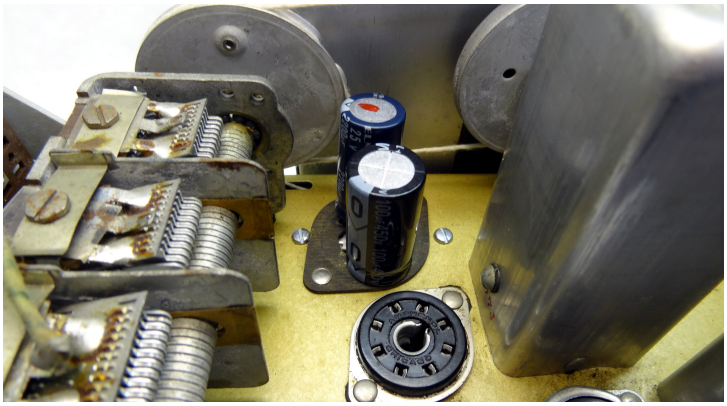


200/40uf Electrolytc removed

Closeups of the two electrolytic cans removed. In one case I actually cut the can out which was unnecessary. I never re-stuff cans, it is a waste of time. On the second one I remove all the wires, twisted off the three retainer tabs and removed the old can. The phenolic mounting plate is left as shown above.

As you can see in the photos below I used both axial and radial lead electrolytics at both locations. But first a word about values for electrolytics. In 1948 both the size and cost of electrolytics limited their maximum value. For this reason manufacturers used the minimum value that would work in the circuit. Electrolytics are used to filter AC and make it as close as possible to pure DC. Any AC component would add to hum in the speaker. Many older radios had some hum in the audio as a certain amount was deemed acceptable. Today in 2021 capacitors of all types are considerably smaller in size then they were in the 1940's. This is especially true for electrolytic capacitors. So back to the Transoceanic, it uses a total of five electrolytic capacitors. A three section can next to the rectifier tube which is 40/20/10uf @ 150V and a dual can behind the dial that is 200/40uf @ 10V and 150V. I generally buy 100uf @ 160V electrolytics

for small line type radio replacement. In this case the 40/20uf caps at the rectifier position were replaced with two axial lead 100uf @160V caps. Their positive leads are threaded through two of the insulated phenolic mounting holes and soldered on the bottom. The common negative ends are both soldered to the third mounting hole where the negative bus is soldered. Again remember B- is not chassis ground!



Likewise the can behind the dial is replaced with two radial lead capacitors. One is 470uf @25 volts and the other is 50uf @ 160V.

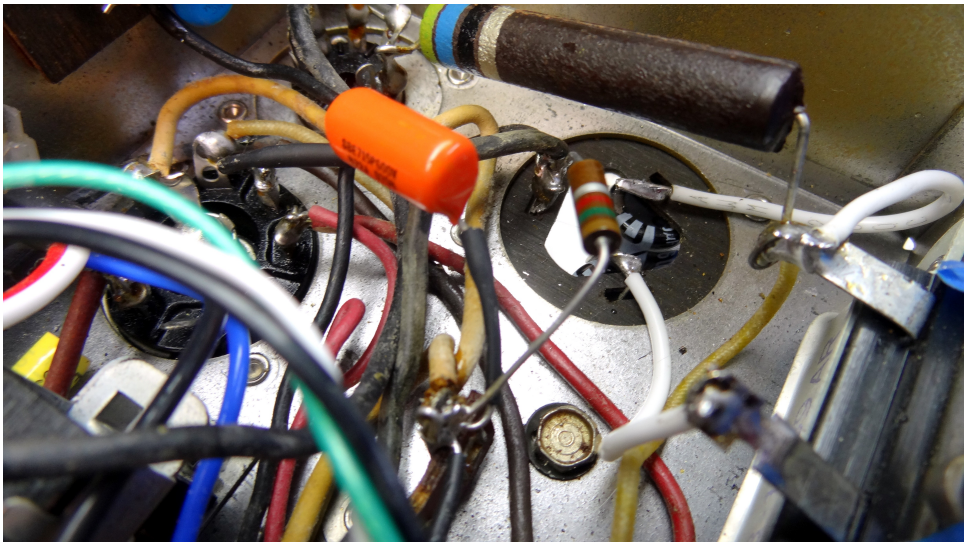
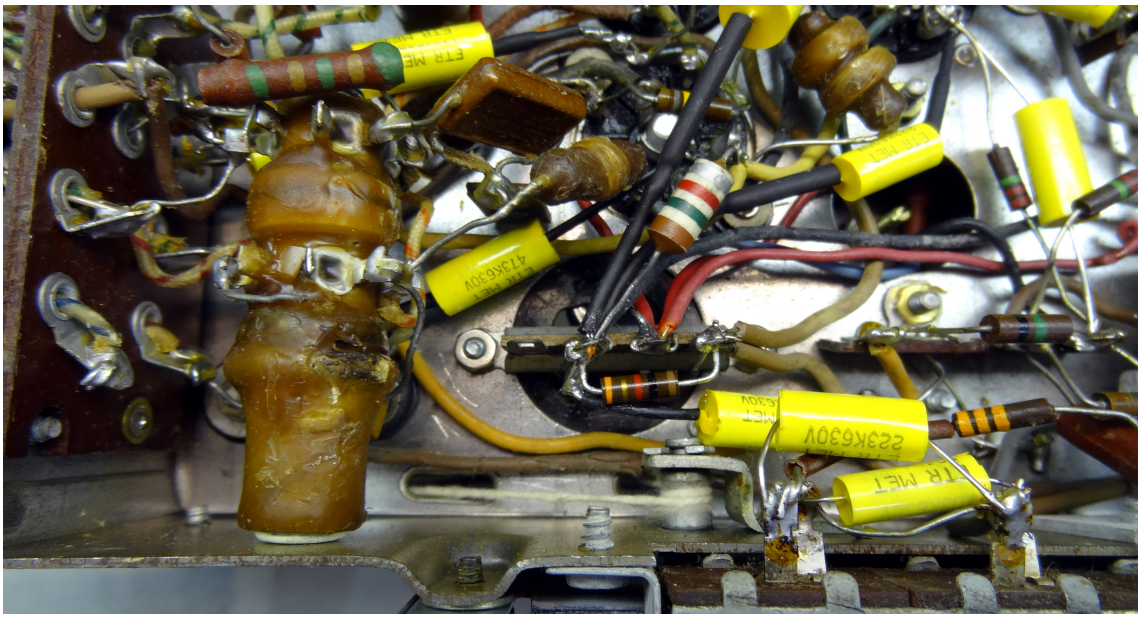


Photo showing the two 100uf electrolytics terminated on the bottom.
The electrolytics were firmly supported by the leads
and also hot glued to the phenolic on the top.



For the dual electrolytic because of the large number of leads involved a terminal strip was mounted across the original phenolic wafer as shown above. Again the leads from the capacitors were threaded through the mounting holes of the phenolic from above and all connections were restored at the terminal strip. The capacitors were hot glued on the top at their bases to the phenolic. This makes a very solid mounting and would be easily replaced 70 years from now when the next person goes over the radio!

The mostly yellow and some orange capacitors you see in the photos are the replacements. Again don't be concerned about exact values. For instance an often used value in the radio is .05 which can easily be replaced with a .047 which is much more common. Capacitors at least the ones used back then had very wide range tolerances. I measured every capacitor I took out of the radio and most were 10-20% above the marked value but had considerable leakage. The replacements were very close to the marked value and had little or no leakage.

Voltage ~100VDC @121VAC input

This is the series filament voltage point. The voltage here should be ~ 9.8 VDC. Zener diodes added for protection.

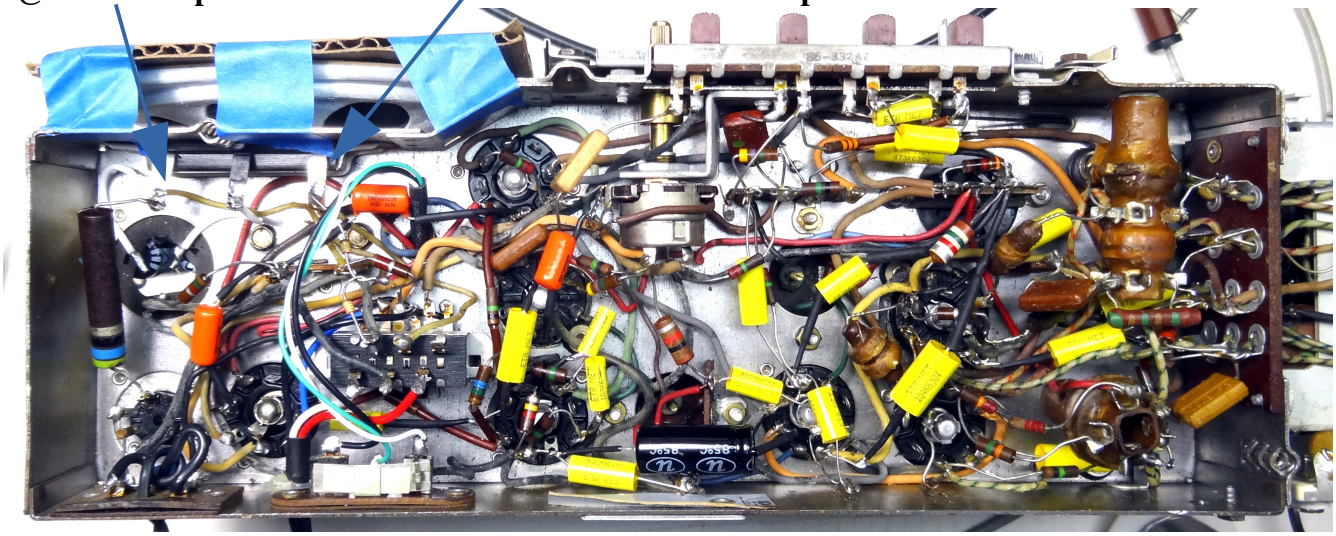
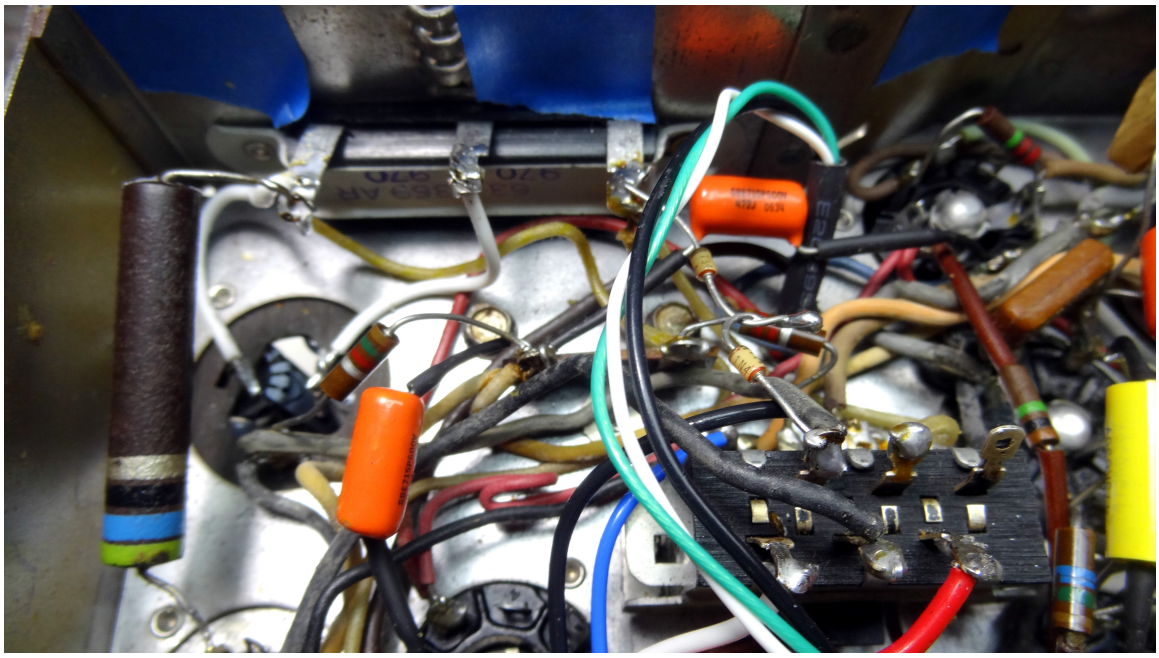


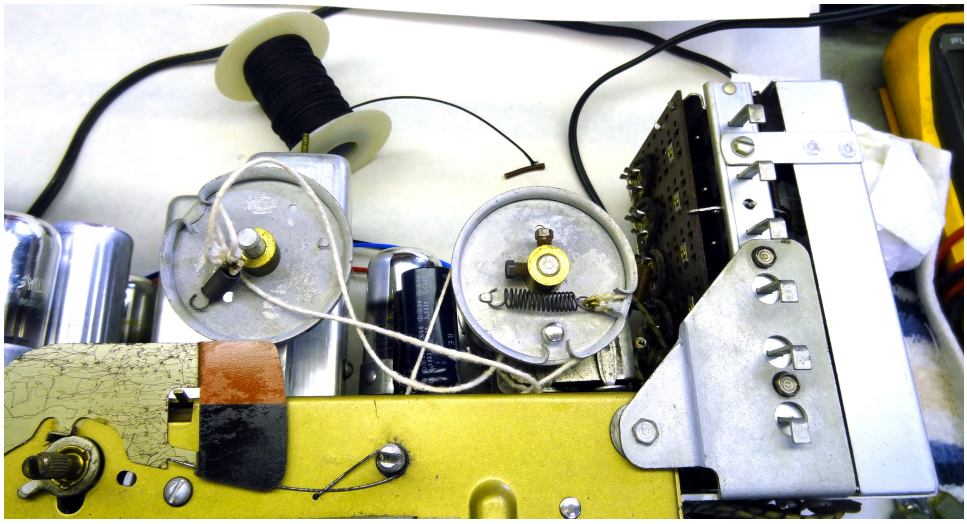
Photo showing the completed below chassis restoration. The fifth electrolytic previously in the can adjacent to the rectifier is shown in the bottom center. Previously there was a wire halfway across the chassis to this location.



Zener diodes installed from filament high point to B-bus. Voltage here should be around 9.8VDC. The added zeners start to conduct at about 9.9VDC to protect the filaments from over voltage.

When replacing components use your judgment as to the best way to do it. If you can easily get to the end points and solder the part directly there then that would be the best way. In many cases this is just not feasible for many reasons. Sometimes it is logistically not possible and in others there are just too many connections at the site. I generally cut out the old component leaving enough lead at both ends to bend over and make a joint. I do the same with the replacement part and solder the joint. Done neatly and correctly this looks and works perfectly well. You can also use heat shrink over the connection if desired or necessary.

Now that all the parts they needed replacement are installed I moved on to the top of the chassis. The tuning was working but were slipping and the dial cords were simple white string. I kind of doubt this was original but maybe it was as the end points had little brass rings so it looked like a more professional job. I have good heavy duty dial cord so it was a no brainer to replace them. Here is a photo showing the original white string cord taken off.



And the new cord installed. The cord I used was heavier than what is often used and because of that I used an extra turn around the tuning shaft below the chassis. The final result was a solid non-slip feel when tuning. The spring and cord are pulled very tight.

New dial cords installed. This radio uses two runs and two springs. One between the tuning shaft and the capacitor shaft and one between the capacitor shaft and the dial shaft.

Tips when electrically restoring

- There are many Transoceanic models so make sure you are using the right schematic and documentation for your model.
- The 8G005 uses seven Loctal 1.4 volt filament tubes for a total series string voltage of 9.8 volts. I like to keep the voltage at 9.8 or slightly less but more than 9.4. If the voltage falls too low you may find that the local oscillator does not run on the SW bands. This is obvious as you would get little or no audio on those bands.
- The filament voltage on the Transoceanics is unique in that when it is run on AC it is fed from a dropping resistor off of the DC bus and thus the voltage comes up slowly as the rectifier heats and the filter capacitors charge. This has the added benefit of protecting the filaments from any turn on surge but it does take longer to come to life at turn on.
- Besides using an isolation transformer I would recommend a variac. This can be used to bring the voltage up slowly for testing but also to set the maximum voltage. I found that my isolation transformer actually increased the AC voltage by about 10%. At 121VAC input to the isolation transformer I had 130VAC at the radio. This drove me to believe I needed to change the dropping resistor mounted off of the rectifier until I measured the AC voltage coming into the radio with a DVM. With the variac in-line you can adjust the input to the proper value.

- I would suggest using larger value filter electrolytic capacitors when restoring. 100uf is a common value and much smaller than the original lower values. In many cases the larger values are also less expensive. In the case of the 8G005 all of the electrolytic capacitors with the exception of the 200uf can be replaced with 100uf capacitors. The 200uf can also be a much larger value and is a much lower voltage. The original was 10V, I replaced with a 470uf @ 25 volts.
- All tubular capacitors should be replaced. My 8G005 had slimy wax capacitors but even those in molded cases should be replaced. Capacitors made in this era did not have the quality of those made today. Generally the values of these old caps are OK but they all have a good deal of leakage. This causes bias problems in coupling capacitors and in general is not good. The good quality capacitors you use for replacement today hopefully should not need replacement in another 70 years!
- Don't go crazy trying to replace parts with exactly the same value. A .047uf can replace a .05uf. Capacitors have wide tolerances and as long as they are not being used in frequency determining applications the values are not that critical. Many of the old capacitors removed measured well above the marked values but exhibited lots of leakage.
- Use your best judgment when replacing parts. Because the replacement capacitors are significantly smaller than the originals their placement can often be more efficiently located. The 8G005 uses a B- bus so only a few of the capacitors actually go to chassis ground. You can sometimes connect the ground end of the capacitor to a different location but make sure it is on the correct circuit. It is always a good idea to use the shortest possible lead length especially in a bypass capacitor. This was often overlooked in older designs because the part was so large.
- Old parts can be cut out leaving enough lead to bend over and accept the bent over lead of the replacement part. Done neatly and correctly this results in a very acceptable way to replace parts. If you can connect the part directly to the pin instead by all means do so but don't destroy anything trying to do it.
- All contact surfaces should be treated with a good contact cleaner like Deoxit. This includes the tube sockets. Remove the tubes one by one and spray the socket. For Loctal tubes the center pin is used to secure and ground the base ring of the tube. It should fit snugly and snap and lock in. If it does not or fits loosely use a pair of long nose pliers to carefully compress the center pin of the socket.
- Once the radio is operating check for intermittent connections which would make crackling noise in the speaker when bumped. I found two tubes that when slightly rocked caused intermittent static. Tightening the center pin and re-soldering a couple of tube pins solved the problem.

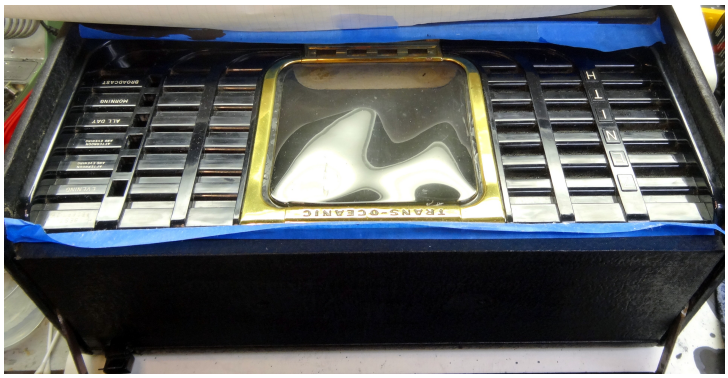
Mechanical Restoration

The Transoceanics of this period were not real fancy. It was basically a wooden box lined with a leather like material. In many cases this material could be worn or coming off. I was lucky and none of mine was that worn or missing however it was separating from the wood in many places. The first thing I did was remove just about everything that was practical to remove from the case. The front latches, the top handle, the rear accessories and their attachments and the bottom front manual storage compartment door latches. This makes it easy to determine what parts of the liner need gluing. I used Elmers glue and a small brush carefully pulling away what was loose and applying a good amount of glue to the wood surface below sealing the covering down. This process works very well and after wiping off any excess it really looks nice. I am not sure what they originally used to secure the liner but it did not look like there was much evidence of an adhesive where the liner was raised from the wood so no surprise that it was loose in some areas.

Some of the items removed and cleaned, painted and polished. Not shown are the screws which were also painted.

Some of the products used. Brass polish, Leather dye with applicator, Rust remover, and Elmers glue with container and brush.

Parts removed were thoroughly cleaned, rust removed, and polished or painted as required. Once the case covering was repaired the black leather dye was applied. You do need to mask areas you do not want painted. The dye will stain anything including your hands so be sure to wear gloves.

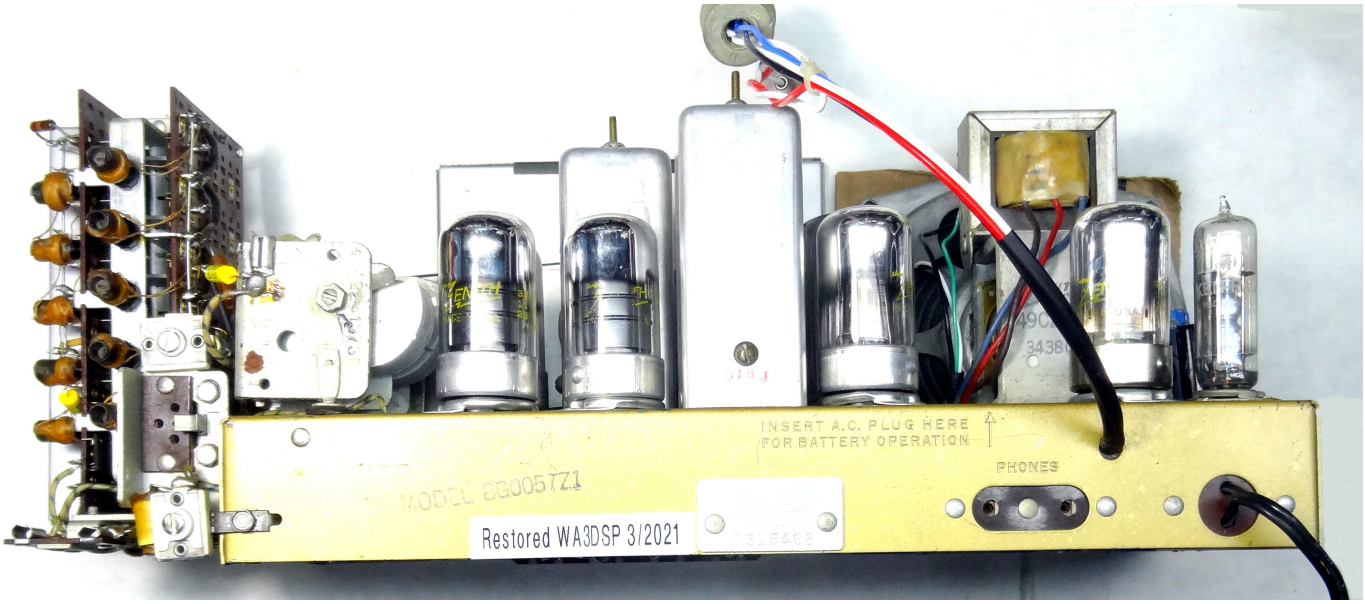


Carefully mask areas you do not want painted with the black leather dye. Cover the entire dial area also to avoid accidents.

The cabinet ready for a coat of black leather dye.

I am not sure what it was but the material under the chassis front panel switches sure looked to me like asbestos. Why it needed to be there I don't know as there is no special need such as higher heat at that location. I decided to be cautious and cover it with a liberal coat of Elmers glue to seal it in place.

Front after dying and reinstalling hardware.



Chassis ready for re-installation in the cabinet

Alignment of the 8G005

- Alignment of the radio is fairly straightforward and no unlike aligning a standard 5 tuber radio
- Start with the 455Khz IF's. There are two cans. I found them to be broad but with a definite peak.
- Next the AM broadcast band is aligned with the three compression trimmers on the top of the main tuning capacitor.
- Then the five SW bands each have three slug tuned coils adjacent to each band switch.
- The coils can sometimes be hard to tune. If they show resistance to turning do not force. I found that heating them carefully with the clean tip of a soldering iron placed against the core for a few seconds. This will heat the core and melt the wax that has sealed it from turning.
- As mentioned earlier the higher frequency (lower meter) bands may not work well or work at all if the local oscillator is not running or low in output. This could be due to low filament or B+ voltage or a weak tube. I found that anything below about 9.4 volts on the 7 tube 1.4 volt series filament string caused and intermittent local oscillator.
- The original battery pack for the 8G005 series used a pack that included a 90V B battery and a 9V A battery. There was also a second connector that went to a stand alone 1.5V A batter that was in series with the internal 9V battery for a total of 10.5 Volts. This put 1.5 volts of each filament. These tubes are often referred to as 1.5V tubes but in reality their filaments are spec'ed at 1.4V. This added voltage probably allowed a little longer filament voltage life from the A batteries.
- There is also an alignment procedure for the “Wave Magnet” antenna stored on the back cover.
- There is mention of an FM trap adjustment for elimination of FM interference however they don't describe the frequency band this interference would be coming from. Is it the current commercial FM band or the old band in the 40Mhz region. Either way I am curious why it would be a problem since I don't see this in other HF receivers of the time.
- See the schematic pages in the links below for details on alignment points and procedures.

Battery Replacement

There is a source for replica battery cases and accessories for the Zenith Transoceanic and other battery capable radios of the past. See the links below for information. The 8G005 has a battery switch that is activated by inserting the AC plug into a socket on the chassis. This switches the filament and B+ circuits to the battery leads and ensures that the user is not able to plug radio into AC when using the battery..

The replica battery cases will store the needed batteries to run the radio. It would require ten 9V batteries and seven D 1.5V batteries. To me this would be a waste of resources in today's world. First of all the batteries would be expensive, would not last that long, and storing them with possible leakage is another issue.

I have ordered a switching boost supply that will easily supply 90V from 12V and a simple buck supply or even an LM-317 and a few parts could supply the 9.8 volts @ 50ma from 12V for the filaments. Once I get these parts I will setup a test to see how much hash it causes and if it does how well I can filter it. If it works I will enclose it in one of those replica cases and use an external 12V rechargeable Lithium battery to run the radio. This would be the 2021 way of doing things and much more practical. It also would be a fun project.

Chassis re-installed in the cabinet

Finished rear panel showing accessories

Two more photos of the finished Transoceanic showing the manual drawer opened

And here it is, the pile of parts removed and replaced!

In your home or wherever you roam, there's no thrill in radio like this New Zenith Trans-Oceanic Portable! Take it anywhere—it plays in remotest areas, below-zero cold, jungle heat. And it's "tropic-treated" against humidity, radio's greatest enemy. GUARANTEED to give perfect performance even under the worst of humid conditions!

With its exclusive Zenith Wavemagnets (U.S. Patents 2164251 . . . 2200674) this Trans-Oceanic Portable pulls in standard broadcast coast to coast, plus world-wide short wave on 5 international bands—just press a button and tune 'em in! Works on battery (up to a year's normal use) and on AC or DC current. Tops in performance, tone, smart luggage styling. No wonder a list of Zenith Trans-Oceanic owners reads like "Who's Who in the Sportsman's World!" Get a thrilling demonstration at your radio dealer's today. Model 8G005Y **$114.40***

* Battery Extra. West Coast Price slightly higher.

NEW ZENITH TRANS-OCEANIC PORTABLE

•LONG DISTANCE• **RADIO** Zenith Radio Corp., Chicago 39, Illinois

Original 1947 advertisement for the 8G005 TransOceanic Receiver

Interesting links about the Zenith Transoceanic

- Wikipedia Trans-Oceanic
- NPR Trans-Oceanic History
- Wikimedia - list of Trans-Oceanic Receivers
- Article The California Historical Radio Society
- EETimes - Best Radio Ever?
- Antique Radio Classified - The story of the Zenith Transoceanic
- The Transoceanic Fanatic groups.io site

Some of the products used in restoration

- Amazon - Black leather dye
- Just Radios - Capacitors, resistors, etc.
- Ed's Antique Radios - Replica battery parts

  But for those who don't want to be ripped off by a $20 postage fee for a cardboard box here is another option. Join the CVR for around $17/year US and get the plans.
- Canadian Vintage Radio - Homebrew Battery plans

Schematics and manuals for the 8G500

- 8G005 User Manual
- 8G005 Rider Manual
- 8G005 Schematic

Other Restoration Sites

This is just a small sample of the numerous sites showing Transoceanic information and restoration on the web. Google transoceanic for more info.

- H-500 Restoration Guide
- Ed's Antique Rados – Transoceanics
- Transoceanic A600 Restoration
- Transoceanic G500 Restoration
- Another G500 Restoration
- Transoceanic - shows the ridiculous methods people go to to restore old radios!
- Transoceanic 7G605 Restoration
- Complete restoration kits - These are viable kits but IMHO a waste of money compared to the way I did it