Dr. H. Holden. August, 2026.

MODIFYING THE VINTAGE SONY MICRO -TV WITH:

1) DC RESTORATION OF VIDEO, FOR STABLE IMAGE BLACK LEVEL.

2) RETRACE BLANKING AMPLIFIER.

3) TURN OFF SPOT KILLER.

4) AUTOMATIC AUXILIARY VIDEO & AUDIO INPUTS.

5) THREE WIRE POWER CORD & CHASSIS EARTH.

INTRODUCTION:

When Sony's Micro-TV model 5-303E arrived in 1962, it was hailed as miracle of modern Electronic and Mechanical Engineering. Sony had built a beautifully made compact 5" monochrome Transistorized TV set.

The set could be powered by line voltage or an external 12V DC supply. The Micro-TV was very sensitive and suited to fringe areas too. Sony quoted a maximum sensitivity of 10uV at the input for 10V at the picture tube's Cathode, 120dB voltage gain. The power consumption was quoted at 13W on AC operation and 9.6W on DC operation. The set was either Line powered or 12VDC or 12V Battery operated. The set weighed in at 8 lbs. The fast gated AGC system allowed it to be successfully used in moving vehicles.

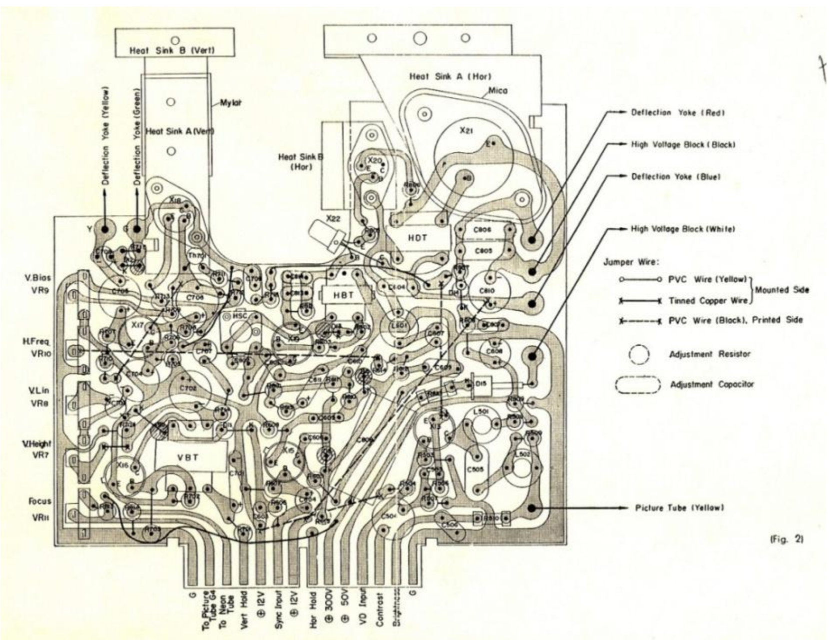
The Micro-TV sported a new generation of Silicon Transistors, such as the 2SC140, created by Sony for the application of TV sub circuits. These included the deflection amplifiers and the video output stage. This TV was and still is a marvel of modern science:

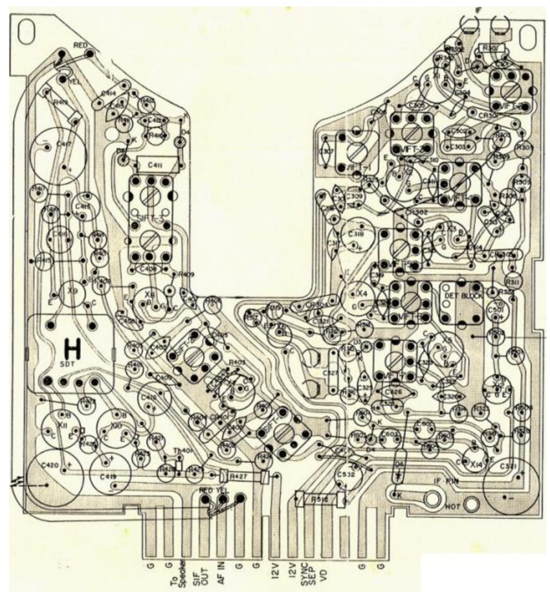
The Micro-TV featured in Life Magazine March 1963, with a very well done advertisement indicating how it could be very helpful entertaining young children. This is something that would have appealed to many parents.

Back in the 1960's as a boy, I could only ever have dreamed of owning anything as beautiful as this Micro-TV. I had no idea back then, that one day, not only would I be able to design & repair TV's like this myself, but also I would be able to improve on what the creative Engineers at Sony did, at least in one part of this TV's circuitry.

Sony also built the TV in a manner where ease of servicing was encouraged and they provided detailed documentation. This is not common in our new throwaway World.

The TV contained two printed circuit boards both of which could be unplugged. A Deflection Board on top with Deflection Oscillators and Deflection Output Stages along with the Video Output stage. One Signal Board board below contained the Video and Sound IF amplifiers, the Sync Separator and the Audio Amplifier. The Tuner was a separate module as was an enclosed EHT generator containing the Flyback Transformer.

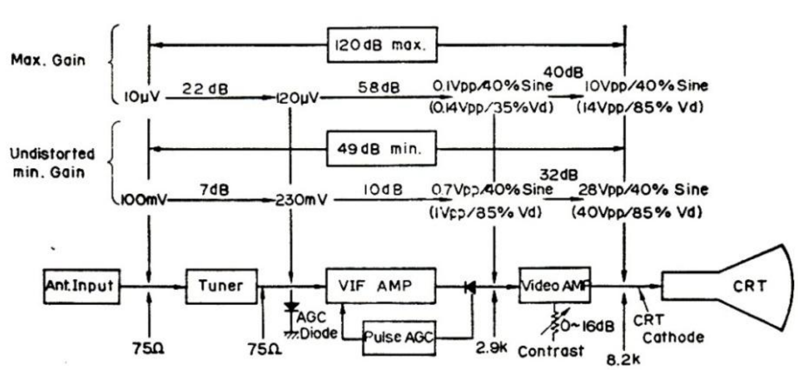




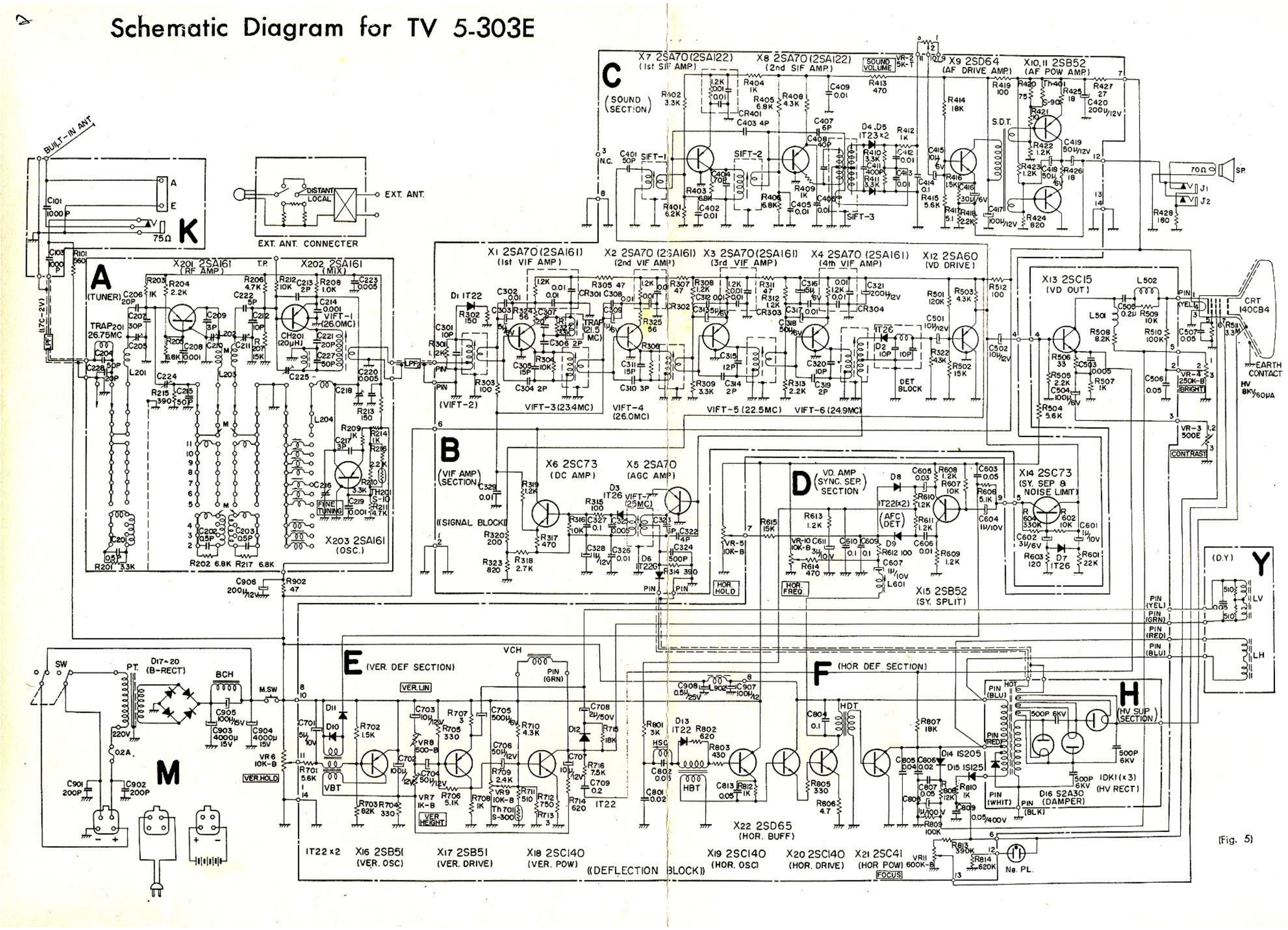
DEFLECTION BOARD SIGNAL BOARD

Sony also provided a Video Level Diagram, seldom seen in many TV service manuals, explaining the signal levels all the way from the Antenna input connector to the CRT:

Level Diagram for Video



(Fig. 8)



The circuit above will be referred to with the various modifications discussed in this article.

1) ADDING A VIDEO DC RESTORER - BLACK LEVEL STABILIZATION CIRCUIT.

Black Level stabilization and DC restoration has been discussed in a number of textbooks. I will explain it here as it relates to the Micro-TV, with the aid of diagrams which help. The first thing is to understand the cause and effects of the absence of DC restoration.

It was customary in the early 1960’s, especially for Transistor TV sets, to simply Capacitively couple the video signal from the video output stage to the Cathode of the CRT. This is despite generations of Tube TV sets coming before, containing DC restorers, or having direct coupled video signals from the Detector to the CRT. This is another method to maintain the DC axis of the Video signal. Although a number of Tube sets also failed to incorporate a DC restorer.

Average Brightness Control:

The user's Brightness control potentiometer is by variation of the average Cathode voltage in the Micro-TV, this varies the voltage with respect to the CRT's g1 Grid. This control in other model TV's can also be deployed in the CRT's grid circuit.

It is the CRT's ***relative*** Grid to Cathode voltage which determines the beam current or brightness. The CRT's Grid is generally sitting in the negative region with respect to the Cathode or put another way; Cathode being positive with respect to the Grid.

For example when the relative Grid to Cathode voltage is zero, there is maximum beam current from the electron gun and maximum brightness. It often takes in the region of 20V to 40V Grid relatively negative with respect to the cathode to repel the electrons back to the Cathode and cut off the beam current and blank out the beam.

The exact value of the voltage which cuts of the beam current depends mainly on the CRT type and other parameters such as the CRT's 1^{st} Anode voltage can affect it.

Therefore, in a video output circuit such as the Micro-TV where the video voltage is applied to the CRT's Cathode, movement of that voltage in the positive direction reduces the beam current & brightness and movement of the cathode voltage in the negative direction increases the beam current & brightness.

In the case that the CRT's Grid is at common (B-) potential as it is in the Micro-TV, the Cathode voltage has to go within a few volts of ground potential for near full beam current. Since the CRT is not run at full beam current all the time, the average Cathode voltage sits at some 10's of volts positive. Not so high it blanks the beam out, but enough to see the raster scan on the CRT face. Taking the Cathode very positive, to a high value, such as that which supplies the video output stage(+50V in this case) totally blanks the beam.

This Cathode drive arrangement also means that the polarity of the Video signal, coming out of the Video Amplifier's collector circuit, is "upside down" compared to a standard video signal seen in a typical textbook with negative going sync pulses. Instead it has positive going sync pulses and grey progressing to white levels in the Video signal correspond to a progressively decreasing or more negative going video voltage at the Cathode.

Average Contrast control:

The Contrast Control controls the peak to peak amplitude of the video signal, including the sync pulse component of it, which gets presented to the CRT. The video voltage coming out of a Video detector in a TV set, due to the action of the TV's AGC, is a fairly stable value, so it is normal that the gain of the Video Amplifier system is adjustable to control the picture's contrast. This achieved in the Micro-TV by gain manipulation of X13's Emitter circuit. And H and V Blanking pulses are also introduced via R807 and C709 respectively into the Emitter circuit.

(Beam Blanking: While many early TV's of this nature did contain Vertical blanking to avoid obvious vertical retrace lines, which would always become visible at some point with AC coupled video and no vertical retrace blanking, it was less common for sets to include Horizontal blanking. It is important to have it because errors in the H. Hold control position can cause picture signal information to get into horizontal flyback time and sometimes appear as artefacts in the reproduced image)

The Problem: No Video Black Level Stability of the CRT's Image without DC Restoration:

Capacitive coupling into a resistive load creates a circuit known as a Differentiator. When any AC waveform is differentiated, from the mathematical perspective, any constants are lost. In this case any associated DC axis (DC position) of the video signal is lost. The video output transistor X13 (a 2SC15) has its output coupled to the CRT's Cathode circuit by C505, a 0.2uF Capacitor.

In this case for the Micro-TV, we are referring to Cathode Drive, where as noted, the video signal is inverted and the syncs are positive going and video voltages are negative going. We need to keep in mind that a *reduction* of the voltage at the CRT's cathode results in in an *increase* of the CRT's beam current and brightness.

(However, exactly the same rules apply and problems without a DC restorer happen when the video signal is up the usual way with negative going sync pulses and is driving a CRT's grid instead, as it does in many brands of TV sets. However, in these cases, an increase in the video drive voltage at the grid results in an increase in beam current instead)

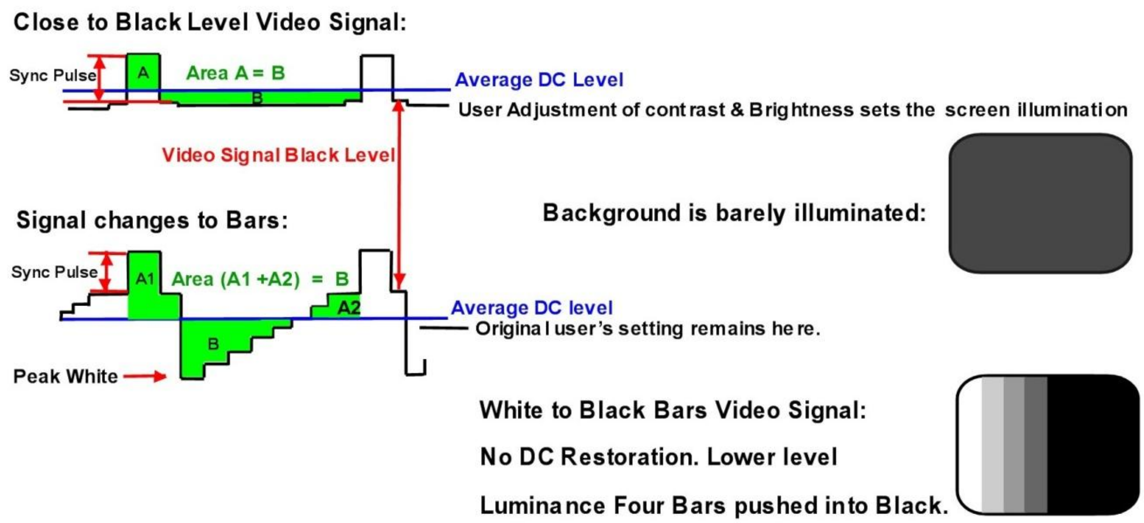
As noted with AC coupling the DC information in the video signal is lost, as is any stability of the voltage value corresponding to black in the transmitted scene. The result is that the black level wanders around depending on the peak to peak value of the video signal.

After AC or "capacitive coupling" the average level of the video signal alters with the the peak to peak value of the signal, because the video signal is not a symmetrical square wave. Its average value over a repeating cycle varies depending on the Voltage-Time product of the positive and negative going parts of the waveform, or the area mapped out by the video voltage. This is seen when the video signal is displayed on a Scope recording which is a "voltage-time" recording. These "areas" are shown in green on the following example diagrams.

If the TV user adjusts the brightness and contrast correctly for a dim scene, then when a high contract scene appears, low grey levels are pushed into the black and are lost. In short the details in the lowlights disappear into black. This effect, for clarity is shown in the diagram immediately below:

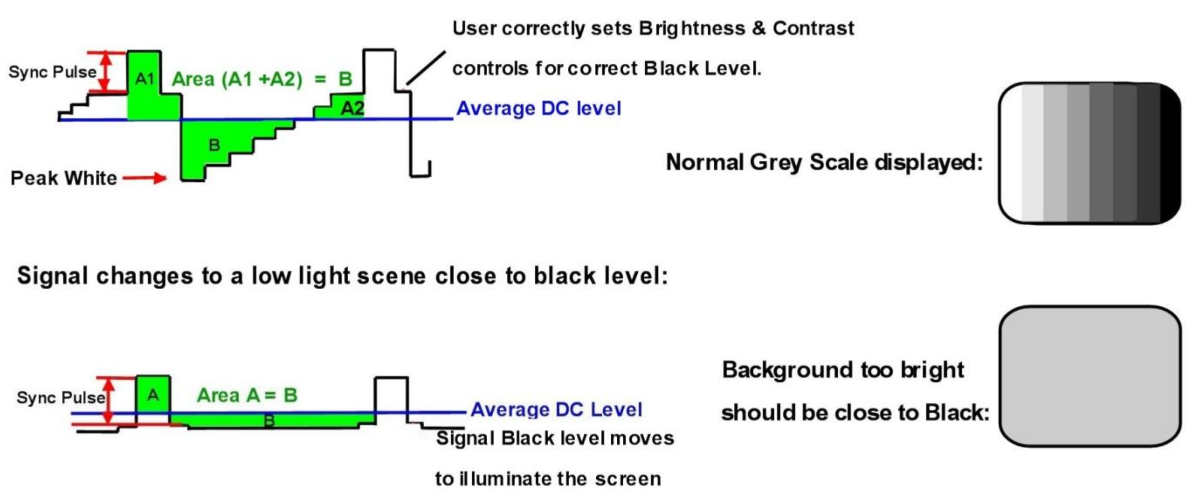
EXAMPLE 1 – No DC restoration.

Image changes from a low contrast image to a medium/ high contrast image:



EXAMPLE 2 – No DC Restoration.

Image changes from a medium/high to a low contrast image.

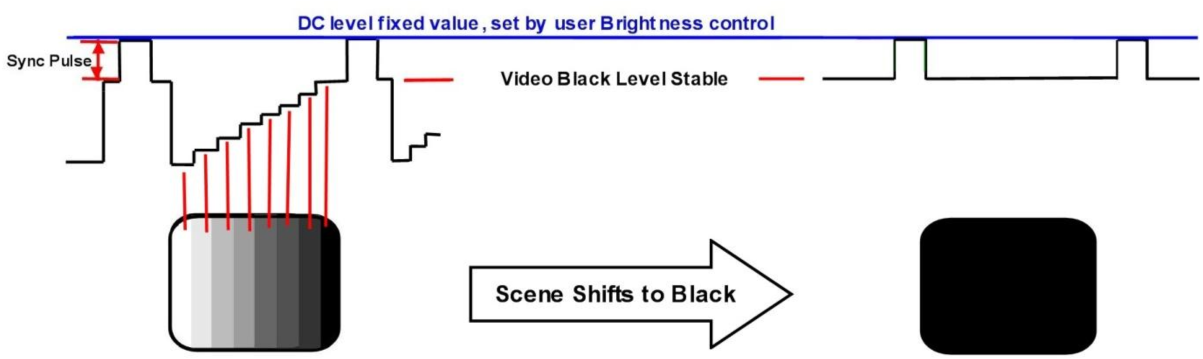


Example 2 above is essentially the same problem, but in this case the user has set the Contrast and Brightness controls so the image is correct on the higher contrast scene with the Bar pattern used as an example. When the two controls are correctly set the far right hand black bar is just into black, with the CRT beam just about or near extinguished. Then if the signal in a scene transitions to a low level one, the background is excessively bright.

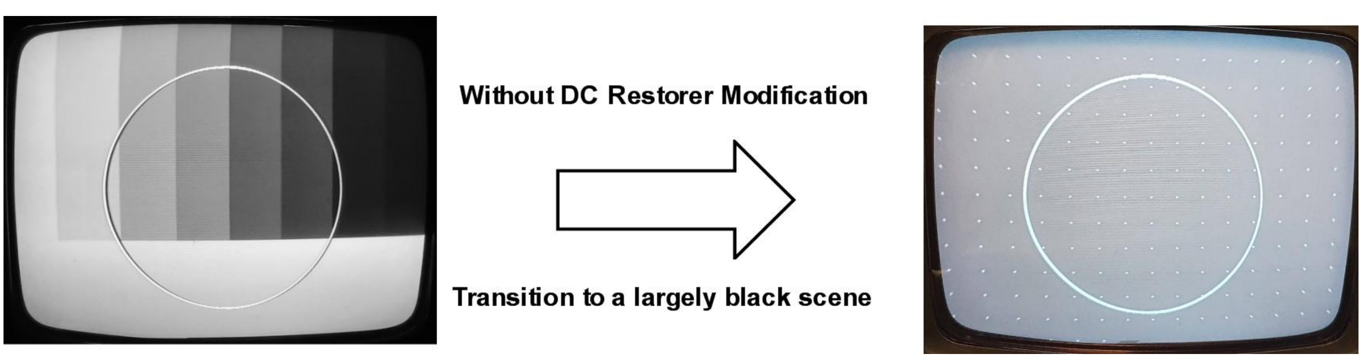
Therefore with AC coupling of the video signal and without any form of DC restoration (or direct coupling from the detector all the way to the CRT) there is no correct setting of the Contrast and Brightness control that suits all scenes from dim to bright which occur in typical movie material.

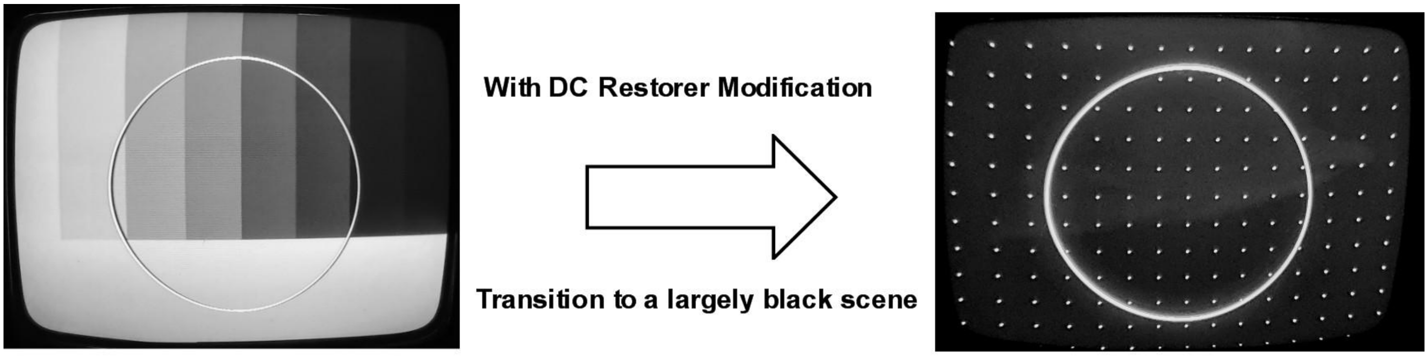
The customary way to remedy this situation is to add a DC Restorer Circuit. As time went by, especially into the 1970's era, many manufacturers of transistor TV's had done this. If the sync tips are clamped to a constant voltage, this effectively stabilizes the black level and stops it altering with changes in the contrast of the scene:

Black Level Control with Sync Tip DC Restorer:



The photos below are screen photos of the Micro-TV before and after the added DC restorer with the example of a transition from a medium to high contrast scene to a scene where the video background is largely black and with only a small amount of white in the video (some of the banding seen in the image is an artefact of the Camera versus the scan lines)





How to add a DC restorer:

Generally there are a few ways it can be done. The idea is to restore the lost DC component, and make the black level stable. One method involves generating a clamp pulse timed with video black level and used to clamp the video signal at the CRT's Cathode (or Grid if that is where the video signal is injected). Usually the video black voltage is clamped to a specific level, or to a variable, but stable level set by the Brightness Control. This way it stays stable, regardless of the contrast in the presented scene.

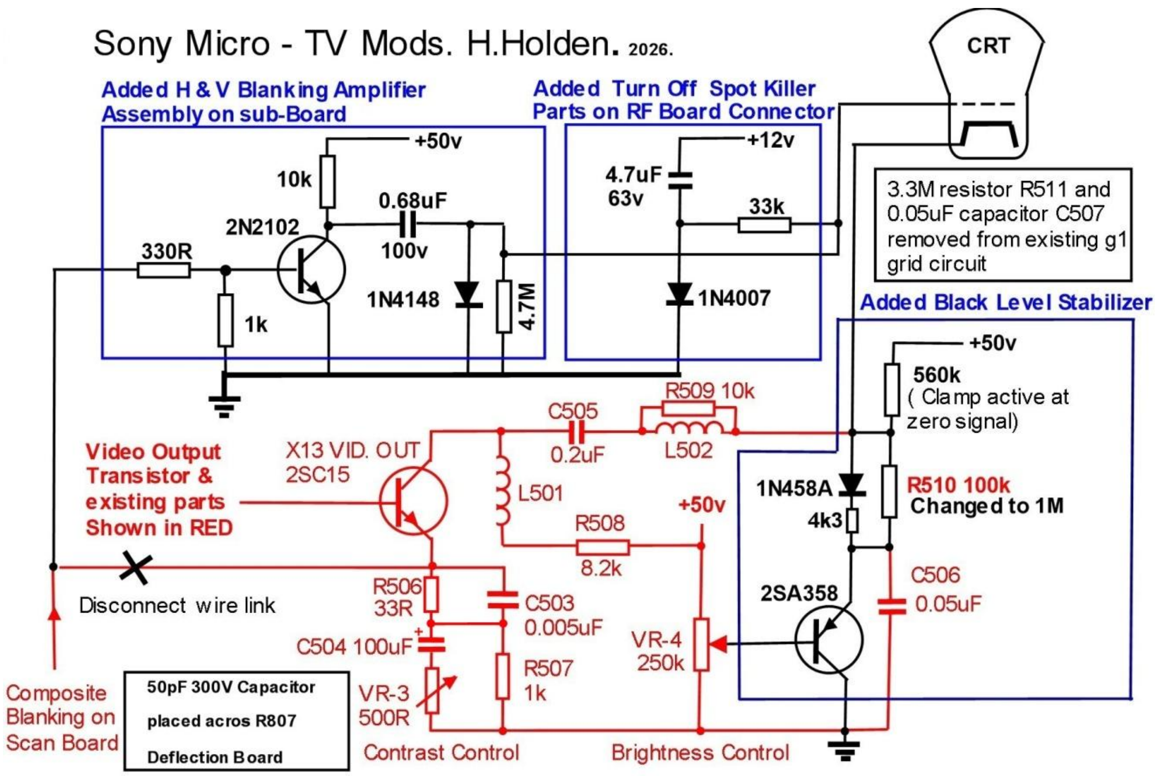
Another common method, rather than having an active driven clamp, is to stabilise the voltage of the tips of the synchronizing pulses. This works indirectly to clamp the black level because of the fixed relationship of the sync pulse amplitude to the black level is not altered by the scene's contrast.

One complication of adding sync tip clamping to the Sony Micro-TV is that in Sony's circuit, they had introduced the Vertical and Horizontal retrace blanking signals at the Emitter of the Video Output amplifier, a 2SC15 Transistor. This has the effect of cutting the video output transistor off during blanking, and therefore taking the cathode voltage of the CRT positive, extinguishing the beam. The method works very well for retrace blanking, but unfortunately there are two problems with it:

When the blanking pulse is present, the sync pulses are annihilated at the collector of the video output transistor and therefore the signal at that point cannot be used as a tool for DC restoration.

Also the net effect of cutting off the video output transistor during blanking time aggravates the black level instability, in that increasing video voltage in a scene, depresses the observed video black level even more than it does with plain AC coupling. As it was designed, manipulating the contrast level (pp video voltage) in the Micro-TV, for increased contrast, results in the white level staying almost stable and the grey & black levels being depressed, which is exactly the opposite to what is ideally required.

The diagram below indicates, it is required to disconnect the blanking signal from the Emitter circuit of the video output transistor for a diode based DC restorer to work:



The added 2SA358 Transistor is a high voltage range vintage Germanium part, similar to the Mullard /Philips AF118. Its purpose in this application is to create a stable low internal resistance voltage reference from the existing 250k user Brightness control. It is not possible to use the control itself as the voltage reference for the sync tip clamping because its internal resistance, as a voltage source, is far too high. The effect of the 2SA358 transistor, acting as an Emitter Follower, lowers the effective source resistance by a factor about equal to the Transistor's current gain.

The 1N458A high voltage low capacitance diode conducts on the positive going sync tips. This charges C505 and stabilizes the sync tip at the brightness control value and therefore, indirectly, stabilizes the black level regardless of scene contrast variations. The 560k resistor ensures the clamp diode is conducting a little initially, before any video voltage is applied, so that no video voltage threshold has to be reached to activate it.

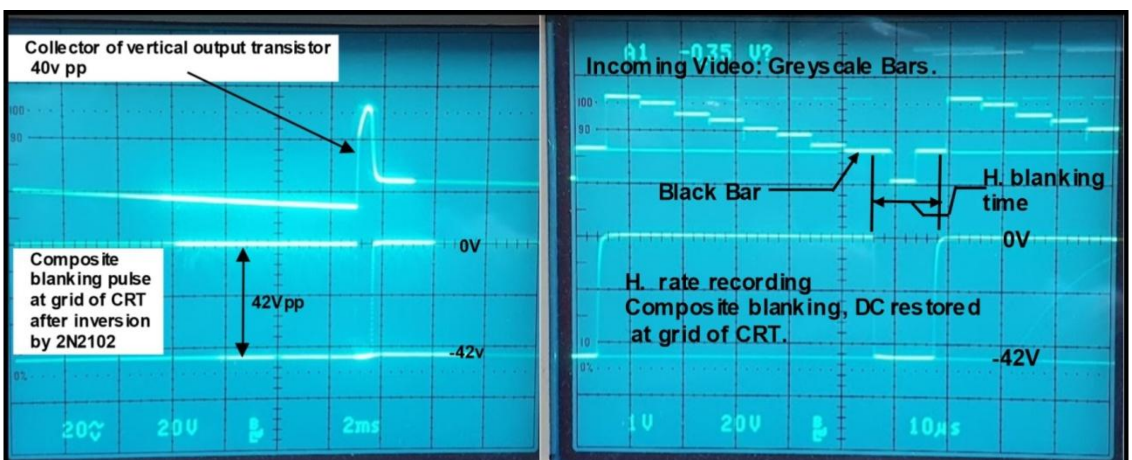
It turns out in the Micro-TV, that the link connecting the composite blanking signal to the video output stage's Emitter was not PCB track-work. It was simply a PVC insulated wire link on the top surface of the Deflection board, so that wire is simply removed.

Testing indicates with the modification in place, an excursion from going from black to a full screen of peak white, the maximum shift in the black level, toward black is only 10% of the pp video voltage. And from a typical medium range contrast scene, for example Monochrome Bars, which reach 75% white for the first bar, a shift in black level of only about 5% occurs on transition to a full black screen. There is no significant visible shift of the black level on the screen regardless of changes in scene contrast.

2) ADDING THE BLANKING AMPLIFIER.

The diagram above shows the blanking amplifier. Since the original Blanking pulses were positive going, it was required to invert them to feed the CRT's control Grid instead. The original components in the CRT's grid circuit were removed and the blanking amplifier added on a small sub-board. A vintage 2N2102 transistor was used. These TO-5 parts are very similar to Sony's 2SC140 transistor, and they can also be used to replace that part, as the original Sony 2SC140 itself can be difficult to obtain.

To improve the H blanking pulse timing a 50pF capacitor was place in parallel with R807. The 1N4148 diode DC restores the capacitively coupled blanking signal so that it has negative going pulses to suit the grid of the CRT. This avoids having to have a negative voltage source to power the blanking amplifier.



Scope recordings Sony Micro TV Black Level, Blanking & Spot Killer Modifications.

3) SPOT KILLER CIRCUIT.

This is required in my Sony Micro-TV but possibly not all Micro-TV's. My set is running a non standard CRT a 14ATB4 not the original 140CB4 CRT.

The original CRT had a quick warm up and quick cool down Heater. This is not the case with the 14ATB4, it has a Heater-Cathode assembly with a higher thermal mass. With this CRT there is a significant turn off spot, which would damage the screen phosphor if it was allowed to persist.

Therefore the circuit with the 4.7uF capacitor and 1N4007 diode was added. When the set is powered the 4.7uF is rapidly charged via the 1N4007 diode. At power down when the 12V rail collapses, the stored charge in this capacitor takes the grid voltage of the CRT -12V negative, for a time frame long enough to extinguish the CRT's beam current while the Heater is cooling down. This avoids the turn off spot.

4) AUTOMATIC AUXILIARY VIDEO & AUDIO INPUTS.

One challenge facing Vintage TV restorers is getting VHF or UHF signal sources for their TV's, now that in most places in the World, Analog TV stations have stopped transmitting.

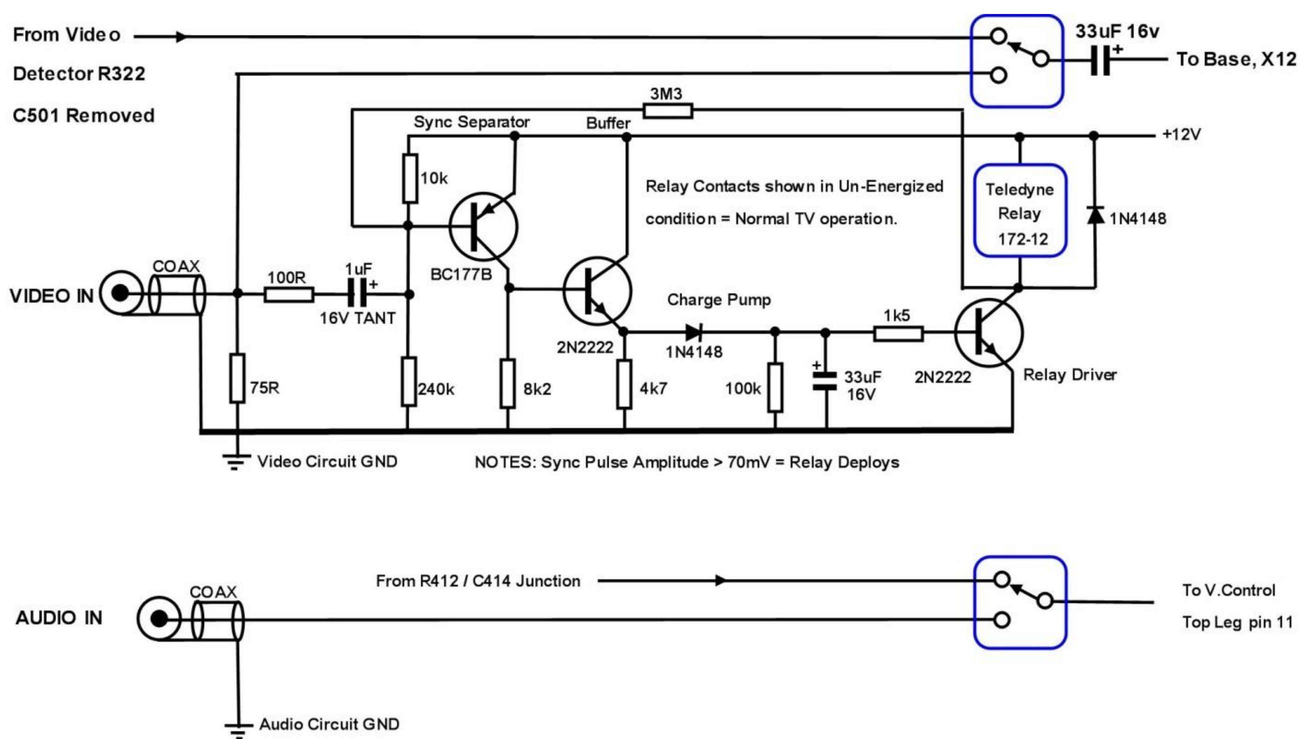
The logical conclusion is to use an RF modulator source fed by standard Analog Video & Audio signals. However many cheap modulator units are sub par.

There is also the issue of the alignment of the video and Audio IF system in the set. Not all vintage TV repair enthusiasts have the required sweep generators or scopes, or the ability and experience to be able to re-align the set to optimal operation. As a result, both the video and sound quality can suffer with problems such as picture in sound or sound in picture interference. I spent many years learning the craft of Analog TV IF alignment and I have the required generators and scopes. But these are not the skills which can be acquired overnight.

Therefore, as a solution for some, it has become ever tempting to to inject the composite video signal and the audio signal directly into the TV's video and audio circuits to attain a clean video image, often with improved resolution and acquire noise or interference free sound. Then it raises the question How to do it? While this has to be customised to suit individual set designs, there are some common themes:

Firstly there are mechanical considerations. I prefer not to do things such as drilling holes in vintage sets to fit connectors and I search for other ways to get the signals in. In the case of the Micro TV there are two 3.5mm earphone sockets on the side. Therefore in this case I decided since I don't use those, or headphones, to reassign them; one for Video Input and one for Audio Input.

And since I didn't want to have a manually operated switch, to switch between normal TV operation, and external Video mode, I created a circuit which detects whether a Video signal is being presented to the TV at the Video Input connector, or not. This is done by detecting the synchronization pulses and the circuit automatically does the changeover switching if the presence of a video signal at the Video Input connector is detected:



Generally a standard 75 Ohm terminated Video signal is in the order of 1Vpp, of which 300mV is sync. However the signal could be non standard depending on its source.

On testing the Sony TV (in the circumstance where external Video signal is injected in place of the signal from the Video Detector) when the Video signal is reduced, the synchronization circuits lose control when the sync pulse amplitude is below about 100mV.

Ideally then, the "sync pulse detector-relay activation circuit" used should be a little more sensitive because, if it was not, then there could be an external video source which could be useable, but the detector circuit could fail to detect its presence. The design above deploys the relay when a sync voltage of > 70mV is detected.

In this Sony set, the polarity of the Video signal out of the detector, under normal operating conditions, receiving an off air signal, has negative going sync and conveniently is in the order of a 1Vpp signal.

(Of note in other TV sets, the polarity of the video signal at the detector may be inverted and the video voltage can be higher up to 2V or thereabouts. When this is the case the external Video signal must still be terminated in a 75 Ohm resistor, reducing it to 1Vpp and then be passed via an inverting amplifier to ensure that not only the polarity is correct but the level is a good match for what normally comes out of the particular TV set's existing video detector)

It is better to insert the external Video signal source in place of the TV's Video detector's signal, because there are many design variations in various TV's, for the point at which the Sync pulses are picked off, and it is better to leave that downstream circuitry untouched.

In addition it is better to use the changeover Signal Relay, because this way it avoids having to do anything in the way of killing the the noise voltages coming out of the existing video and FM audio detectors when the set is in external Video input mode.

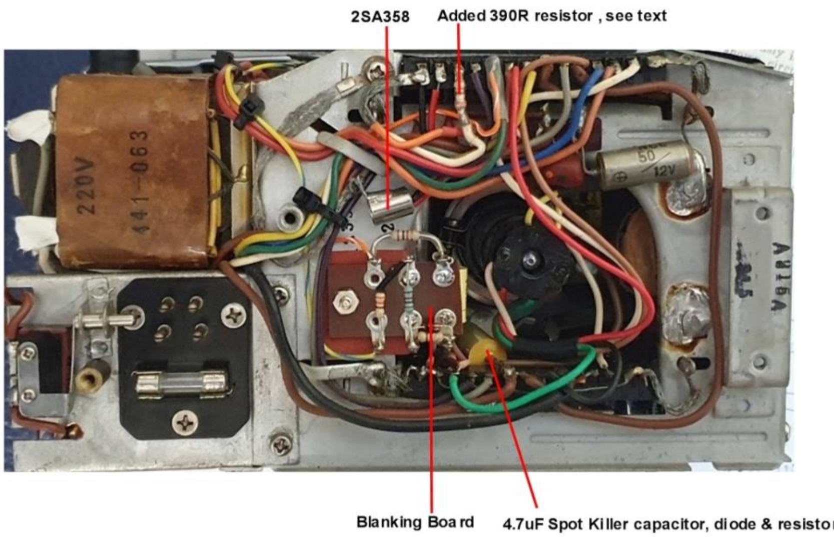
And when it comes to switching video signals between External Video signal sources and Detector sources, it pays to do it with a very low capacitance RF capable switching relay spaced as closely as possible to the original Video Detector. Otherwise the associated wiring & switch capacitances can upset the normal operation of the detector.

The Teledyne 172-12 relay is still available as a new part, they are expensive, however they are available for about 1/10th the cost on eBay for around $18 to $30.

The circuit above can also be used in a Tube TV, it is just a matter of arranging a 12V supply for it. And it would have to be a TV with its own Line transformer and preferably an Earthed chassis, with a three wire line cord, not a hot chassis set unless it was permanently powered via an added line transformer and its chassis earthed.

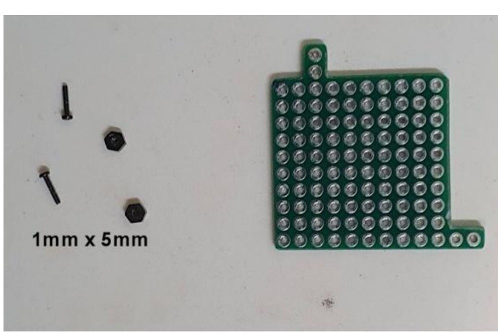
Fitting the modifications to the Sony Micro-TV:

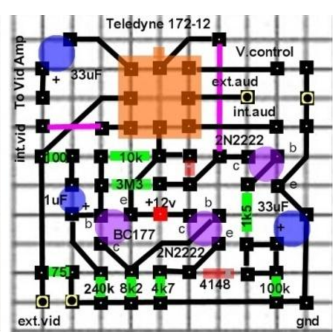
For the Blanking amplifier the parts were simply added to a small tag board and to the connectors for the Deflection and Signal board as shown above.



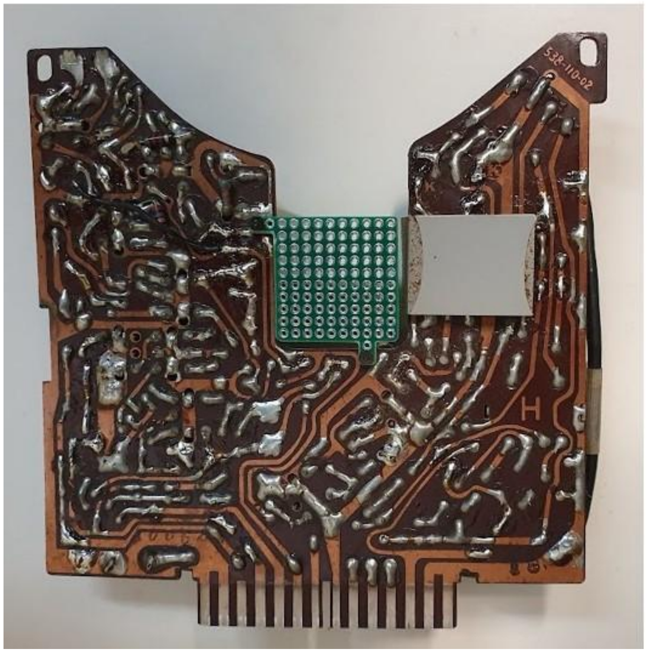
As noted my set uses a 140ATB4 CRT, it is a little more sensitive than the original, so a 390R resistor was added in series with the wire to the Contrast Control. For sets with the original CRT this is not required. And as noted the spot killer parts most likely can be omitted with the original CRT, unless a turn of spot is observed.

The video detector circuit has more parts, so these were simply added on some plated through hole prototype board. The board was crafted to fit, mounted on two 1mm diameter holes with 1mm x 5mm screws and nuts.





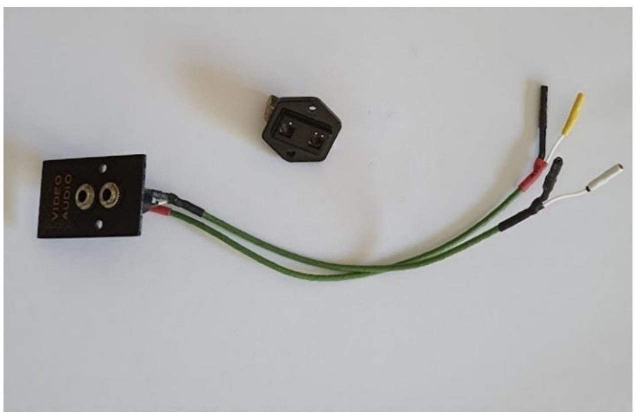
Location of added sub-board:



0.9mm Gold plated connector plugs+ pins (a Jaycar part) were used on the coaxial cables, to attach the coaxial cables to the added board.

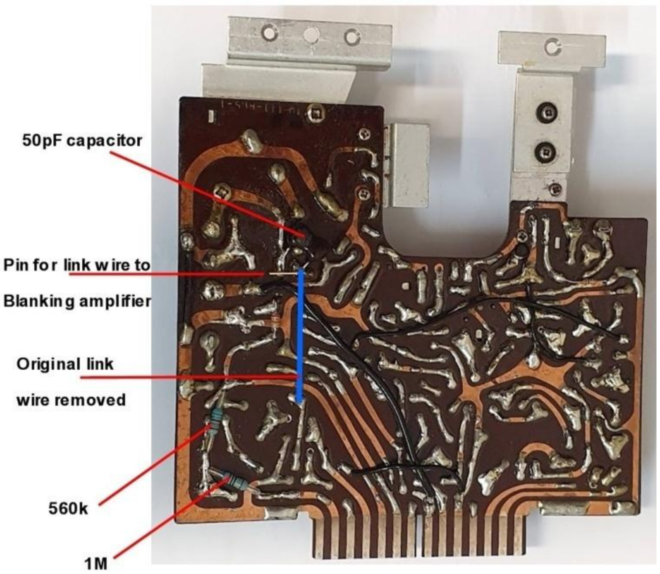
The other end of those two cables connects to the Video and Audio input sockets (which now replace the headphone sockets). This is so that the signal board can still be removed in the normal manner. The Yellow and red wires seen on the lower right side of the prototype board seen above, connect to the locations on the signal board where capacitor C501 was removed.

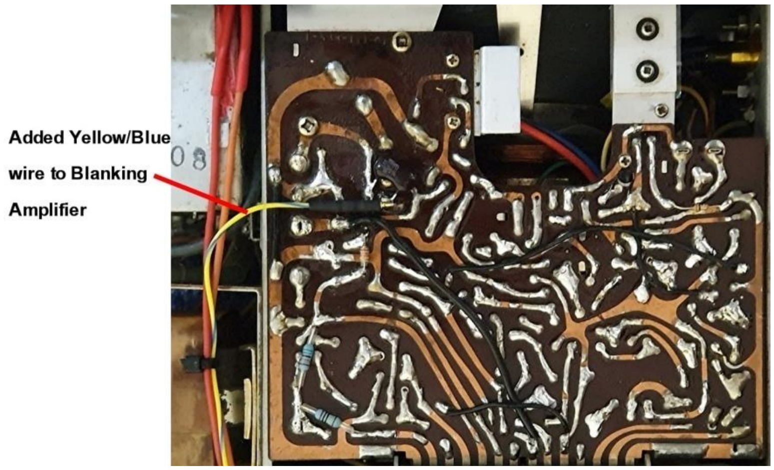
The original Sony dual Earphone connector was unsuitable because its two signal pins were common. So it was replaced by another crafted from some black FR4 fiberglass and two sockets. This simply fits over the original label plate that is still there.The original Earphone socket was saved so that it can be fitted later if it was required to turn the set back to its original condition.

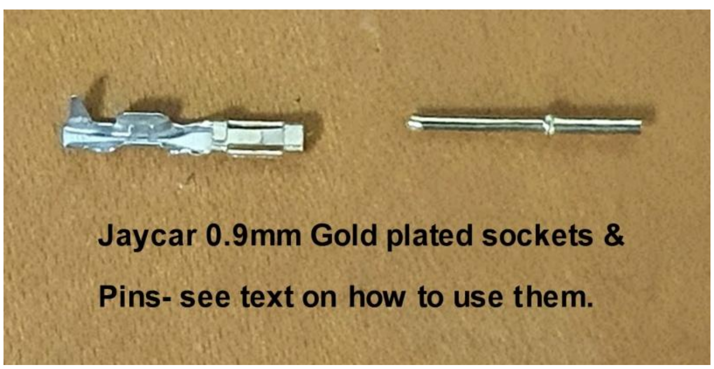


There are minimal changes to the Deflection board. The 1N458A diode and 4k3 resistor replace the 100k resistor previously present on the Component side of the PCB and on the Trackside a 1 Meg resistor is placed in parallel with these.

On the Top of the board (track side) as noted the wire link connecting the blanking signal to the emitter of the the Video output transistor (shown as the blue line below) was removed. A 0.9mm connector pin was used to attach a flying wire with a single 0.9mm socket. This Yellow/Blue wire which heads of to the added blanking amplifier circuit. A 50pF capacitor was placed across R807:







These pin/sockets as new are a particularly tight fit. To use them it pays to apply some lubrication to the socket after the flying wire is fitted to it and sheathed with Heat-Shrink. Then use s spare dummy pin to exercise the socket at least 3 times. This makes them better to use with about the correct tension and a smoother fit on the pin. The flying wire is better to be soldered to the socket, not crimped because that requires a specific wire size & crimping tool. Then the strain relief tags are folded over and the heat-shrink sleeve applied.

Low Frequency Video Response:

A full peak white entire screen is not a common video signal from an off- air TV transmission, perhaps only occasionally and briefly. I found after injection of direct video from the generator, that the Video Amplifier consisting of Driver Transistor X12 and the Video Output Transistor X13, had an inadequate low frequency response.

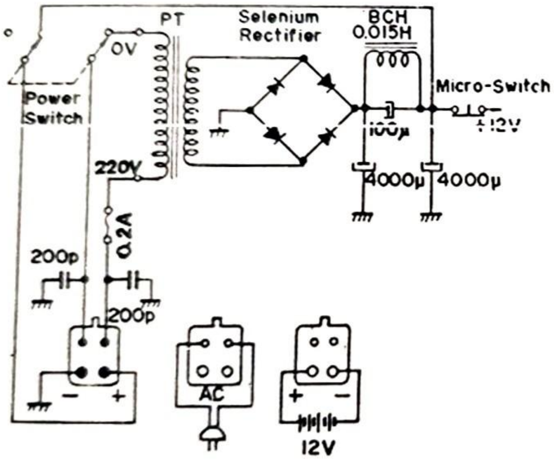
This was evidenced in that over a course of a Field, there was a moderate drop in the peak white voltage. This produced a tilt, or shading effect, where the top of the picture was brightest and its level dropped as the scan progressed to the bottom. The cause of this was found to be the value of the coupling capacitor C502 being too low in value. It was a 10uF part. To cure this I replaced C502 with a 100uF part.

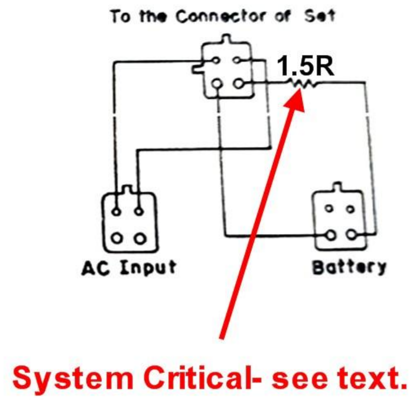
5) THREE WIRE POWER CORD & CHASSIS EARTH.

Sony originally provided a 2 wire line cord as shown below:

Original Sony Power Cord
(pins bent to fit AU/NZ outlet)

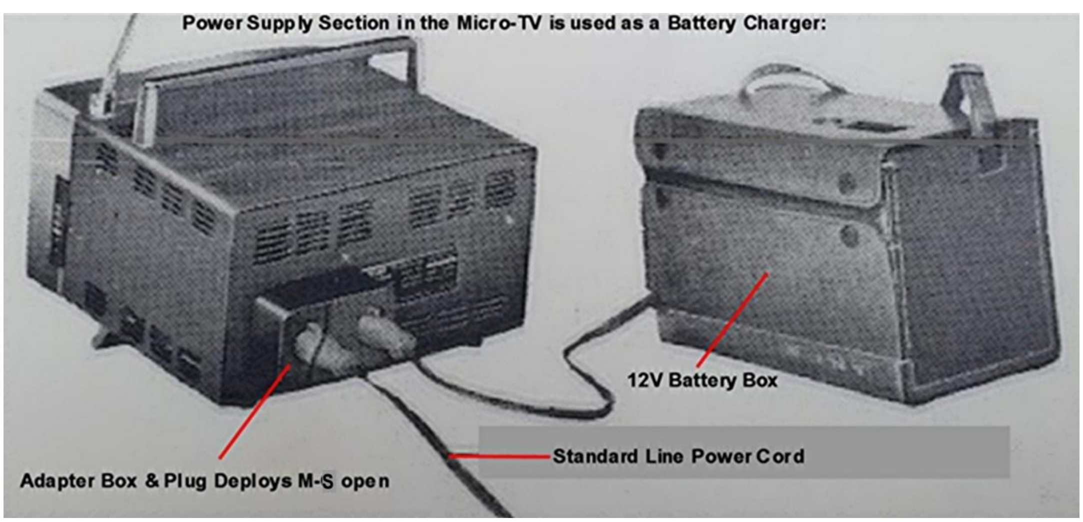
The Micro-TV's Power Supply schematic:



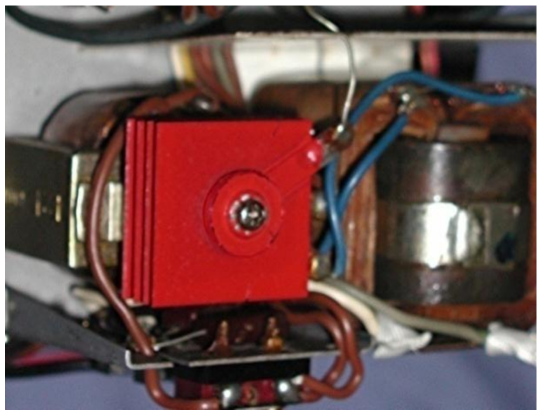


Looking into the connector pins on the rear of the Micro TV, it is as Sony drew it, with the lower pin on the left being the battery negative connected to the chassis and the lower positive pin for the battery on the right. Except the top two AC pins are reversed. In my set, with original factory wiring, the top left pin is connected to the fuse and the top right pin connected to the front panel power Switch.

Sony provided two separate power cords. One for AC line voltage use, one for DC 12V use and in addition, an arrangement to use a separate battery pack, which could be re-charged by the power supply circuit in the the Micro TV itself:



Sony incorporated a Micro-Switch in the position shown, to disconnect the set's main 12V power rail. This was done by having a special plug box which plugged onto the rear of the set, which had a keyway projection on the side of the plug. This deploys the micro-switch to the open condition, isolating the TV circuitry from the battery charging system. The line cord plugs into the box and so does the battery. The Power transformer and Selenium rectifier create an "old school" Lead-Acid Battery Charger.



While some types of Selenium rectifiers have a bad reputation, this type with the washers and cooling fins are very reliable and make excellent Battery charging systems for Lead-Acid batteries. Also the type of paint on the Fins has Thermo-Chromic properties. Therefore it is easy to see from the paint color change when either the rectifier is overheating or has been overheated in the past. There is no indication to replace this rectifier in my set currently.

System Critical:

Another point, not alluded to in the manual's text, but shown in the circuit diagram upper right side, is that it is critical that if the set is powered by an external 12V battery source, especially a power source such as a car battery or a Lead-Acid accumulator, that there is a series 1.5 Ohm resistor. Car batteries especially have a very low internal resistance in the order of 10 milli-Ohms.

The reason for the series resistor is that if the CRT heater is powered from cold (where the heater's resistance is low) from a very low internal resistance 12V source, there can be a very high initial current surge. This can cause localised heating of parts of the filament's length with lower thermal inertia. This effect causes a bright white flash of light from the filament, when that section of the filament heats more quickly than other areas. The event can fuse the CRT's filament. The 1.5 Ohm resistor limits the switch on surge current and in conjunction with the with the 4000uF filter Electrolytic Capacitor slows down the rise of the 12V supply rail in the set at power on from a low internal resistance 12V source, allowing time for the CRT's heater to warm up in a more uniform thermal fashion. The resistor does drop around 1.25V in use due to the set's 0.83A current consumption.

Three Wire Line Cord:

It is possible to have a 3 wire line cord, if the plug was made with three pins and then an Earth could be connected to the chassis.

Sony may possibly have made a cord like this for the use of the set in some countries to satisfy Earthing regulations of non-double insulated appliances. If they did, I have never been able to find one. I would prefer to run the chassis earthed. Therefore I decided to make a plug and three wire Line Power Cord for my Micro-TV.

The TV was supplied with a two wire non polarised line cord. When the two parallel pins are bent to fit a NZ or AU general purpose 230V power outlet, as they were for the 220V versions of this set which appeared in Australasia, it makes the plug polarised as then it will only fit in the outlet one way around.

Sony may have made also made a variant power cord where the plug for the general purpose outlet already had the pins angled correctly for AU/NZ use, I have never seen one.

Of those two choices or ways the plug can fit a general purpose outlet (GPO), depending who bent the plug's pins, neither is ideal. It is better when the line power enters the set, that the Phase wire passes to the Fuse first, then to the power switch second and then to one transformer primary terminal, with the other primary terminal being connected to Neutral.

Therefore neither of the choices Sony allowed for with the plug polarity conforms. But the main concern is that the metal chassis and exposed metal parts are not earthed.

Forced into the two choices, due to the plug polarity becoming fixed, it is probably better that the Phase is fused, certainly if the chassis is going to be Earthed and put up with irregularity of switching the Neutral wire.

While the Micro-TV has its own internal line power transformer, there are exposed connections in the unit and there is the risk of chassis contact with the line power feeds. There are two 200pF capacitors vintage Mica types, from the Neutral and Phase to the chassis. This was to bypass radio frequency currents and aid reception using the Line power connections as a form of ground for RF currents.

These 200pF capacitors, along with the stray capacitance of the transformer primary, suspend the chassis at about ½ the line voltage. This results in the chassis being about 120V above neutral and a similar amount above ground. Assuming the 200pF capacitors are not electrically leaking, they cannot source a dangerous current on account of their low capacity.

However, these 200pF capacitors are now over 60 years old and cannot be trusted. Ideally they should be removed. If they are replaced, changed out with modern certified Y rated safety capacitors. For example, if the 200pF capacitor from Live (Phase) to the chassis shorted out, the chassis would assume the Phase voltage and pose an electrocution risk, because, there is no chassis protective Earth.

Any TV, with nearly all all metal construction and with a line power transformer, along with the paucity of insulation on the Line wiring side of things inside the set, does not qualify as "double insulated"

Therefore it is safer to run the set with a three wire cord and Earth its body to bring it in line with modern Earthing regulations. Also, since the set can now be connected to other apparatus providing Audio and Video signals from Earthed sources in many cases powered via the same GPO & Earth reference, it is better with Earthing applied or small currents can flow in the coaxial sheaths of the inter-connecting signal cables.

I decided to make a Wire-able plug, which could be fitted to a 3 wire line cord, so as to have the chassis Earthed. It required around 18 parts to complete it.

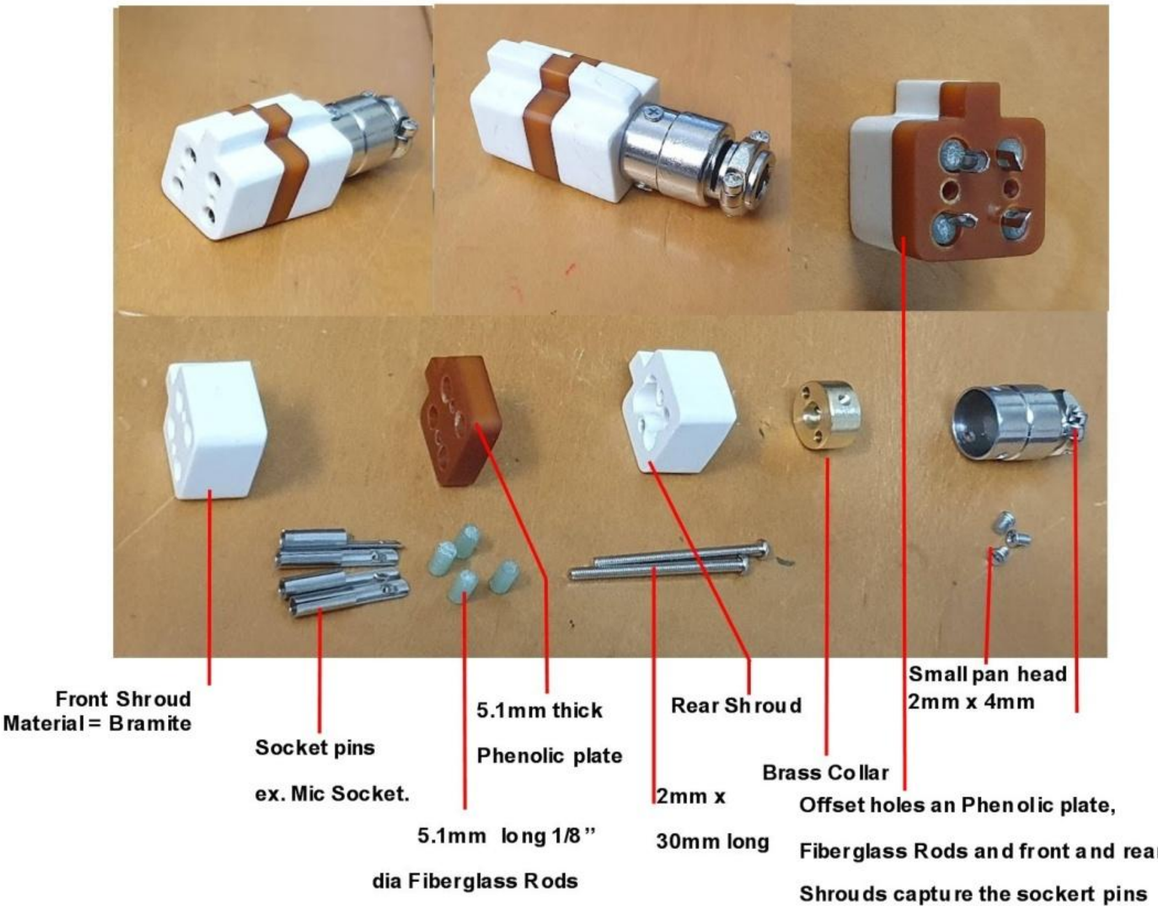
Since the cable clamp assembly is metal it has double layer adhesive heat shrink insulation over it, just in case the clamp assembly came into contact with the conductors. This is unlikely but not impossible. It was very important to have proper cable clamping to avoid the risk of the wires being forcibly pulled out of the connector. This is why the strong metal shell clamp was used.

The socket pins are recessed into the connector the same distance as Sony's original plug, so as to prevent finger contact.

The pins are retained by short sections of 1/8" diameter fibreglass rods placed off centre with respect to to the hole that the socket pins reside in, so the socket pins are locked in place an cannot slide in the assembly.

The photos below show the construction of the connector and the finished new power cord:

Wire-able Plug for Sony Micro-TV:



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