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Construction of a Raster Manipulation Unit

The following material was developed by the Experimental Television Center Ltd. with assistance from the National Endowment for the Arts and the New York State Council on the Arts.

Appended material by Jason Bernagozzi at Signal Culture, 2016

Preface

The following material was developed in part using the original document produced by the Experimental Television Center. Without the work of Sherry Hocking, Dave Jones, Walter Wright and Richard Brewster creating the first Raster Manipulation Unit documentation, our efforts would not have been possible. The goal of the original documentation was to preserve Nam June Paik and Shuya Abe's creation and the concepts behind the tool, essential and valuable information that is being included with this new document. It is important to note that the new documentation is not meant to replace the original; rather it should be seen as a reinvestigation of the form using modern concepts and methods.

In the summer of 2014 Signal Culture co-founder Jason Bernagozzi set out to build a raster manipulation unit for use in the artist residency studio at Signal Culture with the help of Nicholas Economos and intern Robert Hoffman. In addition, Dave Jones provided his invaluable technical expertise that led to the discovery of many of the changes listed in this document. During this process they developed new designs for the unit to make the unit more stable using modern deflection yokes and consumer grade amplifiers. In addition, during this process they found that there were some small errors in the original documentation that resulted in the Sony TV 760 unit not being able to maintain the vertical oscillator or collapse & reverse the raster. In the summer of 2015, Jason Bernagozzi and Dave Jones built a color raster manipulation unit and further improved on the design of the horizontal and vertical coils, which will also be included in this documentation.

The first and most important consideration was the redesign of the hand wound coil, known as the "S Coil". This is a deflection coil that is placed in front of the deflection yoke on the neck of the cathode ray tube. In the original documentation, Nam June Paik and Shuya Abe recommended wrapping 200 feet of 20-gauge wire to create this coil. The problem with this design is that the S-coil would blow almost any amplifier used to drive it. Ralph Hocking found that this was not the case if driven by a McIntosh tube amplifier, which became the standard amp used for this unit in the studio at the Experimental Television Center. The McIntosh amp was able to handle the force of the short circuit created by the S-coil because it features an auto-forming transformer that can handle large electrical loads without short-circuiting and damaging the amplifier.

The problem with using this solution is that McIntosh amplifiers are collector's items, making the acquisition of this amp prohibitively expensive. In order to increase the impedance of the coil so that a less expensive amplifier could drive it, the new design featured an S-Coil consisting of 800 feet of 24-gauge wire instead of the original amount of 200 feet of 20-gauge. The result was that this new S-Coil is

now able to produce the same signal deflection as the original design, but can be driven by a 4ohm, 75-watt thrift store amplifier.

The second new design feature was updating the addition of a color TV deflection yoke to drive the horizontal and vertical deflection. The original raster manipulation unit had a large, 70-degree deflection yoke from an old 1960's color television that fit over the small yoke on the Sony TV 760. The circuit board attached to that TV's electron gun was so large that it required the color yoke to have a minimum interior diameter of 2" and a depth of 3" to fit over it. This posed a real problem for the Signal Culture unit, since modern deflection yokes are often 110 degrees, meaning that they have a small interior diameter on the neck and are not deep enough to fully fit over the entire B&W yoke and electron gun. To avoid purchasing an expensive vintage television yoke, extending the pins from the electron gun to the circuit board made it possible for a modern deflection yoke to fit over the original. The wires from these pins fit through a 1" diameter neck of a 110 degree yoke, making it so the yoke could sit closer to the B&W yoke and still effectively deflect the fields horizontally and vertically.

In 2015, while creating a color raster manipulation unit, Jason Bernagozzi and Dave Jones discovered that if you separate the vertical coils from cathode ray tube deflection yokes, two pairs of vertical coils placed 90 degrees around the unit are more efficient at wobbulating the signal than previous methods. In addition, they found that they could avoid extending the pins from the electron gun since the vertical coils could be installed from the side rather than from behind. This has the added feature that it saves a lot of room, which makes it possible to add additional experimental coils to the original unit. We hope that this documentation will inspire people to further explore what possibilities may be out there with electromagnetic disruption of the raster scan process.

This text also features updated information about the vertical oscillator modification and raster collapse switches. While the original documentation is included throughout this document, it is advised that for proper operation of the raster manipulation unit that you use the schematics and parts list featured in the updated text.

However, **we are not** including specific safety information in this text, you are expected to consult in person with a trained electrical engineer or TV repair professional before doing any of these modifications. DO NOT attempt to create this unit without guidance from a professional, this guide is meant as a historical document of the process.

WARNING

Construction of a Raster Manipulation Unit without expertise or training in electrical engineering or TV repair can result in permanent injury or death. Cathode ray tubes can hold a charge long after being unplugged, are prone to implosion and the extension of the high voltage wire can result in electric arcing if not properly insulated. DO NOT rely on online materials and training before construction of your own unit, seek the expertise of a professional in person before attempting to build a Raster Manipulation Unit. Permanent damage to the receiver may occur if the modifications are not precisely done.

Introduction

A raster manipulation unit or “wobbulator” is a prepared television which permits a wide variety of treatments to be performed on video images; this is accomplished by the addition of extra yokes to conventional black-and-white receiver and by the application of signals derived from audio or function generators to on the yokes. Although the modifications contained here are relatively simple to accomplish, there's a certain danger because of the presence of high-voltage in the receiver and the possibility of implosion of the CRT. Damage to the receiver may be sustained if the modifications are improperly done. It is recommended that the instructions be read in their entirety before any modifications are made. In the interest of safety, most of the test sections indicate that the chassis should be replaced in the case before the set is plugged and turned on. In order that wires are not confused, some of the wiring extensions are done in two steps. Depending on individual knowledge and experience, certain of these steps may be omitted or combined. It is assumed that the individual has a basic familiarity with small format, closed circuit video systems and electronics, has a thorough knowledge of soldering techniques, the use of volt/ohm meter and the ability to read schematics. For the purposes of demonstration, the directions given are specific to the Sony TV-760. The modifications described can be made to any black-and-white or color receiver; if substitution of senses made, be sure that the concepts of modification are fully understood. With certain receivers, it may not be necessary to add a vertical oscillator or current amplifier circuit; naturally the overall layout in source and destination of signals may vary.

It should be noted that the color unit created by Jason Bernagozzi and Dave Jones in 2015 was created using a Sony Trinitron PVM-8041Q portable studio monitor. This unit only required three wire extensions and did not require the addition of a vertical oscillator amplifier. It did require, however, a lot of planning in terms of the placement of the components since the case for this unit was not sufficient to hold the modifications. It is our suggestion that people wanting to develop wobblulators on units other than the TV 760 should first respond to design problems surrounding housing and stabilizing the boards and coils.

I. Parts and Supplies

* Indicates appended material

1 Sony 9" black and white television receiver, Model 760
1 SONY TV-760 SAMS schematics, set 1494, folder 3
*1 Large deflection yoke from an older color television receiver; yoke must be large enough to fit over the small yoke on the Sony, approximately 2" inside diameter and 3" deep; any extraneous parts should be removed. Please note that the modern color yokes have to be quite large to fit over, so use one from a CRT that is quite large or this method will not work.

OR

*2 pairs vertical deflection yokes from a couple of 15" CRT's; continuous wind between single pair should be intact and should be free of excess silicon coating and plastic; can be fragile, handle with care.
*1 800ft roll of 24 gauge enameled copper wire or magnet wire; because this wire is insulated, it cannot be substituted by regular wire.
*2 rotary switches, 3 position minimum, non shorting type.
*2 rotary switch knobs
3 panel mount video connectors, can be UHF or BNC
1 6" length high voltage hookup wire *(check the KV rating the HV wire on the unit you plan to wobbulate)
1 36" length of miniature coaxial cable (RG 174) or any shielded cable
1 50' roll of 20 gauge stranded hookup wire
1 6 terminal barrier strip
1 roll electrical tape
1 10" x 24" piece of plywood for base, painted flat black, ½" thickness
*1 4 ¾" x 7" piece of plywood for yoke support, painted flat black, ½" thickness. This may vary depending on the size of the yoke. If using the 2 pairs of vertical yokes method, you will have to construct custom housing to mount those coils.
1 1" x 1" x 12" section of foam
6 1" x 1" angle brackets with screws
2 100 ohm 5 watt resistors
* Assortment of heat shrink
* 1 tube fire rated RTV or high temp silicon.
Rosin core solder

Panel

3 mono mini panel mount jacks
3 100k ohm logarithmic potentiometers
3 Pot caps
3 mono RCA cables, longer the better, 6' minimum.

Some hookup wire
Small wood or metal panel, see Appendix III for example

Tools

Screwdrivers: flat blade and Phillips
Electric drill with assorted bits from 1/16" to 3/8"
Adjustable open end wrench
Needle nose pliers
Wire cutters/strippers
25 watt soldering iron
volt/ohm meter

Cables

1 6-8" BNC-BNC or UHF-UHF cable to connect TV out to Video In
1 6-8" mini-mini cable to connect Audio out to Audio in
3 3' lengths of speaker wire or AC cord to connect amplifiers to unit; length dependent on final configuration of all components
3 3-6' male RCA to tinned leads or male phone jacks to connect audio generators to audio amplifiers

Components

3 Audio generators
1 mono amplifier
1 stereo amplifier - *Note that 50-75w amps should be sufficient to drive the wobbulator using these redesign principles. However, super low power amps may not give the full effect

Current Amplifier: Output Buffer

This circuit is optional; see appendix 1 for circuit and parts list

Vertical Oscillator

This circuit is necessary; see Appendix II for circuit and parts list

II. Dismantling the Receiver

Perform all the following operations only when receiver is unplugged use caution when handling the CRT and do not place undue pressure on the neck of the tube. If the receiver is placed CRT face down, place a soft protective

material underneath the face to protect from scratches and prevent breakage.

1. Remove the five screws from the plastic cabinet back and slide chassis partially from case; retain the screws for later reassembly. Unplug the three pin speaker plug and remove back completely.
2. Separate the front panel which contains the CRT from the chassis. The following remain with the front panel: on/off volume control, contrast control and brightness control. The following will made with the chassis: UHF and VHF tuners.

III. Wiring Extensions

Certain wires on the receiver must be lengthened because the final layout of the raster manipulation unit. A schematized view is presented in Figure 1; the chassis may be replaced in the case if desired. Perform all of the following operations only when the receiver is unplugged. This set of wire extensions should be performed one wire at a time or each wire carefully labeled before clipping to reduce the likelihood of incorrect reconnection. When unstringing the wires from the deflection board, releases the wire clips from the bottom of the chassis. Unsolder the wire from the point of origination and extend with 12 inch lengths of 20 gauge wire unless otherwise noted. *Tape or heat shrink each solder connection.

A. Disconnect the high-voltage lead from CRT by clicking the wire just behind the cop on the CRT or remove cup terminal from the CRT. See figure 1.
B. If the UHF tuner is not desired, unsolder and disconnect the following:
    1. Orange wire to VHF tuner
    2. RCA plug and gray shielded wire to VHF tuner
    3. Antenna wire to antenna terminals on back of case

Working with the chassis upside down, extend the following wires. Figure 2 provides approximate locations; four exact locations refer to schematics.

C. On/off Volume Switch
    1. On/off switch: see also figure 2A
        a. Brown wire to VHF tuner: location six on figure 2
        b. Brown wire to deflection board: location five on figure 2
        c. Brown wire to powerful board: location seven on figure 2
        d. Brown & white wire to power board: location eight on figure 2
    2. Volume Control: see also figure 2A
        a. Gray and orange wire to Video IF/soundboard: location 10 on figure 2. This extension will eventually go to the audio input connector. The extension wire must be shielded; use 18 inch length of mini coaxial cable

b. Gray and white wire to deflection board: location nine on figure 2. Extend with 8 inch length of mini coaxial cable

D. Contrast Control
   1. White wire to deflection board: location one on figure 2

E. Brightness control: see also figure 2B
   1. Black wire to deflection board: location two on figure 2
   2. Purple wire to deflection board: location three on figure 2
   3. Orange wire to deflection board: location four on figure 2

F. Yoke
   1. Green wire to deflection board: location 11 on figure 2
   2. Gray wire to deflection board: location 12 in figure 2
   3. Blue wire to deflection board: location 13 on figure 2
   4. Red wire to deflection board: location 14 on figure 2

G. CRT: see also figure 2C
   1. Yellow wire to deflection board: location 15 on figure 2
   2. Red wire to deflection board: location to 16 to figure 2
   3. Brown wire to deflection board: location 17 on figure 2
   4. Black wire to deflection board: location 18 on figure 2

H. Ground wire to CRT: see also figure 2D
   This black wire extends from a metal clip located on side of CRT
   1. Solder a terminal lug to the clip, screw lug to the front panel and extend to location 19 on figure 2

I. High Voltage
   This wire has already been cut.
   1. Extend with 6 inch length of high voltage wire
   2. Twist ends together and solder connection
   3. * Place large heat shrink and shrink over one part of the high-voltage wire before it touches the solder connection. Pump RTV fire rated silicone into the heat shrink, fully covering the uninsulated wire. Make sure there are no air pockets. Shrink the rest of the heat shrink and let cure for 24 hours. NOTE: This is very dangerous. If the high-voltage wire is not fully insulated it can arc out and seriously injure the unit or anyone around it. DO NOT attempt to insulate only with heat shrink or electrical tape, this is absolutely needs serious insulation.

IV. Chassis Remounting

In this set of operations the case and front panel of the receiver are mounted on the 10" x 24" plywood base. The smaller section of plywood

serve as a support for the color yoke and will be notched along the 7 inch side; this will be performed at a later time although figure 3 shows the final configuration. Section X provides further explanation of the yoke support.

1. Set the plastic case at the back and of the base and mark locations of the linearity and height adjustments on the bottom. If access to these controls is desired, cut a rectangular hole; these controls will probably need adjustment at a later point.
2. Mount the case to the base. Removed several plastic slats from the bottom of the case in three locations; screw the case to the base using wood screws and washers.
3. Slide chassis back into the case, being careful not to break any solder connections. If extended wires are tied together the danger of breakage is minimized; at this point the wires should not be permanently harnessed together.
4. Mount the front panel with the CRT to the front end of the base, using the 1" x 1" angle brackets to bolt the bottom edges of the plastic frame to the brackets. Before mounting, be sure that the CRT face is perpendicular to the base.
5. Attach the terminal barrier strip to the base

V. Test

1. Recheck all extended wires to make sure all connections are secure.
2. Plug in the receiver and turn it on; it should function normally.
3. If the set does not function, unplug and check all solder connections and continuity. Do not proceed until the receiver functions normally.

   *Note: due to the age of the Sony TV 760, if your build is not functioning, it is likely that there may be some capacitors that have blown. This was the case with our first attempt and it is the case with other people who have attempted this recently. It is important if you want to go on working with the TV 760 two have a volt/ohm meter to find which components are not working.

VI. Monitor Modification

This set of operations modifies the receiver so it will accept a video input and also function as a normal receiver, provided that UHF tuner is kept intact. Two video inputs are bridged; in addition one TV output, one audio input and one audio output are supplied. The video connectors may either be UHF or BNC; the audio connectors are miniature phone plugs. When the TV out is connected to the video input with a short video cable and when the audio out is connected to the audio and with the short cable, the set will function as a normal receiver. When functioning as a

monitor the video input will accept a signal from a video camera, deck or processing system. This modification is useful for converting black-and-white receivers to receivers/monitors, regardless of whether the unit is a raster manipulation device.

1. Unplug the receiver and separate the chassis from the case.
2. Mount the two audio and three video connectors on top of the case as shown in figure 4.

A. TV Out
    1. Locate the TV out cable on the video IF/soundboard: location 20 on figure 2
    2. Follow this cable to video in on the deflection board: location 19 on figure 2.
    3. Disconnect the cable from the deflection board and reconnect cable to the TV out connector on top of the case. Label the connector TV out.
    4. Current amplifier circuit

       This circuit provides proper termination of the TV output with 75 ohms at the input of whatever external monitor/device use. It is constructed on a small piece of perfect board and located between the TV output from the video IF/soundboard and the TV out connector. The schematic is included in Appendix I; Output Buffer. This circuit is optional.

B. Video In
    1. Connect a 12" length of mini-coax cable from video in on Deflection Board to either of the Video In connectors on the top of the case.
    2. Bridge the two Video In connectors as shown in Figure 4A; label the connectors Video In.

C. Audio
    1. See also figure 4B
    2. Looking for gray and orange wire from the volume control to the video IF/soundboard: location 10 on figure 2; this was extended with 18 inch length of mini-coaxial cable
    3. Unsolder the extension connection
    4. Connect the end of the coax cable to Audio In jack
    5. Label connector Audio In
    6. Connect the gray and orange wire from the SIF out, location 10 on Figure 2 to the Audio Out connector
    7. Label connector Audio Out

VII. Test

1. Recheck all wiring in the section
2. Slide chassis back into case
3. Connect TV out to video in and audio out to audio in
4. Plug-in receiver and turn it on it should function normally

VIII. Raster Reversals

This set of operations reverses the raster left to right around the vertical axis and up to down around the horizontal axis; it also permits collapse of the raster to a vertical or horizontal line. The brightness control should be kept very low when collapsing the raster; otherwise the CRT may be burned. This modification may be made to any receiver or receiver/monitor to provide additional options for tape viewing or rescan regardless of whether the set is a raster manipulation unit. This modification can also be made to video cameras to provide versatility of spatial orientation during recording. If this modification is made to a camera, extreme caution must be used to avoid burning the vidicon tube.

1. Unplug the receiver and slide chassis from case
2. *Install the rotary switches on top of the case as indicated in figure 5
3. Locate the extended wires from the yoke of the receiver, locations 11 -14 on Figure 2. Take the horizontal wires (blue, location 13, and red, location 14) and the vertical wires (green, location 11, and gray, location 12) and one by one unsolder the joints made in extending the wires. Connect each wire to its proper position on the switches and install 100 ohm 5 watt resistors, as shown in Figure 5A.

IX. Test

1. Recheck all wiring in this section
2. Slide chassis back into the case
3. Plug in receiver and turn it on; turn down the brightness and contrast. Flip the switches and label horizontal and vertical, normal, reverse and collapse positions
4. If the set does not function normally, recheck all solder connections and continuity. Do not proceed until the set functions normally and the raster reverses horizontally and vertically and collapses.

X. Color Yoke and Continuous Wind Yoke Installation

1. *If not already done, remove all extraneous components from the large color yoke. This yoke will produce the horizontal and vertical

distortions. The same applies for using the paired vertical yoke method. See attached images in Appendix III for that method.

2. *Wind the continuous yoke; this yoke produces the 'S curvet pattern. Take 800' of magnet wire and wrap it around a cylindrical form with a minimum diameter of 3". Creating a spool from cardboard and winding firmly yields good results, but make sure the yoke is roundish in shape. S This yoke will be positioned over the yoke on the SONY set; if you are using a larger set, make sure that this continuous yoke will slide over the normal yoke on the set. Use all of the wire and do not break it at any point. Cover entire yoke with electrical tape except for the terminal connections.
3. Slide chassis from case
4. Check the original yoke on the get. Bend the terminals out of the way, being careful not to create any shorts. Cover with electrical tape.
5. Slide the continuous yoke over the CRT neck go it fits snugly against the CRT and over the original yoke. Secure the continuous yoke to the top of the front panel with cord.
6. *If doing the color yoke method, create 7 3” 20 gauge wire extensions and trim. On the back of the electron gun is a circuit board. Slowly and carefully pull circuit board away from the electron gun. Once detached, you will see where each of the wires from the board was attached. Solder these extensions to those wires and seal with heat shrink.
7. Position the color yoke behind the continuous yoke. Figure 6 shows the final configuration. The color yoke is supported by the 3/14 It X 7 n plywood support. The location of the support in relation to the front panel, distance A in Figure 3, depends on the size of the color yoke used. Cut a V shape from the 7” side of the support and put in the two screws half way. The precise shape of the V depends on the size of the yoke; it should be large and deep enough to support the color yoke at a height, which allows the color yoke to slide behind the continuous yoke but does not allow the color yoke to rest on the neck of the CRT. After the V has been cut, place the foam on top to protect the yoke. Slide the color yoke on behind the continuous yoke, position the V support and fasten support to the base by gluing. *Please note that the modern color yokes have to be quite large to fit over the existing yoke. This will leave some room for the next step, but not much. Make sure to position the yoke so that the horizontal sweep is on top.
8. * Insert the extended pins from the circuit board that used to be on the electron gun in the correct order. This can be seen due to the “C” shape of the pins on the board and how they correspond to the electron gun. Plugging the wrong connections in will result in the malfunctioning of the unit.
9. *If using the paired vertical yoke method, first create a platform where each pair of vertical yokes will rest. These should be attached close to but not touch the unit’s deflection yoke. See Appendix III for

placement strategy. Each vertical yoke can be attached from the side, so there is no need to extend the pins from the electron gun. Each vertical yoke pair needs to sit 90 degrees from each other, positioned vertically and horizontally around the axis of the unit's deflection yoke.

10. Connect the yokes to the terminal barrier strip as shown in Figure 61. Use 20 gauge wire to extend the leads to the barrier strip; loosely braid the two horizontal wires from the color yoke together, the two vertical wires from the color yoke and the two wires from the continuous wind yoke.

XI. Vertical Oscillator Circuit

Appendix II consists of two different circuit diagrams, a description of the operation and associated parts lists; one of the two circuits must be used for proper functioning of the Sony TV-760 unit.

XII. Extended Wire Harnessing

It is suggested that all the extended wires be harnessed together in groups by taping or tying the wires together. This may help to prevent the wires from becoming caught or tangled on the chassis and detached. It also makes it easier to slide the chassis from the case.

XIII. Test

1. Glide chassis back into cage
2. Plug in and turn on receiver
3. Recheck vertical size and linearity

XIV. Final Test

It is suggested that the section on theory of operation be read before attempting the final test. This can be found at the Video History Project online at http://www.experimentaltvcenter.org/history-tools

1. Connect the audio amplifiers to terminal strip as shown in Figure 1
2. Connect the audio oscillators to the amplifiers as shown in Figure 1
3. Turn on the get and verify normal operation turn on amplifiers and oscillators
4. Label the amplifiers and oscillators as appropriate

XV. *Panel

For ease of use, creating a small panel to plug your audio sources into the amplifiers is advisable. This allows for quick plugging and volume controls for the horizontal, vertical and S-coil operations. Some experience in audio components is advised. See Appendix III for images.

1. Cut one of the RCA connectors from each of the three cables. Then solder the cut connection to the output of your potentiometers.
2. Connect each of the three panel mount mini jacks to the input of each of your three potentiometers.
3. Create a panel to mount both potentiometer and mini-jacks.
4. Label which RCA cables goes to which amplifier and which deflection it is assigned to, i.e. H, V and S.
5. Test signals going in to make sure your pot connection is smooth and that your amplifiers are working. Then turn the pots all the way up and turn your amplifiers slowly up until the deflection hits its peak. Turn the pot up and down to test. This means that the pot will sweep from small manipulations to severe manipulations.

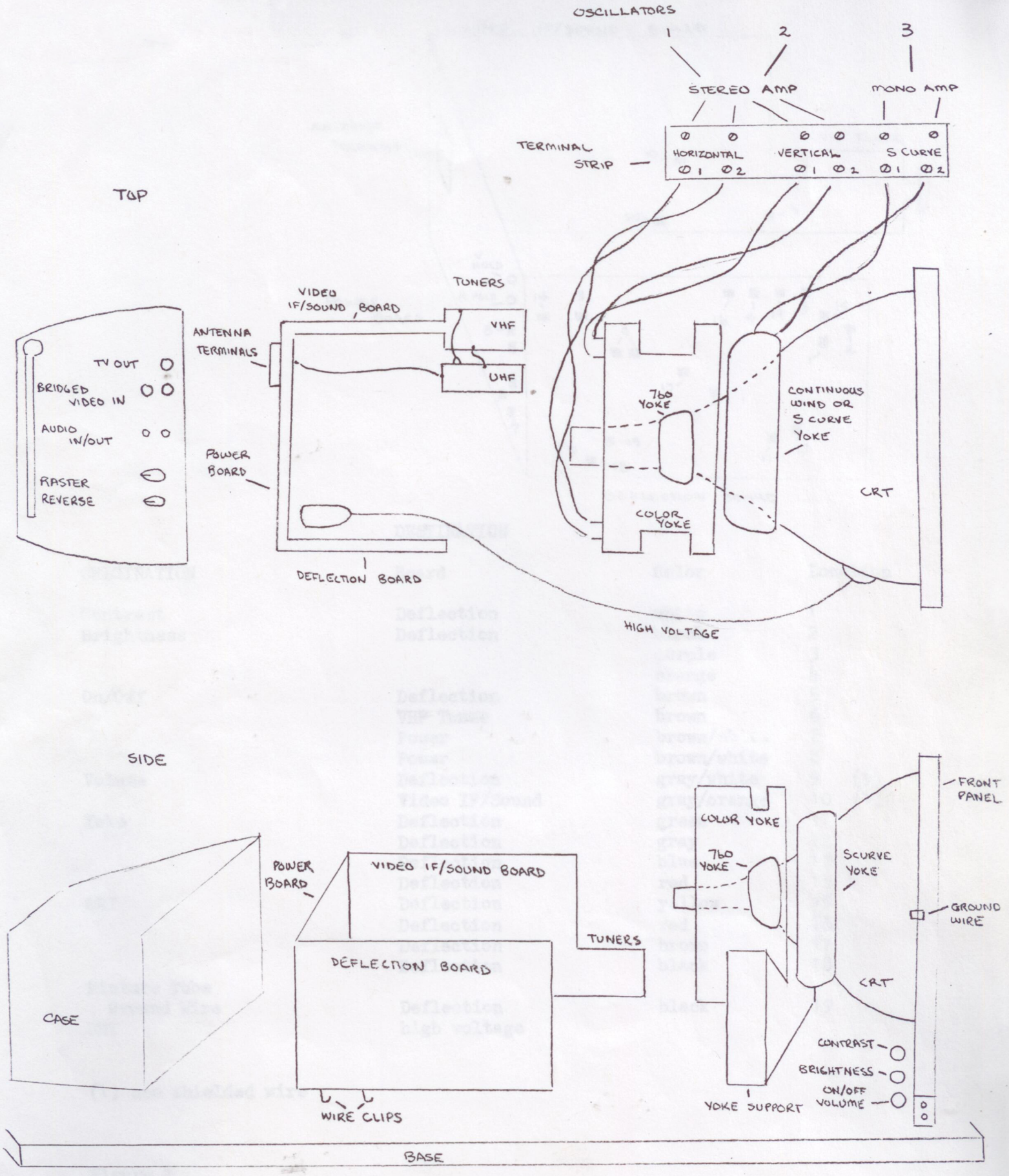
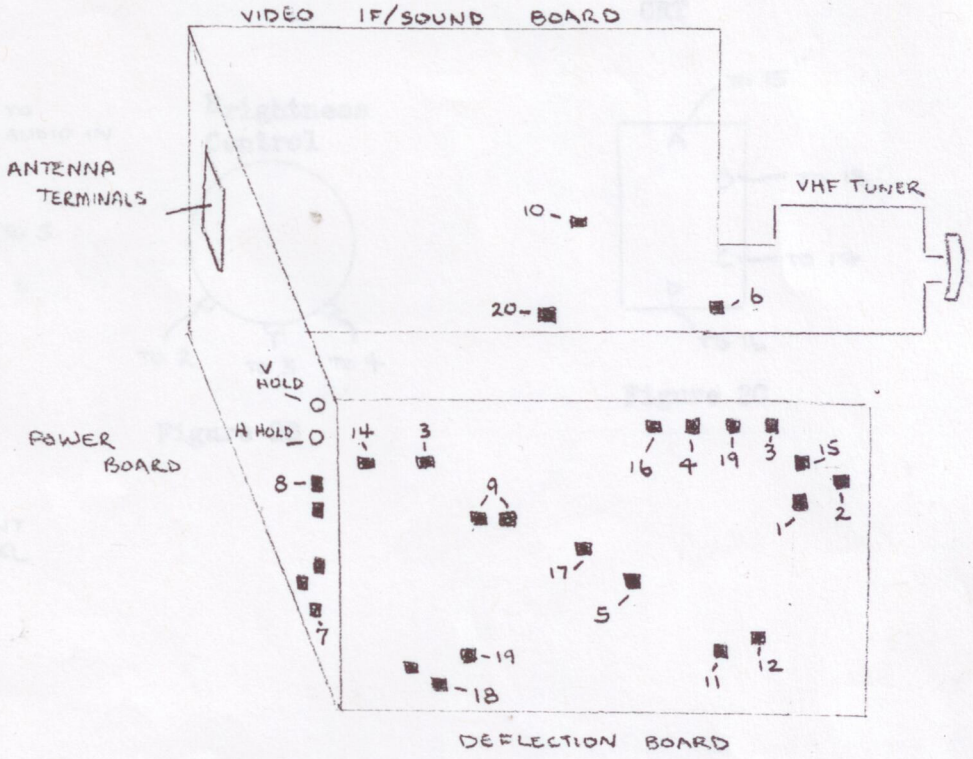

OSCILLATORS
1
2
3
STEREO AMP
MONO AMP
TERMINAL STRIP
HORIZONTAL
VERTICAL
S CURVE
TOP
VIDEO IF/SOUND BOARD
TUNERS
VHF
UHF
ANTENNA TERMINALS
TV OUT
BRIDGED VIDEO IN
AUDIO IN/OUT
RASTER REVERSE
POWER BOARD
DEFLECTION BOARD
760 YOKE
CONTINUOUS WIND OR S CURVE YOKE
COLOR YOKE
CRT
HIGH VOLTAGE
SIDE
CASE
POWER BOARD
VIDEO IF/SOUND BOARD
TUNERS
DEFLECTION BOARD
WIRE CLIPS
COLOR YOKE
760 YOKE
SCURVE YOKE
FRONT PANEL
GROUND WIRE
CRT
CONTRAST
BRIGHTNESS
ON/OFF VOLUME
YOKE SUPPORT
BASE

Figure 1



ORIGINATION	DESTINATION Board	Color	Location
Contrast	Deflection	white	1
Brightness	Deflection	black	2
		purple	3
		orange	4
On/Off	Deflection	brown	5
	VHF Tuner	brown	6
	Power	brown/[illegible]	7
	Power	brown/white	8
Volume	Deflection	gray/white	9 (1)
	Video IF/Sound	gray/orange	10 (1)
Yoke	Deflection	green	11
	Deflection	gray	12
	Deflection	blue	13
	Deflection	red	14
CRT	Deflection	yellow	15
	Deflection	red	16
	Deflection	brown	17
	Deflection	black	18
Picture Tube Ground Wire	Deflection	black	19
CRT	high voltage		

(1) use shielded wire

Figure 2

On/Off Volume Control

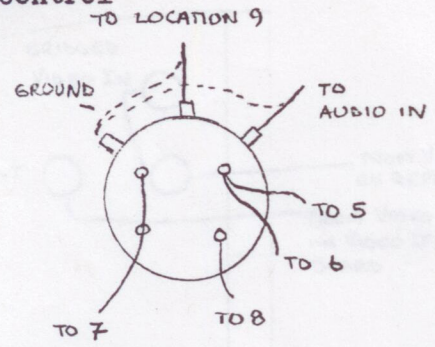


Figure 2A

Brightness Control

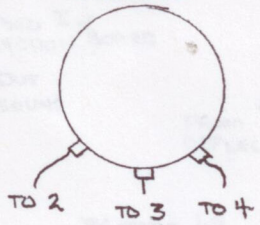


Figure 2B

CRT

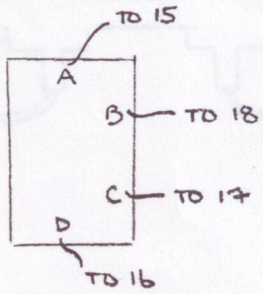
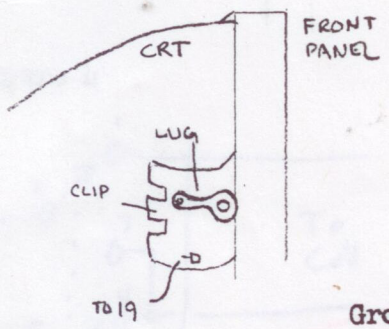


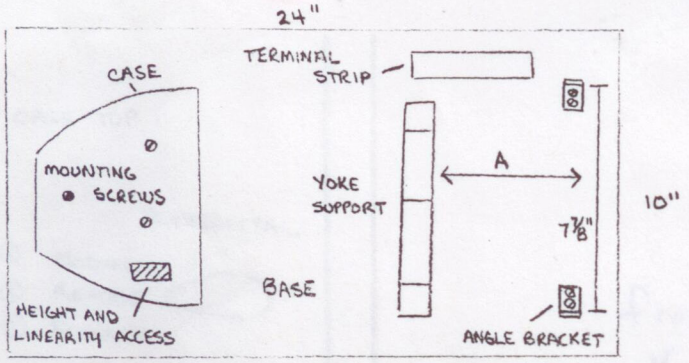
Figure 2C



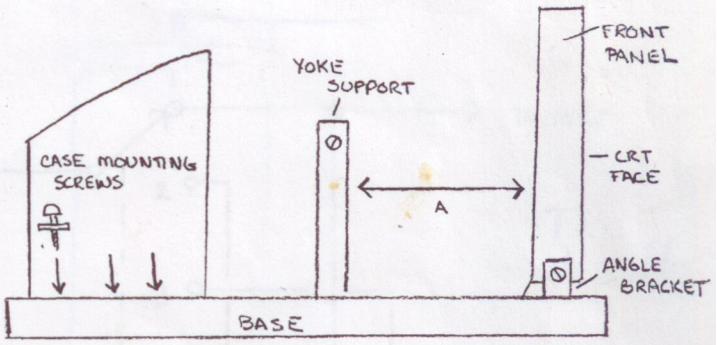
Ground Wire

Figure 2D

Top



Side



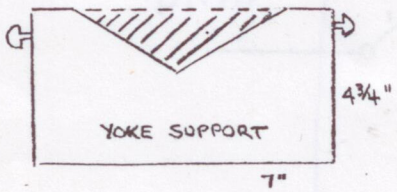


Figure 3

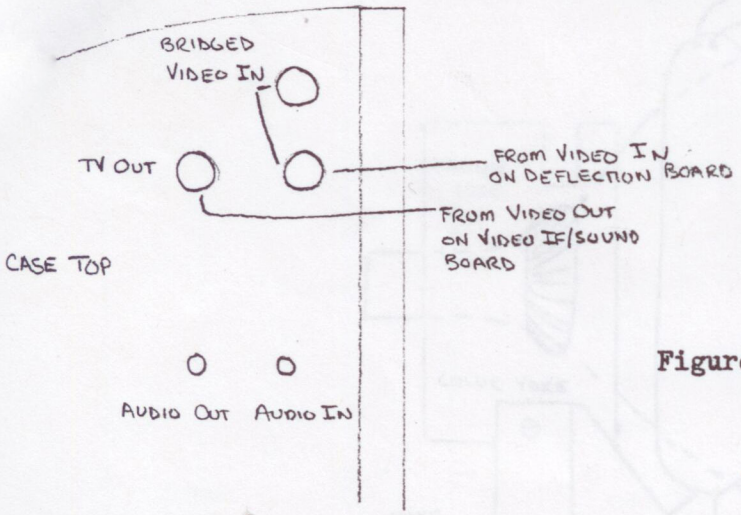


Figure 4

Figure 4A

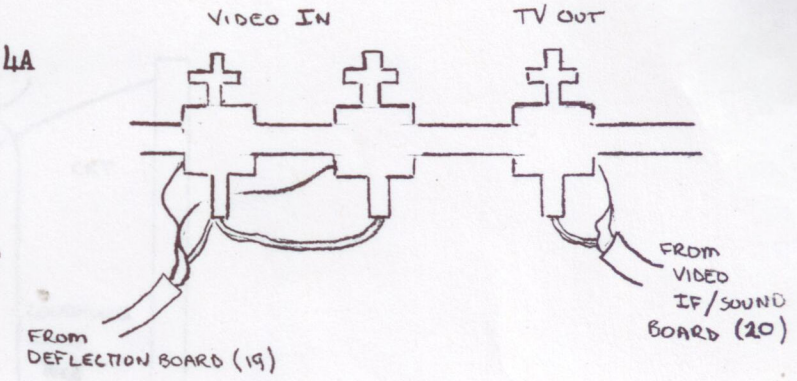
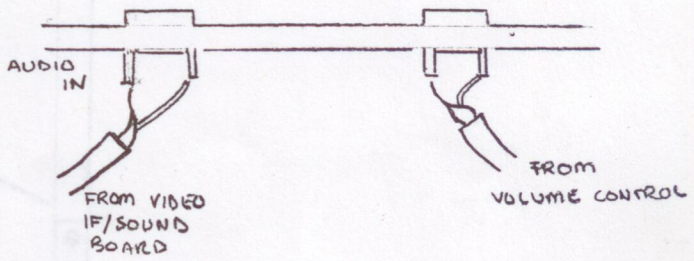
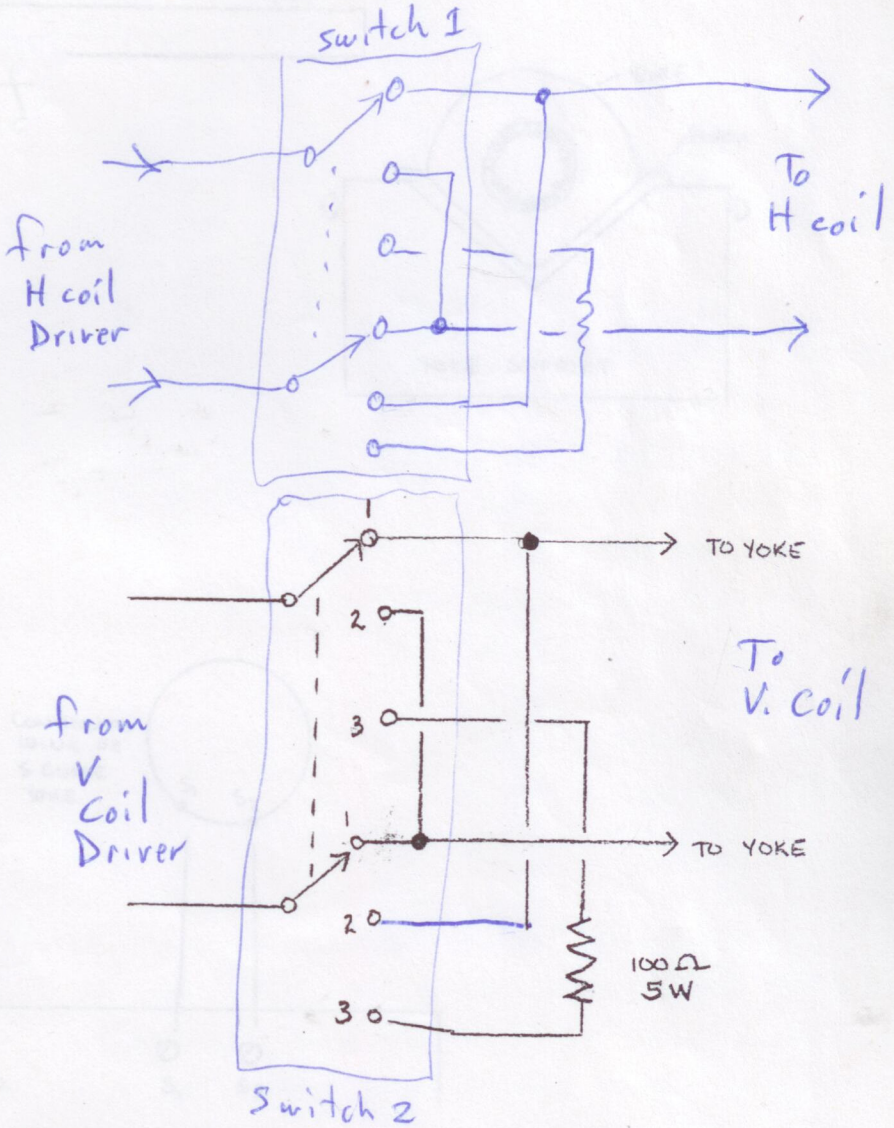
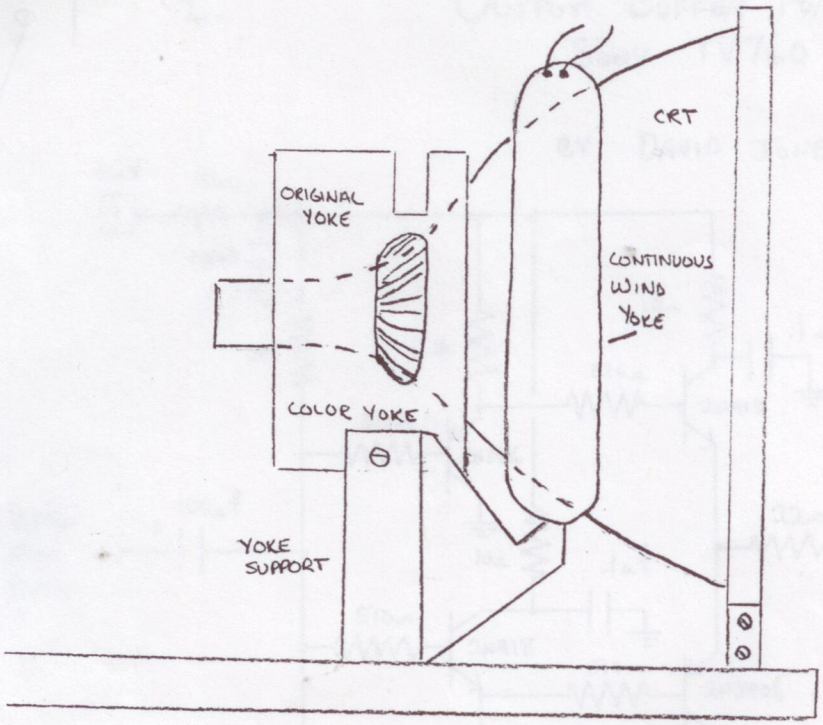


Figure 4B



*Orginal documentation had the wrong kind of switches. Please refer to the hand drawn switch schematic shown here on the right.





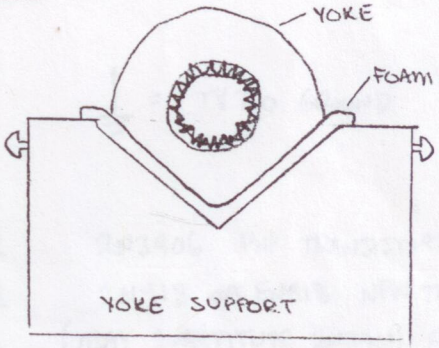


Figure 6

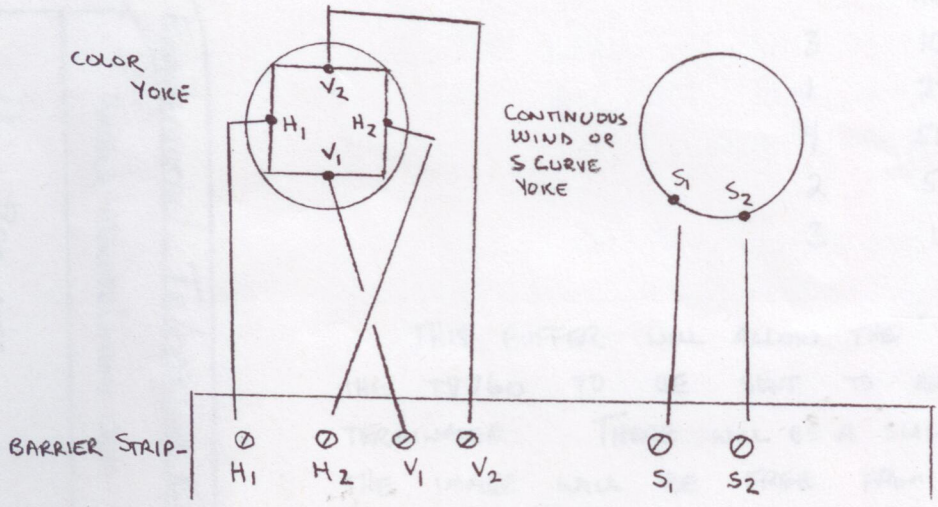
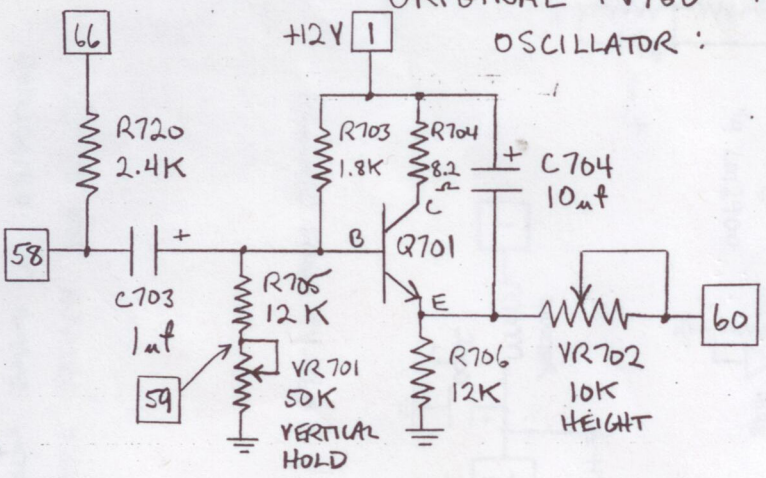


Figure 6A

APPENDIX II

SONY TV760 MODIFICATION

ORIGINAL TV760 VERTICAL OSCILLATOR:

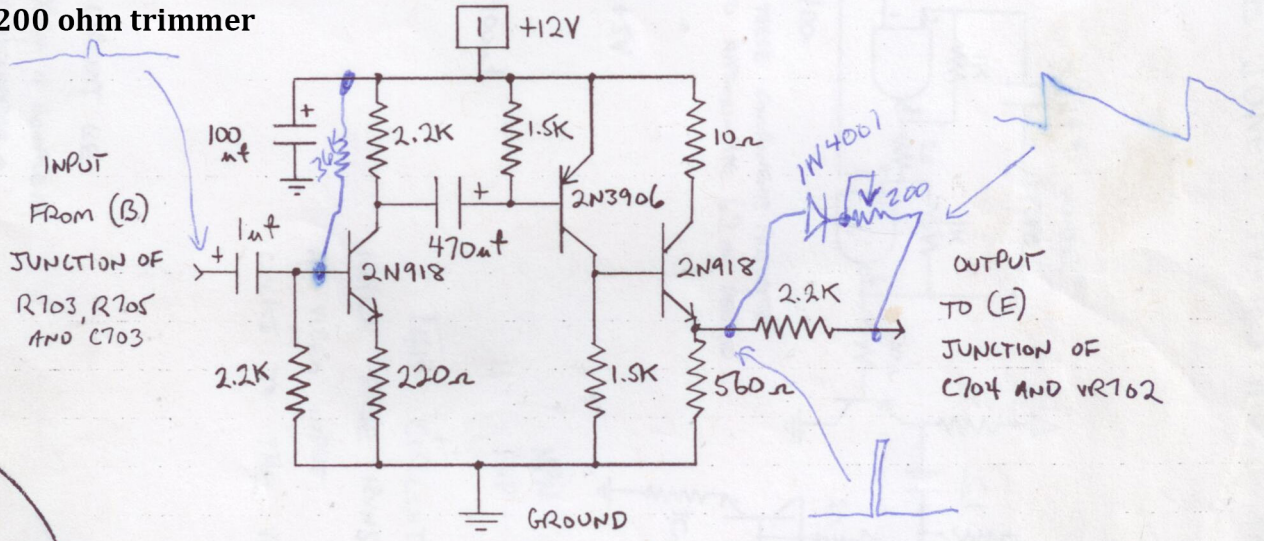


REMOVE

Q701
R706
R720

The additional components in blue are:
1 36K resistor
1 1N4001 diode
1 PCB mount 200 ohm trimmer

SUBSTITUTE THIS CIRCUIT FOR THE Q701:

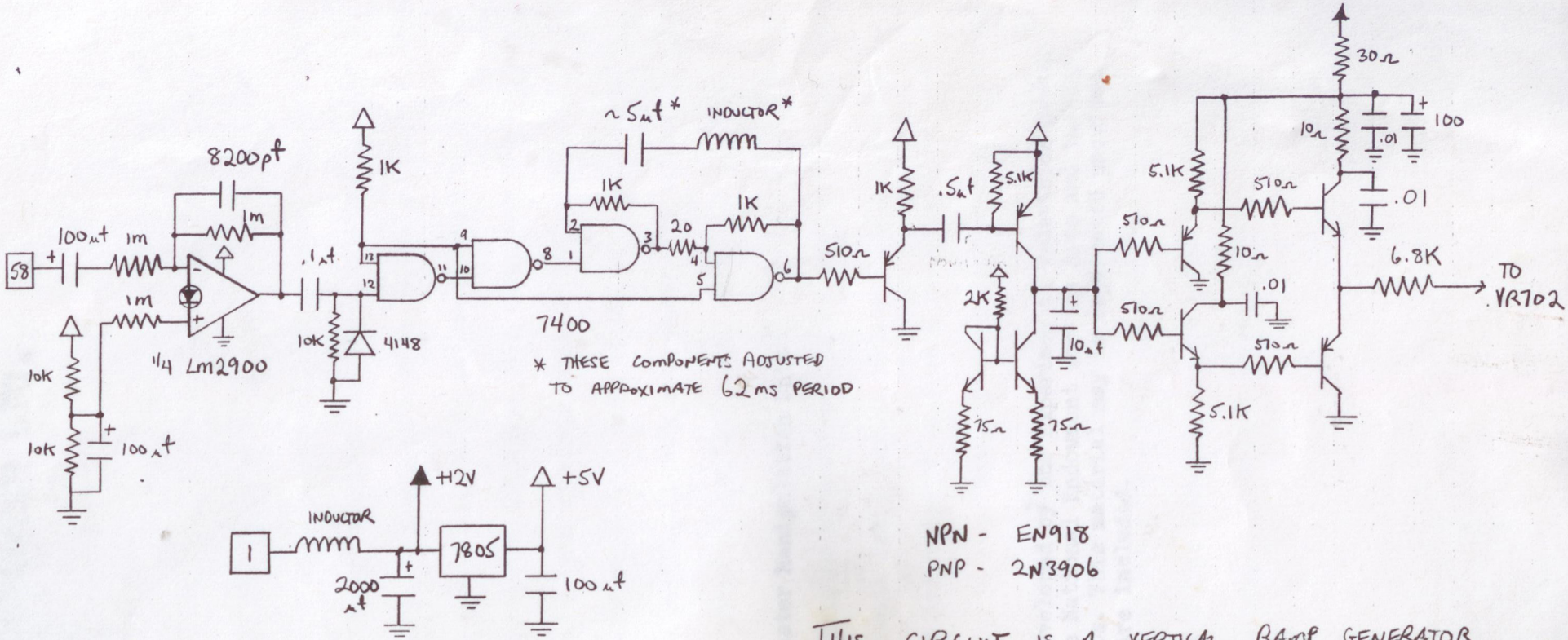


THIS CIRCUIT IS BUILT ON A SMALL CIRCUIT BOARD BY ITSELF AND HAS FOUR WIRES CONNECTING TO THE TV-760: INPUT, OUTPUT, +12 VOLTS (POINT 1) AND GROUND.

THIS MODIFICATION ALLOWS RASTER MANIPULATION BY WOBULATOR COILS WITHOUT INTERFERENCE TO THE VERTICAL OSCILLATOR. ITS DISADVANTAGE IS THAT WITHOUT A COMPOSITE VIDEO SIGNAL FROM A TUNED TV SIGNAL OR A JEEPED VIDEO INPUT, THE RASTER WILL COLLAPSE.

THIS CIRCUIT IS <u>NECESSARY</u> FOR PROPER OPERATION OF THE WOBULATOR UNLESS THE MORE COMPLICATED CIRCUIT ON PAGE #2 OF THESE SCHEMATICS IS USED INSTEAD.

DAVE JONES TV-760 MODIFICATION



THIS CIRCUIT IS A VERTICAL RAMP GENERATOR WHICH FREE RUNS, MAINTAING A RASTER EVEN WITHOUT A VIDEO INPUT. WHEN VIDEO IS PRESENT, THE CIRCUIT LOCKS TO THE VERTICAL SYNC OF THE VIDEO SIGNAL.

REMOVED FROM TV-760:

Q701
R706
R720
C703
C704

IT IS NOT ADVISED THAT THIS CIRCUIT BE DUPLICATED BY ANYONE WITH LESS THAN A COMPLETE UNDERSTANDING OF ITS FUNCTION, AS CONSIDERABLE TWEEKING IS NECESSARY TO ARRIVE AT PROPER OPERATION.

-R.B.

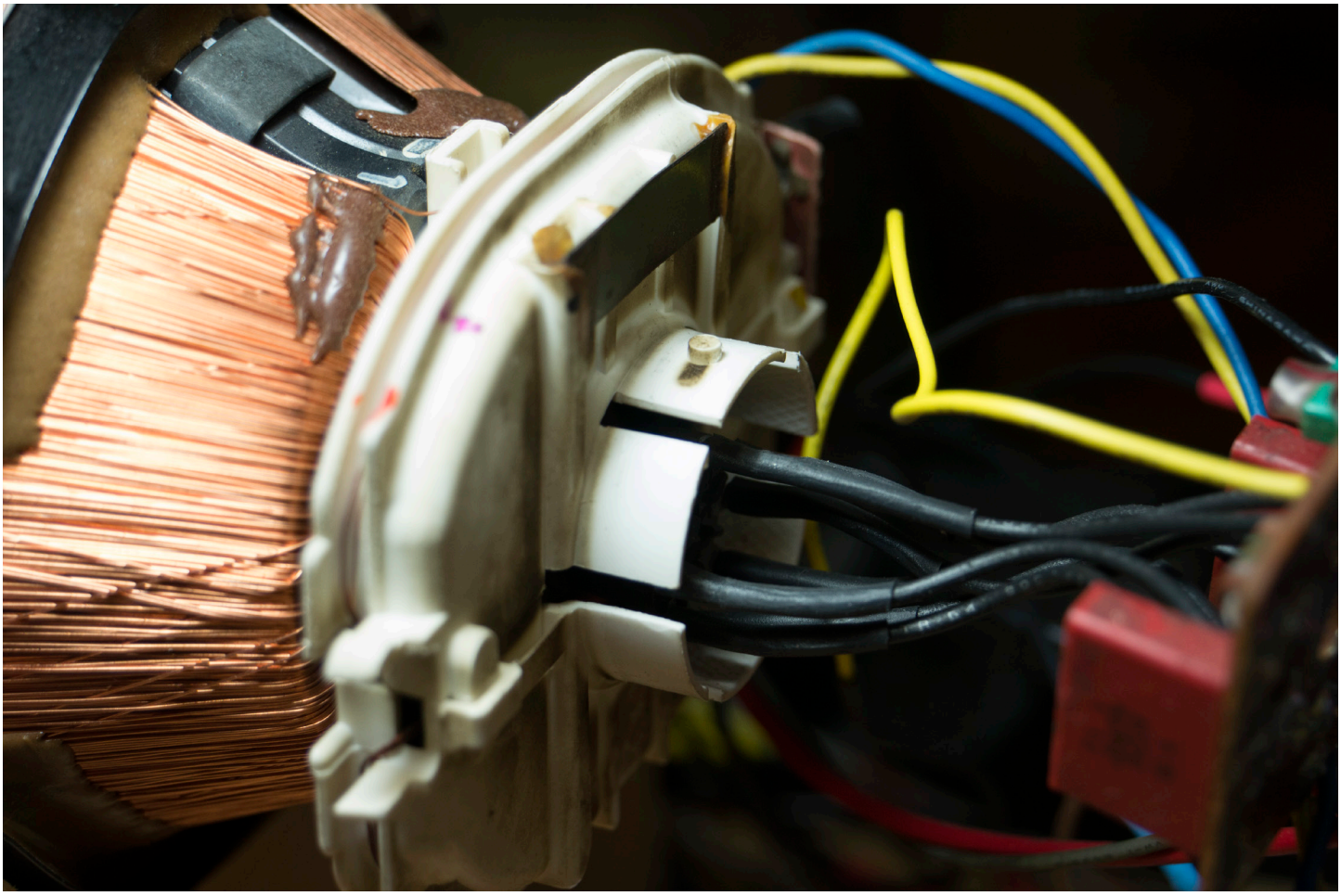
Experimental Television Center Ltd.

RASTER MANIPULATION UNIT CIRCUITS

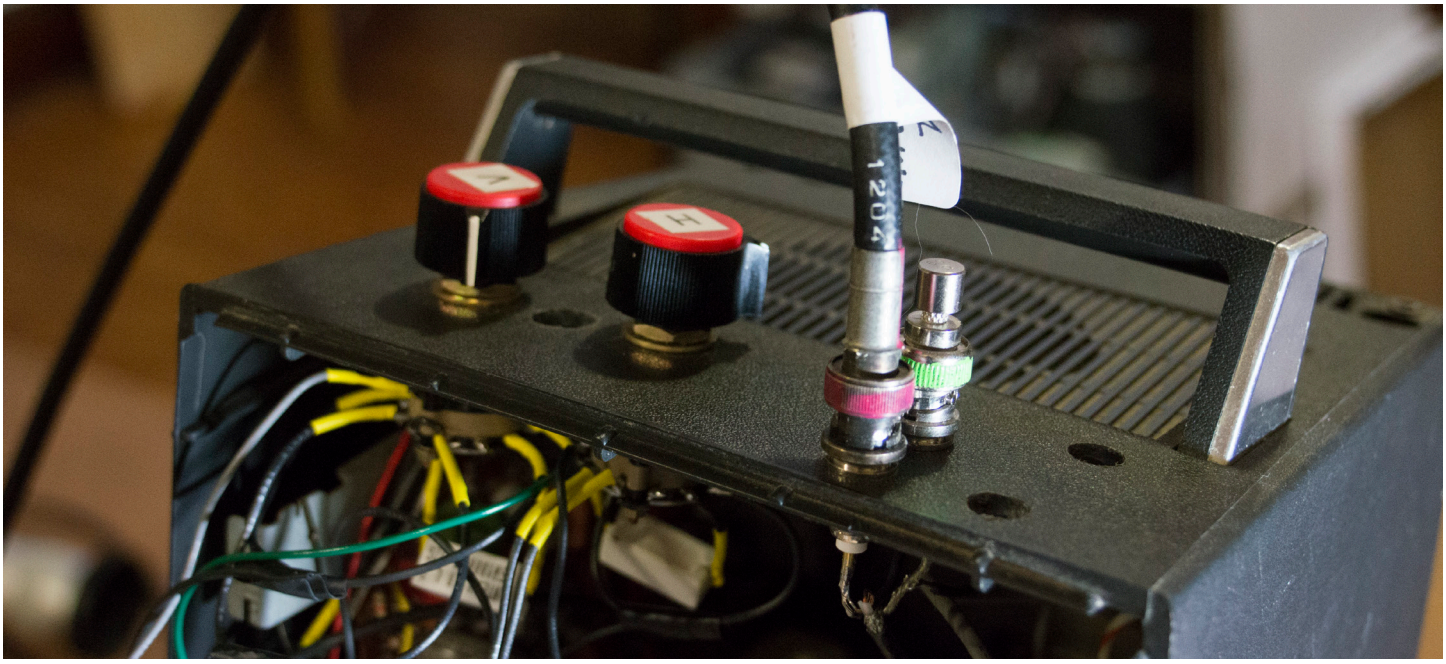
RICH BREWSTER

3 of 3

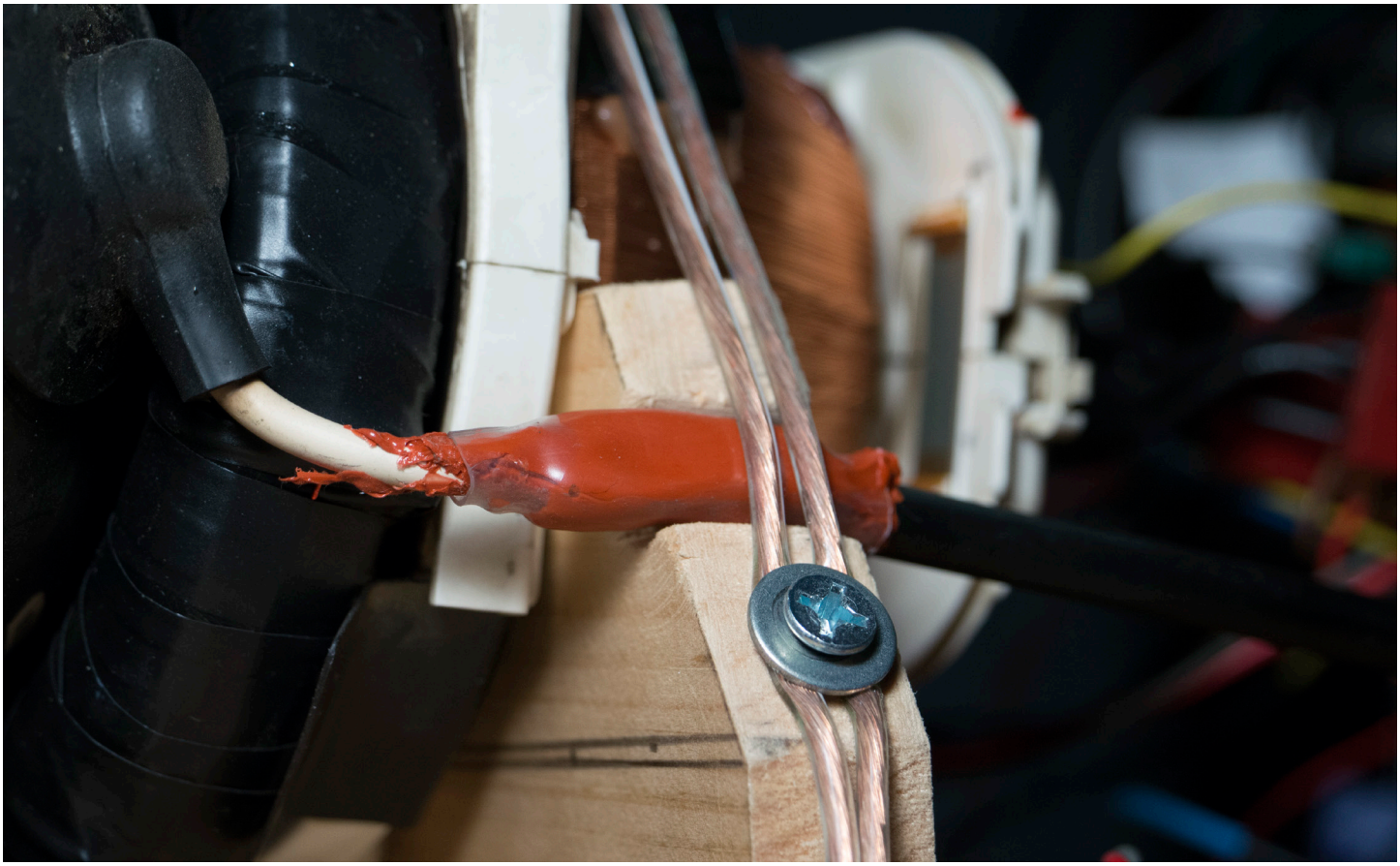
Appendix III - Documentation of changes



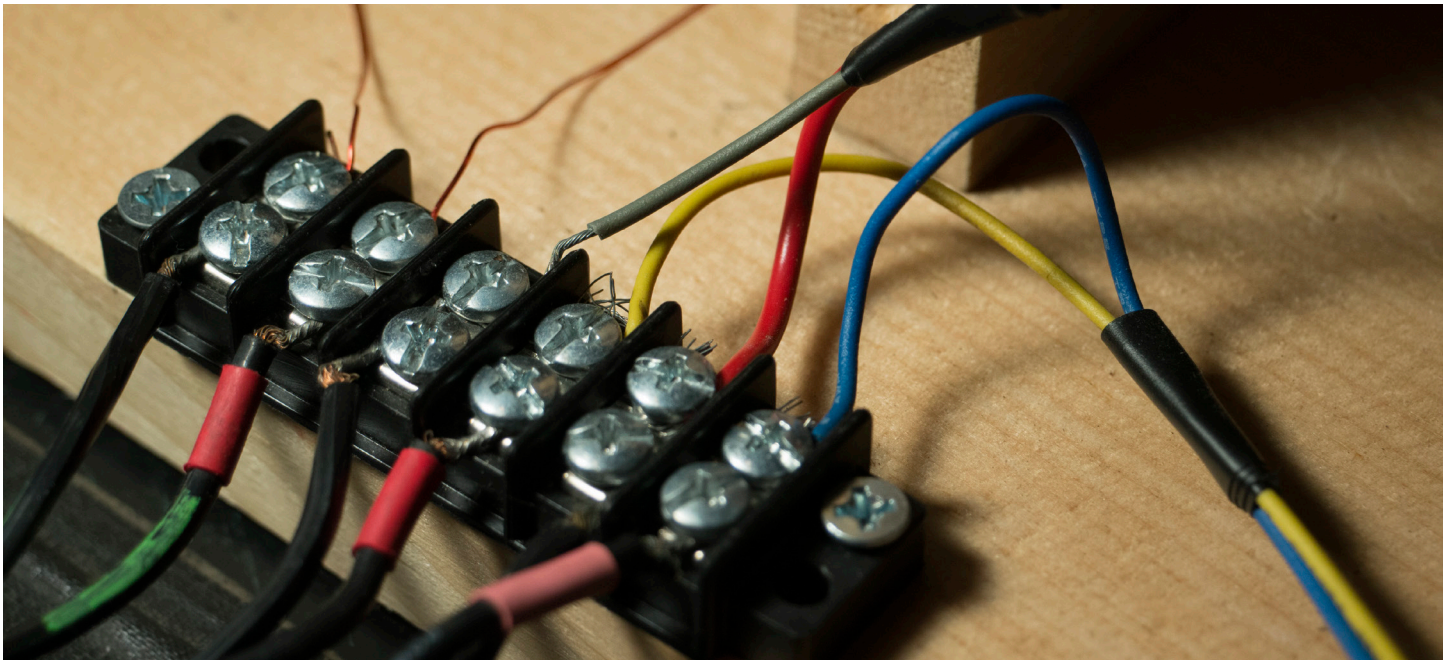
Detail of extension of the pins from the circuit board to the electron gun. Note that the large color yoke is placed over the unit's existing yoke, and that the circuit board is larger than the clearance of the neck of the large color yoke. If using this method, please use caution when placing the larger yoke since it may come in physical contact with the TV-760 yoke.



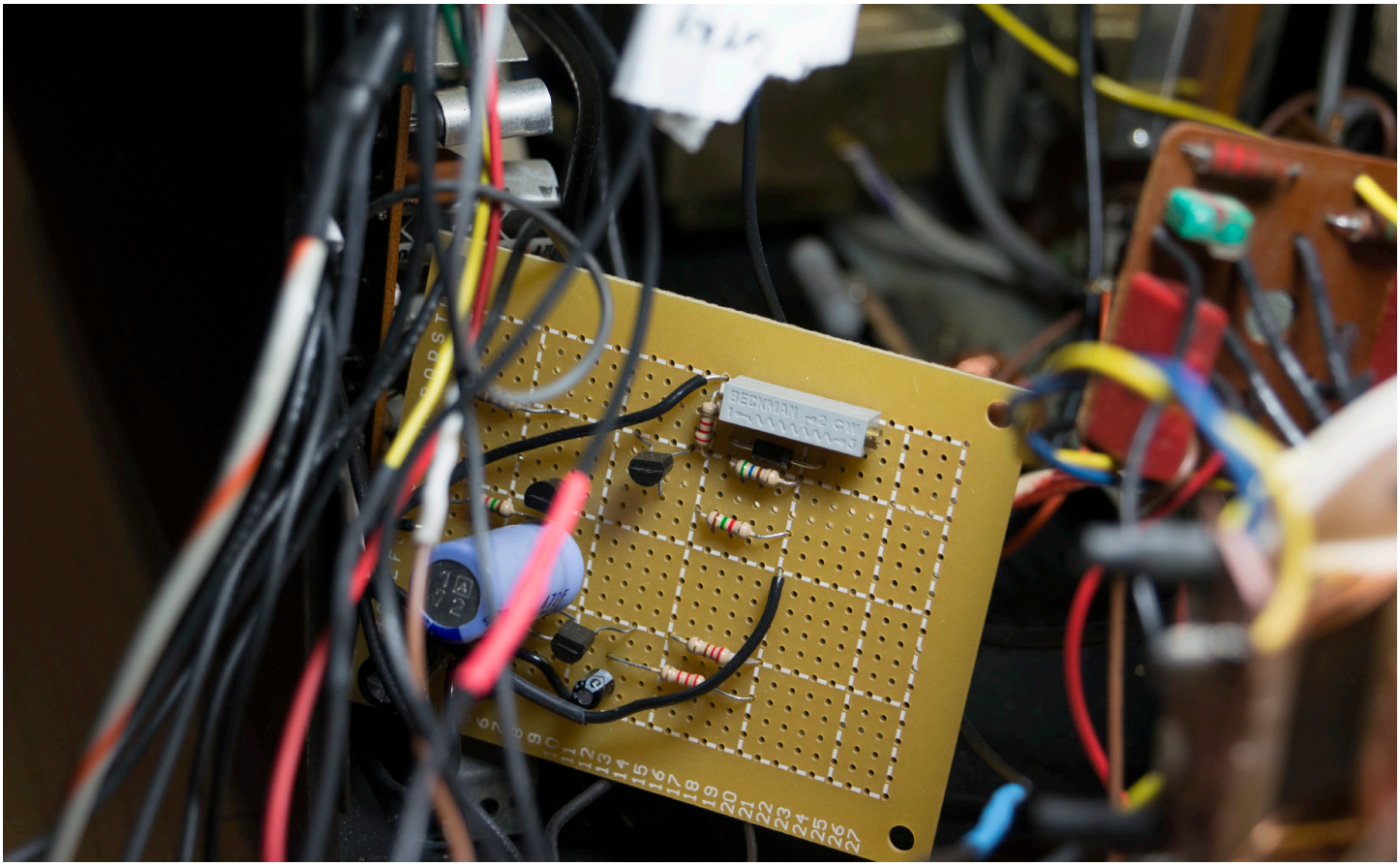
Video input and rotary switches for raster collapse



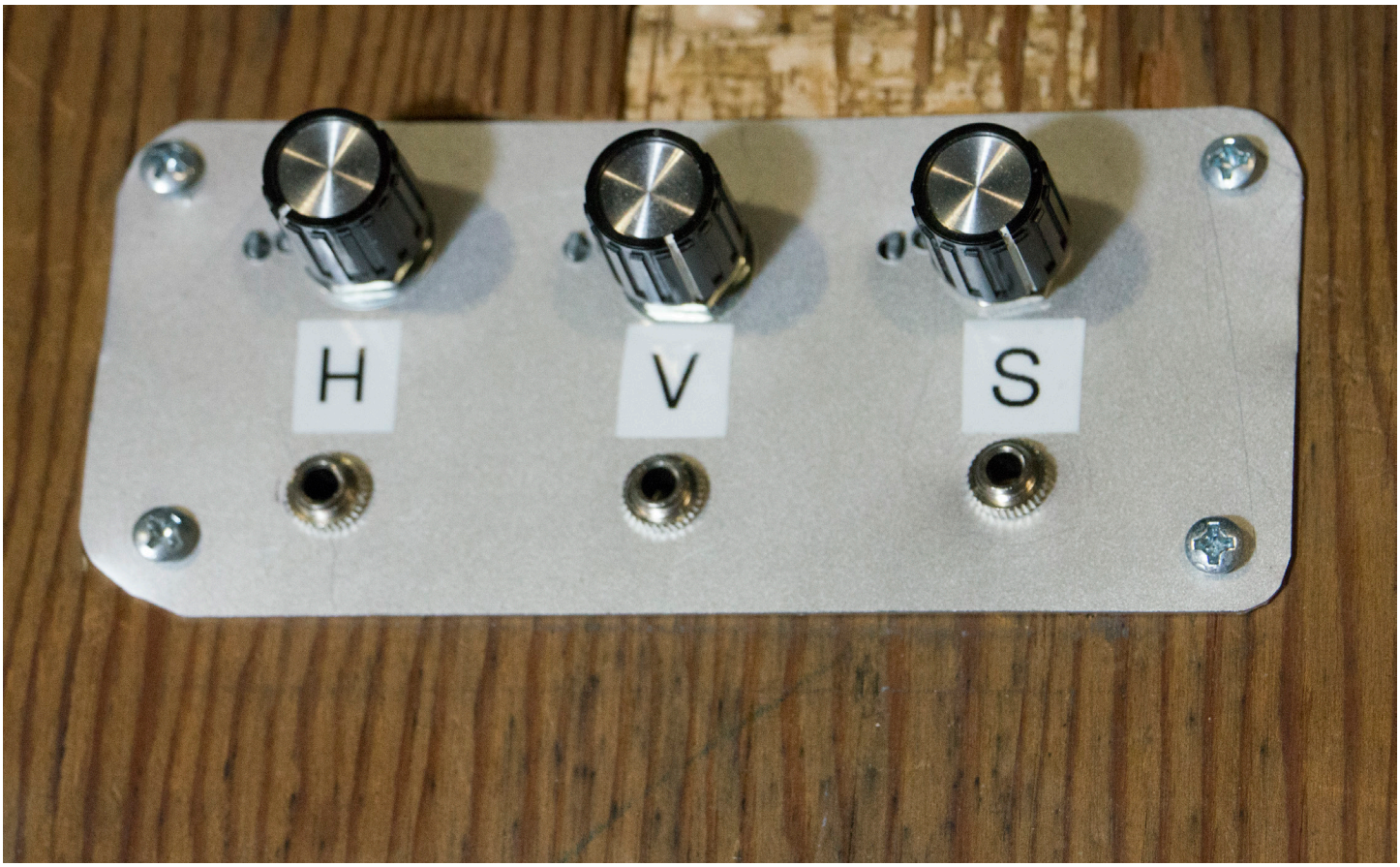
Detail of RTV coating method for High Voltage Wire extension. Note the “Sausage Casing” method for containing silicon using heat shrink.



Detail of barrier strip that connects H, V and S coils to the amplifier speaker wire

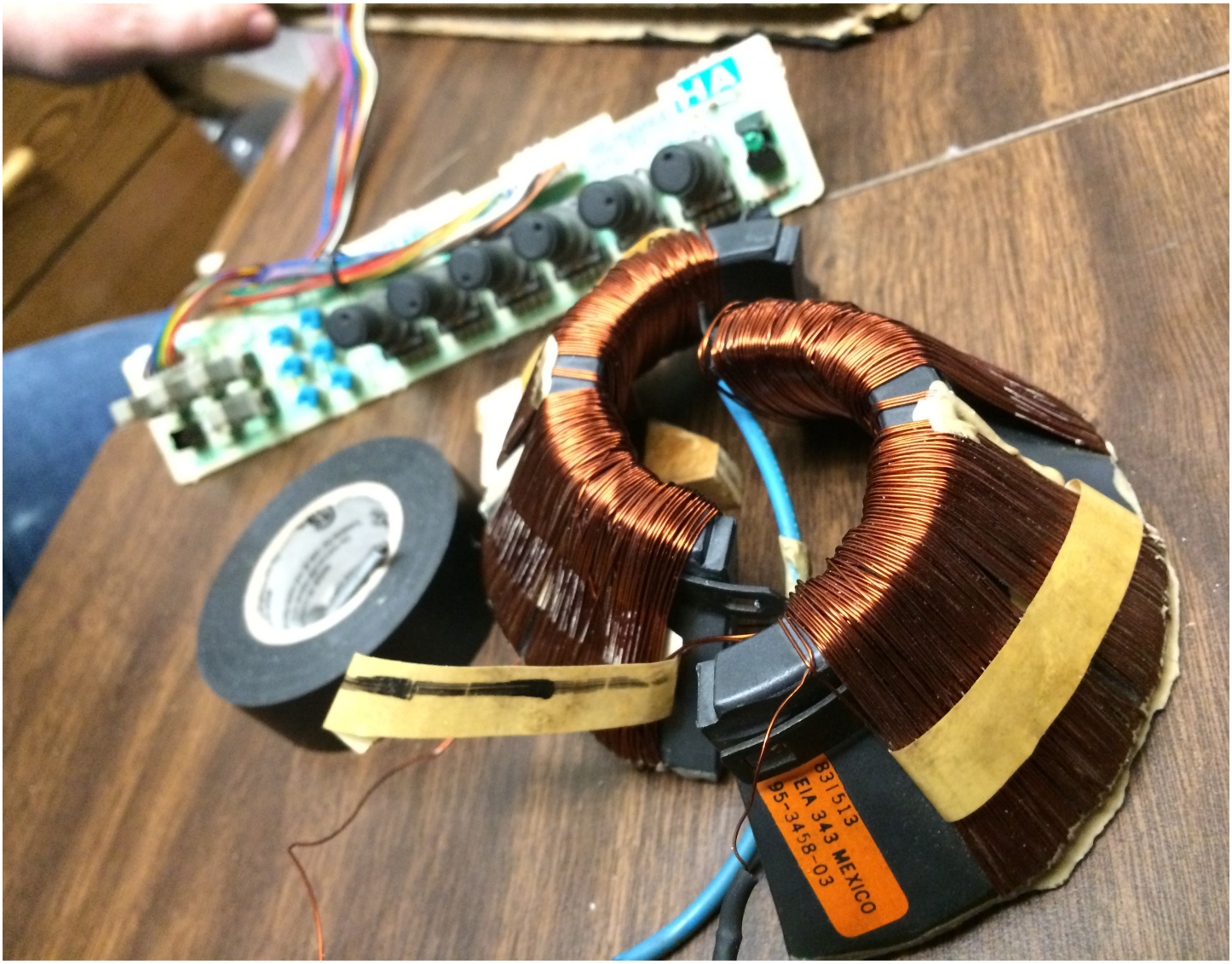


Detail of vertical oscillator on perf board..



Front of panel

Back of panel



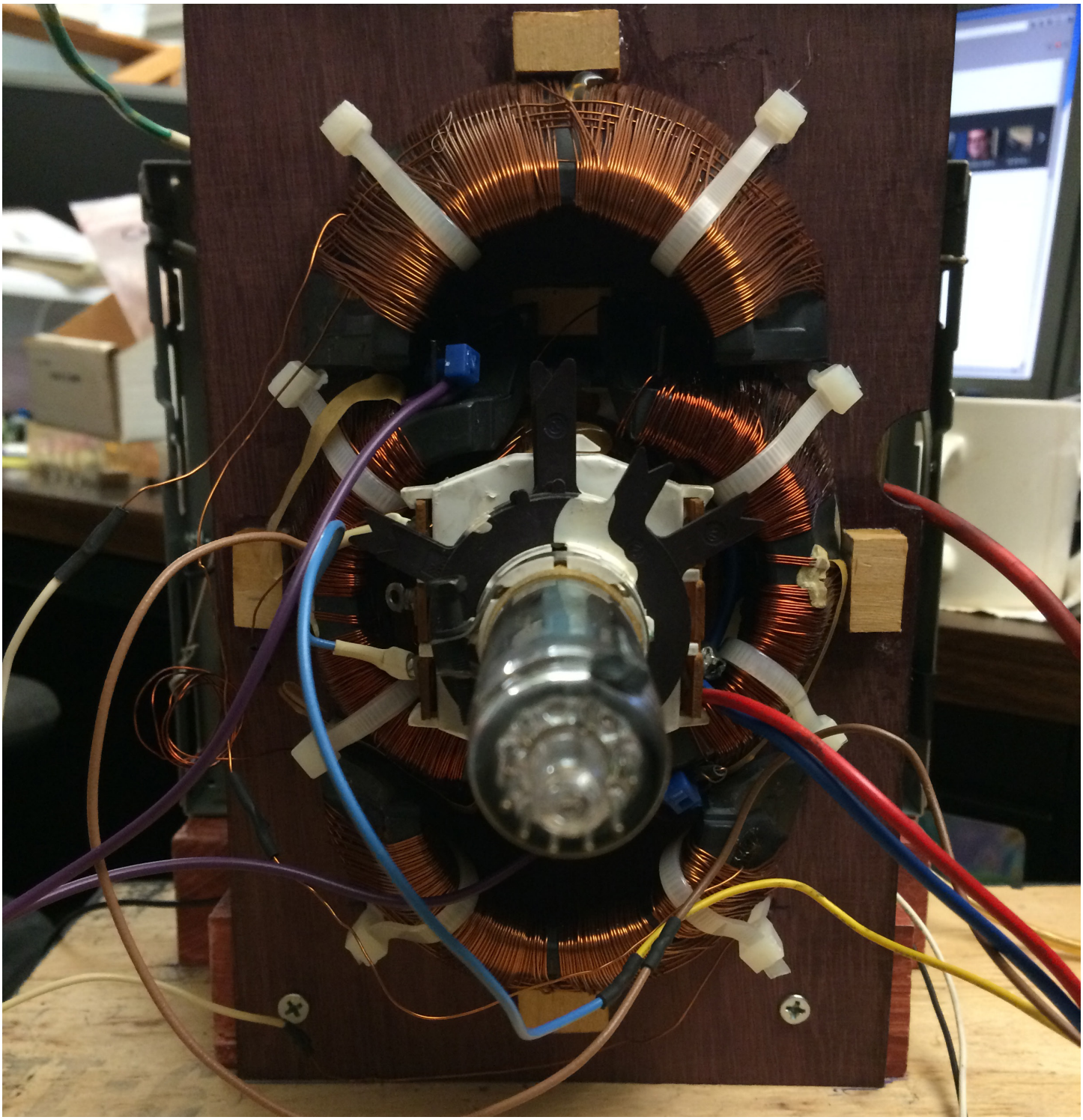
For the other horizontal and vertical deflection method, you must acquire two pairs of vertical coils from other cathode ray tube units. The vertical coil appears to be wound around a solid piece of ferrite. However, you will notice that under the silicon coating between the paired winding, there is a clamp that holds the two sections of wire wrapped ferrite together. Carefully remove this with needle nose pliers, making absolutely sure to not damage or break the wire.

The image above is one pair of continuous wind vertical coils on two pieces of ferrite. This configuration allows you to come from the side of the unit instead from behind, which means that the focusing rings and the board for the electron gun do not need to be cleared.

The next few images on the next pages are details of the paired vertical system of doing the H/V deflection. Note that this requires a lot of planning for the housing of these coils. We used small platforms attached to the housing to properly angle the vertical coils for maximum deflection power. This method, while time consuming, is safer and has a superior deflection to the original method.

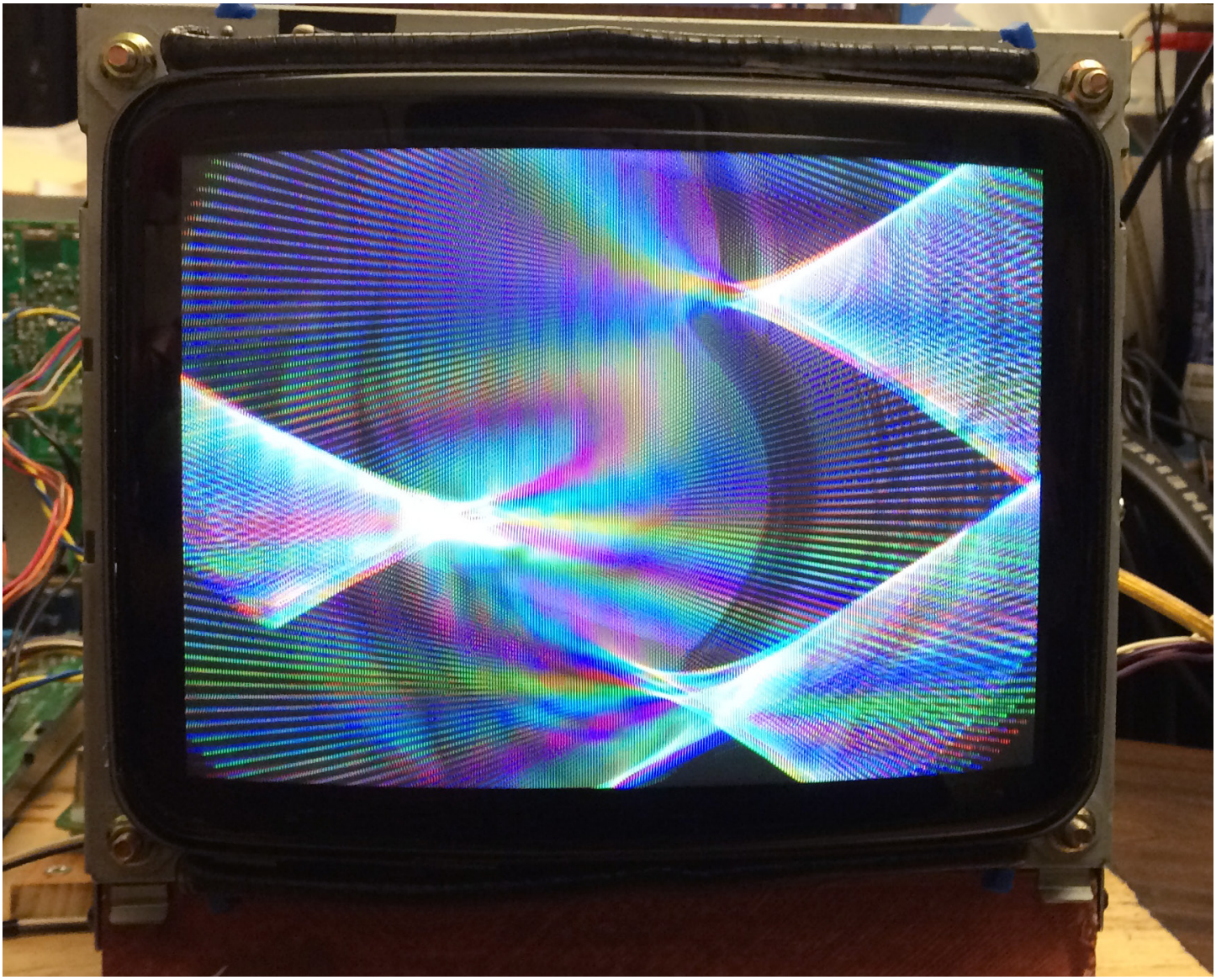
This is the housing for the two vertical yoke system. The wood panel is screwed to the base, and there is a notch in the side to make room for the high voltage wire traveling to the anode cup. The wood blocks help place the coils and angle them properly.

Another detail shot of the vertical housing system



When finally assembled, the two pairs of vertical coils sit 90 degrees around the base of the interior deflection yoke. It took two people to place and secure these yokes correctly. As always, make sure your unit is turned off and unplugged, as this is the most dangerous area of the entire television. Accidentally touching the TV's deflection yoke contacts can result in permanent injury or death.

Fully functioning Sony TV-760 Wobbulator. S-Coil deflection using 60hz sine wave.



Fully functioning Color Wobbulator. S-Coil deflection using 180hz sine wave.