

SUBJECT: Modernization of the CRO-2 Oscilloscope

- Part I - Positive and Negative Sync.
- Part II - Expanding the Internal Sweep
- Part III - Modifying to Permit Use of Model 10-LCP
Low Capacity Probe

The Model CRO-2 is an excellent instrument for use in servicing color receivers without making the following modifications. However, for color receiver manufacturers use and critical waveform observation in servicing, these modifications will be most valuable.

PART I

To enable the operator to have a choice of either a positive or a negative synchronizing signal for better stabilization of the pattern being viewed on the oscilloscope, the circuit has been modified.

SYNC. MODIFICATION PROCEDURE

1. Remove the pilot light assembly and wiring.
2. Remove R-30 (100 K 1/2 w. Resistor).
3. Remove the wire from the Junction of R-29 and R-30.
4. Connect a jumper wire across the terminals where R-30 was removed.
5. Install a single pole double throw toggle switch in the hole in the panel where the pilot light assembly was removed.
6. Replace C-16 (.1 Mfd. condenser) with a 510 Mmfd. condenser.
7. Connect the wire (which was removed from the junction of R-29 and R-30) to the arm of the toggle switch just installed.
8. Connect either one of the two remaining contacts of the switch to Pin #1 of the 1st vertical amplifier.
9. Connect the other contact of the switch in series with the 100 K resistor (which was removed in Step #1) to Pin #2 of the 1st vertical amplifier.
10. Mark the switch positive sync. when the arm of the switch is connected to Pin #1 and negative sync. when the arm connects to Pin #2 of the 1st vertical amplifier.

PART II

To enable the operator to expand and position the pattern being viewed when internal sweep is being used, a positioning potentiometer with an off-on position switch is mounted on the front panel.

When this switch is placed in the ON position and the horizontal selector switch is placed in the Internal Sweep position, the horizontal trace is expanded approximately 4 times, and by rotation of the positioning potentiometer, the linear center part of the trace may be positioned on the viewing screen. The horizontal positioning control may then be used to position the pattern to the center of the screen.

EXPANDED SWEEP MODIFICATION PROCEDURE

1. Locate and drill a $3/8$ " hole midway between the horizontal positioning and focus controls.
2. Install a 500 K potentiometer with a single pole-double throw switch attached into this hole.
3. Ground the counter clockwise terminal of the potentiometer.
4. Connect a wire from the clockwise terminal of the potentiometer to the clockwise terminal of the horizontal positioning control.
5. Connect a 1 megohm $1/2$ watt resistor to the arm of the potentiometer.
6. Connect a 27,000 ohm, $1/2$ watt resistor in series with a 1 meg. resistor just installed.
7. Connect the other end of the 27 K resistor to the switch lug (on the potentiometer) which makes connection to the arm when the switch is in the ON position.
8. Connect a wire from the junction of the 1 meg. and the 27 K resistors to the junction of C-22, C-23, and R-47.
9. Remove the wire from Pin #5 of the horizontal amplifier, V.5.
10. Connect a wire from Pin #5 to the arm of the switch (located on the control just installed).
11. Remove the 1. meg. resistor R-36 and replace with a 3.3 meg. resistor - $1/2$ watt.
12. Connect a wire from the junction of R-36 and C-21 to the remaining contact of the switch.

PART III

Instructions for replacing the vertical input binding posts with a shielded input connector. This change enables the operator to use the Jackson Model 10-LCP low capacitance probe.

1. Remove VERT. INPUT binding post and associated GND binding post from front panel.
2. Lay out hole locations on front panel as shown on attached drawing of lower left hand panel section.
3. Drill connector mounting hole as shown on drawing using #27 drill.
4. Cut 7/8" clearance hole for connector as shown on drawing. It is suggested that a 3/8" hole be drilled on center and a 7/8" socket punch used to enlarge hole to 7/8".
5. An Amphenol type 78-PCG5 shielded connector is inserted from rear into the 7/8" clearance hole and secured by means of 6-32 machine screws and nuts.
6. Internal connections to shielded input connector are listed below:

Pin #1 - Plate voltage necessary for operation of Low Capacity Probe, Model 10-LCP, is taken from the low voltage power supply at the junction of filter choke L-10 and filter condenser C-32 through the 12,000 ohm resistor R-82 and applied to Pin #1 which is by-passed to chassis ground through C-48 and C-49.

Pin #2 - No connection.

Pin #3 - Vertical input capacitor C-1 which formerly was connected to vertical input binding post is connected to Pin #3.

Pin #4 - Connected to chassis ground.

Pin #5 - Supplies heater voltage for low capacity probe and is connected to heater circuit at "X".

7. It will also be necessary to replace the spade lugs which now terminate your input cable with an Amphenol 91-MPM5L cable connector. Connections are made in the following manner:

Pin #1 - No connection.

Pin #2 - No connection.

Pin #3 - Center conductor of coax.

Pin #4 - Outer braid of coax.

Pin #5 - No connection.

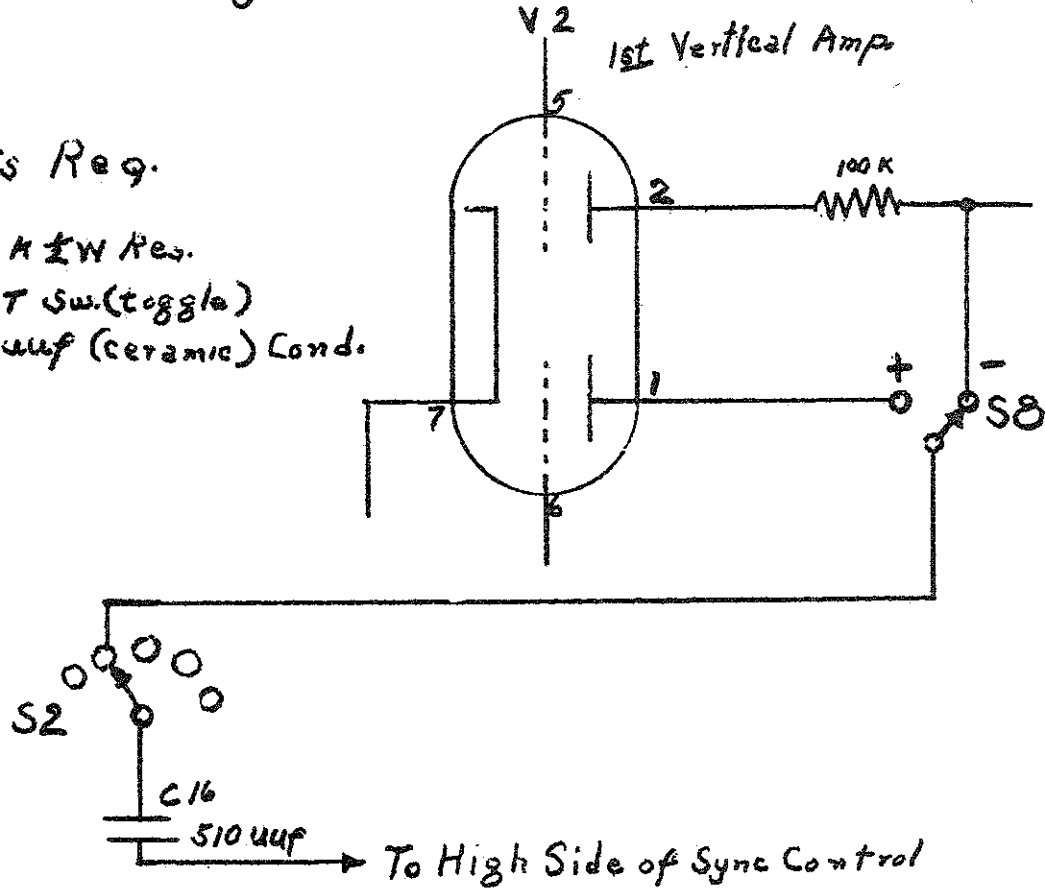
Your Model CRO-2 should now provide performance unequalled by any oscilloscope in the low price field.

April 19, 1954

Sync Modification Schematic

Parts Req.

- 1- 100K $\frac{1}{2}$ W Res.
- 1- SPDT Sw.(toggle)
- 1- 510uuf (ceramic) Cond.



Horizontal Expansion Schematic

Parts Req.

- 1- 500K Potentiometer Linear Taper
- 1- with SPDT Sw. Attached
- 1- 27K $\frac{1}{2}$ W Res.
- 1- 1Meg. $\frac{1}{2}$ W Res.
- 1- 3.3Meg. $\frac{1}{2}$ W Res.

