

RAYTHEON COMPUTER
CUSTOMER SERVICE CHANGE ORDER

C.S.C.O. No. 32

Company Name _____

Company Address _____

Serial Numbers Affected All

Previous C.S.C.O. Necessary None

Subject Delay Lines Adjustment

Purpose To standardize delay line adjustment procedure

Change Made By _____

Date Completed _____

Test Equipment Required:

- Oscilloscope: Tektronix type 535 or 545 or equivalent
- Plug in Unit: Tektronix type CA or equivalent
- Probes: Tektronix type P6006 (2 each) or equivalent

Procedure:

Perform all adjustments in the order listed, see figure 1 for identification of points referred to.

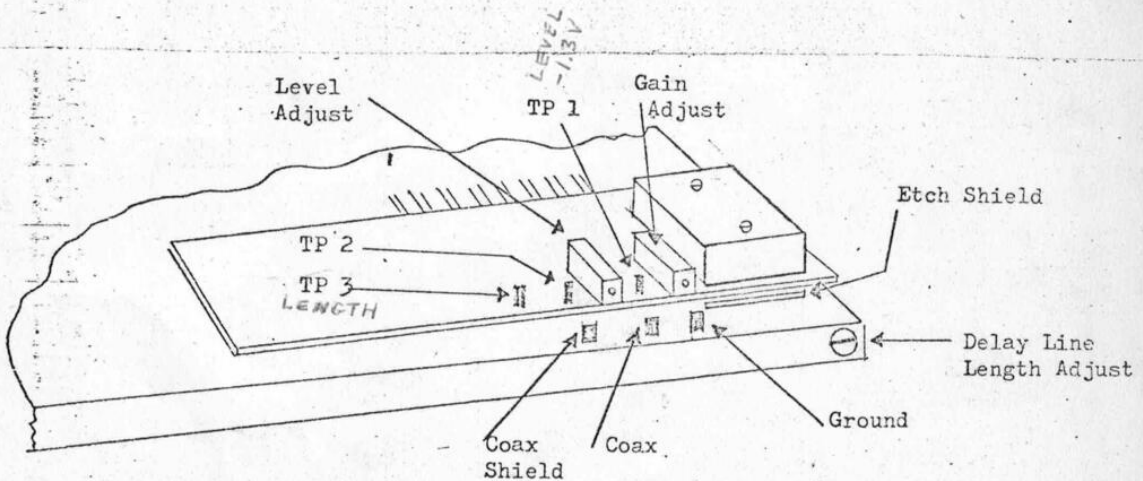


FIGURE 1

A. MSR 1 Length Adjustment

1. Coarse Adjustment:

Scope Setting: Horiz. Display: A Time Base
Time/Cm: .1 Ms/Cm
Triggering Mode: DC
Trigger Slope: - Ext.
Stability: Preset
Trigger Input: Cs (test panel 2E06)
Plug In Setting: Mode: A ONLY
Volts/Cm: .5 scale
Channel A Mode: DC, normal polarity
Channel A Input: Tp 3 of memory line

Insert random information into the line by wiping your finger across the coax connection of the line. The wave shape seen should be stable as shown in figure 2.

Note: width of pulses will depend upon information in the line, amount of pulses seen will depend upon sweep length

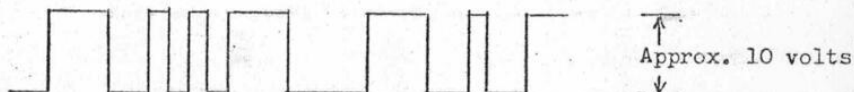


FIGURE 2

If the wave shape drifts adjust the delay line length adjustment until the pulse train is stable. After drifting stops turn the adjusting screw one full turn in the same direction as that which stopped the drifting. Check all MSR 1 delay lines for correct coarse length adjustment.

2. Fine Adjustment:

Scope Setting: Horiz. Display: A Time Base
Time/Cm: .1 us/Cm, calibrated
Triggering Mode: DC
Trigger Slope: - Ext.
Stability: Preset
Trigger Input: P24 (test panel 3E04)
Plug In Setting: Mode: Alternate
Volts/Cm: .5 scale
Channel A & B Mode: DC, normal polarity
Channel A Input: Tp 3 of memory line
Channel B Input: 19E06 (memory clock)

Note: In making the fine length adjustment certain precautions should be taken. If the line is a sealed line manufactured by Ferranti, Delttime or Anderson initially adjust the line to be .3 microseconds shorter than the correct delay. This is done by turning the length adjustment screw in the clockwise direction. The final length adjustment should be made with a counter-clockwise rotation of the adjusting screw.

Adjust length adjustment screw until wave shape is obtained as shown in figure 3.

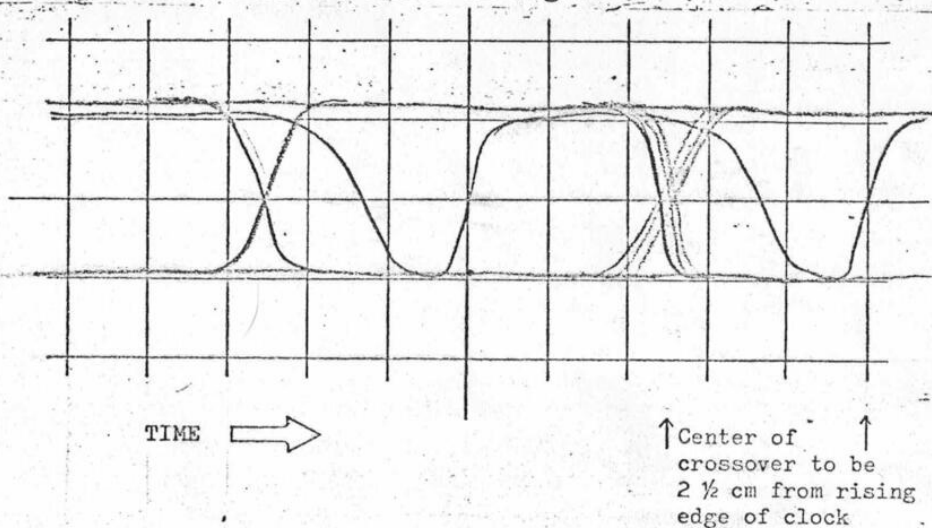


FIGURE 3

3. Dispersion Width Check:

Switch plug in Mode to A ONLY. Examine wave shape for correct width as shown in figure 4.

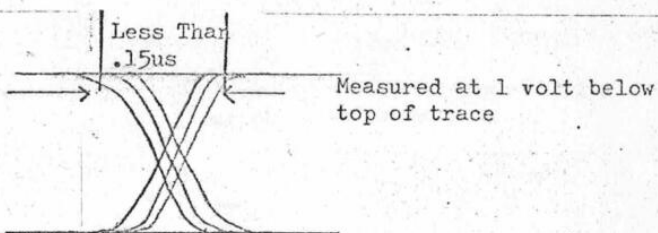


FIGURE 4

If the width of the dispersion is greater than .15 us the line should be removed for repair.

Check all MSR 1 for correct fine delay length adjustment and dispersion width.

B. MSR 1 Level

Scope Setting: Horiz. Display: A Time Base
Time/Cm: .2 us/Cm
Triggering Mode: DC
Trigger Slope: - Ext.
Stability: Preset
Trigger Input: P24 (test panel 3E04)
Plug In Setting: Mode: A ONLY
Volts/Cm: .1 scale
Channel A Mode: AC, normal polarity
Channel A Input: Tp 1 of memory line

Turn computer power off and then on to clear all memory memory lines to zero. Change input to plug in from AC to DC. The level should shift to -1.3 volts on DC. If it does not, turn Level Adjust Trimptot to obtain -1.3 volts shift.

Check all MSR 1 for correct level adjustment.

C. MSR 1 Gain

Scope Setting: Horiz. Display: A Time Base
Time/Cm: .2 us/Cm
Triggering Mode: DC
Trigger Slope: - Ext.
Stability: Preset
Trigger Input: P24 (test panel 3E04)
Plug In Setting: Mode: A ONLY
Volts/Cm: .1 scale
Channel A Mode: DC, normal polarity
Channel A Input: Tp 1 of memory line

With a jumper lead connect Tp 3 of memory line to P24. Wave shape obtained should be as shown in figure 5.

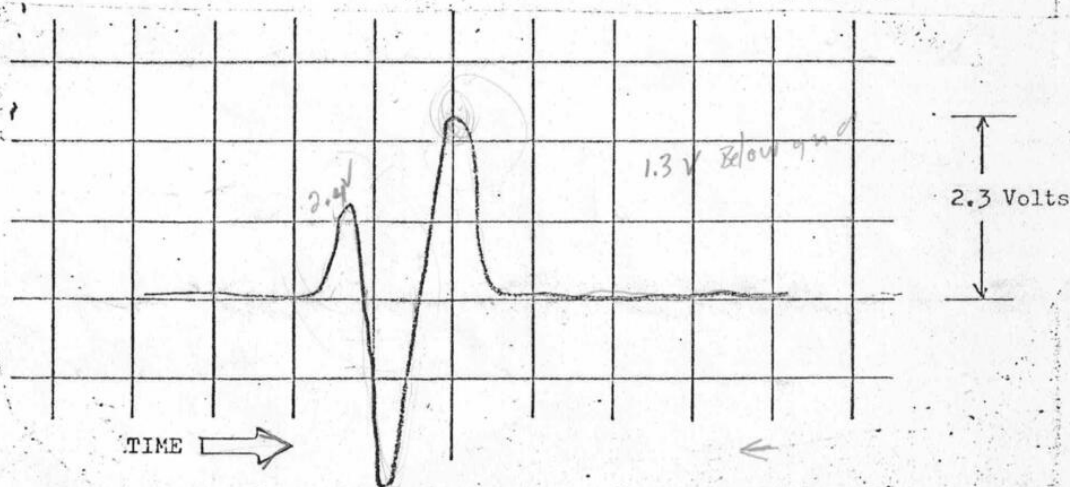


FIGURE 5

Adjust the pulse second in time for +2.3 volts amplitude with the Gain Adjust Trimpot. If +2.3 volts cannot be obtained remove the line for repair.

Check all MSR 1 for correct gain adjustment.

This completes the adjustments of MSR 1.

D. MSR 2 Length Adjustment

1. Coarse Adjustment:

Scope and Plug In Settings: Same as step A-1

This adjustment is only for the modules located at 7D, 14D, 22D and 2B. The module located at 7A will be adjusted later.

Insert random information into the line by touching a screwdriver to the coax connection of the line. The wave shape seen should be stable as shown in figure 2.

If the wave shape drifts adjust the delay line length adjustment until the pulse train is stable. After drifting stops turn the adjusting screw one full turn in the same direction as that which stopped the drifting. Check all MSR 2 delay lines for correct coarse length adjustment.

2. Fine Length Adjustment:

Scope and Plug In Settings: Same as step A-2

Note: In making the fine length adjustment certain precautions should be taken. If the line is a sealed line manufactured by Ferranti, Delttime or Anderson initially adjust the line to be .3 microseconds shorter than the correct delay. This is done by turning the length adjustment screw in a counter-clockwise direction. the final adjustment should be made with clockwise rotation of the adjusting screw

Adjust length adjustment until waveshape is obtained as shown in figure 6.

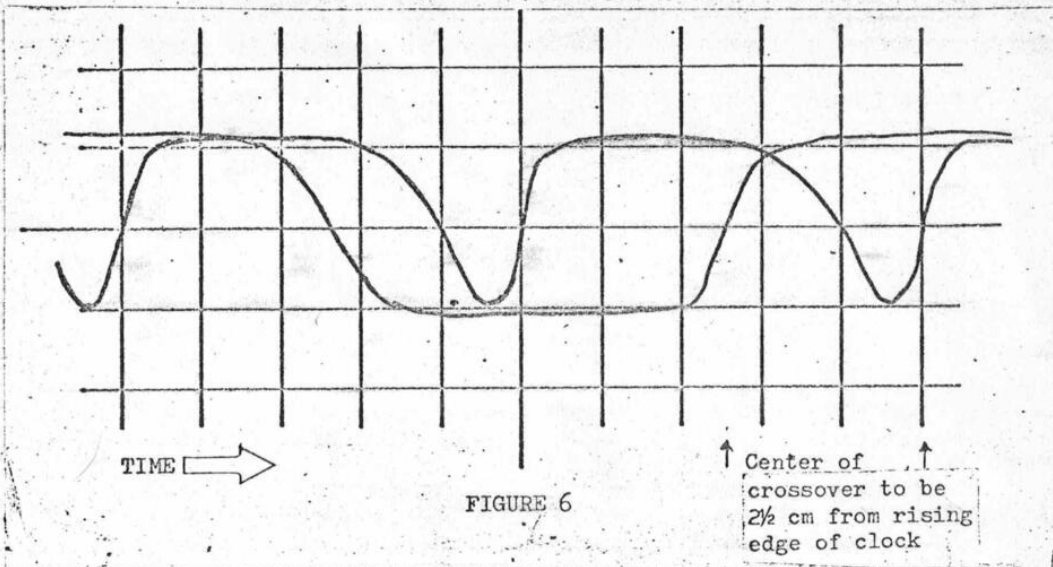


FIGURE 6

E. MSR 2 Level

Scope and Plug In Settings: Same as step B

Adjustment procedure is the same as step B.

F. MSR 2 Gain

Scope and Plug In Settings: Same as step C

Adjustment procedure is the same as step C.

G. Module 7A Adjustment:

Exchange the modules located at 2B and 7A. Perform adjustment steps D, E and F on the module now located at 2B. When completed with step F restore the modules 7A and 2B to their original positions.

This completes adjustment of all delay lines.

H. Helpful Hints

When making the gain adjustment sometimes it is very difficult to insert P24 into the line. This is not an indication of a bad line. It may help to insert a small capacitor in series with the P24 lead or to wet your finger and touch it to Tp 3 at the same time that you touch P24 to Tp 3. If the wave shape obtained is correct but very faint this is all right. It just means that you did not insert P24's into every word of the memory line.

If the adjustment of the line appears correct but the line still fails intermittently check that the

two mounting studs on the etch shield have been filed to remove the anodizing and are making good contact with the etch.

Also insure that C.S.C.O. #39 has been installed if necessary.