

December 26, 1979

Ed Cleary
Mail Station 92-815
Tektronics
P.O. Box 500
Beavertron, Oregon 97077

Mr Cleary:

I am enclosing some information pertaining to the differential linearity of the 5370A which I hope you will find useful.

The differential linearity measurement was made by observing the variation of output Δ t.i. for the same input Δ t.i. as a function of the t.i. This parameter, unfortunately, is not specified at the moment for the 5370A. The measurement set up is also enclosed.

I am grateful for your bringing this measurement to our attention. Please contact me if you think I can be of help in any way.

Sincerely,



David Chu
R&D Project Leader, 5370A

DC/de
Enclosures

5370A DIFFERENTIAL LINEARITY MODIFICATION

There are three known ways differential non-linearity is generated in the 5370A:

1. Crosstalk between strip lines going from Schmitt Trigger outputs (XA4:U1,U2) to the Arming Board (XA22) amplifier inputs (U19,U20).
2. Crosstalk between strip lines going from the Multiplexers (XA22:U15,U16), to the START and STOP flip-flops (U17,U21)
3. Modulation of the 200 MHz reference at and by the mixer inputs (XA19,20:U7).

Differential nonlinearity due to 1 and 2 is observable only in instances where signals are simultaneously active near trigger points. The errors can be well over 100ps. Non-linearity due to 3 is generally less than 100 ps, but is present constantly, being somewhat periodic in 5.02 ns cycles.

The modifications which is found to be useful in reducing error in type 1 are:

XA4 Schmitt Trigger Board (05370-60004):

- ~~(a)~~ Add 4.7 pF cap from pin 13 to pin 15 of U1.
- ~~(b)~~ Add 4.7 pF cap from pin 13 to pin 15 of U2.
- ~~(c)~~ Change R42 from 160 to 200 ohms.
- ~~(d)~~ Change R44 from 160 to 200 ohms.

Type 2 error is reduced by the following modification:

XA22 Arming Board (05370-60022):

- ~~(e)~~ Add 4.7 pF cap from pin 1 to pin 3 of U15.
- ~~(f)~~ Add 4.7 pF cap from pin 1 to pin 3 of U16.
- ~~(g)~~ Change R81 from 464 to 383 ohms.
- ~~(h)~~ Change R86 from 464 to 383 ohms.
- ~~(i)~~ Add 300 ohm resistor from J7 to GND.
- ~~(j)~~ Add 300 ohm resistor from J8 to GND.
- ~~(k)~~ Add 51 ohm series R to pin 15 of U15.
- ~~(l)~~ Add 51 ohm series R to pin 15 of U16.

Type 3 error can be minimized by modifications below:

XA19,20 Interpolator Assembly (05370-60119):

- ~~(m)~~ Add series R 51.1 ohm to mixer D input (pin 3 U7)
- ~~(n)~~ Add series R 51.1 ohm to mixer C input (pin 13 U7)
- ~~(o)~~ Change R17 from 51 to 100 ohms.
- (p) Change R28 from 38.3 to 51.1 ohms.

* improvement more pronounced