X3T9.2/91-215

AERONICS INC.

Memorandum December 9, 1991

FORWARDED TO JOHN LOHMEYER, X3T9.2

To: Bill Spence, X3T9

From: Steve Ego

Subject: FPT sustained currents

Bill:

Based off our last discussions, I've had time to think about what you and others have said regarding the FPT. I guess on the issue of driver currents we will end up dead locked, or at least for now.

As we have seen, based on Robert Allgoods' reports, is that the FPT in its present configuration can source upwards of 60 mA's of current, at low assertion voltages and high V_{TERM} levels. I think we all agree on this fact. Points to ponder though.... V_{TERM} in a typical SCSI system should never run at 5.25 V. If configured the way X3T9 suggests, having the diode isolation V_{TERM} would never exceed the 4.6 to 4.7 V range. At these voltages FPT draws very little extra current, fact.

In addition to the above, it is understood that a 74F38 is a typical SCSI open collector driver. What has yet to be pointed out is that the rating of 48 mA's is the "military" rating for this device. The "commercial" rating is 64 mA's (which by the way we never exceed). It should also be noted, that the absolute maximum rating is twice the rated I_{OL} (mA). This would be 128 mA's for the commercial rating and 96 mA's for the military rating. I believe this point should also be made. The difference between the two is operating temperature. If the commercial rating is 48 mA's, what is the militaries.... 20 mA's?

Based on the above points alone, there is no reason for FPT not to be adopted by X3T9.

If this cannot be accomplished we have modified our regular FPT to a "Model C" configuration per your suggestion. In this configuration we have added current limiting to the clamp circuit. The results of this current limiting in a typical system installation are shown in this document. You will see that the sustained current now only reaches the 24 mA level. Yet, when you compare the wave shapes against the 220/330 and Boulay terminators, the FPT still outperforms them. FPT provides an additional 400 millivolts noise immunity. Quite impressive!

The wave shapes that follow, were taken under the following conditions;

System: IBM PC AT

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SCSI System:	Seagate
Cable:	Madison 4099 SCSI 2
Impedance:	75 Ohms
Length:	10 Meters
Ext Devices:	2, 84 Megabyte Drives
SCSI Driver:	TI P/N CF61891FN
DSO:	Tektronix 2440
V Probe:	P6137
I Probe:	P6021

FPT circuit modification is as follows;

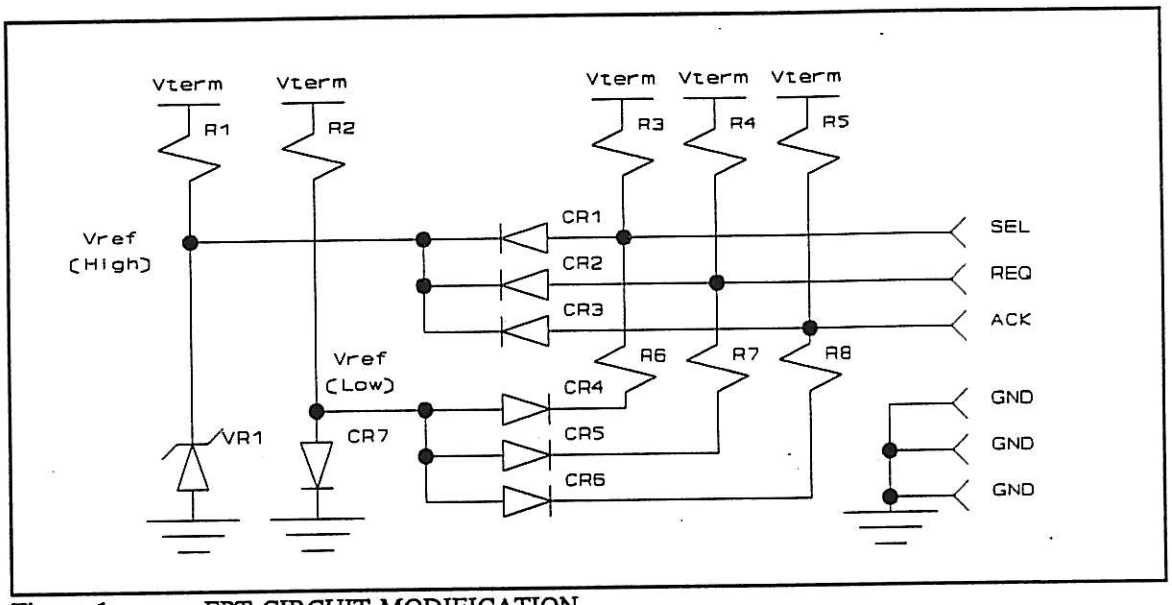

Figure 1: FPT CIRCUIT MODIFICATION
R_6, R_7 AND R_8 ADDED, 45.3 OHMS EACH

Simple change, great results! Hope this makes everyone happy.

Sincerely,

Steve Ego

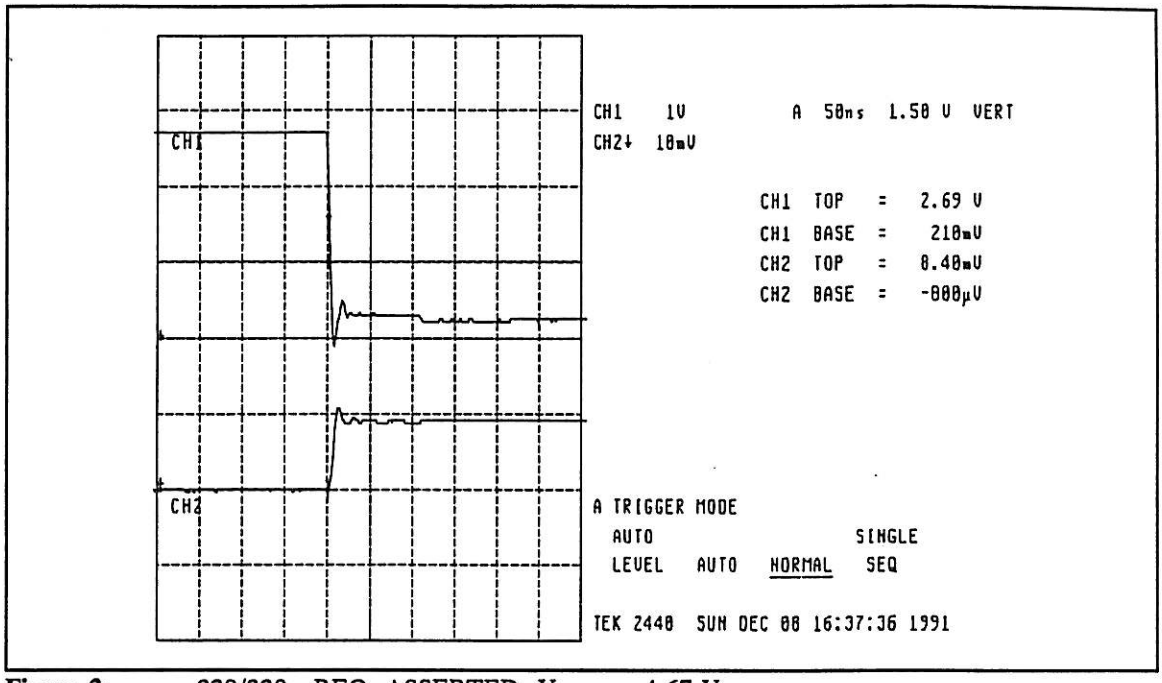

Figure 2: 220/330, -REQ, ASSERTED, V_{TERM} = 4.67 V
CH1 = VOLTAGE TRACE, 1V / DIV
CH2 = CURRENT TRACE, 20mA / DIV, $I_{SUSTAINED}$ = 18.4 Ma

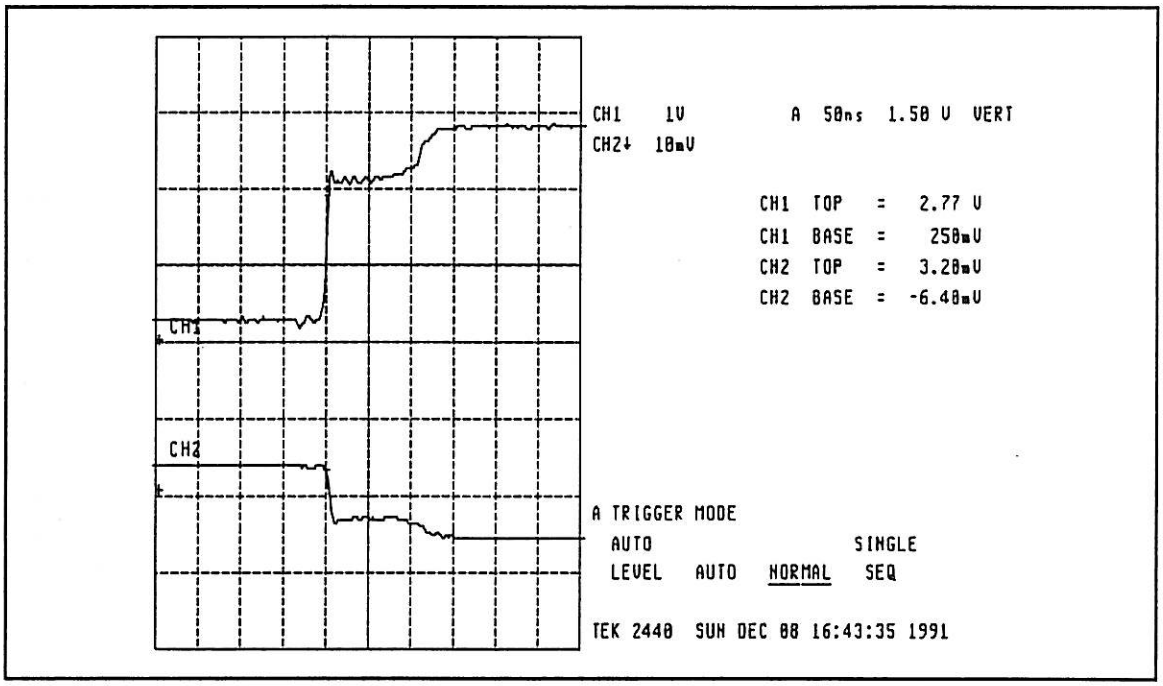

Figure 3: 220/330, -REQ, DE-ASSERTED, V_{STEP} = 2.04 V

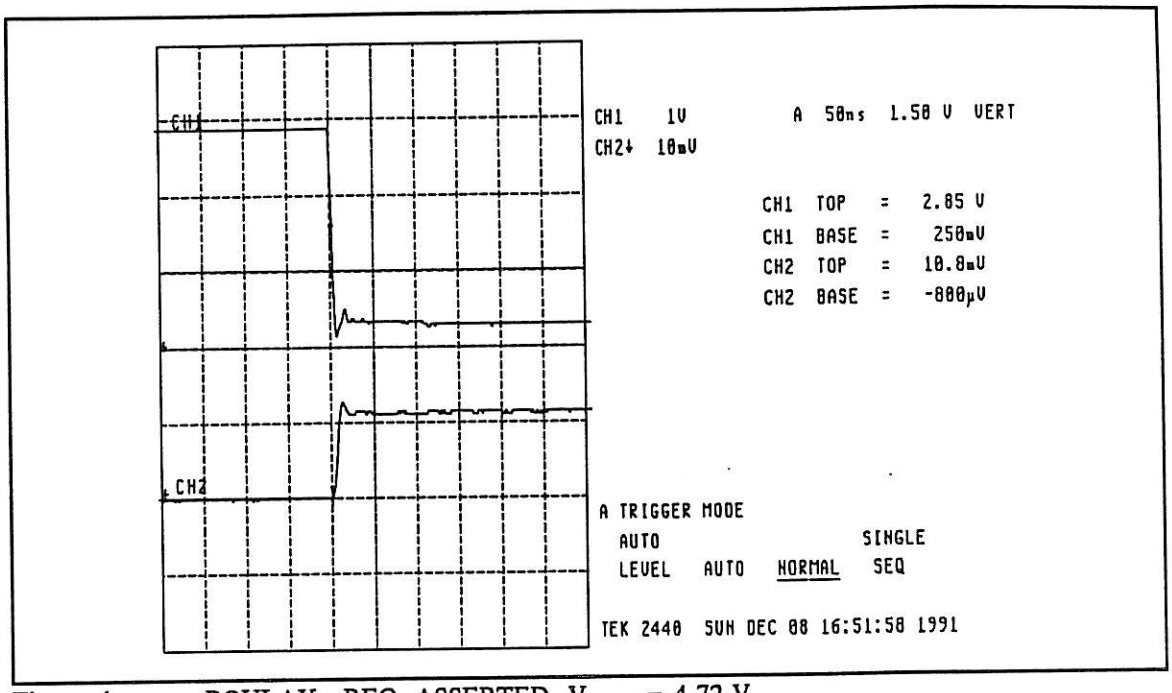

Figure 4: BOULAY, -REQ, ASSERTED, V_{TERM} = 4.72 V
CH1 = VOLTAGE TRACE, 1V / DIV
CH2 = CURRENT TRACE, 20mA / DIV, $I_{SUSTAINED}$ = 23.2 mA

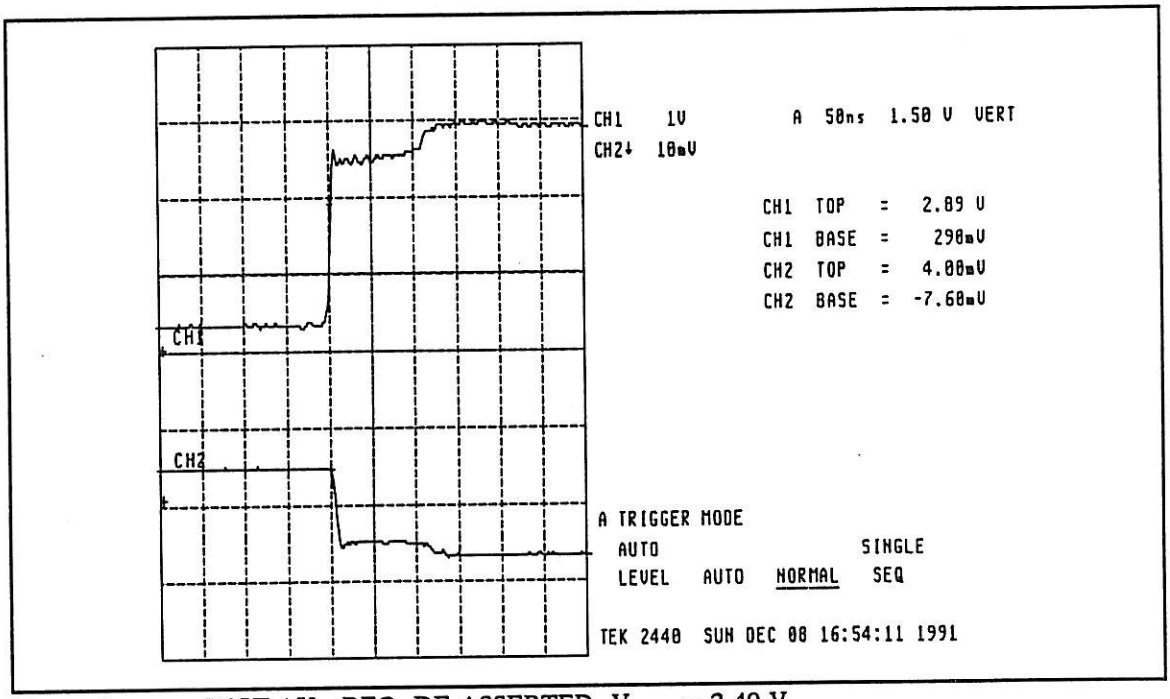

Figure 5: BOULAY, -REQ, DE-ASSERTED, V_{STEP} = 2.40 V

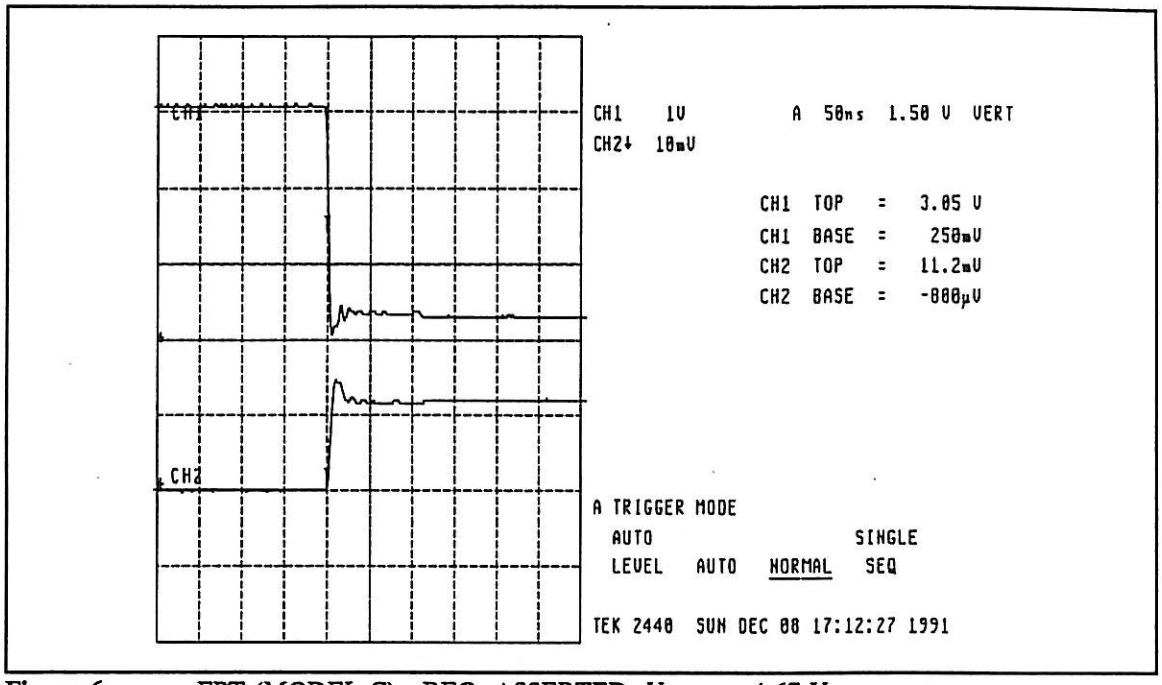

Figure 6: FPT (MODEL C), -REQ, ASSERTED, V_{TERM} = 4.67 V
CH1 = VOLTAGE TRACE, 1V / DIV
CH2 = CURRENT TRACE, 20mA / DIV, $I_{SUSTAINED}$ = 24.0 mA

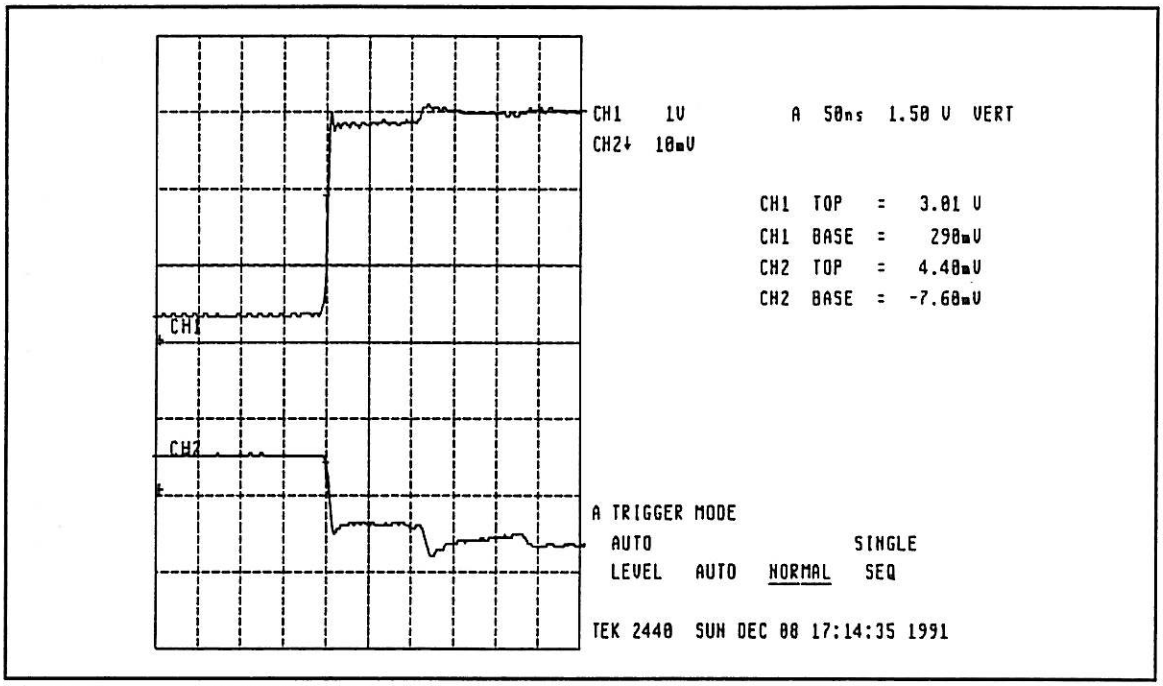

Figure 7: FPT (MODEL C), -REQ, DE-ASSERTED, V_{STEP} = 2.82 V

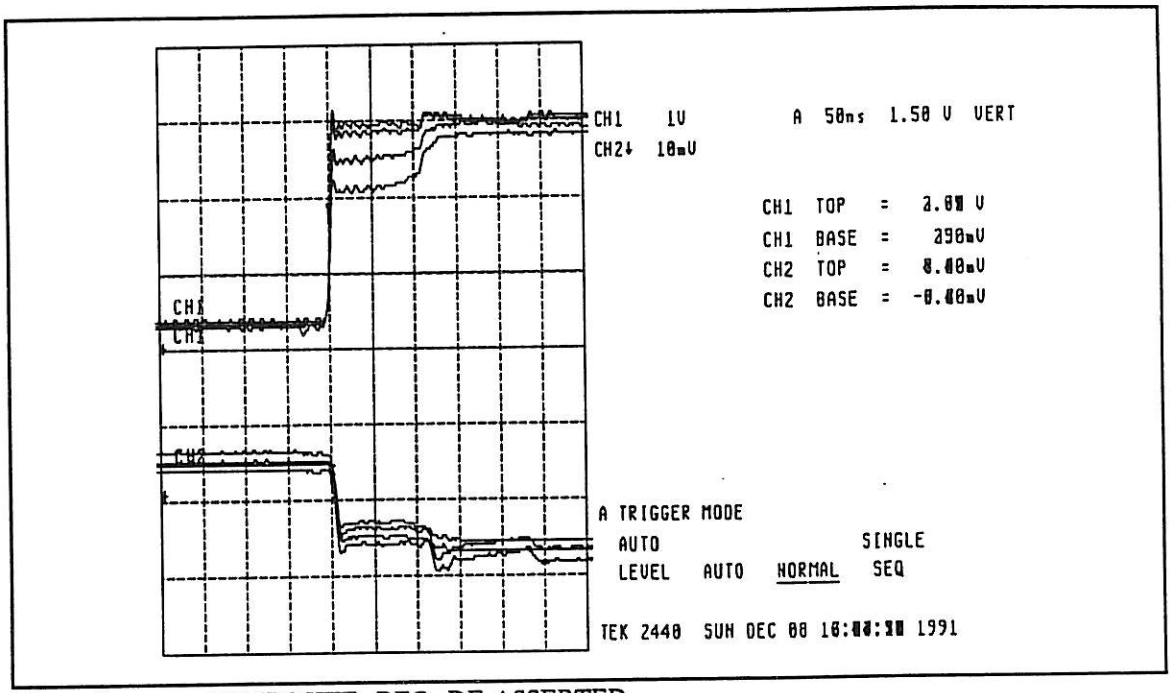

Figure 8: COMPOSITE -REQ, DE-ASSERTED
ALL FOUR (4) TERMINATORS SHOWN

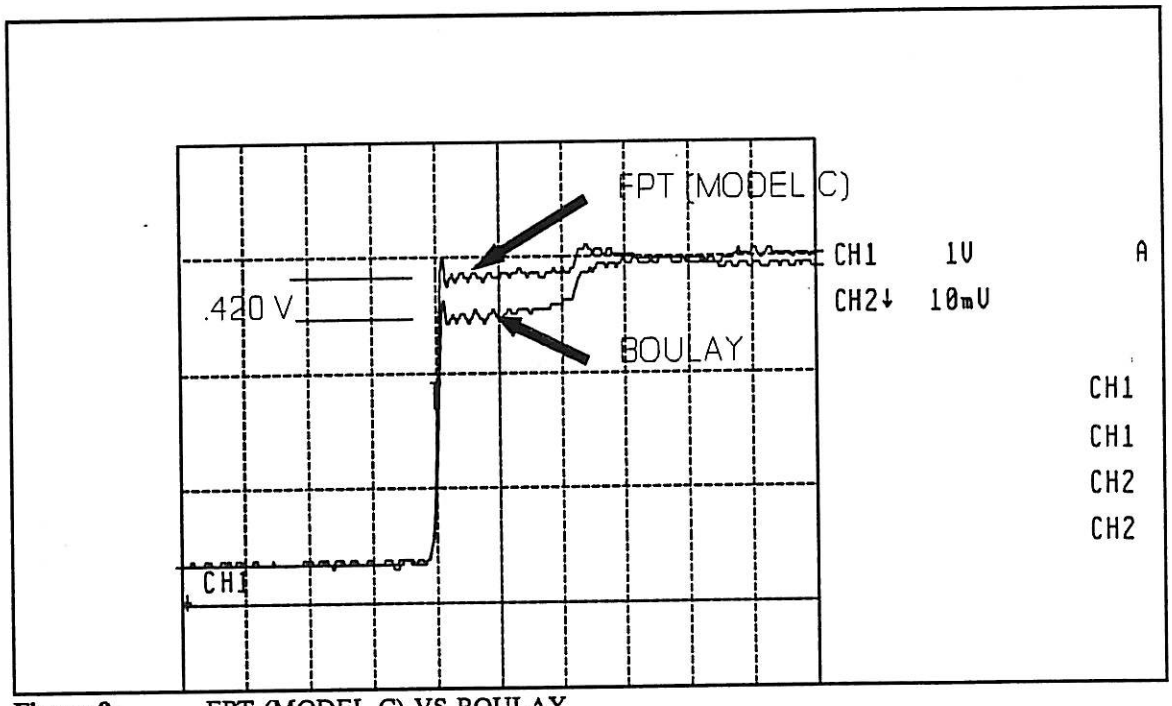

Figure 9: FPT (MODEL C) VS BOULAY