

07/16/2022 - Saturday - Using a HP-7090A Plotter to Characterize a Relay

This see through relay has the following markings:

OEG SRE-202D
C0123
LR74323

It coil was measured to be 160 ohms.

The HP-7090A plotter has three recording channels. It will collect 1000 points per channel. Its update rate depends on the total time selected. It fastest time is 0.03 seconds. Therefore, the update time is 0.00003 sec which provides an update rate up to 33,333 Hz.

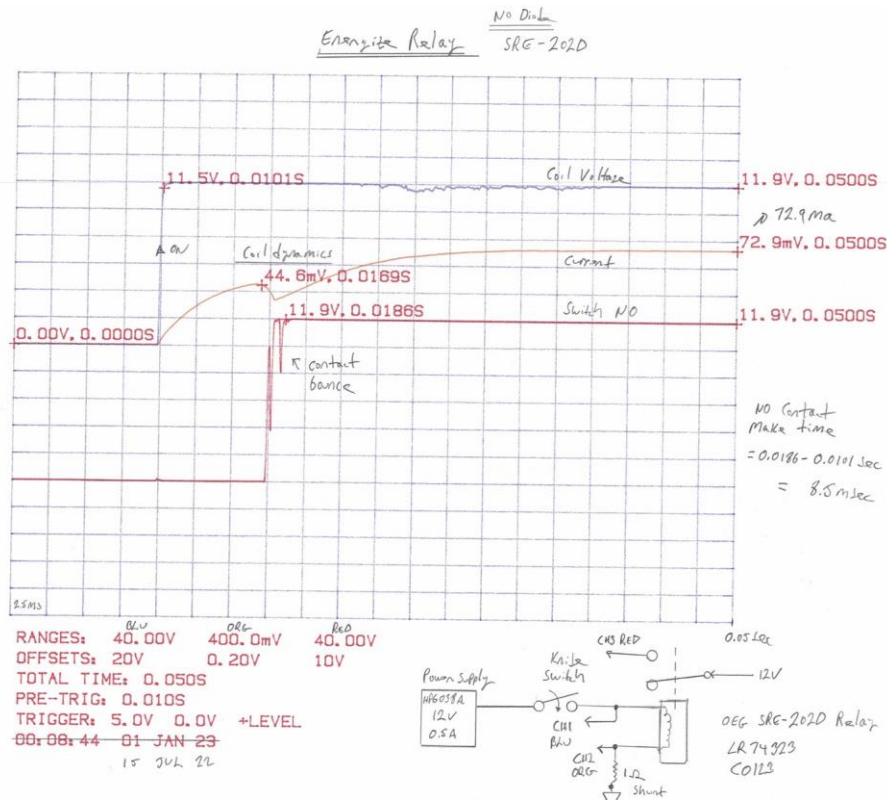
Rather than using an oscilloscope, this tools is more convenient for testing out slower devices such as a relay. This is because it gives you a nice paper copy that you can used for your documentation and you can write on it.

NO = Normally Open Contact
NC = Normally Closed Contact

Plot 1 - Energize the relay with no diode. (Current)

Coil Current = 72.9 mA

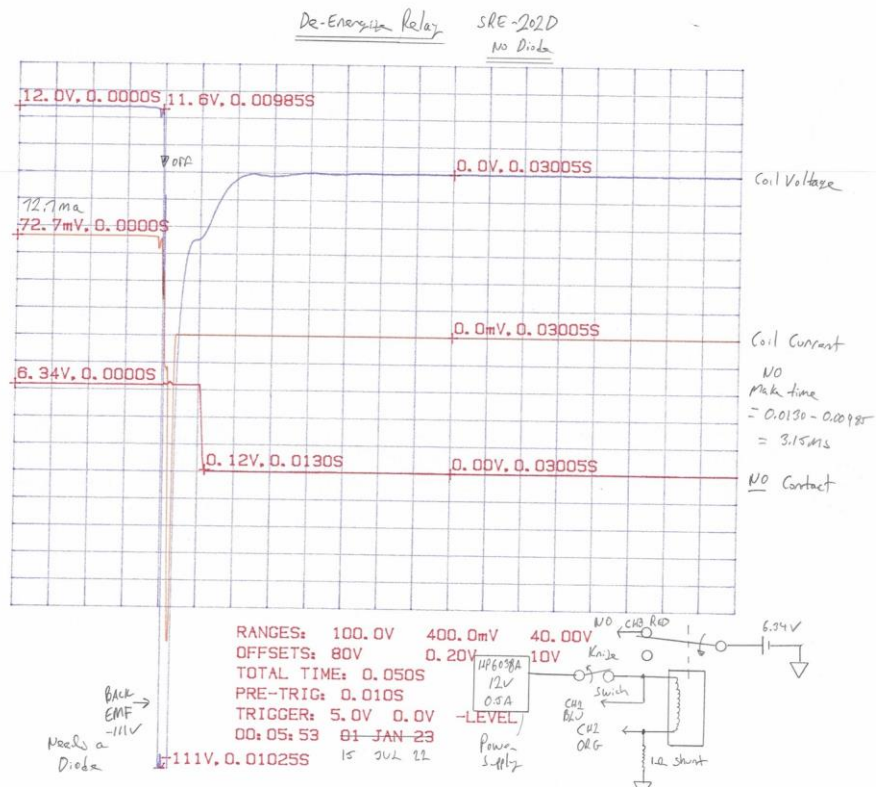
NO Switch time = 8.5 msec.



Plot 2 - De-Energize the relay with no diode. (Current)

Back EMF High

NO Switch time = 3.15 msec.



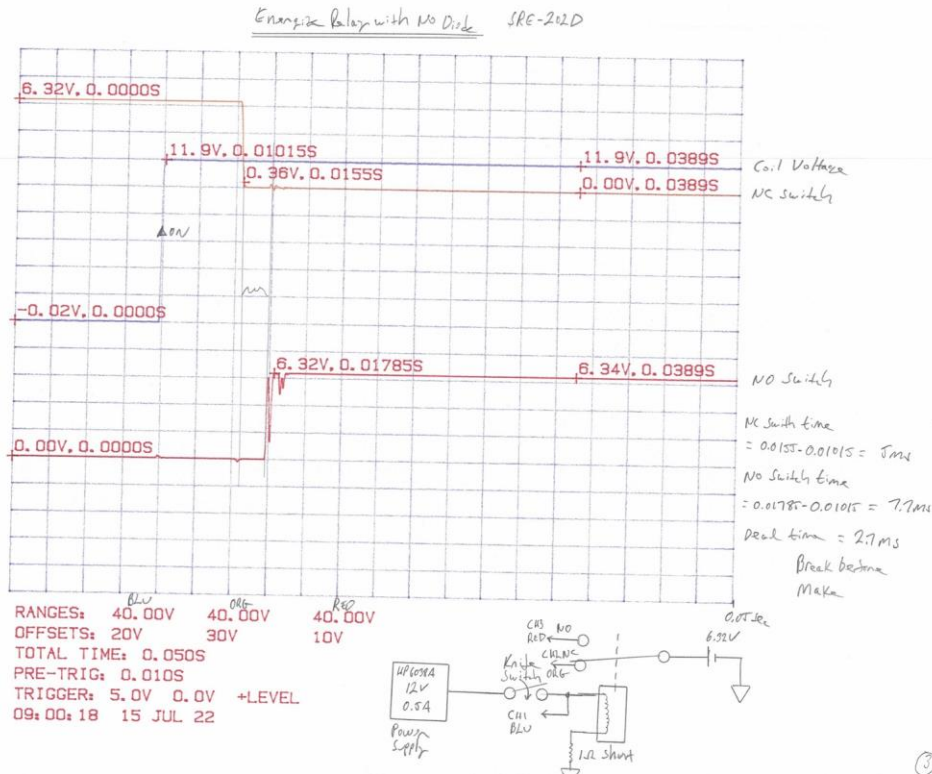
Plot 3 - Energize the relay with no diode. (Contacts)

NO Switch Time = 7.7 msec

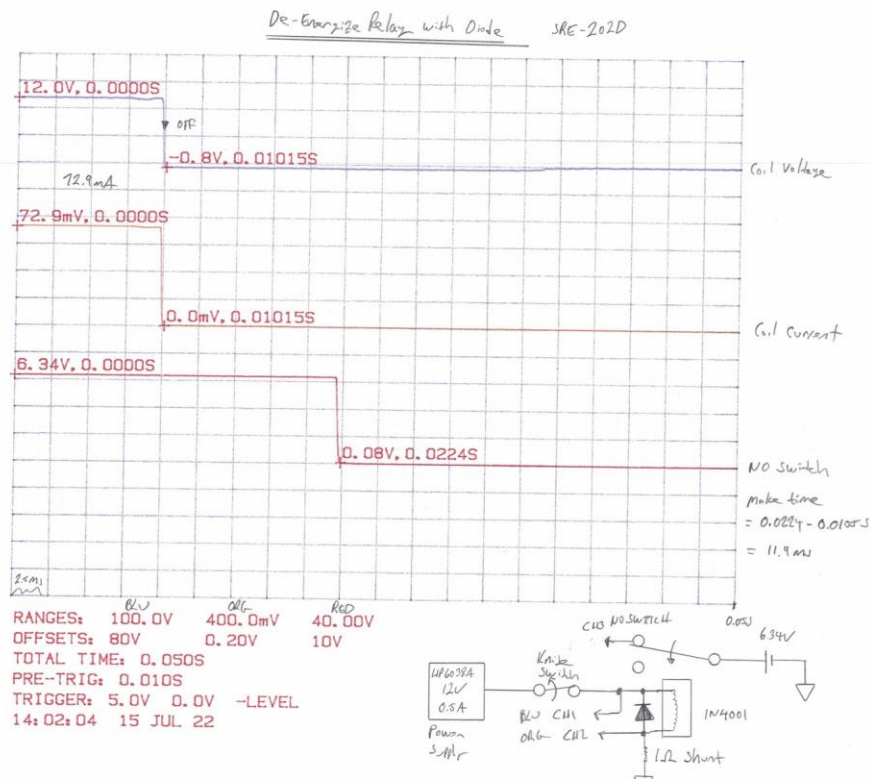
NC Switch Time = 5 msec

Dead Time = 2.7 msec

Break before Make

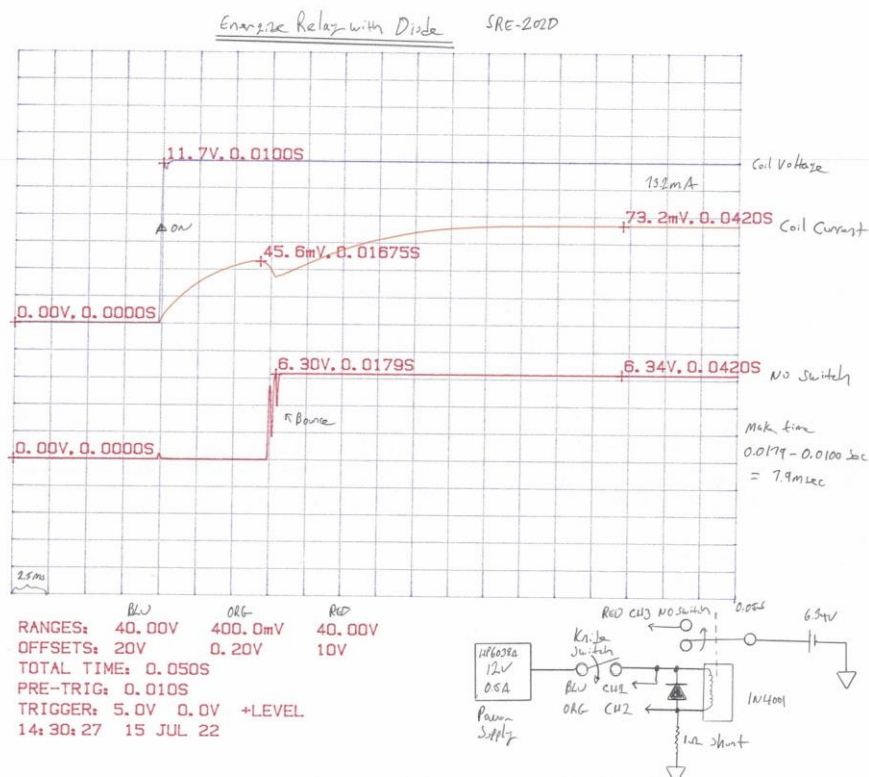


Plot 4 - De-Energize the relay with 1N4001 diode. (Current)
 NO Switch time = 11.9 msec. (Slower with Diode)



Plot 5 - Energize the relay with 1N4001 diode. (Current)

NO Switch Time = 7.9 msec. (Not as slower with the diode.)



Plot 6 - Energize the relay with 1N4001 diode. (Contacts)

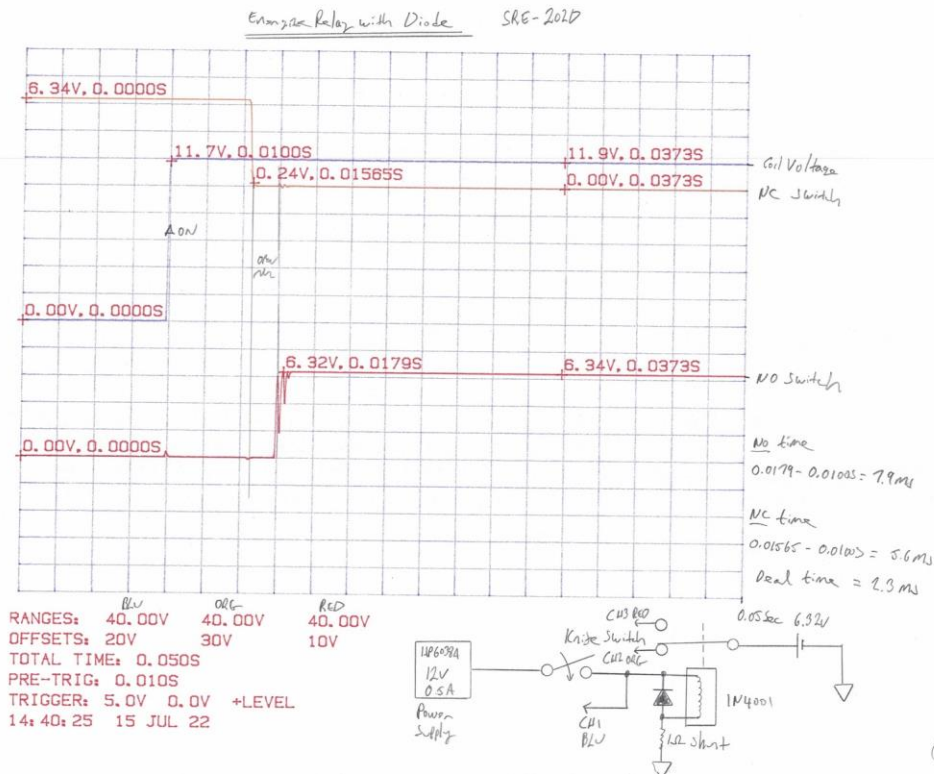
NO Switch Time = 7.9 msec

NC Switch Time = 5.6 msec

Dead Time = 2.3 msec

Break before Make

(No difference with Diode)

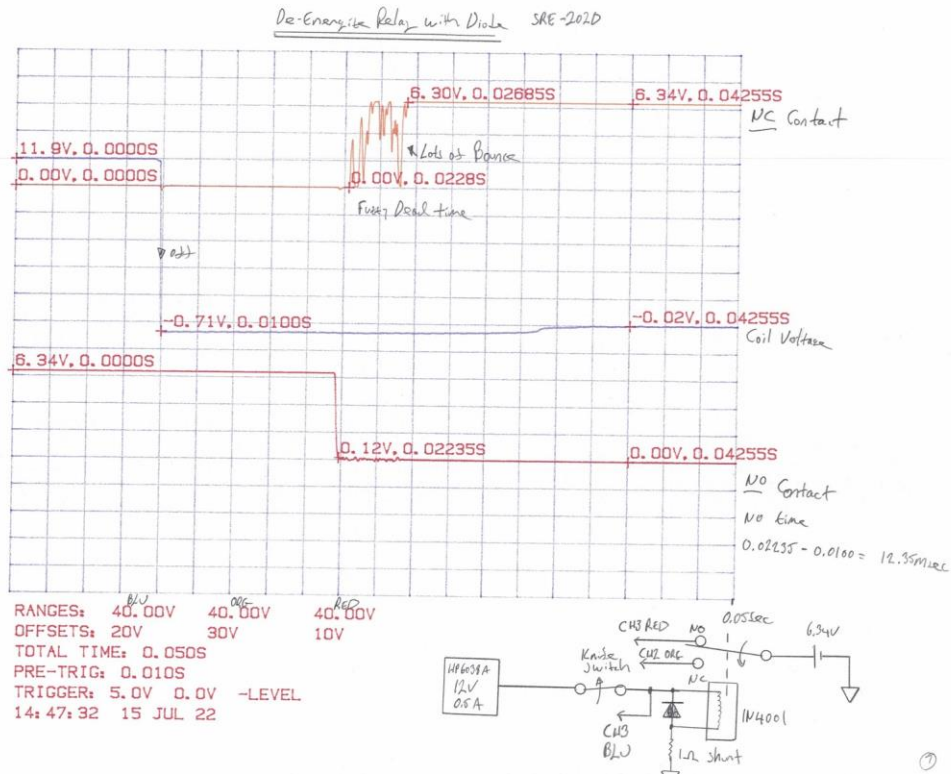


Plot 7 - De-Energize the relay with 1N4001 diode. (Contacts)

NO Switch time = 12.35 msec. (Slower with Diode)

Lots of Bounce Identified on NC Contact from Diode.

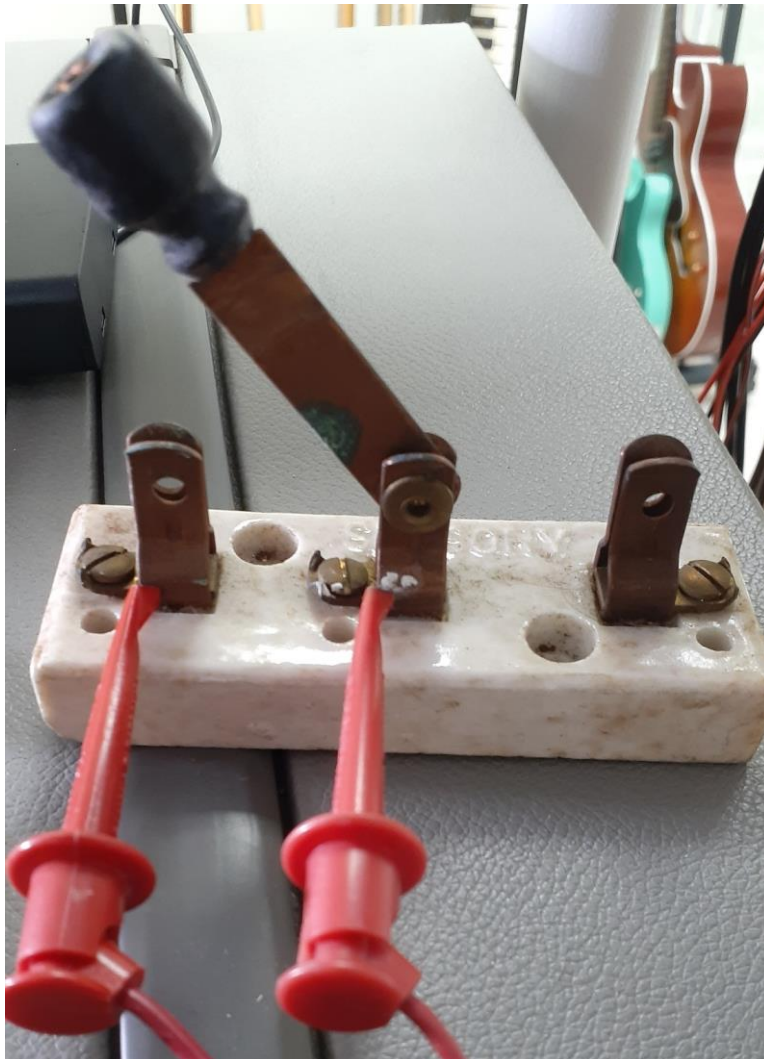
Fuzzy Dead Time



Relay Under Test



Knife-Switch



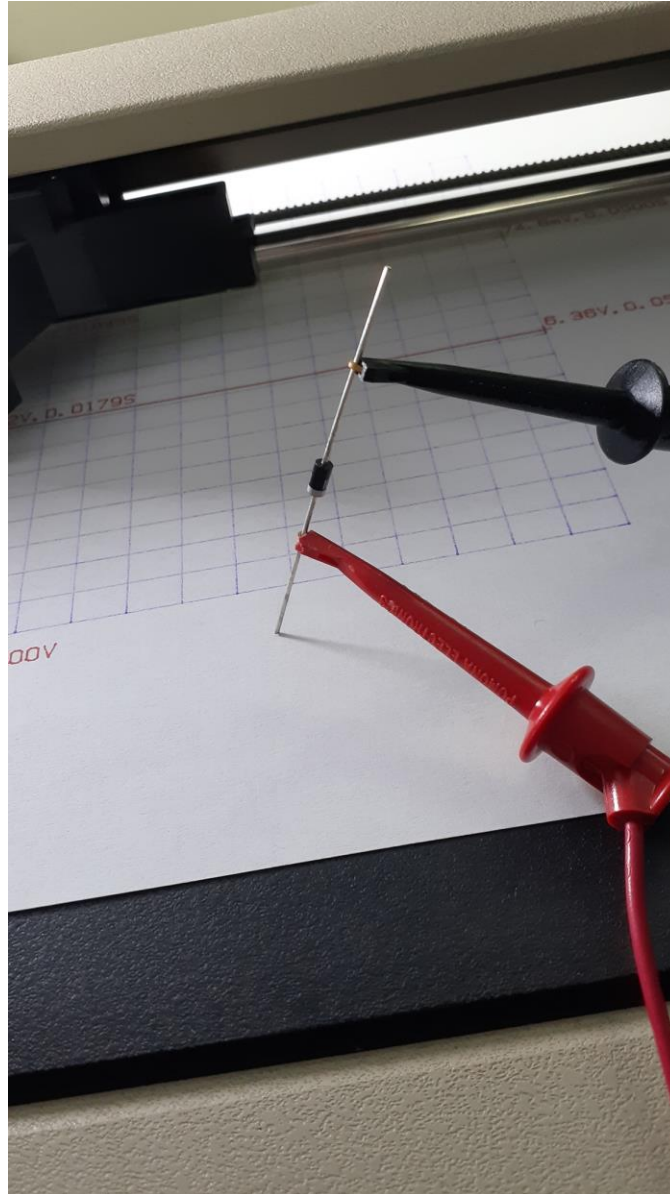
Battery for Contact Testing



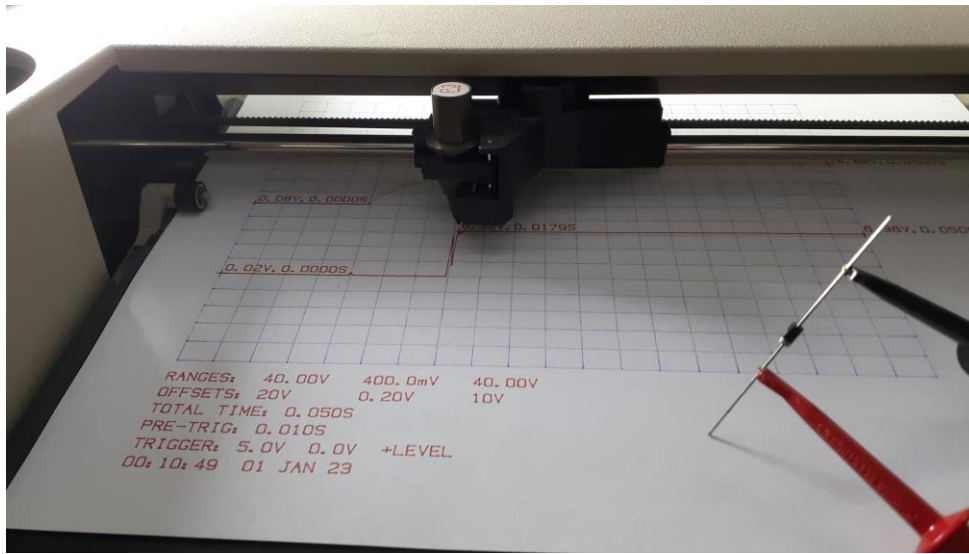
1-Ohm Shunt Resistor for measuring Current



1N4001 Diode



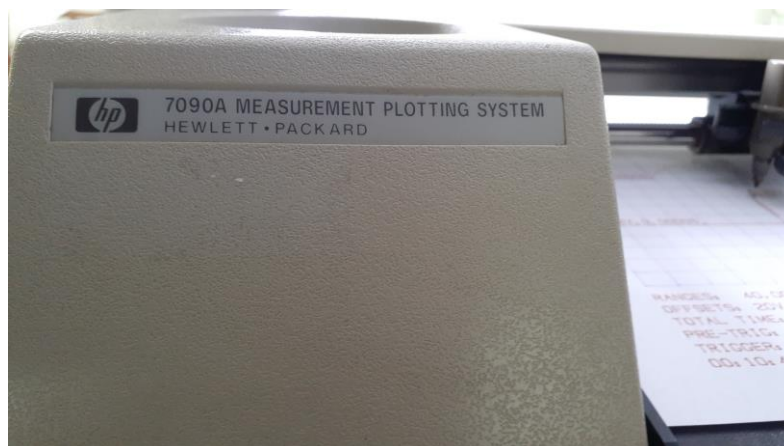
Plotter Results



HP-6038A Power Supply



HP-7090A-Plotter



HP-7090A-Plotter-Left-Side



Test Set-Up



Test Set-Up

