

The 7291 and Clone

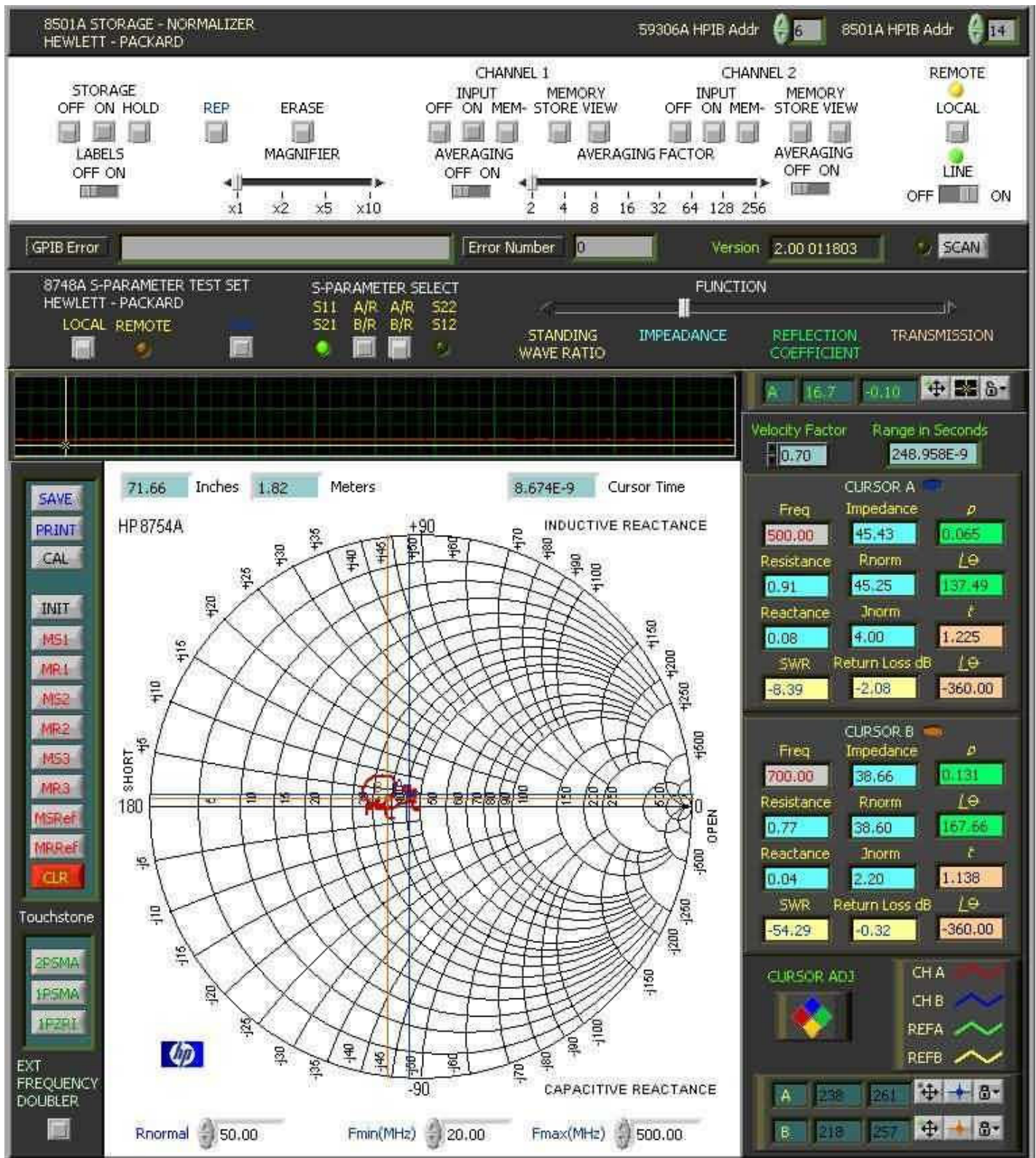




The 7242B's were shipped with a small programmable delay line with a part number of 7291. The above pictures show the unit in the original packing.

The basic idea of the 7291 is that two channels are used to sample at the same rate but with 180 phase shift between them. The dip switches control the amount of delay. From this we can double the single shot sample rate to 2GS/sec.

I did not want to destroy the unit I was able to find, but by the looks of it they used a DIP switch to switch in different length of line. You would think this would cause a lot of problems at the higher frequencies, but here is the results:



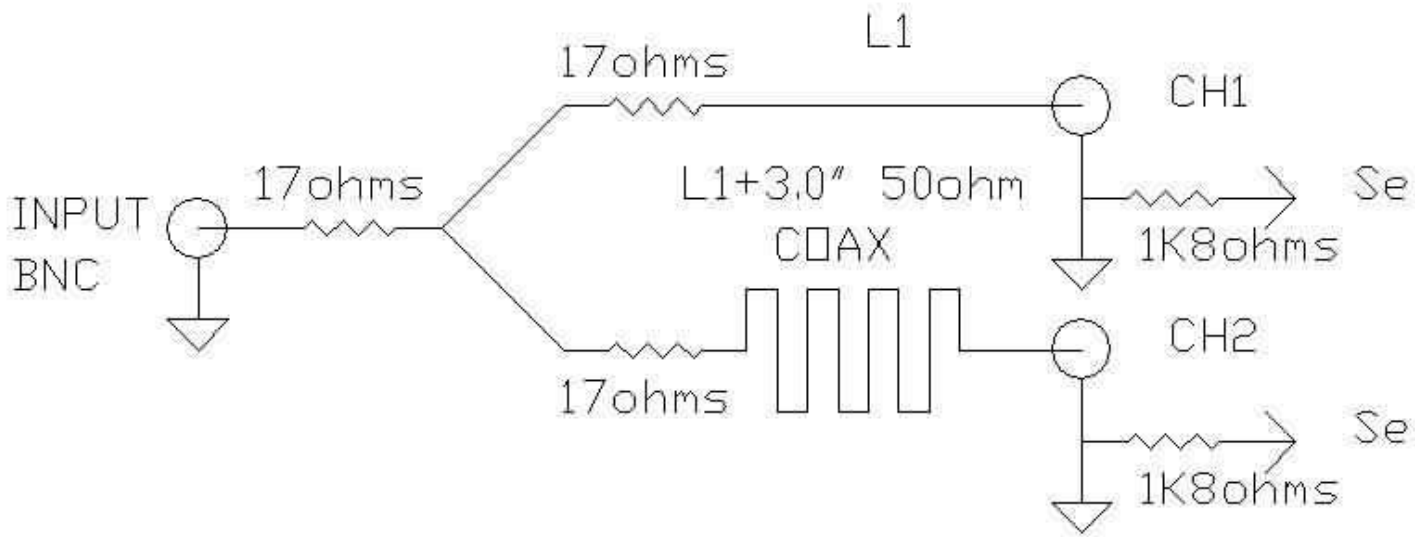
Making a low cost version

I placed a few calls to some probe companies and was able to procure a few BNCs with the ID. The scope will auto-ID the 7291 when the ID resistors on both channels are set to 1.5K - 1.8K ohms. The idea is to take the input signal and feed it to a 'Y'. The Y must allow all of the I/O to see the 50ohm matching impedance. One leg of the Y is then made longer than the other, providing the delay. The thing I do not like

about the whole 7291 is that switch. I was going to check some of these switches on a network analyzer, but have to imagine that it causes corruption of the data.

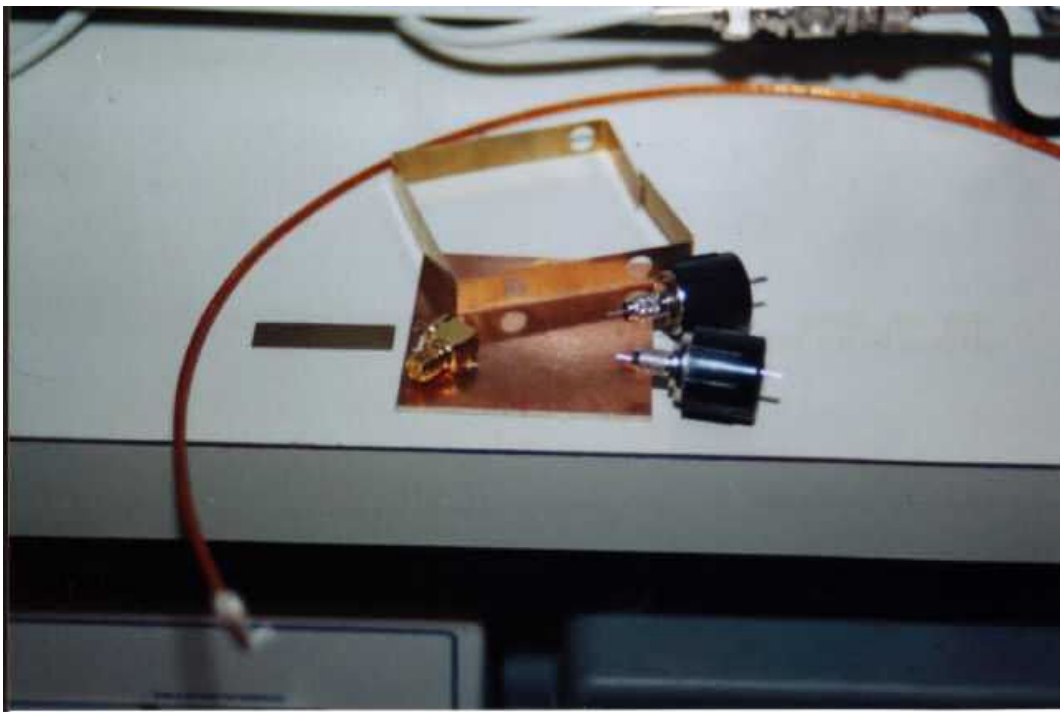
These are my golden connectors. After getting a probe company to sell me the connectors, I decided to just use the springs, pins and caps. The BNC shown is a standard hex crimp type. I machined a slot into the connector to support the cap and spring. The resistors needed are the MELF1s.

7200/A 2G/s Adapter





Here we see the two assembled ID connectors and what is going to be the housing for our unit. The SMA connector is for the input.



Here the connectors have been soldered in place along with the coax and Y resistors. These resistors are calculated as $50 \text{ ohms}/3$, or 16.7 ohms each.

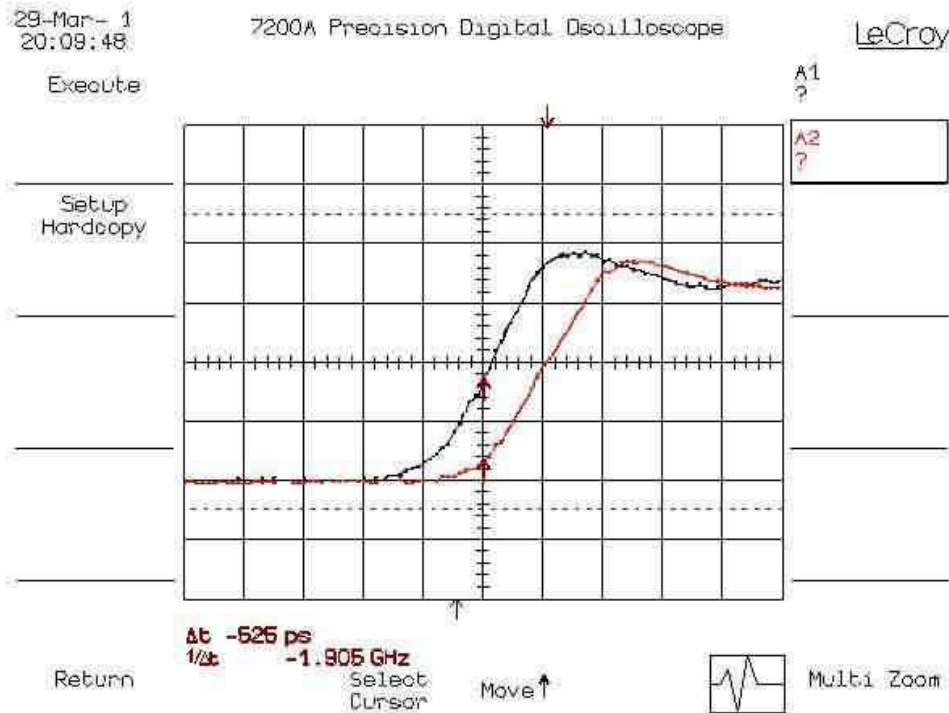


The unit is now attached to the scope and we can use the scopes built-in calibration to tune the coax. I had started out with a 3" length and the scopes showed 0pS right from the start. So, no tuning. I finished the job by adding a layer of copper foil to close the unit and then lettered it.





Looking at the 500ps delay between the two channels after installing our 7291 clone.



Looking at the impedance of our 7291 clone.

8501A STORAGE - NORMALIZER
HEWLETT - PACKARD

59306A HPiB Addr 6 8501A HPiB Addr 14

STORAGE OFF ON HOLD REP ERASE LABELS OFF ON MAGNIFIER

CHANNEL 1 INPUT OFF ON MEM- MEMORY STORE VIEW AVERAGING OFF ON AVERAGING FACTOR 2 4 8 16 32 64 128 256

CHANNEL 2 INPUT OFF ON MEM- MEMORY STORE VIEW AVERAGING OFF ON AVERAGING FACTOR

REMOTE LOCAL LINE OFF ON

GPIB Error Error Number 0 Version 2.00 011803 SCAN

8748A S-PARAMETER TEST SET
HEWLETT - PACKARD

LOCAL REMOTE S-PARAMETER SELECT S11 A/R A/R S22 S21 B/R B/R S12

FUNCTION STANDING WAVE RATIO IMPEDANCE REFLECTION COEFFICIENT TRANSMISSION

71.66 Inches 1.82 Meters 8.674E-9 Cursor Time

HP8754A

INDUCTIVE REACTANCE

CAPACITIVE REACTANCE

SWR Return Loss dB

CURSOR A		
Freq	Impedance	ρ
500.00	55.39	0.138
Resistance	Rnorm	$\angle \theta$
1.07	53.60	67.89
Reactance	Xnorm	$\angle \theta$
0.28	13.99	1.803
SWR	Return Loss dB	$\angle \theta$
-3.30	-5.44	-360.00

CURSOR B		
Freq	Impedance	ρ
700.00	59.58	0.246
Resistance	Rnorm	$\angle \theta$
1.07	53.60	68.03
Reactance	Xnorm	$\angle \theta$
0.52	26.01	2.858
SWR	Return Loss dB	$\angle \theta$
-2.25	-8.32	-360.00

Touchstone 2PSMA 1PSMA 1PZPT

EXT FREQUENCY DOUBLER

Rnormal 50.00 Fmin(MHz) 20.00 Fmax(MHz) 500.00