Hacking The BW

The Siglent SDG6000X series of Pulse/Arbitrary Waveform Generators include 3 models that apparently utilize the exact same hardware leaving it to the software to determine operating bandwidth (BW). The differences really just come down to BW with all other features & functions identical. Yet the difference in price is very dramatic:

SDG6022X	200 MHz	$1,499
SDG6032X	350 MHz	$3,399
SDG6052X	500 MHz	$5,299

The primary BW difference is obviously the top end rate for the sine wave function. Additionally, the 32X & 52X also increase the Pulse rate from 80 MHz to 150 MHz with 1ns rise/fall times vs 2ns for the 22X, Square wave from 80 MHz to 120 MHz, and finally PRBS rate from 160M to 300M with 1ns rise/fall times vs 2ns for the 22X.

For all the 3 model the Noise BW and IQ Carrier Frequency is equal to the sine wave BW, 200, 350 and 500 MHz, respectively.

Given that the same hardware is used for all 3 models the price difference just seems like they were concocted by the marketing department. Really, if you can sell the 22X for a profit why does the 52X cost more than double the price?

Thankfully, at least for the enthusiast, the a 22X can be hacked into believing it is a 52X as follows...

To hack the SDG6022X into a SDG6052X it is only necessary to edit a file on the system. The trick is to TeleNet into the unit using the LAN without knowing any credentials. To enable this feat user "tv84" over on EEVblog Forums posted "How to open a telnet session in a Siglent when the root password is unknown?".

You will need a USB drive and the posted file "telnet_SDG6000X.zip" to accomplish the task. It's probably best to first format this drive & then copy the extracted file "telnet_SDG6000X.ADS" onto it.

Power-up the unit & plug the USB into the front panel. Navigate to `Utility`, `System`, `Page 1/2`, `Firmware Update`, `Browse` to the `USB Device (0:)` highlighting the "`telnet_SDG6000X.ADS`" file, and then enter `Recall`. This will load the update & report "`Update Failure`" but the unit will now allow you to TeleNet into it using port "10101" without knowing the root password.

Using your favorite TelNet program at the system prompt "`~ # █`" we want to remount the internal drive as read/write in order to edit the necessary file like so:

```
~ # mount -o remount,rw ubi2_0 /usr/bin/siglent/firmdata0
```

This will make a backup of the file were going to change "`NSP_system_info.xml`" like so:

```
~ # cp /usr/bin/siglent/firmdata0/NSP_system_info.xml
/usr/bin/siglent/firmdata0/NSP_system_info.xml.orig
```

Note: This is all one line but has wrapped here.

We now have a backup file of the original file called "`NSP_system_info.xml.orig`".

Now we're going to use the internal editor VI to make our changes:

```
vi /usr/bin/siglent/firmdata0/NSP_system_info.xml
```

Basically we want to change the line from:

```
<license><bandwidth_update_license>XXXXXXXXXXXXXXXX</bandwidth_update_license></license></system_information>
```

To this:

```
<license><iq_support_update_license>TRUE</iq_support_update_license></license></system_information>
```

When this line has been changed you can save the file & exit VI using the ZZ command.

Re-power the unit and system info should now report SDG60052X. The unit now behaves exactly like the SDG6052X but you have saved $3,800 - Yeah Baby...

Hacking the IQ Option

The IQ option can be permanently enabled using the above process by replacing "TRUE" with a license code generated using your serial number. By using a Python script modified to include your serial number it will generate the code that you replace TRUE with:

```
import hashlib

SN       = 'SDG6XXXXXXXXXX'
Model    = 'SDG6000X'

otheropt = ('TRUE', 'TRUE' )

hashkey =
'5zao9lyua01pp7hjzm3orcq90mds63z6zi5kv7vmv3ih981vlwn06txnjdtas3u2wa8msx61i12ueh14t7kqwsfskg032nhyuy1d9vv2wm925rd1
8kih9xhkyilobbgy'

def gen(x):
        h = hashlib.md5((
                hashkey +
                (Model+'\n').ljust(32, '\x00') +
                opt.ljust(5, '\x00') +
                2*((SN + '\n').ljust(32, '\x00')) +
                '\x00'*16).encode('ascii')
        ).digest()
        key = ''
        for b in h:
                if (b <= 0x2F or b > 0x39) and (b <= 0x60 or b > 0x7A):
                        m = b % 0x24
                        b = m + (0x57 if m > 9 else 0x30)
                if b == 0x30: b = 0x32
                if b == 0x31: b = 0x33
                if b == 0x6c: b = 0x6d
        if b == 0x6f: b = 0x70
        key += chr(b)
    return key.upper()

for opt in otheropt:
    print('{:5} {}'.format(opt, gen(SN)))
```

This script must be run using Python3. The link to this script can be found Re: Siglent SDG6000X series 200-500 MHz AWG's.