



## 2940A DIRECT DIGITAL SYNTHESIZER

### Instruction Manual

#### SECTION 1: INTRODUCTION

The Model 2940A can produce sinewave outputs from 200kHz to 399.999999MHz in 1Hz steps. It has an LCD display, rear mounted computer serial interface and front panel controls. The LCD display and computer interface controls operate as independent units. The 2940A has two programmable frequencies, "Fa" (top line of display) and "Fb" (bottom line of display), and two front mounted BNC output connectors: one for the "A" frequency and one for the "B" frequency. There is also a BNC connector on the rear panel that accepts an external reference input. Both the A and B frequencies will lock to the external reference automatically if it is present.

The remote computer interface has priority and will automatically place the instrument in Remote Mode if a valid command is received over the serial port.

#### SECTION 2: OPERATING INSTRUCTIONS

The user can use the computer interface or the the front panel controls to set the output frequency. When using the front panel controls the user should depress a cursor button to move the underline character to the number you would like to change and then use the rotary knob to change the number.

**Note 1:** The attenuation setting of 00 on the 2940A display to the right of the frequencies are always present but are not functional.

Depressing the 2940A front panel MENU button allows the user to scroll through the available Instrument settings and select a parameter for each setting. The MENU settings and parameters to select are:

Setting 1: Serial Baud Rate. Parameters: 300, 600, 1200, 2400, 4800, 9600 or 19200)

Setting 2: Remote Echo. Parameters: On or Off.

Setting 3: User Interface. Parameters: Local or Remote (Serial Port)

Setting 4: Power Up Mode. Parameters: Save (Current) Settings or Use Defaults.

Setting 5: External Standard. Parameters: Disabled, 1, 2, 5., 10, 1.544 or 2.048 MHz.

**Note 2:** It is recommended to only set the External Standard to Disabled or to 10. The settings of 1, 2, 5, 1.544 and 2.048 are not tested and may not work.

**Note 3:**

The Factory Default menu settings are:

- 1) Serial Baud Rate = 9600,
- 2) Remote Echo = On,
- 3) User Interface = Local,
- 4) Power Up Mode = Save Settings
- 5) External Standard = Disabled.

A 10MHz reference should be connected to the rear BNC before changing the External Standard setting from Disabled to another setting. The frequency accuracy of the 2940A is degraded when operating with an External Standard setting other than Disabled when no External Standard is connected.

**Note 4:**

The SOF8 CD included with the 2940A contains an application named SOF8\_1940A that can be used to control the 2940A. The 1940A is a rack mount instrument that contains two 2940A. The SOF8\_1940A software supports two COM ports. It is recommended that only one of these ports be given a valid COM port number when using this software with the 2940A.

## SECTION 3: SERIAL COMMANDS

1: The serial protocol for all commands on the 2940A are 8 data bits, 1 stop bit, no parity. Baud rates supported are 300, 600, 1200, 2400, 4800, 9600 and 19200. The commands are not case sensitive. The default baud rate is 9600.

2: The commands 'F' 'Fa' 'Fb' 'E' 'X' 'Aa' 'Ab' and 'S' return 'OK' if parsed and interpreted correctly. The commands can be terminated with CR, LF or CRLF in any order. This allows use with PC systems, Linux or Unix.

3: The commands 'Reset' 'Reset All' and 'C' do not return a value and end by restarting the instrument.

4: Incorrect commands will return an error code:

- ?0 Unrecognized Command
- ?1 Bad Frequency
- ?2 Bad Amplitude
- ?3 Input line too long

5: The command 'Qr' returns the values in the volatile RAM of the instrument. The values returned reflect the present output and state of the 1940A and are as follows:

```
Fa 012.345678 1
Fb 012.345678 2
07 45 06 03 1B 05 01 00 01
```

The first two lines show the output frequency and attenuation setting of both channels in MHz to 1Hz resolution. The next line has hexadecimal values showing the present state of internal registers. These values will only be the same as those from the 'Qr' command if the values have been unchanged or a 'S' command has been executed (which could have been from a power down with save settings enabled). Their interpretation in this example is:

- 07 internal settings
- 45 internal settings
- 06 internal settings
- 03 internal mode ('03'=Remote)
- 1B internal settings
- 05 cursor position
- 01 baud rate register ('00'=19200, '01'=9600, etc.)
- 00 control status
- 01 External Reference Setting: '00'=Use internal VCTCXO, '01'=5MHz, '02'=10MHz, '03'=1MHz, '04'=2MHz, '05'=1.544MHz (T1), '06'=2.048MHz (E1).

6: The command '\Qe' returns the stored values in the non-volatile EEPROM of the instrument. The values returned reflect the last saved state of the 2940A and are as follows:

```
Fa 012.345678 1
Fb 012.345678 2
07 45 06 03 1B 05 01 00 01 00 EF FF B7 14
```

The first two lines show the output frequency of both channels in MHz to 1Hz resolution. The next line has hexadecimal values showing the saved state of internal registers. Their interpretation in this example is:

```
07 internal settings
45 internal settings
06 internal settings
03 internal mode ('03'=Remote)
1B internal settings
05 cursor position
01 baud rate register ('00'=19200, '01'=9600, '02'=4800, '03'=2400, '04'=1200,
    '05'=600, '06'=300)
00 control status
01 External Reference Setting: '00'=Use internal, VCTCXO, '01'=5MHz, '02'=10MHz,
    '03'=1MHz, '04'=2MHz, '05'=1.544MHz (T1), '06'=2.048MHz (E1).
These (above) are the same as the '\Qr' command.
00 internal settings
EF internal settings
FF internal settings
B7 'B7'=save settings, 'B8'=use defaults
14 Software revision, in this example 1.4
```

#### SECTION 4: WINDOWS SOFTWARE

The 2940A comes with a CD that contains the SOF8\_1940 windows software. This software is intended for use with both the 2940A and the 1940A. The 1940A has four programmable frequencies and two COM ports. The 2940A has two programmable frequencies and one COM port. When using the SOF\_1940 software with the 2940A, it is recommended that only one of the COM ports be used. The other COM port can be set to an invalid COM port number to prevent it from operating.

# WARRANTY

NOVATECH INSTRUMENTS warrants that all instruments it manufactures are free from defects in material and workmanship and agrees to replace or repair any instrument found defective during a period of one year from date of shipment to original purchaser.

This warranty is limited to replacing or repairing defective instruments that have been returned by purchaser, at the purchaser's expense, to NOVATECH INSTRUMENTS and that have not been subjected to misuse, neglect, improper installation, repair alteration or accident. NOVATECH INSTRUMENTS shall have the sole right to final determination regarding the existence and cause of a defect.

This warranty is in lieu of any other warranty, either expressed or implied, including but not limited to any warranty of merchantability or fitness for a particular purpose. In no event shall seller be liable for collateral or consequential damages.

All instruments manufactured by NOVATECH INSTRUMENTS should be inspected as soon as they are received by the purchaser. If an instrument is damaged in shipment the purchaser should immediately file a claim with the transportation company. Any instrument returned to NOVATECH INSTRUMENTS should be shipped in its original shipping container or other rigid container and supported with adequate shock absorbing material.

This warranty constitutes the full understanding between NOVATECH INSTRUMENTS and the purchaser and no agreement extending or modifying it will be binding on NOVATECH INSTRUMENTS unless made in writing and signed by an authorized official of NOVATECH INSTRUMENTS

## NOVATECH INSTRUMENTS

United States of America

206.301.8986 Voice

<http://www.novatechsales.com>

[sales@novatechsales.com](mailto:sales@novatechsales.com)