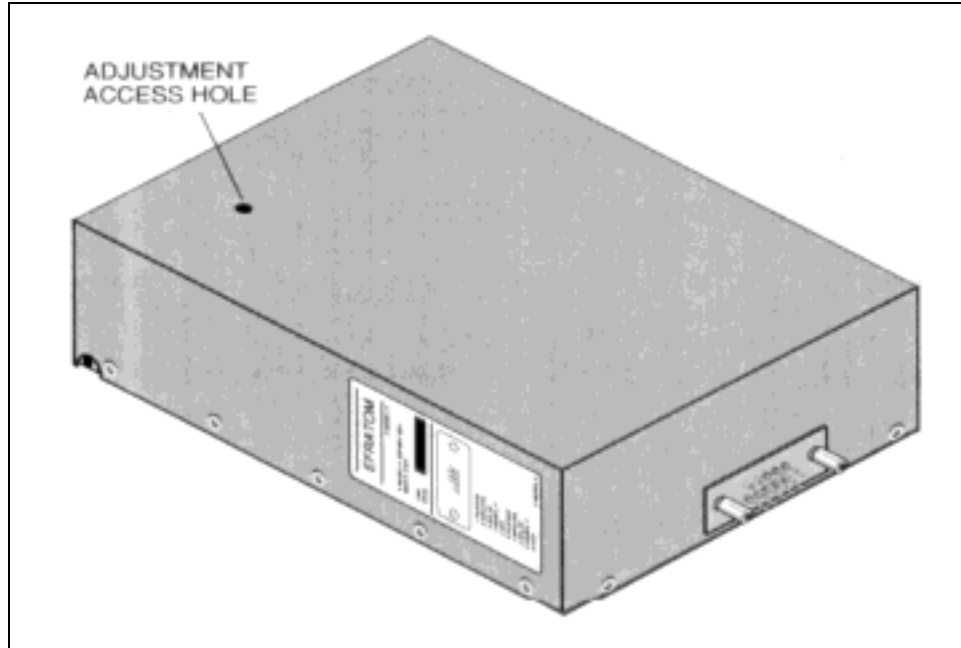


NOVATECH INSTRUMENTS, INC.

INSTRUCTION MANUAL Rubidium Oscillator Module Calibration



PN 2307-0001 Rb Module

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1.0 DESCRIPTION

1.1 This calibration manual covers all Novatech Instruments, Inc. products which use part number 2307-0001 Rubidium Oscillator Modules. Only calibration steps specific to the module are included here. Consult your instrument manual for details on other calibration which may be required.

1.2 Since a Rubidium Oscillator is considered a secondary standard, routine adjustment or calibration is not recommended or generally required. Adjustments should be performed if your instrument fails its performance test or the product has been repaired.

1.3 The primary reason for routine calibration of the Rubidium Oscillator module is to match its performance to a more accurate primary source, such as an external Cesium clock or a GPS satellite. Periodic adjustment, in this case, will allow the Rubidium oscillator to match the primary standard's lower aging rate and greater accuracy.

2.0 SPECIFICATIONS

2.1 Please consult your instrument manual for detailed specifications relating to your model.

2.2 The 2307-0001 Module internal adjustment range is nominally $\pm 1.5 \times 10^{-9}$ with a setting resolution of less than 1×10^{-11} . This adjustment range allows for correction of several years of drift in normal use.

2.3 Since the temperature stability of the module is $\pm 4 \times 10^{-10}$ over the temperature range of $+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$, it is important to adjust the module in an environment which closely matches that of the expected application environment.

3.0 CALIBRATION

Table 1: Recommended Equipment

Item	Minimum Specification	Recommended
50 Ω Termination	50 Ω , $\pm 2\%$	Tektronix 011-0049-01
Frequency Counter	100MHz, 12 digits	HP53132A, with external time base.
Counter Time Base	primary standard	HP5071A or equivalent, or GPS Reference Standard
Adjustment tool	non-metallic with reach of $>25\text{mm}$ and diameter $<2.54\text{mm}$	

NOTE:

Most frequency counters are not accurate enough for this calibration. You may substitute a frequency comparator or frequency difference meter. Please follow the manufacturer's instructions for your equipment. You will need a resolution of at least 1×10^{-11} to set the module properly.

3.1 Refer to Table 1 for a list of suggested equipment. The following procedure assumes a stable temperature environment.

3.2 Remove the cover of the unit under test (UUT) per instructions in your instrument manual. For the Model 1450A series this involves removing the two screws on the top cover and sliding the cover off. On the 2950AR series, you must remove the two screws on the front panel and slide the cover off the instrument.

WARNING:

Opening your instrument will expose live line voltages. Please follow appropriate safety precautions. Only properly skilled and trained personnel should perform these operations.

3.3 Connect the 10MHz output of the UUT through the 50 Ω termination to the frequency counter (or

other device per note above). Apply power to the UUT and allow to reach a steady state operating temperature.

3.4 Allow the UUT to stabilize for at least 7 days prior to performing any adjustments.

3.5 Using the non-metallic tool, make minor adjustments to the module through the Adjustment Access Hole shown on Page 1 of this manual. The figure shows only the module: mounting methods may vary in different products.

3.6 Each revolution of the adjustment is approximately 1.5×10^{-10} so only minor corrections should be made. Allow the UUT to stabilize after each adjustment. This may take up to one hour.

Note:

It is suggested that the cover be replaced on the UUT after each adjustment to simulate the internal temperature of the final installation. It is not necessary to fasten the cover in place each time.

3.7 Continue the adjustments of paragraph 3.5 until the desired accuracy is obtained. Be sure to account for the temperature stability of your application.

3.8 If the module cannot be adjusted to meet the accuracy of the instrument, then the module may be defective or aged beyond its adjustment range. The module is not field repairable or replaceable, so Novatech Instruments, Inc. should be contacted regarding repair or replacement, if this be the case.

Note:

The adjustment of the module requires extreme care not to damage any internal components. Do not force rotation: damage may result. Units damaged during calibration are not covered by warranty.

3.9 After your desired accuracy has been achieved, replace the instrument cover and secure all hardware. This completes the calibration of the 2307-0001 Rubidium Oscillator Module.

PRODUCT WARRANTY

NOVATECH INSTRUMENTS, INC. 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, INC. and that have not been subjected to misuse, neglect, improper installation, repair alteration or accident. NOVATECH INSTRUMENTS, INC. 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. Some states do not allow limitations or exclusion of consequential damages so this limitation may not apply to you.

All instruments manufactured by NOVATECH INSTRUMENTS, INC. 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, INC. 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, INC. and the purchaser and no agreement extending or modifying it will be binding on NOVATECH INSTRUMENTS, INC. unless made in writing and signed by an authorized official of NOVATECH INSTRUMENTS, INC.

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