USER GUIDE

AUTOMATED TUNER

Models NT Waveguide Series

Maury Microwave

NTWR6-020 (Rev A) 10/2024

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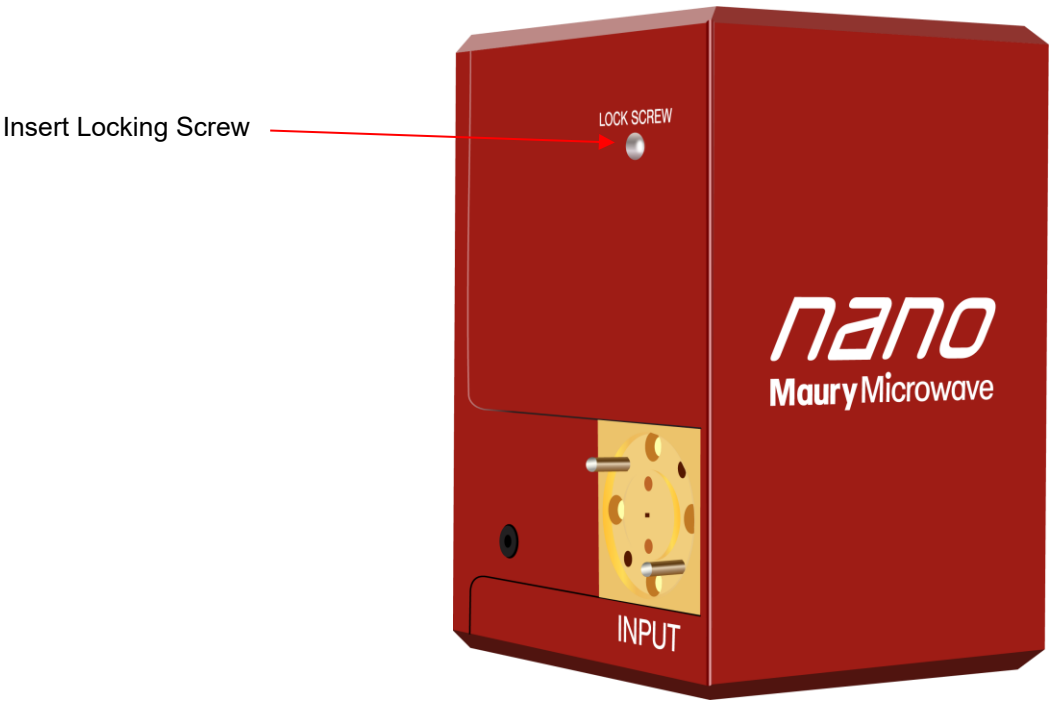
To protect this unit during transit, the tuner carriage has been locked into position via a locking screw. Before applying power and before using the tuner, it is necessary to unlock the tuner using the locking/unlocking screw. Retain this notice along with all packing materials in the event the unit requires future shipment. Before shipping the unit, refer to the Appendix for packaging instructions. Shipping the tuner without properly locking its carriage(s) will cause damage to the carriage(s) and other parts.



Warranty

Maury Microwave hardware products are warranted against defects in materials and workmanship for a period of one year from the date of shipment. During the warranty period, Maury Microwave will, at its option, either repair or replace products which prove to be defective.

Maury Microwave software products are warranted against defects in the material and workmanship of the media on which the product is supplied for a period of ninety (90) days from the date of shipment. Maury also warrants that the product shall operate substantially in accordance with published specifications during the same warranty period. During the warranty period, Maury Microwave will, at its option, either repair or replace products which prove to be defective. Maury does not warrant that the operation of the product shall be uninterrupted or error-free.

For warranty service or repair, all products must be returned to Maury Microwave and must be issued a return authorization number by Maury prior to shipment. The buyer shall prepay shipping charges to Maury. Obligation is limited to the original Buyer.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or wear resulting from normal use. No other warranty is expressed or implied. Maury Microwave specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

The remedies provided herein are the Buyer's sole and exclusive remedies. Maury Microwave shall not be liable for any direct, indirect, special, incidental, or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other financial loss) arising out of the Buyer's use of or inability to use the product, even if Maury or an authorized Maury dealer has been advised of the possibility of such damages.

CONTENTS

TABLES

FIGURES

GENERAL INFORMATION

NT Series WG Automated Tuners

The NT-110G-170G-1C, NT-140G-220G-1C, NT-170G-260G-1C, and NT-220G-330G-1C Series Automated Impedance Tuners are precision electromechanical tuners. These tuners serve as a matching network to reduce reflections caused by mismatches present in a transmission line or to introduce a controlled mismatch into an otherwise matched transmission line.

The tuners have a single vane (akin to a probe in lower-frequency tuners) to cover the entire operational frequency range. The reflection magnitude is controlled by a vane interacting with electromagnetic fields propagating in the waveguide channel. The vane position along the slit at the top of the waveguide determines the phase of the reflection.

The non-contacting vane is moved along the waveguide channel by the carriage. A linear piezoelectric actuator will provide a minimum of one-half wavelength lateral movement of the vane at the tuner's lowest rated frequency.

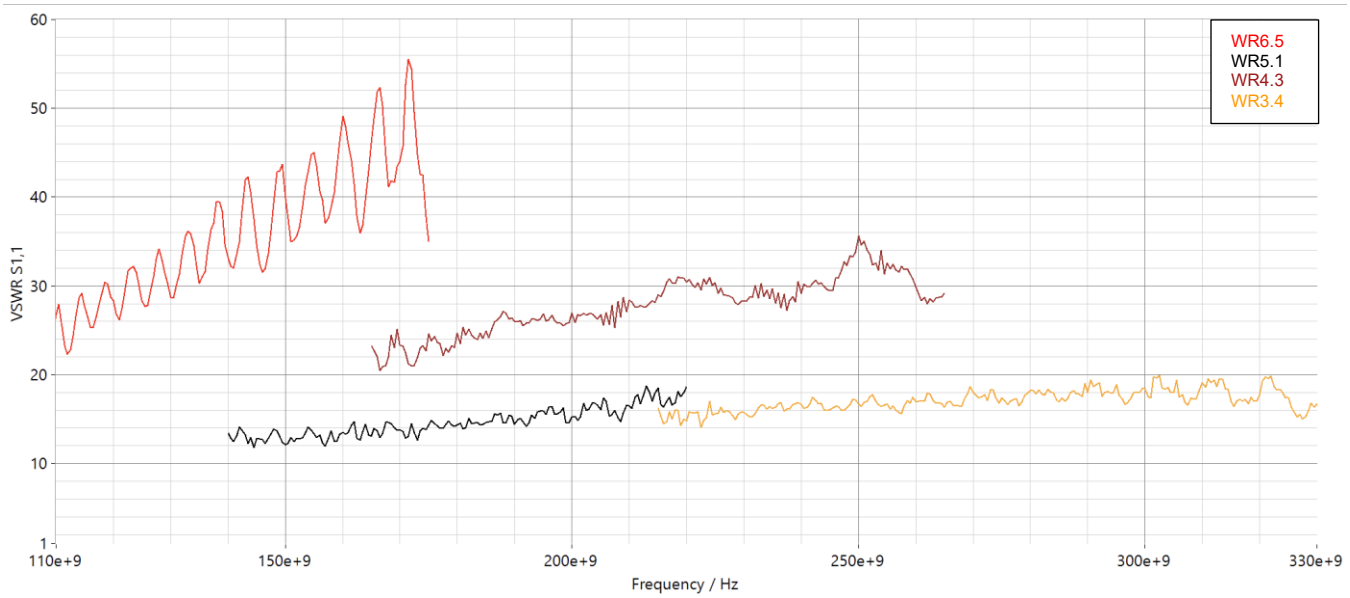


Figure 1. Typical VSWR Response of an NT millimeter wave tuner.

Operation

The NT series of tuners support multiple modes of remote-control operation:

- Web based control using Ethernet connection.
- Telnet based control using Ethernet connection (port 5024)
- COM port serial communication using USB connection (virtual COM port)
- 3-rd party software compatible driver (TunXtIP.exe)
- MTune3 - https://apps.maurymw.com

Please consult the XT981-557 User Manual for information on configuring your computer for the operation of the tuner using Ethernet or USB port.

Specifications

Electrical Specifications

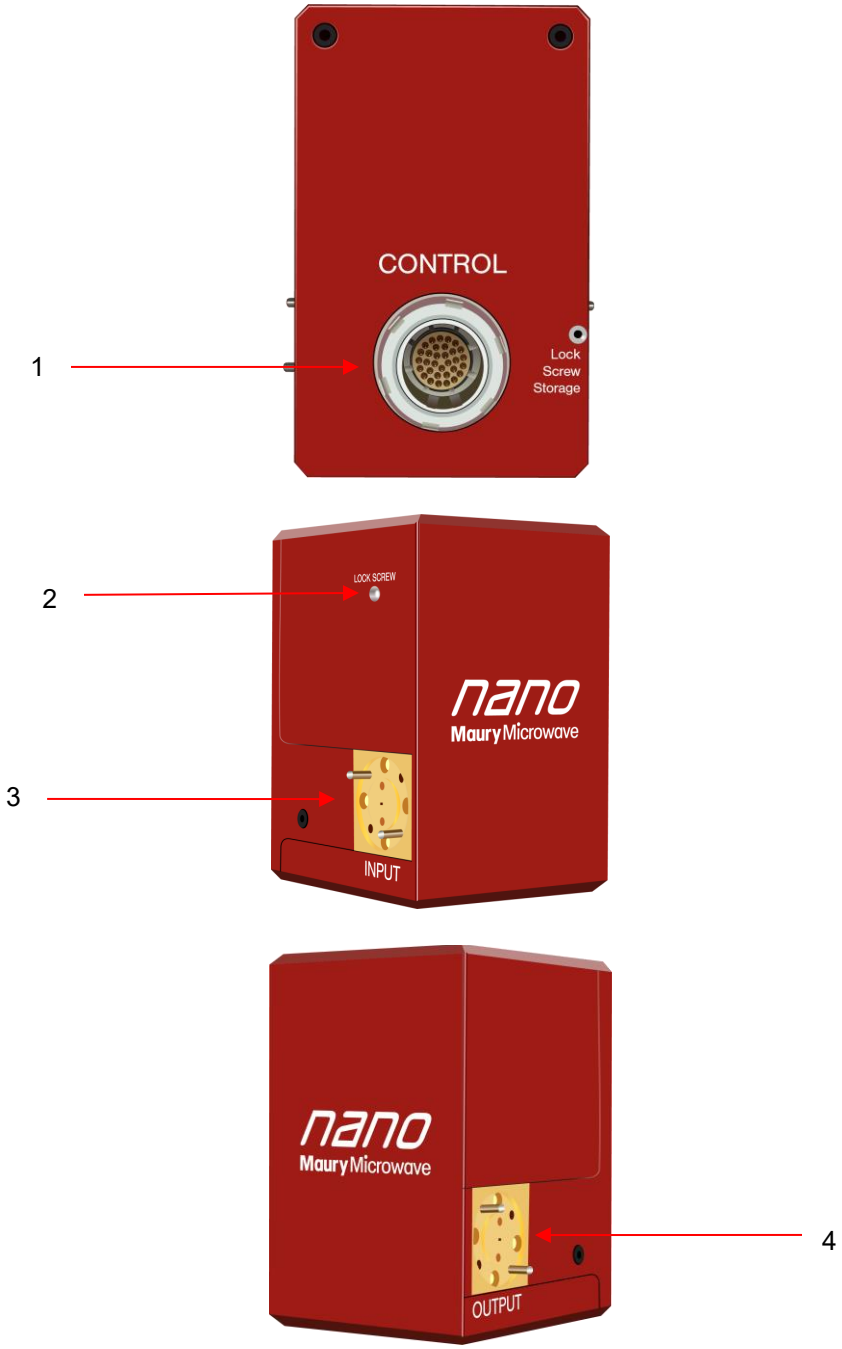
Model	Flange Type	Frequency Range (GHz)	Matching Range (min)	Insertion Loss [1] (max)	Vector Repeatability (min)	Power Capability [2]
NT-110G-170G-1C	UG-387/UM	110 – 170	20:1	0.5 dB	-40 dB	304 W
NT-140G-220G-1C	UG-387/UM	140 – 220	12:1	0.65 dB	-40 dB	198 W
NT-170G-260G-1C	UG-387/UM	170 – 260	18:1	1 dB	-40 dB	141 W
NT-220G-330G-1C	UG-387/UM	220 – 330	12:1	1.35 dB	-40 dB	192 W

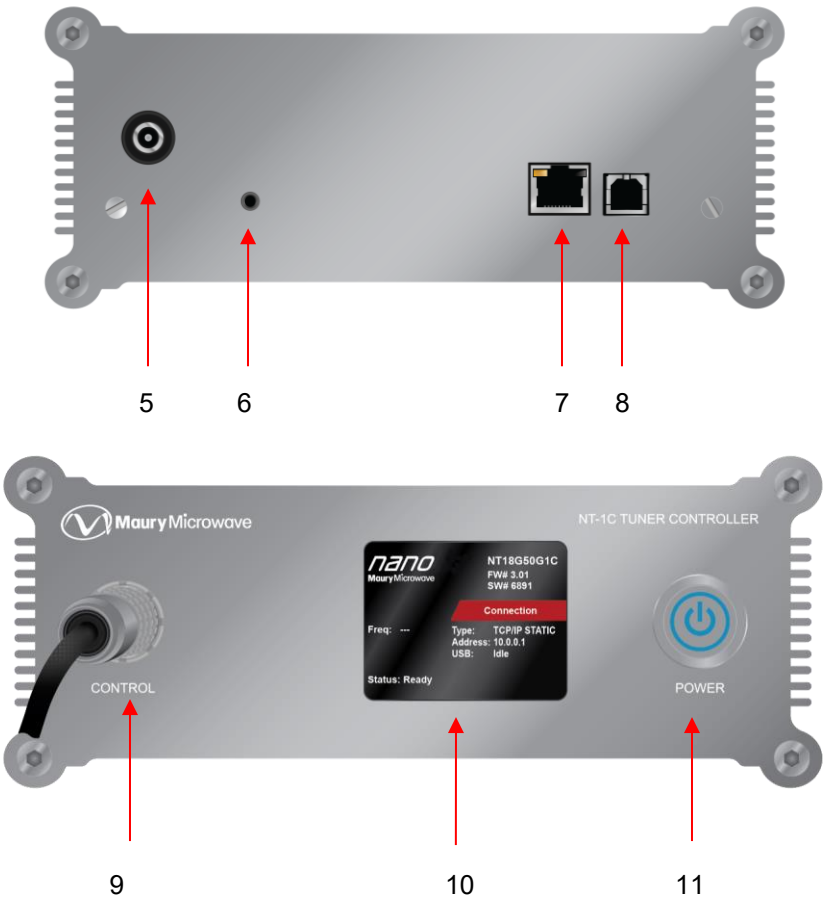
Table 1. Tuner Electrical Specifications

[1] With vane fully retracted.

[2] Power rated at maximum VSWR.

GETTING TO KNOW YOUR TUNER





1. Control Cable Connector (Tuner)
2. Locking Screw (Tuner)
3. Input RF Port (Tuner)
4. Output RF Port (Tuner)
5. Power Supply Port (Controller)
6. Reset Button (Controller)
7. Ethernet Port (Controller)
8. USB Port (Controller)
9. Control Cable Connector (Controller)
10. Display (Controller)
11. Power Button (Controller)

An LCD display is mounted in the front panel of the controller.

The display has information that provides the user the status of the controller:

1) Model Number of the tuner
2) Firmware version.
3) Serial number of the tuner.
4) LAN Connection Type (STATIC or DYNAMIC)
5)
    - IP address of the controller if connected to the network.
    - “Network Offline” TCP/IP is not connected.
6) “Active” if the USB is connected to the PC and “Idle” if no USB is connected to the PC.
7) The control frequency of the tuner characterization file.
8)
    - “Ready” when the controller/tuner is ready to receive commands.
    - “Done” if the tuner has completed initialization or completed movement.
    - “Cal data loaded” after a successful remote CALIB command.
    - “Startup” when firmware is loading.
    - “Rebooting” when a new firmware version is loaded.

INSTALLATION

Safety Precautions

The NT Series Automated Tuners are not electrically, chemically, or mechanically hazardous to the operator. The following precautions are necessary to protect the instrument:

- Use extreme care in moving, handling, and storing this instrument, and avoid physical contact with other instruments.

- The tuner must be connected to the tuner controller before turning on the power to the tuner controller to avoid potential damage to the tuner.
- Do not move the instrument by pulling an attached cable.
- Visually and mechanically inspect the connectors regularly to maintain performance characteristics and minimize damage to the instrument or any mating devices.
- To keep the precision components inside the tuner clean, the cover should be kept on the tuner at all times, except when the tuner is being serviced or in use.

Software Installation

- If this is the first time a Maury Tuner is being installed on the host computer, MTune3, must first be installed before connecting the tuner to the computer (https://apps.maurymw.com).

Tuner Installation

- Before installing the tuner, inspect the connector and tuner flanges to ensure that all are clean and undamaged before connecting.
- The tuner must be connected to the tuner controller before turning on the power to the tuner controller to avoid potential damage to the tuner.
- Connect the DC power to the tuner controller and either RJ45 network or USB cables.
- When using USB connection, the host computer will detect the tuner as a new device and automatically install the tuner drivers (Tuner_USB.inf)
- When using TCPIP connection, the computer's Ethernet connector must be configured to match the tuner network settings. See XT981-557 User Manual for more information.

MAINTENANCE

Connector Maintenance

Periodically inspect the waveguide flanges for signs of damage. Tuners with damaged flanges should be returned to the factory for repair. Flanges should be cleaned using dry compressed air of a very low velocity, do not direct the compressed air inside the channel as this may damage the vane. Clean the flange with a solvent such as isopropyl alcohol and any contacting surfaces, alignment parts, and threads using a lint-free swab. Reapply dry compressed air to evaporate any residual solvent. After cleaning, re-inspect the flanges to make sure that no fibers have been left around the contact or mating surfaces.

APPENDIX

Packaging of the Automated Tuner

All shipping containers and packing materials for the Automated Tuner should be retained in the event it becomes necessary to return the instrument to the factory. If the instrument fails to meet specifications or the contents are incomplete, notify the carrier and Maury Microwave Corporation immediately and wait for instructions before returning any products. If you must return the tuner for any reason, please refer to the following packaging instructions.

Packing Instructions

To protect the tuner during transit, the carriage must be secured in its locking position and the tuner packaged in its original shipping container and packing materials. If you do not have the original shipping container and/or packing materials, contact your Maury Microwave representative or the factory and a packaging kit will be provided. See Figure A 1. The instructions provided herein will properly prepare the tuner for return to the factory.

Instructions for Locking Tuner Carriage Before Shipping (Mtune3 can also be used to park the tuner)

Step 1. Initialize the tuner.

- Launch Telnet network protocol and connect to the tuner (See XT981-557 user manual for more information)
- Type the command “INIT” to initialize the tuner.
- Once the tuner stops moving, query the position of the motor to verify initialization has completed successfully. Type “POS?” The position should read (Pos 1, & 2 can vary by ± 100 steps)
    - Stat = 1
    - Pos1 = 100
    - Pos2 = 750,000

Step 2. Move the tuner to the lock position.

- Using Telnet, type the command “PARK”.
- Once the tuner has stopped moving, proceed to step 3.

Step 3. Insert the locking screw into the “Lock Screw” position to lock the tuner (see Figure A 2).

Model	Carriage Travel Range (steps)	Vane Travel Range (steps)
NT-110G-170G-1C	0 to 2,800,000	0 to 750,000
NT-140G-220G-1C	0 to 2,100,000	0 to 750,000
NT-170G-260G-1C	0 to 1,800,000	0 to 750,000
NT-220G-330G-1C	0 to 1,100,000	0 to 750,000

Table 2. Travel Range

Figure A 1. Packing Kit

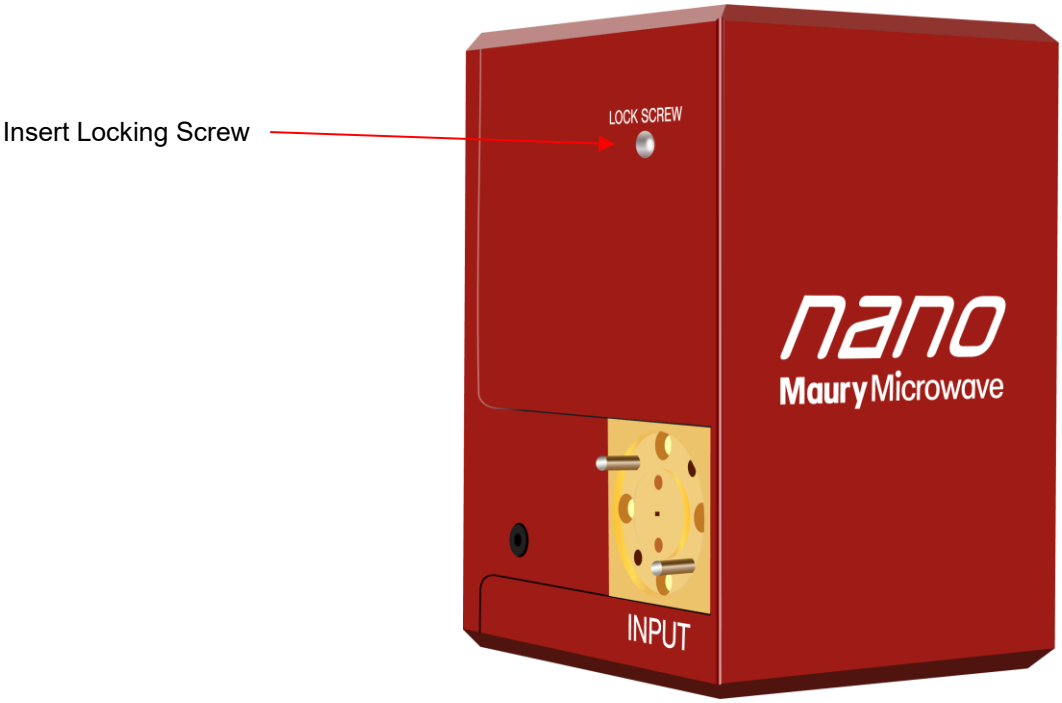


Figure A 2. Locking Screw

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