Maury Microwave

User Guide

Coaxial Manual Tuner

12.0 to 34.0 GHz

Model MST983B35

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Maury Microwave

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MST983-4 (Rev A) 10/15

Warranty

Maury Microwave hardware products are warranted against defects in materials and workmanship for a period of one year from 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 material and workmanship of the media on which the product is supplied for a period of ninety (90) days from 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.

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General Information

MST983B35 Manual Tuner

The MST983B35 Manual Tuner is a high performance precision manual slide screw tuner that achieves low through-line VSWR and an excellent matching range. The tuner is provided with a female 3.5mm connector on one end, and a male 3.5mm connector on the other, for easy connection into a circuit. The tuner features micrometers for controlling both the matching level and carriage (phase) position. The tuner serves as a matching network for reducing reflections caused by mismatches present in a transmission line or to introduce a controlled mismatch into an otherwise matched transmission line.

The MST983B35 Manual Tuner is a slide screw tuner which uses two probes to cover the frequency range. The low frequency probe covers the range from the lowest frequency to the crossover frequency. The high frequency probe covers the range from the crossover frequency to the tuner's maximum rated frequency. Each probe induces a mismatch in its frequency range as it is inserted into the tuner transmission line and should be used only in its designated frequency range. Each probe will meet its specifications over its rated frequency range and typically has considerably higher matching capability in the middle of its band. Figure 1 shows an example of a typical response of a low frequency and high frequency probe.

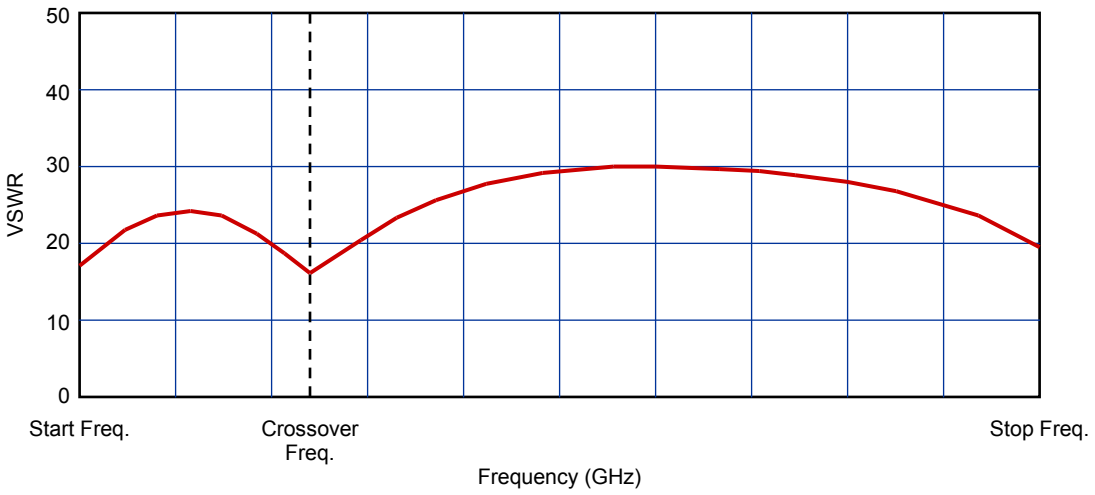

Figure 1. Typical VSWR Response

Specifications

Table 1. Tuner Electrical Specifications

Model	Connector Type	Frequency Range (GHz)	Crossover Frequency (GHz)	Matching Range (min)	Insertion Loss [1] (max)	Power Capability [2] (Ave/Pk Watts)
MST983B35	3.5mm	12.0 – 34.0	16.0	10:1	0.7 dB	15/150

[1] With probes fully retracted.

[2] Power rated at maximum VSWR.

Description of Components

Please refer to Figure 2 for the various components of the tuner. The number to the left of each following paragraph corresponds to the item number shown in the Figure.

1. **High Frequency Probe Micrometer:** This micrometer controls the position of the high frequency probe. Turning the micrometer counterclockwise retracts the probe (moves the impedance toward 50 ohms). Clockwise rotation inserts the probe and increases the mismatch. The micrometer locking ring (item number 4) must always be released before turning the micrometer or the tuner can be damaged. Care must be used to ensure that the micrometer is not turned beyond its upper or lower mechanical limits. If it is, the tuner will be damaged.
2. **Low Frequency Probe Micrometer:** This micrometer controls the position of the low frequency probe. Turning the micrometer counterclockwise retracts the probe (moves the impedance toward 50 ohms). Clockwise rotation inserts the probe and increases the mismatch. The micrometer locking ring (item number 4) must always be released before turning the micrometer or the tuner can be damaged. Care must be used to ensure that the micrometer is not turned beyond its upper or lower mechanical limits. If it is, the tuner will be damaged.
3. **Micrometer Scales:** The micrometer scale shows the relative position of the probe and is primarily used to repeat locations previous set. It is not intended to show actual distance of the probe away from the center conductor or an impedance value. The micrometer will reach its limit and be at its maximum matching position while the micrometer is still far from its zero position.

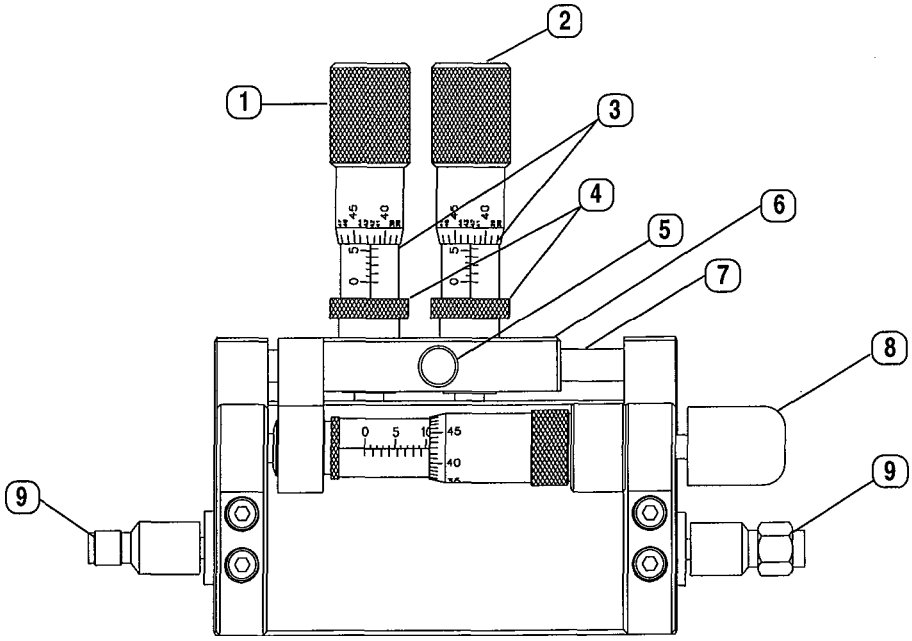

Figure 2. Tuner Components

4. **Micrometer Locking Rings:** Each micrometer has a black-knurled locking ring, that when turned clockwise, will lock the micrometer so it will not easily rotate. This ring must be unlocked (turned counterclockwise) before the micrometer is rotated or the tuner may be damaged. With the ring in the unlocked position, the micrometer thimble will turn easily with little or no resistance. This allows the user to feel the mechanical stops and avoid applying undue rotational pressure. See Figure 3 for an illustration of the micrometer locking ring operation.
5. **Carriage Lock:** Turning this knob clockwise will lock the carriage in position. The lock must be released (turned counter clockwise) before moving the carriage.
6. **Tuner Carriage:** The tuner carriage can be moved left and right along the transmission line to vary the phase of the reflected signal. The carriage will need to be moved nearly its full length to make a complete 360 degree phase rotation at the tuner's lowest frequency. At higher frequencies, the carriage will need to be moved only a small amount to cover all phase angles and can achieve a required phase at multiple carriage positions. For the maximum matching range, the carriage should generally be positioned at the point that gives the desired response that is as close to the part to be matched as possible.
7. **Carriage Rails:** The carriage, which supports the probe micrometers and the probes, rides on two rails. The rails should be kept clean and very lightly oiled for smooth operation.
8. **Carriage Micrometer:** This micrometer controls the position of the carriage. The scale shows the relative position only. This micrometer does not have a position lock. The carriage lock, Item 5, must be released before moving the carriage.
9. **Tuner Connectors:** This tuner is provided with precision 2.4mm connectors. The connectors should always be covered with the provided dust covers when the tuner is not in use. To protect the tuner and the devices connected to it, all connectors should be checked with a connector gauge prior to use.

Using Your Tuner

Any impedance (up to the maximum matching range of the tuner) can be set by varying the position of either the low frequency or high frequency probe and the carriage position. The probes vary the magnitude and the carriage position varies the phase. The micrometer scales for the probe positions and the carriage position allow accurate resetting of previously set impedances. To achieve maximum repeatability between settings, the probe position and carriage position should always be approached from the same direction each time.

The low frequency probe should be used for frequencies between the tuner's lowest rated frequency and the crossover frequency. The high frequency probe should be used for frequencies above the crossover frequency. The optimum crossover frequency will vary from tuner to tuner. The tuner is designed to meet its specifications using either the low frequency or high frequency probe—not both at the same time. Using both probes at the same time will not harm the tuner and in some cases may result in a higher matching range.

When setting probe positions using the micrometers, the black-knurled locking ring on the micrometer must be released before turning the micrometer. This is necessary so the user can feel when a position limit is reached. Under normal use, the micrometer thimble will rotate very easily when unlocked, which makes it easy to feel when a limit is reached. If the micrometer is turned beyond its preset limit, the tuner will be damaged.

The carriage position micrometer and probe micrometers are designed to read relative physical positions. The positions do not indicate an absolute position of the probes. The probe micrometers will reach their lower limit before the micrometer scale reads zero.

WARNING: If the micrometer is turned beyond its preset limit, the tuner will be damaged.

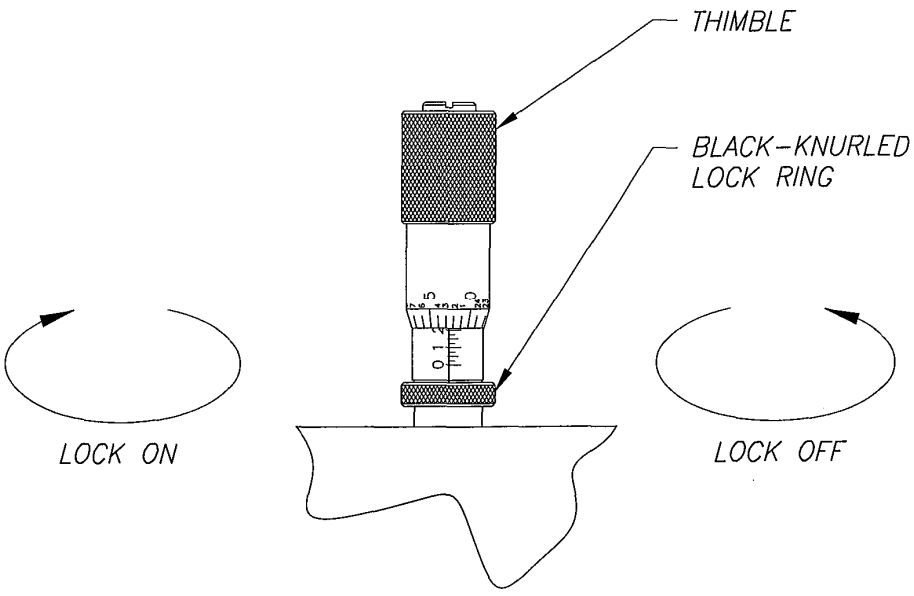

Figure 3. Micrometer Locking Ring Operation

Appendix

Data Sheet Resources

2G-035 – Slide Screw Tuners
http://www.maurymw.com/pdf/datasheets/2G-035.pdf

2B-021 – Adapters – 3.5mm In-Series
http://www.maurymw.com/pdf/datasheets/2B-021.pdf

2Y-020 – Connector Gauge 3.5mm
http://www.maurymw.com/pdf/datasheets/2Y-020.pdf

Table 2. Tuner Model Cross Reference

Model	
New	Old (obsolete)
MST983B35	8041C

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Web Resources

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