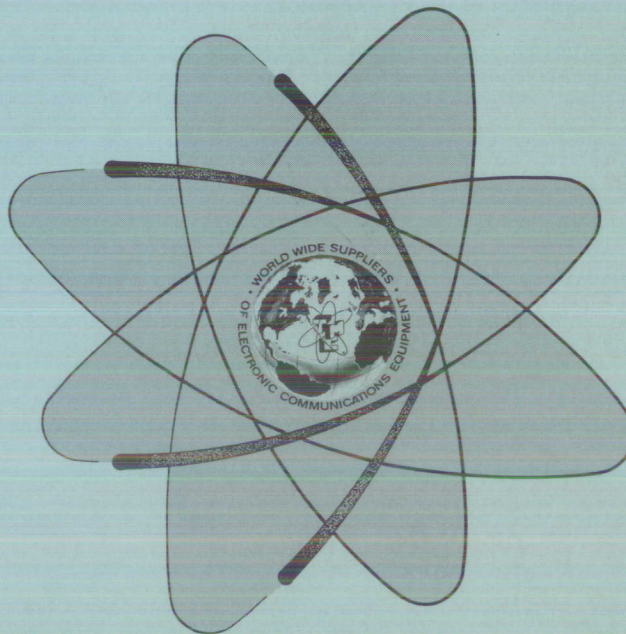


Master  
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OPERATORS MANUAL  
FOR  
RECEIVER STABILIZATION UNIT  
MODEL RSU-1



THE TECHNICAL MATERIEL CORPORATION  
MAMARONECK, N.Y. OTTAWA, ONTARIO

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# THE TECHNICAL MATERIEL CORPORATION

C O M M U N I C A T I O N S   E N G I N E E R S

700 FENIMORE ROAD

MAMARONECK, N. Y.

## W a r r a n t y

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes, \*fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

\*Electron tubes also include semi-conductor devices.

### *PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT*

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

### *PROCEDURE FOR ORDERING REPLACEMENT PARTS*

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

### *PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT*

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION  
Engineering Services Department  
700 Fenimore Road  
Mamaroneck, New York



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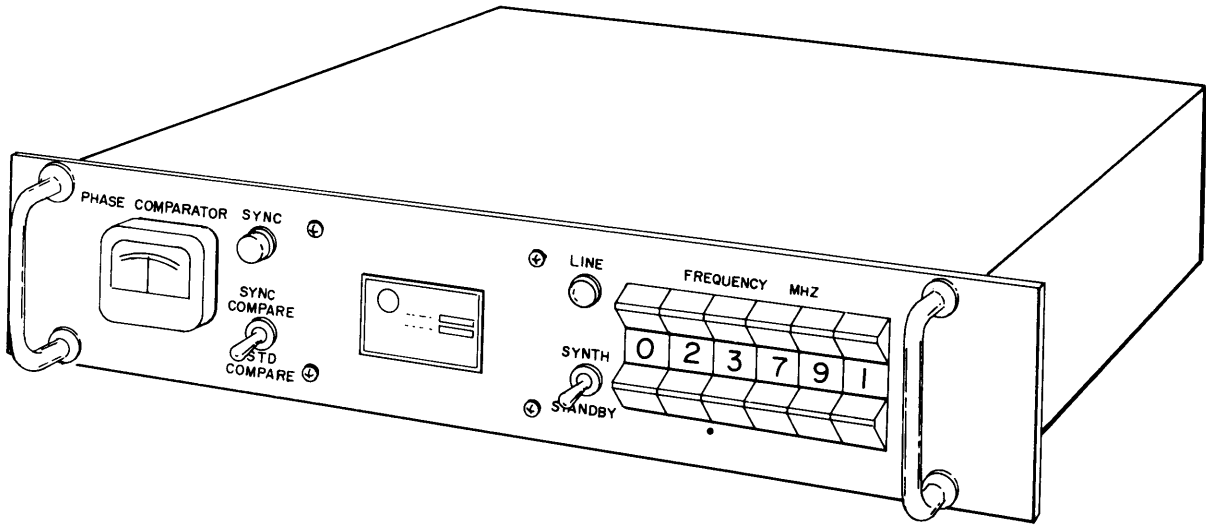


Figure 1-1. Receiver Stabilization Unit, Model RSU-1



## SECTION 1

### GENERAL INFORMATION

#### 1-1. FUNCTIONAL DESCRIPTION.

The Receiver Stabilization Unit, Model RSU-1 (hereinafter referred to as the RSU-1), shown in figure 1-1, provides frequency stabilization for associated receiving equipment. In addition, the RSU-1 is also a frequency synthesizer which replaces and acts to stabilize all frequency determining oscillators in the associated receiving equipment. Thumbwheel digital-type switches on the front panel of the RSU-1 permit incremental frequency control down to 100 hz over the entire frequency range of the associated receiving system.

After the receiving frequency has been selected on the RSU-1, the same receiving frequency is tuned to on the associated receiver. A front panel meter and lamp on the RSU-1 indicate when the associated receiver frequency is phase locked to the frequency selected on the RSU-1. Once the associated receiver frequency is phase locked, the RSU-1 will provide continuous frequency correction and maintain the associated receiving system at the same stability as the internal standard of the RSU-1, which is one part in  $10^8$  per 24 hours.

Two visual indications are provided on the front panel of the RSU-1 to indicate phase locking of the associated receiver to the RSU-1. A front panel lamp will light continuously and a phase meter will indicate the phase relationship between the RSU-1 and the associated receiver's tuned frequency.

The RSU-1 also has provisions for using an external standard, which enables it to maintain the associated receiver at the same stability as that of the external standard. The external standard must develop a minimum of 0.7 volt rms output. When an external standard is used, the internal standard of the RSU-1 is electrically disconnected and placed in a standby condition. The RSU-1 will automatically switch over to the internal standard if the external standard output falls below 0.7 volt rms, thereby preventing loss of information in the event of a failure in the external standard.

The internal standard of the RSU-1 is temperature stabilized by an oven. In order to maintain a high degree of stability, the oven is operative as long as the line cord is connected to a source of power. The entire RSU-1 can be electrically disconnected from the associated receiver by placing it in a standby condition. The associated receiving equipment will then operate independent of the RSU-1.

#### 1-2. PHYSICAL DESCRIPTION.

The RSU-1 is mounted on a 3-1/2 inch high chassis and is designed for slide mounting in a standard 19-inch rack. The unit is approximately 17 inches deep and weighs 18 pounds. The RSU-1 is completely self contained with its own power supply, frequency standard, and protective devices mounted internally. All connections from and to the associated receiving system are made at the rear panel from bnc-type connectors and a terminal strip. The front panel contains six digital-type thumbwheel switches which enable selection of the desired receiving frequency in 100-hz increments. Actuating the bottom of a digital switch advances the setting by one digit. Actuating the top of a digital switch decreases the setting by one digit.

A LINE indicator on the front panel provides a visual indication that the RSU-1 is connected to a source of power. Below the LINE indicator is a two-position switch. Placing this switch in the SYNTH position electrically connects the RSU-1 into the associated receiver circuitry; placing the switch in the STANDBY position disconnects the RSU-1 from the associated receiver circuitry.

The left side of the front panel contains a meter and an associated lamp which provide two visual indications that the associated receiver frequency is phase locked to the RSU-1. In addition, the phase of an external standard can be compared against the phase of the RSU-1 internal standard when both standards are available. A front panel switch performs the necessary signal routing with the indication obtained on the front panel meter.

The RSU-1 contains two fuses which are located at the rear of the unit.

#### 1-3. REFERENCE DATA.

Table 1-1 lists the technical specifications of the RSU-1.

TABLE 1-1. TECHNICAL SPECIFICATIONS

Frequency range:	100 hz to 31.9999 mhz.
Stability:	One part in $10^8$ per 24 hours. (higher stability may be achieved by use of an external standard)
Operating temperatures:	0 to 50 degrees Centigrade.
Operating humidity:	0 to 95% relative humidity.
Primary power:	115/230 vac, $\pm 10\%$ , 50/60 hz, single phase.
Power requirements:	30 watts average.
Frequency readout:	Digital type, indicates tuned frequency down to the 100-hz incremental level.
Dimensions:	3-1/2 inches high; 19 inches wide; 17 inches deep.
Weight:	18 pounds.
Storage temperature:	-30 to +75 degrees Centigrade.
Cooling:	Convection air.

SECTION 2  
OPERATOR'S SECTION

2-1. GENERAL.

This section contains detailed operating instructions for the RSU-1. Basically, operation of the unit consists of selecting the desired receiving frequency on the front panel digital switches and then tuning (locking) the associated receiver to the same frequency. A lamp and meter on the RSU-1 front panel provide visual indications that the two frequencies are phase locked. No further operator intervention will be necessary as the RSU-1 will automatically correct and maintain the associated receiver at the same stability as the standard used in the RSU-1.

2-2. OPERATING CONTROLS AND INDICATORS.

The operating controls and indicators of the RSU-1 are listed and described in table 2-1. The location of the operating controls and indicators are shown in figure 2-1.

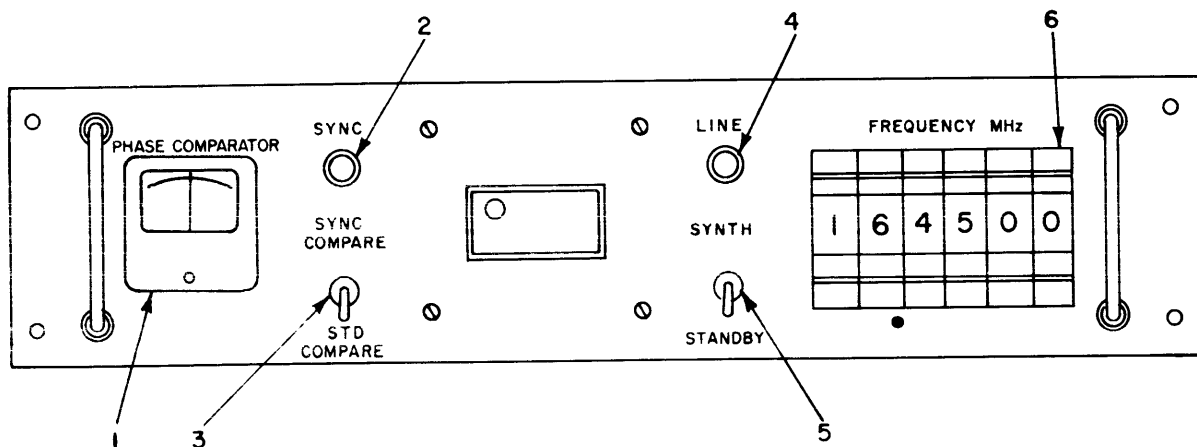


Figure 2-1. Receiver Stabilization Unit, Model RSU-1,  
Controls and Indicators

TABLE 2-1. OPERATING CONTROLS AND INDICATORS

INDEX NO.	CONTROL OR INDICATOR	FUNCTION
1	PHASE COMPARATOR meter M101	Indicates phase lock of the associated receiver frequency to the RSU-1 frequency. Also used to compare phase of external standard against internal standard.
2	SYNC indicator DS102	Indicates zero beat as frequency of associated receiver approaches frequency setting of RSU-1. Remains lighted when receiving frequency is exactly the same as the frequency of the RSU-1 (phase locked).
3	SYNC COMPARE/STD COMPARE switch S102	In SYNC COMPARE position, enables the PHASE COMPARATOR meter to indicate the phase difference between the associated receiver and the RSU-1. In STD COMPARE position, enables the PHASE COMPARATOR meter to indicate the phase difference between the external and internal standards.

TABLE 2-1. OPERATING CONTROLS AND INDICATORS (Cont)

INDEX NO.	CONTROL OR INDICATOR	FUNCTION
4	LINE indicator DS101	Illuminates to indicate that the RSU-1 is connected to a source of power and the internal standard oven is receiving power.
5	SYNTH/STANDBY switch S101	In SYNTH position, the RSU-1 is in the associated receiver circuitry for frequency control. In STANDBY position, the RSU-1 is electrically disconnected from the associated receiver circuitry.
6	FREQUENCY switch S103	Sets output frequency of RSU-1 for frequency stabilization of associated receiver system. Consists of six decade switches. Pressing and releasing bottom of a switch advances the setting by one digit. Pressing and releasing top of a switch decreases the setting by one increment.

### 2-3. OPERATING PROCEDURE.

The RSU-1 contains an internal frequency standard which is maintained at operating temperature by an oven. The oven is energized whenever the unit is connected to a source of power, as indicated by an illuminated front panel LINE indicator. The RSU-1 has provisions for using an external standard which is connected to the RSU-1 via a rear panel bnc-type connector. The external standard must develop an output of at least 0.7 volt rms. If the output of the external standard drops below the 0.7 volt rms level, the RSU-1 automatically switches to the internal standard. The 0.7 volt rms output of the external standard automatically selects the external standard signal; however the oven temperature of the internal standard is still maintained.

If it is desired to electrically disable the RSU-1, the SYNTH/STANDBY switch should be set to STANDBY. In the STANDBY position, the internal oven remains energized as indicated by an illuminated LINE indicator.

a. To operate the RSU-1, proceed as follows:

- (1) Ensure that the RSU-1 is energized by checking that the LINE indicator lamp is illuminated.
- (2) Set the SYNTH/STANDBY switch to SYNTH.
- (3) Set the SYNC COMPARE/STD COMPARE switch to SYNC COMPARE.
- (4) Set the FREQUENCY switches to the desired operating frequency.
- (5) Adjust the tuning control of the associated receiver to the same receiving frequency. As the frequency of the associated receiver closely approaches the frequency setting of the RSU-1, the SYNC indicator will illuminate and the PHASE COMPARATOR meter will start to deflect. Continue adjusting the frequency setting of the associated receiver until the SYNC indicator remains illuminated and the PHASE COMPARATOR meter reads exactly center scale. When the SYNC indicator remains illuminated and the PHASE COMPARATOR meter reads center scale, the frequency of the associated receiver is exactly the same as the frequency on the RSU-1 and phase locked. The RSU-1 will then maintain the frequency of the associated receiver without any further adjustments necessary.

(6) To change the receiving frequency, select the new frequency on the FREQUENCY switches and adjust the tuning control of the associated receiver until the SYNC indicator remains illuminated and the PHASE COMPARATOR meter again reads center scale.

NOTE

The following paragraph applies only when both internal and external standards are available.

b. To compare the external standard against the RSU-1 internal standard, set the SYNC COMPARE/STD COMPARE switch to STD COMPARE. The PHASE COMPARATOR meter will indicate the phase difference, if any, between the two standards.

NOTE

The RSU-1 remains operational and continues to provide frequency stabilization for the associated receiver during a phase comparison.