

OPERATING NOTE 15 JAN 68

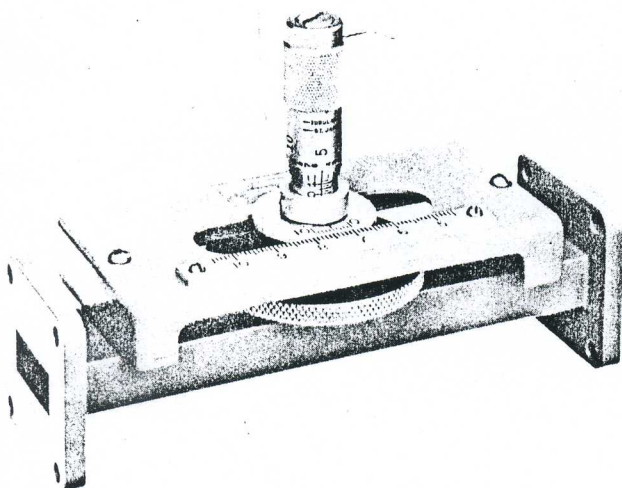


Figure 1. Model X870A Slide Screw Tuner

GENERAL INFORMATION

1. The HP Model 870A tuner is a waveguide slotted section with an adjustable probe mounted on a precision carriage. The position and penetration of the probe is adjusted to set up a reflection which effectively

cancels out the standing waves existing in the system. The tuner can be used to compensate to 1.02, or better, for a mismatched load having an SWR as high as 20:1. Small reflections can be corrected exactly.

2. Probe penetration into the guide is varied with a threaded adjustment on the S band unit, and by a micrometer drive on the others. Position of the probe along the guide of the G, J, H, X, M, and P band units is adjusted by a thumb-operated wheel, and position can be read to 0.1 mm on a vernier scale. K and R band units use a micrometer drive to move the probe along the guide; position can be read to 0.01 mm.

3. Among the applications for which waveguide slide screw tuners are useful are: correcting discontinuities or "flattening" waveguide systems; matching loads, terminations, bolometer mounts, or antennas to the characteristic impedance of the waveguide; determining experimentally the position and magnitude of the matching structures required in waveguide systems.

4. K and R band units may be ordered with circular contact flange adapters.

Table 1. Specifications

Maximum Correctable SWR: 20:1				Insertion Loss at Maximum Correctable SWR: S, G, J, H, X, M, P: 2 db, maximum K, R: 3 db, maximum					
Model	Freq Range (GHz)	Fits Waveguide Size		Approx Length		Equiv Waveguide Type	Equiv Flange Type	Net Weight	
		Nom. OD (in.)	EIA	(in.)	(mm)			(lb)	(kg)
S870A	2.60 - 3.95	3 x 1-1/2	WR284	11	279	RG-48/U	UG-53/U	10-1/4	4, 5
G870A	3.95 - 5.85	2 x 1	WR187	8.25	210	RG-49/U	UG-149A/U	4-1/4	1, 9
J870A	5.30 - 8.20	1-1/2 x 3/4	WR137	7.625	190	RG-50/U	UG-344/U	3	1, 3
H870A	7.05 - 10.00	1-1/4 x 5/8	WR112	6	152	RG-51/U	UG-51/U	1-1/2	0, 6
X870A	8.20 - 12.40	1 x 1/2	WR90	6.05	154	RG-52/U	UG-39/U	1-1/4	0, 5
M870A	10.00 - 15.00	.850 x .475	WR75	5.875	149	WR75	---	1	0, 5
P870A	12.40 - 18.00	.702 x .391	WR62	5	127	RG-91/U	UG-419/U	1	0, 4
K870A*	18.00 - 26.50	.500 x .250	WR42	4.25	108	RG-53/U	UG-595/U	1-1/4	0, 5
R870A*	26.50 - 40.00	.360 x .220	WR28	4.375	111	RG-96/U	UG-599/U	1-1/4	0, 5
* Circular contact flange adapters: for K band specify 11515A (UG-425/U) for R band specify 11516A (UG-381/U)									



OPERATING INSTRUCTIONS

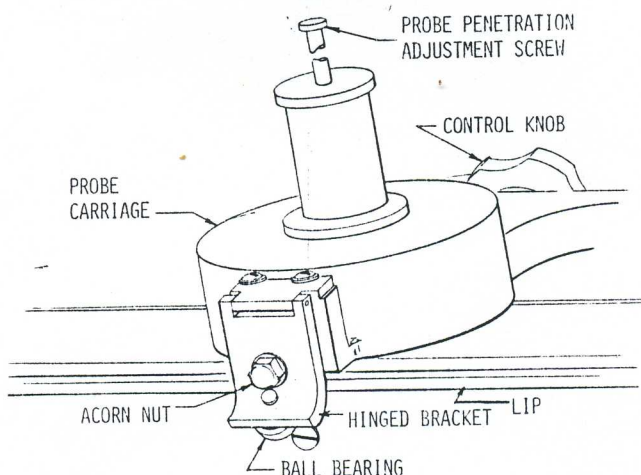


Figure 2. Model S870A Probe Carriage Detail

5. All instruments are shipped assembled except the Model S870A. See paragraph 6 for instructions on assembling the Model S870A.

ASSEMBLING MODEL S870A TUNER

6. To avoid the possibility of damage in shipment, the waveguide and probe carriage of the Model S870A are packed separately. The parts referred to in the following assembly procedure are identified in figure 2.

a. Screw out the probe penetration adjustment screw until the probe tip is flush with the under side of the carriage.

b. Remove the acorn nut so that the hinged bracket may be pulled away from the carriage. A spring and washer will come off with the nut.

c. Stand the slotted waveguide section on end. Place the control knob side of the probe carriage against the triangular lip so that the two ball bearings bear against the under side of the lip.

d. Pull the lower end of the hinged bracket away from the carriage so that the ball bearing will clear the edge of the triangular lip. Lower the carriage and release the hinged bracket; the ball bearing will ride against the under side of the lip.

CAUTION

Do not attempt to shorten this procedure by forcing the bearing over the lip. The lips are easily marred.

e. Replace the washer, spring, and acorn nut removed in step b. Tighten the nut until it butts against the end of the screw.

f. The probe carriage should travel freely along the waveguide section when the control knob is rotated.

7. Depth of probe penetration determines the magnitude of the reflection; the position of the probe determines the phase of the reflection. On all units except S-band, penetration and position controls are calibrated. These scales are useful when it is desired to return to a previously used setting of the tuner, and also to give information about the phase of the reflection which is being tuned out. (The effect of the tuner can be represented to a good approximation as a shunt susceptance located at the plane of the probe.)

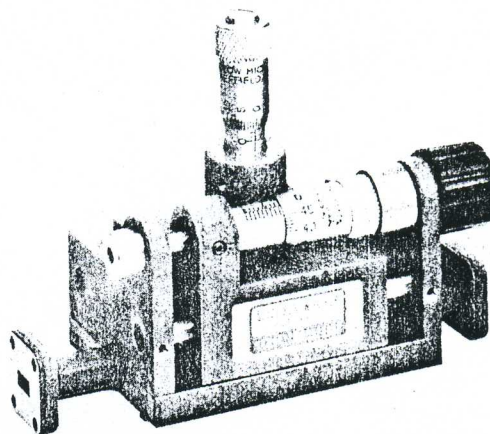


Figure 3. Model R870A Slide Screw Tuner

8. On the G, J, H, X, M, and P band units the position scale is used to measure the position of the probe along the guide axis. The scale is calibrated in centimeters to read distance of the probe from the flange which is on the right (as you face the unit).

9. Figure 4 indicates an X-band setup in which a Model X870A is used to cancel out the reflection from a mismatched load. The following is a typical step-by-step procedure for setting the tuner in such a setup.

a. Remove the Model X870A tuner and the load, and place a short on the end of the directional coupler (Model X752C). Adjust the Model 375A/B attenuator so that the Model 415B/D indicator is at a convenient reference level.

b. Reconnect the Model X870A and load; see figure 4.

c. Screw the probe micrometer out until the probe does not penetrate into the waveguide (and hence produces no effect). (The difference between this reading of the Model 415B/D and the reference set in step a gives an approximate value in dB of the return loss of the load.)

d. Screw in the probe until it produces a noticeable change in the Model 415B/D reading.

e. Slide the probe horizontally until the Model 415B/D reading reaches a minimum.