

S E R V I C E N O T E

Supersedes:

Supersedes: None

HP MODEL 86290A/B/C RF PLUG-IN

ALL SERIALS

FREQUENCY TRACKING ADJUSTMENT

This adjustment procedure optimizes the frequency tracking of the YTM (YIG Tuned Multiplier) to the YTO (YIG Tuned Oscillator) for CW or slow speed sweep operation. This procedure should be used when the YTO or YTM is replaced, when the YTO or YTM driver boards are repaired, or when power is being outputted but does not meet plug-in specifications for Maximum Levelled Power.

This procedure functions as follows: the YTO is frequency modulated by an external source through the bandpass of the YTM; the output power is detected and displayed on a network analyzer; and tracking is adjusted to insure maximum power transfer.

In this procedure, maximum power transfer (optimum tracking) adjustments are facilitated because the YTM bandpass is viewed directly on a CRT display. As the YTO is frequency modulated, an increase and decrease in power is seen on the display. This waveform is the YTM bandpass and with its peak centered on the display, optimum tracking is obtained.

EQUIPMENT:

Sweep Oscillator	HP 8620C
RF Plug-in	HP 86290A/B/C
Swept Amplitude Analyzer	HP 8755C
Display	HP 182T
Detector	HP 11664A
10-dB Attenuator	HP 8491B
Function Generator	HP 3312A
Oscilloscope	HP 1740A
DC Digital Voltmeter	HP 3455A
Extender Board	HP P/N 86290-60020
100k Ω Resistor	HP P/N 0698-7284
2k Ω Resistor (variable)	HP P/N 2100-3413
50k Ω Resistor (variable)	HP P/N 2100-3760



NOTE

Check YTO for frequency accuracy and adjust if necessary. See Operating and Service Manual for frequency accuracy performance test and adjustments.

NOTE

If A10, A10A1, A11, or A12 has been replaced or repaired, perform YTM BIAS CONTROL ADJUSTMENT described in the Operating and Service Manual.

PROCEDURE:

1. Press 8620C LINE switch OFF. Remove top cover.
2. Remove the 86290 A4 FM Driver Board, place cellophane tape on pins 8 and 9, and reinstall board. This allows the YTO to be frequency modulated without modulating the YTM.
3. Place 86290 A2 YTM Driver Board on an extender. (An extender board is supplied with the 86290.)
4. Set controls as follows:

8620C:

BAND BAND 1
MODE MANUAL

86290:

RF ON
ALC MTR
POWER LEVEL Fully Clockwise
PEAK Midrange
SLOPE-OFF OFF
FM-NORM-PL (Rear Panel) FM

3312A:

RANGE Hz 1
FREQUENCY 3
FUNCTION TRIANGULAR WAVE
AMPLITUDE 10
LINE OFF

1740A:

AUTO-NORM AUTO
A vs B IN
POS-NEG NEG
AC-DC DC
DC couple Channels A and B

8755C, Channel 1:

REFERENCE LEVEL +00
REFERENCE LEVEL VERNIER OFF
dB/DIV 5
REFERENCE POSITION IN
VIDEO FILTER OUT

182T:

MAGNIFIER.....	X1
DISPLAY.....	EXT
EXT COUPLING.....	DC

NOTE

DO NOT move PEAK control setting from Midrange position during this adjustment.

NOTE

If A2 YTM Driver Assembly or A2U1 Band Change Amplifier has been replaced, perform the following adjustment. If not, go to step 6 and proceed with slow speed tracking adjustment.

5. YTM Tracking Offset Adjustment:

- Remove 86290 A5 SWEEP CONTROL Assembly. Press 8620C LINE switch ON. Allow the equipment 30 minutes to warm up.
- Connect DVM with HIGH lead connected to A2TP1 and LOW lead to A2TP3.
- Adjust 86290 A2 Zero Control A2R27 for DVM indication of $0.0000\text{VDC} \pm 0.0001\text{VDC}$.
- Press 8620C LINE switch OFF, reinstall A5 board, and remove DVM leads.

Slow Speed Tracking Adjustment

- Connect equipment as shown in Figure 1 (100k Ω Resistor connected from A4TP2 to A3TP3).

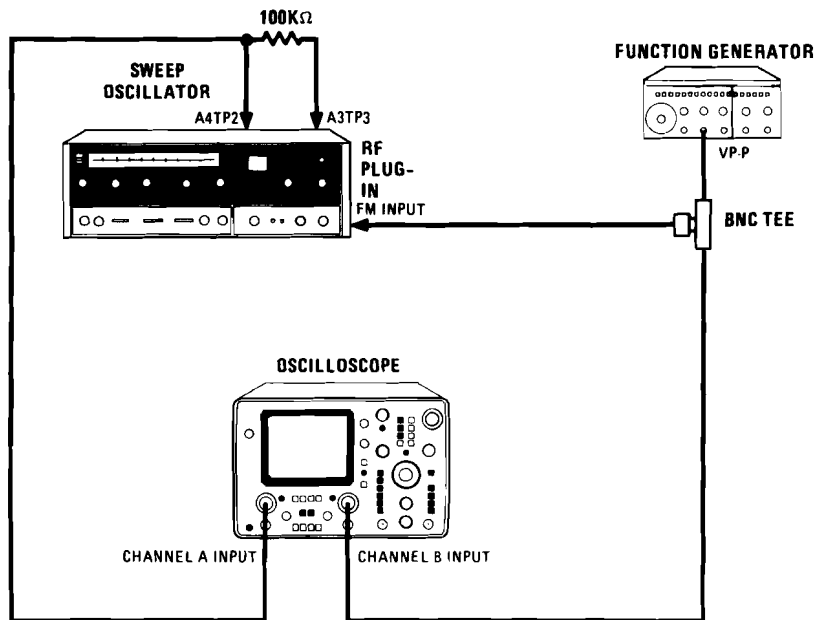
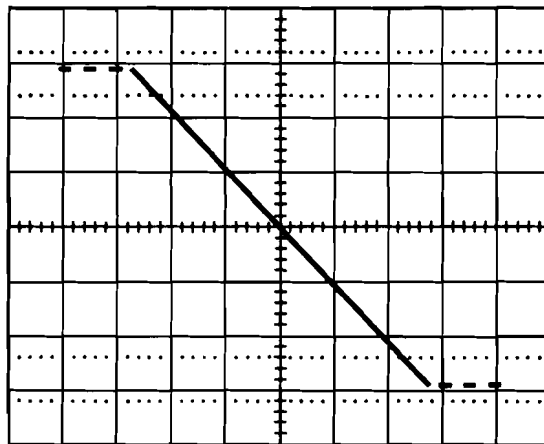


Figure 1. Function Generator Amplitude Adjustment Setup

7. Press 8620C LINE switch and 3312A LINE switch ON. Press the 8620C CW pushbutton and adjust the CW control to 4.1 GHz. Allow the equipment 30 minutes to warm up.
8. Adjust the 3312A AMPLITUDE VERNIER so that the AMPLITUDE is just below the point of overdriving the FM amplifier. (See Figure 2 for output waveform.) DO NOT change the 3312A AMPLITUDE CONTROL beyond this step.



Solid line shows FM amplifier not being overdriven. Output waveform will extend to dotted lines when amplifier is overdriven.

Figure 2. FM Amplifier Output

9. Connect the equipment as shown in Figure 3. Be sure that the 100k Ω Resistor is still connected.

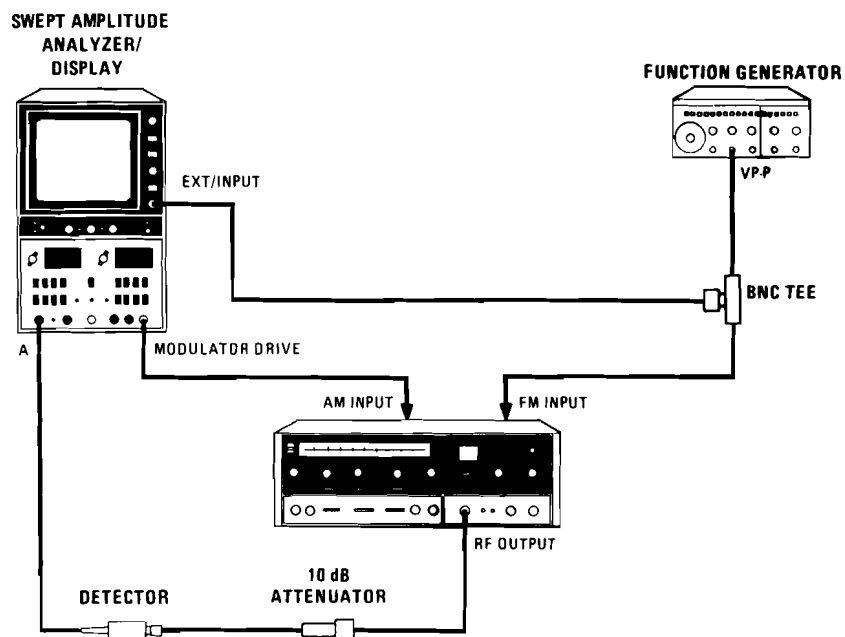


Figure 3. YTM Frequency Tracking Adjustment Setup

10. Center Reference line on the 182T display. Adjust the 182T EXT VERNIER (horizontal) for a full 10 cm display.
11. Press CHANNEL 1 A DISPLAY switch on the 8755C.
12. Adjust 3312A FREQUENCY until a single trace is obtained. Display should be similar to that shown in Figure 4.

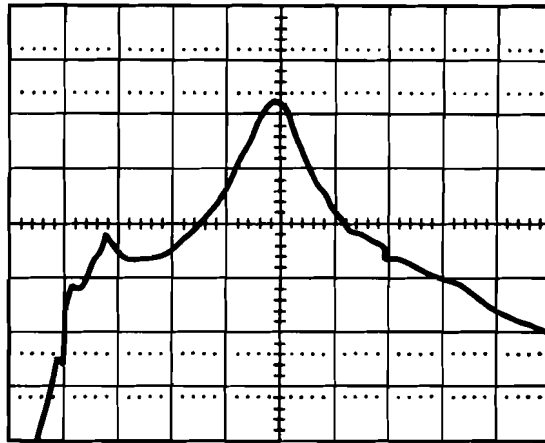


Figure 4. Typical Output Waveform. Displays YTM Bandpass

NOTE

If this adjustment is being performed due to replacement of the A12 YTM Assembly or the A2 Driver Assembly, proceed with step 13. If this adjustment is being performed for reasons other than A12 YTM Assembly or A2 YTM Driver Assembly replacement, skip steps 13 through 18.

13. Center band tracking adjustments A2R1 through A2R6.
14. Replace A2R60 with a 2k Ω pot, and A2R65 with a 50k Ω pot. Center pot adjustments.
15. Select BAND 2 and BAND 3 alternately and adjust the 2k Ω pot until the YTM bandpasses of BAND 2 and BAND 3 are centered. If centering the bandpasses is not possible, adjust them so that they are equidistant from the center of the display.
16. Select BAND 1. Adjust the 50k Ω pot until the YTM bandpass is centered on the display.
17. Repeat steps 15 and 16 once to insure the YTM bandpasses of BANDs 1 through 3 are as close to the center of the display as possible.
18. Remove pots, measure resistance, and replace with fixed resistors.

NOTE

During steps 19 through 25, monitor the power at the peak of the YTM bandpass. Readings should stay above the Maximum Leveled Power specified for the plug-in. If not, perform the YTM BIAS CONTROL Adjustment procedure in Section V of the Operating and Service Manual. If the output power is still low, troubleshoot to faulty RF component.

NOTE

During this adjustment, a power drop-out at the peak of the bandpass may occur (see Figure 5). This is caused by an undesired oscillation of the YTM's YIG sphere called squegging.

If squegging occurs, complete this adjustment procedure and then press CW on the 8620C. Manually sweep Bands 1 through 3 and determine the frequency at which squegging occurs. Connect a spectrum analyzer to the RF OUTPUT of the 86290. Adjust the 86290 for the Maximum Leveled Power specified in Table 1-1 of the Operating and Service Manual, and determine if squegging still occurs at the frequency it was observed. (On a spectrum analyzer, squegging will be seen as a spurious signal similar to that shown in Figure 6. This signal must not exceed the spurious signal specifications given in Table 1-1 of the Operating and Service Manual.) If squegging still occurs, and exceeds specifications, the YTM may have to be replaced.

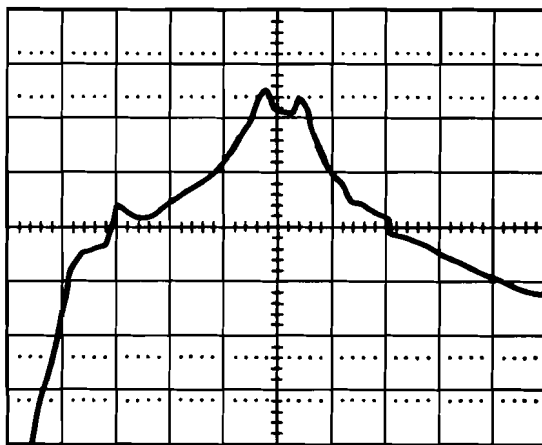
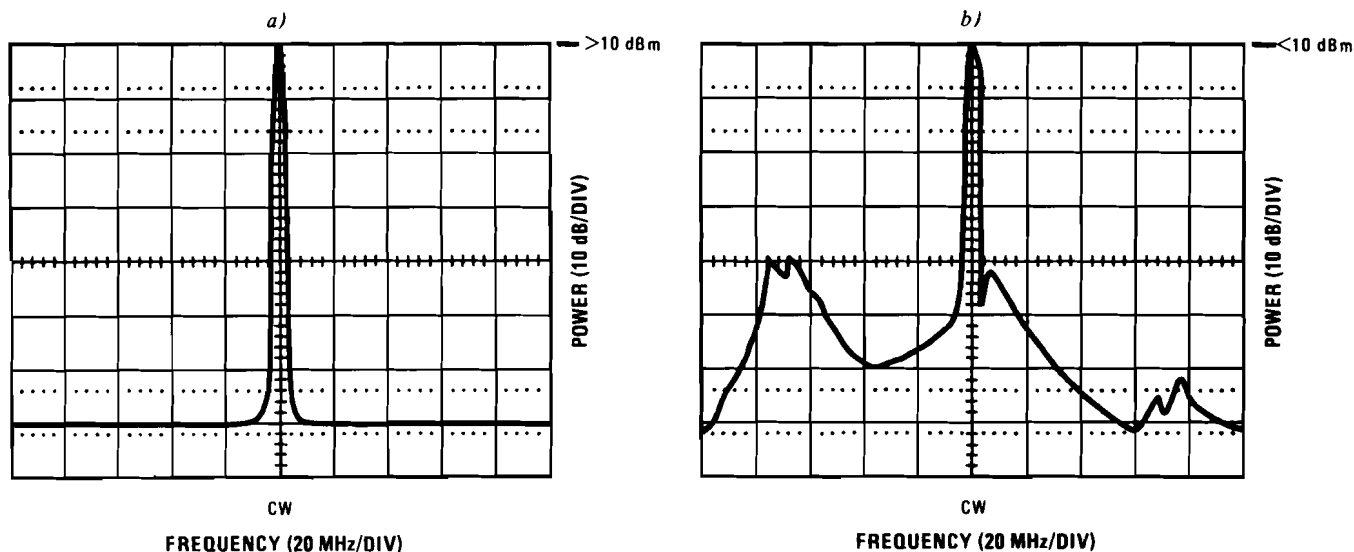


Figure 5. Typical Output Waveform. Displays Drop-Out at Peak of YTM Bandpass When Squegging Occurs



a) Waveform when output is leveled. No squegging.

b) Waveform when squegging occurs. Power at peak is below maximum specified power because squegging causes drop in output power. Also note higher sidebands.

Figure 6. Typical Output Waveforms For an 86290B As Seen On a Spectrum Analyzer

19. Press FULL SWEEP on the 8620C.
20. Adjust the 8620C MANUAL sweep vernier fully counterclockwise. Select Band 1. Adjust Band 1 LO Control A2R2 for optimum tracking (YTM bandpass centered on display) at low frequency end of Band 1.
21. Adjust the 8620C MANUAL sweep vernier fully clockwise. Adjust Band 1 HI Control A2R1 for optimum tracking at high frequency end of Band 1.
22. Select Band 2. Using Band 2's adjustments, repeat steps 20 and 21. (Band 2's LO Control is A2R4 and HI Control is A2R3.)
23. Select Band 3. Using Band 3's adjustments, repeat steps 20 and 21. (Band 3's LO Control is A2R6 and HI Control is A2R5.)
24. Repeat steps 20 through 23 until the best tracking is obtained in all bands. This is done because of interaction between the adjustment pots.
25. Disconnect test setup and continue with the YTM and YTO DELAY COMPENSATION ADJUSTMENTS (Section 5-25 of the Operating and Service Manual).

NOTE

Remember to remove the cellophane tape from pins 8 and 9 of the 86290 A4 board.



For more information, call your local HP Sales Office or nearest Regional Office: **Eastern** (201) 265-5000; **Midwestern** (312) 255-9800; **Southern** (404) 955-1500; **Western** (213) 970-7500; **Canadian** (416) 678-9430. Ask the operator for instrument sales. Or write Hewlett-Packard, 1501 Page Mill Road, Palo Alto, CA 94304. In **Europe**: Hewlett-Packard S.A., 7, rue du Bois-du-Lan, P.O. Box, CH 1217 Meyrin 2, Geneva, Switzerland. In **Japan**: Yokogawa-Hewlett-Packard Ltd., 29-21, Takaido-Higashi 3-chome, Suginami-ku, Tokyo 168.

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