HP 3588A Service Manual

Serial Number 3005A00647 and greater.

Manual Backdating adapts this manual
to instruments with earlier serial numbers.

HEWLETT PACKARD

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HEWLETT PACKARD

SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements. This is a Safety Class 1 instrument.

GROUND THE INSTRUMENT

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

Warning

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

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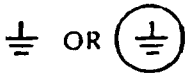
SAFETY SYMBOLS

General Definitions of Safety Symbols Used On Equipment or In Manuals.

Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked.)



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.

Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.

Alternating current (power line.)

Direct current (power line.)

Alternating or direct current (power line.)

Warning

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which if not correctly performed or adhered to, could result in injury or death to personnel.

Caution

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

Note

The NOTE sign denotes important information. It calls attention to procedure, practice, condition or the like, which is essential to highlight.

Table of Contents

Section III Manual Backdating

Section IV Circuit Descriptions

Section I

Adjustments

Introduction

This section contains the adjustment procedures for the HP 3588A Spectrum Analyzer. Use these adjustments if the analyzer does not meet its specifications or if instructed in section V, "Service," to perform these adjustments. These adjustments are not required for routine maintenance. Table 1-1 lists all the adjustments.

The top cover must be removed to perform all adjustments except "1. Oven Shutdown" and "16. Oven Frequency." For information on top cover removal, see "Disassembly/Assembly" in section II, "Replaceable Parts."

Note

Allow the HP 3588A Spectrum Analyzer to warm up for at least an hour. This is critical for adjustment "2. 80 MHz Reference VCXO." Analyzers with the oven option (option 001) must cool off for at least 8 hours before doing adjustment "1. Oven Shutdown" and warm up for at least 48 hours before doing adjustment "16. Oven Frequency."

During many of these adjustment procedures, an adjustment message appears on the screen. The instructions on the screen are not as complete as the instructions in this manual. When an adjustment message appears on the screen, continue to follow the instructions in this manual. Failure to follow the instructions in this manual may result in an incorrect adjustment, which would appear as a hardware failure.

Table 1-1. Adjustments

Adjustment Procedure	Assembly	Component
1. Oven Shutdown	A91	R2
2 80 MHz Reference VCXO	A31	C6, R13
3 300 MHz Reference VCO	A32	L506, L508
4 Interpolation VCO	A51	L101
5 Single Loop Control Voltage Clamps	A52	R423, R422
6 100 kHz and API Spurs	A52	R416, R518, R521, R533
7 Sum VCO Filter	A21	L106, L107
8 Multiple Loop Control Voltage Clamps	A23	R463, R461
9 Step VCO Filter	A24	L506, 507
10. Pretune Offset and Slope	A23	R452, R457
11 ADC Gain, Offset, and Reference	A62	R407, R405, R431
12. Second IF Bandpass Filter	A61	L3-L6, L8-L10, C30, R11
13 Source Bandpass Filter	A42	CAV ADJ 1-CAV ADJ4
14 First IF Bandpass Filter	A12	CAV ADJ 1-CAV ADJ4
15 Autorange Thresholds and 1 Meg Ohm Flatness	A11	C413, R624, R626
16. Oven Frequency	A91	U3, R12
17 Calibrator Flatness and Level	A31	R322, C330
18 Display	Display	VR31-VR34, VR41, VR42, VR64, VR67, L403

Note

If an assembly is replaced, see table 5-2 for required adjustments and performance tests.

Safety Considerations

Although the HP 3588A Spectrum Analyzer is designed in accordance with international safety standards, this manual contains information, cautions, and warnings that must be followed to ensure safe operation and to keep the unit in safe condition. Adjustments in this section are performed with power applied and protective covers removed. These adjustments must be performed by trained service personnel who are aware of the hazards involved (such as fire and electrical shock).

Warning

Any interruption of the protective (grounding) conductor inside or outside the unit, or disconnection of the protective earth terminal can expose operators to potentially dangerous voltages.
Under no circumstances should an operator remove any covers, screws, shields or in any other way access the interior of the HP 3588A Spectrum Analyzer. There are no operator controls inside the analyzer.

Equipment Required

See chapter 1, "General Information," in the *HP 3588A Performance Test Guide* for tables listing recommended test equipment. Any equipment which meets the critical specifications given in the tables may be substituted for the recommended model.

Remote Operation

Adjustments can be set up using the remote operation capability of the HP 3588A Spectrum Analyzer. See table 1-2 for a list of adjustments and corresponding HP-IB codes. See the *HP 3588A HP-IB Programming Reference* for general information on remote operation.

Table 1-2. HP-IB Codes to Set Up Adjustments

Adjustments	HP-IB Codes
4. Interpolation VCO	DIAG:FRAC:VCO ADJ
5. Single Loop Control Voltage Clamps	DIAG:FRAC:SLO:CHIG DIAG:FRAC:SLO:CLOW
6. 100 kHz and API Spurs	DIAG:FRAC:SPUR:NULL DIAG:FRAC:SPUR:API:ONE DIAG:FRAC:SPUR:API:TWO DIAG:FRAC:SPUR:API:FOUR
7. Sum VCO Filter	DIAG:FRAC:SUMV:LPF
8. Multiple Loop Control Voltage Clamps	DIAG:FRAC:MLO:CHIG DIAG:FRAC:MLO:CLOW
9. Step VCO Filter	DIAG:FRAC:SVCO:LPF
10. Pretune Offset and Slope	DIAG:FRAC:PRET:OFFS DIAG:FRAC:PRET:SLOP
11. ADC Gain, Offset, and Reference	DIAG:ADJ:ADC:GAIN DIAG:ADJ:ADC:OFFS
12. Second IF Bandpass Filter	DIAG:REC:TWO:ONE DIAG:REC:TWO:TWO DIAG:REC:TWO:THR DIAG:REC:TWO:FOUR DIAG:REC:TWO:FIVE
13. Source Bandpass Filter	DIAG:ADJ:SOUR:RES
14. First IF Bandpass Filter	DIAG:REC:HRES
15. Autorange Thresholds and 1 Meg Ohm Flatness	DIAG:REC:MOHM:FLAT DIAG:REC:RANG UP DIAG:REC:RANG DOWN
17. Calibrator Flatness and Level	DIAG:CAL:EREF DIAG:CAL:FLAT DIAG:CAL:HFR DIAG:CAL:LEV
18. Display	TEST:DISP PATT

1. Oven Shutdown

This procedure adjusts the heater shutdown trip point on the optional A91 Fan Power/Oven assembly. When the oven is cold, the heater shutdown circuit disconnects the oven output from the rear panel output connector. After the oven has been on long enough for the frequency to be stable, the heater shutdown circuit connects the oven output to the rear panel output connector.

Equipment Required: Spectrum Analyzer
BNC Cable

Note

The HP 3588A Spectrum Analyzer must be off for at least 8 hours before this adjustment is made. Once power is applied, the adjustment **MUST** be completed within **FIVE MINUTES.**

1. Remove the screw on the oven-adjustment cover. Lift the screw side of the oven-adjustment cover and tilt back to the open position.
2. Connect the spectrum analyzer to the OVEN REF OUT connector (located on rear panel) using a BNC cable.
3. Set the spectrum analyzer as follows:

Center Frequency	10 MHz
Frequency Span	1 MHz
Reference Level	– 60 dBm

4. Set the power switch to ON (I), then check that the amplitude of the 10 MHz signal is approximately – 70 dBm or lower (oven is cold).
5. Change the reference level on the spectrum analyzer to 10 dBm.
6. Turn OVEN SHUTDOWN (A91 R2) counterclockwise until the amplitude of the 10 MHz signal is > 0 dBm. Then turn OVEN SHUTDOWN clockwise until the amplitude of the signal just returns to approximately – 70 dBm and turn an additional 10 degrees clockwise.
7. Return the oven-adjustment cover and screw, and rear panel jumper (OVEN REF OUT to EXT REF IN) to their original positions.

2. 80 MHz Reference VCXO

This procedure adjusts the control voltage for the 80 MHz reference VCXO on the A31 Reference/Calibrator assembly. The 80 MHz reference is the primary frequency reference for the analyzer.

Equipment Required:

Frequency Counter
BNC(m)-to-SMB(f) Cable
Flat-Edge Adjustment Tool

Note

Before doing this adjustment, make sure the HP 3588A Spectrum Analyzer has been ON (I) for approximately one hour to allow the 80 MHz reference VCXO to reach a stable operating temperature.

1. Disconnect the rear panel jumper (OVEN REF OUT to EXT REF IN) on analyzers with the optional oven.
2. Disconnect the cable from A31 J3, and connect the frequency counter to A31 J3 using a BNC-to-SMB cable.
3. Adjust FREQ ADJ FINE (A31 R13) to the center of its adjustment range.
4. Adjust FREQ ADJ CRS (A31 C6) for 10 MHz ± 10 Hz using the flat-edge adjustment tool in the service kit.
5. Adjust FREQ ADJ FINE for 10 MHz ± 1 Hz.
6. Disconnect the frequency counter from A31 J3, and reconnect the cable from A61 J2 to A31 J3.
7. Reconnect the rear panel jumper on analyzers with the optional oven.

3. 300 MHz Reference VCO

This procedure adjusts the control voltage for the 300 MHz reference VCO on the A32 300 MHz assembly. The 300 MHz reference is the high-frequency reference for the analyzer.

Equipment Required: Digital Multimeter
Extender Board
Extender Cable

1. Set the power switch to STANDBY (⏻). Remove the screw at each end of the A32 300 MHz assembly, and place the assembly on an extender board.
2. Reconnect A32 J1 to A31 J9 using an extender cable.
3. Connect the multimeter's input terminal to A32 TP400 (see figure 1-1) and its ground terminal to chassis ground.

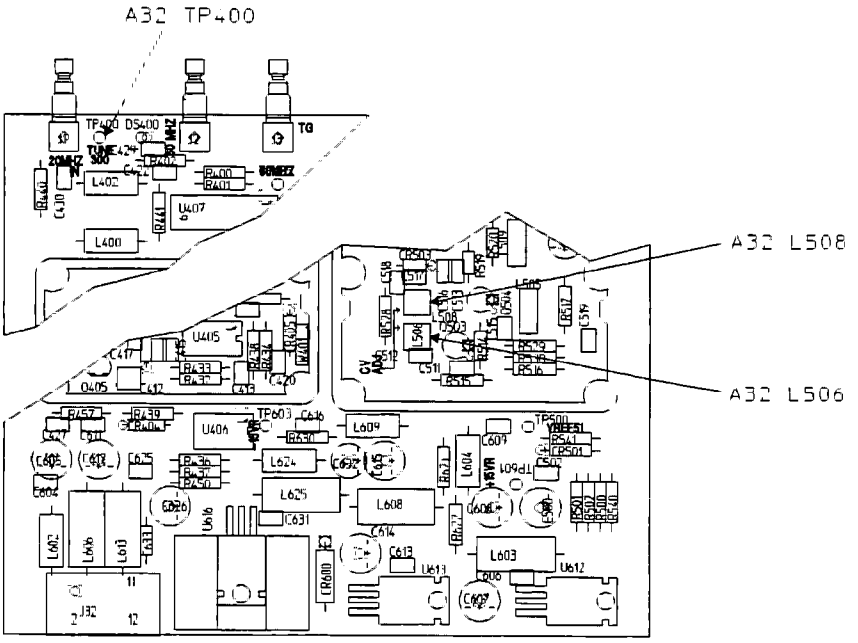


Figure 1-1. A32 300 MHz Component Locator

4. Set the power switch to ON (I). Through the holes in shield can, alternately adjust A32 L506 and L508 for -7.00 ± 0.25V.

5. Set the power switch to STANDBY (⏻). Place the 300 MHz assembly into the card nest and replace the screws.

6. Reconnect the following using original cables:

   A32 J1 to A31 J9
   A32 J2 to A33 J1
   A32 J3 to A42 J3
   A32 J4 to A23 J2
   A32 J5 to A13 J1

4. Interpolation VCO

This procedure adjusts the frequency range of the interpolation VCO on the A51 Interpolation VCO assembly.

Equipment Required: Frequency Counter
Extender Board
BNC(m)-to-SMB(f) Cable

1. Set the power switch to STANDBY (⏻). Remove the screw at each end of the A51 Interpolation VCO assembly, and remove the assembly from the card nest.
2. Move the jumper on A51 J101 to its test position (see figure 1-2). Place the assembly on an extender board.

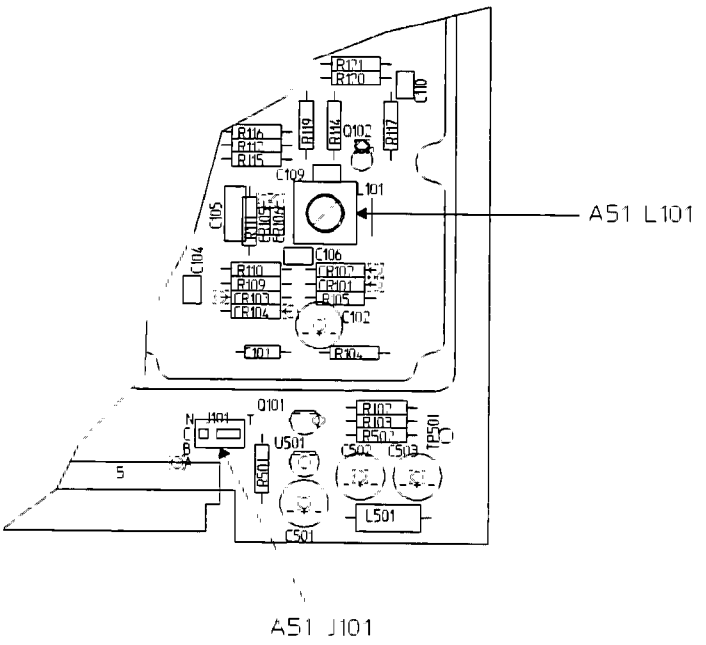


Figure 1-2. A51 Interpolation VCO Component Locator

3. Connect the frequency counter to A51 J4 using a BNC-to-SMB cable.

4. Set the power switch to ON (|), then press the following keys:

   [Spcl Fctn]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
   [INTRPL VCO]

5. Through the hole in the shield can, adjust A51 L101 for 55 ± 0.5 MHz using a plastic tuning tool.

6. Set the power switch to STANDBY (⏻). Move the jumper back to its normal position, and place the Interpolation VCO assembly into the card nest. Replace the screws.

7. Reconnect the following using original cables:

   A51 J1 to A22 J3
   A51 J2 to A21 J1
   A51 J3 to A52 J1
   A51 J4 (no connection)

5. Single Loop Control Voltage Clamps

This procedure adjusts the upper and lower out-of-limit voltages on the A52 Fractional-N assembly. The single loop control voltage is compared to the out-of-limit voltages. If the control voltage exceeds either the upper or lower out-of-limit voltage, the control voltage is clamped to the out-of-limit voltage.

Equipment Required: Frequency Counter
BNC(m)-to-SMB(f) Cable

1. Set the power switch to ON (|).
2. Disconnect the cable from A21 J3, and connect the frequency counter to A21 J3 using a BNC-to-SMB cable.
3. Press the following keys:
   [**Spcl Fctn**]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
   [SNGL LOOP CLAMPS
   [SNGL LOOP CLAMP-HI]
4. Disconnect the cable from A51 J3.
5. Adjust H.F.LIMIT (A52 R423) for 470 ± 2 MHz. If H.F.LIMIT cannot be adjusted to 470 ± 2 MHz, disconnect and reconnect A51 J3 until the loop unlocks and H.F.LIMIT can be adjusted.
6. Reconnect the cable from A51 J3 to A52 J1.
7. Press the [SNGL LOOP CLAMP-LOW] softkey.
8. Disconnect the cable from A52 J2.
9. Adjust L.F.LIMIT (A52 R422) for 290 ± 2 MHz.
10. Disconnect the frequency counter from A21 J3.
11. Reconnect A21 J3 to A12 J1 and A52 J2 to A33 J4.

6. 100 kHz and API Spurs

This procedure attenuates the 100 kHz sample and hold spur, and the API spurs on the A52 Fractional-N assembly.

Equipment Required:

- Spectrum Analyzer
- Extender Board
- Extender Cables
- BNC(m)-to-SMB(f) Cable
- BNC Cable

1. Set the power switch to STANDBY (⏻). Remove the screw at each end of the A52 Fractional-N assembly, and place the assembly on an extender board.

Caution 

To avoid damaging the cables connected to A33 J5 and J6, disconnect and position the cables away from the A52 Fractional-N assembly before removing or inserting the A52 Fractional-N assembly.

2. Reconnect the following using extender cables:

   A52 J1 to A51 J3
   A52 J2 to A33 J4
   A62 J1 to A33 J3
   A62 J2 to A31 J8

3. Disconnect the cable from A21 J2, and connect the spectrum analyzer to A21 J2 using a BNC-to-SMB cable. Connect the spectrum analyzer's 10 MHz reference output to EXT REF IN (on rear panel) using a BNC cable.

4. Press the [**Preset**] hardkey, then set the spectrum analyzer as follows:

Center Frequency	400 MHz
Frequency Span	500 kHz
Reference Level	10 dBm
Res BW	10 kHz
Video BW	1 kHz

5. Set the power switch to ON (I), then press the following keys:

   [**Spcl Fctn**]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
   [SPURS]

[100 kHz]

6. Adjust A52 R416 (see figure 1- 3) for a minimum spur level at approximately 400.2 MHz (figure 1-4 shows the spurs out of adjustment).

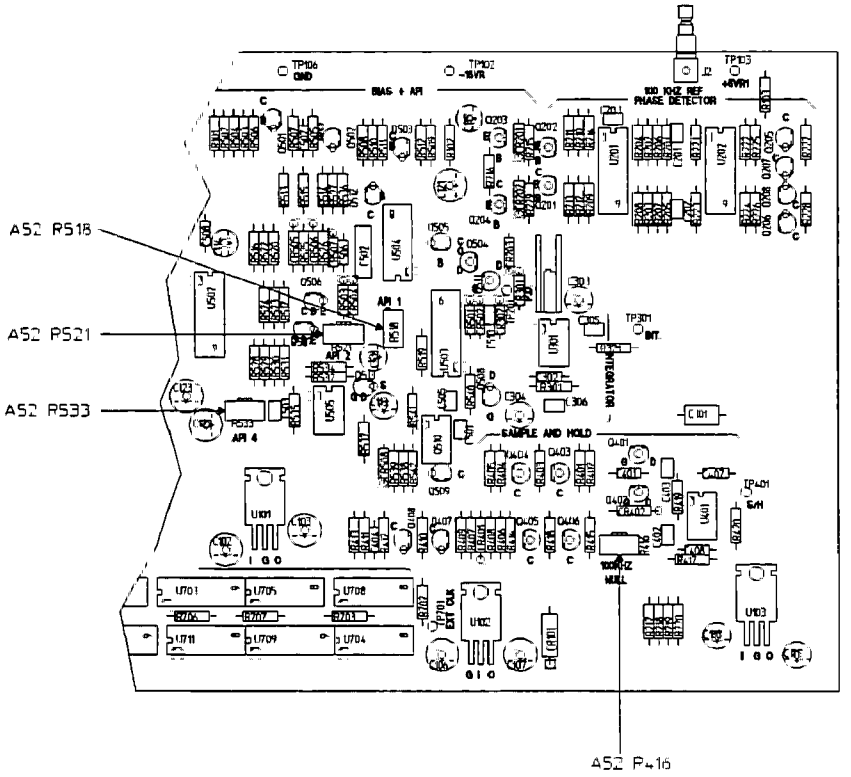


Figure 1-3. A52 Fractional-N Component Locator

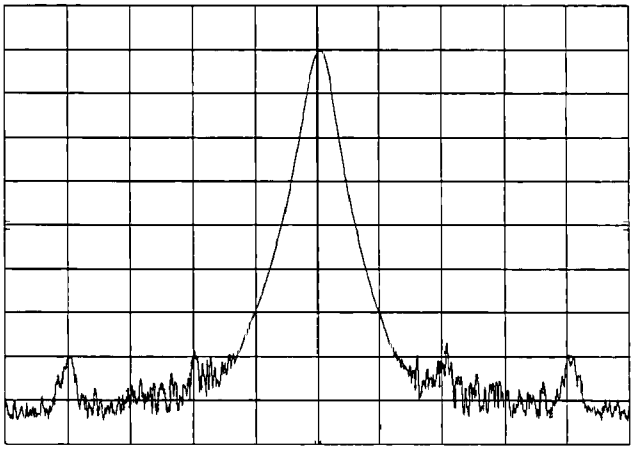


Figure 1-4. Spurs Out of Adjustment

7. Set the spectrum analyzer as follows:

Center Frequency	400.03 MHz
Frequency Span	25 kHz
Res BW	300 Hz
Video BW	300 Hz
Sweeptime	1 sec

8. Press the [API 1] softkey.
9. Adjust API 1 (A52 R518) for a minimum spur level at 400.033 MHz.
10. Change the spectrum analyzer's center frequency to 400.003 MHz.
11. Press the [API 2] softkey.
12. Adjust API 2 (A52 R521) for a minimum spur level at 400.006 MHz.
13. Change the spectrum analyzer's center frequency to 400.0001 MHz.
14. Press the [API 4] softkey.
15. Adjust API 4 (A52 R533) for a minimum spur level at 400.00303 MHz.
16. Set the power switch to STANDBY (⏻). Place the Fractional-N assembly into the card nest, and replace the screws.
17. Reconnect the following using original cables:

    A52 J1 to A51 J3
    A52 J2 to A33 J4
    A62 J1 to A33 J3
    A62 J2 to A31 J8
    A21 J2 to A42 J2
    A33 J5 to TRIG OUT (white cable)
    A33 J6 to EXT TRIG (black cable)

7. Sum VCO Filter

This procedure adjusts the low pass filter on the A21 Sum VCO assembly. This filter improves spectral purity of the VCO.

Equipment Required:

Spectrum Analyzer
Extender Board
Extender Cable
BNC(m)-to-SMB(f) Cable

1. Set the power switch to STANDBY (⏻). Remove the screw at each end of the A21 Sum VCO assembly, and place the assembly on an extender board.
2. Reconnect A21 J1 to A51 J2 using an extender cable. (A11 J2 to A31 J1 may be left unconnected.)
3. Connect the spectrum analyzer to A21 J2 using a BNC-to-SMB cable.
4. Set the power switch to ON (I), then press the following keys:
   [**Spcl Fctn**]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
   [SUM VCO LOW PASS]
5. Press the [**Preset**] hardkey, then set the spectrum analyzer as follows:

Center Frequency	380 MHz
Frequency Span	200 MHz
Reference Level	– 5 dBm
dB per Division	1 dB
Maximum Hold	On

6. Through the holes in the shield can, alternately adjust A21 L106 and L107 (see figure 1-5) for a flatness (maximum amplitude minus minimum amplitude) of less than 3 dB(p-p). During this adjustment, periodically clear the spectrum analyzer's maximum hold function.

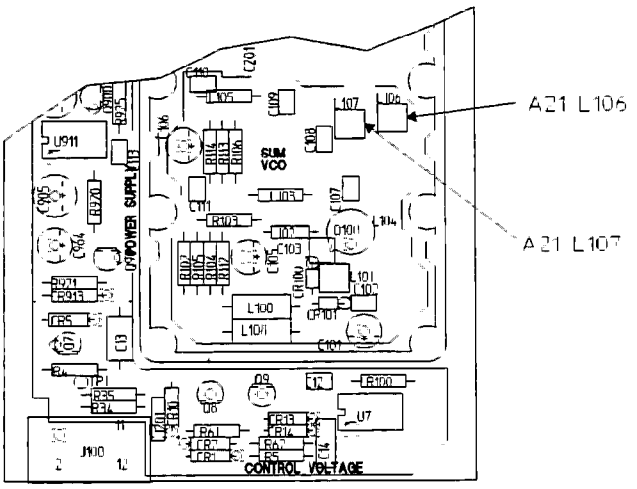


Figure 1-5. A21 Sum VCO Component Locator

7. Set the power switch to STANDBY (⏻). Place the Sum VCO assembly into the card nest, and replace the screws.

8. Reconnect the following using original cables:

   A21 J1 to A51 J2
   A21 J2 to A42 J2
   A21 J3 to A12 J1
   A21 J4 to A22 J1
   A11 J2 to A31 J1

8. Multiple Loop Control Voltage Clamps

This procedure adjusts the upper and lower out-of-limit voltages on the A23 Step Phase Detector assembly. The multiple loop control voltage is compared to the out-of-limit voltages. If the control voltage exceeds either the upper or lower out-of-limit voltage, the control voltage is clamped to the out-of-limit voltage.

Equipment Required: Frequency Counter
BNC(m)-to-SMB(f) Cable

1. Set the power switch to ON (|).
2. Disconnect the cables from A23 J3 and from A24 J1.
3. Connect the frequency counter to A24 J1 using a BNC-to-SMB cable.
4. Press the following keys:
   [**Spcl Fctn**]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
   [MULT LOOP CLAMPS]
   [MULT LOOP CLAMP-LOW]
5. Adjust STEP OOL_L (A23 R461) for 297 ± 0.5 MHz.
6. Reconnect the cable from A23 J3 to A31 J4.
7. Disconnect the cable from A23 J1.
8. Press the [MULT LOOP CLAMP-HI] softkey.
9. Adjust STEP OOL_H (A23 R463) for 470 ± 0.5 MHz.
10. Disconnect the frequency counter from A24 J1.
11. Reconnect A23 J1 to A24 J3 and A24 J1 to A22 J2.
12. Press the [**Preset**] hardkey to exit the adjustment mode.

9. Step VCO Filter

This procedure adjusts the low pass filter on the A24 Step VCO assembly. This filter improves the spectral purity of the VCO.

Equipment Required:

- Spectrum Analyzer
- Extender Board
- Extender Cable
- BNC(m)-to-SMB(f) Cable

1. Connect the spectrum analyzer to A24 J2 using a BNC-to-SMB cable.
2. Set the power switch to ON (I), then press the following keys:
   [**Spcl Fctn**]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
   [STEP VCO LOW PASS]
3. Press the [**Preset**] hardkey, then set the spectrum analyzer as follows:

Center Frequency	380 MHz
Frequency Span	200 MHz
Reference Level	– 20 dBm
dB per Division	1 dB
Maximum Hold	On

4. If the flatness (maximum amplitude minus minimum amplitude) of the displayed signal is less than 3 dB(p-p), the step VCO filter is within tolerance and should not be adjusted. Disconnect the spectrum analyzer from A24 J2.
5. If the flatness (maximum amplitude minus minimum amplitude) of the displayed signal is larger than 3 dB(p-p), do the following:
   a. Set the power switch to STANDBY (⏻). Remove the screw at each end of the A24 Step VCO assembly, and place the assembly on an extender board.
   b. Reconnect A24 J3 to A23 J1 using an extender cable.
   c. Reconnect the spectrum analyzer to A24 J2 using a BNC-to-SMB cable.

d. Set the power switch to ON (I), then press the following keys:

[**Spcl Fctn**]

[ ] (second softkey from bottom)

– 99

[ ] (second softkey from bottom)

[SERVICE FUNCTIONS]

[ADJUSTMTS]

[LOCAL OSC]

[STEP VCO LOW PASS]

e. Through the holes in the shield can, alternately adjust A24 L506 and L507 (see figure 1-6) for a flatness (maximum amplitude minus minimum amplitude) of less than 3 dB(p-p). During this adjustment, periodically clear the spectrum analyzer's maximum hold function.

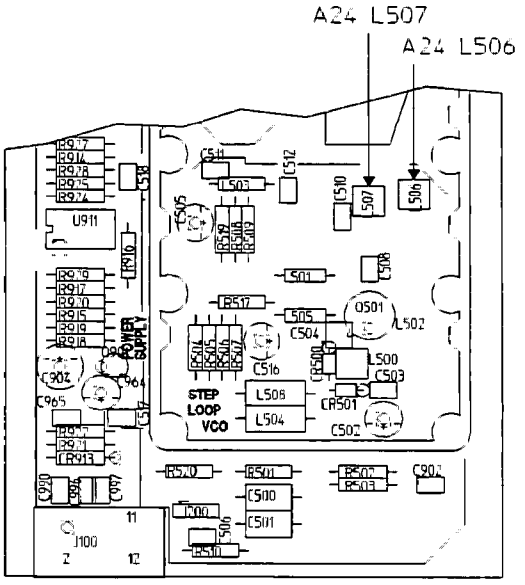


Figure 1-6. A24 Step VCO Component Locator

f. Set the power switch to STANDBY (⏻). Place the Step VCO assembly into the card nest, and replace the screws.

g. Reconnect the following using original cables:

A24 J1 to A22 J2
A24 J2 (no connection)
A24 J3 to A23 J1

10. Pretune Offset and Slope

This procedure adjusts the pretune offset and slope on the A23 Step Phase Detector assembly. Pretune offset is added to the control voltage, then amplified by pretune slope. The resulting voltage coarsely adjusts the sum VCO's frequency to ensure that the sum loop can phase lock.

Equipment Required: Frequency Counter
BNC(m)-to-SMB(f) Cable

1. Set the power switch to ON (I).
2. Disconnect the cables from A22 J3 and from A21 J3.
3. Connect the frequency counter to A21 J3 using a BNC-to-SMB cable.
4. Press the following keys:
   [Spcl Fctn]
   [ ] (second softkey from bottom)
   – 99
   [ ] (second softkey from bottom)
   [SERVICE FUNCTIONS]
   [ADJUSTMTS]
   [LOCAL OSC]
5. Press the [PRETUNE OFFSET] softkey.
6. Adjust PRETUNE OFFSET (A23 R452) for 450 ± 0.5 MHz.
7. Press the [PRETUNE SLOPE] softkey.
8. Adjust PRETUNE SLOPE (A23 R457) for 306 ± 0.5 MHz.

Note

If PRETUNE SLOPE cannot be adjusted for 306 ± 0.5 MHz, adjust either A21 L101 (see figure 1-5) or A24 L500 (see figure 1-6). Adjusting A21 L101 clockwise or A24 L500 counterclockwise reduces the frequency.

9. Repeat steps 5 through 8 until both PRETUNE OFFSET and PRETUNE SLOPE are within tolerance without adjustment.

10. Press the following keys:

    [**Preset**]
    [**Sweep**]
        [SWEEP AUTO **MAN**]
        [MANUAL FREQ]
        30
        [MHz]

11. The counter readout should be 336 ± 1 MHz. If the counter readout is not within tolerance, do the following:

    a. Press the following keys:

    [**Spcl Fctn**]
        [SERVICE FUNCTIONS]
        [ADJUSTMTS]
        [LOCAL OSC]
        [PRETUNE SLOPE]

    b. Adjust PRETUNE SLOPE (A23 R457) for 305.6 ± 0.1 MHz.

    c. Repeat steps 5 through 11 until all are within tolerance without adjustment

    d. Press the [**Preset**] hardkey to exit the adjustment mode.

12. Disconnect the frequency counter from A21 J3.

13. Reconnect A21 J3 to A12 J1 and A22 J3 to A51 J1.

11. ADC Gain, Offset, and Reference

This procedure adjusts the second-pass gain, the first-pass offset, and the reference voltage for the ADC on the A62 ADC/Digital Filter assembly.

Equipment Required:

- Oscilloscope
- 1:1 Oscilloscope Probe
- Synthesizer
- Extender Board
- Extender Cables
- BNC(m)-to-SMB(f) Cable
- Capacitive Load
- BNC Cable

Note

Although a digital oscilloscope is listed in the recommended equipment list, this adjustment may be easier using an analog oscilloscope.

1. Set the power switch to STANDBY (⏻). Remove the screw at each end of the A62 ADC/Digital Filter assembly, and place the assembly on an extender board.
2. Reconnect A62 J1 to A33 J3 and A62 J2 to A31 J8 using extender cables. Reconnect the fast bus cable to A62 J5 using the fast bus extender cable.
3. Connect the oscilloscope to A62 TP400 (see figure 1-7) using a capacitive load and a 1:1 oscilloscope probe. Connect the probe ground clip to TP 505 (AGND).

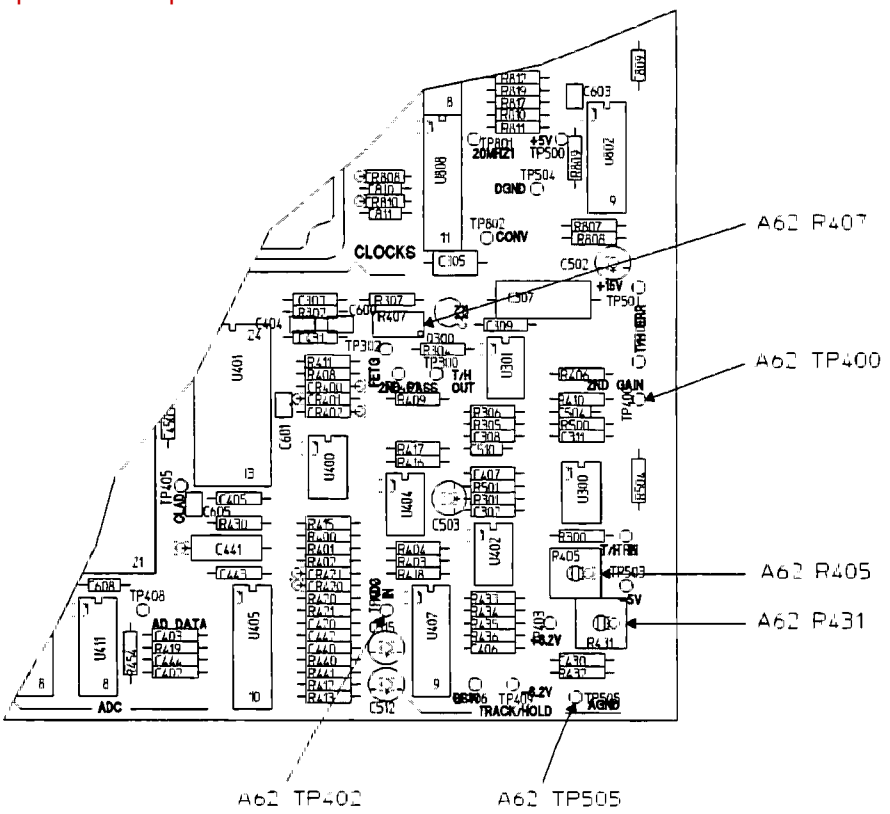


Figure 1-7. A 62 ADC/Digital Filter Component Locator

4. Connect the synthesizer to A62 J3 using a BNC-to-SMB cable.

Note

A 50Ω termination is required for synthesizers with 50Ω output impedance.

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5. Connect the synthesizer's synchronous output to either the oscilloscope's channel 2 input or external trigger input using a BNC cable.

6. Set the synthesizer as follows:

Function	Sine Wave
Frequency	1 kHz
Amplitude	10 mVrms