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A text file by David Wise which details the differences between the HP 8552A and 8552B with tips on calibration and diagnos

8552A-8552B_Differences.txt:

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DIFFERENCES BETWEEN 8552A AND 8552B.

By David Wise
May 2005

Source material:
        TM 11-6625-2781-14-1 (8552B military manual, S/N 971 to 1650A)
        HP 8552A Operating and Service Manual (S/N 809 to 852)

This is only a summary.  It will give you enough information to
perform a calibration on an 'A in conjunction with the above 'B manual.
If you also have the 'A schematics, you'll be in fairly good shape
for diagnosis too.

I make no attempt to reconcile changes in component callouts on
the schematics.  Most boards changed, even if only slightly.

Procedures not mentioned here are the same for 'A and 'B.

Feature differences:

Late 'A vs. early 'A:

1. Single Scan button can stop a scan in progress.

2. Better compatibility with the 8443A Tracking Generator.
   (With an early 'A, the RF output will be correct, but
    the counter will display garbage, no marker will be
    generated in MARKER mode, and the scan will free-run
    in SCAN HOLD mode.)

   Modification to make early 8552A compatible with 8443A:
   A. Add a wire from XA6-E to J3-41.
   B. Insert a 20K resistor in parallel with a 470pF cap,
      in series with the wire connecting to XA6-4.
   C. Add a wire from the wire in step B to J3-13.

   Step A allows the 8443A to control the scan ramp.
   Steps B and C allow the 8443A to control blanking.

   Late 8443A's (with LED readout) have a RESTORE SIGNAL mode.
   The 8552A, and early 8552B's (see Change J) do not support this.
   Electrically speaking, it's a simple change (add A8R98 and
   W13, see 'B SS13), but the soldering at J3 is quite difficult
   and in my opinion it's not worth the effort unless you MUST
   have the feature.

3. Pen Lift output.

'B vs. Late 'A:

1. Tighter resolution.  The 'A goes down to 50Hz.  The 'B goes to 10Hz.
   (The 30Hz and 10Hz positions on the RF unit's bandwitch selector
    both select 50Hz when the 'A IF unit is used.)

   Where the 'B Crystal Filter board has five crystals, the
   'A board has three.  The 10dB and 20dB gain adjustments are
   here rather than on the LC Filter board.
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2. Better VCO frequency stability. This was required to make use of the 10Hz bandwidth.

   The 'B has a 47MHz VCO which is slaved (as in a PLL) to the 47MHz mixing product of a 45MHz crystal oscillator and a 2MHz VCO. The 'A just has a straightforward 47MHz VCO.

3. Better Cal frequency stability.

   The 'B Cal oscillator is crystal-controlled, where the 'A is a simple RC multivibrator.

4. Manual Scan.

   This is essentialy External Scan driven from a front-panel pot.

5. 2dB Log vertical mode.

   The 'B deflection board adds a x5 magnifier.

Checks and Adjustments:

4.23 Calibrator Output.

   Frequency is 30MHz +/- 300kHz.

5-32. 300 kHz Band pass Filter Adjustment
5-33. LC Filter Adjustment

   Tip: Use the crystal filter to determine the center frequency.
   Switch to 3kHz bandwidth, center the signal, then switch to
   the bandwidth of interest and adjust the filter.
   This comment applies to both the 'A and the 'B.

5-34. Crystal Filter Fine Adjustment

   Omit steps 2, 3, and 4. In Step 5, don't use CAL OUTPUT.
   Tune to the LO feedthrough or use a stable external oscillator.
   In steps 10 and 13, there are adjustments only for 100Hz and 50Hz.
   300Hz is a factory-selected resistor. Bypass, 3kHz and 1kHz are
   all controlled by another.

5-35. Crystal Filter Coarse Adjustment

   The 'A has the same "null" and "skirt" trimmers as the 'B,
   just three sets instead of five. To short out a stage,
   place the shorting network directly across the crystal.

   If my experience with the Tektronix 1L10 is any guide, the two
   trimmers interact in a nonintuitive way, and the best strategy is
   to simply tweak around until you find the "sweet spot", which Tek
   identifies as "as broad as possible while maintaining symmetry".
   This sounds odd until you read the 1943 Bliley E6 app note explaining
   that broadening a crystal filter is the hard part. Tek also uses a
   modulated test signal, so you can see the sidebands. You want to
   make the valleys between the fundamental and the sidebands as
   shallow as possible but equal height. I recommend 3kHz modulation.

5-36. 3 MHz lF Gain Adjustment

   Clarification of step 12 ("Turn LOG REF LEVEL vernier to -6.
   Note error from 1.000 Vdc and adjust HP 606B output for
   -1.000 Vdc minus error."): They mean literally that.
   "Error" is a signed number; note which way it's off, then
   increase or decrease generator output so it's off the same
   amount the other way. Then you repeat the adjustments.
   The goal is to make it as linear as possible, eliminating
   any "bend" in the middle.
   This comment applies to both the 'A and the 'B.

   The 10dB and 20dB adjustments are on the Crystal Filter
   board A4, not the LC Filter board A1.

5-37. 47 MHz LO Automatic Phase Lock Check and Adjustment

   This procedure is completely different.
   Here is my improved version:

   There is no "Error Level" A3A2L1 (SS3). Well, there is,
   called "47MHz Tune" A3A2C4, but it does the job of
   "Center Freq" A13T1 (SS4). There're also no "Offset"
   A5R71 or "Shaping" A5R45 linearity adjustments.
   Instead, you just set the frequency endpoints with
   "47 MHz Tune" and "Tuning Range" A5R42. Linearity is
   set by factory selection of ten resistors (!) in the
   shaping network. (A lot of work for a generic curve;
   the VCO is on another board - A3.)

   - Put A5 (Power Supply) on an extender.
   - Set Zero Scan.
   - Turn off Tuning Stabilizer.
   - Ground XA5-5.
   - DC volts on XA5-2, -3, and -13 should be 0 +/- 200mV.
   - Frequency at Aux A jack J3 pin A2(94 coax cable) should
     be 46.7MHz +/- 5kHz; adjust "47MHz Tune" A3A2C4 if it's off.
   - Inject -300uA on the base of A5Q9. Since it's at ground,
     this can be done with a voltage supply, e.g. -30V through a

100K 1% resistor, or -100V (available in the instrument) through 333K. Don't short to the nearby -100V trace!
- Frequency should shift to 47.3MHz +/- 5kHz; adjust "Tuning Range" A5R42 if it's off.

5-38. 50 MHz lF Bandpass Check and Adjustment

The procedure is okay, just badly described. The adjustment portion (steps 1-7) is fine except the figure, which is idealized. Don't expect to get those vertical skirts! If you trust your RF module, you can dispense with the sweep generator and instead simply set FREQUENCY to 0kHz (the LO feedthrough) and SCAN WIDTH to 1MHz/div. In the check (steps 8-10), the figure is nonsense. The operation sweeps the signal across the central 400kHz of the passband, 200kHz due to the scan ramp, 200kHz due to FINE TUNE. Start with FINE TUNE full cw and the signal at the extreme right side of the CRT. Observing signal amplitude throughout, use FREQUENCY to move the signal to the left, then FINE TUNE to move it to the right, repeating until FINE TUNE is full ccw and the signal is at the extreme left.

5-40. 30 MHz Calibration Oscillator Check and Adjustment

Step 7: Set the amplitude with A6R54; set the frequency with A6C15.

Steps 8 and 9: Omit.

Service Sheets:

Reminder: These comments convert, if you will, the 'B Service Sheets into 'A Service Sheets.

The 'A manual contains an Overall Wiring and Switching Diagram (Service Sheet 2). The 'B TM does not, and I consider it a serious omission.

SS3: The 'A 50MHz Converter Assembly A3 (08552-6003) is similar to the 08552-60149 in the 'B, but it doesn't have the third 47MHz output for APC, and the control input might also not be the same voltage range. The VCO module is wired differently, but you probably won't be in there anyway.

SS4: N/A

SS5: The 'A Power Supply board summing/shaping section is completely different from the 'B (discrete vs op-amp), but it does almost exactly the same thing. Inputs are pins 2, 3, and 5. Output is on 13, it's not filtered at slow SCAN TIME settings, and I don't know if it's the same voltage range.

There's neither a Shaping nor an Offset adjustment. Instead, Tuning Range adjusts the gain of the summing amp.

SS6:
SS7: The 3MHz Amplifier board A2 is a different part number, but I can't see any difference.

SS8: Only three differences: (a) Slightly different values in the 10kHz bandwidth-setting resistors, (b) 2-transistor output stage, and (c) 10dB and 20dB gain adjustments are on the crystal filter board not here.

SS9: 924 and 925 wires go to the crystal board not the LC board.

SS10:
SS11: Same idea, but many detail differences. The 'B is definitely an evolutionary refinement, what the 'A should have been.

The 'B has five identical stages; the 'A has three different stages. Like the 'B, each 'A stage has LC load and neutralization trimmers. There are no crystal fine-tune trimmers. Bypass is done by shunting each crystal with a reed relay.

The first crystal is not preceeded by a buffer, it just has the single transistor driving the neutralizer cap. The second is buffered by a darlington pair not a feedback amplifier. The third stage topology resembles the B's four-transistor feedback amp + neutralizer core, but the feedback is switched up and down by the 10dB and 20dB gain controls. It's also preceeded by an emitter follower.

The output amp is three transistors not four, and there are gain compensation adjustments for 50Hz and 100Hz only; 300Hz is a factory-selected resistor. A second factory-selected resistor adjusts gain at all other bandwidths: 1kHz, 3kHz, and Bypass.

The IF attenuator topology is the same, but in keeping with the rest, many of the resistor values are different.

SS12:
SS13: The Lin/Log Amp board A8 is... the same!

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      The Video Filter assembly lacks the 10Hz position.
      The Lin/Log switch lacks the 2dB LOG position.
      The Lin/Log sense wire (968) is not brought out to J3-40.
      The 8553B does not use this.  I don't know what does;
      maybe the 8556A.
      XA8-13 (3MHz signal) is not brought out to J3-23/24.
      Supporting the late-version 8443A's RESTORE SIGNAL mode,
      this was added partway through the 'B production, and
      while electrically simple, it's hard to do at home.

SS14: The 'A Deflection board is similar to the old 'B board
      (see Change H), differing only in the vertical input stage,
      which in the 'B contains the x5 magnifier for 2dB LOG mode.

SS15:
SS16: The Scan Generator board A6 and Scan Time Switch assembly A9
      have different part numbers.  The total redraw of this
      sheet makes it hard to tell, but I can't find a significant
      difference.  Ah, there it is: the 'A has three holdoff times;
      the 'B, four.  Starting at 10Sec, the 'A holdoff shortens
      at 5mSec and .5mSec.  (The 'B is .1Sec, 5mSec and .5mSec.)

SS17: The Video Filter switch lacks the 10Hz position.

SS18: The 957 wire from the LOG REF LEVEL selector doesn't go out
      to XA8-7 (through a 27K resistor).  The schematic doesn't
      show it going anywhere, so its purpose is a mystery.

SS19: Although the Power Supply board A5 has a different part
      number, this portion of it is the same.  The 'A lacks
      a couple of ferrite beads.

And one unrelated comment, placed here because where else would
I put it?

8553B: In Zero Scan, Scan Width doesn't do anything, but
      you _still_ have to turn it down to get Tuning Stabilizer.
      Wart!
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