

0. Sony APR alignment presets

1. Set tape speed and select preset, set equalization standard (usually **NAB**)
2. Preload all primary alignment parameters with midrange values; secondary parameters with Sony-recommended values
3. Press **Control + Store** and **preset** to store parameters in memory

1. VU Meter Calibration (3.9)

1. Note: this is a one-time-only adjustment: power recorder off, remove channel 1 card
2. Install Extender Card (Sony part: 1-619-379-11) in channel 1 card location (note correct orientation, with printed text on card facing up), insert channel card 1 into Extender Card
3. Set signal generator for 1 kHz at exactly +4 dBu (connect the generator output directly to the millivoltmeter input to set precise level), (LMV-185A: range: +10, -6 dBu), then connect to Sony rear-panel BNC **Calibration: Input**. Sony specifies +0 dBu = 0.778 Vrms
4. Connect the rear-panel Sony BNC **Calibration: Output** to the millivoltmeter front panel input
5. Select IND: channel 1, and adjust **Input: Mon Level** for exactly +0 dB (LMV-185A: range +10, -6 dBu)
6. On the channel 1 card, adjust **RV 3** with a non-magnetic driver for exactly +0 VU on the Sony VU meters
7. Power recorder off, repeat procedure with channel card 2 to adjust **RV 3** for channel 2

2. Input: level calibration (3.9)

1. Set signal generator for 1 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu)
2. Adjust **Input: Mon Level** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel, store in memory

3. Repro: head wrap (6.6.1)

1. Clean tape path, and de-magnetize recorder
2. Thread MRL alignment tape, set Tape Time to zero (0:00) at beginning of 1 kHz tone, turn speaker on, store MRL frequencies as locations 1–6. Note: start times allow 5 seconds for tape path settling; 1 kHz tone begins about 15 seconds from physical start of tape

1 kHz	0:00	location 1
500 Hz	0:30	location 2
8 kHz	0:53	location 3
16 kHz	1:16	location 4
32 Hz	1:40	location 5
10 kHz	3:29	location 6

3. Set Monitor: Repro, Track: All, position MRL alignment tape at 10 kHz (recall 6). Note: when shuttling MRL tapes, *a/ways* touch MVC to enter Spool/Library Wind mode

4. Adjust **Repro head wrap screw** for peak reading on millivoltmeter using #3 slotted screwdriver (PB 100/3), (LMV-185A: range +10, -6 dBu)

4. Sync: head wrap (6.6.1)

1. Set Monitor: Sync, Track: All, position MRL alignment tape at 10 kHz (recall 6)
2. Adjust **Sync head wrap screw** for peak reading on millivoltmeter using #3 slotted screwdriver (PB 100/3), (LMV-185A: range +10, -6 dBu)

5. Repro: head azimuth (6.6.1)

1. Position MRL alignment tape at 8 and 16 kHz tones (recall 3, 4), adjust **Repro: head azimuth screw** for minimum phase difference using 2 mm hex driver (PB 205). Note that turning the hex driver clockwise will shift the waveform for channel 2 to the right
2. Leader 1021 oscilloscope: note that the Time/Div setting can be changed from 50 μ s (for 8 kHz) to 20 μ s (for 16 kHz) to show a comparable number of waveforms

6. Repro: level calibration (6.6.3)

1. Position MRL alignment tape at 1 kHz (recall 1)
2. Adjust **Repro: Level** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel, store in memory

7. Sync level calibration (6.6.5)

1. Position MRL alignment tape at 1 kHz (recall 1)
2. Adjust **Sync: Level** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU), for each channel, store in memory

8. Repro: high frequency alignment (6.6.4)

1. Position MRL alignment tape at 10 kHz (recall 6)
2. Adjust **Repro: H. Freq** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel
3. Return to MRL 1 kHz (recall 1), and re-check **Repro: Level** for +0 dB on millivoltmeter
4. If the level for 1 kHz had to be re-adjusted, re-check **Repro: H. Freq** at 10 kHz (recall 6), on millivoltmeter until both levels read +0 dB, store in memory

Note: if **Repro: H. Freq** can't be lowered enough, lower the value of RGC.

9. Sync: high frequency alignment (6.6.6)

1. Position MRL alignment tape at 10 kHz (recall 6)
2. Adjust **Sync: H. Freq** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel

3. Return to MRL 1 kHz (recall 1), and re-check **Sync: Level** for +0 dB on millivoltmeter
4. If the level for 1 kHz had to be re-adjusted, re-check **Sync: H. Freq** at 10 kHz (recall 6), on millivoltmeter until both levels read +0 dB, store in memory

10. Sync: frequency response sweep (6.6.7)

1. Position MRL alignment tape at the beginning of the full tone sequence, 32 Hz (recall 5)
2. Play back frequencies and note the levels as registered by the millivoltmeter. Note: this may also be a useful point to do a preliminary Repro frequency response sweep, especially to begin to optimize RGC

11. Record: bias level (6.7.1)

1. Set signal generator for 10 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu)
2. Thread blank tape on the recorder, arm each channel (**Record: Ready**), begin recording
3. Decrease the **Bias: Level** to a low level, e.g. 2A, to confirm that one is beginning below the peak output level. Note: it may be necessary to switch millivoltmeter ranges to maximize legibility and accuracy
4. Slowly increase the bias to determine the peak output level; log the bias setting that produces the peak, and the maximum output level reached for each channel
5. Continue to increase the bias until the output level has fallen from its peak by the desired amount (overbias); note the final bias level setting and the output level, store in memory

12. Record: level calibration (6.7.1)

1. Set signal generator for 1 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording, adjust **Record: Level** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel
2. Keeping the signal level constant, switch parameters to **Input: Mon Level**, and adjust for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel
3. Re-check **Record: Level**, and fine tune both parameters until both read +0 dB, store in memory

13. Record: high frequency alignment (6.7.2)

1. Set signal generator for 10 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording
2. Adjust **Record: H. Freq** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel, store in memory. Note: *reversed parameter*

14. Repro: low frequency alignment (6.7.3)

1. Begin recording, Monitor: Repro, and sweep signal generator from 30 to 500 Hz at +0 dB, (LMV-185A: range: +10, -6 dBu), to find the maximum output, then hold at that frequency
2. Adjust **Repro: L. Freq** for +0.5 dB on millivoltmeter (LMV-185A: range +10, -5.5 dBu), (Sony: +0.5 VU) for each channel, then check response with signal generator at 30 and 100 Hz, store in memory. Note: *reversed parameter*

15. Sync: low frequency alignment (6.7.4)

1. Keep signal generator at the peak output frequency found for **Repro: L. Freq**, +0 dB, (LMV-185A: range: +10, -6 dBu), and record for 1 minute
2. Rewind tape, and adjust **Sync: L. Freq** for +0.5 dB on millivoltmeter (LMV-185A: range +10, -5.5 dBu), (Sony: +0.5 VU) for each channel, store in memory. Note: *reversed parameter*

16. Record/Repro: frequency response sweep (6.7.5)

1. Set signal generator for 1 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording, adjust **Record: Level** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel
2. Switch signal generator to 10 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording, adjust **Record: H. Freq** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel
3. Reset signal generator to 1 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), adjust **Input: Mon Level** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel, store in memory
4. Reset signal generator to 20 Hz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording, Monitor: Repro, Track: Ind
5. Sweep signal from 20 Hz to 25 kHz, recording response at MRL frequencies, and compare results to the Sony Quality Assurance response curve shipped with the recorder

17. Record: RCB, compensation feedback (6.8.1)

1. **RCB** provides a Record low treble shelving boost from 2–8 kHz, i.e. from 8 kHz *back* with decreasing control codes: [C7, C6, C5, C4, C3, C2, C1, C0]. Note: *reversed parameter*
2. If the Record/Repro frequency response sweep in the prior section shows the need for additional lift in the low treble, increase the **RCB** value (**Control + Record: H. Freq**), store in memory

18. Record: RCF, feed forward (6.8.2)

1. **RCF** provides a Record high treble shelving boost from 8–25 kHz, i.e. from 8 kHz *forward* with increasing control codes: [C0, C1, C2, C3, C4, C5, C6, C7]. The additional control code sequence, [C8, C9, CA, CB, CC, CD, CE, CF], is functionally identical.

2. Set signal generator to 16 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording, adjust **RCF (Control + Record: Level)** for +0 dB on millivoltmeter, (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel, begin recording, monitor from Repro head

3. Switch signal generator to 20 kHz at +10, check levels again, adjust **RCF** as necessary, store in memory

Logic: 16 and 20 kHz are significantly higher than the standard 10 kHz adjustment point for high frequency EQ, and therefore useful points for determining optimal RCF

19. Repro: RGC, gap compensation (6.8.4)

1. **RGC** provides a Repro high frequency shelving boost from 10–25 kHz with increasing control codes:

[C8, C9, CA, CB, CC, CD, CE, CF] +10–25 kHz

[C0, C1, C2, C3, C4, C5, C6, C7] +10–25 kHz + low frequency boost

Note: to see the effect of the low frequency boost, toggle between CF and C0

2. Position MRL alignment tape at 8 kHz (recall 6), and check levels from 8 – 20 kHz
3. If necessary, adjust **RGC (Control + Repro: Level)** for +0 dB on millivoltmeter (LMV-185A: range +10, -6 dBu), (Sony: +0 VU), for each channel, to bring high treble into alignment, store in memory

Logic: Graphing the Repro response to MRL frequencies from 8–25 kHz will indicate the necessity for RGC boost

20. Sync: SGC, gap compensation (6.8.4)

1. **SGC** provides a Sync high frequency shelving boost from 10–25 kHz with increasing control codes:

[C8, C9, CA, CB, CC, CD, CE, CF] +10–25 kHz

[C0, C1, C2, C3, C4, C5, C6, C7] +10–25 kHz + low frequency boost

2. Set signal generator to 16 kHz at +0 dB, (LMV-185A: range: +10, -6 dBu), begin recording, adjust **SGC (Control + Sync: Level)** for +0 dB on millivoltmeter, (LMV-185A: range +10, -6 dBu), (Sony: +0 VU) for each channel, begin recording, monitor from Repro head
3. Switch signal generator to 20 kHz at +0 dB, check levels again, adjust **SGC** as necessary, store in memory

21. Repro: frequency response sweep (6.6.7)

1. Position MRL alignment tape at the beginning of the full tone sequence, 32 Hz (recall 5)
2. Play back frequencies and note the output levels as registered by the millivoltmeter
3. Store the finished set of alignment parameters in memory, and record them on a spreadsheet