



Connevens Limited

**EQUIPMENT FOR DEAF AND HEARING IMPAIRED PEOPLE
IN EDUCATION, EMPLOYMENT, THE HOME & LEISURE**

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OPERATING INSTRUCTIONS FOR THE OUTPUT LEVEL SETTER

Introduction

The Connevens Output Level Setter (OLS) consists of a calibrated audio signal generator and audio voltmeter. The equipment may be used to 'rebalance' a CRM200/220 or fmGenie radio aid system rapidly on any occasion, subsequent to its initial balancing by conventional means, provided that a record of the output level, as measured by the OLS, is kept after the conventional balancing is completed.

1) At the beginning of each session check the calibration state of the instrument by depressing and holding the operating switch in the "CAL" position and observing the display. Providing the display reads a value between 950 mV and 1050 mV, the equipment is in calibration and may be used. If the value is outside this range then the equipment should be returned to Connevens Ltd. for re-calibration. If the 'battery low' symbol on the display is showing then the battery should be replaced (see "IMPORTANT NOTES") and the calibration state re-checked, as described above. Connevens recommend a yearly calibration of OLS units.

2) Press the operating switch to the "ON" position. The display should read "000", "-001" or "001" at the most. If the display reads any value other than these the equipment should be returned to Connevens Ltd. for re-calibration.

3) a) CRM-220 - Check that the tone control settings (CRM220R) are the same as when the original balancing was done. (Refer to pages 19 and 45 of the CRM220 Radio Microphone Aid Information and Instruction Handbook: 2nd Edition.)

b) fmGenie - Check that the tone control settings (fmGenie receiver) are the same as when the original balancing was done. (Refer to pages 72-74 & 83 of the fmGenie instruction booklet). Use of the OLS with an fmGenie is also covered on pages 56-57 of the fmGenie instruction booklet - as mentioned the fmGenie should be set to HI audio output when taking OLS readings (even if actually used on LO for direct input).

4) a) CRM-220 - Connect the non-polarised 2 pin plug into the "O/P" socket of the CRM200/220 radio aid receiver preferably with the cable lying towards the top of the case (although it will work either way round) and switch the receiver onto the correct channel.

b) fmGenie - see instruction booklet pages 56-57 for fmGenie connection variation.

5) a) CRM-220 - Connect the 3.5mm jack plug into the "EXT MIC" socket on the CRM200/220 radio aid transmitter and switch the transmitter on.

b) fmGenie - see instruction booklet pages 56-57 for fmGenie connection variation.

6) a) CRM-220 - Adjust the "Tx" control on the receiver until the display on the Output Level Setter reads a value somewhere near to the required level (as recorded at the original balancing).

b) fmGenie - exactly the same procedure however the volume control is marked "Tx vol"

7) a) CRM-220 - If it is also required to set the level of the environmental microphone in the receiver, this may be achieved in a similar fashion by plugging the 3.5mm jack plug into the "EXT MIC" socket on the radio aid receiver. The "E" control may then be adjusted for the required level on the OLS display. Note that the environmental microphone level on the receiver may only be set if the 2 pin plug is fitted with the cable lying towards the top of the case.

b) fmGenie - exactly the same procedure however the mic socket is marked "Env mic" and the volume control "Env vol"

8) Switch off the radio aids, remove the plugs and re-connect them to the next set of radio aids to be re-balanced. If you are working with fmGenie equipment do not forget to reset the LO / HI audio output switch if direct input hearing aids are being used.

9) Switch off the OLS.

IMPORTANT NOTES

- 1) Switch off the equipment before removing or replacing the battery or the battery compartment lid.
- 2) Do not pull on the integral flying leads, they are not designed to support the weight of the equipment.
- 3) CRM-220 equipment will show a higher maximum reading than fmGenie equipment when connected to the high impedance input of the OLS. The fmGenie is designed to drive lower load impedances than the CRM-220 and will in practice give a higher/better output than the CRM-220 when used with a neck loop or pair of headphones.
- 4) Notes on level setting accuracy

Since the OLS gives you an objective reading of output level as a linear quantity i.e. in millivolts rms, it is natural to try and set that level as near as you can to the recorded value measured after the original balancing by conventional means. In fact you don't have to worry unduly about setting the level so accurately: the level measured on any calibrated OLS will be within 10% (typically 2%) of the level measured by the same OLS at another time or by any other calibrated OLS. Another way of saying this is that the maximum error in setting the output level of any radio aid if two different calibrated OLS's are used at different times would be no more than 10% (typically no more than 2%). On a linear reading display like that on the OLS this amount of error would be quite obvious but if you consider that an error of 10% is the same as an error of 0.8dB (2% = 0.17dB) then it becomes clear that setting the output level somewhere near the required value is entirely adequate. When you also consider that the normal human ear has difficulty in distinguishing between sound levels which are less than 2 to 3dB different (or 26% to 41% different in linear terms), then if you set the level within about 10% of the required nominal value this is much better than you could do subjectively by ear and is about as good as you could get in a hearing aid test set. You could, of course, set it more accurately if you wanted to.

An example: Supposing that Neil's radio aid and hearing aid are balanced in a test box and then the radio aid level setting is checked for the first time as indicated in the instructions above. Let's say that the level measured is 50mV. This level would be recorded in a register against Neil's name (for the CRM220 you might also record the preferred tone control settings). Let us further suppose that the next week Neil went on a school visit to Blackpool and accidentally dropped his radio aid receiver under a tram. Oh dear! However, the forward thinking teacher has brought a spare radio aid and a Connevans Output Level Setter with her. A quick phone call back to school (because Neil couldn't remember his 'number') and the teacher has Neil's level and tone settings. Whilst sitting on a tram on the way to the Tower the teacher quickly connects up the OLS and sets the output to 48mV (the tram was wobbling and then Sarah was sick, so that had to do!) Now Neil has another receiver to use and can hear clearly again.

Just out of interest, what would the possible error in level setting have been? Well, the original measurement was 50mV and the teacher set the receiver to 48mV so this error is $(1-48/50) * 100\%$ or 4%. Further, supposing that the school OLS was reading 2% low for some reason and the teacher's OLS was reading 2% high, but both were still meeting the internal calibration requirements, then this could account for another $2\% + 2\% = 4\%$ error. So the total error could be $4\% + 2\% + 2\% = 8\%$. Well, 8% is the same as 0.7dB. Could you get it that good back in the audiology department at school, let alone on a wobbly tram?

A table of percentage error versus dB error

Error %	Approx. error dB
3	0.25
6	0.5
9	0.75
12	1.0
15	1.25
18	1.5

TECHNICAL SPECIFICATION FOR OUTPUT LEVEL SETTER

Signal Generator Section

Nominal frequency	1000 Hz \pm 5% at 25°C
Internal calibration level	1000 mV \pm 1% at 25°C
Output level into CRM200/220	1.26 mV \pm 2% (equivalent to -75dB SPL \pm 0.17dB)
Variation of output level with temperature	< 3% from 0°C to 50°C
Total Harmonic Distortion	< 2%

Audio Voltmeter Section

Maximum dc offset (indicated)	\pm 1mV
Maximum offset in electric field of 3V/m, 30MHz-1GHz	\pm 5 mV
Frequency response (-3dB)	20 Hz to 20 kHz minimum
Maximum input level (no damage)	3 V rms
Display resolution	1 mV
Absolute accuracy	better than \pm 1% of reading or 2 mV at 25°C
[see note 1]	better than \pm 2% of reading or 4 mV from 0°C to 50°C

Power Requirements

1 off 9 volt battery	e.g.	MN1604 alkaline-manganese
Current consumption		less than 2 mA
Battery life with MN1604 battery		250 Hours typical
Low battery threshold		7.9 V typical

Environmental Information

Size	145 x 80 x 36 mm approx. excluding flying leads
Integral lead length	200 mm nominal
Electromagnetic emissions	complies with BS EN 50081-1:1992
Electromagnetic immunity	complies with BS EN 50082-1:1992

Notes:

- 1) whichever is the largest

Whilst every effort has been made to ensure the accuracy of this literature, Connevans Ltd. operates a policy of continuous improvement and reserves the right to amend specifications without notice.