Cartridge alignment gauge

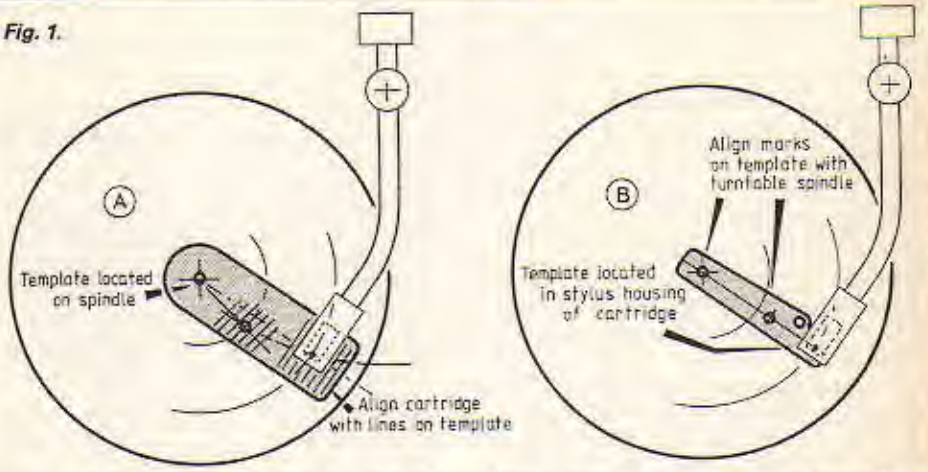
Simple device offers accuracy with convenience

by R. J. Gilson, M.I.Mech.E.

As anyone who has attempted to position a pick-up cartridge accurately on a headshell will realise, the so-called "protractor" method customarily recommended is not by any means as positive in use as its advocates claim. There are two major difficulties; first, the fact that the cartridge is usually well hidden under the headshell; and second, the fact that zero angle at the two protractor radii cannot be achieved unless the overhang is correct. It seems not to be generally realised that the stipulation of zero angle error at any two radii on the record necessitates a specific overhang value. The relationship between these factors was given in "The Cartridge Alignment Problem" in *Wireless World*, October 1981 (see later): $h = \sqrt{C^2+Rr}-C$. where h is the overhang, C is the centre distance from the arm pivot to the turntable axis and R and r are the radii for zero angle-error. In practice it is not easy to measure the overhang with any accuracy, nor is it easy to line up the cartridge with the guide lines marked on the protractor. Many cartridges are only about 12 mm or so long, and an error of 1 mm in this length could easily occur, giving an angular error of some 5°.

Both these problems are avoided with this improved setting gauge. Figure 1 shows at A the customary "protractor" method, and at B the new method, in which the replaceable stylus unit is removed from the cartridge body, and the setting gauge inserted in its place. Fig. 2 gives the detailed design of a gauge suitable for the VMS 20 EII cartridge. For other cartridges the tongue portion which engages with the cartridge body would, of course, be modified to suit. The essential features are that the tongue is a snug fit in the cartridge without lateral play, and that it lies at exactly 90° to the setting line running along the horizontal limb; it is necessary also that this setting line passes through the stylus point position.

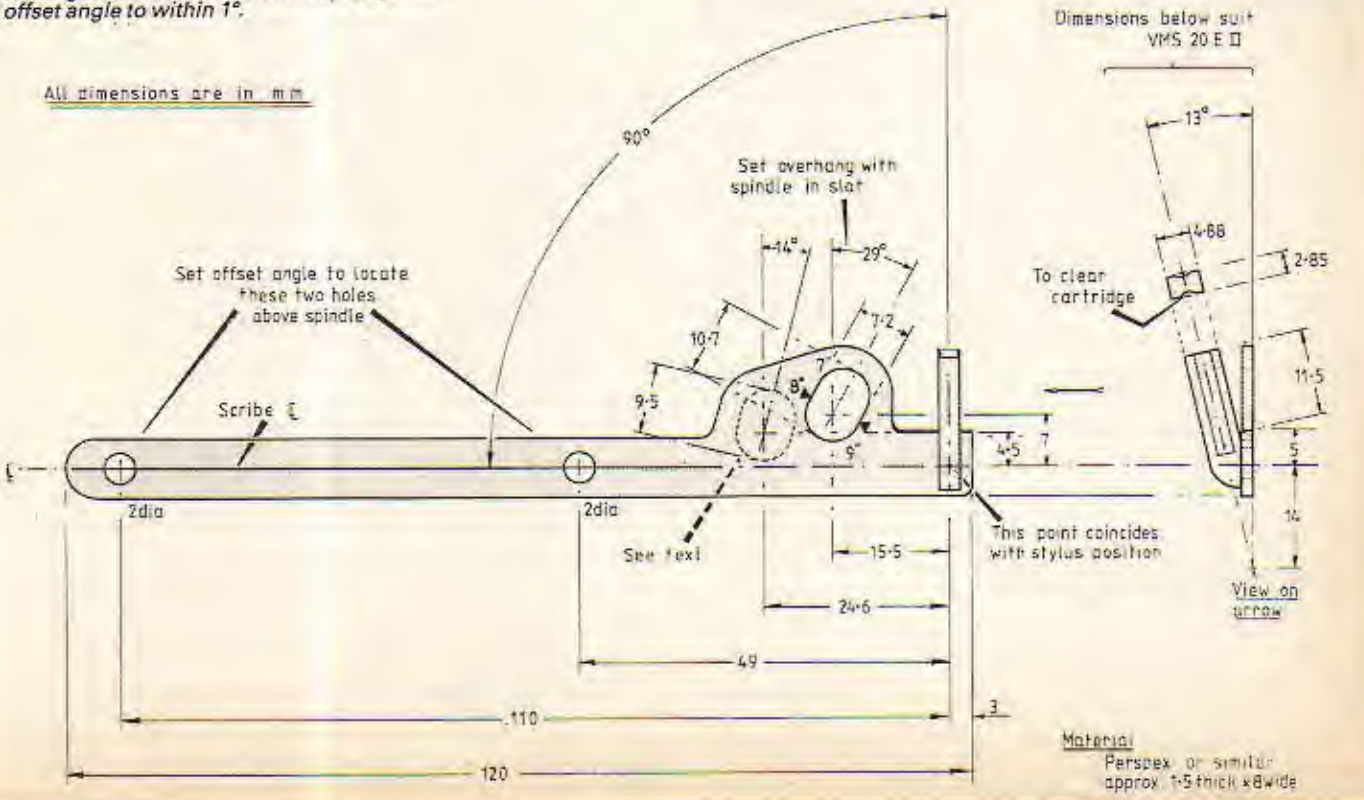
Fig. 1.



The overhang is first set by aligning the turntable spindle with the slot near the cartridge which is elongated to accommodate a range of arm lengths of around 7-9 in. The correct end to use is indicated by the 7 and 9 figures marked near the slot. Intermediate figures can of course be judged, bearing in mind that the half-way figure of 8 will be a little nearer the 9 end, as suggested by the marks on the slot edges. Ideally, the overhang-setting slot should be located in line with the cartridge axis, but this would make it too inaccessible, and the position shown is more convenient. For those arms which have insufficient inwards movement for the slot to reach the turntable spindle, an alternative slot position is indicated in dotted lines, but the nearer position is preferable.

continued on page 80

Fig. 2. Gauge reduces error of cartridge position and offset angle to within 1°.



continued from page 49

Having first set the overhang, the cartridge is then twisted round slightly until the two sighting holes at 110 and 49 mm radii both align with the centre of the turntable spindle as the arm is swung inwards. Due to the offset of the overhang-setting slot, this twisting round of the cartridge may slightly alter the overhang, but the appropriate correction is easily made in a second shot if necessary.

The amount of overhang provided by the dimensions shown is in accordance with the rule proposed in the above article: $h=2600/C$ where C is from arm pivot to turntable axis, in mm. Needless to say, the basic design can be used for any required overhang rule, the position of the slotted hole and setting marks being changed accordingly. The 2 mm holes are only intended to act as setting marks, and could be omitted in favour of short cross lines.

The author has made up a gauge in accordance with Fig. 2, and finds it a major improvement. He can now be certain, for the first time, that the required cartridge position and offset angle are correct to something within 1° of error, whereas previously an error of several degrees would have been possible.

● **Cartridge alignment problem.** A misunderstanding over whether author's corrections had been incorporated into proofs led to errors which must have made understanding R. J. Gilson's October article difficult. Figure numbers were omitted and although the diagrams were in the right order some of the text references were incorrect. On page 60 column 1, read Fig. 2 in line 5 for Fig. 1, Fig. 2 for Fig. 3, and in column 3, Fig. 2 for the lower reference to Fig. 3. Take the multiplication signs for addition signs in the Appendix on page 61, formulae 4 a, b and c, and also prior to 2 & 2.5° on page 60, column 1. Also in the Appendix, for the upper formula 1, read $(L^2+R^2-C^2)/2LR$, whilst in formula 4c β_{in} should have been β_i. Just below the Appendix in column 3, insert a stop after 13mm to end that sentence. Apologies to Mr Gilson for this marring of his constructive review of the tracking problem.