SECTION 3. REQUIREMENTS FOR CALIBRATION BLOCK No 2 AND METHODS OF USE

3.1 DIMENSIONS AND SURFACE IDENTIFICATION. Calibration block No 2 shall conform to the dimensions shown in Fig. 3.1.

Surfaces A and B shall be identified by engraving appropriate identification letters on one of the major faces adjacent to the surfaces. It is recommended that the sides of the block be engraved to permit beam angle measurement relative to the 1.5 mm diameter hole 25 mm below surface A. It is also recommended that the engravings be—

(a) relative to surface B for angles up to 60 degrees;

(b) relative to surface A for angles greater than 60 degrees;

(c) at 5-degree intervals for angles up to 50 degrees; and

(d) at 2-degree intervals for angles greater than 50 degrees.

3.2 METHODS OF USE—NORMAL PROBES. Dominant frequency and overall system gain can be determined using block No 2 in a manner similar to that described in Clauses 2.3.6 and 2.3.8 respectively.

3.3 METHODS OF USE—ANGLE PROBES.

3.3.1 Measurement of Beam Angle. Position the probe on surface A or B (see Fig. 3.1) and maximize the echo from the hole 25 mm below surface A. The beam angle can then be estimated from the engravings on the side of the block. Alternatively, the angle can be calculated as follows (see also Fig. 3.2):

(a) With the probe on surface A: $\tan \alpha = \dfrac{x - 83}{25}$

(b) With the probe on surface B: $\tan \beta = \dfrac{y - 83}{50}$

where x and y are determined from Fig. 3.2, and are in millimetres.

3.3.2 Assessment of Beam Profile.

3.3.2.1 *General.* In order to assess the profile of discontinuities using surface plotting methods, it is necessary to determine the effective profile of the beam. This is achieved by investigating the changing amplitude of the reflection from a target positioned at varying distances along, and transverse to, the beam axis.

3.3.2.2 *Procedure for vertical plane.*

(a) Position the probe on surface A or surface B (see Fig. 3.2) and maximize the echo from a selected hole.

(b) Mark on the block the position of the probe index corresponding to the maximum echo height (position 1, Fig. 3.3(a)).

(c) Adjust the echo at this position to a full screen graticule height.

(d) Decrease the gain on the calibrated control by 20 dB and note the new height of the echo.

(e) Return the gain to the original setting.

(f) Move the probe forward until the echo disappears from the screen and then reverse the probe movement to return the echo to the height obtained in step (d).

(g) Note the new position of the probe index position 2, Fig. 3.3(b).

(h) Move the probe backwards until the echo disappears from the screen and then reverse the probe movement to return the echo to the height obtained in step (d).

(j) Note the new position of the probe index (position 3, Fig. 3.3(c)).

(k) Draw the beam axis (the probe angle having been already determined).

(l) Plot the distance y (forward shift, behind the axis, as in Fig. 3.3(b)), and the distance x (backward shift, in front of the axis, as in Fig. 3.3(c)), at the appropriate depth.

(m) Repeat this procedure for holes at other depths and construct the beam profile as shown in Fig. 3.3(d).

3.3.2.3 *Procedure for horizontal plane.*

NOTE: A more accurate method of assessing beam profile which may be preferred is by the use of calibration block No 3 and is described in Clause 4.2(b).

(a) Position the probe on surface A or surface B (see Fig 3.2) and maximize the echo from a selected hole.

(b) Adjust the echo at this position to full screen graticule height.

(c) Decrease the gain on the calibrated control by 20 dB and note the new height of the echo.

(d) Return the gain to the original setting.

(e) Move the probe parallel to the hole and away from the edge of the block until the echo disappears from the screen and then reverse the probe movement to return the echo to the height obtained in step (c).

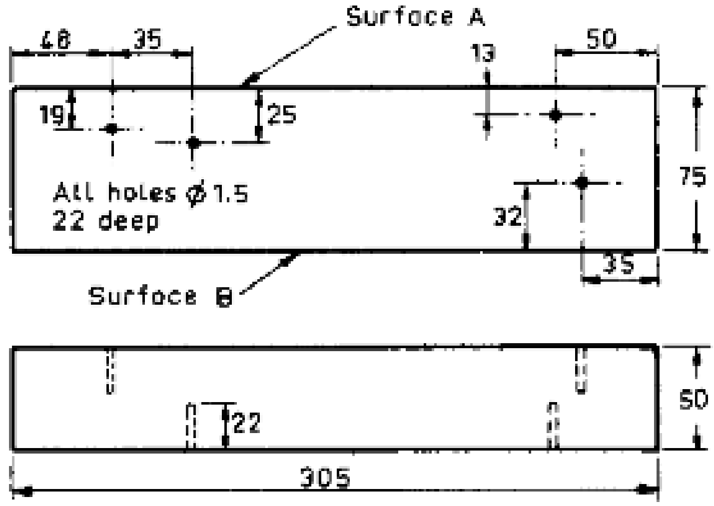
(f) Measure the distance of the centre of the probe from the edge of the block (x in Fig. 3.4) and establish the half-beam width by subtracting 22 mm from this dimension (see point *Q*).

(g) Reverse the probe and repeat the sequence from the opposite direction as shown in Fig. 3.4.

(h) Repeat the procedure for holes at other depths.

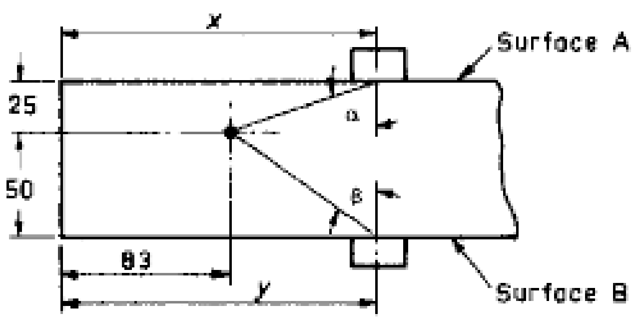
(j) From the data collected construct the beam profile in a manner similar to that described for the vertical plane (Clause 3.3.2.2(m)).

3.3.3 Assessment of Overall System Gain. Position the probe at 'F' (see Fig. 2.2) and assess the overall system gain relative to any of the 1.5 mm diameter holes in a similar manner to that described in Clause 2.2.9(b) to (e).



DIMENSIONS ARE IN MILLIMETRES

Fig. 3.1. DIMENSIONS OF CALIBRATION BLOCK NO 2



DIMENSIONS ARE IN MILLIMETRES

Fig. 3.2. GEOMETRIC DETERMINATION OF BEAM ANGLE USING CALIBRATION BLOCK NO 2

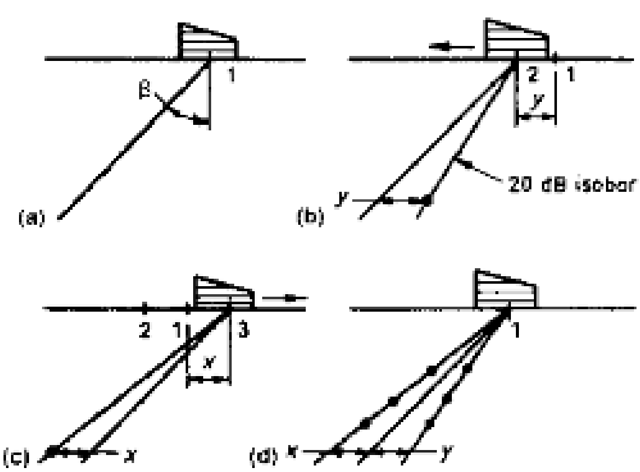


Fig. 3.3. ASSESSMENT OF BEAM PROFILE, VERTICAL PLANE, USING CALIBRATION BLOCK NO 2

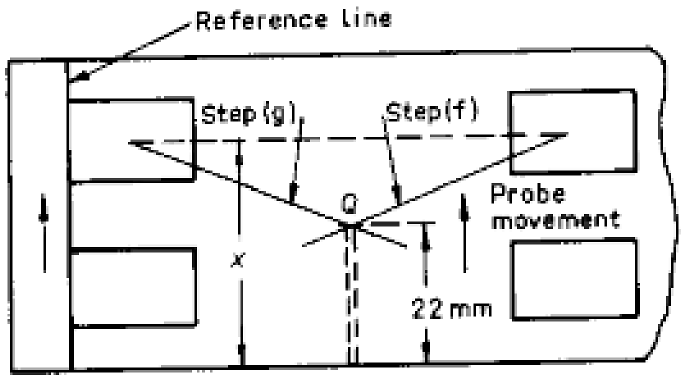


Fig. 3.4. ASSESSMENT OF BEAM PROFILE, HORIZONTAL PLANE, USING CALIBRATION BLOCK NO 2