



RECTANGULAR-POLAR CONVERSION With Post Slide Rules

The following procedure may be used for converting a vector number from the rectangular form, $a + jb$, to the polar form c/θ .

Rule: Set index* of slide over the larger number (a or b) on D scale. Set hair-line to the smaller number on the D scale and find θ on T scale. If a is larger than b read the black figures on the T scale; if b is larger than a read the red figures on the T scale. Then move slide until θ on S scale comes under the hair-line. If θ was read on the black figures on the T scale it should also be read on the black figures on the S scale, and vice versa. Then find c on D scale under index of S scale.

NOTE: When the magnitude of either a or b is between one-tenth and one-hundredth of the corresponding number, use modified procedures as illustrated in examples 3 and 4.

✓ **Example 1:** To find polar form of $3 + j4$. Set index of slide over 4 (the larger number) on the D scale. Set hair-line to 3 on the D scale and find 53.15 on T scale (red figures being used because 4 is larger than 3). Move slide until 53.15 on Cos scale (increasing as T red) comes under hair-line. Then read 5 on D scale under index. The required vector number is 5/53.15.

✓ **Example 2:** To find the polar form $125 + j30$. Set index of slide over 125 (the larger number) on the D scale. Set hair-line to 30 on the D scale and find 13.5 on T scale (black figures being used because 125 is larger than 30). Move slide until 13.5 on S scale (increasing as T black) comes under hair-line, and read 128.5 on D scale under index. The required vector number is 128.5/13.5.

✓ **Example 3:** (Illustrating procedure when the magnitude of the b number is between .1a and .01a). To find the polar form of $4.99 + j.392$. Set index of slide over 4.99 (the larger number) on the D scale. Set hair-line to 3.92 (i.e., to $.392 \times 10$ since the ST scale is to be used) on the D scale and find 4.5 on the ST scale. The required vector number is 4.99/4.5. It will be observed that the a number and the c number have been taken as equal. The maximum error involved in so doing is less than half of one per cent.

Example 4: (illustrating procedure when the magnitude of the a number is between .1b and .01b). To find the polar form of $.392 + j4.99$. Set index of slide over 4.99 (the larger number) on the D scale. Set hair-line to 3.92 (i.e., to $.392 \times 10$ since the ST scale is to be used) on the D scale and find 4.5 on the ST scale. The angle required is then $90 - 4.5 = 85.5$. (The angle 85.5 cannot be read directly since the compliments of the angles on the ST scale have not been shown in red figures on these slide rules). The required vector number is 4.99/85.5. The b number and the c number have been taken as equal. This involves an error of less than half of one per cent.

*By index is meant the extreme mark at either end of the slide. In some cases the one at the right-hand end of the slide must be used; in other cases, the one at the left-hand end.