NOTES ON THE LENGTH OF PULSE PRODUCED BY HK KEYBOARD (NONOPULSE)

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Specification 5-6079, Issue 3, under "Test Requirements" states that the length of signal "R" should be 56 ± 4 scale divisions on a distortion test set geared 44 to 9. Presumably this means a DXD having a motor speed of 1800 rpm. Such a DXD rotates at 1800 x 9 + 44 = 368.18 rpm and the time length of one scale division is 60 x 1000 
+(368.18 x 742) = .219628 milsec. The time length of the "R" pulse would be 56 x .219628 = 12.2992 ms, an absurdity. Evidently the true length of the "R" pulse must be T + 12.2992 ms, where T is the time required for an unknown whole number of complete revolutions of the DXD, each requiring 60 x 1000 + 368.18 = 162.964 ms.

The HK motor speed is 1800 rpm and the gearing is 5:20 and 9:33. The rpm = 1800 x 5 x 9 + 20 + 33 = 122.727, or approximately 2 per second. Rotation of 1° requires 1000 + (122.727 x 360 + 60) = 1.358 ms.

The letter "R" requires more than half a revolution of HK and it is obvious that T cannot have a value of one, because 162.964 + 12.2992 is much less than 1/2 x 360 x 1.358. Evidently the value of T is 2 and the length of the "R" pulse is therefore 2 x 162.964 + 12.2992 = 338.36 ms, ± 7.1%.

The "-" pulse is 3 x 8.5917 x 1.358 = 35.00 ms long. Its frequency is 1000 + 35 + 2 = 14.29 cps and is the highest frequency produced by any character on the HK.

SUPPORTING INFORMATION

1. According to a Bell letter in the D & R File, the character "-" has a pulse length of 3 x 8-13/22°. Examination of drawing 101327 for the selector ring shows that 8-13/22 is an approximation, the correct figure being 80° 35.5' or 8.5917°. Since "R" is 26 steps of 8-13/22° longer than "-", its pulse length would be 29 x 8.5917 = 249.159°. Its length in time would be 249.159 x 1.358 = 338.16 ms, which is very close to the figure previously calculated.

2. A DXD, equipped with 3:44 gears and 1800 rpm motor to duplicate the speed of an HK, displayed an "R" pulse from an HK 512 divisions long. (512 + 742) x (60 + 122.727) x 1000 = 337.35 ms.