UNIT 1

ASSEMBLY LIMIT

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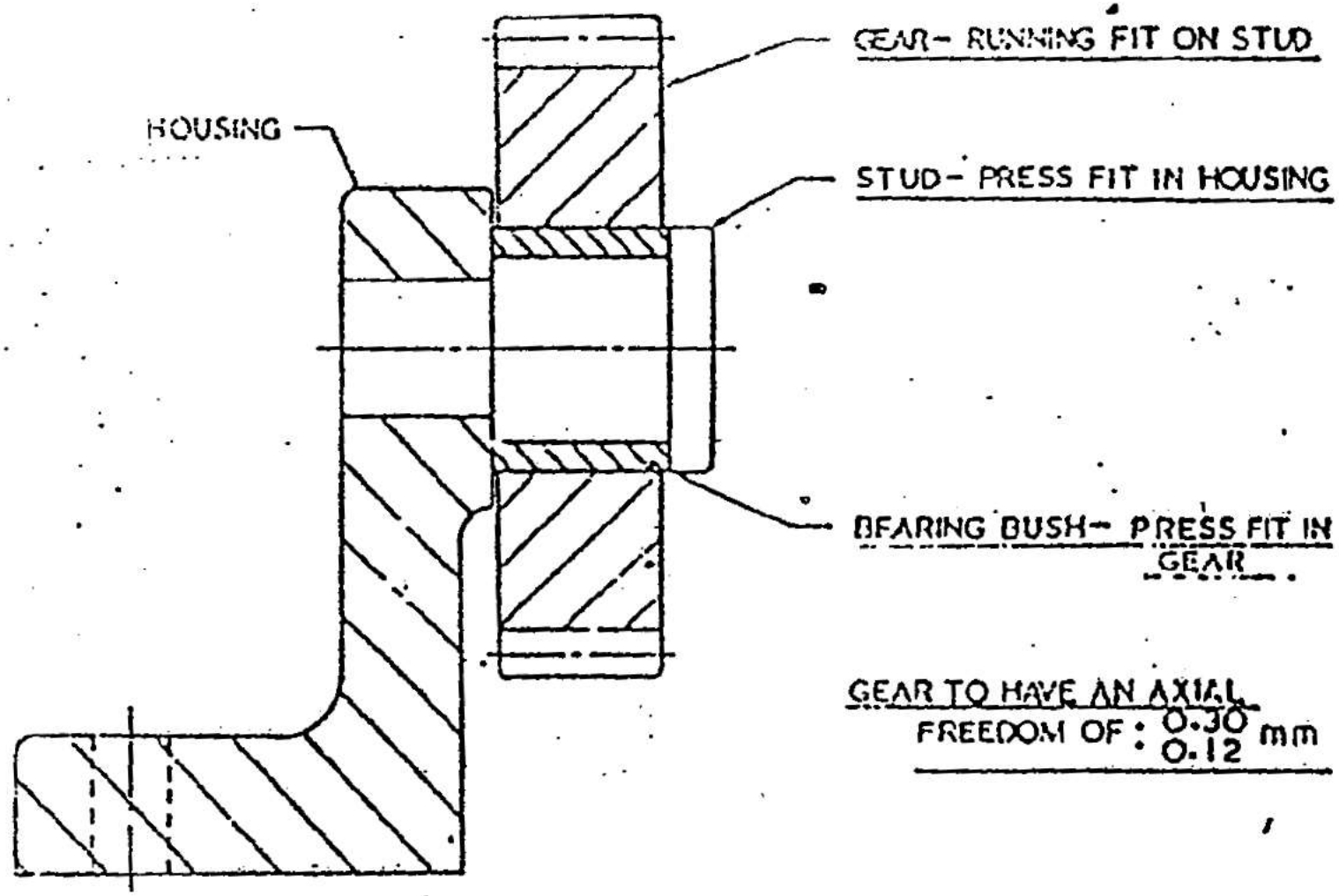


1.20 A CARRIER WHEEL ASSEMBLY

ASSEMBLY LIMIT…contd

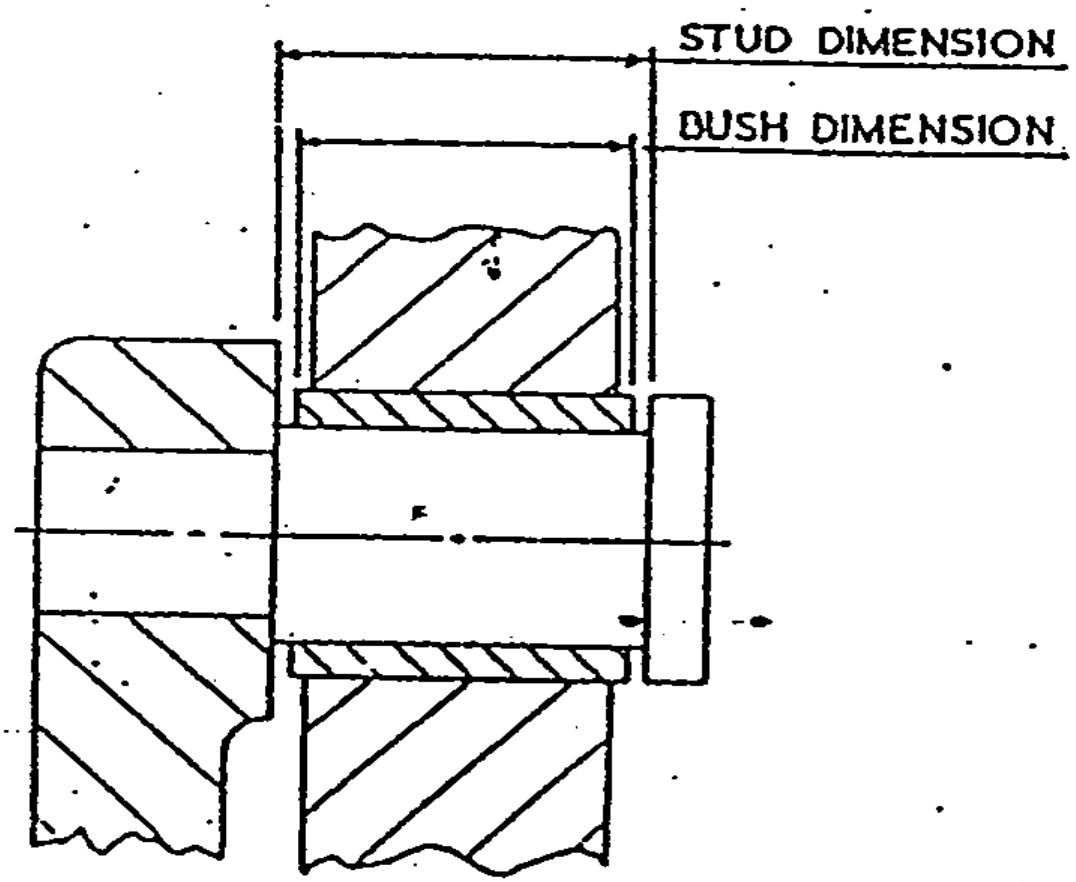
The carrier wheel assembly shown in *Fig.1.20* has a specified assembly requirement, namely the axial freedom of movement of the gear wheel (with bush) on the stud, $\begin{matrix}0{\cdot}30\\0{\cdot}12\end{matrix}$ mm. These limits are assembly limits - the limits required when the components are assembled together in their working condition.

The attainment of assembly limits requires the allocation of appropriate limits to the relevant dimensions of the components, and the procedure for obtaining these component limits is as follows:

First: Identify the component dimensions involved

A study of *Fig.1.20* shows that the bearing bush is longer than the gear width and projects each side of the gear faces; therefore, it is the bush (which is a press fit in the gear) which must be free to move axially between the stud flange face and the face of the housing. The relevant component dimensions therefore are bush length and length of middle diameter of the stud (*Fig.1.27*).

ASSEMBLY LIMIT…contd



1.27 RELEVANT COMPONENT DIMENSIONS IDENTIFIED

ASSEMBLY LIMIT…contd

Secondly: Allocate tolerance to component dimensions

Always, the assembly tolerance is the amount of tolerance for the component dimensions. Share this tolerance - equally when possible - between the component dimensions. Thus:

Assembly tolerance = 0·3 minus 0·12 = 0·18

Equally divided: Tolerance for stud dimension = 0·09
Tolerance for bush dimension = 0·09

Thirdly: With the tolerance known and the nominal size known, set limits for all component dimensions except one

Decide to set limits for the bush, the nominal size of the bush being 30 mm.

The bush limits will be set at 30·09 (maximum)
30·00 (minimum)

(The bush limits could equally well be 30·00 / 29·91 - it is immaterial.)

ASSEMBLY LIMIT…contd

Fourthly: Determine limits for remaining component dimension

(a) Establish, diagrammatically, the component dimensions condition, maximum or minimum, in terms of the assembly conditions of maximum and minimum. *Fig.1.28* shows that for a maximum axial movement, the stud dimension is maximum and the bush dimension is minimum. Conversely, for a minimum axial movement, the stud dimension is minimum and the bush dimension is maximum.

(b) Choose one of the assembly conditions and determine the limits for the stud, thus:

From *Fig.1.28*,

(1) Stud max = Bush min + 0·30 = 30·00 + 0·30 = 30·30

or

(2) Stud min = Bush max + 0·12 = 30·09 + 0·12 = 30·21

REFERENCE BOOKS

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2. James G. Bralla (1986), Hand Book of Product Design for Manufacturing, McGraw Hill co, ISBN- 978-0-071-50178-1.
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