Methods of correction for interfering and modifying inputs:- It is normal practice to try and reduce the effects of interfering and modifying inputs. There are many methods.

(i) Method of inherent insensitivity:-

In this method the instruments or the measurement systems are so designed that they are sensitive only to desired inputs and are insensitive to both interfering and modifying inputs. This means that it is desirable to make G_2 and/or G_{1m} as nearly equal to zero as possible so even though r_1 and/or r_m may exist they cannot affect the output.

The approach adopted is not practicable in many situations, but acts as a motivating factor in many cases to use ingenuity for elimination of effects of spurious. For example, temperature is an interfering input in the case of measurement of strain with the help of strain gauges. The method of inherent insensitivity motivates one for finding and using materials for strain gauges that have a very low resistance temperature co-efficient. If such a material could be found, the problem of interfering temperature inputs is partially solved.

(ii) Method of calculated output corrections:-

The use of this method requires the knowledge of magnitude of interfering and/or modifying inputs and also the mathematical relationships which describe the way these inputs affect the output. With this information it becomes possible to calculate the errors in output caused by the interfering/modifying inputs. Thus correction can be applied to the measured o/p

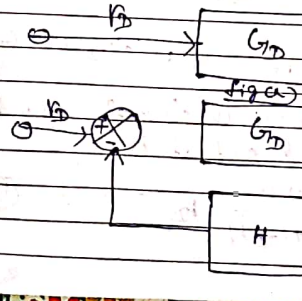
to compute the output corresponding to desired input. For example, for the case of measurement of differential pressure with the help of mercury manometer, the effects of temperature on the scale length and on the density of mercury can easily be calculated in the case the temperature is known.

The gravitational force is also an interfering and modifying input for the manometers. The corrections for this spurious input can easily be computed provided the evaluation and latitude of the place at which manometer is used are known. The method of calculated output corrections though applicable to any form of input, can only be used for inputs that are essentially constant.

(iii) Method of high gain feedback:-

Feedback systems play an important part in modern measurement and control systems because they can easily be adopted to perform their assigned tasks automatically. The most significant advantage of using a feedback system is that the use of feedback makes the system response relatively insensitive to modifying inputs.

A non-feedback system is shown in fig. (a). The transfer function for the desired inputs is G_D and desired input is r_D.



Fig(a). Non feedback open loop system.
Fig(b). Feedback closed loop system.

∴ output due desired input $C = G_D R$.

Suppose due to modifying input like changes in ambient temperature, the transferfunction changes by ΔG_D and therefore the modifying transfer function is $G_{MD} = G_D + \Delta G_D$. The output of the non-feedback systems changes to

$$C + \Delta C = (G_D + \Delta G_D) R = G_D R + \Delta G_D R.$$

Output due to change in transfer function on account of modifying input is

$$\Delta C = \Delta G_D r_D \quad \text{——— (I)}$$

Fig(b) shows a feedback closed loop system having H as the transfer function of feedback element. The output corresponding to desired input is

$$C = \frac{G_D}{1 + G_D H} r_D$$

In the presence of modifying inputs, the output changes to

$$C + \Delta C = \frac{G_D + \Delta G_D}{1 + (G_D + \Delta G_D) H} r_D$$

$$= \left(\frac{G_D}{1 + G_D H + \Delta G_D H} + \frac{\Delta G_D}{1 + G_D H + \Delta G_D H} \right) r_D$$

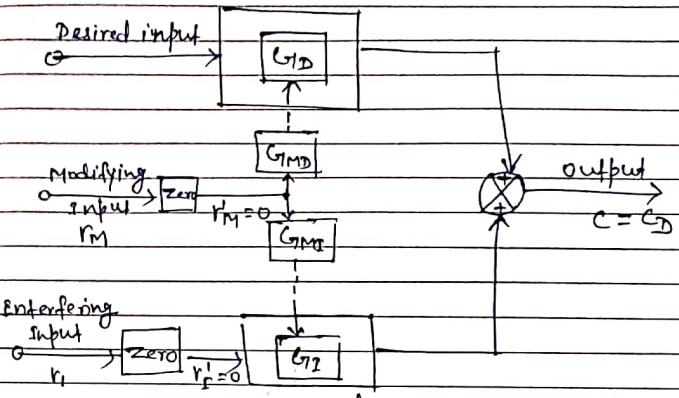
$$= \frac{G_D}{1 + G_D H} r_D + \frac{\Delta G_D}{1 + G_D H} r_D \quad \left(\text{as } \Delta G_D << G_D \right)$$

∴ output due to change in transfer function on account of modifying output is.

$$\Delta C = \frac{\Delta G_D}{1 + G_D H} r_D \quad \text{——— (II)}$$

Hence, comparing the eqn (I) & (II) it is clear that in comparision to the non feedback system, the output in the feedback system, corresponding to change of transferfunction because of modifying inputs is reduced by a factor $(1 + G_D H)$, Now if the feedback systems are designed with a high gain feedback, H the value of output on account of modifying inputs is considerably reduced.

(iv) Method of signal filtering :-



Schematic diagram of inputs filtering

The method of signal filtering is based upon introduction of filters in instruments and measurements systems. The filter blocks the passage of unwanted signals in such a way that output on account of spurious signals is either completely eliminated or is considerably reduced. The filter may be introduced into any of the three major steps of a measurement system, the choice, however, depends upon the application. schemes involving input filtering have filters introduced into the input stage of measurement system for interfering and modifying signals. This is schematically shown in fig. above. Therefore, the output that is available from the summing