data in Table 1 at temperatures below about 150 F, the volume v of moist air per pound of dry air at any degree of saturation μ may be computed from the simple relation,

$$v = v_a + \mu v_{as} \tag{4}$$

To obtain comparable accuracy at temperatures above about 150 F it is necessary to add a correction term $\bar{v}$ as follows,

$$\bar{v} = \frac{\mu(1 - \mu)A}{1 + aW_s\mu} \tag{4a}$$

where a denotes the ratio of the apparent molecular weight of dry air (28.966) to the molecular weight of water (18.016), namely, 1.6078. In Table 4 are given, for each of several higher temperatures, the corresponding value of the coefficient A, the value of μ at which the correction term $\bar{v}$ attains its maximum value, and the maximum value of the correction term there attained.

At temperatures below about 150 F the enthalpy h of moist air per pound of dry air at any degree of saturation μ may be computed from the simple relation,

$$h = h_a + \mu h_{as} \tag{5}$$

To obtain comparable accuracy at temperatures above about 150 F it is necessary to add a correction term $\bar{h}$ as follows,

$$\bar{h} = \frac{\mu(1 - \mu)B}{1 + aW_s\mu} \tag{5a}$$

In Table 4 are listed values of the coefficient B and maximum values of the correction term $\bar{h}$, the latter occurring at the same values of μ as do those of the correction term $\bar{v}$.

Unfortunately, values of the entropy s of moist air per pound of dry air computed from the simple relation,

$$s = s_a + \mu s_{as} \tag{6}$$

do not approximate the true values as closely as might be desired except at temperatures considerably lower than 150 F. Only a relatively small portion of the error is contributed by the correction term

$$\bar{s} = \frac{\mu(1 - \mu)C}{1 + aW_s\mu} \tag{6a}$$

Table 4 lists values of the coefficient C and maximum values of the correction terms $\bar{s}$, the latter occurring at the same values of μ as do those of the correction terms $\bar{v}$ and $\bar{h}$. The larger portion of the error is contributed by the so-called *mixing entropy*. It can be expressed as an additional correction term $\bar{\bar{s}}$ as follows,

$$\bar{\bar{s}} = 0.1579\,[(1 + \mu aW_s)\log_{10}(1 + \mu aW_s - \mu aW_s \log_{10}(\mu) - \mu(1 + aW_s)\log_{10}(1 + aW_s] \tag{6b}$$

Maximum values of $\bar{\bar{s}}$ and the values of μ at which they occur are given in Table 4. In Equation 6b $\log_{10}$ denotes logarithm to the base 10.

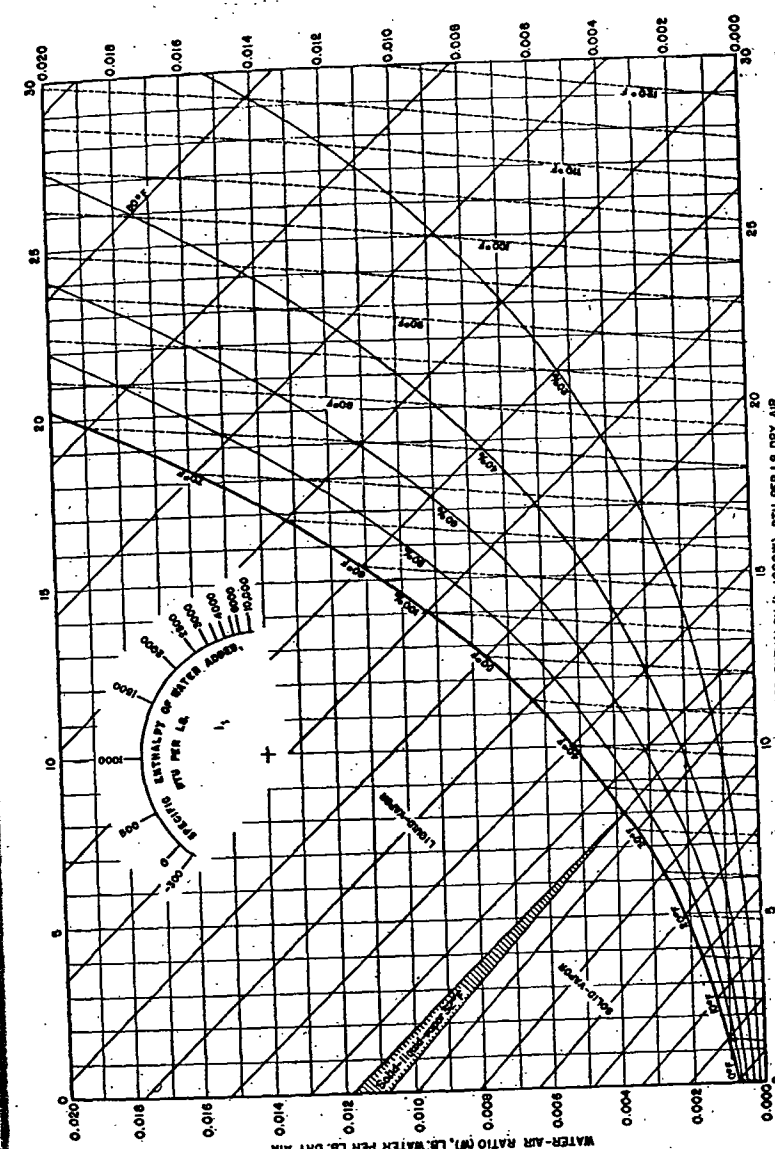


FIG. 1. ABRIDGMENT OF GOFF DIAGRAM FOR MOIST AIR

By John A. Goff, University of Pennsylvania, Thermodynamics Research Laboratory. Standard atmospheric pressure (29.921 in. Hg).