TECH TIP # 1

HARDI
HEATING, AIRCONDITIONING & REFRIGERATION DISTRIBUTORS INTERNATIONAL

One of a series of dealer contractor technical advisories prepared by HARDI wholesalers as a customer service.

SIMPLE RULES TO FOLLOW ON THE PLACEMENT OF RETURNS

Low for heating -- High for cooling

Perhaps the most frequently asked question concerning system design is "where should the returns go?" This question seems to persist year after year despite the fact that there is nothing magical or mysterious about return air intakes. It may well be that the influence of returns in the overall room air distribution picture is considerably *over estimated*.

Essentially, a return air intake is nothing more than a relief valve that bleeds off "excess" air from a conditioned space. And, like all well-designed relief valves, except within the immediate vicinity of the inlet, the device causes little or no disturbance to the main stream --- in our case, air in the occupied area of the room.

(Note: The occupied area of a room is considered to be the inner core of the space, physically extending 6 ft. above the floor and to within 1 ft. of all walls.)

Actually, for all practical purposes, it's the characteristics, number and placement of the supply outlets that determine whether room distribution -- that is, temperature uniformity and air motion -- is good or bad. Generally, money spent on the supply system does far more good than equal dollars spent on the return side. (We assume that both sides of the system are properly *sized*.)

But since a return is a relief valve, it should be installed so that unwanted air is drawn off first, say air that is too hot or too cold. In this way, returns can ease the burden on the supply outlets, which must mix conditioned air and room air together into a homogenous, draftless mixture.

Now in every room there exists a region referred to as the *stagnant zone* or stagnant layer. In this region, the supply air discharge ceases to have an influence or exert agitating action on room air. Room air merely stratifies in layers of descending temperature. We have all seen cigarette smoke "hang" in one spot in a room (at the floor, or near the ceiling). This is visual evidence of the existence of a stagnant zone.

The general rule for the placement of returns is to locate intake grilles within this stagnant zone. In this way, the least homogenous air will be drawn out of the room. During heating, this stagnant zone is near the floor, so returns should be placed low for both high and low supply outlet arrangement. During cooling, the stagnant zone is near the ceiling, and again irrespective of the supply locations, returns should now be placed high.

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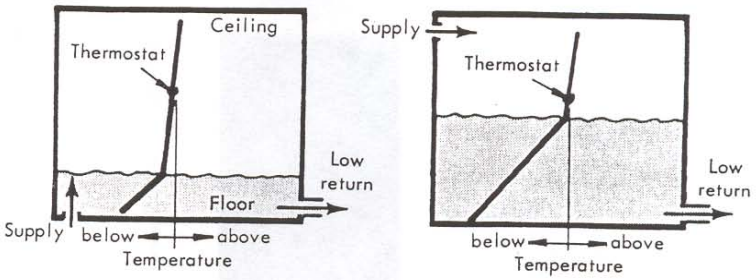
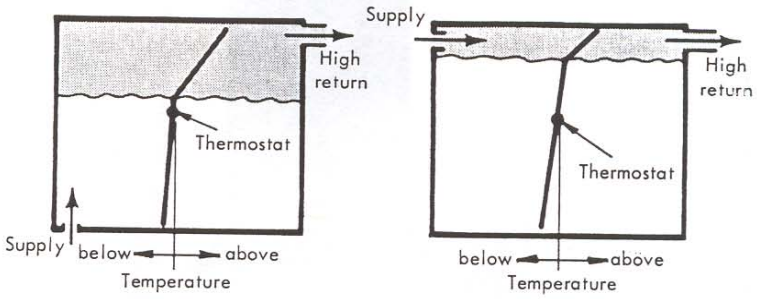
In the case of a single system that must both heat and cool, returns should be located to serve the most critical season -- the period when the most disturbing stagnant zone exists. Thus, with perimeter (low) supply, the larger stagnant zone occurs during cooling operation, so returns should be placed high. With the high supply locations, the poorer year round performance occurs during heating, so returns should be placed low to bleed off near the floor.

These are the rules, but the effect of return location on overall comfort is indeed minimal; and these guidelines can be considered highly flexible, readily yielding in the face of practical necessity

Heating only — use low returns



Cooling only — use high returns



Year round system

With low supply — use high returns

With high supply — use low returns