station device. The maximum safe operating pressure for most pneumatic devices is 30 psig and the relief valve prevents the pressure from exceeding this limit. If the pressure regulator fails, this device protects the controls downstream.

The compressor must be sized properly so that it does not operate continuously. Normally, compressors should not run more than one-third of the time. This extends the compressor life and allows sufficient cooling of the compressed air in the air storage tank which permits maximum condensation of water and oil vapors so that most of these contaminates can be removed by the automatic drain trap.

Most pneumatic devices exhaust some air to the atmosphere and this air is measured either in standard cubic feet per minute (SCFM) or standard cubic inches per minute (SCIM). To determine the air requirements for a system, the air usage of all pneumatic devices in the system must be totalled.

The speed of the compressor is also an important factor to consider. As the compressor operates faster, more heat is generated. This can reduce the overall compressor life, cause premature component failures, increase the overall compressor noise level and, in the case of oil lubricated compressors, can increase oil carry-over. Therefore, a compressor with low revolutions per minute (RPM) rating should be used.

Another consideration is the electrical power available at the compressor site, along with a working knowledge of selecting, installing or servicing starters, contactors and other electrical components within the system.

The following formula applies when selecting an air compressor to meet job requirements:

$$SCFM = \frac{\text{Total air consumption (SCIM)}}{\text{Desired compressor operation (\% running time)} \times 1728}$$

SCFM = Free cubic feet per minute of compressor capacity that will be required.

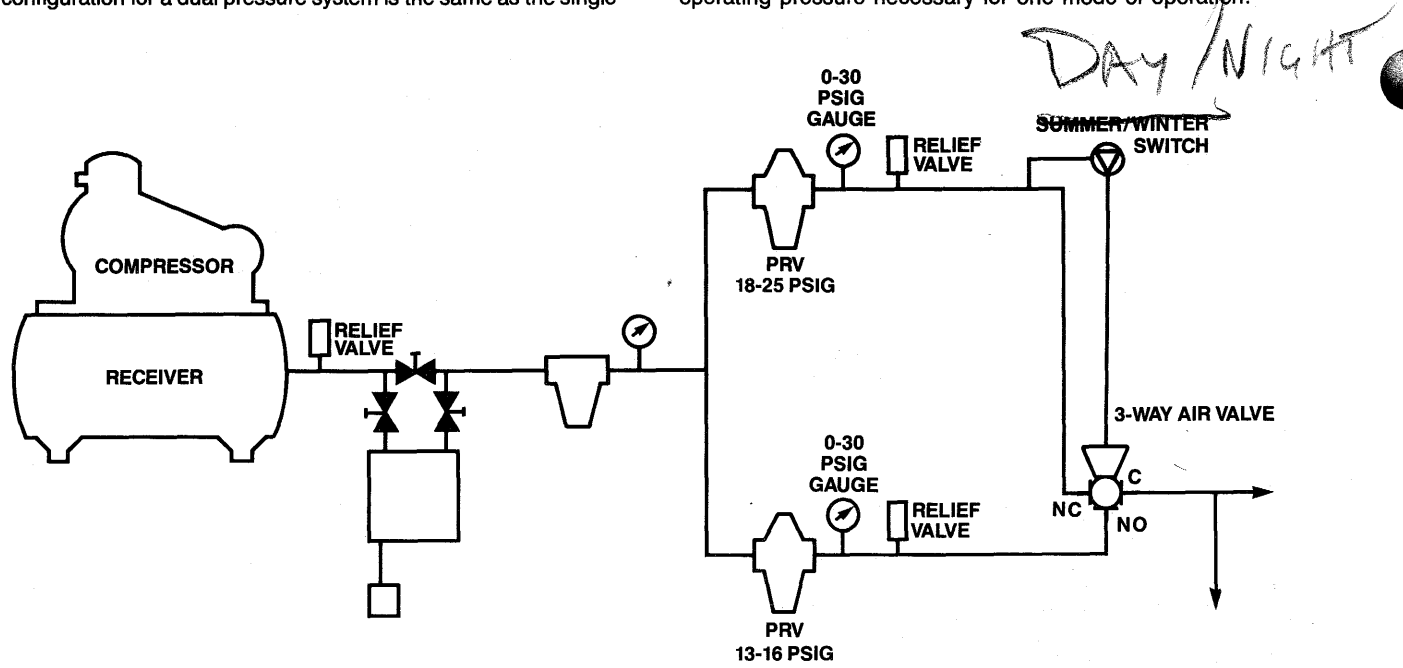
Total air consumption = sum of control devices used multiplied by the SCIM for each respective device.

Compressor operation = percentage of operating time required, such as 33-1/3% or 50% operation.

1728 = number of cubic inches per cubic foot of air.

DUAL PRESSURE SYSTEM

In pneumatic control systems there are two applications that require two different main air pressures in order to function. These are summer/winter and day/night systems. The air station configuration for a dual pressure system is the same as the single pressure system shown in figure 2-1 up to the pressure reducing valve. Since two distinct main air pressures are necessary, there are two separate pressure reducing valves, each set at the system operating pressure necessary for one mode of operation.



DUAL PRESSURE PNEUMATIC AIR STATION

FIGURE 2-2

In the typical dual pressure system shown in figure 2-2, one pressure regulator reduces tank pressure to between 13 and 16 psig and the other to between 18-25 psig (specific pressures depend on control manufacturer). The lower pressure is normally supplied to the controlling device such as a summer/winter thermostat, when the demand calls for cooling (summer cycle). The higher pressure is supplied to the thermostat when the demand calls for heating (winter cycle). In day/night applications, the lower pressure is usually day and higher for night operation.

The two main air signals from the PRV station are supplied to a three-way air valve before going on to the thermostat. There is also a two-position switch (either manual or automatic). The function of the switch is to supply pressure to the three-way air valve actuator to cause the normally closed port to open and the normally open port to close. Pressure on the valve actuator permits the valve to allow the higher operating pressure out the common port to the thermostat.