preferably near the front of the vehicle so as not to contaminate this supply with exhaust fumes and road dust. Of the 30 cfm circulated per person, about 8 to 10 cfm are outside air and the remainder is recirculated. Power for the motor driving the centrifugal fans is obtained from the bus battery.

More recently a coach design has been brought out which provides for a number of return air outlets below the seats; these permit return air to enter a longitudinal duct below the floor. The filters and evaporator are located in this duct near the front of the vehicle. In this instance a central heating coil utilizing waste heat from the coach engine is also located in this duct. Conditioned air is delivered through a pair of vertical ducts to a package rack distribution scheme.

Summer conditioning systems for these vehicles range in cooling capacity from 36,000 to 48,000 Btu per hour. Mechanical compression systems using dichlorodifluoromethane are used, and are powered by water cooled, gasoline engines of approximately 14 hp.

Complete systems add from 800 to 1300 lb to the weight of a coach. Sometimes an auxiliary generator driven by the air conditioning engine is used which serves to help charge the bus battery and thus offsets the power drain imposed by the ventilating blower. Belted reciprocating compressors and direct driven V-type and rotary compressors are used, with engine speeds up to about 1800 rpm. Air cooled condensers for this service require about 5000 cfm of outdoor air, and this is provided by either centrifugal or propellor type fans belted or direct driven by the air conditioning engine. Preventing noise and vibration from affecting passengers is of vital importance. Installations must be made so that quick daily servicing of the engine is possible. In all cases fuel is obtained from the main bus tanks, and in some cases the main engine jacket water cooling system is used to cool the air conditioning engine.

In the more deluxe equipment after the driver has started the air conditioning engine by means of its own cranking motor, the engine speed is modulated automatically as the refrigeration demand is partially met, and if this demand is then fully met, the engine is stopped thermostatically. Restarting when the cooling thermostat is no longer satisfied is accomplished either automatically or manually. The various protective and automatic devices on the refrigerant and engine systems make some of the bus air conditioning control systems quite complicated.

AUTOMOBILE SUMMER AIR CONDITIONING

Recently summer air conditioning has been applied to automobiles. The average present day automobile with little insulation, large, single glazed window areas, and high infiltration and exfiltration losses requires about 15,000 Btu per hour of cooling capacity. One system utilizes a reciprocating compressor belted from the main engine fan shaft thus operating at varying speeds up to 3000 rpm. The resulting refrigeration capacity varies from about 6000 Btu per hour at idling speed to 24,000 Btu per hour at maximum car speed.

A dry air condenser is placed in front of the engine radiator, and the liquid and suction refrigerant lines run back under the car floor to the

evaporator which is located in back of the rear seat. Conditioned air is delivered into the car just above the shelf near the back of the rear seat. A return grille is provided under the rear seat, and the recirculated air is filtered. Outdoor air is provided by infiltration. Power for the air circulating blowers is obtained from the car storage battery. Equipment of this nature increases the car weight approximately 200 lb.

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