AIR CONDITIONING SYSTEM MAINTENANCE PROCEDURES
(ENGINE DRIVEN COMPRESSOR SYSTEM)

PURPOSE

This procedure covers maintenance information for air conditioning installations used in Models 340, 401, 402, 414 and 421. It outlines:

1. Normal Maintenance Procedures
2. Troubleshooting Guide
3. System Functional Check
4. Safety Precautions

WARNING: Prior to performing any maintenance on the air conditioning system, refer to paragraph 4, safety precautions.

NOTE: Refer to Figure 1 for system schematic and Figure 2 for typical test set-up and equipment.

1. NORMAL MAINTENANCE PROCEDURES

a. Cleanliness - Cleanliness is of utmost importance to avoid system contamination and useless wear on the compressor and other equipment items causing possible short life or failure. All plumbing hoses and components should be kept clean during normal maintenance. If components are removed for maintenance they should be capped and precaution should be taken to prevent contamination.

b. Torquing of Plumbing Fittings - All plumbing fittings must be torqued to prevent potential freon leakage and any removed or loosened fittings during maintenance shall be rechecked after high pressure leak check has been performed. During maintenance when reinstalling fittings, it is recommended that all straight thread fittings and "O" rings be lubricated with clean refrigerant oil and all taper (pipe) threads be serviced with teflon tape; use care not to get teflon tape closer than 2 threads from the end of the fitting. Should a piece of tape get into system, it can cause blockage of several small orifices.

TORQUE VALUES

Tube Size	Torque (in #)
-4	55-65
-6	100-125
-8	200-250
-12	400-500

CAUTION: The use of other thread lubricants is positively prohibited, including "Lock-Tite" or other commercial refrigerant lubricants such as "Leak-Lock."

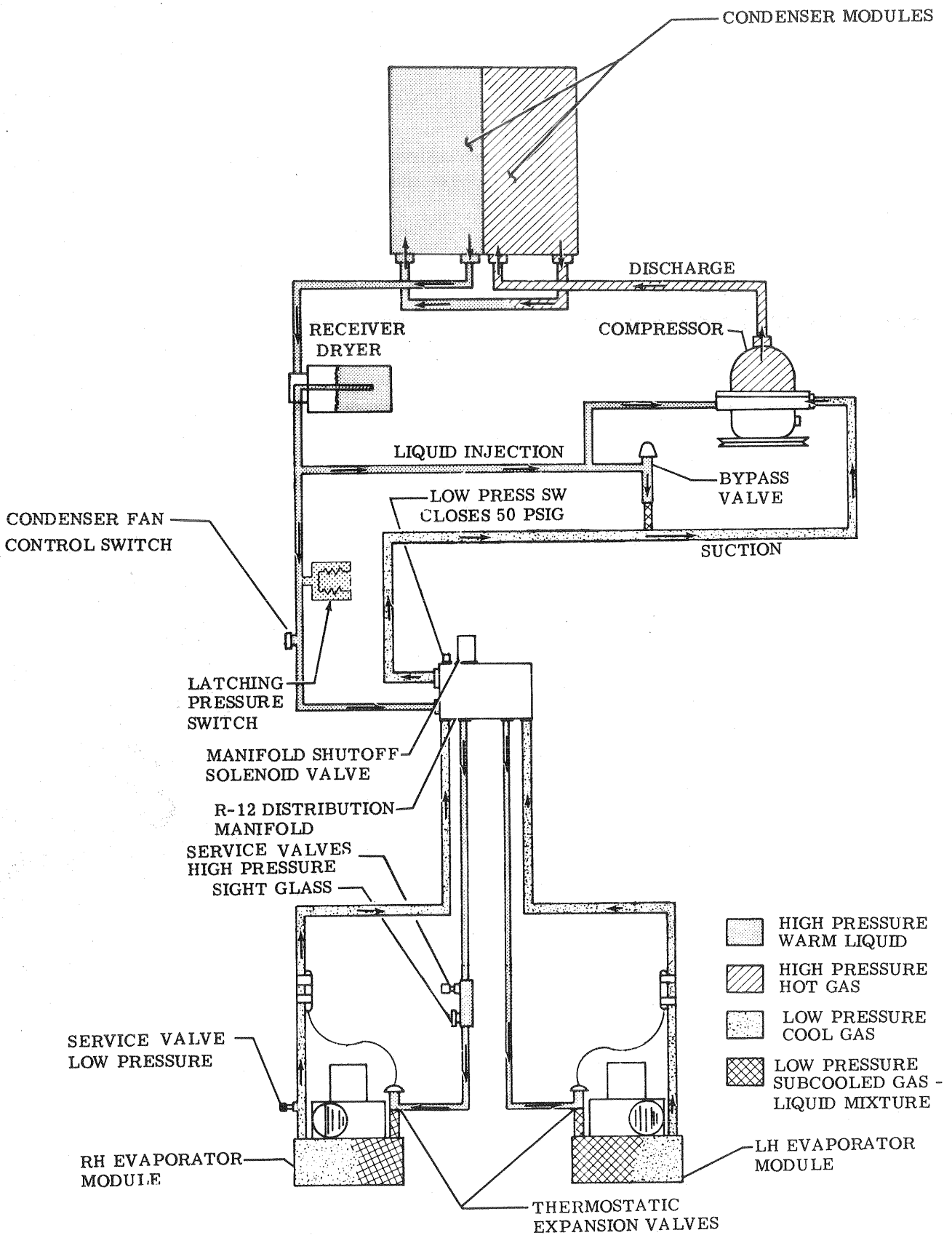


Figure 1. Air Conditioning System Schematic

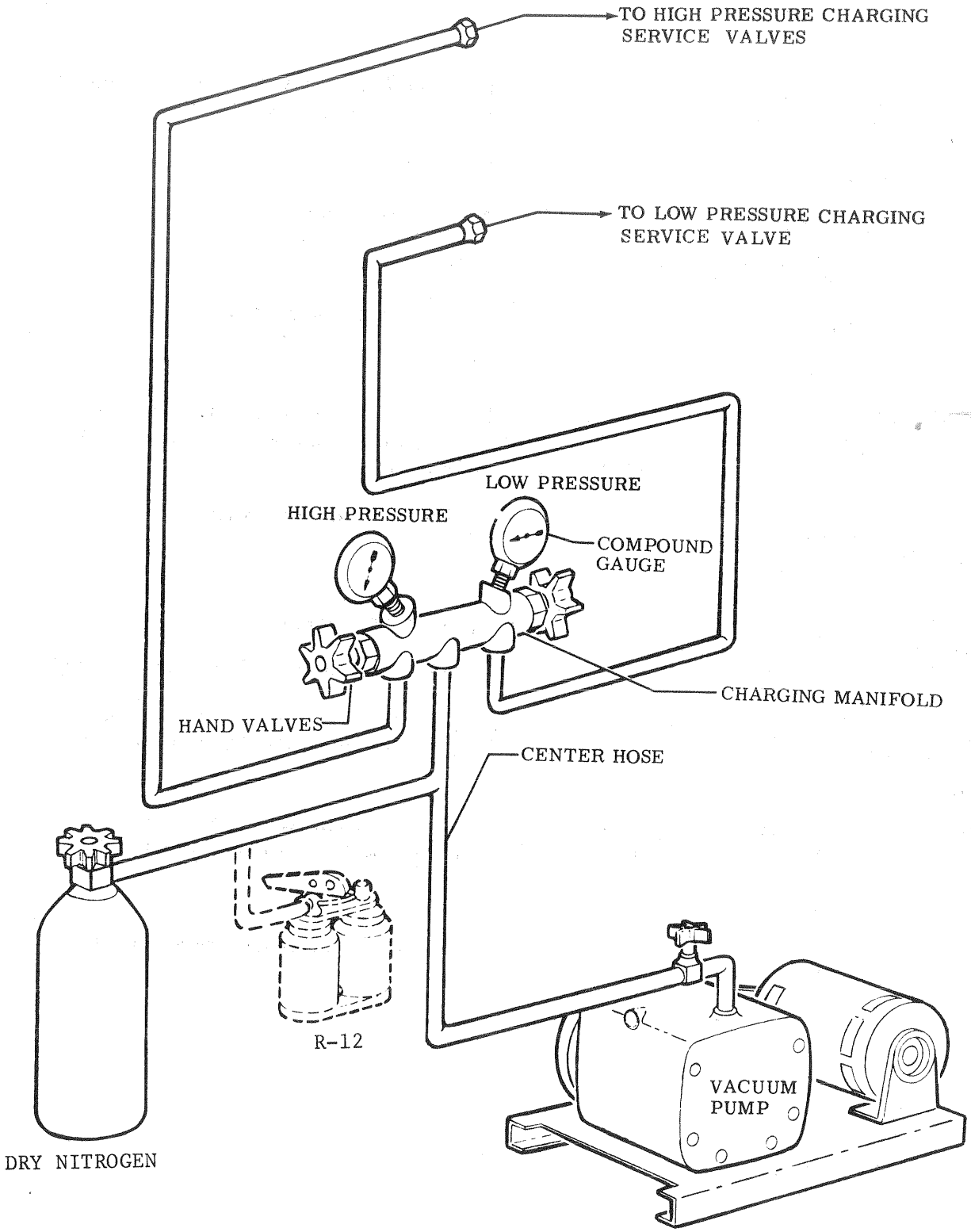


Figure 2. Test Set-Up and Equipment (Sheet 1 of 2)

1. Charging manifold and hose assembly, P/N CMN-4-3* or equivalent. Equipment must be inspected periodically to assure good working condition

2. 4-way conversion adapter CM-1K* or equivalent

3. Refrigerant can adapter, P/N CT-11001* or equivalent

4. R-12 Refrigerant cans (1.0 lb. capacity)

5. Vacuum pump capable of operating at 28 to 29 inches of mercury

6. Dry nitrogen

7. Halogen leak detector, P/N 50-420-805-AAAA1*, or equivalent, must be maintained and inspected periodically to assure good working condition in accordance with manufacturer's recommendation

8. Spring scale 0-80# range prefereably with a slide indicator

NOTE

Mercury thermometers must not be used in aircraft

9. Two dial type thermometers 0^{o} to 120^{o}F range minimum, 2" diameter dial

10. Atlas "Quick Charge" cans of refrigerant oil with freon. P/N 645007, Atlas Supply Company, Springfield, New Jersey or equivalent with 500 viscosity minimum

11. Refrigerant oil for lubricant. 500 viscosity minimum. Capella "E" - Texaco, Incorporated or Suniso #5 - Sun Oil Company or equivalent

12. Teflon tape

13. Zero-Mist, G.C. Number 8667 - G.C. Electronics Division, Hydrometals, Incorporated, Rockford, Illinois, 61101

*Superior Supply Company
215 Laura
Wichita, Kansas

Figure 2. Test Set-Up and Equipment (Sheet 2)

2. TROUBLESHOOTING GUIDE

a. Clutch Engagement

(1) Clutch Does Not Engage

(a) Check fuse (replace as required)

(b) Check latching pressure switch (reset and check continuity)

(c) Check clutch coil for continuity (replace as required)

(d) Check electrical plug to clutch for power

(e) If ambient temperature is 55°F or above, check the low pressure switch for continuity. If replacement is required, discharge the system per Paragraph 3.h., evacuate and recharge per Paragraph 3.e. Check new low pressure switch for electrical continuity.

(f) If the ambient temperature is between 55°F and 20°F, the low pressure switch may be open because system pressure has gone below its drop out pressure, which occurs when temperature reaches a minimum of 25°F to 35°F. Therefore, jumper the switch to check for clutch operation. If possible, hangar the aircraft overnight to bring the ambient temperature of the system above 55°F and follow procedure in step (e) above. The switch re-engages as the temperature comes up to between 45°F and 55°F.

CAUTION: The low pressure switch function is to protect the system from operation below 25°F. NEVER OPERATE BELOW 20°F by jumpering switch.

(g) Energize clutch per Paragraph 3.g. (1)(a) and spin drive pulley with belt off. If no drag exists, clutch has failed. Remove and replace failed components or entire clutch assembly as required.

(2) Clutch Engages, but compressor does not operate.

(a) Energize clutch per Paragraph 3.g.(1)(a) and turn drive pulley with belt off. If there is heavy drag or it cannot be turned by hand, the compressor has an internal failure. Normally the compressor can be rotated fairly easily by hand, but will not continue to spin after you quit turning the clutch pulley. Discharge system per Paragraph 3.h., remove compressor, cap off all hoses, disassemble clutch assembly, and inspect for burnt coil and heavily galled face plates. Some galling on the face plates is normal wear.

(b) Replace compressor but retain clutch if it is not damaged. Replace receiver-dryer. Evacuate and recharge per Paragraph 3.e.

b. Compressor Oil Check (Per Paragraph 3.f.)

(1) Shut off system while observing oil level. In a normal system the oil will disappear from sight glass within 10 seconds. Compressor check OK.

(2) If oil remains in sight glass and looks black and murky, indicates internal galling in the compressor which must be replaced. (See Paragraph 3.f.)

c. Freon Charge

(1) Connect charging manifold hoses to service valves loosely. (See figure 1, Paragraph Test and Equipment and Materials.) Open both manifold valves and screw down valve on can to puncture seal and open slightly to purge air out of hoses. When hose end fittings become cold to touch, the air is purged. Quickly tighten each fitting, close valves on can, and close manifold valves.

(2) Jumper low pressure switch if necessary (if ambient temperature is below 55°F). See Paragraph 2.a.(1)(f).

(3) Run system while observing sight glass and gages.

(4) If cabin temperature is below 80°F, heater must be run or single wire on temperature control switch to solenoid must be disconnected.

(5) Frothy sight glass indicates low charge. Note that during low temperature operation (below 55°F) the sight glass will clear with less total charge than during high temperature operation. Add approximately 1/2 pound freon per Paragraph 2.c. If sight glass does not clear after two minutes or gage pressures read from 25-65 psi (low pressure gage) and 75-225 psi (high pressure gage), continue to add freon in approximately two ounce increments, waiting two minutes between each addition until can is empty. If still undercharged, connect the dry nitrogen source and leak check per Paragraph 3.c. Fix leaks, discharge the system per Paragraph 3.h., evacuate, and recharge per Paragraph 3.c. When recharged, check oil level per Paragraph 3.f.

(6) Clear sight glass and high discharge pressure (over 275 psi) indicate overcharged system. Discharge per Paragraph 3.h., evacuate and recharge per Paragraph 3.e. Recheck oil level per Paragraph 3.f.

d. Evaporators

(1) Both Not Cooling

(a) Turn temperature control to maximum cool and wait three minutes. If cabin temperature is above 80°F the solenoid valve should not be energized. If below 80°F, disconnect single wire from switch terminal. If there is still no differential temperature, discharge system per

paragraph 3.h., and replace solenoid valve. Evacuate and recharge system per Paragraph 3.e. Check oil level per Paragraph 3.f.

(b) Check for clogged face (paper, etc., covering evaporator inlet) and clean.

(2) One Evaporator Not Cooling

(a) Check for clogged face choking off air. Clean face.

(b) Check both high and low blower operation.

(c) Check fan blade (squirrel cage) for tightenss on shaft.

(d) Check exposed portion of suction line - should be very cold to touch. If it is warm, the expansion valve must be replaced. Follow procedure in Paragraph 3.g.(1)(d).

(3) Evaporator frozen with Ice

(a) Turn off system and allow evaporator to thaw out.

(b) Check expansion valve temperature sensing bulb for secure clamps on low pressure line. (Should be on top of freon line). If loose, clamp securely to top of suction line and wrap tightly with two layers of insulating tape. (Do not deform temperature sensing bulb by overtightening clamps.)

(c) If the above action fails to stop ice formation, adjust bypass valve as follows:

1 Remove cap on free end of valve.

2 Lines and numbers appear on the adjustment shaft, noting the pressure at which the valve will open to maintain low pressure.

3 Turn the adjustment knob CW to increase low pressure setting. Remember the system efficiency deteriorates with increased low pressure, so make adjustments in very small increments and do not screw in past 32 psi.

e. Water Being Thrown Out of Air Outlet

(1) Check condensate drain valve (421, 414, and 340) and drain tube by pouring water into one drain and observing drain on bottom of aircraft. Replace drain valve if not free flowing. Check drain tubes on 401/402.

f. Condenser Fan Unusual Noise

(1) Check mounting bracket for fatigue cracks. Replace if cracked.

(2) Check blade for nicks, chips, etc. that could cause it to become unbalanced. Replace if necessary.

(3) Check blade security to its hub. Replace if loose.

g. Belt Idler Pulley Wobbly

(1) Check bearings for failure. Replace pulley assembly.

(2) Check idler arm on compressor for excessive play. End play on end of idler arm over .015, replace.

h. Idler Arm Tight on Clutch Housing

(1) Check for galling of bearing surfaces. Replace idler arm and/or clutch housing.

i. System Contamination

(1) Discharge system per Paragraph 3.h.

(2) Replace receiver-dryer with a new unit.

(3) High pressure leak check system per Paragraph 3.a.(9). Evacuate and charge the system per Paragraph 3.e. Oil level check per Paragraph 3.f.

3. SYSTEM FUNCTIONAL CHECK

The following procedure shall be performed in the sequence as listed, after the aircraft has gone thru all other normal maintenance. This is important to assure that system will not be disturbed by maintenance of other aircraft squawks.

NOTE

The service valves are located near the RH evaporator on 414 and 421, in nose compartment on 401/402, and in aft cabin under shelf on 340.

a. Leak Check (After Component Replacement)

NOTE

Charging manifold and hoses must be free of contamination.

(1) See figure 2, Test Equipment and Materials for schematic of the equipment hook-up. Hook up the Charging Manifold Assembly to the high side and low side pressure service valves. This equipment stays in the aircraft during complete functional check thru final charging.

(2) Connect the vacuum pump to charging manifold.

(3) Open valve on vacuum pump and both valves on manifold.

(4) Turn on vacuum pump to begin evacuation of the system.

(5) Continue evacuation a minimum of 30 minutes after the low pressure gage has reached 27 to 29 inches of mercury.

(6) Close valve on vacuum pump and turn off pump.

(7) Open valve on freon can and add 1 lb of freon. Can may be inverted for faster filling. Close valve.

NOTE

When connecting hose to charging manifold, purge hose prior to tightening hose fitting.

(8) Remove vacuum pump hose from charging manifold and connect dry nitrogen to charging manifold.

(9) Pressurize system with dry nitrogen to 375 psi ± 10 psi and check for leaks by closing charging manifolds valves to isolate system and check for pressure drop. Leak consists of 5 psi pressure drop in 10 minutes.

(10) The system may also be checked by maintaining 375 psi ±10 psi and using leak detector and checking all joints.

b. Component Functional Check - After major leaks have been corrected, perform the following components functional checks before final leak check:

NOTE

Step (1) latch pressure switch and step (2) high pressure switch for condenser blower may be checked at the same time to save time and nitrogen.

(1) Latch Pressure Switch - (In forward baggage area in wing locker) Functions by opening clutch circuit at 350 + 10 - 0 psi and disabling clutch assembly in event of too high a system pressure.

(a) Pressure as described in Paragraph 3.a.(9) remove fuse and check for open switch.

(b) Lower pressure in system to approximately 250 psi by bleeding off a portion of the dry nitrogen thru the evacuation portion of the manifold.

(c) Reset latching switch (should have opened during high pressure check at 375 psi).

(d) Check to assure electrical continuity thru switch. Slowly increase pressure with dry nitrogen until switch clicks and check to assure electrical discontinuity thru switch. Replace fuse.

CAUTION: Do not go beyond 400 psi.

(e) If latch pressure switch does not operate normally, slowly bleed off pressure, replace switch, and repeat function check.

(2) High Pressure Switch for Condenser Blower - Functions by turning on condenser blower in flight when system pressure exceeds 235 psi and turning off blower when system pressure is reduced below 195 psi.

(a) Pressure as described in Paragraph 3.a.(9) disconnect ground wire and check for electrical continuity through switch.

(b) Lower nitrogen pressure to 185 psi and check to assure electrical discontinuity through switch.

(c) Increase nitrogen pressure to 250 psi and check to assure electrical continuity through switch. Reconnect ground wire.

(d) If switch does not function normally, bleed off pressure, replace switch, and repeat functional check.

(3) Low Pressure Switch (In Manifold) - Functions by opening the circuit and disabling the clutch assembly in event of loss of freon from the system or operation during extreme low outside ambient temperature (approximately 30°F).

(a) Check for pressure above 60 psi then check for electrical continuity through switch.

(b) Lower system pressure to 25 psi.

(c) Check to assure electrical discontinuity thru switch.

(d) Increase system pressure until switch actuates (pressure should be in the range of 40 - 60 psi).

(e) If switch is not electrically continuous or if it malfunctioned previously, bleed off pressure, replace switch, and repeat functional check.

(4) Temperature Control Switch and Solenoid Valve - Control freon flow to the evaporators by sensing inlet air temperature. The rheostat on the control panel is connected to a resistance heater mounted under the temperature control switch. The set point for the switch is 80°F.

(a) With Cabin Temperature above 80°F an open electrical circuit should exist to solenoid. The solenoid can be checked for operation by jumpering across the switch with the power on. The switch can be checked by lightly spraying with an evaporating agent such as alcohol or "Zero-Mist," which will not leave a residue. Make sure the power is off. Using the thermometer touching the switch case, observe temperature at which the switch opens as it warms up. This should be between 75°F and 85°F. This may take three to five minutes.

CAUTION: Do not use mercury type thermometers.

(b) With Cabin Temperature below 80°F a closed electrical circuit to the solenoid should exist. Turn the temperature control to warmest setting and heat cabin with heater, blow warm air on switch with an auxiliary hot air blower, or use a heat lamp beamed on the switch. Switch should open in a very short period of time. Remove heat and monitor circuit while switch cools. A thermometer touching the case will give an indication of the switch temperature. The switch should close between 75° and 85°F while cooling down.

c. Final Leak Check

(1) If any components were removed or replaced, add freon to the system per Paragraph 2.c.

(2) Raise system pressure to 375 $\pm$ 10 psi.

(3) Close valves on charging manifold and disconnect nitrogen supply. Keep manifold and gages in aircraft to monitor pressure bleed down.

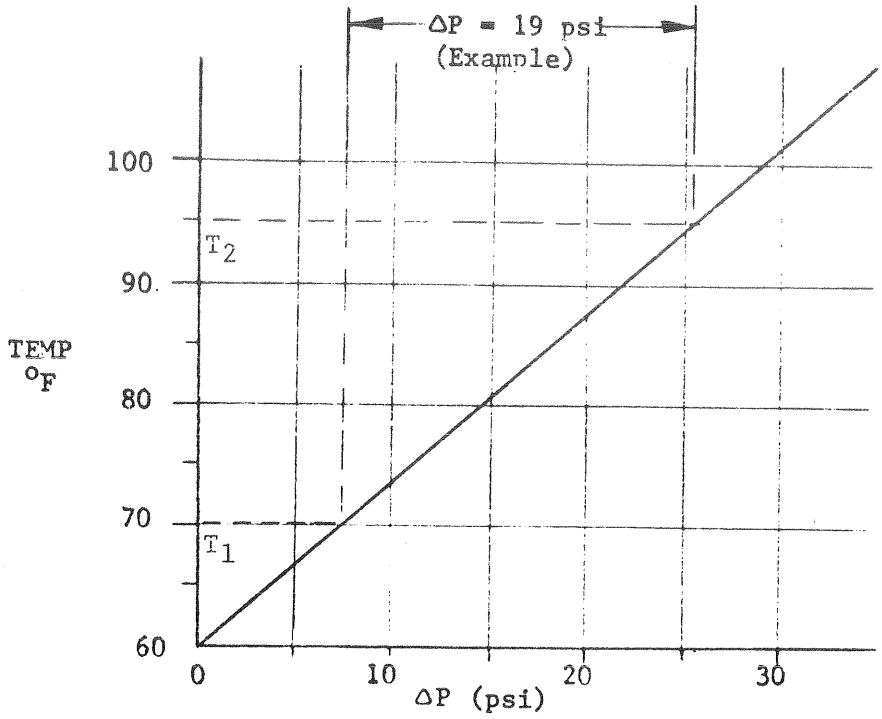
(4) Record pressure reading from gage and ambient temperature (assuming the aircraft has been in the hangar a minimum of two hours to allow temperature stabilization).

(5) Maintain system pressure a minimum of 24 hours.

(6) Record system pressure and temperature after 24 hours. The measurement is valid only after two hours minimum temperature stabilization in the hangar.

(7) Using the chart, see figure 3, depending on final temperature being above or below initial temperature, add or subtract the ΔP to the initial pressure reading. (See example)

(8) Compare the adjusted initial pressure with the final pressure. If the system loss is greater than 10 psi, there is a system leak which must be corrected. Use the Halogen Leak Detector. When leak has been fixed, rerun pressure check.



Example of Calculation: $T_1 = 70^{\circ}F$, P = 380 psi, $T = 95^{\circ}F$, P_2 = 385 psi. From chart P = 19.

Temperature and pressure at the beginning of the test is $70^{\circ}F$ and 380 psi. Temperature and pressure after 24 hours is $95^{\circ}F$ and 385 psi. From the chart, the differential pressure (Δ P) is 19 psi. When this differential pressure is added to the pressure which was recorded at the beginning of the test (380 psi + 19 psi) a new adjusted pressure of 399 psi has been established. This pressure subtracted from the pressure after 24 hours indicated a drop in pressure of 14 psi (399 psi - 385 psi = 14 psi) indicating a leak in the system.

- If temperature at beginning of the test is lower than that after 24 hours - add the differential psi to P_1 pressure and subtract from P_2 pressure.

- If temperature at beginning of test is higher than that after 24 hours - subtract differential pressure from P_1 pressure and add to P_2 pressure.

Figure 3

d. Belt Idler Spring Tension - The spring tension system is designed to keep the belt tight enough not to slip under the highest compressor load conditions and still allow the engine to move around on its mounts. Improper belt tension will cause premature belt failure or allow spring resonance allowing the belt to jump its pulleys.

(1) 401, 402, 421 Spring Tension - Tension is measured by using a spring scale hooked under the idler arm at the pulley hub and pulling upward in line with the spring. Read the scale when the bottom straight run of the belt sags approximately .06 inch while sighting along the bottom of the compressor pulley and the bottom of the engine drive pulley. If adjustment is required, disconnect spring rod from idler pulley, loosen jamb nut at top of spring, and screw rod in or out of spring end plug as required. Each full rotation of the rod will change tension approximately one pound. Care should be taken not to twist the spring plug into the spring as this will change the number of active coils and change spring rate characteristics. The spring must have 12 active coils, i.e., 12 revolutions of free spring from the upper end plug to the lower end plug to the lower end plug. Adjust spring tension for 421 to 35± 2 lbs. and 401/402 to 70± 3 lbs.

(2) 414, 340 Spring Tension - Tension is measured by a spring scale under the idler arm spring attachment and pulling upward in line with the spring. Read the scale when the bottom straight run of the belt sags approximately .06 inch while sighting along the bottom of the lower idler pulley and the engine pulley. Adjust spring tension by repositioning the jamb nuts on top and bottom sides of the cross bar between the springs on the 340 and 414. Adjust spring tension for 340 and 414 to 70 ± 3 lbs.

e. Charging System - See figure 2, Test Equipment and Materials for schematic of the equipment hook-up. Manifold and hoses must be free of contamination. See Paragraph 4 for safety precautions. Proceed as follows:

(1) If charging manifold is still connected to the service valves, shut off nitrogen bottle valve then remove the hose from the dry nitrogen bottle and connect hose to the vacuum pump. If the charging hoses have been disconnected, remove caps from service valves and connect hoses per figure 1, Test Equipment and Materials. Discharge system pressure down to 5 psi.

(2) Open valve on vacuum pump and both valves on manifold.

(3) Turn on vacuum pump to begin evacuation of the system.

(4) Continue evacuation a minimum of 30 minutes after the low pressure gage has reached 27 to 29 inches of mercury.

(5) Close valve on vacuum pump and turn off pump.

(6) Open valve on freon can. Can may be inverted for faster filling.

(7) When system pressure stabilizes with freon pressure from can (must be above 50 psi) close high pressure valve on manifold, start R.H. engine, run at 950 rpm, and select "cool" on mode switch.

(8) Add second can, screw down valve to puncture seal, and open valve. Warm can in warm water to speed fillings, invert can for liquid.

(9) When system pressure stabilizes with freon pressure from can (must be above 50 psi) close high pressure valve on manifold, start R.H. engine, run at 950 rpm, and select "cool" on mode switch.

(10) Repeat (7) and (8) for third can except limit filling to approximately 1/2 can (determined by frost line on can).

(11) Gages should read approximately 30-65 psi on the low pressure gage and 100-224 psi on the high pressure gage. Higher readings indicate overcharged or blocked system.

(12) Bubbles in the sight glass of a stabilized system (5 minutes minimum operation) constituting a foam action indicate an undercharge, but occasional individual bubbles passing thru the sight glass should be considered as a clear sight glass and full charge.

(13) If frothing continues for three more minutes, open can adaptor valve to allow approximately two ounces freon into the system. Wait two minutes and recheck sight glass. Clear glass shows full charge, frothy glass shows low charge. Repeat two ounce charge, two minute wait procedure or until it clears or until can is empty.

CAUTION: Under no circumstances put in more than three full cans. Normally 2-1/2 cans will fill the system.

(14) If sight glass is clear, run throttle to maximum static rpm and observe the high pressure gage for one minute to assure pressure does not go above 275 psi. Throttle back to 950 rpm, close all valves, and remove low pressure gage hose from the low pressure service valve. Use a rag around the service valve to catch the freon spray with oil trapped in the hose. Hold hose down against valve while spinning off the nut for best results. Turn system off, allow one minute for system pressure equalization, then remove the high pressure hose as described above. Some oil will be in the freon trapped in the hose, so use a rag while disconnecting. Replace service valve caps.

f. Oil Level Check - The compressor is shipped with 250 cc (approximately 8 ounces) of refrigerant oil. There is a sight glass on the aft end of the compressor which shows oil level.

(1) Start R.H. engine, run at 950 rpm, and select "cool" on the mode switch.

(2) Observe sight glass on compressor. The oil shows an amber color and should be 3/4 full to full, immediately after start-up. After 3 to 4 minutes, the oil level may drop to 1/3 full but there must always be some oil in the sight glass. Increasing engine rpm will bring the oil level back up, but at very high rpms, the level will drop again.

(3) If less than 1/3 full at any time, connect a can of Atlas "Quick Charge" oil and freon to the can adapter and charging manifold. Keep system running, loosely attach low pressure gage hose to low pressure service valve per figure 1, Test Equipment and Materials. Screw valve down to puncture can and open valve slightly to purge hose. High pressure valve must be closed, low pressure gage valve open. When air is purged from hoses at low pressure service valve, fitting becomes cold. Screw down hose fitting and quickly invert "Quick Charge" can to get liquid into low pressure line. Wait two minutes and rerun check in Paragraph 3.f.(2).

g. System Operation Check

(1) Temperature at 55°F or higher (Ambient)

(a) With engine off, pull 25 amp breaker for condenser fan, turn on battery switch and select "cool" on mode switch while another person listens to the compressor for metallic click signifying clutch engagement. Cyle switch several times to assure power to the clutch.

NOTE

Check gear handle to be in gear down position.

NOTE

Step (b) must be performed with aircraft on jacks.

(b) Push in 25 amp breaker and listen for condenser fan operation (mode select "cool"). Actuate landing gear safety switch to "in flight" position and fan should go off. Actuate switch to "ground" position and fan should go on.

(c) Start R.H. engine, set at 950 rpm, select "cool" on mode switch, and turn temperature control knob to maximum cool.

(d) Temperature difference across the evaporators should be at least 20°F and may be 40° on very hot days. Measure both evaporators with dial type thermometers. If either evaporator does not cool, discharge system per Paragraph 3.h. Replace expansion valve. Exercise care when changing expansion valve, not to twist the boss against the coils, which could cause a leak in the braze joint. Always back up the boss with a wrench on the flats. When replac-

ing the temperature sensing bulb, clamp firmly to top of low pressure line and wrap with two layers of insulating tape. When the expansion valve or module has been reinstalled, run system leak check per Paragraph 3.a., charge system per Paragraph 3.c., and recheck evaporator performance per this paragraph.

(e) Turn temperature control knob to maximum warm, and observe air inlet temperature near the temperature control switch. If this is above 80°F, duct air from one of the outlets to the switch with a piece of flexible duct. As the switch cools, it should activate the solenoid and an increase in the evaporator air temperature will be noticed. If the temperature is below 80°F the evaporators will not be receiving freon because the solenoid is closed. Unhook the single wire from the terminal on the switch and note the 20° difference between inlet and outlet temperatures as measured above in Paragraph 3.g.(d).

(f) Actuate blower switch to assure proper blower operation on both high and low speeds.

(2) Temperature Below 55°F (Ambient) creates additional checkout problems. The easiest way to eliminate some of these is to keep aircraft in hangar overnight to bring component temperatures up.

CAUTION: Do not attempt system check out below 20°F OAT.

(a) Bypass the low pressure switch electrically to complete clutch circuit. Follow procedure in Paragraph 3.g.(1)(a).

(b) Push in 25 amp breaker and listen for condenser fan operation (mode select "cool"). Actuate landing gear safety switch to "in flight" position and fan should go off. Actuate switch to "ground" position and fan should go on. Then pull 25 amp fan breaker for subsequent steps.

(c) Same as Paragraph 3.g.(1)(c) except run heater to build up cabin temperature above 70°F before operating system. Unhook single wire terminal from temperature control switch to bypass solenoid operation.

(d) Temperature difference across the evaporators should be at least 20°F and may be 40° on very hot days. Measure both evaporators with dial type thermometers. If either evaporator does not cool, discharge system per Paragraph 3.h. Replace expansion valve. Exercise care when changing expansion valve, not to twist the boss against the coils, which could cause a leak in the braze joint. Always back up the boss with a wrench on the flats. When replacing the temperature sensing bulb, clamp firmly to top of suction line and wrap with two layers of insulating tape. When the expansion valve or module has been installed, run system leak check per Paragraph 3.a., charge system per Paragraph 3.c., and recheck evaporator performance per this paragraph.

(e) Turn off cabin heater and continue to operate system while reconnecting temperature control switch. Note that evaporator outlet temperature increases.

(f) Actuate blower switch to assure proper blower operation on both high and low speeds.

(3) Belt Check - 421 Only

(a) While system is operating, run R.H. engine slowly up to maximum static rpm, observing belt and idler pulley for smooth running, then slowly throttle back to idle speed.

(b) Run the throttle rapidly up to maximum rpm and chop it off, observing belt and pulley for smooth operation.

(c) Repeat both of the two preceding steps with the system turned off.

(d) If the belt or idler pulley begins to dance erratically, or belt comes off under any of the above conditions then recheck the following:

1 Compressor alignment per SK421-48. Realign compressor by shimming if necessary.

2 Idler tension spring has proper number of active coils, i.e. 12 free revolutions between top spring plug and bottom spring plug. Replace spring if number of coils is incorrect.

3 Spring tension per Paragraph 3.d. Adjust spring tension if required.

h. Discharge Procedure

(1) Connect charging manifold hoses per Paragraph 2.c.(1).

(2) Use hose off of center port to discharge freon into a container (small bucket, etc.) to catch the oil.

CAUTION: Be careful not to let freon come in contact with skin or eyes.

(3) Open high pressure manifold valve slowly to bleed off freon and oil into container without splattering.

(4) As pressure drops, valve may be opened wider for faster discharging.

(5) Close valve when pressure drops to 5-10 psi so no air enters the system, unless a component must be replaced.

(6) Observe amount of oil caught in container. If it amounts to approximately one tablespoon or less, disregard the loss. If it is more than one tablespoon, add one can of Atlas "Quick Charge" per Paragraph 3.f.

4. SAFETY PRECAUTIONS

a. Servicing with Freon

(1) Liquid R-12 at normal atmospheric pressure and temperature will freeze anything it contacts. Use of protective clothing, gloves, and goggles will protect the skin and eyes.

(2) The eyes are especially susceptible to damage, so safety glasses are absolute minimum protection if goggles are not available, and shall be worn at all times when servicing the freon system.

(a) Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash out, followed with a weak solution of boric acid to flush out the oil solution. Seek the aid of a doctor immediately even if the irritation has ceased.

b. Removing Hoses Under Pressure

(1) When service hoses are removed from fittings the freon in the hose will spew vigorously and will whip the end of the hose if not restrained. Use a rag to catch the escaping fluid.

c. Use of Intense Heat

(1) To avoid explosion, never weld, use a blowtorch, solder, steam clean, or use any other intense heat on or in the immediate area of the refrigerant system while it is closed to the atmosphere, charged or not. Although R-12 gas under normal conditions is non-poisonous, the discharge of refrigerant near an open flame can produce a very poisonous gas (phosgene). This gas will also attack all bright metal surfaces.

(2) Do not use a flame type leak detector because of fire hazard on aircraft, and production of minor amounts of phosgene gas.

CAUTION: Do not smoke in the vicinity of refrigerant discharge because inhaling refrigerant through the burning tobacco will produce the poisonous gas like an open flame.

d. Discharging Systems

(1) Discharge refrigerant systems only in well ventilated areas, preferably out of doors.