CHECKER MOTORS CORPORATION
Kalamazoo, Michigan 49007

SERVICE BULLETIN NO. K-10-73
June 11, 1973

AIR CONDITIONING MAINTENANCE
Taxicab-Marathon-Aerobus
Models 1968-1973

The Air Conditioning Maintenance Procedure References outlined herein, are identified and located in this Service Bulletin per following notations.

Parts and Service Division

Attachment

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Procedure references recorded in this Service Bulletin will be of assistance when servicing the Air conditioning System furnished in Checker vehicles for the period of 1968 through 1973.

1. VISUAL INSPECTION OF SYSTEM (ENGINE NOT RUNNING)

A. Engine drive belts tight within specifications: Be sure belts are not worn or frayed and are lined up with other pulleys. (Refer 1-E-a)

B. Check compressor clutch for energizing (engaging) and disengaging.

C. Check refrigerant hoses, hose clamps, metal tubing and connections for leaks. Leaks will show evidence of oil residue.

D. Check electrical wires for wear and loose connections.

E. Because of the close relationship between the air conditioner and cooling system, the following items must be checked.

a. Drive Belts - Adjust tension on 3/8" belts to 120 to 150 lbs. with a min. residual tension of 55 lbs. Adjust 15/32" belts to 135 to 165 lbs. with a min. residual tension of 80 lbs.

b. Fan Clutch (If Applicable) - Run engine and observe engine operating temperature with fan clutch engaged. If fan clutch operates quietly and considerable air flow is prevalent at engine idling speed, fan clutch is functioning properly.

c. Pressure test engine cooling system for leaks. Use cooling system tester AC PCT-1 or equivalent. Inspect radiator and heater hoses for coolant leaks and collapsed condition of hoses, check hose clamps for tightness, replace as necessary.

d. Radiator Cap - Pressure test for proper pressure holding capacity*(15 PSI). Use cooling system tester AC PCT-1 or equivalent. *(13 PSI 1968-1970) (15 PSI 1971-1973)

1. VISUAL INSPECTION OF SYSTEM (ENGINE NOT RUNNING) - (CONT'D).

E. Because of the close relationship between the air conditioner and cooling system, the following items must be checked: - Cont'd.

e. Thermostat - Run engine until normal operating temperature is reached. The thermostat is operating properly when the upper radiator tank becomes hot and flow of air through radiator changes from ambient temperature to hot at rear of radiator.

f. Engine Coolant*(Permanent Anti-Freeze) - Coolant level should be 1" below bottom of radiator filler neck when cold. *(44 percent solution -20°F)

g. Coolant Recovery System (If Applicable) - Check level of coolant at the see through reservoir. Level should be at add mark when cold and between add and full marks when hot.

F. Radiator and condenser MUST be cleaned to insure proper air flow to prevent engine overheating. Use air pressure to blow out any restrictions in condenser and radiator fins. NOTE: Do not damage fins.

2. CHECKING SYSTEM OPERATION (ENGINE NOT RUNNING)

A. Make sure both hand valves are closed on air conditioning Manifold Gauge Set. Gold Seal #20-0993 or equivalent. Remove protective caps from low and high side service fittings at rear of compressor located in air conditioning hoses.

B. Connect Manifold Gauge Set hoses into air conditioning system. (ALWAYS connect high side first). NOTE: High side service fitting is located on hose assembly which connects compressor to condenser.

C. To purge air from charging hoses: MAKE CERTAIN VEHICLE ENGINE IS NOT RUNNING.

a. Slightly open high side Manifold Gauge Set hand valve momentarily and allow R-12 from system to push air from high side out through the center hose. Close high side Manifold Gauge Set hand valve.

b. Slightly open low side Manifold Gauge Set hand valve momentarily to push air from low side hose through center hose. Close low side Manifold Gauge Set hand valve.

2. CHECKING SYSTEM OPERATION (ENGINE NOT RUNNING) - (CONT'D).

D. Start Engine - NOTE: Both high and low side Manifold Gauge Set hand valves are closed.

a. Open car doors. Operate system at maximum cooling, high blower speed and engine operating at fast idle (with exhaust ventilated) for a maximum of five minutes to stabilize the system.

b. Use large fan in front of condenser to substitute for normal ram air flow through condenser. CAUTION: WHEN VEHICLE ENGINE AND AIR CONDITIONER ARE OPERATING, NEVER, UNDER ANY CIRCUMSTANCES, OPEN THE HIGH PRESSURE SIDE MANIFOLD GAUGE SET HAND VALVE.

c. Close car doors, then place service thermometer, Gold Seal #20-9564 or equivalent in air vents in evaporator. Temperature reading should be (38 degrees to 48 degrees F).

d. When system is stabilized, the pressure gauges on the Manifold Gauge Set should read pressures corresponding to values listed under PERFORMANCE DATA, page 6 and 7.

e. When correct system pressures are observed, check sight glass to insure that sight glass is clear (no foam or bubbles can be observed). If foam or bubbles are present, refer page 8, item number 9.

f. Feel outlet air distribution to insure that cold air is being distributed. NOTE: The high side of the system will be hot or warm to the touch, starting at discharge side of compressor, going through condenser, filter-drier and up to inlet side of expansion valve. Any restriction or partial blockage in this area will be indicated by touch from warm to cool.

g. Disconnect Manifold Gauge Set lines then cap fittings located in compressor hoses.

3. LEAK TESTING THE SYSTEM

A. HALIDE LEAK DETECTOR Gold Seal #20-9915 or equivalent is a propane gas-burning torch which is used to locate a leak in any part of the system by watching for change in color of flame (soft) green flame indicates small leak, purple or bright blue indicates bad leak. WARNING: DO NOT USE LIGHTED DETECTOR IN ANY PLACE WHERE COMBUSTIBLE OR EXPLOSIVE GASES, DUSTS OR VAPORS MAY BE PRESENT.

3. LEAK TESTING THE SYSTEM - (CONT'D).

B. ELECTRONIC LEAK DETECTOR Gold Seal #20-9901 or equivalent. will indicate leaks electronically by sounding an alarm signal. Directions for use of this equipment are furnished with instrument.

C. LEAK SPOT internal charged leak detector Gold Seal #20-9510 or equivalent. This comes in a 15 oz. can similar to R-12 and can be charged into the system with the Manifold Gauge Set. A leak area can be spotted by a tell-tale red-orange spot at point of leak which will remain until wiped off.

4. PURGING THE SYSTEM

In replacing any of the air conditioning components, the system must be completely purged or drained of refrigerant. The purpose is to lower the pressure inside the system so that a component part can be safely removed.

A. With the engine stopped, install high and low pressure lines of the Manifold Gauge Set into the air conditioning system.

B. Place free end of Manifold Gauge Set, center hose, in a empty 3 lb. container with a plastic cover which has been cross-slit (X'ed), to allow hose entry, which works well for this purpose.

C. SLOWLY open either the high or low side Manifold Gauge Set hand valve and adjust valve until moderated flow of refrigerant is blowing out. Do not open valve too wide and check the container to make certain no oil is being discharged with the refrigerant. CAUTION: If refrigerant is allowed to escape too fast, compressor oil will be carried out with refrigerant and will be lost from compressor. NOTE: If oil is lost, it may be added to the system during recharging.

D. SLOWLY open the other Manifold Gauge Set hand valve (so that refrigerant is discharged from both high and low sides of the system) and adjust valve for refrigerant flow from center hose. Do not open valve too wide. Again check container to make certain no oil is being discharged with the refrigerant. As system pressure drops on gauge readings, slowly increase opening of both Manifold Gauge Set hand valves until gauges indicate "0" psi.

5. EVACUATE SYSTEM (ENGINE NOT RUNNING AND MANIFOLD GAUGE SET CONNECTED IN SYSTEM)

GENERAL NOTE: In all evacuating procedures shown below, the specification of 28-29 inches of Mercury vacuum is used. These figures are only attainable at or near Sea Level Elevation. For each 1000 feet above sea level where this operation is being performed, the specifications should be lowered by 1 inch. Example: at +5000 ft. elevation, only 23 to 24 inches of vacuum can normally be obtained. Whenever the air conditioning system is open for any reason, it should not be put into operation again until it has been evacuated to remove air and moisture which may have entered the system.

A. After completing repairs and before system is recharged with R-12, evacuate system with vacuum pump. Gold Seal numbers 20-9542 or 20-9544 or equivalent.

B. Connect center charging hose to vacuum pump. Open both high and low side Manifold Gauge Set hand valves.

C. Start vacuum pump.

D. Watch vacuum reading on low side compound gauge. Reading should be approximately 29 inches of Mercury at sea level. Let vacuum pump (20-9544) run for 30 minutes after reading reaches 29". Moisture in system will be vaporized and removed. Vacuum pump, (20-9542, air) only has to run 10 minutes.

D. Close both Manifold Gauge Set hand valves (high and low). Stop vacuum pump and allow system to set 4 minutes. If system loses no vacuum it is void of leaks.

E. Remove center hose from vacuum pump. System is now ready for recharging.

6. RECHARGING SYSTEM (ENGINE NOT RUNNING - AND MANIFOLD GAUGE SET CONNECTED IN SYSTEM)

A. Connect center hose to valve on new can of R-12.

B. After R-12 can is attached, open can valve and purge air from center hose by slightly loosening hose connector at Manifold Gauge Set momentarily allowing all air to escape, then retighten connector.

C. WITH CAR ENGINE NOT RUNNING, open high side Manifold Gauge set hand valve and allow refrigerant to flow into system with refrigerant can upright in vapor-position.

D. As soon as both gauges stop rising, close high side Manifold Gauge Set hand valve and can valve.

E. Start engine, operate at normal fast idle speed, turn air conditioner on maximum cool with high speed blower fan.

6. RECHARGING SYSTEM (ENGINE NOT RUNNING - AND MANIFOLD GAUGE SET CONNECTED IN SYSTEM) - (CONT'D.)

F. Open valve on can of R-12, open low side hand Manifold Gauge Set hand valve and service R-12 through low side.

G. Anytime repairs of compressor seal, filter-drier, condenser, expansion valve, evaporator or hose replacements have been made, ALWAYS charge system with (1) can of oil charge, Gold Seal #20-9507 or equivalent. NOTE: Refrigerant can be rocked from side to side to increase flow of refrigerant into system. CAUTION: NEVER OPEN HIGH SIDE MANIFOLD GAUGE SET HAND VALVE WHEN VEHICLE IS RUNNING.

H. Repeat process until sight glass shows system is completely charged. Watch high side gauge until it registers near normal reading. (See performance data chart on page 6 and 7).

I. When high and low gauge pressures reach normal reading and bubbles disappear in sight glass, close low side Manifold Gauge Set hand valve and can valve. Do not overcharge.

J. Insert thermometer, Gold Seal #20-9564 or equivalent, in evaporator air vent to determine temperature. Normal reading should be 38 degrees to 48 degrees on low blower fan speed. Stop engine, disconnect Manifold Gauge Set and re-install service fitting protective caps.

K. Be sure to install service decal and properly date for next service. (1 year)

7. REPAIRING LEAKS

A. Whether installing a new compressor shaft seal, hoses, any component part, etc., always coat the fittings and "O" rings generously with refrigerant oil Gold Seal #20-9500 or equivalent. (Cleanliness is very important, especially compressor shaft seals. Smallest particles of dirt on seal surfaces could cause leaks.)

B. It is very important that proper tools are used in doing service work.

8. PERFORMANCE DATA

The following Performance Data defines normal operation of the air conditioning system as noted under System Operation, page 2. Relative humidity does not appear in the table because after running the prescribed length of time on recirculated air and maximum cooling, the relative humidity of the air passing over the evaporator core will remain at approximately 35% to 40% regardless of the ambient temperature or humidity.

8. PERFORMANCE DATA - (CONT'D.)

Should excessive compressor head pressures (High Side) be encountered at higher ambient temperatures, an 18" fan placed in front of the vehicle and blowing into the condenser will provide the extra circulation of air needed to bring the pressures to within the limits specified. NOTE: High pressures will occur at higher ambient temperatures. In areas of high humidity it is possible to have gauge readings approach but not reach the figures listed in the performance tables and still have a satisfactory operating unit. However, it is important to remember that low pressure (Low Side) has a direct relationship to outlet temperature. If pressure is too low, ice will gradually form on the evaporator fins, restricting airflow into the passenger area and resulting in insufficient or no cooling.

APPROXIMATE REFRIGERANT CHARGE
Taxicab-Marathon-Aerobus

Single System..... 2 5/8 lbs.
Single System With
Roof Top Condenser..... 3 5/8 lbs.
Dual System..... 4 1/4 lbs.
Dual System With
Roof Top Condenser..... 5 1/4 lbs.

Temperature Of Air Entering Condensor	70°	80°	90°	100°	110°	120°
Engine R.P.M.	Fast Idle					
Compressor Head Pressure (High Side)	135 145	165 175	190 200	210 220	230 240	255 265
Evaporator Approximate Pressure (Low Side)	15.0 - 30.0 PSI					

9. REFRIGERANT QUICK-CHECK PROCEDURE

The following procedure can be used to quickly determine whether or not an air conditioning system has a proper charge of refrigerant. This check can be made in a manner of minutes thus facilitating system diagnosis by pinpointing the problem to the amount of charge in the system or by eliminating this possibility from the overall checkout.

Start engine and place on fast idle. Set controls for maximum cold with blower on high.

Bubbles present in sight glass.

System low on charge. Check with leak detector. Correct leak, if any, and fill system to proper charge.

No bubbles. Sight glass clear.

System is either fully charged or empty. Feel high and low pressure pipes at compressor. High pressure pipe should be warm; low pressure pipe should be cold.

No appreciable temperature differential noted at compressor.

System empty or nearly empty. Turn off engine and connect Manifold Gauge Set. Induce ½# of refrigerant in system (if system will not accept charge, start engine and draw ½# in through low pressure side). Check system with leak detector.

Temperature differential noted at compressor.

Even though a differential is noted, there exists a possibility of over-charge. An overfilled system will result in poor cooling during low speed operation (as a result of excessive head pressure). An overfill is easily checked by disconnecting the compressor clutch connector while observing the sight glass.

If refrigerant in sight glass remains clear for more than 45 seconds (before foaming and then settling away from sight glass) an overcharge is indicated.

Verify with a performance check.

If refrigerant foams and then settles away from sight glass in less than 45 seconds, it can be assumed that there is a proper charge of refrigerant in system.

Continue checking out system using performance checks outlined previously.

10. CHECKING OIL

In the six cylinder compressor it is not recommended that the oil be checked as a matter of course. Generally, compressor oil level should be checked only where there is evidence of a major loss of system oil such as might be caused by:

A. A broken refrigerant hose.

B. A severe hose fitting leak.

C. A very badly leaking compressor seal.

D. Collision damage to the system components.

As a quick check on compressor oil charge, operate the engine at idle on maximum cold for approximately 10 minutes, turn off the engine and momentarily crack open the oil drain plug on engine side of the compressor letting a slight amount of oil drain out. Retighten plug. Again slightly crack open the plug. If oil comes out, the compressor has the required amount of oil. NOTE: The oil may appear foamy. This is considered normal.

To further check the compressor oil charge, should the above test show insufficient oil, it is necessary to remove the compressor from the vehicle, drain and measure the oil as outlined under "Checking Compressor Oil Charge."

11. CHECKING COMPRESSOR OIL CHARGE

A. Run the system for 10 minutes at*675 engine rpm with controls set for maximum cooling and high blower speed. * Approximately in "PARK" position.

B. Turn off engine, purge the system, remove compressor from vehicle, place it in a horizontal position with the drain plug downward. Remove the drain plug and tipping the compressor back and forth and rotating the compressor shaft, drain the oil into a clean container, measure and discard the oil.

C. Add new refrigeration oil to the compressor as follows:

a. If the quantity drained was 4 fluid oz. or more, add the same amount of new refrigeration oil to the original compressor.

b. If the quantity drained was less than 4 fluid oz., add 6 fluid oz., of new refrigeration oil to the original compressor.

11. CHECKING COMPRESSOR OIL CHARGE - (CONT'D.)

C. Add new refrigeration oil to the compressor as follows: (Cont'd.)

c. If a new service compressor is being installed, drain all oil from it and replace only the amount specified in Steps C-a and C-b above.

d. If a field repaired compressor is being installed, add an additional 1 fluid oz. to the compressor.

D. In the event that it is not possible to idle the compressor as outlined in Step A to effect oil return to it, proceed as follows:

a. Remove the compressor, drain, measure and discard the oil.

b. If the amount drained is more than 1½ fluid oz., and the system shows no signs of a major leak, add the same amount to the original compressor.

c. If the amount drained is less than 1½ fluid oz., and the system appears to have lost an excessive amount of oil, add 6 fluid oz. of clean refrigeration oil to the original or new service replacement compressor, 7 fluid oz. to a repaired compressor.

If the oil contains chips or other foreign material, replace the receiver-drier and flush or replace all component parts as necessary. Add the full specified volume of new refrigeration oil to the system.

E. Add additional oil in the following amounts for any system components being replaced.

Evaporator..... 3 fluid oz.

Condenser..... 1 fluid oz.

Receiver-Drier..... 1 fluid oz.

CAUTION: When adding oil to the compressor, it will be necessary to tilt the rear end of the compressor up so that the oil will not run out of the suction and discharge ports. Do not set the compressor on the shaft end.

12. COMPRESSOR OIL

Special refrigeration lubricant should be used in the system. This oil is as free from moisture and contaminants as it is possible to attain by human processes. This condition should be preserved by immediately capping the bottle when not in use.

12. COMPRESSOR OIL - (CONT'D.)

Due to the porosity of the refrigerant hoses and connections, the system refrigerant level will show a definite drop after a period of time. Since the compressor oil is carried throughout the entire system mixed with the refrigerant, a low refrigerant level will cause a dangerous lack of lubrication. Therefore the refrigerant charge in the system has a definite tie-in with the amount of oil found in the compressor and an insufficient charge may eventually lead to an oil build-up in the evaporator.

13. GOOD HABITS AND SAFETY FACTORS

A. DO NOT loosen fittings or clamps while system is under pressure.

B. DO NOT try to check oil level in compressor while system is under pressure with engine running.

C. DO NOT leave open fittings and hoses exposed. Cap off to eliminate contamination.

D. DO NOT over-charge air conditioning system. Could damage compressor reed valves.

E. DO NOT service air conditioning units without using Manifold Gauge Set and hoses also suitable eye protection.

F. DO NOT use Halide's propane leak detector inside of vehicle, unless doors are open.

G. DO NOT assemble fittings, hoses, shaft seals, without spraying first with refrigerant oil.

H. DO NOT try to replace shaft seal or clutch assembly without using proper air conditioning tools.

I. DO NOT remove caps, seals or plugs from new replacement parts, until ready to install.

J. DO NOT store R-12 where temperature is above 120 degrees fahrenheit.

13. GOOD HABITS AND SAFETY FACTORS - (CONT'D.)

TEMPERATURE - PRESSURE RELATION
Refrigerant R-12

Fahrenheit	PSI	Fahrenheit	PSI
-20	0.6	65	63.8
-15	2.4	70	70.2
-10	4.5	75	77.0
- 5	6.7	80	84.2
0	9.2	85	91.8
5	11.8	90	99.8
10	14.6	95	108.3
15	17.7	100	117.2
20	21.0	105	126.6
25	24.6	110	136.4
30	28.5	115	146.8
35	32.6	120	157.7
40	37.0	125	169.1
45	41.7	130	181.0
50	46.7	135	193.5
55	52.0	140	206.6
60	57.7	145	220.3

14. HELPFUL HINTS FOR EFFICIENT OPERATION OF THE AIR CONDITIONING SYSTEM

A. Keep a window open ½ inch to permit air to circulate while air conditioner is operating.

B. Run the unit a few minutes every week in the winter to lubricate compressor seals.

C. Turn off unit when vehicle engine is idling for extended periods.

D. If unit stops putting out cold air, turn it off immediately as it might burn up the compressor.

E. Check drive belt frequently, as loose belts strain clutch bearing and cause noise problems.

F. Do not use a bug screen on the radiator, but keep condenser free of bugs and debris.

15. INSPECTION AND PERIODIC SERVICE OF THE AIR CONDITIONING SYSTEM

6000 Mile Inspection

A. Be sure engine exhaust is suitably ventilated.

B. With controls positioned for operation of the system,

15. INSPECTION AND PERIODIC SERVICE - (CONT'D.)

6000 Mile Inspection - (Cont'd.)

start engine and operate the unit for five minutes at fast idle speed. Observe the clutch pulley bolt to see that the compressor is operating at the same speed as the clutch pulley. Any speed variation indicates clutch slippage.

C. Before turning off the engine, check the sight glass to see that the unit has a sufficient refrigerant charge. The glass should be clear, although during milder weather it may show traces of bubbles. Foam in the flow indicates a low charge. No liquid visible and no temperature differential between compressor inlet and outlet lines, indicates no charge in the air conditioning system.

D. Check unit for any indication of a refrigerant leak.

E. If there is an indication of an oil leak, check the compressor for proper oil charge. NOTE: A slight amount of oil leakage at the compressor front seal is considered normal.

F. Tighten the compressor brace and support bolts and check the belt tension.

G. Inspect condenser regularly to be sure that the fins are not plugged with leaves or other foreign material.

H. Check evaporator drain tubes regularly for dirt or restrictions.

I. At least once a year, check the system for proper refrigerant charge and the flexible hoses for brittleness, wear or leaks.

J. Check the system controls for proper operation.

Acknowledgement

Murray Corporation (Gold Seal)
Cockeysville, Maryland 21030

Satisfactory service requires proper tools. Refer to the current Murray Corporation Gold Seal Air Conditioning Parts Catalog, or equivalent, for complete line of tools, equipment, and supplies.