



ZEE Systems, Inc.

SERVICE LETTER 55M-1

I. PLANNING INFORMATION

- A. Effectivity: ZEE Systems, Inc. Air Conditioning Module SZ55M-Series.
- B. Reason: Provide refrigerant charging instructions for the SZ55M Air Conditioning Module.
- C. Description: Servicing of the module is done in 3 phases, 1) Evacuation, 2) Static Charge, and 3) Running Charge.
- D. Compliance: Compliance is mandatory.
- E. Manpower: The following is an estimated time only. Facility, knowledge, experience, equipment and ambient conditions will effect these estimates: 1) Remove Panels: 0.5hrs, 2) Recover refrigerant: 2.0hrs, 3) Evacuation 4.5hrs, 4) Static Charge: 0.5hrs, 5) Running Charge: 1-4hrs, 2) Panel installation 0.5hrs. This estimate does not include equipment set up and any other service, maintenance or repairs that may be required.
- F. Material cost and availability: Operator to provide all cost.
- G. Tools and Materials:
 1. The following special tools are required to perform the maintenance described in this Service Letter.

ITEM	SOURCE
Leak Detector, for HFC-134a	Commercially Available.
Power Supply capable of 28VDC, 150 Amps	Commercially Available.
Refrigerant Recovery/Recycle equipment Meeting SAE J1990 or J2209 specifications.	Commercially Available.
Manifold Gauge Set, R-134a, with automotive service connections.	Commercially Available.
Refrigeration Vacuum Pump.	Commercially Available.
Scale with 0.1 lb. increments (minimum). Scale with 10 gram increments acceptable Scale with .01 kilogram increments acceptable	Commercially Available.
Thermometer	Commercially Available.

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2. The following material may be required to perform maintenance described in this manual.

ITEM	SOURCE
Refrigerant, HFC-134a	Commercially Available.
Lubricant, Refrigeration (HFC-134a) Lubrizol 2916 Castrol SW100, Icematic Alternate P/N:431756C any Poloyl Ester (P.O.E.) refrigerant oil with ISO of 68 to100.	Commercially Available.

H. Weight and Balance: Compliance with this Service Letter does not effect previous calculations.

I. Electrical Load Data: Compliance with this Service Letter does not effect previous calculations.

J. References: Not applicable.

II. ACCOMPLISHMENT INSTRUCTIONS

NOTE 1: NEVER INVERT THE REFRIGERANT BOTTLE WHEN SERVICING OR CHARGING THE SYSTEM. LIQUID REFRIGERANT WILL DAMAGE THE COMPRESSOR.

NOTE 2: ANYTIME THE SYSTEM HAS BEEN OPEN TO AMBIENT CONDITIONS OR YOU SUSPECT THE SYSTEM HAS BEEN CONTAMINATED WITH AIR OR MOISTURE REPLACE THE RECEIVER-DRYER BEFORE YOU EVACUATE THE SYSTEM.

NOTE 3: USE ONLY VIRGIN REFRIGERANT IN THIS SYSTEM. DO NOT RETURN REMOVED REFRIGERANT TO THIS SYSTEM.

NOTE 4: DO NOT ADD OIL WITH THE REFRIGERANT. ONLY ADD OIL TO THE CRANKCASE OF THE COMPRESSOR. THE SYSTEM MUST BE DISCHARGED TO ADD OIL.

NOTE 5: "TOPPING OFF" OF THE SYSTEM MAY BE DONE USING STEPS C.,1, C.,2, C.,3, C.,4 AND C.,6.

NOTE 6: WITH R-134a REFRIGERANT THE BUBBLES DO NOT CLEAR IN THE SIGHT GLASS LIKE R-12. DO NOT ATTEMP TO USE THIS METHOD TO DETERMINE IF THE SYSTEM IS ADEQUATELY CHARGED.

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A. EVACUATION

1. Attach the manifold gauges to the 1) Vacuum pump (yellow hose), 2) discharge (high side) service port (red hose), 3) the suction (low side) service port (blue hose). Make sure all valves are closed.
2. Pull a deep vacuum for at least 4 hours. Follow the vacuum pump manufacturer recommendations and procedures for pump operation.
 - a. When the vacuum pump is running open the 1) valve on the yellow hose (if it has one) to the vacuum pump, 2) high side (red) valve on the manifold gauges and 3) low side (blue) valve on the manifold gauges.
 - b. After 30 minutes of evacuation close the high side (red) valve on the manifold gauges and the low side (blue) valve on the manifold gauges. Note the vacuum reading. The needle should not move on either gauge. Wait 5 minutes and check the readings, the vacuum reading should not move toward zero. **DO NOT** turn off the pump.
 1. If the needle has moved toward zero there is a leak in the system. Stop the procedure and repair all leaks. After all leaks have been repaired start the evacuation procedure over with Step 1.
 2. If the needle did not move open the valves and continue with the evacuation.
 - c. Continue to evacuate for at least 3.5 hours after Step 2., b. **NOTE: *BEFORE*** you turn off the vacuum pump close all valves (red and blue on the gauge set and any on the yellow hose)

B. STATIC CHARGE

1. Attach the manifold gauges to the 1) refrigerant bottle (yellow hose), 2) discharge (high side) service port (red hose), 3) the suction (low side) service port (blue hose). Make sure all valves are closed.
2. Bleed the hose (yellow) from the refrigerant bottle to the manifold gauge set to remove all air. Place the refrigerant bottle on the scale.
3. Weigh the refrigerant bottle.
4. The system OFF. Introduce a static charge into the system. **NEVER LIQUID CHARGE THE SYSTEM.**
 - a. Open the valve on the refrigerant bottle.
 - b. Open high side valve (red) on the manifold gauge set.
 - c. Open the low side valve (blue) on the manifold gauge set.

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- d. Continue to introduce refrigerant until both the high side and low side gauges stabilize and are reading the same OR the target weight of 1Lb-7oz. (.65kg) of refrigerant has been achieved.
- e. Close both the high side and low side valves on the manifold gauge set.

C. RUNNING CHARGE

1. Place the thermometer so you are reading the temperature of the air as it enters the condensing coil (just before the fan blades).
2. Turn the system ON. Record the temperature of the air entering the condensing coil.
3. Add 30°F (16.7°C) to the temperature reading for the target condensing temperature.

EXAMPLE 1: (air temp entering coil 87F) $87 + 30 = 117\text{F}$
(air temp entering coil 30.6C) $30.6 + 16.7 = 47.3\text{C}$

4. Using the Temp-Press Chart (See TABLE 1) read the corresponding (R-134a) pressure for temperature calculated.

EXAMPLE 2: 117°F=>163 psig.

5. Charge the system.
 - a. Slowly open the low side (blue) valve on the manifold gauge set until the low side maximum reading is 40 psig. NOTE: NEVER OPEN THE HIGH SIDE VALVE WHILE THE SYSTEM IS RUNNING.
 - b. Continue to charge until you reach the target weight if 1Lb. -7oz. (.65kg). When the target weight is achieved close all valves.
6. METHOD TO DETERMINE ALTERNATE TARGET WEIGHT: Continue to charge until you get a discharge (high side) reading that matches the calculated condensing temperature (see Steps 1, 2, 3, 4 and Example 1 and Example 2). The Suction (low side) should be 33 psig \pm 5 psig.
 - a. Slowly open the low side (blue) valve on the manifold gauge set until the low side maximum reading is 40 psig. NOTE: NEVER OPEN THE HIGH SIDE VALVE WHILE THE SYSTEM IS RUNNING.
 - b. Continue to charge until you reach the calculated discharge (high side) pressure. When the target pressure is achieved close all valves.
 - c. When charging is complete weigh the bottle and determine weight of the refrigerant charge. (Starting weight)-(end weight)= (total charge weight) This would be your alternate target weight for a dry system.

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TEMPERATURE - PRESSURE CHART

TEMP		PRESSURE (PSIG)		TEMP		PRESSURE (PSIG)	
F°	C°	R-12	R-134a	F°	C°	R-12	R-134a
50	10	46.7	45.5	100	37.8	117.2	124.3
52		48.8	47.7	102		120.9	128.5
54		51.0	50.1	104		124.7	132.9
56		53.2	52.3	106		128.5	137.3
58		55.4	55.0	108		132.4	142.8
60	15.6	57.7	57.5	110	43.3	136.4	146.5
62		60.1	60.1	112		140.5	151.3
64		62.5	62.7	114		144.7	156.1
66		65.0	65.5	116		148.9	161.1
68		67.6	68.6	118		153.2	166.1
70	21.1	70.2	71.2	120	48.9	157.7	171.3
72		72.9	74.2	122		162.2	176.6
74		75.6	77.2	124		166.7	182.0
76		78.4	80.3	126		171.4	187.5
78		81.3	83.5	128		176.2	193.1
80	26.7	84.2	86.8	130	54.4	181.0	198.9
82		87.2	90.2	132		185.9	204.7
84		90.2	93.6	134		191.0	210.7
86		93.3	97.1	136		196.1	216.8
88		96.5	100.7	138		201.3	223.0
90	32.2	99.8	104.4	140	60	206.6	229.4
92		103.1	108.2	142		212.0	235.8
94		106.5	112.1	144		217.5	242.4
96		110.0	116.1	146		223.1	249.2
98		113.5	120.1	148		228.8	256.0
				150	65.6	234.6	263.0

TABLE 1.