

TECHNICAL MANUAL

**OPERATOR'S, UNIT, DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE MANUAL**

**AIR CONDITIONER, COMPACT, VERTICAL
208-VOLT, 3 PHASE, 60,000 BTU/HR
50/60 HERTZ**

**KECO MODEL F60T-2
NSN 4120-00-935-5416 (EIC: VTN)**

**HARVEY W. HOTTEL, INC.
MODEL CV 60-6/6-08
NSN 4120-00-935-5416**

**KECO MODEL F60T-2A
NSN 4120-01-181-6060**

**UNIFAB INDUSTRIES, MODEL CV-60-5/6-08
NSN 4120-01-213-5980**

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

- This manual supersedes TM 5-4120-357-14, dated 9 May 1980.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
31 August 1993**

Technical Manual }
 No. 9-4120-357-14 }

HEADQUARTERS
 DEPARTMENT OF THE ARMY
 WASHINGTON, D.C., 31 August 1993

**OPERATOR'S, UNIT, DIRECT SUPPORT
 AND GENERAL SUPPORT MAINTENANCE MANUAL
 AIR CONDITIONER, COMPACT, VERTICAL
 208-VOLT, 3 PHASE, 60,000 BTU/HR
 50/60 HERTZ
 KECO MODEL F60T-2
 NSN 4120-00-935-5416
 HARVEY W. HOTTEL, INC.
 MODEL CV 60-6/6-08
 NSN 4120-00-935-5416
 KECO MODEL F60T-2A
 NSN 4120-01-181-6060
 UNIFAB INDUSTRIES, MODEL CV-60-5/6-08
 NSN 4120-01-213-5980**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

Table of Contents

		Page
CHAPTER	1.	INTRODUCTION
Section	I.	General Information1-1
	II.	Equipment Description1-1
	III.	Technical Principles of Operation1-6
CHAPTER	2.	OPERATING INSTRUCTIONS
Section	I.	Description and Use of Operator's Controls and Indicators2-1
	II.	Preventive Maintenance Checks and Services2-5
	III.	Operation under Usual Conditions2-7
	IV.	Operation under Unusual Conditions2-10
CHAPTER	3.	OPERATOR MAINTENANCE INSTRUCTIONS
Section	I.	Lubrication Instructions3-1
	II.	Troubleshooting3-1
CHAPTER	4.	UNIT MAINTENANCE INSTRUCTIONS
Section	I.	Service upon Receipt of Material4-1
	II.	Movement to a New Worksite4-2
	III.	Repair Parts, Special Tools and Equipment4-3
	IV.	Lubrication Instructions4-3
	V.	Preventive Maintenance Checks and Services4-3
	VI.	Troubleshooting4-7

* This manual supersedes TM 5-4120-357-14, dated 9 May 1980.

		Page
	VII.	Radio Interference Suppression4-15
	VIII.	Maintenance of Covers, Grilles and Filters4-19
	IX.	Maintenance of Control Panel and Junction Box4-35
	X.	Maintenance of Compressor Assembly.....4-42
	XI.	Maintenance of Pressure Cutout Switches4-43
	XII.	Maintenance of Refrigeration Components.....4-43
	XIII.	Maintenance of Heater Assembly4-46
	XIV.	Maintenance of Fans and Motors.....4-48
	XV.	Maintenance of Wiring Harnesses.....4-56
CHAPTER	5.	DIRECT SUPPORT MAINTENANCE INSTRUCTIONS
Section	I.	Repair Parts, Special Tools and Equipment5-1
	II.	Troubleshooting5-1
	III.	General Refrigeration System Maintenance5-7
	IV.	Removal and Installation of Major Components and Assemblies5-13
CHAPTER	6.	GENERAL SUPPORT MAINTENANCE INSTRUCTIONS
APPENDIX	A.	ReferencesA-1
APPENDIX	B.	Maintenance Allocation Chart.....B-1
APPENDIX	C.	Expendable/Durable Supplies and Materials ListC-1
	IndexIndex-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Air Conditioner, Front View (with shipping dimensions)	1-2
1-2	Location of Major Components - Front (junction box removed)	1-3
1-3	Location of Major Components - Rear	1-4
1-4	Location of Major Components - Top	1-5
1-5	Refrigeration Diagram	1-7
2-1	Control Panel	2-2
2-2	Mounting Details.....	2-8
2-3	Decal and Instruction Plates	2-11
4-1	Junction Box (cover removed).....	4-17
4-2	Interference Suppression Components	4-18
4-3	Junction Box, External Components.....	4-24
4-4	Condenser Fan and Motor.....	4-25
4-5	Rear Covers, Door and Guard.....	4-27
4-6	Fresh Air Intake and Damper.....	4-29
4-7	Evaporator Section.....	4-32
4-8	Block-off Assembly	4-34
4-9	Control Panel Assembly	4-36
4-10	Junction Box, Internal Components	4-40
4-11	Junction Box Wiring Diagram	4-41
4-12	Compressor Section.....	4-44
4-13	Typical Solenoid Valve.....	4-47
4-14	Heater Section	4-49
4-15	Evaporator Fan Assembly	4-53
4-16	Wiring Diagram	4-58
5-1	Typical Flushing Hook-up	5-11
5-2	Condenser Section	5-16
5-3	Pressure Cutout Switches	5-20
5-4	Typical Expansion Valve	5-51
6-1	Casing and Insulation	6-3

LIST OF TABLES

Table	Title	Page
2-1	Operating Settings.....	2-4
2-2	Preventive Maintenance Checks and Services	2-7
3-1	Troubleshooting	3-1
4-1	Unit Preventive Maintenance Checks and Services.....	4-4
4-2	Troubleshooting	4-8
4-3	Switch Positions	4-37
4-4	Wire List	4-60
5-1	Troubleshooting	5-2
5-2	Normal Operating Pressures	5-13
5-3	Pressure-Temperature Relationship of Saturated Refrigerant-22.....	5-52

**CHAPTER 1
INTRODUCTION**

Section I. GENERAL INFORMATION

1-1. Scope.

This manual is issued for the use of personnel who have the responsibility for service, operation and maintenance of the Air Conditioner, Compact, Vertical, Model F60T-2 and F60T-2A, manufactured by Keco Industries, Inc., Cincinnati, Ohio; Model CV-60-5/6-08, manufactured by Unifab Industries, Inc., Red Lion, Pennsylvania. Chapters 1 through 3 provide information required for set-up, operation and servicing of the equipment by the operator. Chapter 4 contains detailed maintenance instructions for the use of unit maintenance personnel. Chapters 5 and 6 provide detailed instructions for repair and replacement of components authorized at direct support and general support maintenance levels.

1-2. Purpose.

The air conditioner provides ventilation by either circulating inside air or a mixture of inside and outside air, and is equipped to utilize air passed through a chemical biological-radiological (CBR) filtering system if required. The air conditioner also provides 60,000 Btu/Hr of cooling or 49,000 Btu/Hr heating, both of which are thermostatically controlled to maintain desired comfort levels. During cooling operation, a percentage of dehumidification also occurs, the amount depending upon the degree of humidity present in the atmosphere.

1-3. Special Limitations on Equipment.

The air conditioner is designed to operate at all ambient temperatures between -50°F (-45.6°C) and 120° F (48.9°C) as follows:

	Mode		Temperature
		Min.	Max
A.	Heating	-50°F(-45.6°C)	90°F(32.2°C)
B.	Cooling	0°F(-17.8°C)	120°F(48.9°C)

This does not necessarily mean that a desirable comfort level can be maintained at extreme temperatures, since the comfort level is dependent upon the heat loss or heat gain of the space to be heated or cooled, and upon whether such heat loss or gain is within the capacity of the air conditioner to supply. When the air conditioner is stopped while in the cooling mode, a period of one minute should be allowed to elapse before attempting to re-start. This period will permit pressures to equalize so that the compressor will not encounter high head-pressures.

1-4. Maintenance Forms and Records.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS).

1-5. Reporting Equipment Improvement Recommendations.

Equipment Improvement Recommendations (EIR's) can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, just simply tell why the design is unfavorable or why a procedure is difficult. EIR's may be submitted on SF 368. Mail directly to AMSAT-I-MDO, U.S. Army Aviation and Troop Command, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

1-6. Difference Between Models.

There is no difference between Keco Model F60T-2, F60T-2A and Unifab Industries, Model CV-60-5/6-08.

Section II. EQUIPMENT DESCRIPTION

1-7. Equipment Purpose, Capabilities and Features.

The purpose of the air conditioner is to ventilate, heat, or cool the air in an enclosure, and to provide a comfortable environment for personnel occupying the enclosure. (See Figures 1-1 through 1-4). The unit may

also be utilized to maintain a constant temperature for heat producing equipment such as electrical or electronic apparatus, biological or chemical specimens, and other controlled atmospheres. The modes of operation and the thermostatically controlled temperature are set by a rotary switch and a thermostat mounted on a small control panel in the lower front area of the unit. Controlled amounts of outside air may be mixed into the return air to provide freshness, and delivered air can be ducted to remote spaces, using standard duct work, if required. The control panel of the unit may also be placed in a remote location, if desired.

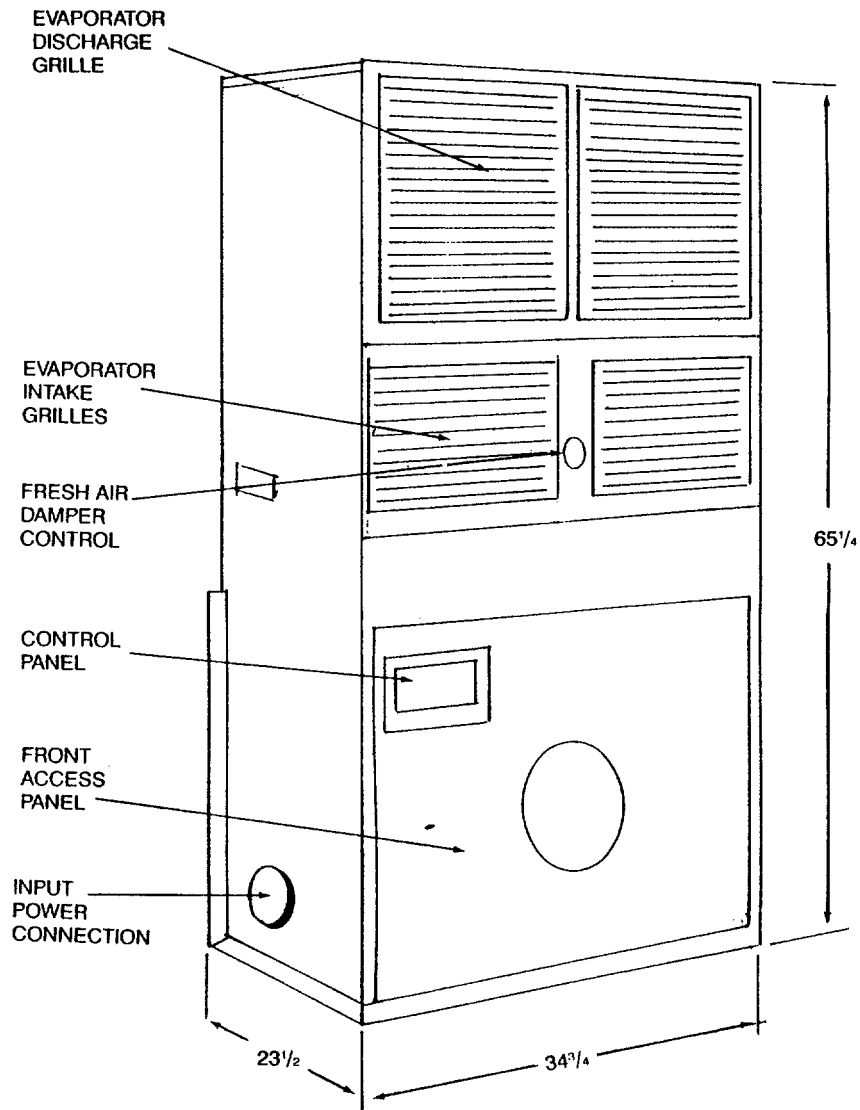


Figure 1-1. Air Conditioner, Front View
(With Shipping Dimensions)

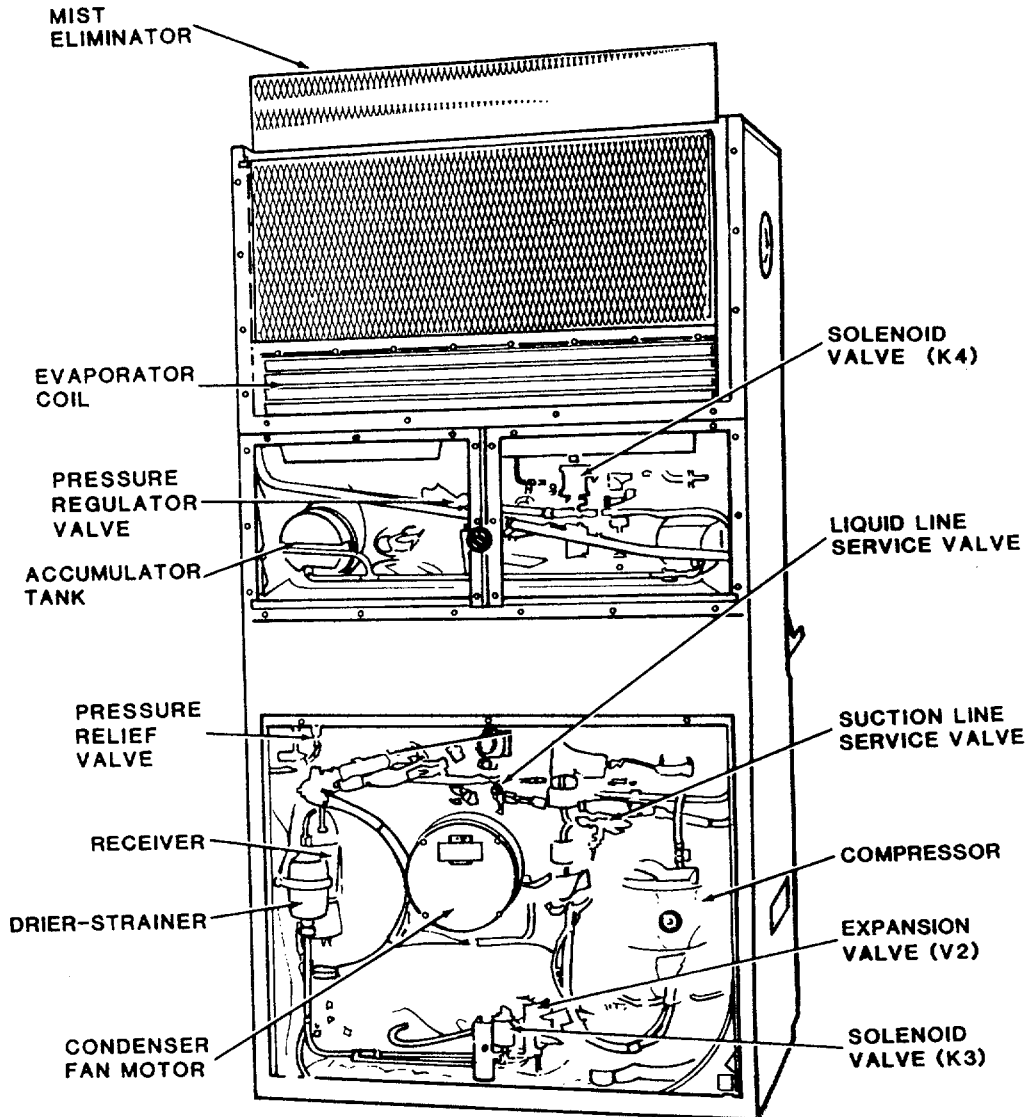


Figure 1-2. Location Major Components (Front)