

N62470-88-3620

M-420-422

E. R. Taylor & Assoc.

Operation/Maint Manuals



M 100 J- ps-5

C & S MECHANICAL INC.

P.O. BOX 3528

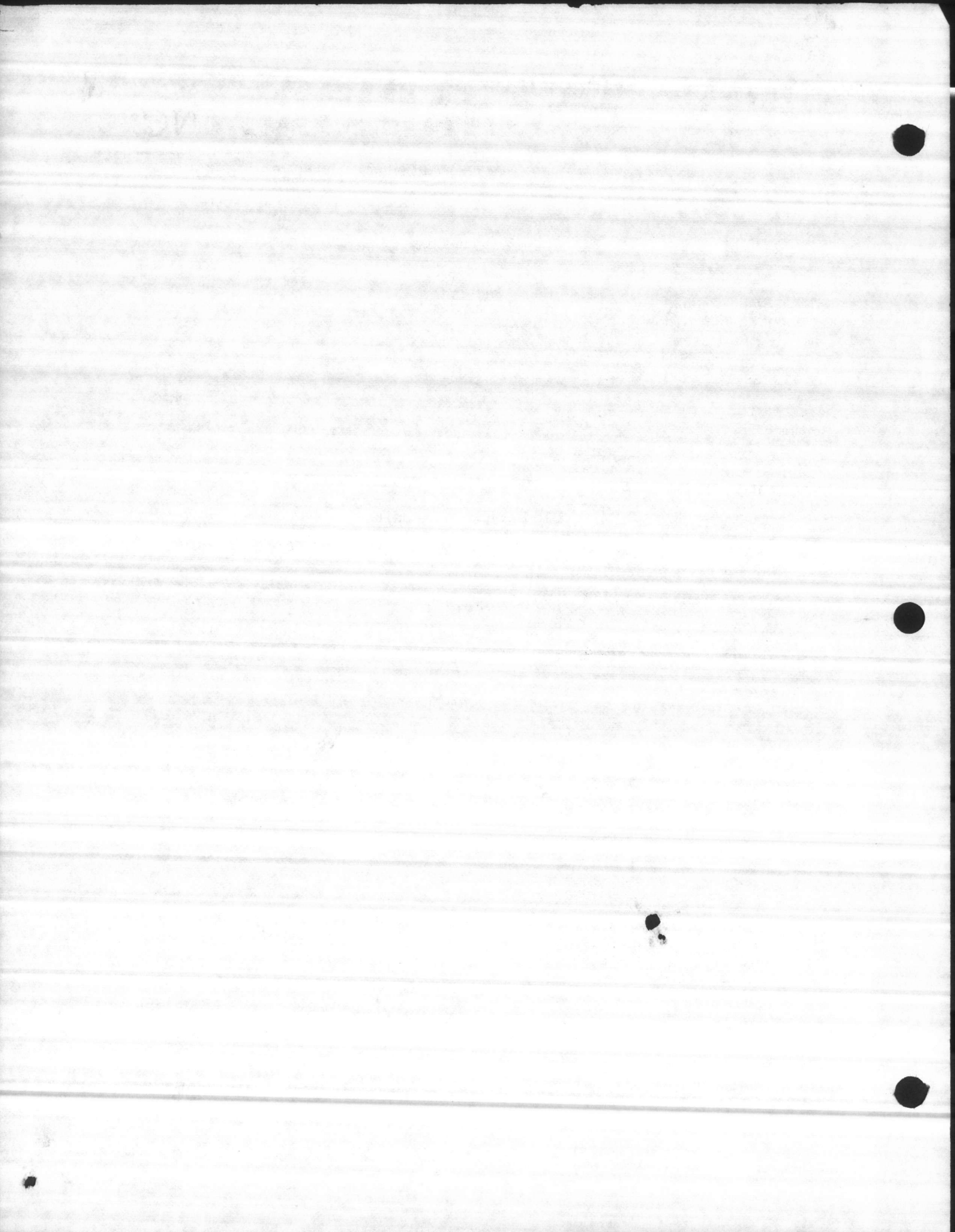
KINSTON, NORTH CAROLINA

919-527-6061

MAINTENANCE & OPERATION

N62470-88-C-3620
Renovate Buildings M-420 and M-422
Marine Corps Base
Camp Lejeune, N.C.

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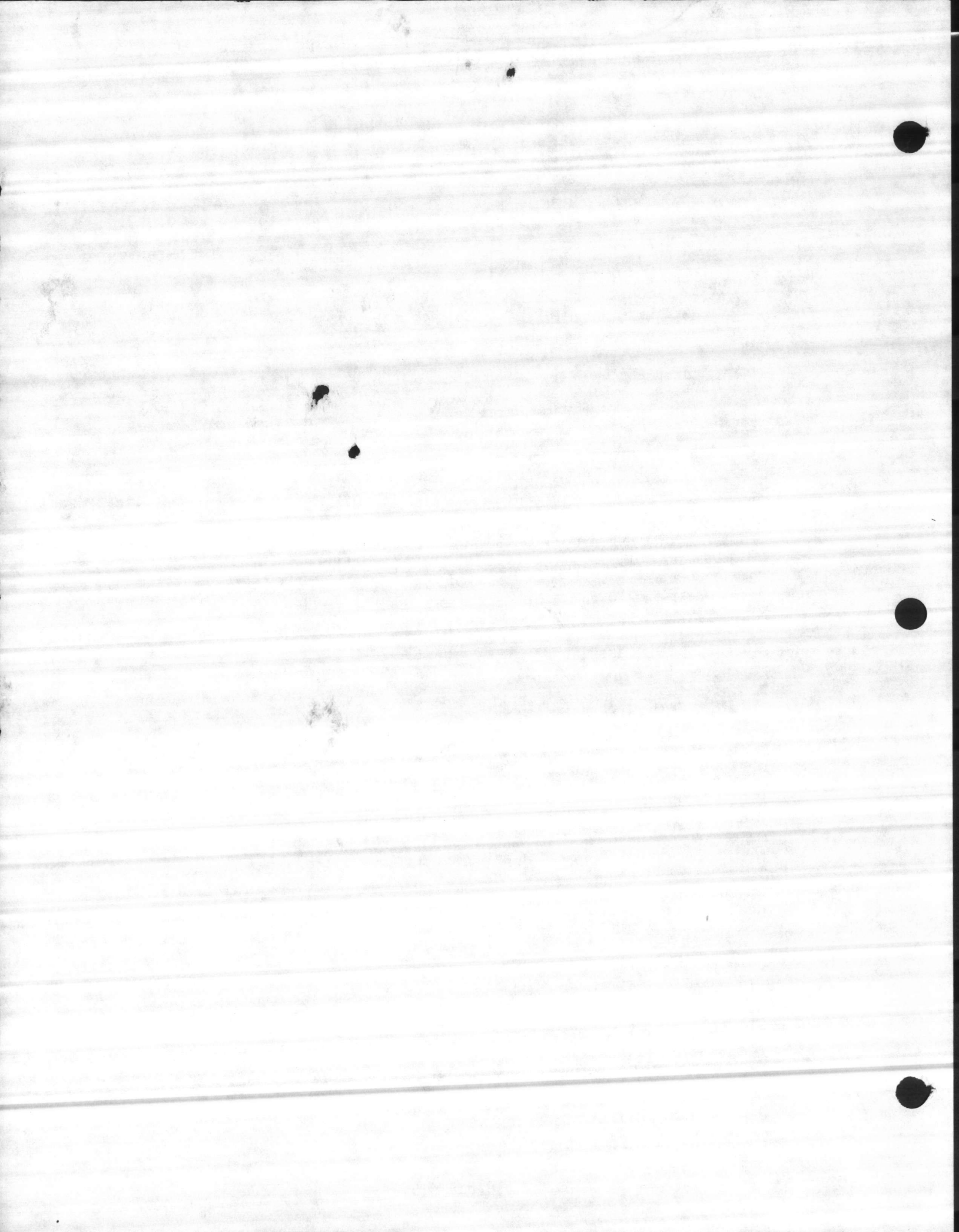


C & S MECHANICAL INC.

P.O. BOX 3528 KINSTON, NORTH CAROLINA 919-527-6061

PARTS SUPPLIERS

1. EBCO Water Cooler
Noland Company919-523-6171
P.O. Box 3069
Kinston, N.C. 28501
ATTN: Larry Elmore
2. Adamson/Old Dominion Fab. Water Heater
Heat Transfer Sales919-876-3846
1305 Millbrook Rd.
Bldg. "C", Suite 24
Raleigh, N.C. 27609
ATTN: Larry Faust - David Swinson
3. Trane Company - Fan Coil Units, AC Units & Air Handlers
Brady/Trane Co., Inc.919-781-0458
5214 Western Blvd.
Raleigh, N.C. 27606
ATTN: John Suggs
4. Greenheck - Exhaust Fans
Hoffman - Hoffman, Inc.919-781-8011
P.O. Box 32258
Raleigh, N.C. 27622
ATTN: Robert Brooks
5. Mueller Pump - Weinman Condensate Pump
Heat Transfer Sales.....919-876-3846
1305 Millbrook Rd.
Bldg. "C", Suite 24
Raleigh, N.C. 27609
ATTN: Larry Faust - David Swinson
6. Spence Engineering Co., Inc. - Steam Pressure Reducing Valve
Heat Transfer Sales919-876-3846
1305 Millbrook Rd.
Bldg. "C", Suite 24
Raleigh, N.C. 27609
ATTN: Larry Faust - David Swinson
7. Controls
Independent Tek, Inc.919-270-9166
P.O. Box 970
Hampstead, N.C. 28443
ATTN: Matt Hoysak
8. Carrier-Fan Coil & Condensing Unit
Thermo Industries
P.O. Box 25309
Raleigh, N.C. 27611
Contact: Percy Barbour Ph. 919-829-0155



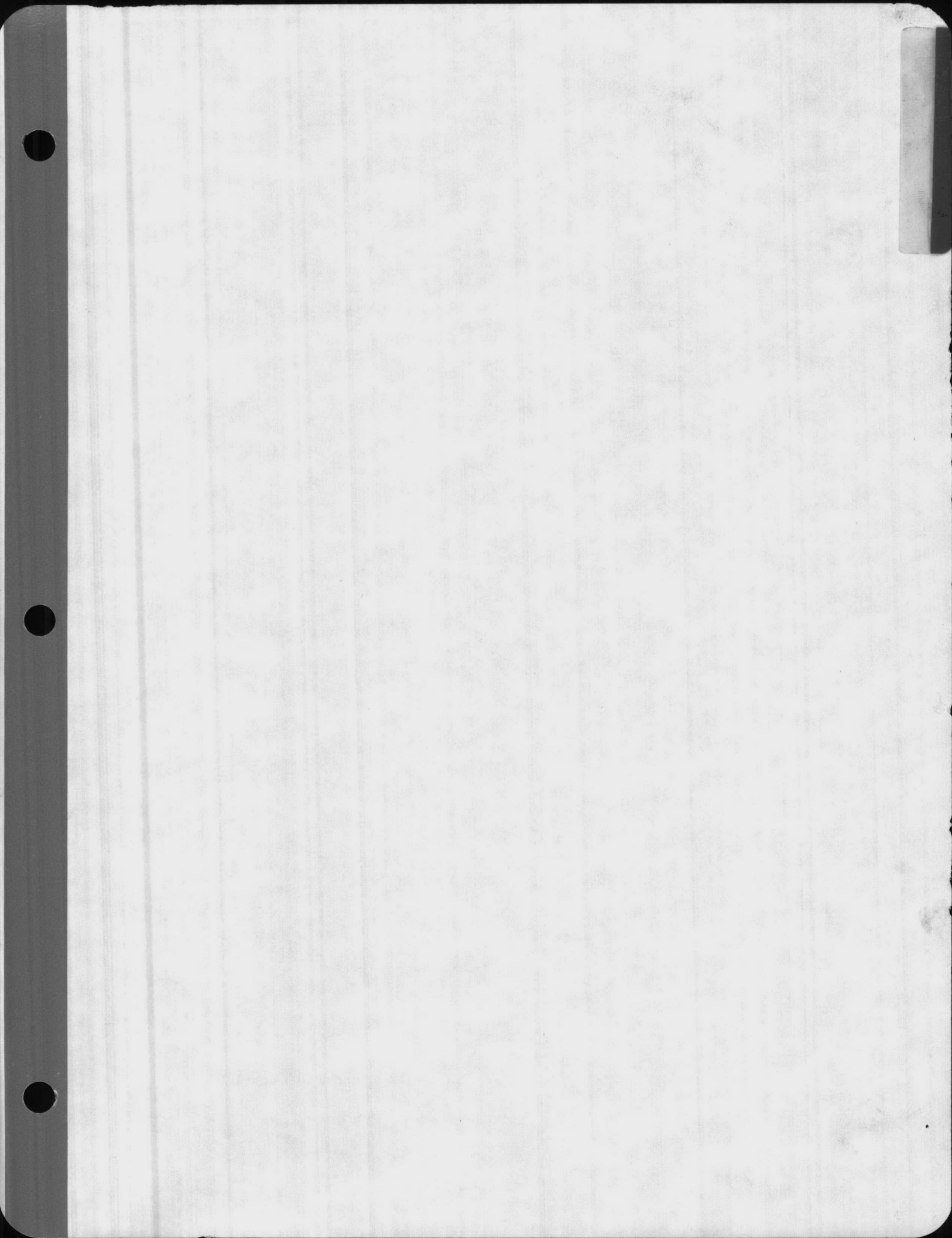
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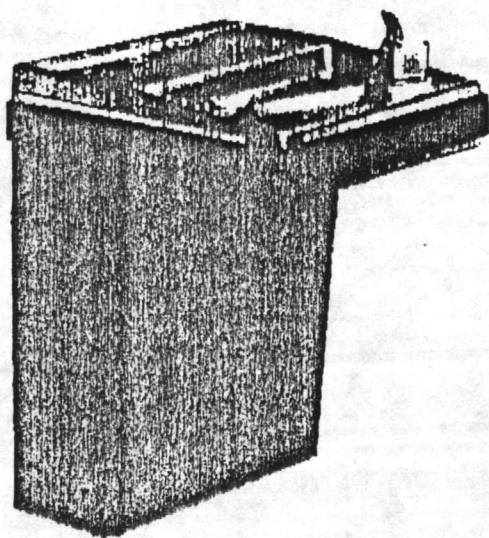


SERVICE INSTRUCTIONS

...with Illustrated Parts Breakdown

EBCO®

**WATER COOLER MODELS:
EP8WM, EP8WM-E, EP8WM-AE,
EP8WM-EQ, WEWCO8, WEWCO8-SG,
WEWCO8-SA AND WEWCO8-SH**



DESCRIPTION

These models are designed for use by the handicapped, are user friendly and provide drinking water cooled to 50° F at 8 gallons per hour. The unit mounts on a wall and requires connections to supply water, electrical power and waste drain.

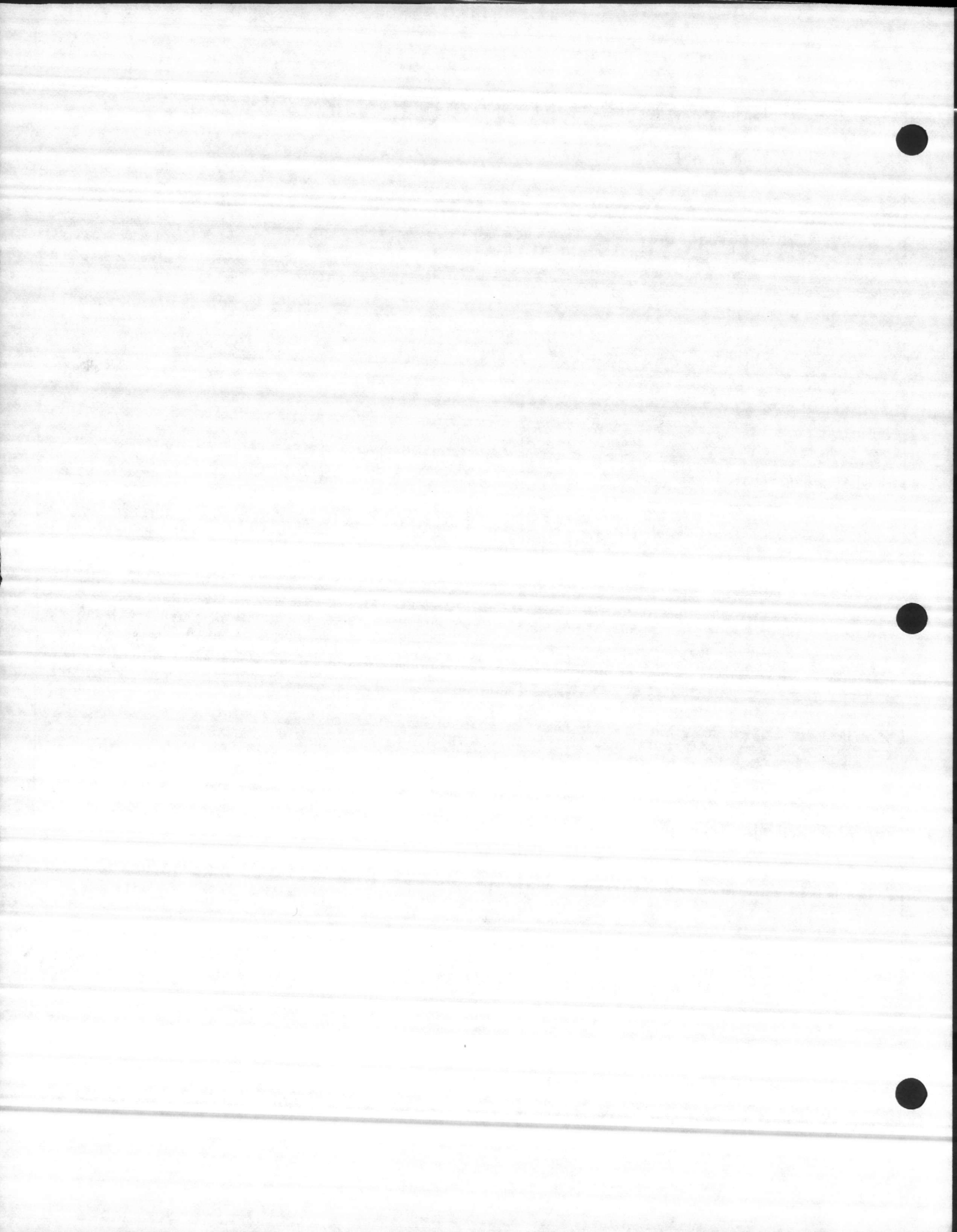
The refrigeration system is hermetically sealed at manufacture and is generally considered to be non-field serviceable. The air-cooled compressor pumps refrigerant through the fan-cooled condenser and a capillary tube (expansion valve) to the cooling tank evaporator. The evaporator is wrapped around the cooling tank for high efficiency.

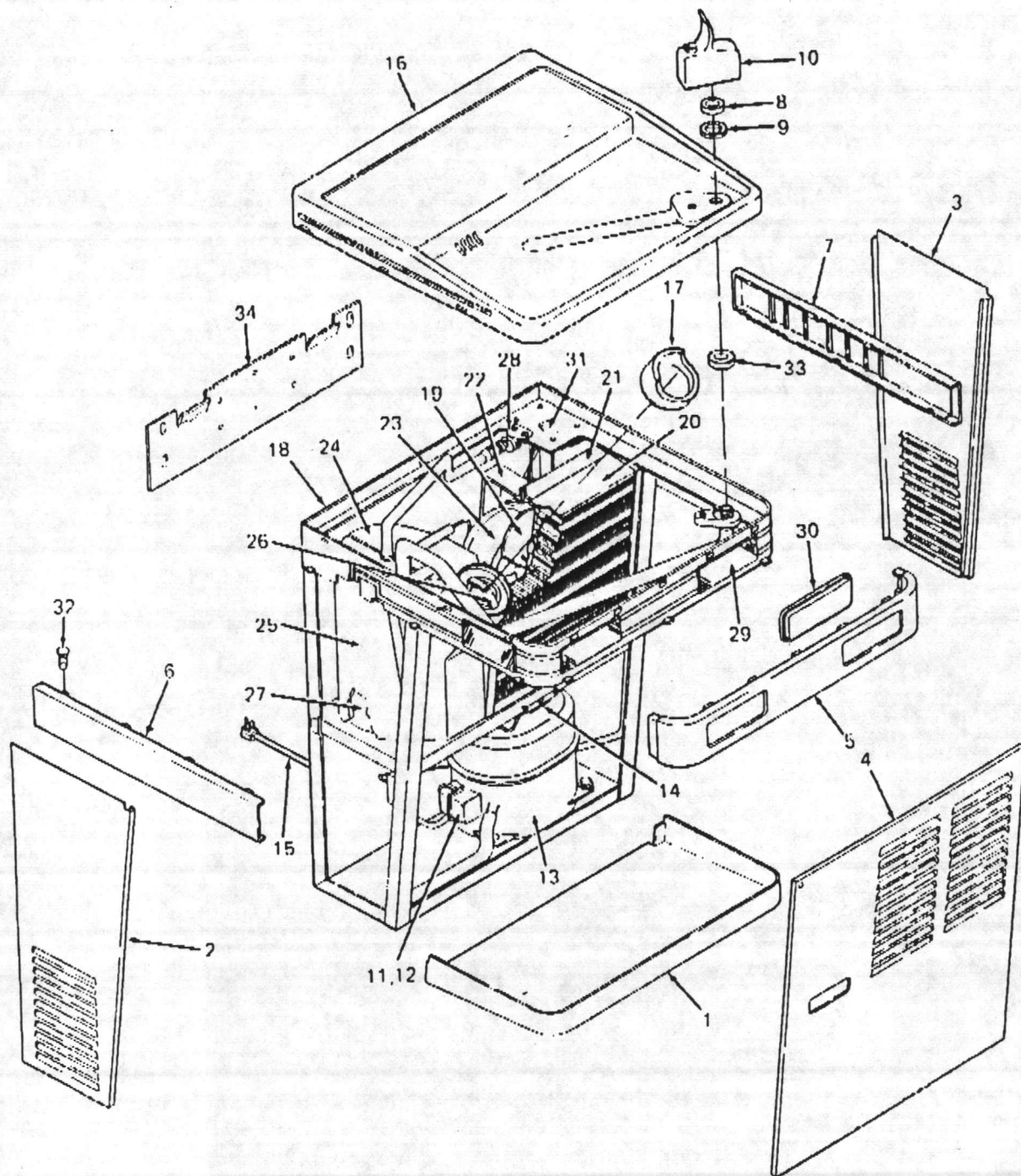
The electrical circuit includes automatic overload protection, and an adjustable cold control for water temperature regulation.

SPECIFICATIONS

Voltage	115 VAC ±10%/1PH/60 Hertz
Size	25" H., 18" W., 19" D.
Shipping Weight (Approx)	60 LBS.
Cold Water Capacity	7.8 GPH
Compressor	1/5 HP
Refrigerant	R-500
Refrigerant Charge	4 OZ.

Specifications subject to change without notice.





EP8WM-EQ/WEWC08-SII uses same parts as
 EP8WM-AE except this cooler takes the
 =026952-002 P.C. Board.

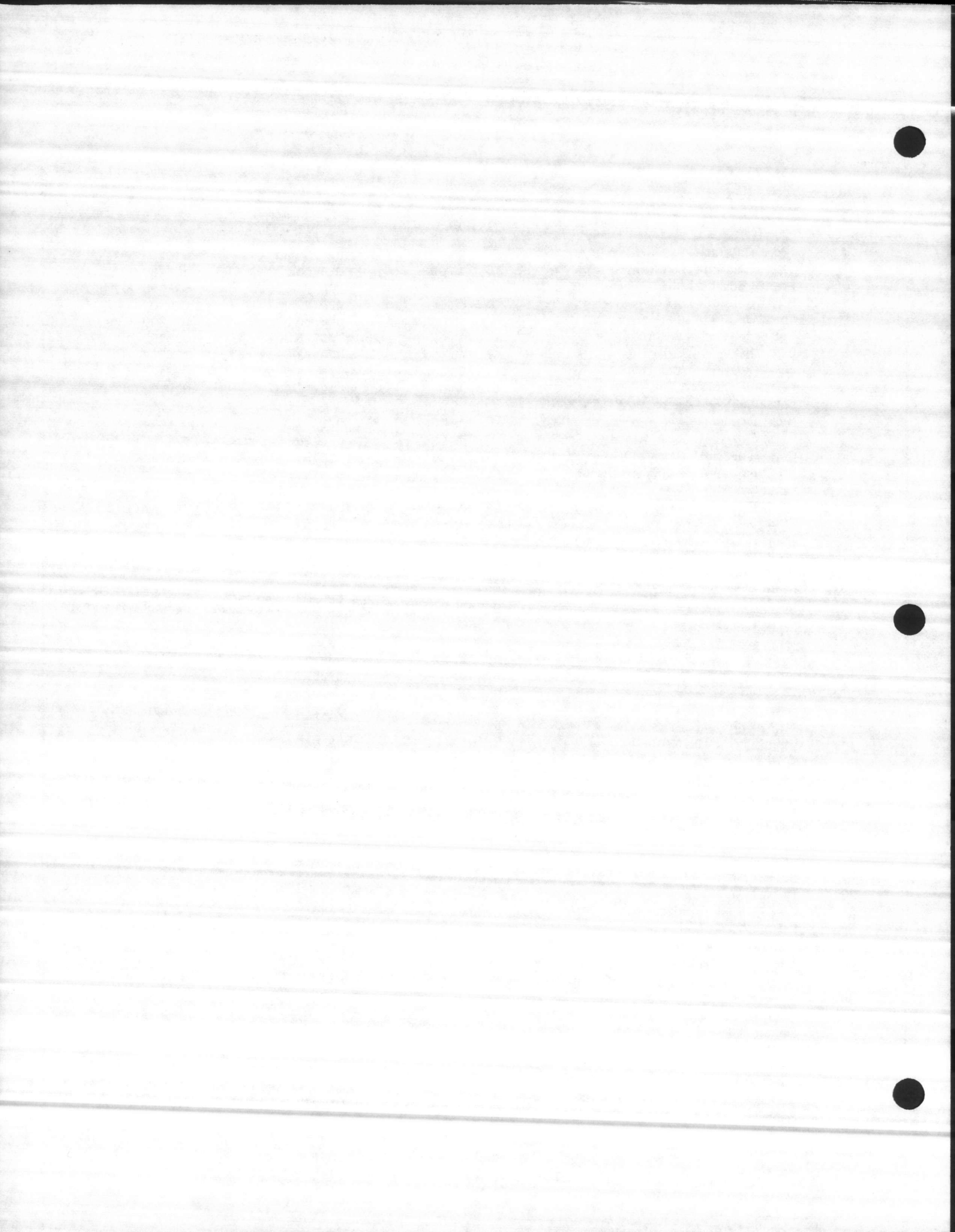


PARTS LIST

ITEM NO.	DESCRIPTION	EP8WM WEWC08	EP8WM-E WEWC08-SG	EP8WM-AE WEWC08-SA
1	Front Housing - Walnut	026780-001	026780-001	026780-001
	Front Housing - Sandstone	026780-002	026780-002	026780-002
	Front Housing - Charcoal	026780-003	026780-003	026780-003
	Front Housing - Stainless Steel	026780-004	026780-004	026780-004
	Front Housing - Beige W/W*	026780-006	026780-006	026780-006
2	Left Side Panel - Walnut	026798-001	026798-001	026798-001
	Left Side Panel - Sandstone	026798-003	026798-003	026798-003
	Left Side Panel - Charcoal	026798-005	026798-005	026798-005
	Left Side Panel - Stainless Steel	026798-007	026798-007	026798-007
	Left Side Panel - Beige W/W*	026798-011	026798-011	026798-011
3	Right Side Panel - Walnut	026798-002	026798-002	026798-002
	Right Side Panel - Sandstone	026798-004	026798-004	026798-004
	Right Side Panel - Charcoal	026798-006	026798-006	026798-006
	Right Side Panel - Stainless Steel	026798-008	026798-008	026798-008
	Right Side Panel - Beige W/W*	026798-012	026798-012	026798-012
4	Front Panel - Walnut	026802-001	026802-001	026802-001
	Front Panel - Sandstone	026802-002	026802-002	026802-002
	Front Panel - Charcoal	026802-003	026802-003	026802-003
	Front Panel - Stainless Steel	026802-004	026802-004	026802-004
	Front Panel - Beige W/W*	026802-006	026802-006	026802-006
5	Front Bezel	026869-002 CLOSED	026869-001 OPEN	026869-001 OPEN
6	Left Side Bezel	026886-003 CLOSED	026886-003 CLOSED	026886-001 OPEN
7	Right Side Bezel	026886-004 CLOSED	026886-004 CLOSED	026886-002 OPEN
8	Valve Body Gasket	008983	008983	008983
9	Friction Washer	009281	009281	009281
10	Valve Assembly	026551-002	026551-006	026551-006
11	Overload	017977	017977	017977
12	Relay	017978	017978	017978
13	Compressor	027256-002	027256-002	027256-002
14	Cold Control Thermostat	027040-007	027040-007	027040-007
15	Cord Assembly	026540-004	026540-004	026540-004
16	Top	026775-001	026775-001	026775-001
17	Waste Gasket	027205	027205	027205
18	Frame Assembly	026976	026976	026976
19	Fan Blade	024033	024033	024033
20	Condenser	026967	026967	026967
21	Fan Shroud	026968	026968	026968
22	Fan Motor Bracket	026969	026969	026969
23	Fan Motor	016490	016490	016490
24	Cooling Tank Insulation (RH)	026950	026950	026950
25	Cooling Tank Insulation (LH)	026951	026951	026951
26	Waste Assembly	026981	026981	026981
27	Cooling Tank and Heat Exchanger Assembly (Insulated)	027085-003	027085-001	027085-001
28	Solenoid Valve . . . . .	...	026985-001	026985-001
29	Membrane Switch . . . . .	...	026987	026987
30	Switch Pad . . . . .	...	026895	026895
31A	PC Board . . . . .	...	026952-002	...
31B	PC Board (Timed) . . . . .	...	...	026952-001
32	Line Head Screw (Size No. 5)	026630-018**	026630-018**	026630-018**
33	Gasket (Under Top)	010545	010545	010545
34	Hanger	016698-002	016698-002	016698-002
Not Shown	Water Inlet Fitting	025813	025813	025813

*W/W White-Westinghouse

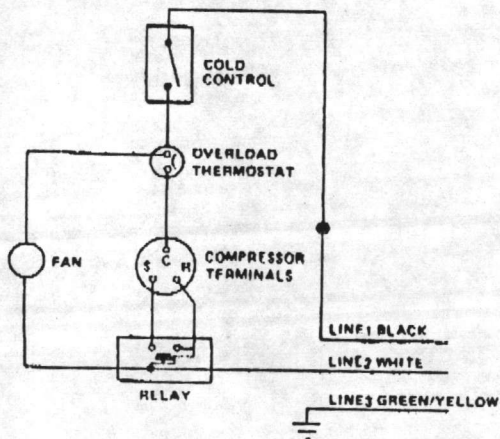
**Use line head screw/driver size DLR2-75, part No. 400261



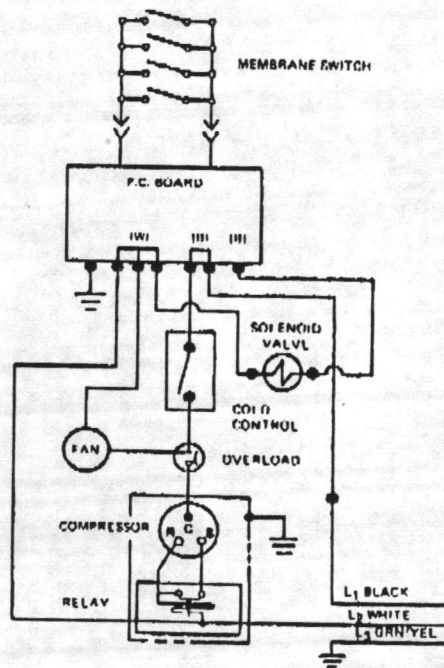
SERVICE CHECK CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Unit not running	No electrical power Defective cold control Defective relay	Check power source Check that cold control is not in off position Replace Replace
Unit running but not cooling	Refrigerant leak or low refrigerant	Add refrigerant
Unit running continuously	Defective cold control Low refrigerant	Replace Add refrigerant

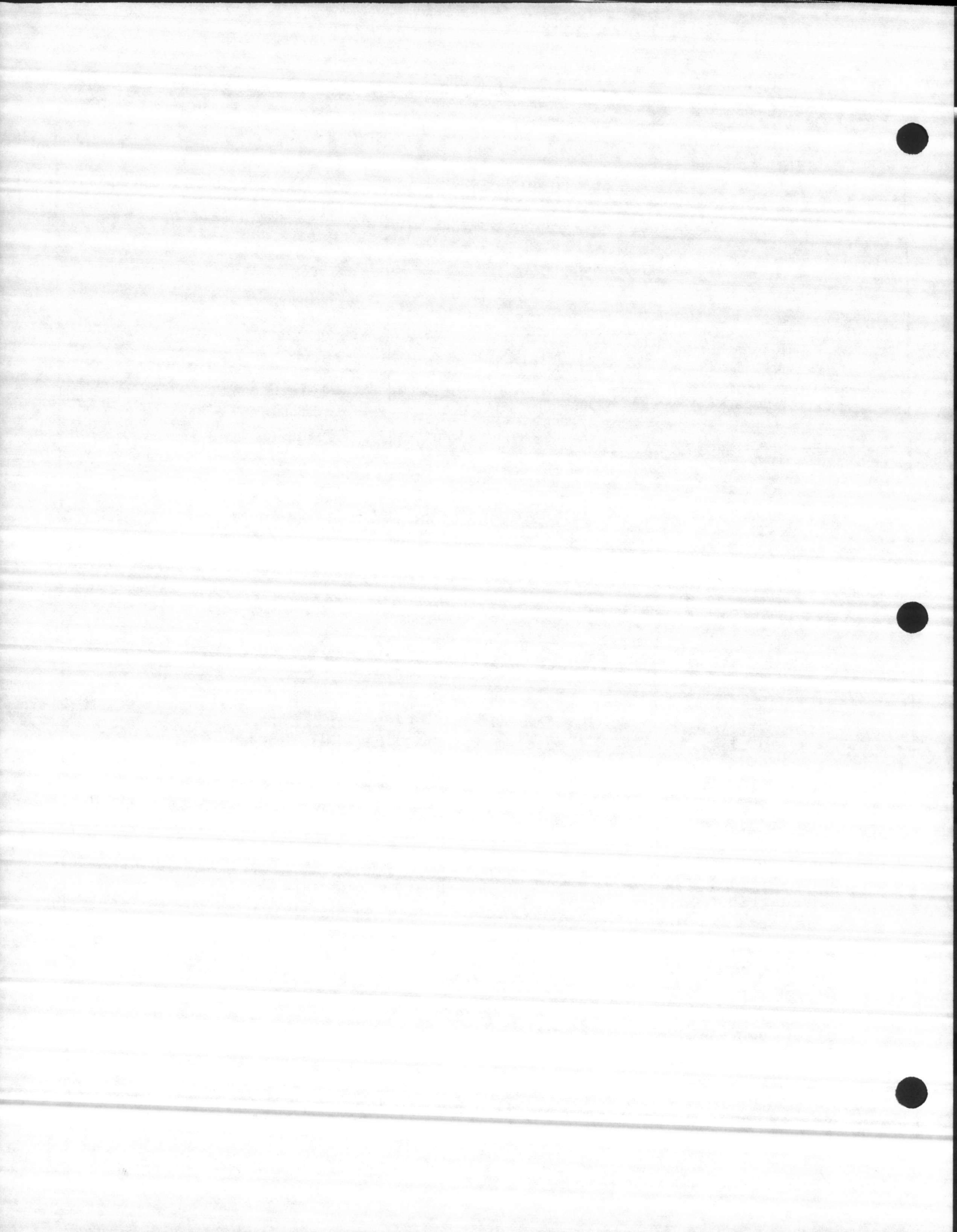
ELECTRICAL DIAGRAM



EP8WM



EP8WM-E, EP8WM-AE



Water Cooler Models

EP8WM-AE, EP8WM-E, EP8WM, EPWM, EP8WM-EQ

INSTRUCTIONS

1. INSPECTION

Inspect the carton and water cooler for evidence of rough handling and concealed damage. Damage claims should be filed with the carrier.

2. MAINTENANCE

The only maintenance operation required is the removal of dirt and lint from the condenser. Inspection should be made at 3 month intervals. Disconnect the power supply cord, then clean the condenser with a small stiff non-wire brush when required. Observance of this procedure will ensure adequate air circulation through the condenser so operation is efficient and economical.

3. OVERLOAD PROTECTION

The compressor motor is equipped with an automatic reset protector which will disconnect the motor from the line in case of an overload.

4. LUBRICATION

This unit is equipped with a hermetically sealed compressor and requires no additional lubrication. The fan motor on this unit seldom needs oiling, but if required, a few drops of SAE 10 oil should be used.

5. TO PUT WATER COOLER INTO SERVICE

- a) Locate and install plumbing and electrical service in accordance with the Roughing-In Drawing.
- b) Install unit on the wall hanger.
- c) Install a trap in the waste line and a shut-off valve in the water supply line. When the unit has an internal waste trap, the trap should be wrapped with insulating tape to prevent sweating.
- d) Use clean $\frac{3}{8}$ " O.D. copper tubing for water supply line. Wrap the male pipe threads with teflon tape. Do not over-tighten. Damage to the cooler may result.
INSTALL SHUT-OFF VALVE AND FLUSH BUILDING WATER SUPPLY LINE BEFORE INSTALLING UNIT.
- e) Rotate the fan blade by hand to see that it is free of obstructions.
- f) Check the available power supply against the water cooler data plate to assure correct electrical service. Plug power supply cord into wall outlet.
- g) To fill the cold water tank, open the shut-off and bubbler valve. Deflect the stream from the bubbler and run water until stream is free of bubbles.

6. TO DISCONTINUE USE OF WATER COOLER

- a) Close water shut-off valve.
- b) Provide container to catch water to be drained.
- c) On mechanical valve model, disconnect the power supply cord. Remove drain plug from tank and open the bubbler valve and glassfiller valve (if any) and drain the cooler.
- d) On pushbutton model, disconnect the water supply line at the shut-off valve and remove the tank drain plug. Actuate and hold-in the pushbutton to open the solenoid valve and completely drain the cooler. Disconnect the power supply cord.
- e) Replace plug when draining is complete.
- f) **ALWAYS DRAIN ALL WATER WHEN FREEZING TEMPERATURES ARE ANTICIPATED AND BEFORE SHIPPING THE WATER COOLER.**

WARNING

The warranty and the Underwriters' Laboratory listing for this machine are automatically voided if this machine is altered, modified, or combined with any other machine or device. Alteration or modification of this machine may cause serious flooding and/or hazardous electrical shock or fire.

Except as set forth herein, the Manufacturer makes no other warranty, guarantee or agreement expressed, implied or statutory, including any implied warranty of merchantability or fitness for a particular purpose.



OASIS®

Wheelchair
Water Coolers

- OEP8WM-AE
- OEP8WM-EQ
- OEP8WM-E
- OEP8WM
- OEPWM

This design is both attractive and user-friendly. The slender, angled cabinet provides plenty of room for wheelchair users, and all users will appreciate the convenience of the electronically activated bubbler valve on three of the models.

Model OEP8WM-AE is the ultimate in automatic cooler convenience. Just tap one of the four membrane switch touch pads lightly. Water runs automatically for 7 seconds; then stops—automatically. No continuous pressing. Just the one light touch by any part of the body and the water flow begins.

Model OEP8WM-EQ is activated by light pressure on any one of its four membrane switch touch pads. Water continues to flow as long as the pressure on the pad is maintained.

Model OEP8WM-E has two touch pads on the front. Water flows from the bubbler as long as pressure is maintained on one of the pads.

Model OEP8WM is activated with a simple twist of the Dial-A-Drink® valve, operated mechanically. (OEPWM is a non-refrigerated version).

SUGGESTED SPECIFICATIONS

Cooler(s) shall deliver at least 7.8 gph of 50°F. water at 80°F. inlet water and 90°F. room temperature.

Bubbler valve shall have built-in pressure regulator for supply pressures from 20 to 125 psi.

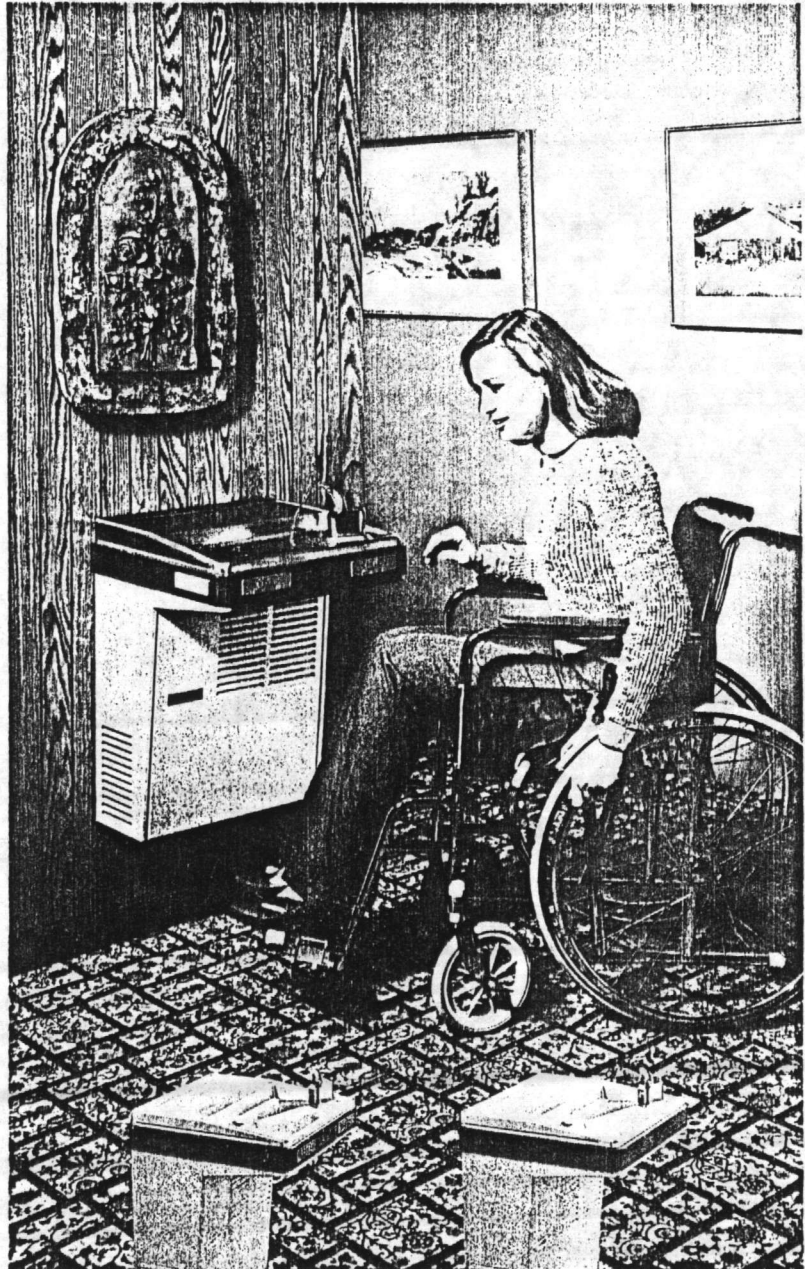
Bubbler shall be electronically controlled and be activated by touch pads for electrically timed period of water flow (OEP8WM-AE)... or by any one of four electronic touch pads (OEP8WM-EQ)... or by either of two electronic touch pads (OEP8WM-E)... or by a Dial-A-Drink® bubbler that is mechanically operated (OEP8WM).

Cooling tank shall be red brass with copper refrigerant coils. Refrigerant flow controlled by capillary tube. Temperature controlled by adjustable thermostat with "Off" position.

All water carrying lines shall be copper.

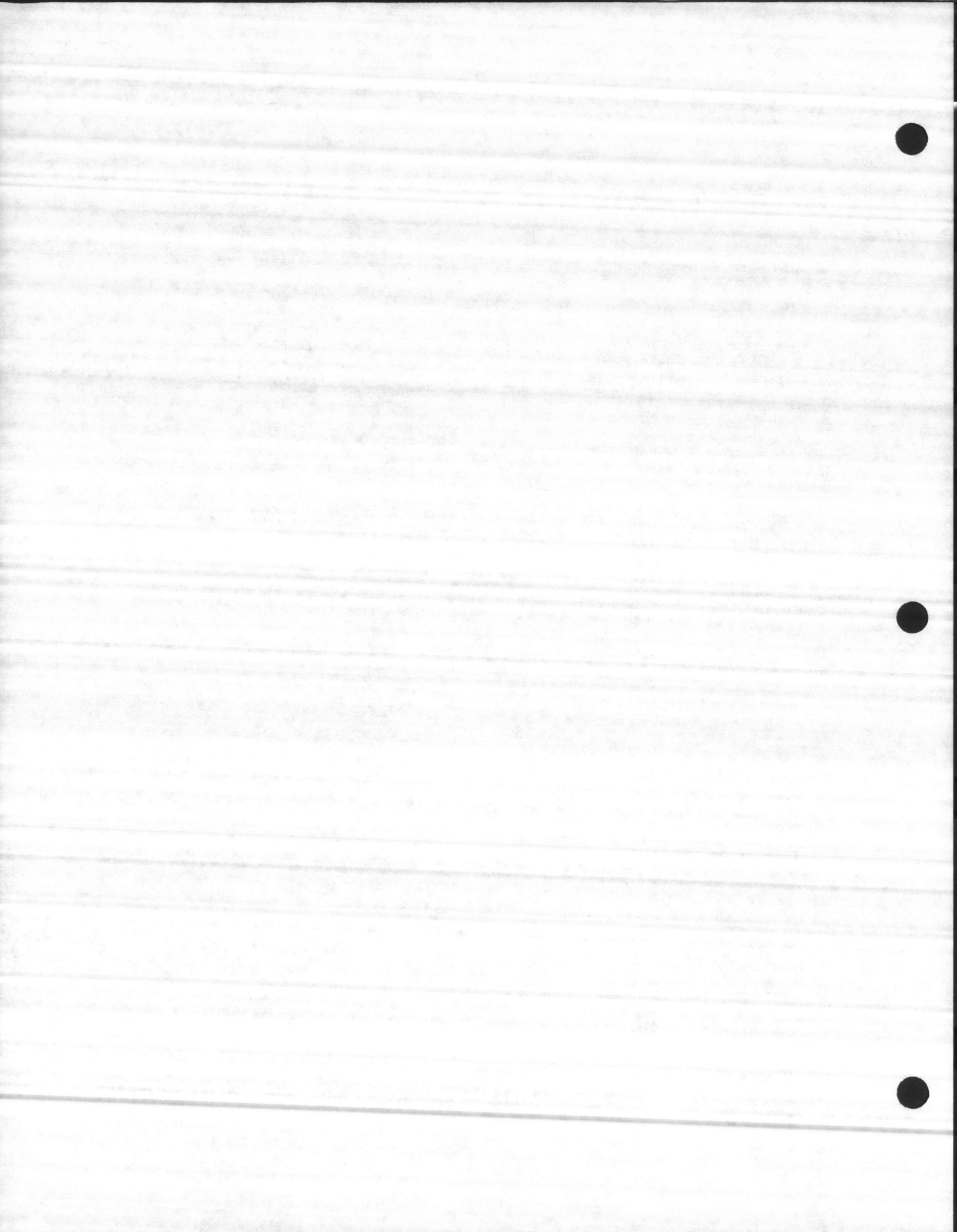
Water cooler(s) shall have limited five-year warranty on the sealed refrigeration system and most component parts.

Cooler(s) shall meet specifications of U.S. Department of Commerce Bureau of Standards; Public Health, Sanitary and Plumbing Codes; and be Certified to ARI, Listed by Underwriters' Laboratories, and Certified by CSA. Water cooler(s) shall be Oasis Wheelchair Model(s) _____.



Model OEP8WM-E

Model OEP8WM



Oasis Wheelchair Water Cooler Specifications

Model	Capacity in GPH of 50°F.* Drinking Water				Base Rate GPH	Pre- Cooler	115 Volts, 60 Hz.		Net Weight, Approx.	Number of People Served (Bubbler) Per One Gallon of Capacity at ARI Standard Rating Condition	
	Ambient Air Temperature						Compr. HP	Full Load Amps			
	70°F.	80°F.	90°F.*	100°F.							
OEP8WM-AE	9.0	8.4	7.8	7.1	7.8	No	1/5	5.5	59 Lbs.	Offices, Hospitals, Schools, Stores, and Lobbies	25
OEP8WM-EQ	9.0	8.4	7.8	7.1	7.8	No	1/5	5.5	59 Lbs.	Light Manufacturing	15
OEP8WM-E	9.0	8.4	7.8	7.1	7.8	No	1/5	5.5	59 Lbs.	Heavy Manufacturing	12
OEP8WM	9.0	8.4	7.8	7.1	7.8	No	1/5	5.5	59 Lbs.	Hot, Heavy Manufacturing	10
OEPWM	FOUNTAIN ONLY								27 Lbs.	Note: The table above is in accordance with ARI Drinking Water Cooler Application Standard 1020.	

*Air Conditioning and Refrigeration Institute Standard Rating Condition 80°F. inlet water temperature.

Bubbler Valve: Built-in pressure regulator assures a smooth, steady flow at line pressures from 20 to 125 psi. All metal parts are either stainless steel or brass.

Electronic Bubbler Valve Control: Membrane switch activates an electronic solid-state circuit control.

One-Piece Top and Receptor: Satin finish Type 304 stainless steel. Effective anti-splash ridge with easy-to-clean integral strainer.

Cabinet: The separate unitized (welded) framework of heavy-gauge steel that provides rigidity is enamel coated for corrosion protection. Panels have standard finish of Sandstone vinyl laminated to steel. Optional colors available in vinyl and baked enamel on steel. Also available in stainless steel and Regency Bronze at extra cost.

Units feature removable front and side panels, and are shipped with mounting bracket.

Tank and Cooling Coil: High-efficiency, tank-type cold water storage system reduces starts

and operating time of compressor. Two metal walls between drinking water and refrigerant. All water carrying lines are constructed of copper tubing.

Cooling Tank Insulation: Removable, molded, expanded bead polystyrene.

Cold Water Thermostat: Adjustable thermostat, with "Off" position, controls cold water temperature.

Refrigeration Unit: Fan-cooled condenser. Internally spring mounted, hermetically sealed compressor with automatic overload protector. No lubrication needed. Refrigerant is controlled by accurately calibrated capillary tube.

Electrical: Furnished with 3-wire service cord and polarized plug.

Accessory Glass Filler: Factory installed. Push down (A550R), push back (A525R), push button (A500R).

Limited 5-Year Warranty (Continental limits of the United States and Canada): Five years

on the sealed refrigeration system and most component parts. Detailed warranty certificate enclosed with each water cooler, sample copy available upon request.



Models covered by these specifications comply with all known Plumbing Codes. Listed by

Underwriters' Laboratories, Certified by Canadian Standards Association, and Certified to Air Conditioning and Refrigeration Institute.

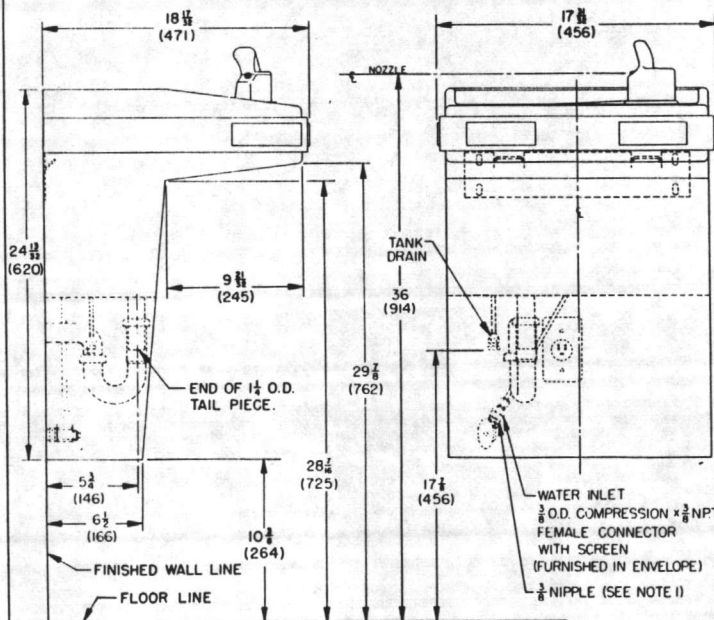
EXPORT

Special Export Models: Models OEP8WM-AE-50 and OEP8WM-50 are operable on 220-240 volts, 50 Hertz without transformers UL, CSA and ARI not applicable.

Warranty: One year on the sealed refrigeration system and most component parts. Four-year replacement contract on sealed refrigeration system. Detailed warranty certificate enclosed with each water cooler, sample copy available upon request.

DIMENSIONAL DRAWING

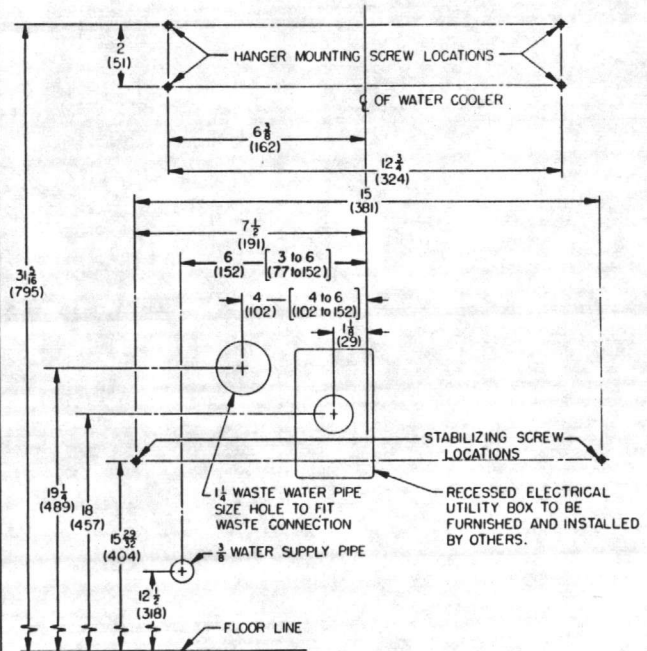
ALL DIMENSIONS ARE IN INCHES.
DIMENSIONS IN PARENTHESIS () ARE IN MILLIMETERS.



NOTES:

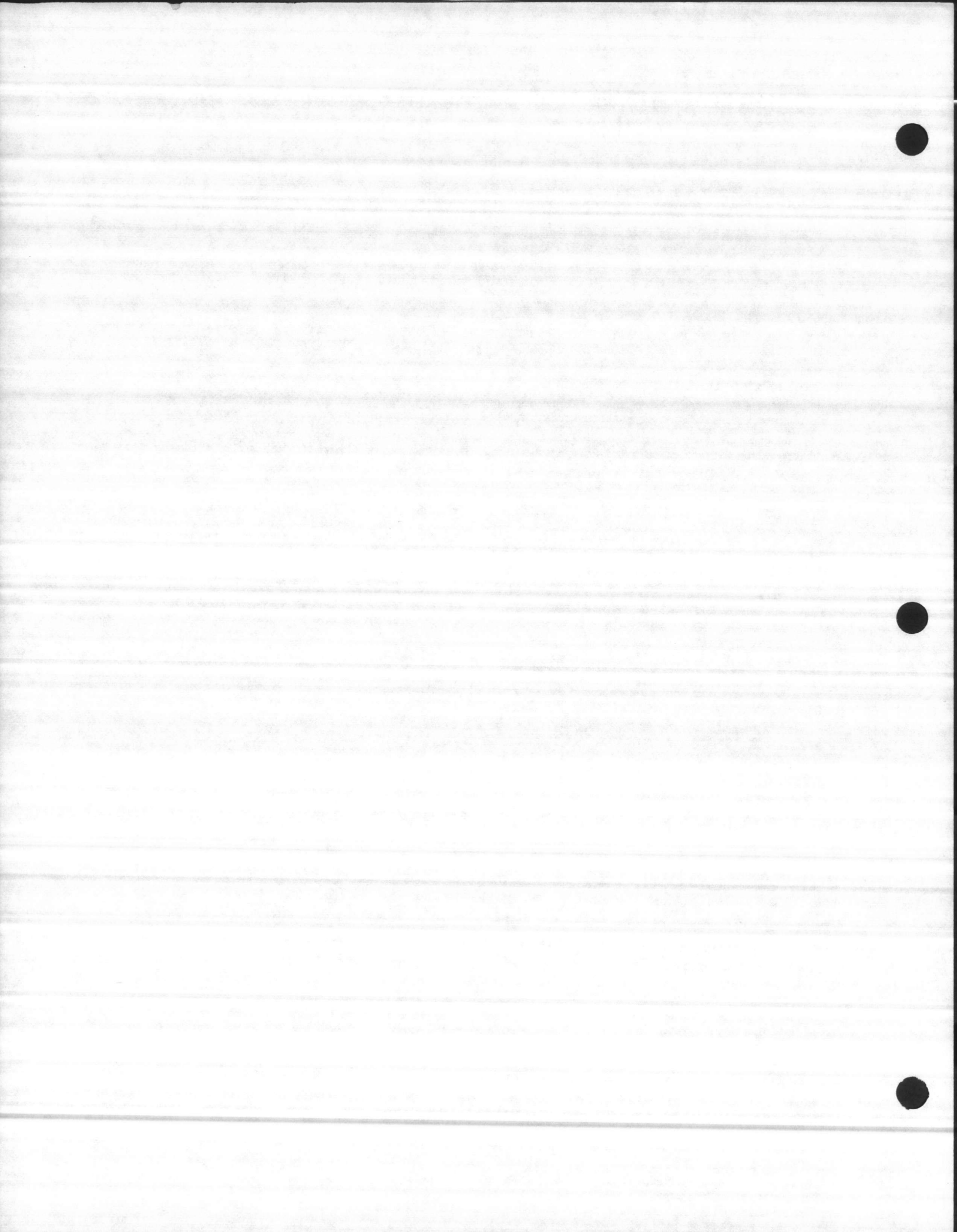
- TRAP, FIXTURE STOP VALVE AND 1/2 O.D. NIPPLE NOT FURNISHED WITH WATER COOLER.
- IF WATER COOLER IS SET IN ALCOVE OR NEAR CORNER, ALLOW 3 INCHES (76mm), 1 1/2 INCHES (38mm) PER SIDE, FOR VENTILATION.

ROUGHING-IN DRAWING



NOTE: DIMENSIONS ON THIS DRAWING PROVIDE A 36" NOZZLE HEIGHT AND MAY BE ADJUSTED TO SUIT LOCAL REQUIREMENTS.

REV	DATE	BY	CHKD



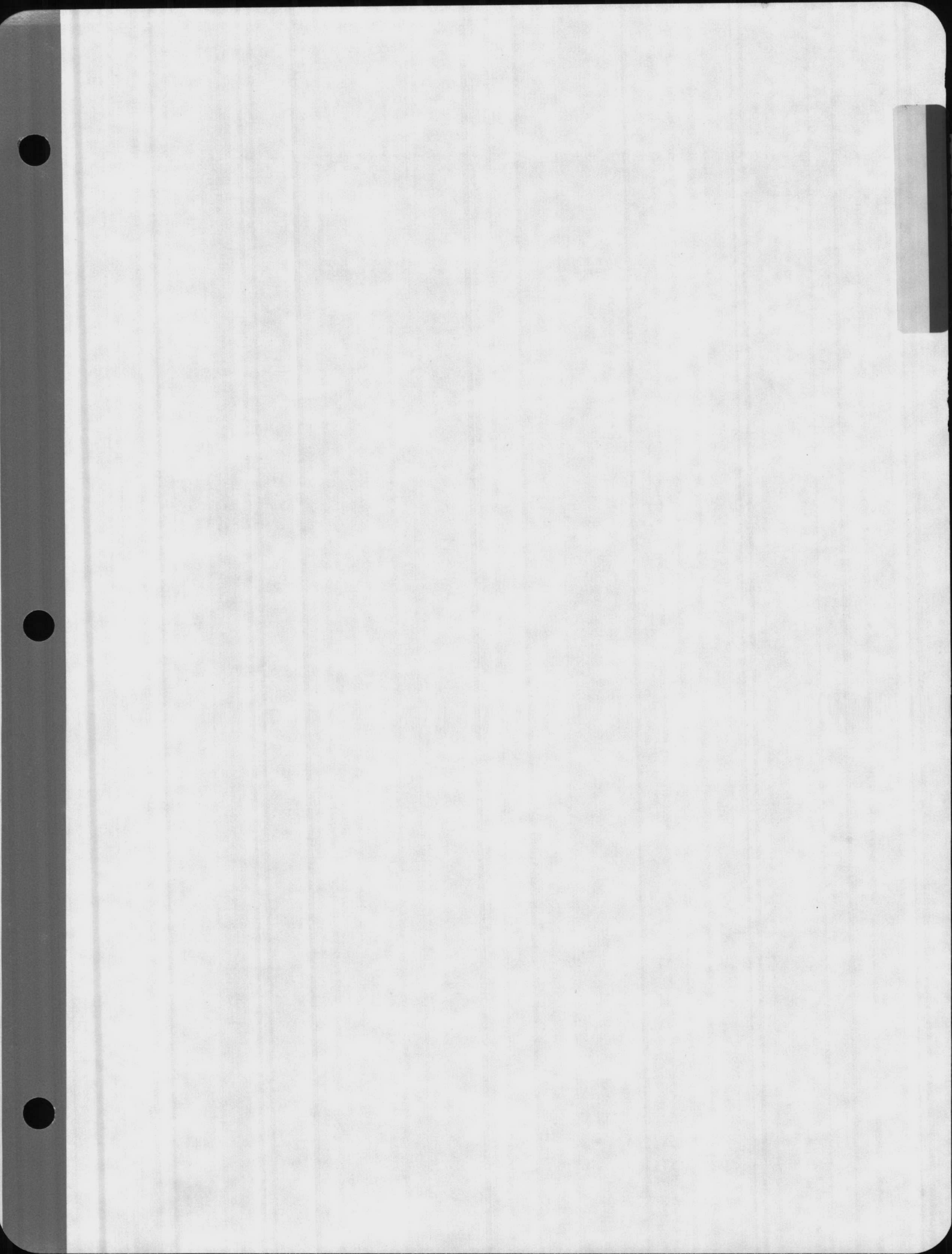
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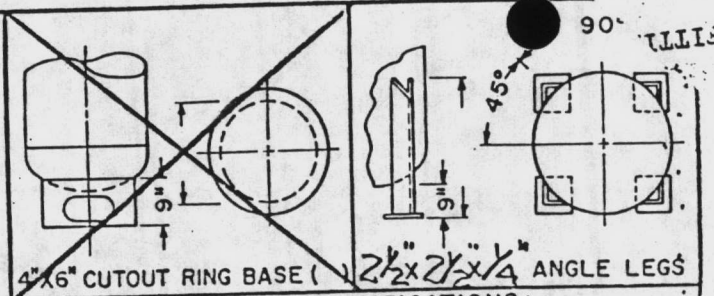
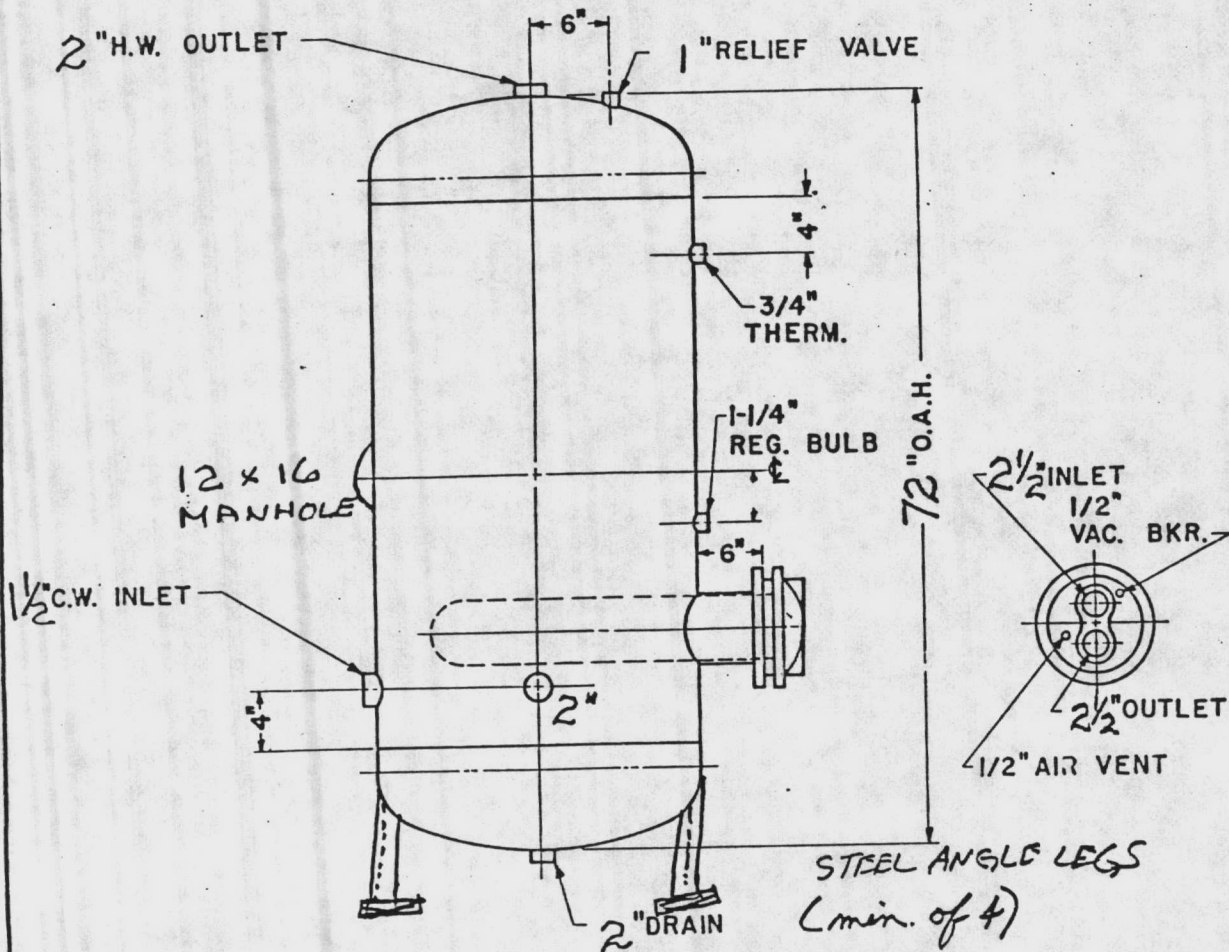
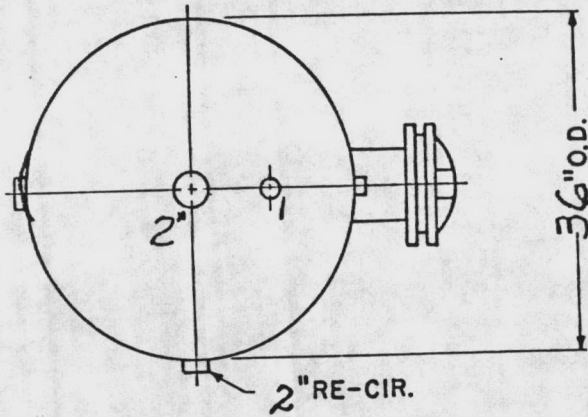
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HEATING ELEMENT SPECIFICATIONS:
 ELEMENT NUMBER: W611
 WORKING PRESSURE: 125 TEST PRESSURE: 188
 HEATING SURFACE REQUIRED 11 SQ. FT.
 ELEMENT NECK: N/F
 SEAMLESS COPPER TUBES: 3/4 O.D. x GA.
 TUBE SHEET (X) STEEL ()
 ELEMENT HEAD (X) CAST IRON ()
 ELEMENT SUPPORT (X) NOT REQ. ()
 HTG. CAP. 319 G.P.H. WATER 40°F TO 40°F.
 HTG. MED. 0 P.S.I. STEAM
 CIRC. BOILER WATER IN AT °F. OUT AT °F.

REVISION	1	2	3	4	5
DATE					

TANK SPECIFICATIONS:
 NO. OF UNITS REQUIRED: 2
 DESIGN PRESSURE 125 P.S.I.
 TEST PRESSURE 188 P.S.I.
 CONSTRUCTION: (X) A.S.M.E. INSPECTED & STAMPED
 () MFG. STANDARD
 MATERIAL: ASME GRADE STEEL
 PAINT OR LINING: CEMENT LINED
 EXTERIOR - RED OXIDE, INTERIOR -
 CUSTOMER: SCOTT - GRIFFIN
 P.O. NO.
 PROJECT: BLDGS M420 & M422
 AGENT: HEAT TRANSFER
 ARCHITECT:
 ENGINEER: OMNI ENGRS
 NOTES:

WATER STORAGE HEATER
ADAMSON
 ADAMSON CO. INC.

SCALE NONE	CHECKED <i>[Signature]</i>	DRAWN BY L.F.	DATE 9/24/68	JOB NO.
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ADAMSON COMPANY, INC.

Welded Products

FUEL STORAGE TANKS
FACTORY PACKAGED WATER HEATERS
ASME CODE PRESSURE VESSELS
HEAT EXCHANGERS

TELEPHONE (804) 748-6453 TELEX 82-7328
13200 RAMBLEWOOD DRIVE
CHESTER, VIRGINIA 23831

ADAMSON

INSTALLATION OPERATING & MAINTENANCE STORAGE HEATER

TANK

TANK IS CEMENT LINED. CARE MUST BE TAKEN NOT TO DROP OR BUMP THE TANK DURING SETTING.

NO WELDING OR CHANGES CAN BE MADE TO TANK. THIS WOULD VOID A.S.M.E. STAMP. NAMEPLATE CAN NOT BE MOVED. INSULATORS MUST BOX AROUND IT.

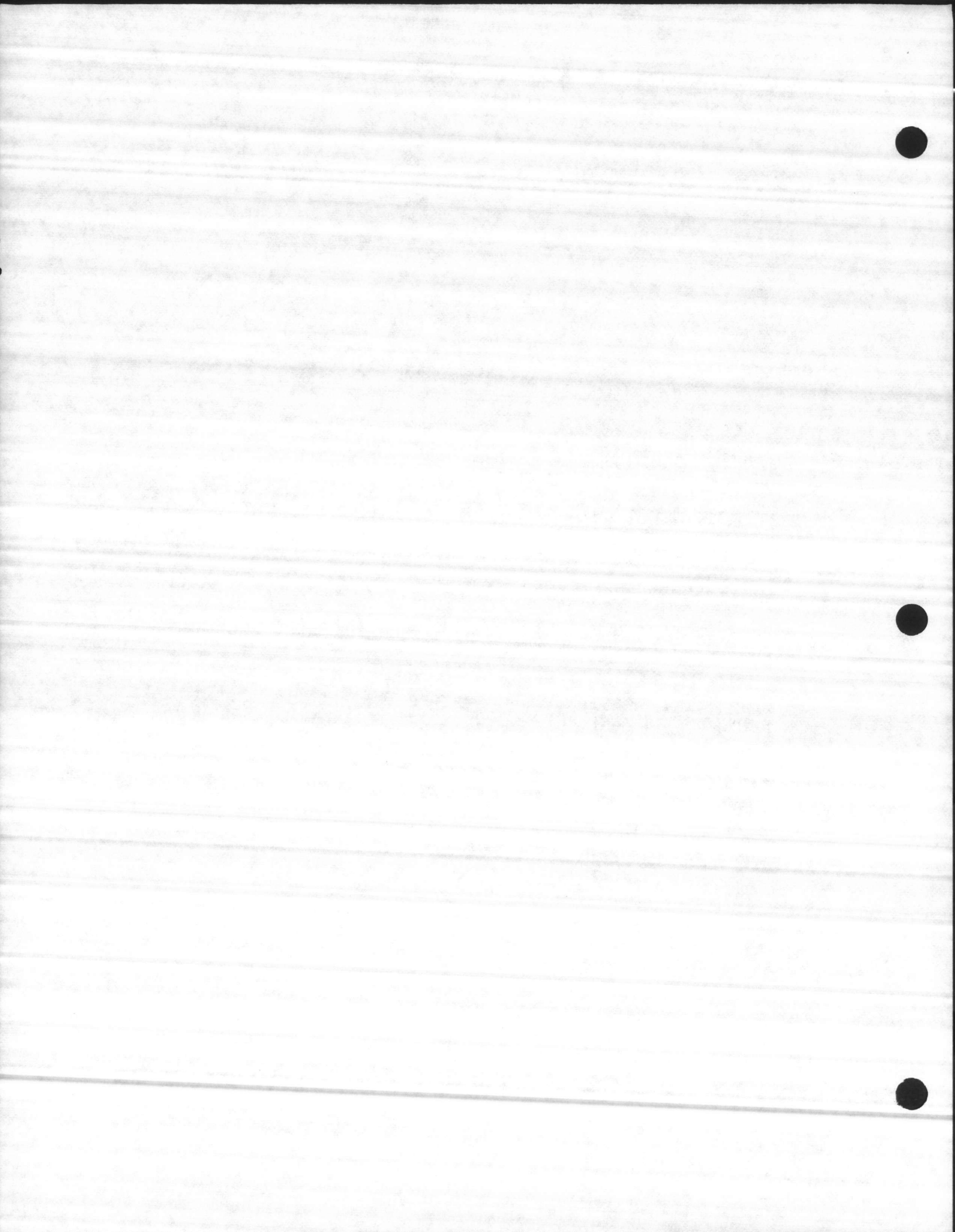
HEAT EXCHANGER

PROVIDE A VACUUM BREAKER IN HEAD OPENING AS MARKED. BE SURE TANK IS FULL OF WATER BEFORE TURNING STEAM ON.

AN A.S.M.E. RELIEF VALVE MUST BE INSTALLED IN OPENING PROVIDED ON TANK. PRESSURE SETTING MUST NOT BE GREATER THAN WORKING PRESSURE STAMPED ON TANK NAME PLATE.

MAINTENANCE

CEMENT LINING NEEDS NO MAINTENANCE. SHOULD UNIT START MAKING POPPING NOISES WHEN STEAM CONTROL VALVE OPENS, CHECK STEAM TRAP.



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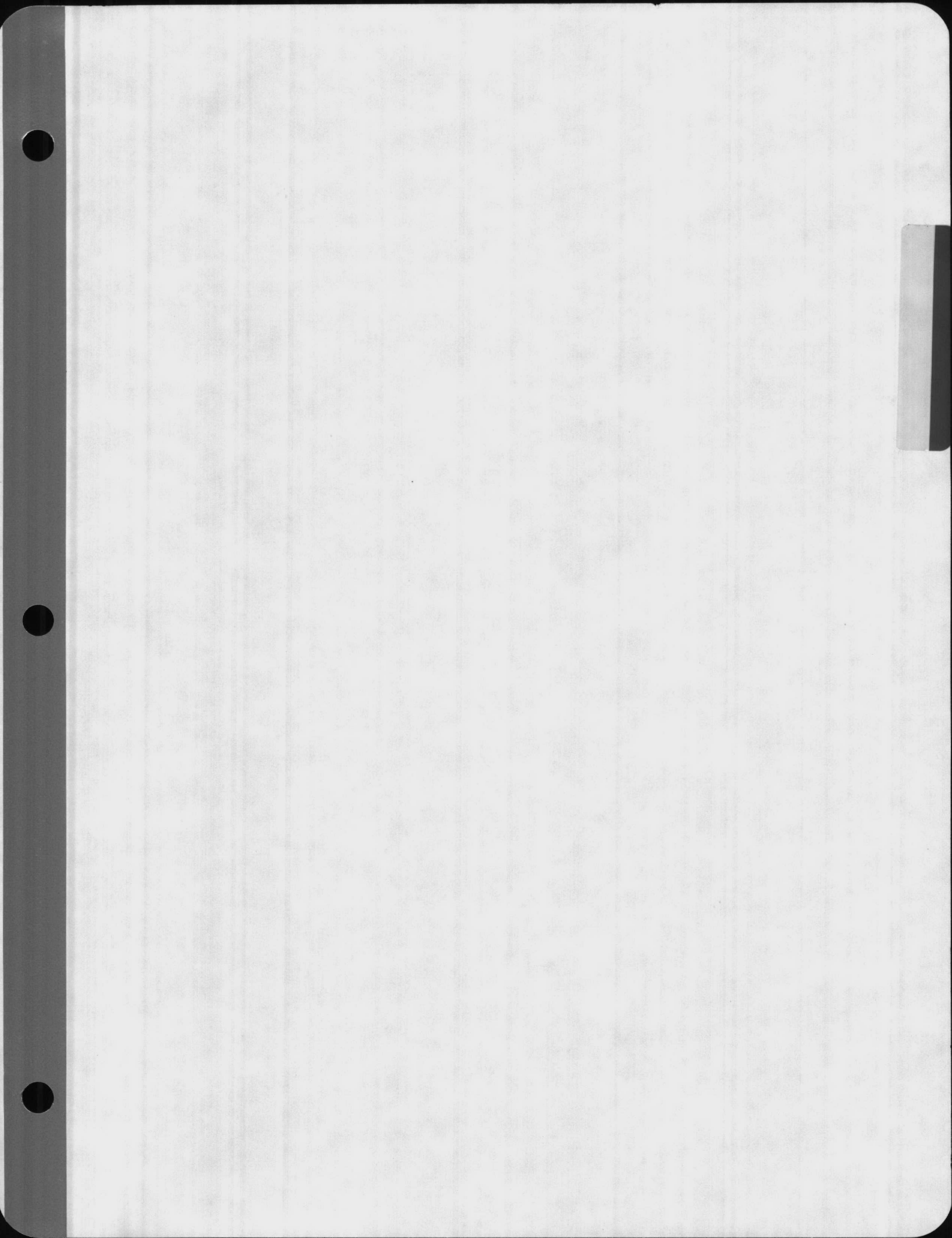
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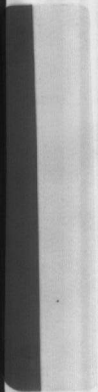
Confidential Records Management, Inc.

New Bern, NC

1-888-622-4425

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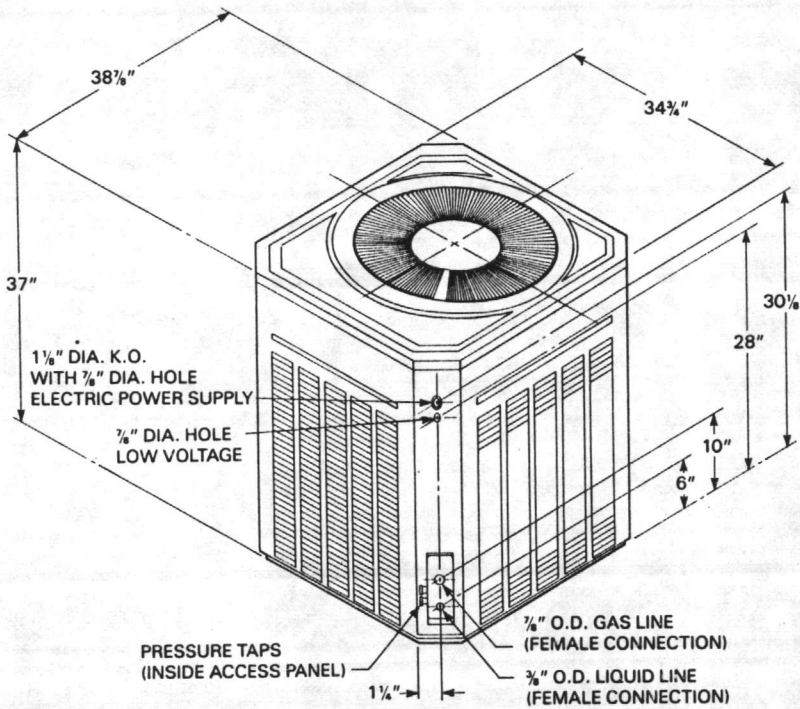


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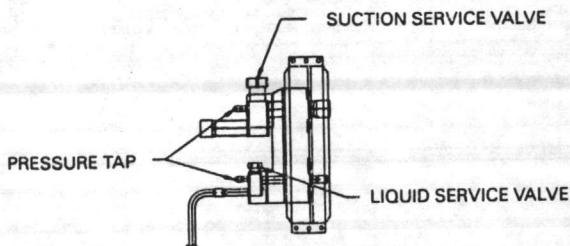
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**5-Ton
Split System
Condensing
Unit - 3Ø
TTA060A**

TOP DISCHARGE AREA SHOULD BE UNRESTRICTED. UNIT SHOULD BE PLACED SO ROOF RUN-OFF WATER DOES NOT POUR DIRECTLY ON UNIT, AND SHOULD BE AT LEAST 12" FROM WALL AND ALL SURROUNDING SHRUBBERY ON TWO SIDES. OTHER TWO SIDES COMPLETELY UNOBSTRUCTED.



NOTE: ALL DIMENSIONS ARE IN INCHES.



REFRIGERANT CONNECTION DETAIL
(LOCATED BEHIND ACCESS PANEL)

Table 1 Electrical Characteristics

Outdoor Unit	TTA060A3	TTA060A4
Power Conns. - V./Ph./Hz.	200/230/3/60	460/3/60
Min. Brch. Cir. Ampacity ¹	25.2	13.2
Br. Cir. } Max. (Amps.)	40	20
Prot. Rtg. } Recmd. (Amps.)	40	20

NOTE:

1. Calculated in accordance with currently prevailing Natl. Electric Code. Suitable for use with HACR circuit breakers or fuses.

Table 2 Unit Weights (Lbs.)

Outdoor Unit	TTA060A3	TTA060A4
Shipping	316	316
Net	300	300

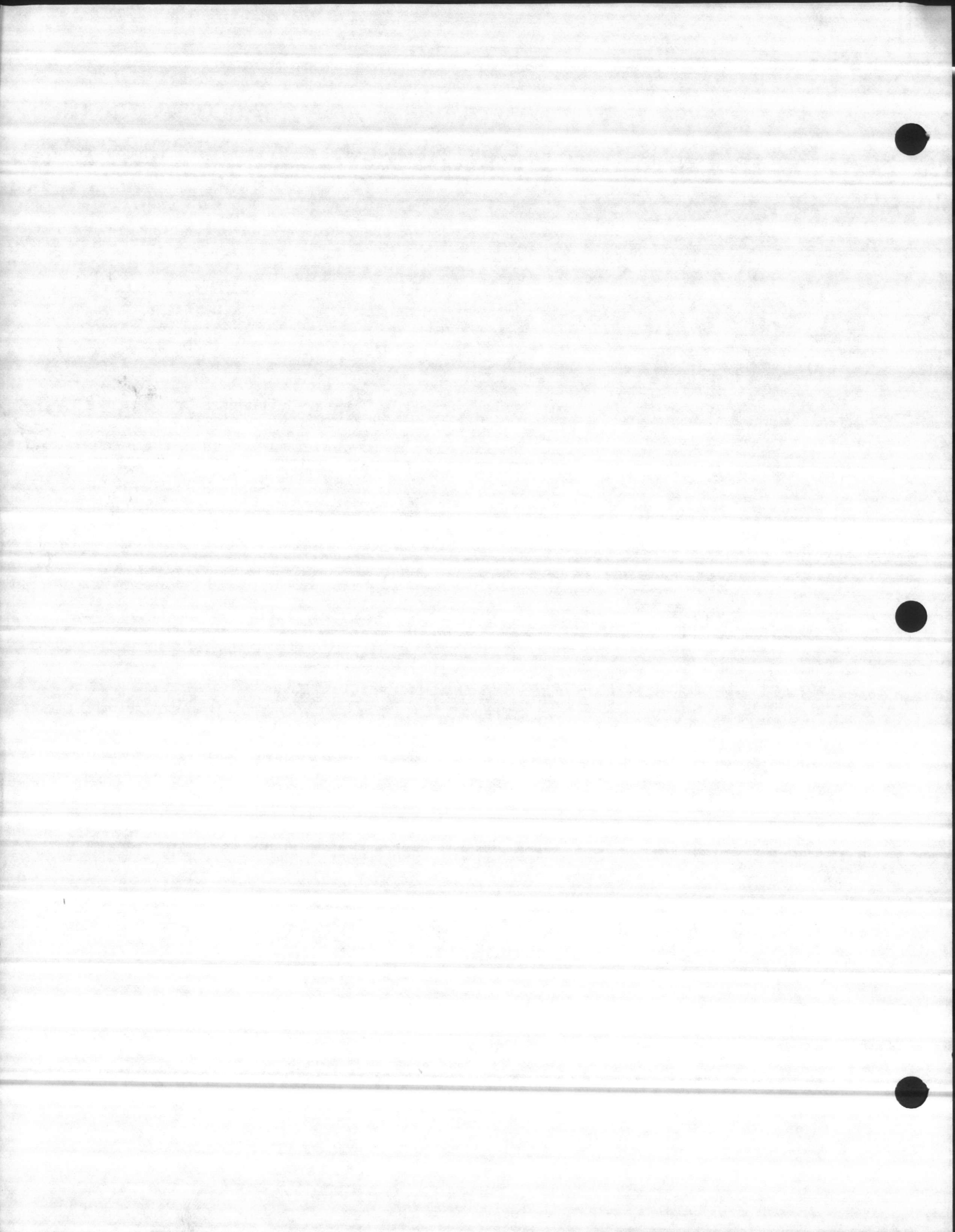
Table 3 General Data

Outdoor Unit	TTA060A300A	TTA060A400A
Noise Rating No. ¹	8.4	8.4
Compressor	Climatuff™	Climatuff™
No. Used - No. Speeds	1 - 1	1 - 1
Volts/Ph./Hz.	200-230/3/60	460/3/60
RL Amps. - LR Amps.	18.6 - 118	9.1 - 71
Brch. Cir. Selec. Cur. Amps	18.6	10
Outdoor Fan - Type	Propeller	Propeller
Dia. (In.) - No. Used	26 - 1	26 - 1
Type Drive - No. Speeds	Direct - 1	Direct - 1
CFM @ 0.0 In. WG ²	4030	4030
No. Motors - HP	1 - 1/4	1 - 1/2
Motor Speed RPM	825	825
Volts/Ph./Hz.	200-230/1/60	460/1/60
FL Amps. - LR Amps.	1.9 - 3.3	1.0 - 1.8
Outdoor Coil - Type	Spine Fin™	Spine Fin™
Rows - FPI	1 - 20	1 - 20
Face Area (Sq. Ft.)	26.92	26.92
Tube Size (In.)	.38	3/8
Refrigerant		
Lbs. - R-22 (OD Unit) ³	10 Lb., 4 oz.	10 Lb., 4 oz.
Factory Supplied	Yes	Yes
Line Size - In. OD Gas ⁴	1 1/8	1 1/8
Line Size - In. OD Liq. ⁴	3/8	3/8
Dimensions - Cratd (In.)		
H x W x D	37 1/2 x 40 1/8 x 39 1/8	

NOTES:

1. Rated in accordance with A.R.I. Standard 270.
2. Standard Air - Dry Coil - Outdoor.
3. This value approximate. For more precise value see unit nameplate and service instruction.
4. Max. linear length 80 Ft.; Max. lift - Suction 60 Ft.; Max. lift - Liquid 60 Ft. Max. length of precharged tubing 40 Ft. For greater length contact your Trane Representative.






TRANE™
REDDI FACTS

Air Conditioner

Model: TTA060A300A0

IMPORTANT — This document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.

PRODUCT SPECIFICATIONS

OUTDOOR UNIT	TTA060A300A0
PWR. CONNS. — V/Ph/Hz	200-230/3/60
Min. Brch. Cir. Ampacity [Ⓢ]	22.7
Fuse Size — Max. (Amps)	35
Fuse Size — Recmd. (Amps)	35
COMPRESSOR	Climatuff™
No. Used — No. Speeds	1 — 1
Volts/Ph/Hz	200-230/3/60
R.L. Amps — L.R. Amps	16.6 — 118
Brch. Cir. Selec. Cur. Amps	16.6
OUTDOOR FAN — Type	Propeller
Dia. (in.) — No. Used	26 — 1
Type Drive — No. Speeds	Direct — 1
CFM @ 0.0 in. w.g. [Ⓓ]	4030
No. Motors — HP	1 — 1/4
Motor Speed R.P.M.	825
Volts/Ph/Hz	200-230/1/60
F.L. Amps — L.R. Amps	1.9 — 3.3
OUTDOOR COIL — Type	Spine Fin™
Rows — F.P.I.	1 — 20
Face Area (sq. ft.)	26.92
Tube Size (in.)	.38
REFRIGERANT	
Lbs. — R-22 (O.D. Unit) [Ⓢ]	10
Factory Supplied	Yes
Line Size — in. O.D. Gas [Ⓢ]	1-1/8
Line Size — in. O.D. Liq. [Ⓢ]	3/8
DIMENSIONS — Cratd (in.)	
H x W x D	37.5 x 40 x 36
WEIGHT	
Shipping (lbs.)	332
Net (lbs.)	314

- ① Rated in accordance with A.R.I. Standard 210.
 ② Rated in accordance with A.R.I. Standard 270.

③ Calculated in accordance with currently prevailing National Electric Code.

④ Standard Air — Dry Coil — Outdoor.

⑤ This value approximate. For more precise value see unit nameplate and service instruction.

⑥ Max. linear length 80 ft; Max. lift - Suction 60 ft; Max. lift - Liquid 60 ft. Max length of precharged tubing 40 ft. For greater length refer to Refrigerant Piping Manual Pub. No. 22-3040.

⑦ Rated in accordance with D.O.E. test procedure. HSPF is at the minimum design requirement for Region IV.

[*] Power supply voltage limits

Voltage Limits		Max I.D. Temp.		Max O.D. Temp.	
Low	High	DB/HTG	DB/WB CLG	DB HTG	DB CLG
207 — 254		80	95/71	75	115
196 — 207(a)		80	95/71	75	105
187 — 196(b)		80	95/71	65	100

(a) I.D. Airflow between 400 & 450 CFM/TON.

(b) I.D. Airflow between 400 & 450 CFM/TON. Start kit required.

(c) Capacity reduction for unit operation at 208 volts vs. 230 volts is 1% approximately.

SAFETY NOTICE

THIS INFORMATION IS INTENDED FOR USE BY INDIVIDUALS POSSESSING ADEQUATE BACKGROUNDS OF ELECTRICAL AND MECHANICAL EXPERIENCE. ANY ATTEMPT TO REPAIR A CENTRAL AIR CONDITIONING PRODUCT MAY RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. THE MANUFACTURER OR SELLER CANNOT BE RESPONSIBLE FOR THE INTERPRETATION OF THIS INFORMATION, NOR CAN IT ASSUME ANY LIABILITY IN CONNECTION WITH ITS USE.

RECONNECT ALL GROUNDING DEVICES

ALL PARTS OF THIS PRODUCT CAPABLE OF CONDUCTING ELECTRICAL CURRENT ARE GROUNDED. IF GROUNDING WIRES, SCREWS, STRAPS, CLIPS, NUTS OR WASHERS USED TO COMPLETE A PATH TO GROUND ARE REMOVED FOR SERVICE, THEY MUST BE RETURNED TO THEIR ORIGINAL POSITION AND PROPERLY FASTENED.

Library	Service Literature
Product Section	Unitary
Product	Air Conditioners - Split System
Model	TTA
Literature Type	Service Facts
Sequence	4A
Date	December 1987
File No.	SV-UN-S/S-TTA-SF-4A 12/87
Supersedes	

OPTIONAL EQUIPMENT

OPTIONAL EQUIPMENT FOR CONDENSING UNITS

Indoor Thermostats —

Horizontal, Heat/Cool only w/Manual SwitchoverAY28X92

Horizontal, Heat/Cool w/Manual SwitchoverAY28X97A

Horizontal, 2-Stage Heat/Cool w/Manual

SwitchoverAY28X98A

Vertical, Cool only w/Fan SwitchAY28X104

Vertical, Heat/Cool w/Manual SwitchoverAY28X105

Horizontal, Heat/CoolBAY28X182

Evaporator Defrost Control Kit Needed for

cooling operation between 55° and 40°AY28X79

Outdoor Thermostat Kit

Includes Thermostat AY28X125 and Mtg.

Brkt. — for 46°F. to -10°F. (Adjustable)BAY28X125A

Hot Water BankBHW009A

Muffler for Hot Water BankBAY41X219

Coupling Kit — 7/8" Tube (90° Bend), -11

Coupling, 3/8" Tube -6 CouplingBAY71X003

Coupling Kit — 7/8" Tube -11 Coupling,

3/8" Tube -6 CouplingBAY71X004

Coupling Kit — 1-1/8" Tube (90° Bend), -11

Coupling, 3/8" Tube -6 CouplingBAY71X005

Coupling Kit — 1-1/8" Tube -11 Coupling,

3/8" Tube -6 CouplingBAY71X006

Head Pressure Control KitBAYLOAM100A

TUBING INFORMATION

Tubing Sizes		Tubing Length	Additional Refrigerant
Suction	Liquid		
1-1/8"	3/8"	15'	5 oz.
1-1/8"	3/8"	25'	12 oz.
1-1/8"	3/8"	32'	18 oz.
1-1/8"	3/8"	40'	24 oz.

Tubing lengths in excess of forty (40) feet use the following amount:
 1-1/8" and 3/8" uses 3 oz. per each 4 ft.



SPLIT SYSTEM

DISCONNECT POWER BEFORE SERVICING

P.I. 12/87

© American Standard Inc. 1987

The Trane Company

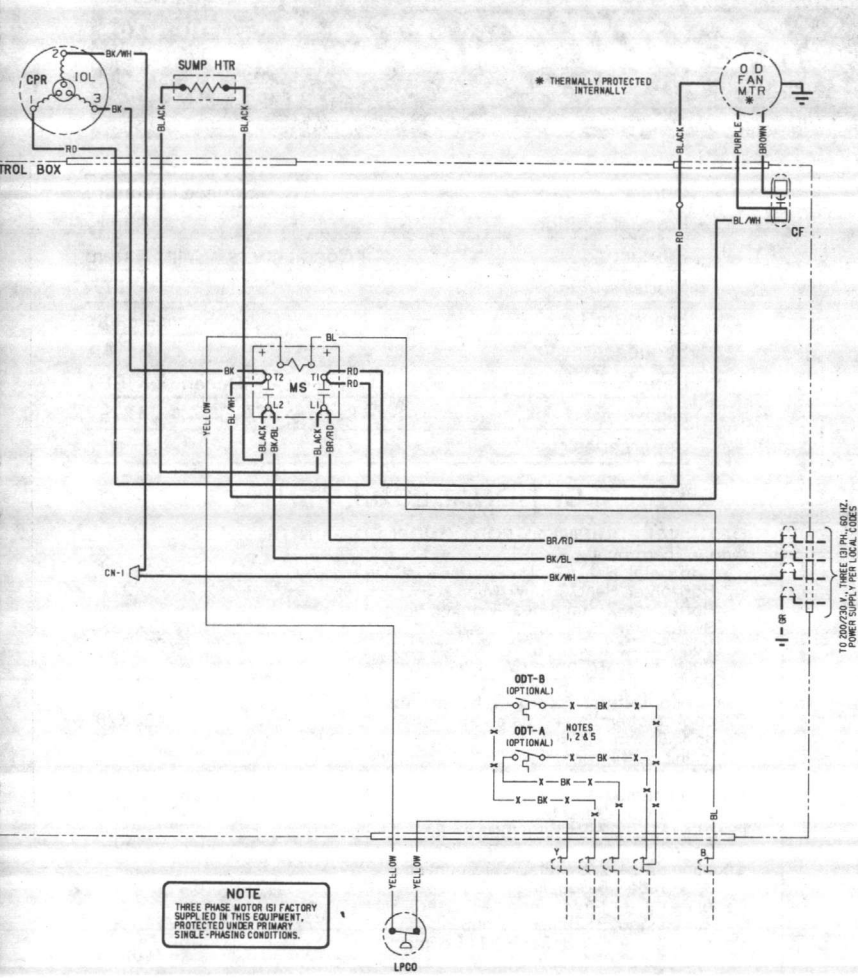
Dealer Products Group • Troup Highway • Tyler, TX 75711

Dwg. No. 21A142231 P02

Page C-237

DA300A0 WIRING DIAGRAM

LEGEND



- Color of Wire
BK/BL Black Wire with Blue Marker
Color of Marker
- | | | |
|----------|-----------|-----------|
| BK Black | OR Orange | YL Yellow |
| BL Blue | RD Red | GR Green |
| BR Brown | WH White | PR Purple |
-
- 24 V. } Factory Wiring
— Line V. }
- - - 24 V. } Field Wiring
- - - Line V. }
- x- Field Installed Factory Wiring
- | | |
|-------------------------|-------------------------------|
| ⊥ Ground | ⊙ Internal Overload Protector |
| • Junction | ⊙ Pressure Actuated Switch |
| △ Wire Nut or Connector | ⊞ Resistor or Heating Element |
| ⌒ Coil | ⊞ Motor Winding |
| → Capacitor | ○ Terminal |
| ⊥ Relay Contact (N.O.) | □ Terminal Board |
| ⊥ Relay Contact (N.C.) | |
-
- CF Fan Capacitor
CN Wire Connector
CPR Compressor
IOL Internal Overload Protector
LPCO Low Pressure Cut-Out
MS Compressor Motor Contactor
ODT Outdoor Thermostat

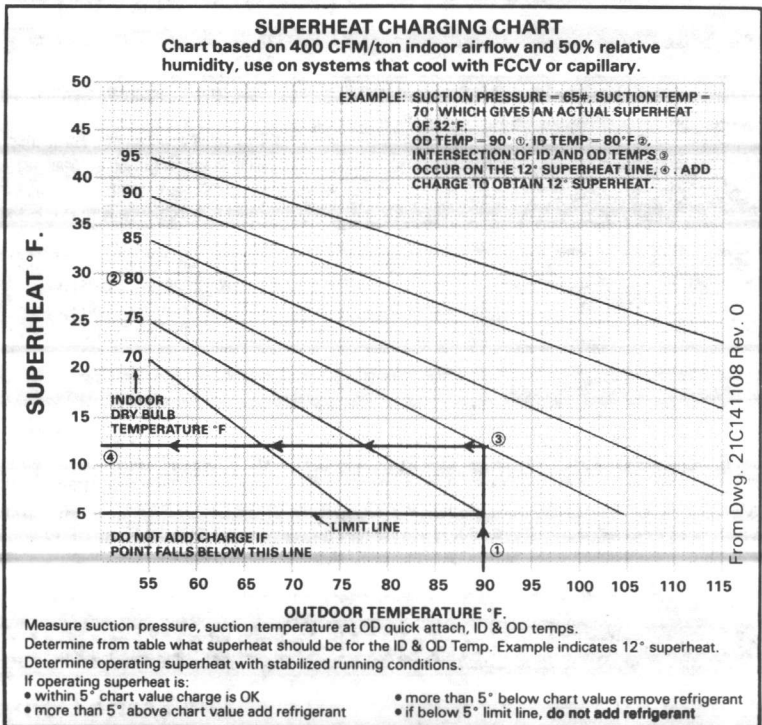
NOTES:

- IF ODT-A IS NOT USED MAKE NO CONNECTIONS TO BK LEADS AT OD UNIT AND ADD JUMPER BETWEEN W1 & W2 AT A/H.
- IF ODT-B IS NOT USED MAKE NO CONNECTIONS TO BK LEADS AT OD UNIT AND ADD JUMPER BETWEEN W2 & W3 AT A/H.
- LOW VOLTAGE (24 V.) FIELD WIRING MUST BE 18 A. W. G. MIN.
- USE COPPER CONDUCTORS. IF ALUMINUM OR COPPER-CLAD ALUMINUM POWER WIRING IS USED, CONNECTORS WHICH MEET ALL APPLICABLE CODES AND ARE ACCEPTABLE TO THE INSPECTION AUTHORITY HAVING JURISDICTION SHALL BE USED.
- PROVISIONS FOR OPTIONAL "ODT'S" WILL VARY DEPENDING ON UNIT SIZE.
- HEAD PRESSURE CONTROL BAYLOAM100A MAY BE USED WITH THIS UNIT.
- RELAY ACCESSORY BAY42X042 MAY BE USED WITH THIS UNIT.

NOTE
THREE PHASE MOTOR ISI FACTORY SUPPLIED IN THIS EQUIPMENT. PROTECTED UNDER PRIMARY SINGLE-PHASING CONDITIONS.

WHAT TO CHECK

REF. CIRCUIT RESTRICTIONS	RESTRICTED O.D. AIRFLOW	RESTRICTED O.D. AIRFLOW	T.V. STUCK OPEN	SUPERHEAT					
P	S	P	S	P	S				
S	P				S	S			S
S	P	P			S	P			S
	S						S	P	S
		P		S	S		S	P	
		P						P	S
S	P	P	S		S	P		S	P
P	P								
	S								
	P	S	P	S	S	S	S	S	S
P									



Measure suction pressure, suction temperature at OD quick attach, ID & OD temps. Determine from table what superheat should be for the ID & OD Temp. Example indicates 12° superheat. Determine operating superheat with stabilized running conditions.

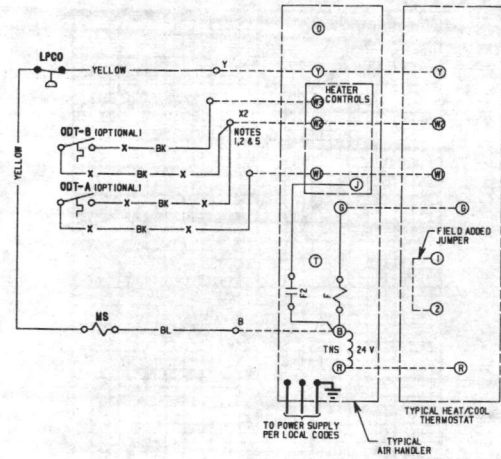
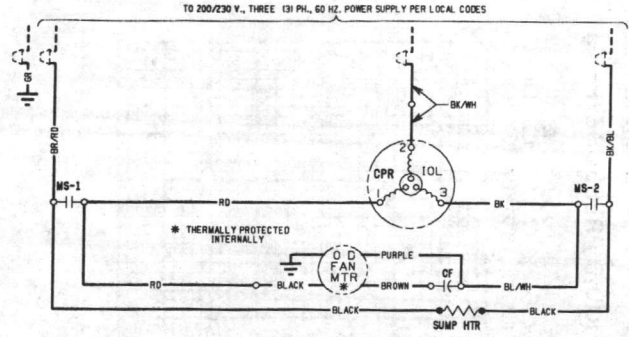
If operating superheat is:
 • within 5° chart value charge is OK
 • more than 5° below chart value remove refrigerant
 • more than 5° above chart value add refrigerant
 • if below 5° limit line, do not add refrigerant

REDDI PARTS

COMPONENT	QTY.	DESCRIPTION	CAT. #
Capacitors (CF)	1	12.5 MFD, 370V	WG20X0029
Compressor	1	GP673-LM3-AA RLA 16.6 LRA 118, Wind. res. @ 77°F. = .565 Ohms	Order by unit model #
Internal Line Break (IOL)		Opens on rise in winding temp. - Resets in 30-90 min.	
Internal Press. Relief (IPR)		Opens on 350# diff. between high & low side pressure	
Contactor (MS)	1	Type DPST, Contacts 240V, FLA 25.0, LRA 125.0, Coil 24V., .53 A. Hid., #3ARR8C4	WW23X0138
Drier	1	Suction Line w/Sweat Fit., 30 Cu. In., 1-1/8" x 1-1/8"	WW22X0070
Drier	1	Liquid Line w/Sweat Fittings, 8 Cu. In., 3/8" x 3/8"	WW22X0088
Fan	1	3 blade 26" Dia., 1/2" bore, CCW, 19°	WW73X0102
Motor	1	200/230 V, 60 Hz., 1 Ph., Closed Shell, 825 RPM, 1/4 HP, 1-Speed, FLA 1.9 LRA 3.3, Ball Bearings, CCW	WW94X0488
Sump Heater	1	230V, 65 WATTS, Resistance Heater, Cartridge Type	WW08X0065
Switch, Low Pressure Cut-Out (LPCO)	1	Opens @ 8 ± 4 PSIG, Resets 25 ± 7 PSIG, Type SPST, 28V, AC/DC-2 Amps, #20PS122KA025G008D	WW26X0090
Thermostat	1	AY28X92, Heat/Cool, Horizontal	WY28X0092
	1	AY28X104, Cool Only, w/Fan Switch, Vertical	WY28X0104
	1	AY28X105, Heat/Cool, Vertical	WY28X0105

SCHEMATIC DIAGRAM

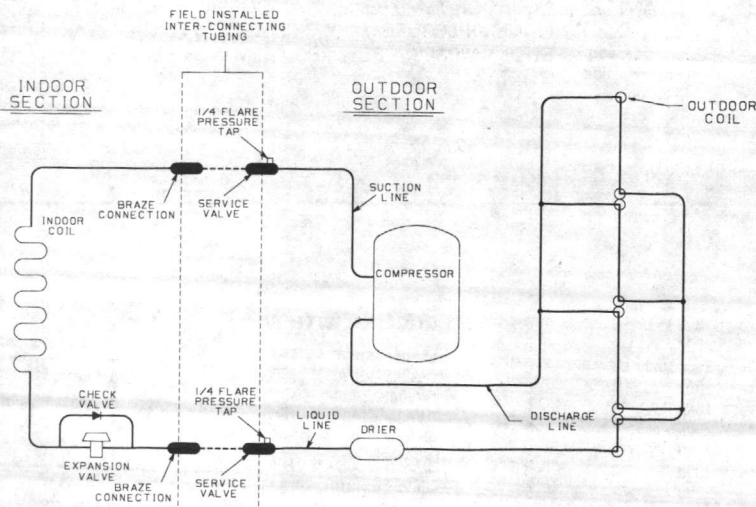
TTA060



From Dwg. 21D141225 P03

REFRIGERANT CIRCUIT

TROUBLESHOOTING CHART



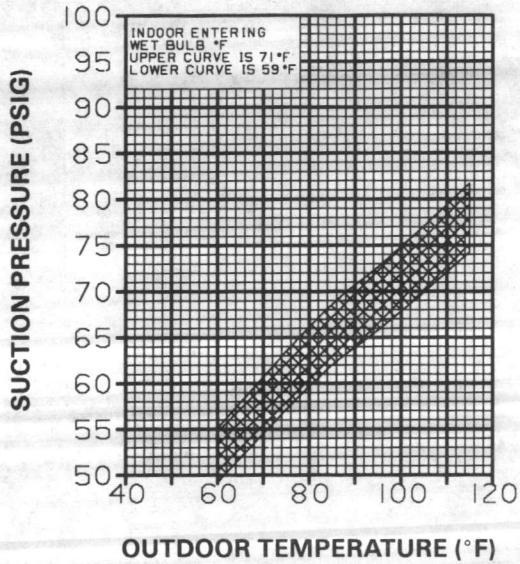
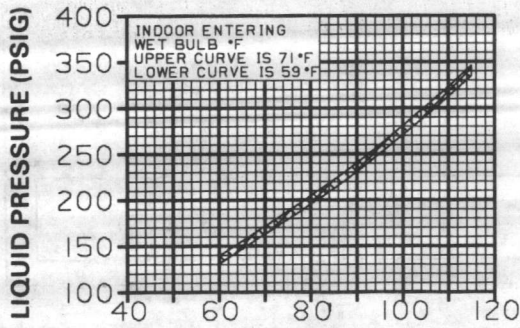
From Dwg. 21C141012 Rev. 0

SYSTEM FAULTS	TROUBLESHOOTING CHART									
	POWER SUPPLY	HIGH VOLTAGE WIRING	CONTR. TRANSFORMER	START RELAY	START CAPACITOR	RUN CAPACITOR	CONTR. CONTACTS	LOW VOLTAGE WIRING	CONTR. TRANSFORMER	LOW VOLTAGE WIRING
REFRIGERANT CIRCUIT										
Liquid Pressure Too High										
Liquid Pressure Too Low										
Suction Pressure Too High										
Suction Pressure Too Low										
Liquid Refrig. Floodback TXV System										
Liquid Refrig. Floodback Capillary Tube System										
I.D. Coil Frosting										
Compressor Runs Inadequate or No Cooling										
ELECTRICAL										
Compressor & O.D. Fan Do Not Start	P	P							S	P
Compressor Will Not Start But O.D. Fan Runs		P	S	P	P	P				
O.D. Fan Won't Start		P		P						
Compressor Hums But Won't Start		P		P	P	P	S			
Compressor Cycles on IOL		P	S	P	P	P	S			
I.D. Blower Won't Start	P	S							S	P

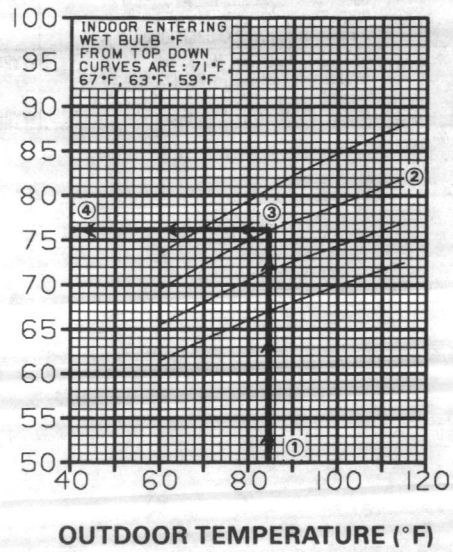
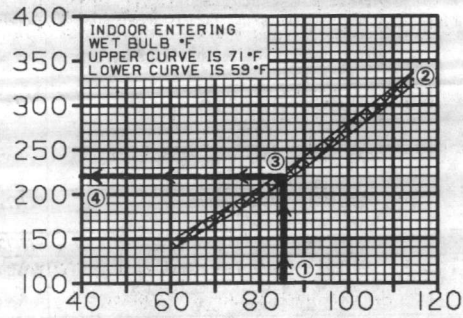
P Primary Causes S Secondary Causes

PERFORMANCE CURVES — TTA060A300A0

TXA048A4HPA
Cooling with FCCV or Capillary Tubes



TXC760P3HPA
Cooling With Thermal Expansion Valve



From Dwg. 21D139920 Rev. 2

COOLING PERFORMANCE TO BE CHECKED WHEN OUTDOOR TEMPERATURE IS ABOVE 65° F. AFTER OPERATING PRESSURES HAVE STABILIZED: MEASURE INDOOR WET BULB TEMP - OUTDOOR TEMP - LIQUID & SUCTION PRESSURES. LOCATE OUTDOOR TEMP ① LOCATE INDOOR WET BULB ② FIND INTERSECTION OF OD TEMP & ID W.B. ③ READ LIQUID OR SUCTION PRESSURE IN LEFT HAND COLUMN ④
 ACTUAL LIQUID PRESSURE SHOULD BE ± 10 PSIG OF CHART
 SUCTION PRESSURE SHOULD BE ± 3 PSIG OF CHART

EXAMPLE: ① OUTDOOR TEMP 85°F., ② INDOOR WET BULB 67°F.,
 ③ LIQUID PRESSURE @ 2000 CFM = 220 PSIG ④
 ⑤ SUCTION PRESSURE @ 2000 CFM = 76 PSIG ④

ALTERNATE INDOOR UNITS

COOLING WITH THERMAL EXPANSION VALVE

INDOOR UNIT	CFM	CORR. PRESSURE	
		S	L
BWE060C100F	2000	-3	0
BWH748P100A	1800	-3	0
BWH754P100B	2000	0	0
BWH760P100A	2000	0	0
BWV748P100A	1800	-3	0
BWV754P100B	2000	0	0
BWV760P100A	2000	0	0
BXA060A300A	2000	-3	0
BXA060P3HPA	2000	0	0
BXA090A3HPA	2250	+3	0
BXA748P3HPA	1800	-3	0
BXF060A300A	2000	-3	0

BXF748P3HPA	1800	-3	0
BXH060P3HPA	2000	0	0
TWH764P100A	2000	+3	0
TWV764P100A	2000	+3	0
TXC748P3HPA	1800	-3	0
TXC760P3HPA*	2000	0	0
TXC072P300A	2250	+3	0
BXH060P3HPA	2000	0	0
BXF060P3HPA	2000	-3	-6
TXC049P5HPA	1800	-3	-6
TXC060P5HPB	2000	0	0
TXC072P500B	2250	3	6
TXA072P500A	2250	3	6
TXA060P5HPA	2000	0	0
TXV060P150A	2000	0	0
TWV064P150A	2000	3	6
TWH060P150A	2000	0	0
TWH064P150A	2000	3	6
BWE090C100E	2250	3	6

COOLING WITH FCCV

TXA048A4HPA*	1800	0	0
TXA049A4HPA	1800	0	0
TWV048A140A	1800	2	4
TWH048A140A	1800	2	4

*BASE INDOOR UNIT FOR COOLING CURVES ON 21D139920

S - Suction L - Liquid

From Dwg. 21A139920 Rev. 2

18-HF10D2-1
ASCT-IN-3A

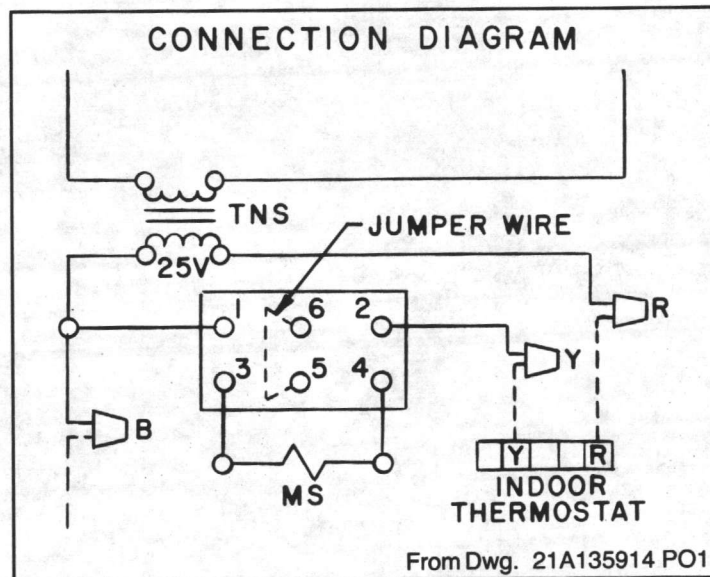
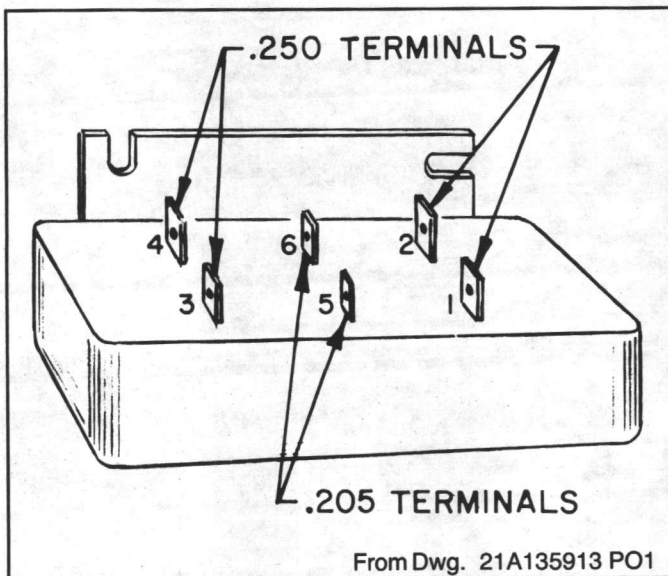
TIME DELAY RELAY (BAY41X171A)

This accessory may be installed on any compressor bearing outdoor section using 24VAC contactor coil.

This accessory **MUST** be installed in a weather protected area within the unit cabinet, such as the control box, the fan orifice plate, etc.

CAUTION:

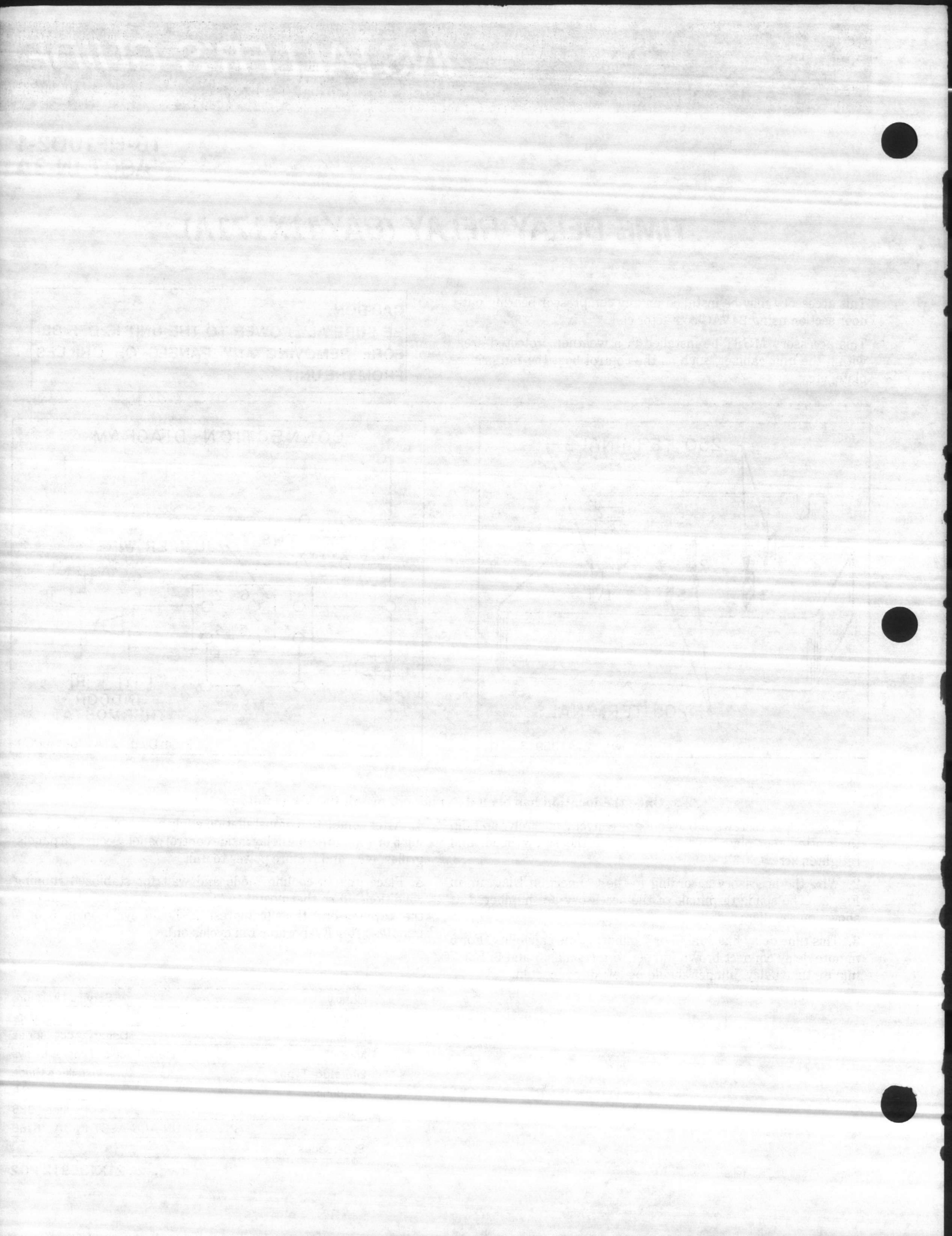
BE SURE ALL POWER TO THE UNIT IS OFF BEFORE REMOVING ANY PANELS OR GRILLES FROM THE UNIT.



Once the location has been determined, install the kit as follows:

1. Use enclosed screws or back out any convenient screws and slip the slotted foot-plate (see Fig. 1) under the screw head, and retighten screw.
2. Wire the accessory according to the Connection Diagram in Fig. 2. (The spade terminals of the accessory are numbered as shown on the diagram).
3. This time delay has dual (5 or 7 minute) time capability. For 5 minute delay connect brown jumper to terminals 5 and 6. For 7 minute time delay, jumper should be left disconnected.
4. After completion of installation apply appropriate label denoting 5 or 7 minute time delay inside control panel. Secure all panels, grilles, etc., and restore power to unit.
5. Place unit in cooling mode and wait for stabilized running conditions. Turn thermostat to "OFF" momentarily and observe the "cycling-on" time (compressor should cycle on in 5 or 7 minutes after Evaporator fan cycles on).

Library	Service Literature
Product Section	Unitary
Product	Unitary Accessories
Model	T'stats, Panels, Timers, Relays
Literature Type	Installer's Guide
Sequence	3A
Date	June 1988
File No.	SV-UN-ACC-ASCT-IN-3A 6/88
Supersedes	





**18-HD10D1
DFST-IN-1B**
1st Printing, 1988

(AY28X079 & 084) LOW AMBIENT COOLING CONTROL

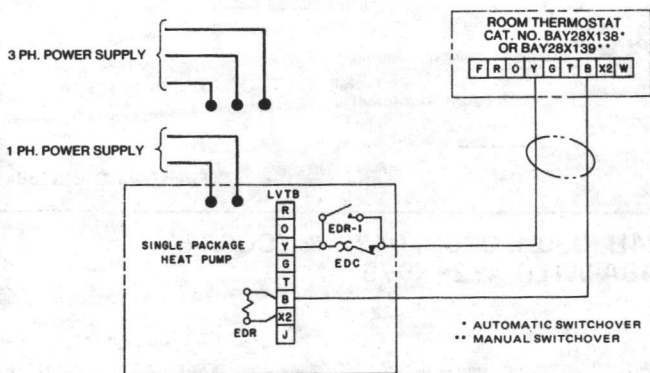
GENERAL:

This control is installed in the evaporator (indoor) coil. Its purpose is to cycle the compressor when the evaporator frosts under low outdoor ambient cooling conditions.

When installed on an "A" Coil, follow procedure below on either bank of the coil. For low ambient cooling performance, consult Service Manual.

NOTE: Hook-up diagrams for heat pumps on this page, hook-ups for cooling on back page.

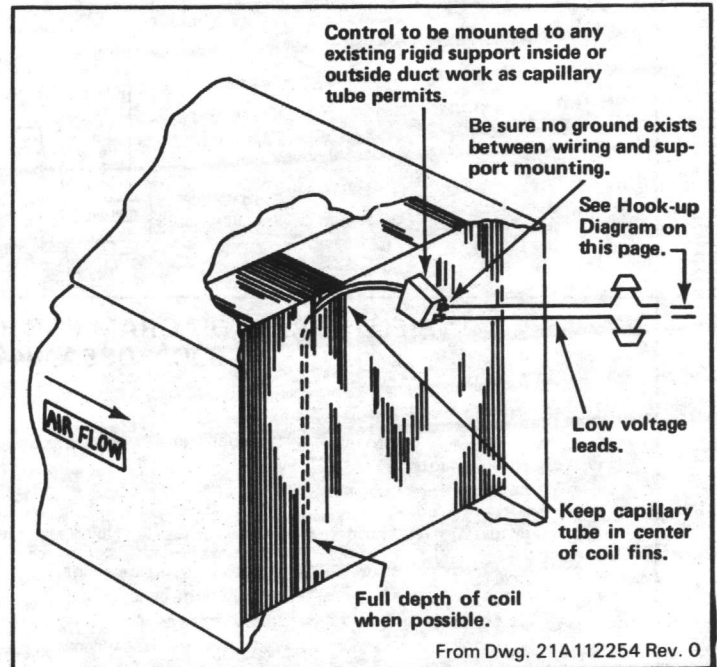
FIELD WIRING FOR SINGLE PACKAGE HEAT PUMP WITH AY28X084



NOTES:

1. SIZE OF POWER WIRING, AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
2. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE.
3. LOW VOLTAGE WIRING TO BE NO. 18 A.W.G. MINIMUM CONDUCTOR.

From Dwg. 21B123129 Rev. 1

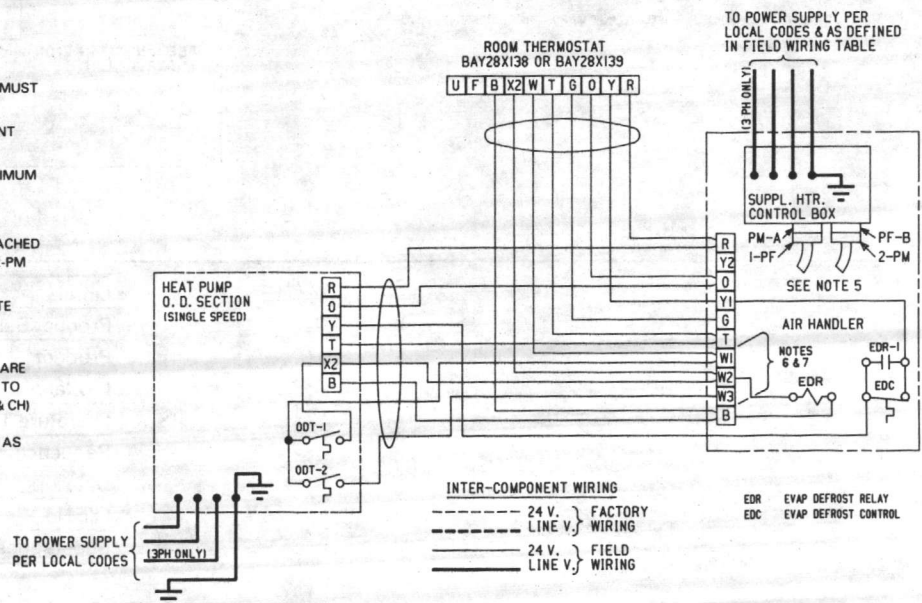


From Dwg. 21A112254 Rev. 0

FIELD WIRING FOR SPLIT SYSTEM HEAT PUMP WITH AY28X084

NOTES:

1. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
2. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE.
3. LOW VOLTAGE WIRING TO BE NO. 18 A.W.G. MINIMUM CONDUCTOR.
4. USE COPPER CONDUCTORS ONLY.
5. POLARIZED PLUG SECTIONS PM-A AND PF-B ATTACHED TO HEATER CONTROL BOX. SECTIONS 1-PF AND 2-PM FACTORY WIRED INTO AIR HANDLER.
6. IF ODT IS NOT USED, THEN CONNECT APPROPRIATE JUMPERS FROM W1 TO W2 AND W3 ON LVTB.
7. TERMINALS W2 AND W3 WILL HAVE INTERNAL CONNECTIONS ONLY IF 2ND & 3RD CONTACTORS ARE USED BY THE HEATER FOR CONTROLLING POWER TO ELECTRIC HEATING ELEMENTS. IF 2ND & 3RD (BH & CH) CONTACTORS ARE NOT USED, THEN FIELD CONNECTIONS TO W2 AND W3 CAN BE OMITTED AS APPROPRIATE.

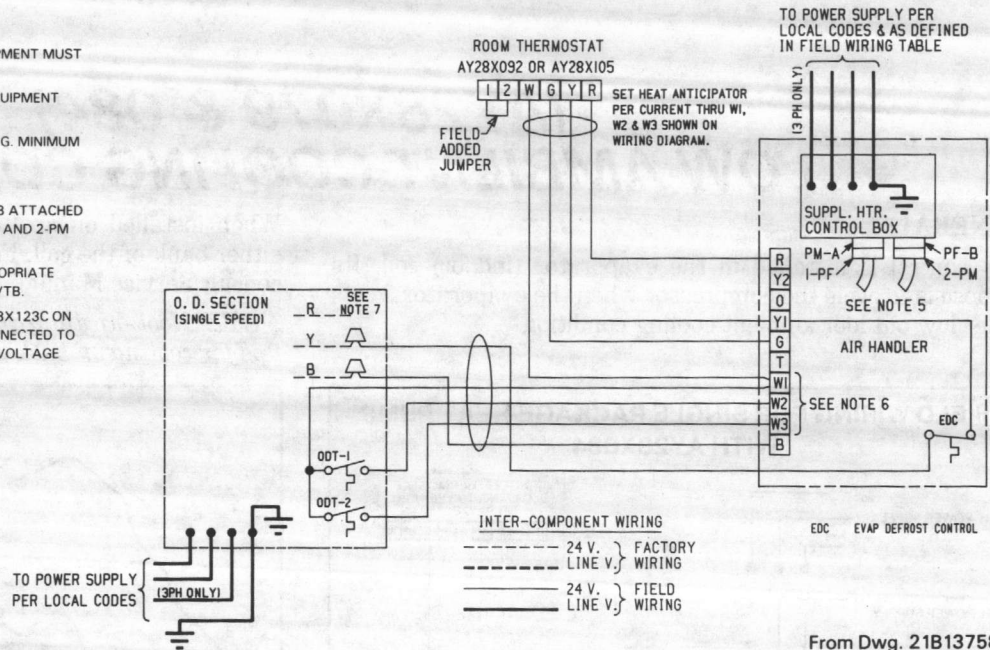


From Dwg. 21B137583 Rev. 0

FIELD WIRING DIAGRAM FOR SPLIT COOLING WITH AY28X079

NOTES:

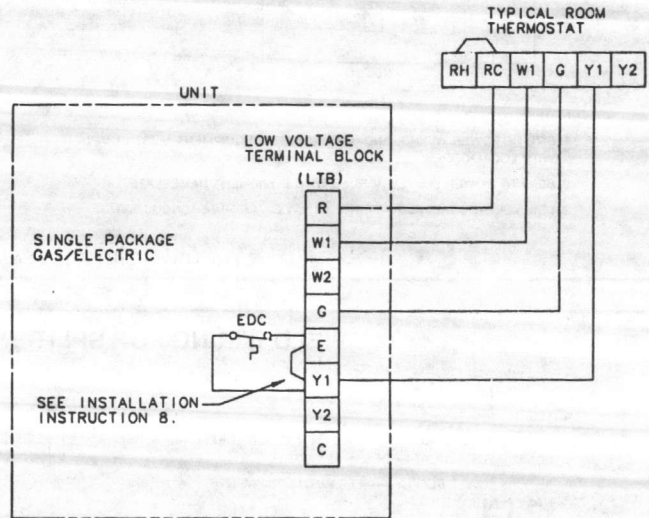
1. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
2. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE.
3. LOW VOLTAGE WIRING TO BE NO. 18 A.W.G. MINIMUM CONDUCTOR.
4. USE COPPER CONDUCTORS ONLY.
5. POLARIZED PLUG SECTIONS PM-A AND PF-B ATTACHED TO HEATER CONTROL BOX. SECTIONS 1-PF AND 2-PM FACTORY WIRED INTO AIR HANDLER.
6. IF ODT IS NOT USED, THEN CONNECT APPROPRIATE JUMPERS FROM W1 TO W2 AND W3 ON LVTB.
7. TO USE LOW AMBIENT COOLING KIT BAY28X123C ON 3 PHASE MODELS, "R" LEAD MUST BE CONNECTED TO "Y" LEAD IN ORDER TO SUPPLY CONTROL VOLTAGE FOR KIT.



FIELD WIRING DIAGRAM FOR BYC024H, 030H, 036H, 042H & YCC024A, 030A, 036A, 042A, 048A WITH AY28X079

EDC INSTALLATION INSTRUCTIONS

1. DISCONNECT POWER TO UNIT.
2. REMOVE BOTH TOP COVERS FROM UNIT.
3. SPREAD EVAPORATOR FINS TO ALLOW INSERTION OF EVAPORATOR DEFROST CONTROL (EDC) CAPILLARY TUBE INTO FULL DEPTH OF COIL. EDC CAPILLARY TUBE MUST BE LOCATED 2 TO 6 INCHES FROM HEADER END OF COIL (BETWEEN THE 2 ROWS OF TUBES). LOCATING HOLES ARE PROVIDED ON TOP EVAPORATOR COIL BLOCKOFF ON BYC024H & 030H UNITS.
4. LUBRICATE EDC CAPILLARY TUBE AND INSERT INTO FULL DEPTH OF COIL.
5. MOUNT EDC ON TOP CORNER OF INDOOR/OUTDOOR PARTITION PANEL.
6. ALL WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
7. WIRING FROM EDC TO LTB TO BE 18 AWG MINIMUM CONDUCTOR, WITH A MINIMUM INSULATION RATING EQUAL TO UNIT NAMEPLATE VOLTAGE.
8. REMOVE JUMPER BETWEEN E & Y1 ON THE LTB AND WIRE EDC AS SHOWN.
9. ALL WIRING SHOWN IS 24V FIELD SUPPLIED WIRING.
10. SEE UNIT INSTALLERS GUIDE FOR OTHER UNIT WIRING REQUIREMENTS.



Library	Service Literature
Product Section	Unitary
Product	Unitary Accessories
Model	Econ, Dampers, Motor, Low Ambient
Literature Type	Installer's Guide
Sequence	1B
Date	February 1988
File No.	SV-UN-ACC-DFST-IN-1B 2/88
Supersedes	DFST-IN-1A 10/87

The Trane Company
 Dealer Products Group • Troup Highway • Tyler, TX 75711
 An American-Standard Company

dwg. no. 21A113215 P07
 P.I.



TRANE™

CUST: C&S Mech.
ATTN: Roy Galloway
Job: RENOV. TO BLDG. 420 & 422

Unit Parts

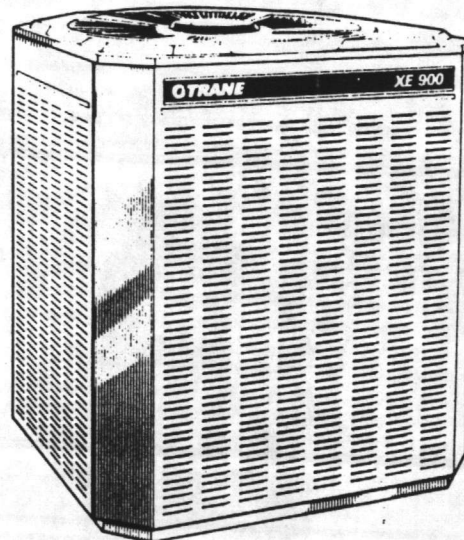
TTA-UP-1A

Library	Service Literature
Product Section	Unitary
Product	Split System-Cooling
Model	TTA
Literature Type	Unit Parts
Sequence	1A
Date	May 1989
File No.	SV-UN-S/S-TTA-UP-1A-589
Supersedes	TTA-UP-1

Cooling Unit Split System

Literature Change:

Compressor Changes &
General Update



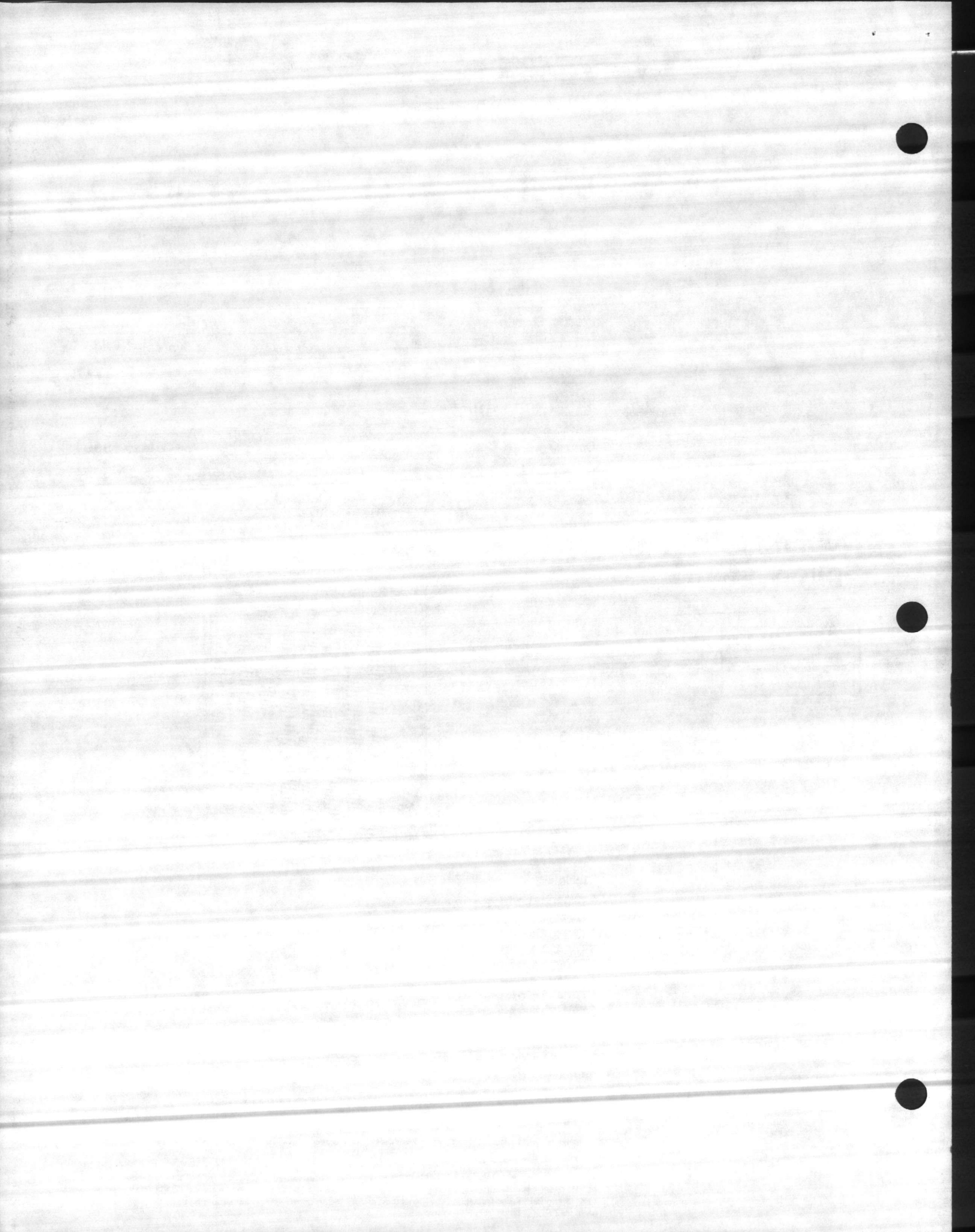
Models

TTA030A300A0
 TTA036A300A0
 TTA036A400A0
 TTA042A300A0
 TTA042A400A0
 TTA048A300A0
 TTA048A400A0
 TTA060A300A0
 TTA060A400A0
 TTA072A300A0
 TTA072A400A0

This parts list is designed for ease of parts selection. Wherever possible, the parts list allows parts selection without the use of the Trane model number. Parts may be selected from the illustrations and/or tables from the parts index located at the back of the parts list.

Contact your local Trane parts distributor for assistance or identification of any parts not identified in this parts list.

Since The Trane Company has a policy of continuous product improvement and parts standardization, it reserves the right to change specifications and design without notice. This parts list identifies known standardized parts and other parts changed by standardization. The installation and servicing of this equipment should be done by qualified, experienced technicians.



Model Number Description

Trane products are identified by a multiple character model number that precisely identifies a particular type of unit. An explanation of the alphanumeric model number is shown below. It will enable the owner or Service Engineer to define operation, components and accessories.

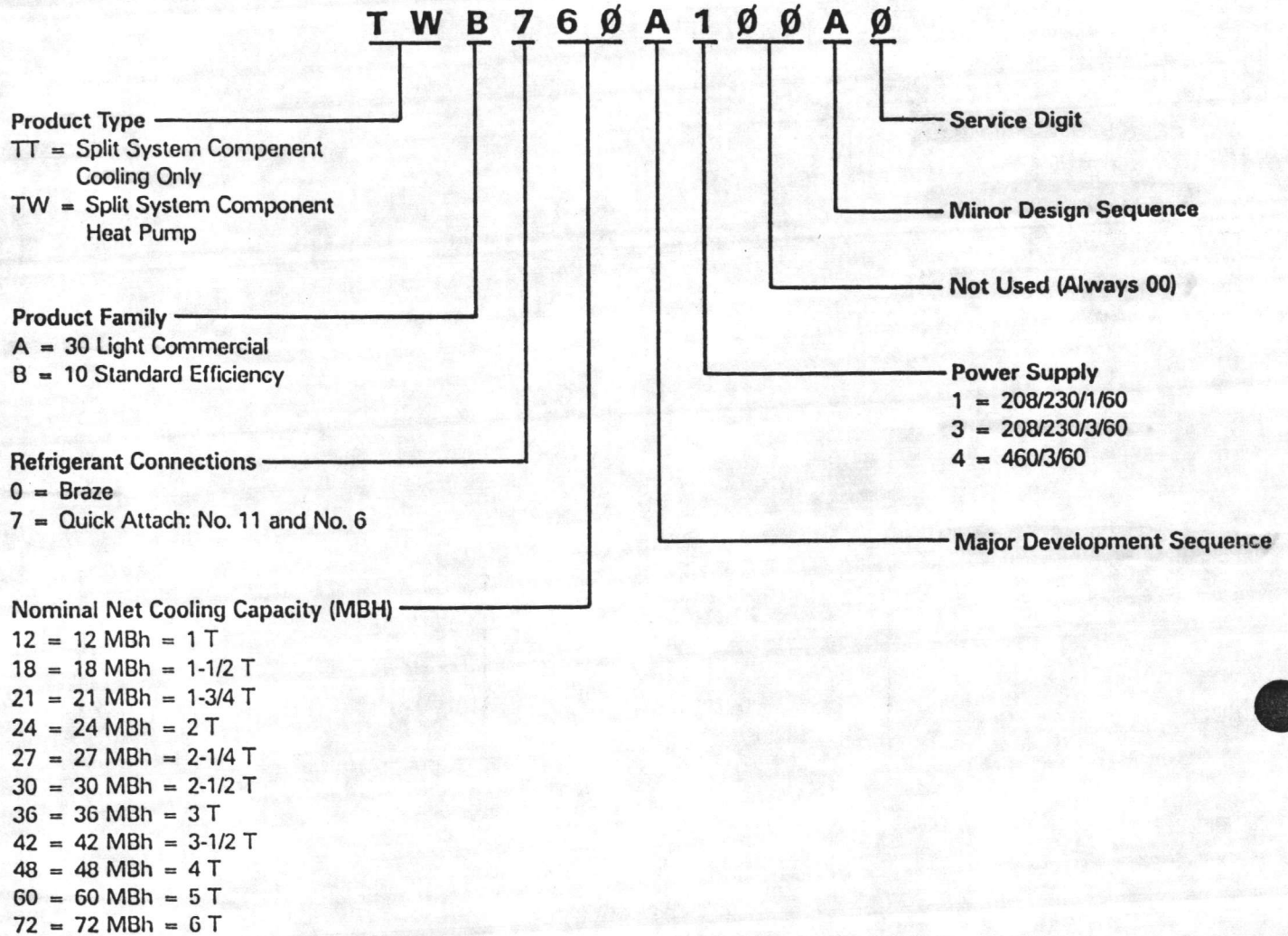


Table of Contents

Description	Section	Page
TTA030 & TTA036 Units	1	3
TTA042 & TTA048 Units	1	4
TTA060 Units	1	5
TTA072 Units	1	6

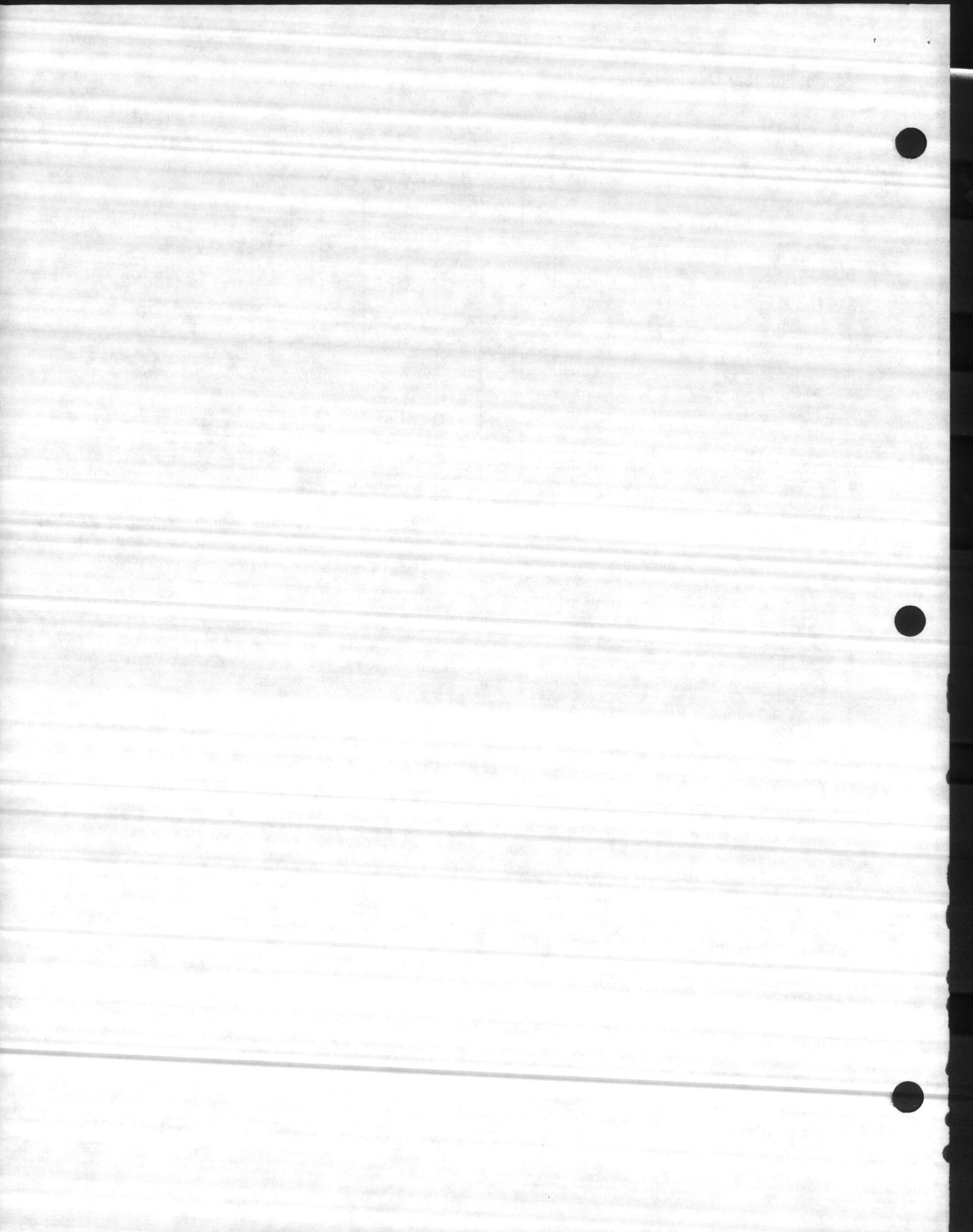
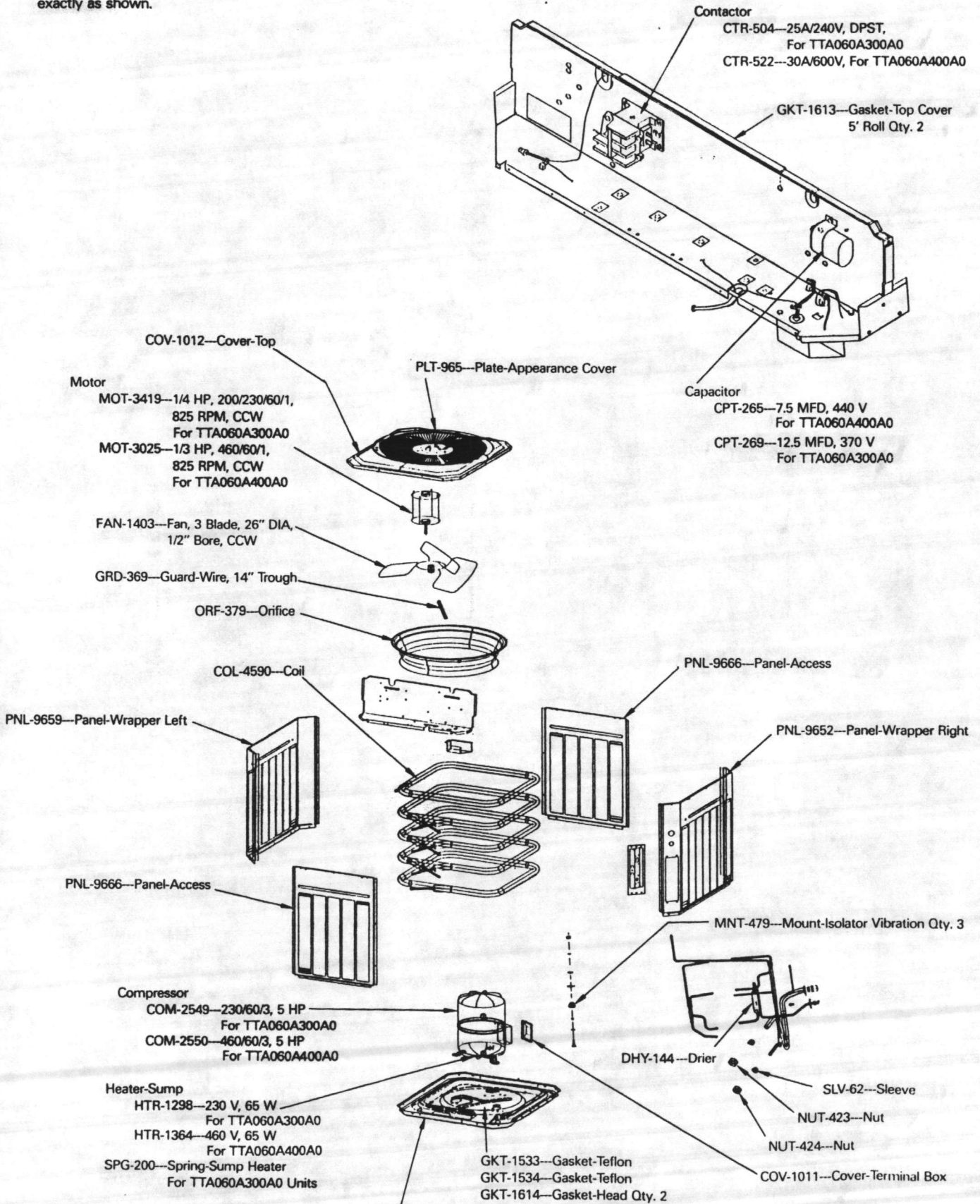
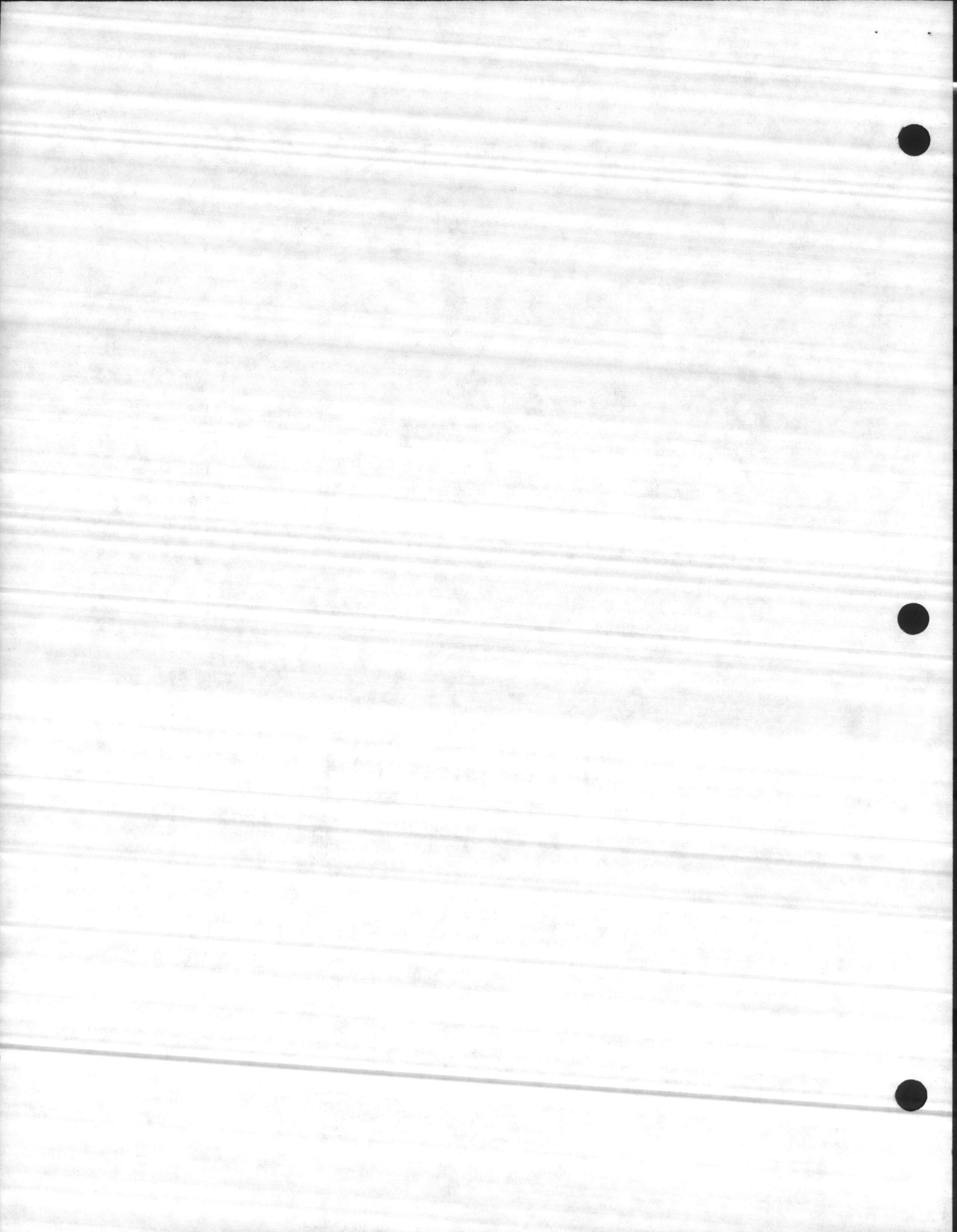


Illustration for TTA060A300A0 & TTA060A400A0

This is a typical illustration. The unit in the field may not appear exactly as shown.



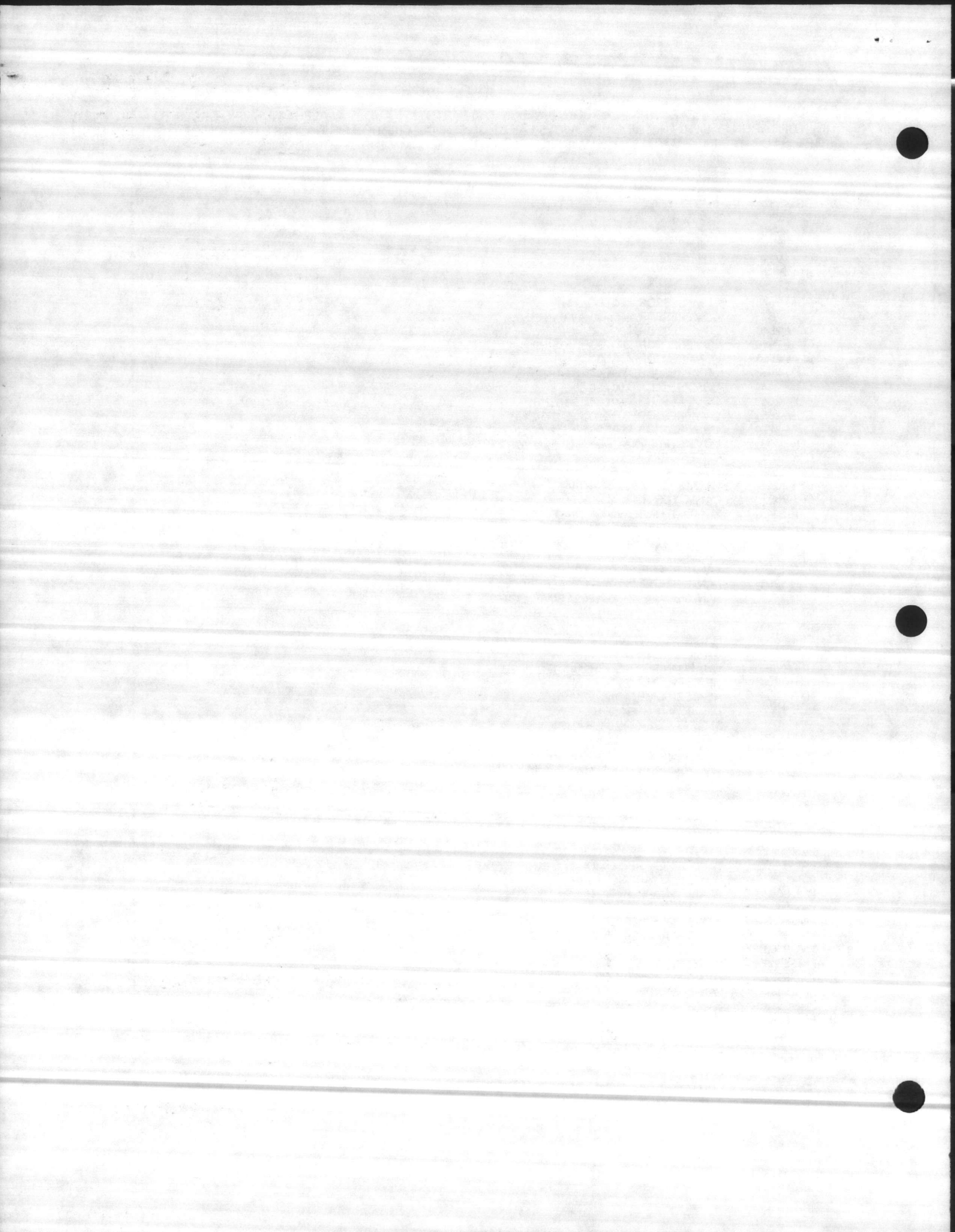
*Not Illustrated
 *BOD-66—Body-Valve
 *SWT-506—Switch-Pressure



Parts Index

THIS IS A LISTING OF PART NUMBERS CONTAINED IN THE PARTS LIST AND IS IN ALPHA-NUMERIC ORDER TO MAKE PARTS IDENTIFICATION EASIER. THIS INDEX PROVIDES PART NUMBER, DESCRIPTION OF THE PART, SECTION OF THE PARTS LIST THE PART IS LOCATED IN, QUANTITY AND WHETHER THE PART IS RECOMMENDED FOR LOCAL STOCK.

PART NO.	DESCRIPTION	SECTION	NO. REQ.	RLS
BOD-66	BODY-VALVE	1	1	
BRK-688	BRACKET	1	2	
COL-4587	COIL	1	1	
COL-4588	COIL	1	1	
COL-4589	COIL	1	1	
COL-4590	COIL	1	1	
COM-2542	COMPRESSOR, 200/230/60/3, 3 HP	1	1	+
COM-2543	COMPRESSOR, 460/60/3, 3 HP	1	1	+
COM-2545	COMPRESSOR, 200/230/60/3, 4 HP	1	1	+
COM-2546	COMPRESSOR, 460/60/3, 4 HP	1	1	+
COM-2549	COMPRESSOR, 200/230/60/3, 5 HP	1	1	+
COM-2550	COMPRESSOR, 460/60/3, 5 HP	1	1	+
COM-2553	COMPRESSOR, 460/60/3, 6 HP	1	1	+
COM-2642	COMPRESSOR, 200/230/60/3, 3-1/2 HP	1	1	+
COM-2643	COMPRESSOR, 460/60/3, 3-1/2 HP	1	1	+
COM-2651	COMPRESSOR, 200/230/60/3, 2-1/2 HP	1	1	+
COM-2774	COMPRESSOR, 200/230/50/3, 200/230/60/3, 6.2 HP	1	1	+
COV-1011	COVER-TERMINAL BOX	1	1	
COV-1012	COVER-TOP	1	1	
COV-1013	COVER-TOP	1	1	
CPT-265	CAPACITOR, 7.5 MFD, 440V	1	1	+
CPT-269	CAPACITOR, 12.5 MFD, 370V	1	1	+
CTR-504	CONTACTOR, 25A/240V, DPST	1	1	+
CTR-522	CONTACTOR, 30A/600V	1	1	+
DHY-144	DRIER	1	1	
DHY-145	DRIER	1	1	
FAN-1357	FAN, 3 BLADE, 26"DIA, 1/2" BORE, CCW	1	1	
FAN-1358	FAN, 3 BLADE, 22"DIA, 1/2" BORE, CCW	1	1	
FAN-1403	FAN, 3 BLADE, 26"DIA, 1/2" BORE, CCW	1	1	
GKT-1533	GASKET-TEFLON	1	1	
GKT-1534	GASKET-TEFLON	1	1	
GKT-1613	GASKET-TOP COVER, 5' ROLL	1	AR	
GKT-1614	GASKET-HEAD	1	2	
GRD-369	GUARD-WIRE TROUGH, 14" REQUIRED	1	1	
HTR-1298	HEATER-SUMP, 230V, 65W	1	1	+
HTR-1364	HEATER-SUMP, 460V, 65W	1	1	+
LUB-5	LUBRICANT-GREASE SILICONE	1	1	
MNT-479	MOUNT-ISOLATOR VIBRATION	1	3	
MNT-517	MOUNT-ISOLATOR UNIT	1	4	
MOT-2953	MOTOR-1/3 HP, 200/230/60/1, 825 RPM, CCW	1	1	
MOT-3025	MOTOR, 1/3 HP, 460/60/1, 825 RPM, CCW	1	1	+
MOT-3419	MOTOR, 1/4 HP, 200/230/60/1, 825 RPM, CCW	1	1	+
NUT-423	NUT	1	1	
NUT-424	NUT	1	1	
ORF-379	ORIFICE	1	1	
ORF-388	ORIFICE	1	1	
PAI-74	PAINT-SLATE GRAY TOUCHUP	1	1	
PAI-75	PAINT-FINISH-RED OXIDE TOUCHUP	1	1	
PLT-965	PLATE-APPEARANCE COVER	1	1	
PNL-9652	PANEL-WRAPPER RIGHT	1	1	
PNL-9653	PANEL-WRAPPER RIGHT	1	1	
PNL-9659	PANEL-WRAPPER LEFT	1	1	
PNL-9660	PANEL-WRAPPER LEFT	1	1	
PNL-9666	PANEL-ACCESS	1	2	
PNL-9669	PANEL-ACCESS	1	2	
PNL-9692	PANEL-WRAPPER LEFT	1	1	
PNL-9694	PANEL-WRAPPER RIGHT	1	1	
PNL-9693	PANEL-ACCESS	1	2	
PNL-9695	PANEL-WRAPPER LEFT	1	1	
PNL-9696	PANEL-ACCESS	1	2	
PNL-9697	PANEL-WRAPPER RIGHT	1	1	
SLV-56	SLEEVE	1	1	
SLV-57	SLEEVE	1	1	
SLV-62	SLEEVE	1	1	
SPG-200	SPRING-SUMP HEATER	1	1	
SWT-506	SWITCH-PRESSURE	1	1	+



BWE-SQ-200.02



SUBMITTAL

TAG: FC-1-8

**5 Ton
Convertible
Air Handler
BWE060C**

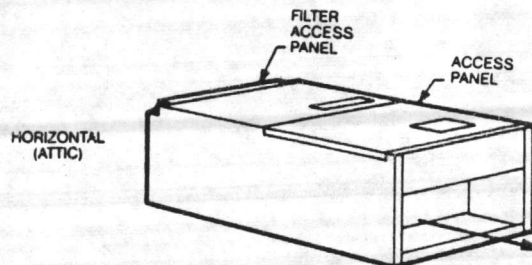
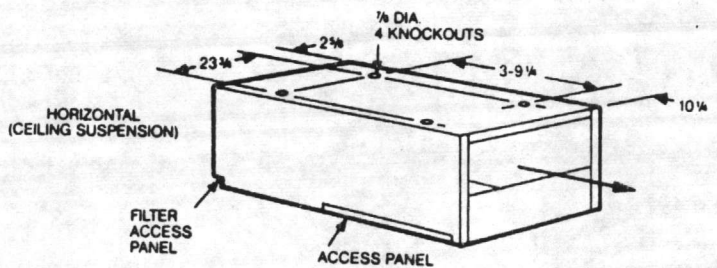
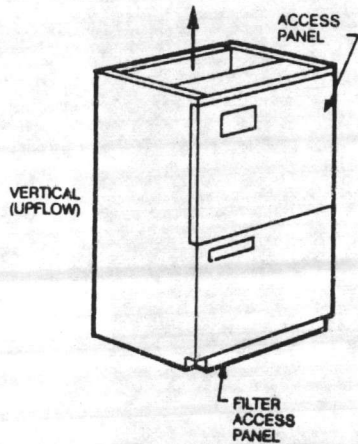
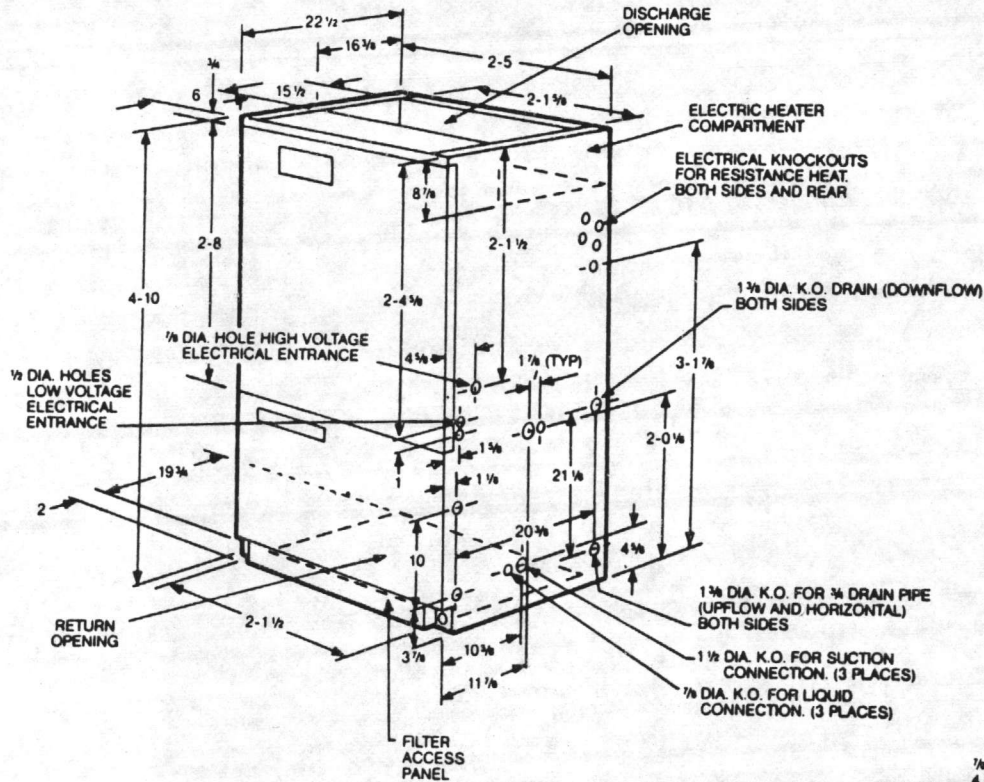
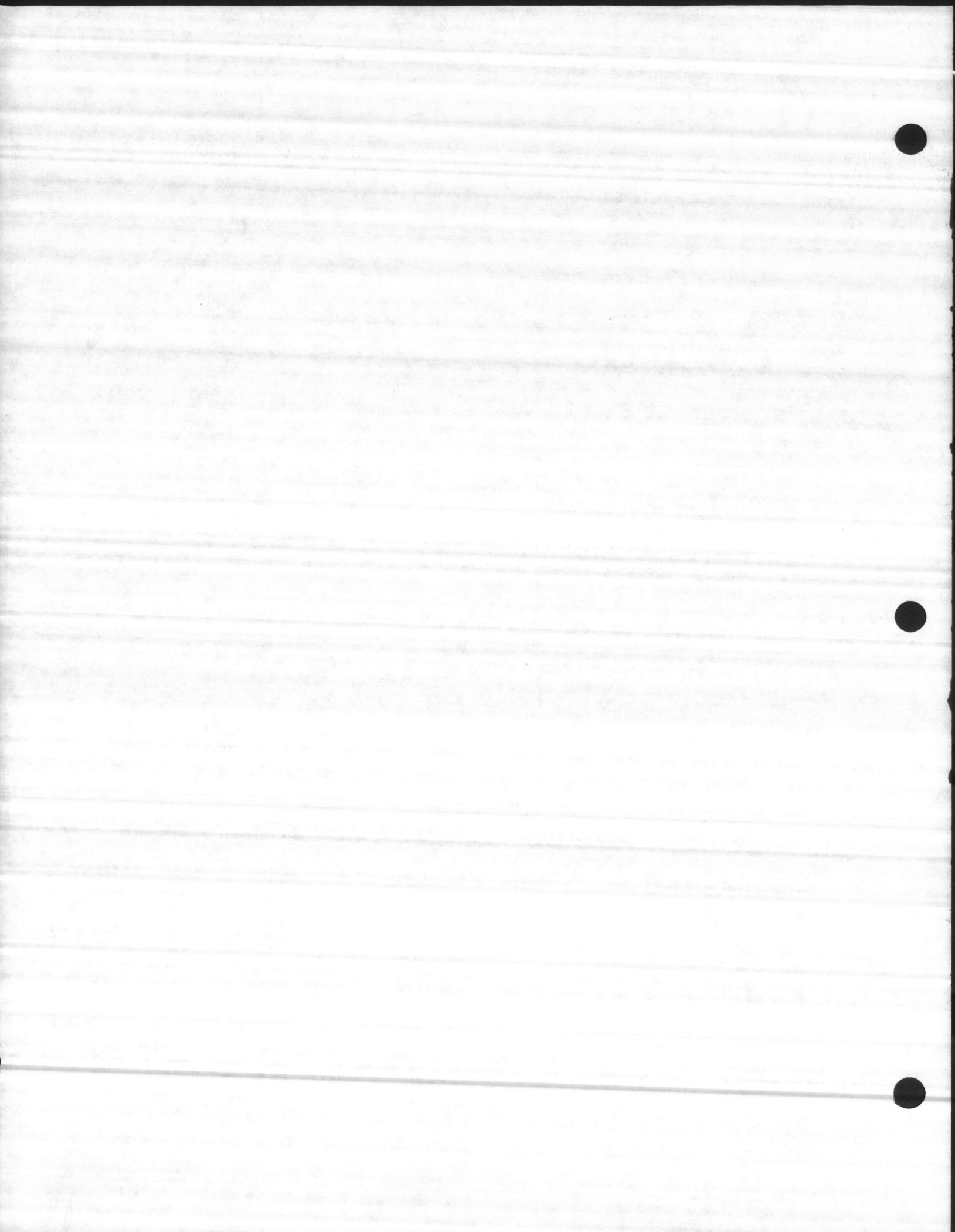


Table 1 Unit Weights (Lbs.)

Model	BWE060C
Shipping	244
Net	234





INSTALLER'S GUIDE

Air Handler 5 Ton

**Models:
BWE060C-G**

Library	Service Literature
Product Section	Unitary
Product	Split System A/C-Evap. Fan-Coil
Model	BWE
Literature Type	Installer's Guide
Sequence	4
Date	June 1986
File No.	SV-UN-S/S-BWE-IN-4 6/86
Supersedes	New
Ordering No.	

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change specifications and design without notice. The installation and servicing of the equipment referred to in this booklet should be done by qualified, experienced technicians.

ALL phases of this installation must comply with NATIONAL, STATE and LOCAL CODES.

These instructions do not purport to cover all variations in systems nor to provide for every possible contingency to be met in connection with installation. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to The Trane Company, Light Commercial Group.

A. GENERAL

This instruction covers the installation of the WE—C air handlers. This equipment can be used in the applications listed in the table below.

MODEL NO.	APPLICATION	ACCESS
BWE060C BWE060C	Vertical Upflow (as shipped)	Front
	Downflow (field converted)	Front
	Horizontal	Bottom (as shipped)
	Horizontal (field converted)	Top

1. **Inspection** — Check carefully for any shipping damage. If damaged, this must be immediately reported to, and claims made against the transportation company. Replace damaged parts with authorized parts only.

2. **Installation Limitations and Recommendations** — The general location of the Air Handler is normally selected by the architect, contractor, and/or buyer. For proper installation the following items must be considered.

Check the available power supply to determine compatibility with that specified on the nameplate of the unit.

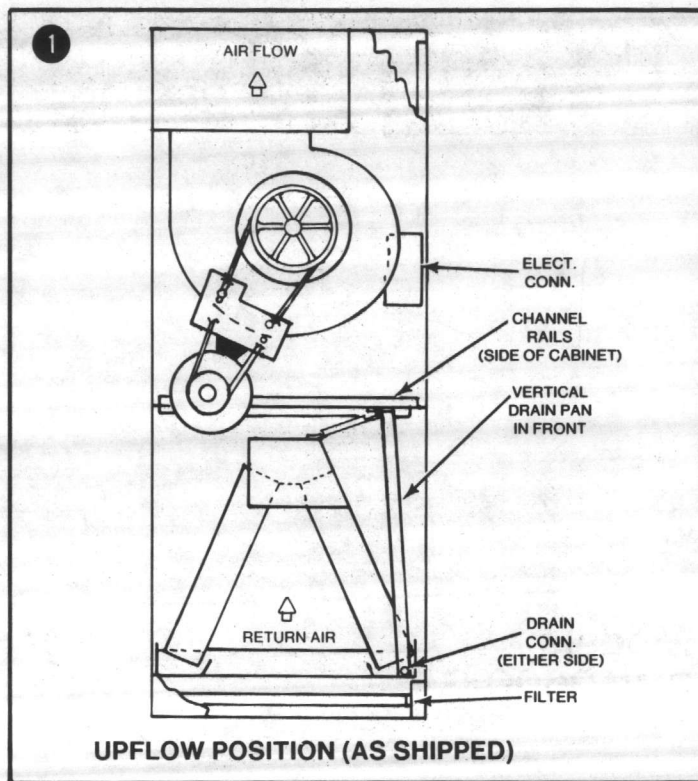
3. It is recommended that the outline drawings (pages 6, 7 and 8) be studied and dimensions properly noted and checked against selected installation site. By noting in advance which knockouts are to be used, proper clearance allowances can be made for installation and possible future service.

CAUTION: If adding external accessories to the unit, additional clearance must be considered for the overall space needed.

For installation of accessories available for this air handler, follow the instructions packed with each accessory.

ACCESSORIES

AY28X079	Kit Low Temp. Cool
AY28X084	Kit Low Temp. Cool
BAYDFSR003	Air Diffuser
BAYFLTR007	Enc. Grille Filter
BAYFLTR005	Encl. Filter
BAYWATR001	Coil-Hot Water
BAYWATR002	Coil-Hot Water
BAYWATR003	Coil-Steam
BAYWATR004	Coil-Steam
BAYWATR005	Coil-Steam
BAYPLNM011	Wet Heat Encl
AY99X104	Kit Subbase
BAYPLNM012	Plenum



4. When air handler with Supplementary Heater is to be installed in the downflow position on combustible flooring an accessory sub-base must be used.

If supplementary heaters are installed, power supplies must be installed so that no branch circuit load exceeds 48 amps.

CAUTION: All duct work and refrigerant gas piping must be insulated.

5. **Positioning** — The final position must be determined by service access to unit, weight distribution over structural supports, electrical and refrigerant lines and piping for condensate drainage.

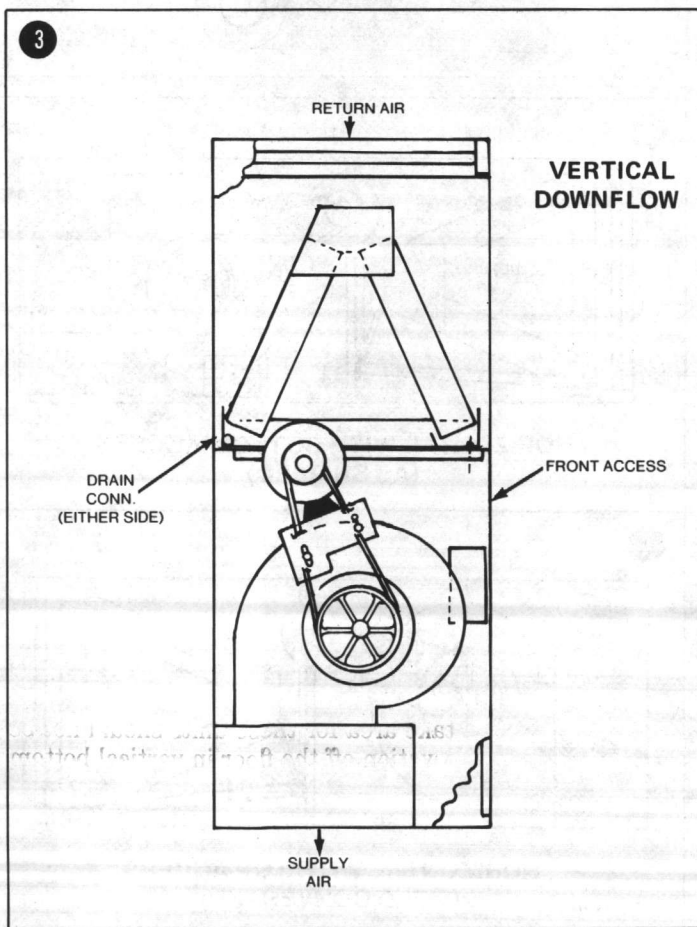
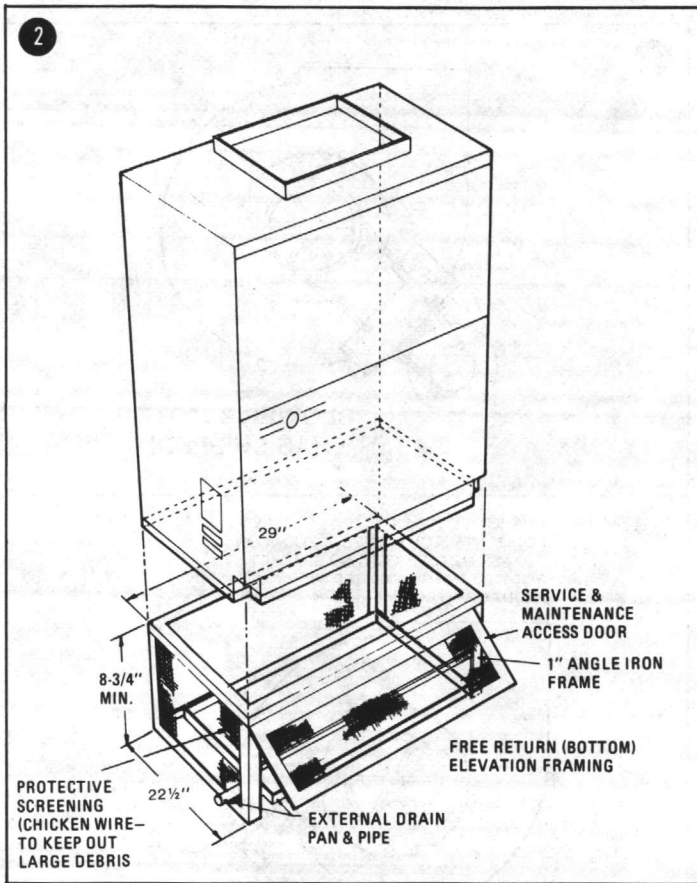
UNIT INSTALLATION

1. **Vertical Upflow—Front Access.** Determine how the return will be ducted into the unit. If return duct is brought in under the unit foundation, be sure the connecting return is the same dimension as the return opening of the unit. These dimensions are shown in outline drawings (pages 6, 7 and 8).

If the Air Handler is free standing or ducted inside the conditioned space, a frame strong enough to support the unit total weight must be provided, and it must be high enough to provide proper unrestricted return air.

The total return air intake area for these units should not be less than 503 sq. in. Elevation off the floor in vertical bottom return configuration should be 8³/₄" minimum. See Figure 2.

The suggested method for elevating the unit is the Filter Enclosure (AY85X063) and Filter Enclosure Grille (AY82X245) or build a frame of angle iron. A protective wire mesh (hardware cloth or fine chicken wire) can be used to prevent the entry of small objects. See Figure 2.



2. **Vertical Downflow** — Conversion (*Note: Unit must be field converted for this application — See Figure 3.*)

- a. Set Air Handler in the vertical (upflow) position.
- b. Remove upper front access panel by removing two (2) screws at bottom corners of the panel, then pull panel out slightly at the bottom and down to remove.
- c. Position Air Handler Cabinet horizontally on its back side.
- d. Remove filter access panel by removing the two (2) knobs which hold the filter access panel in place, also remove filter.
- e. Remove lower front access panel by removing a screw from each corner of the panel.
- f. Remove the six (6) screws holding coil in place. Four (4) screws are located at the top of the vertical drain pan leg and pan support angles, attached to channel rails on each side of Air Handler cabinet. The other two (2) are located at the bottom front — in the filter access panel area.
- g. Remove and discard the two (2) small support angles attached to top corners of vertical drain pan, since they are not needed for vertical downflow application.
- h. Set Air Handler in the vertical (upflow) position.
- i. Slide the coil and drain pan assembly out of the Air Handler cabinet.
- j. Position Air Handler cabinet vertically in a downflow position. See Figure 3.

CAUTION: Place unit on 2" x 4" wood or equivalent so supply air duct flanges are not bent or damaged.

k. Remove and discard vertical drain pan leg and braces from coil and drain pan assembly:

STEP 1. Remove two (2) screws at bottom of vertical drain pan leg. Remove two (2) screws from braces and top (apex) of coil.
STEP 2. Replace two (2) screws at top of coil apex, removed in step 1.

l. With unit still in a vertical downflow position; position coil so that drain connections will exit the cabinet at the rear of either side panel and the top (apex) of coil is nearest the return air opening of cabinet.

m. Slide coil into cabinet on channel rails on each side of cabinet. Coil assembly must be lifted over blower motor and positioned down on channel rails with coil assembly fully inserted into the cabinet.

n. Secure rail of coil and drain pan assembly to channel rails on each side of cabinet, at front bottom of coil assembly and cabinet side rails. Secure with two (2) screws previously removed from bottom front of the vertical drain pan leg — in the filter panel area in item f. above.

IMPORTANT: Check for clearance between the motor and coil, also for correct belt tension.

o. Remove knockouts provided for drain lines (one each side).

p. Replace filter.

**IMPORTANT: As noted in the "Installations Limitations and Recommendations" when a unit with Supplementary Heater is installed on a combustible flooring a sub-base accessory must be used. See Installation Instruction pack-
ed with the sub-base to prepare the opening in the floor and for installation of the field fabricated supply duct or plenum.**

UNIT INSTALLATION (Cont.)

NOTE: Secure access panels if not making connections (electrical or refrigerant), or mounting, at this time. The Trane emblem will be upside down when the panel is reinstalled.

q. Go to Refrigerant Piping section for balance of instructions.

3. Horizontal — Suspension Kit & Auxiliary Drain Pan. If the Air Handler is to be suspended, use Suspension Mounting Kit or equivalent from (Joiner-Meade-Capers, Inc., 3720 Cedar Springs, Dallas, Texas, 75219, **PHONE: 1-214-526-8624**). When ordering the above kit, specify rubber or spring mounting and weight of unit plus any added accessories. (See Product Specs for weights.)

Hanging rails or channels and suspended mounting rods may be purchased locally.

A field fabricated auxiliary drain pan should be installed under the unit for all horizontal applications; at least 2" beyond the horizontal dimensions of the air handler. This drain pan would take care of any excess condensation due to extreme humidity condition or possible drain obstruction. Isolate the drain pan either from the Air Handler or from the structure. If the application is a "bottom-access" then suspend the drain pan, so it may be removed easily for servicing of the Air Handler.

Connect the auxiliary drain pan to a separate drain line. (No trap is needed in this drain line.)

4. Horizontal With Bottom Access — Suspension. Unit is shipped in this configuration — no internal unit changes are required with the exception of one (1) on the three phase models. Remove mounting screws of electrical junction box and rotate junction box 90° to new mounting holes and re-mount box using previously removed screws. (See Figure 6).

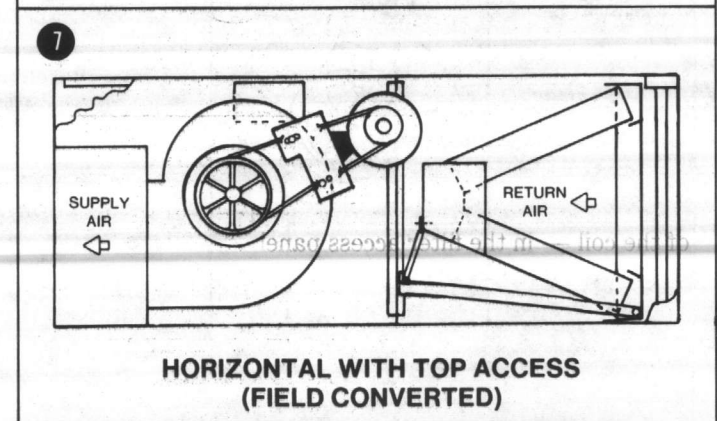
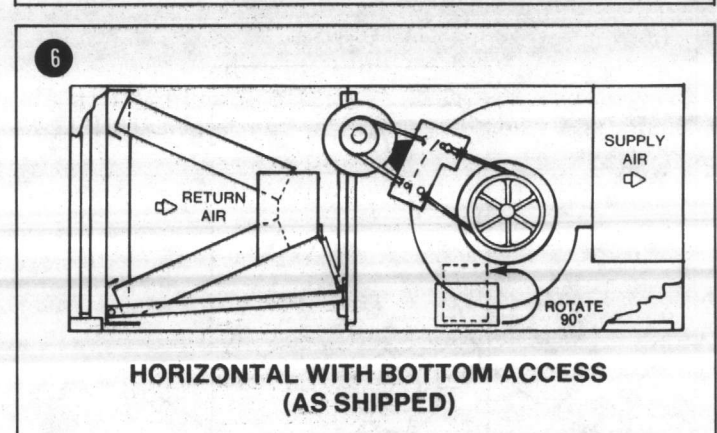
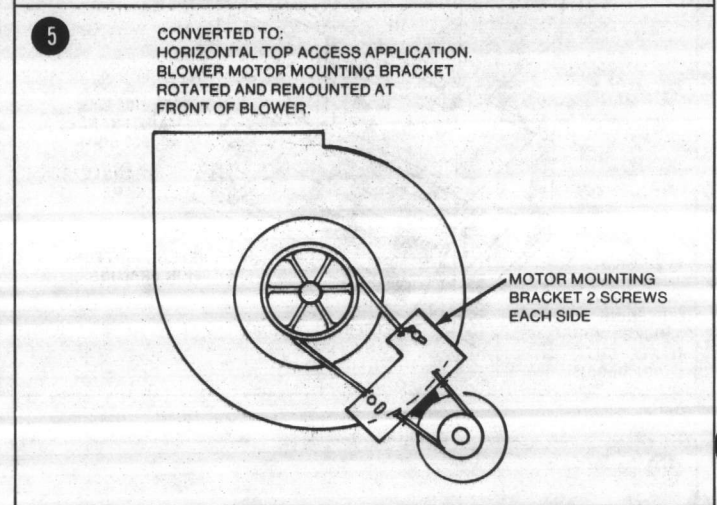
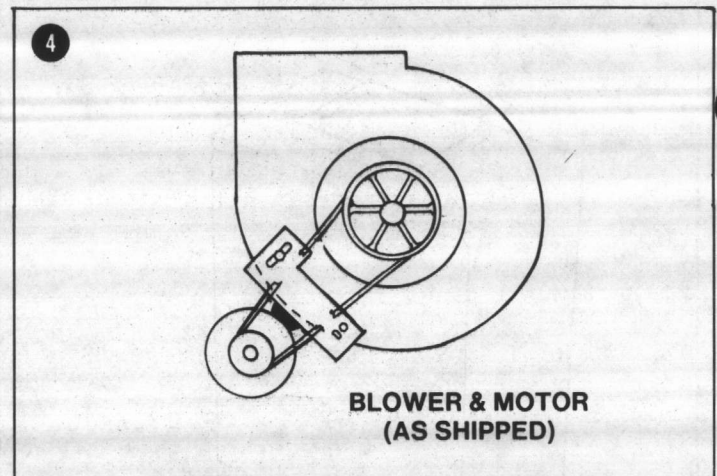
Check the dimensions of the knockouts in rear panel of cabinet (See outline drawings, pages 6, 7 and 8). Position illustrated in Figure 6.

IMPORTANT: Re-enforce cabinet at rear panel knockouts for suspension rods.

Align holes with structural supports and secure suspension rods to structure, then to Air Handler cabinet. If knockout holes (See Outline Drawings - pages 6, 7 and 8) will not permit alignment to existing structure, it may be necessary to field fabricate cross members to structural beams.

5. Horizontal With Top Access — Conversion. (*NOTE: The unit must be field converted for this application. See Figure 7.*)

- Set Air Handler in the vertical upflow position.
- Remove upper front access panel by removing two (2) screws at bottom corners of the panel, then pull panel out slightly at the bottom and down to remove.
- Position Air Handler cabinet horizontally on its back side.
- Remove filter access panel by removing the two (2) knobs which hold the filter access panel in place, also remove filter.
- Remove lower front access panel by removing a screw from each corner of the panel.
- Remove the six (6) screws holding coil in place. Four (4) screws are located at the top of the vertical drain pan leg support angles and channel on each side of Air Handler cabinet. The other two (2) are located at the bottom front — in the filter access panel area.



NOTE: The two (2) pan support angles attached to the top of the vertical drain pan, should remain attached — since they will be needed for later use.

- g. Set Air Handler in the vertical upflow position.
- h. Remove motor wire clamp and wires from blower housing.
- i. Slide the coil and drain pan assembly out of the Air Handler cabinet. (Vertical leg of drain pan is to the front of the cabinet.)
- j. Remove motor mounting bracket from blower housing with motor still attached to motor mounting bracket:
STEP 1 - Remove two (2) screws from fan motor mounting bracket and blower housing — pulley side.
STEP 2 - Remove two (2) screws from opposite side of fan motor mounting bracket and blower housing, while supporting motor and motor mounting bracket.
STEP 3 - Remove motor and mounting bracket from blower housing and remove motor pulley out of drive belt. Place motor and mounting bracket outside cabinet with wires still attached.
- k. Rotate the coil and drain pan assembly to position vertical leg of drain pan toward the rear of the cabinet.
- l. Slide coil and drain pan assembly into cabinet with vertical leg of drain pan to the back of cabinet, and top (apex) of coil positioned up toward the blower housing.
- m. Secure support angle brackets on top of vertical drain pan to channel rails on each side of cabinet (coil may need to be tilted slightly to align screw holes).
- n. Remove motor from motor mounting bracket and re-mount motor on mounting bracket with pulley at opposite end of mounting bracket; fan motor and mounting bracket to be re-mounted to front mounting location of blower housing. See Figures 4 and 5.
IMPORTANT: It will be necessary to alter or move the suction (gas) tube slightly to provide clearance for the motor. It will be necessary to loosen clamp on liquid line also, for clearance for motor. Caution must be exercised to prevent crimping of tubes on end of coil to suction and liquid lines when moving refrigerant tubes.
- o. Place motor pulley in drive belt (to aid in supporting motor weight) and position motor mounting bracket on blower housing at front mounting location of blower housing: See Figure 5.
STEP 1 - Secure motor mounting bracket to front mounting position of blower housing on side opposite motor pulley (right side as you face the unit.)
STEP 2 - Secure motor mounting bracket to blower housing at pulley side (left side as you face the unit.)
IMPORTANT: Check and adjust for correct belt tension and clearance between the motor and coil tubes.
- p. Replace clamp with motor wires to blower housing, same location as removed from in Item h. above and dress wires to prevent damage to wires. Replace clamp on liquid line and secure to prevent vibration.
- q. Position Air Handler Cabinet horizontally on its back side.
- r. Replace the two (2) screws removed from the bottom front of the coil — in the filter access panel area.
- s. Remove knockouts provided for drain lines (one (1) for each side).
- t. Replace filter.

IMPORTANT: A field fabricated auxiliary drain pan should be installed under the Air Handler, particularly in attic applications.

NOTE: Secure access panels if not making connections (electrical or refrigerant), or mounting, at this time.

- u. Go to Refrigerant Piping section for balance of instructions.

6. Top Access — Suspension. To secure unit in place, check the dimensions of the knockouts in rear bottom panel of cabinet. (See Outline Drawings - pages 6, 7 and 8). Position illustrated in Figure 7.

A suggested method for suspending the Air Handler from structural beams. Attach cross supports to rear bottom panel of Air Handler with the ends extended far enough beyond each side of the air handler to provide adequate clearance for service, when the four (4) suspension rods are attached. Supports to be of sufficient strength to provide support for the weight of unit and ducts, plus any accessories (factory or field installed).

Align holes of supports with structural supports, and secure suspension rods to structure, then to unit supports. If holes at the end of air handler supports do not align with existing structure, it may be necessary to field fabricate cross members to structural beams, joist or other supports in the building.

REFRIGERANT PIPING

NOTE: Refer to "Refrigerant Piping Guide" Pub. No. 22-3040 Tab 16 in "APPLICATION MANUAL".

All refrigerant piping connections are made inside the cabinet. The refrigerant lines may enter the cabinet through factory provided knockouts. Insulate refrigerant gas piping, including that inside cabinet over apex (top) of coil.

NOTE: You will find a bag attached to refrigerant tube at top of coil, inside the bag you will find two (2) grommets. Insert in the appropriate refrigerant line size knockout holes prior to installing the refrigerant lines.

Installation, brazing, leak testing evacuation of refrigerant lines are covered in the installation instructions packaged with the outdoor unit. Read the instructions before starting installation of refrigerant lines.

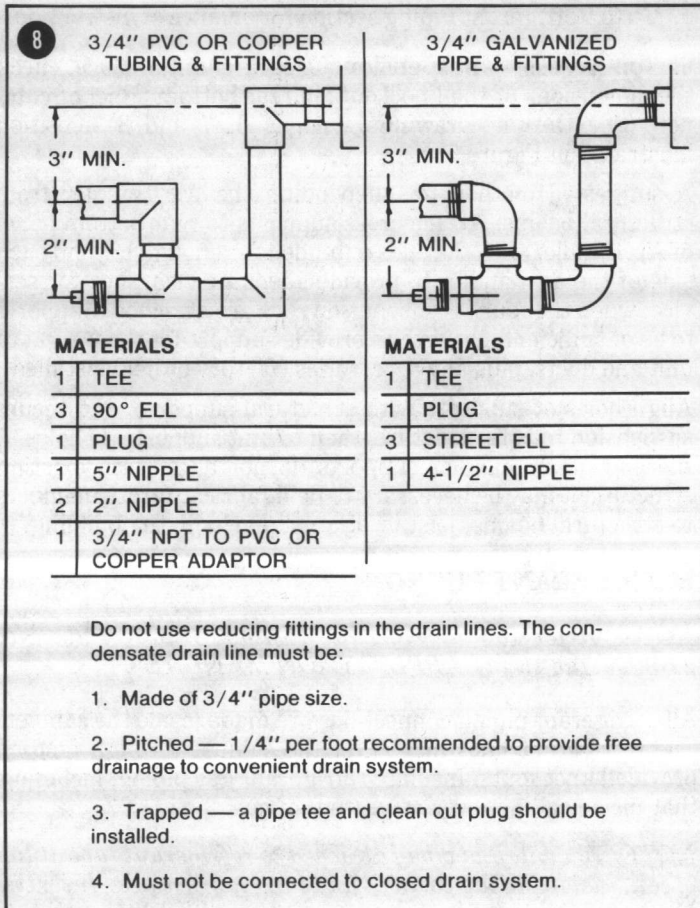
Do not remove sealing caps on ends of Air Handler refrigerant lines until ready to braze lines to unit.

CAUTION: This air handler is shipped with a holding charge in coil. BE SURE to bleed off the holding charge before unbrazing seal cups. DO NOT bleed holding charge until refrigerant lines are ready to be connected.

IMPORTANT: When routing refrigerant lines in the cabinet be sure to allow enough clearance with the motor so the full motor adjustment may be made if necessary.

CONDENSATE PIPING

Drain connection knockouts are provided on both sides of the Air Handler. Drain location is shown in Outline Drawings - pages 6, 7 and 8. (See Figure 8 for typical drain trap assembly.)



NOTE: When air handlers are installed above ceilings or in other locations where damage from condensate overflow may occur, it is recommended that a field fabricated auxiliary drain pan be installed under the air handler. Drain lines from this pan must be installed, but should not be connected to the primary drain line from the air handler.

DUCT CONNECTION

The supply and return ducts should be connected to the unit with flame retardent duct connectors.

The return duct should be sized to the same dimensions as the return inlet of the unit, (see outline drawing).

FILTERS

Shipped with the air handler is one semi-permanent high velocity (27 x 21½ x 1) filter. Due to the unique size of this filter, it may be necessary to contact your installing dealer or consult the yellow pages of your telephone book for the nearest Trane air conditioning contractor.

ELECTRICAL CONNECTIONS

WARNING: When installing or servicing this equipment, ALWAYS exercise basic safety precautions to avoid the possibility of electric shock.

1. All electrical lines, sizing, protection, and grounding must be in accordance with national and local electrical codes.
2. Install a separate disconnect switch at the outdoor unit.
3. Isolate conduit whenever vibration transmission may cause a noise problem within the building structure.
4. Be sure all connections are made tight and no wires exposed.
5. All electrical accessories must be installed and wired according to the instructions packaged with that accessory.

The electrical connections are made in the fan junction box located on the side of the Air Handler.

Wiring entrance into the junction box is through holes provided on the side of the cabinet. (See Outline Drawings on pages 6, 7 and 8). Wire and fuse sizes may be selected from wiring diagram attached to unit.

Field wiring diagrams for unit accessories are shipped with the accessory.

THERMOSTAT & CONTROL CONNECTIONS

Mount the thermostat in the desired location.

Install color coded low voltage cable between outdoor unit, indoor unit and thermostat.

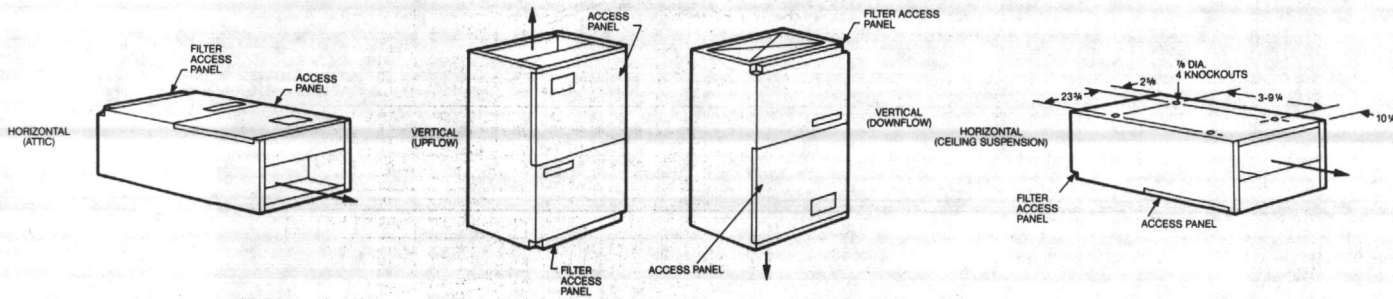
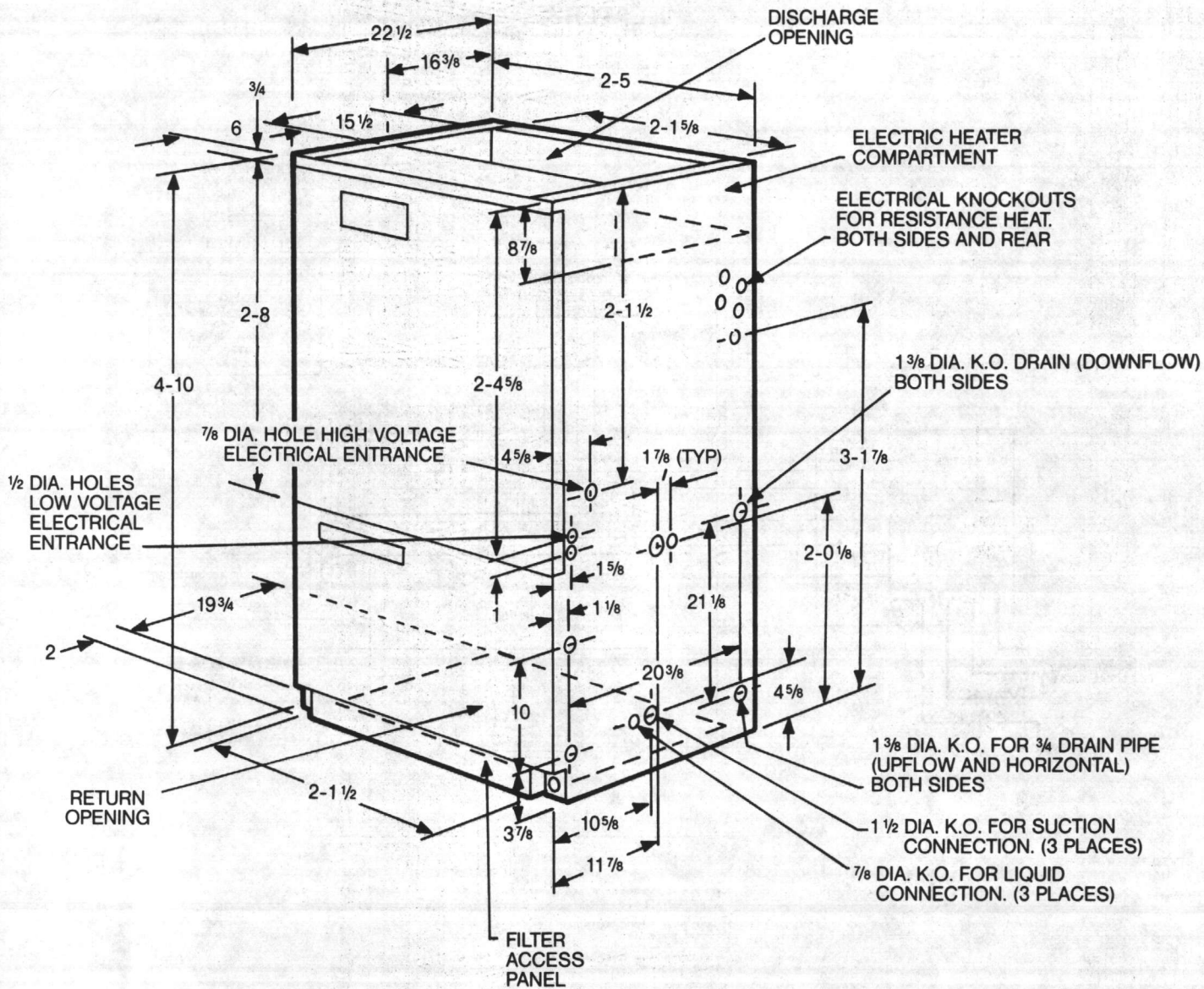
Connect low voltage control conductors per field wiring diagrams accompanying the units or the diagrams on page 9 & 10. Observe all notes on these diagrams.

OPERATIONAL AND CHECKOUT PROCEDURE

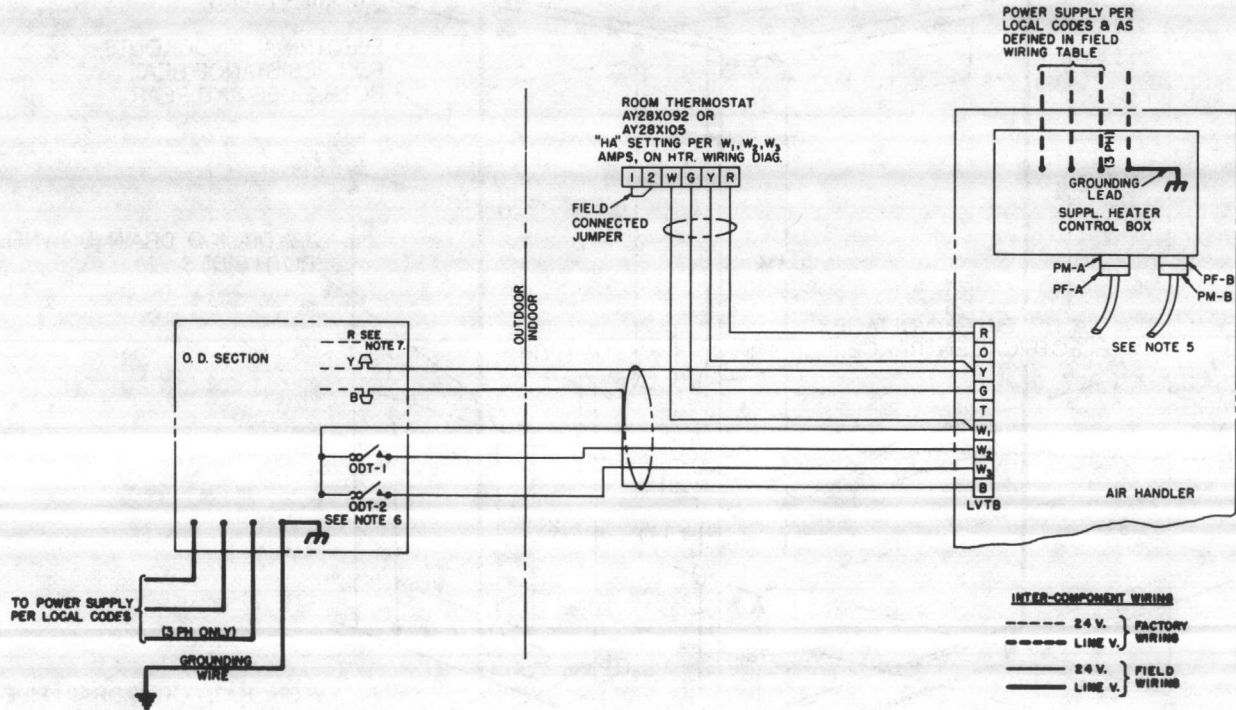
The final phases of the installation are the "Checkout Procedures and Operation Checks". Go to page 12 for checkout of this portion of the installation.

BWE060C AIR HANDLERS

(ALL DIMENSIONS ARE IN INCHES)



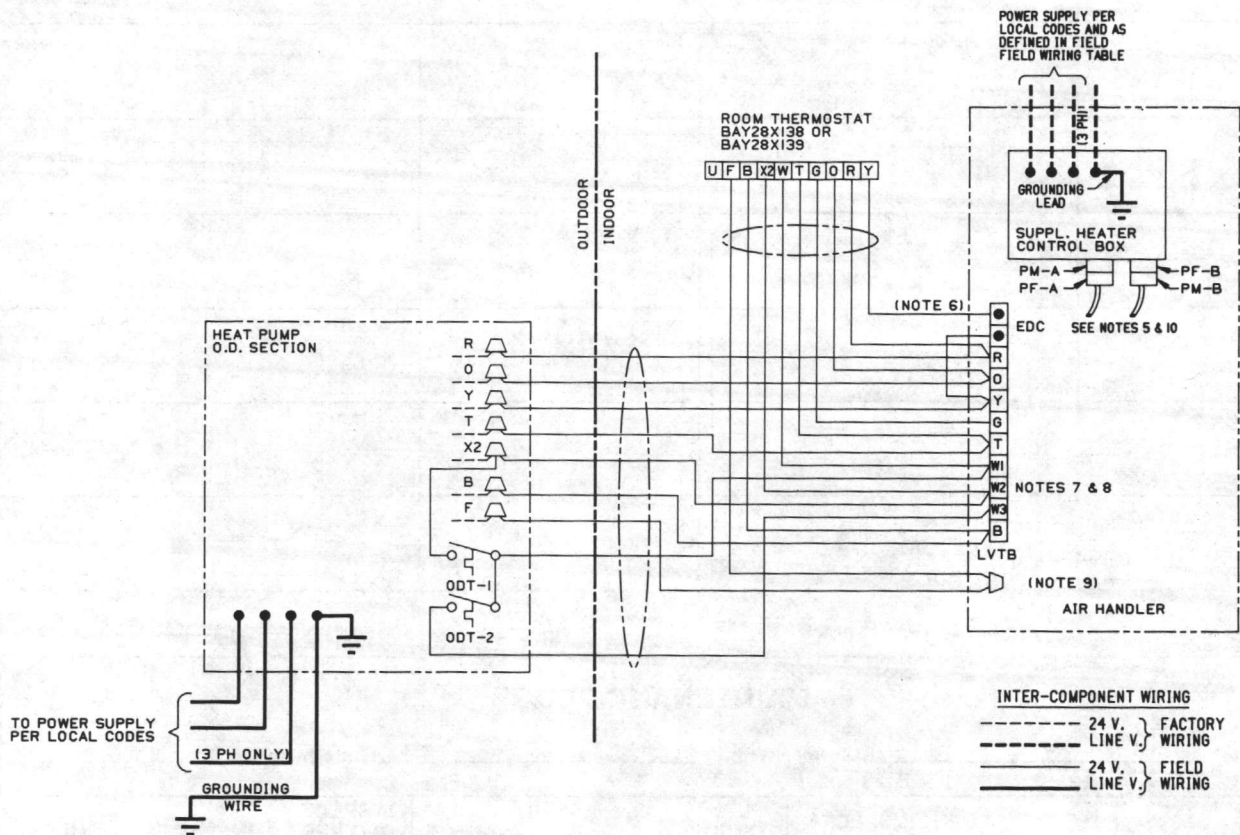
FIELD WIRING DIAGRAM FOR CONDENSING UNIT WITH BWE — C AIR HANDLER AND SUPPLEMENTARY HEATERS



NOTES:

1. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
2. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE.
3. LOW VOLTAGE WIRING TO BE NO. 18 A.W.G. MINIMUM CONDUCTOR.
4. USE COPPER CONDUCTORS ONLY.
5. POLARIZED PLUG SECTIONS PM-A AND PF-B ATTACHED TO HEATER CONTROL BOX. SECTIONS PF-A AND PM-B FACTORY WIRING INTO AIR HANDLER.
6. IF ODT IS OMITTED, THEN CONNECT APPROPRIATE JUMPERS FROM W1 TO W2 AND W3 ON LVTB.
7. TO USE LOW AMBIENT COOLING KIT BAY28X123B ON 3 PHASE MODELS, "R" LEAD MUST BE CONNECTED TO "Y" LEAD IN ORDER TO SUPPLY CONTROL VOLTAGE FOR KIT.

FIELD WIRING DIAGRAM FOR HEAT PUMP WITH BWE — C AIR HANDLER AND SUPPLEMENTARY HEATERS



NOTES:

1. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
2. BE SURE POWER SUPPLY AGREES WITH EQUIPMENT NAMEPLATE.
3. LOW VOLTAGE WIRING TO BE NO. 18 A.W.G. MINIMUM CONDUCTOR.
4. USE COPPER CONDUCTORS ONLY.
5. POLARIZED PLUG SECTIONS PM-A AND PF-B ATTACHED TO HEATER CONTROL BOX. SECTIONS PF-A AND PM-B FACTORY WIRED INTO AIR HANDLER.
6. IF AIR HANDLER DOES NOT HAVE EDC., THEN CONNECT THIS LEAD TO TERMINAL "Y" ON LVTB.
7. IF ODT IS OMITTED, THEN CONNECT APPROPRIATE JUMPERS FROM W1 TO W2 AND W3 ON LVTB.
8. TERMINALS W2 & W3 WILL HAVE INTERNAL CONNECTIONS ONLY IF 2ND & 3RD CONTACTORS ARE USED BY THE HEATER FOR CONTROLLING POWER TO ELECTRIC HEATING ELEMENTS. IF 2ND & 3RD (BH & CH) CONTACTORS ARE NOT USED, THEN FIELD CONNECTIONS TO W2 & W3 CAN BE OMITTED AS APPROPRIATE.
9. CONNECT IN THIS MANNER IF OD UNIT HAS "F" CONNECTION.

CAUTION:

10. IF THREE-PHASE HEATERS ARE USED IN SINGLE PHASE WE090C, I20C - DO NOT CONNECT PF-A. SEPARATE POWER SUPPLY MUST BE PROVIDED TO AIR HANDLER IN ACCORDANCE WITH AIR HANDLER WIRING DIAGRAM.

SERVICE LOG

DATE OF FAILURE	TYPE OF FAILURE	DATE OF FAILURE	TYPE OF FAILURE

MAINTENANCE LOG

Model _____ Serial Number _____ Date Installed _____

INSPECTION CHECK	INSPECT THERMOSTAT	INSPECT FLASHING CAULKING ETC.	CHECK AIR FILTERS	OIL MOTORS	INSPECT OD & ID COILS	INSPECT BLOWER WHEELS PULLEYS BELTS	INSPECT CONDENSATE DRAINS	CHECK ALL WIRING

CHECKOUT PROCEDURES

After installation has been completed, it is recommended that the Air Handler be checked against the following checklist.

1. Make sure power is off at power disconnect switch. []
2. Check all field wiring for tight connections. See that grounding of unit is in accord with code. []
3. Make sure unit suspension (if used) is secure and that there are no tools or loose debris in, around or on top of the unit. []
4. Check all duct outlets; they must be open and unrestricted. []
5. Check drain lines and be sure all joints are tight. []
6. Make sure (for horizontal application) secondary drain pan is installed. []
7. Check fusing in power supply for correct requirements per unit nameplate. []
8. Check filters for proper size and panels secure. []
9. Energize the system and carefully observe its operation; make any necessary adjustment. []
10. Instruct owner, engineer (if possible) on proper operating procedure. []

SUPPLEMENTARY HEATERS CHECKOUT PROCEDURES, IF USED

DOES HEATER REQUIRE A SEPARATE CIRCUIT? SEE "LIMITATIONS AND RECOMMENDATIONS".

1. Be sure the fused disconnect switch is "OFF" and safety label (if any) is attached. []
2. Check on field wiring for sound connections and grounding according to codes. []
3. Check fuses for proper size per nameplate specifications. []
4. Check control box panel — in place and secured. []

NOTE: OPERATION OF HEATERS MUST BE CHECKED DURING THE OPERATION CHECK OF THE TOTAL SYSTEM.

The Trane Company

Light Commercial Group
Guthrie Highway
Clarksville, TN 37040



BWE-SF-5A

Library	Service Literature
Product Section	Unitary
Product	Split System AC-Evap. Fan-Coil
Model	BWE
Literature Type	Service Facts
Sequence	5A
Date	December 1987
File No.	SV-UN-S/S-BWE-SF-5A 12/87
Supersedes	BWE-SF-5

SERVICE FACTS

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change specifications and design without notice. The installation and servicing of the equipment referred to in this booklet should be done by qualified, experienced technicians.

Convertible Air Handler Model: BWE060C100GA

IMPORTANT — This document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.

PRODUCT SPECIFICATIONS

MODEL	BWE060C100F1
RATED VOLTS/PH/HZ	200-230/1/60
RATINGS	SEE O.D. SPECIFICATIONS
INDOOR COIL — Type	A
Rows — F.P.I.	4 — 12
Face Area (Sq. Ft.)	5.8
Tube Size (In.)	3/8
Refrigerant Control	Expansion Valve
Drain Conn. Size (In.)	3/4 NPT
INDOOR FAN — Type	Centrifugal
Dia./Width — In.	12 x 12
No. Used	1
Drive — Speeds (No.)	Belt — Adjustable
CFM vs.In. W.G. ①	See Fan Performance Table
No. Motors — HP	1 — 3/4
Motor Speed R.P.M.	1725
Volts/Ph/Hz	200-230/1/60
F.L. Amps — L.R. Amps	6.3 — 26.2
FILTER — Furnished?	Yes
Type Recommended	--
Lo Vel (No.-Size-Thk.)	--
Hi Vel (No.-Size-Thk.)	1 - 27x21.5 - 1 in.
REFRIGERANT (R-22)	Holding Charge
Ref. Line Connections	Braze
Coupling or Conn. Size-In. Gas	1-1/8
Coupling or Conn. Size-In. Liq.	3/8
DIMENSIONS	H x W x D
Crated (In.)	58.5 x 30.5 x 24.25
WEIGHT	
Shipping (Lbs.) / Net (Lbs.)	244 / 234

OPTIONAL EQUIPMENT

BAY28X079	Kit Low Temp Cool
BAY28X084	Kit Low Temp Cool
BAY82X243/BAYDFSR003	Air Diffuser
BAY82X245/BAYFLTR007	Encl. Grille Filter
BAY85X063/BAYFLTRO05	Encl. Filter
BAY88X082/BAYWATRO01	Coil - Hot Water
BAY88X083/BAYWATRO02	Coil - Hot Water
BAY88X084/BAYWATRO03	Coil - Steam
BAY88X085/BAYWATRO04	Coil - Steam
BAY88X086/BAYWATRO05	Coil - Steam
BAY99X082/BAYPLNM011	Wet Heat Encl.
BAY99X104	Kit - Subbase
BAYPLNM012	Plenum

Model Number	Power Supply			
	208/1/60		240/1/60	
	KW	BTUH	KW	BTUH
BAY96X1509A	6.48	22,100	8.64	29,500
BAY96X1514A	10.80	36,900	14.40	49,100
BAY96X1520A	15.12	51,600	20.16	68,800
BAY96X1526A	19.44	66,300	25.92	88,500
BAY96X1532A	23.76	81,100	31.68	108,100
	208/3/60		240/3/60	
BAY96X3507A	5.36	18,300	7.14	24,400
BAY96X3517A	12.83	43,800	17.10	58,400
BAY96X3527A	20.30	69,300	27.06	92,400

①Standard Air; Wet Coil.



SAFETY NOTICE

THIS INFORMATION IS INTENDED FOR USE BY INDIVIDUALS POSSESSING ADEQUATE BACKGROUNDS OF ELECTRICAL AND MECHANICAL EXPERIENCE. ANY ATTEMPT TO REPAIR A CENTRAL AIR CONDITIONING PRODUCT MAY RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. THE MANUFACTURER OR SELLER CANNOT BE RESPONSIBLE FOR THE INTERPRETATION OF THIS INFORMATION, NOR CAN IT ASSUME ANY LIABILITY IN CONNECTION WITH ITS USE.

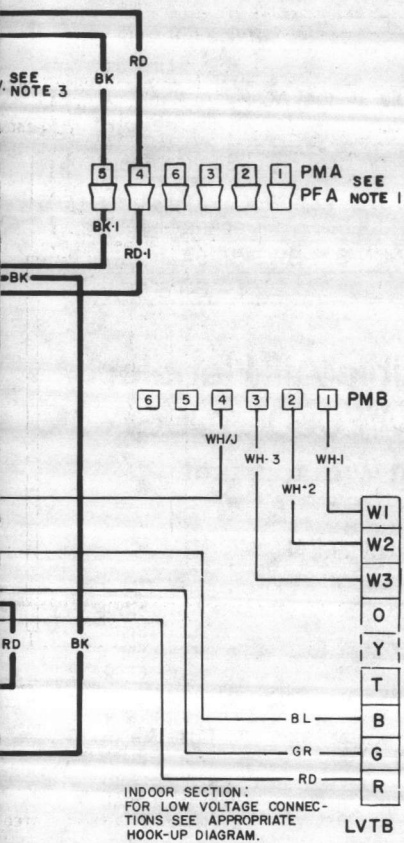
RECONNECT ALL GROUNDING DEVICES

ALL PARTS OF THIS PRODUCT CAPABLE OF CONDUCTING ELECTRICAL CURRENT ARE GROUNDED. IF GROUNDING WIRES, SCREWS, STRAPS, CLIPS, NUTS OR WASHERS USED TO COMPLETE A PATH TO GROUND ARE REMOVED FOR SERVICE, THEY MUST BE RETURNED TO THEIR ORIGINAL POSITION AND PROPERLY FASTENED.

DISCONNECT POWER BEFORE SERVICING

BWE060C

LEGEND



- NOTES:**
1. WHEN HEATERS ARE USED DISCARD PMA AND ATTACHED LEADS AND CONNECT PMB & PFA TO THE MATING HALVES IN THE HEATER CONTROL BOX.
 2. THE COIL CURRENT OF THE "F" RELAY IS 0.25 AMPS.
 3. FOR 200V OPERATION DISCONNECT RED TRANSFORMER LEAD FROM CN-1 AND INSULATE. CONNECT ORANGE TRANSFORMER LEAD TO REMAINING TWO RED LEADS OF CN-1.

COLOR CODES

WIRE
 BK/BL Black Wire with Blue Marker
 MARKER

BK Black OR Orange YL Yellow
 BL Blue RD Red GR Green
 BR Brown WH White PR Purple

SYMBOLS

— L.V. Factory Wiring
 — H.V. Factory Wiring
 --- L.V. Field Wiring
 --- H.V. Field Wiring
 -x- L.V. Field Installed
 -x- H.V. Factory Wiring

Relay Contact
 Capacitor
 Magnetic Coil
 Transformer Winding
 Wire Connector
 Polarized Plug
 Chassis Ground
 Ground
 Fuse

CF Capacitor
 CN Connector
 F Indoor Fan Relay
 GRD Ground
 LVTB Low Voltage Terminal Board
 PF Plug Female
 PM Plug Male
 TNS Transformer

From Dwg. 21C756583 P01

TABLE A

INTERNAL STATIC PRESSURE (IN. OF WATER)						
.40	.50	.60	.70	.80	.90	1.00
RPM BHP WATTS	RPM BHP WATTS	RPM BHP WATTS	RPM BHP WATTS	RPM BHP WATTS	RPM BHP WATTS	RPM BHP WATTS
780 .49 545	825 .53 585	865 .57 635	905 .61 675	950 .69 770	990 .81 905	1025 .98 1100
805 .53 590	850 .57 630	890 .60 670	935 .69 770	975 .79 875	1010 .92 1025	—
830 .57 635	870 .61 675	920 .67 745	960 .76 850	1000 .89 990	1025 1.03 1150	—
850 .61 680	900 .66 730	940 .74 820	985 .87 970	1020 .92 1145	—	—
890 .67 745	935 .75 840	980 .88 985	1010 1.0 1110	—	—	—
920 .75 835	965 .85 945	1005 1.01 1125	—	—	—	—
945 .83 920	995 .99 1105	—	—	—	—	—
980 .97 1085	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—

INDOOR FAN PERFORMANCE

AIRFLOW CFM	NUMBER OF RACKS (SEE TABLE AT RIGHT)	
	1&2	3
	AIR PRESSURE DROP inches of w.g.	
1000	0.03	0.06
1100	0.03	0.07
1200	0.04	0.08
1300	0.05	0.10
1400	0.06	0.12
1500	0.07	0.14
1600	0.08	0.16
1700	0.10	0.18
1800	0.11	0.20
1900	0.12	0.22
2000	0.13	0.25
2100	0.15	0.28
2200	0.16	0.30
2300	0.18	0.33
2400	0.19	0.36
2500	0.21	0.39
2600	0.22	0.42
2700	0.24	0.46
2800	0.26	0.49

HEATER MODEL NO.	NO. OF RACKS
BAY96X1509A	1
BAY96X1514A	2
BAY96X1520A	2
BAY96X1526A	3
BAY96X1532A	3
BAY96X3507A	1
BAY96X3517A	2
BAY96X3527A	3

NOTES:

- DATA INCLUDES PRESSURE DROP DUE TO WET COIL AND 1" HIGH VELOCITY FILTERS AND NO ELECTRIC HEATERS INSTALLED.
- STANDARD FAN MOTOR EFFICIENCY IS: BWE060C100 -- 67%
 BWE060C300 -- 73%
 BWE060C400 -- 73%
 BRAKE HORSEPOWER (BHP) IS HORSEPOWER OUTPUT AT MOTOR SHAFT.
- MULTIPLY WATT VALUES OF TABLE A BY 0.92 FOR MODELS BWE060C300 AND BWE060C400.
- CONSULT SERVICE REPRESENTATIVE OR FACTORY FOR DRIVE SYSTEM COMPONENTS FOR APPLICATIONS BEYOND THOSE SHOWN IN TABLE A.

From Dwg. 21B126244 Rev. 2

DRIVE SYSTEM (FACTORY)	DESCRIPTION
C100	BWE060C300, C400
DRIVE SYSTEM COMPONENTS	FAN DRIVE SYSTEM COMPONENTS
MOTOR: 3/4HP, 200-220/480V, 3Ø, 80 Hz, CLASS A INSUL, THERMALLY PROTECTED, S.F. 1.25	
MOTOR SHAFT: SINGLE GROOVE, DIA 3/8 IN. BORE (PITCH DIA 3/4-5/4 IN.; 4L BELT)	
BLOWER SHAFT: SINGLE GROOVE, FIXED PITCH - 5.83 IN. DIA 5/8 IN. BORE (PITCH DIA 5.70 IN.; 4L BELT)	
BELT: 4L420	

IS 4 T.O. - MOTOR SHAFT IN 1/2 TURN INCREMENTS.

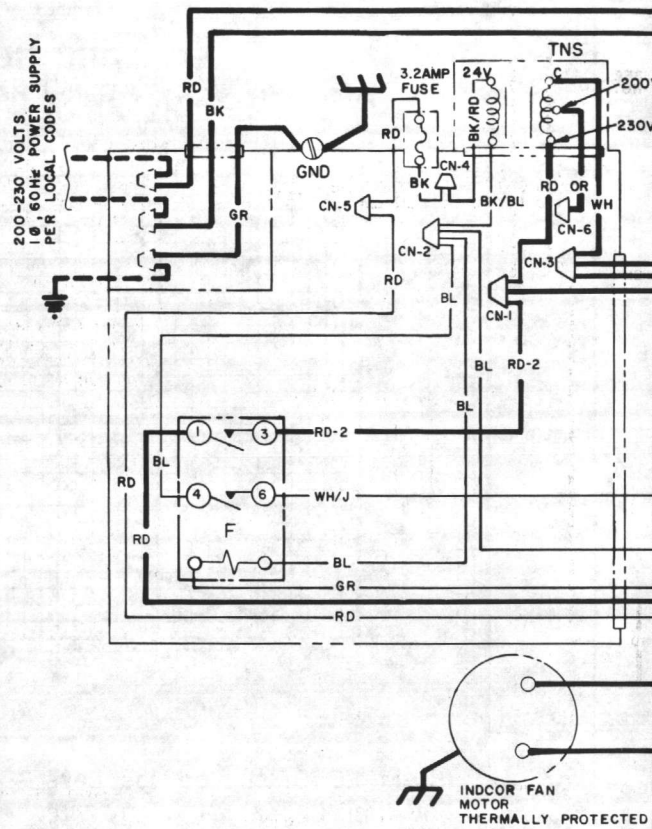
From Dwg. 21C725642 Rev. 1

SERVICE PARTS

COMPONENT	QTY.	DESCRIPTION	DPG CAT. #	CSG MNEMONIC #
Belt	1	Type V, 43" O.L., 44" Pitch Length	Purchase Locally	B-105
Blower Pulley	1	6" OD x 5/8" Bore, 5.7 Pitch	WW34X53	SHE-734
Blower Wheel	1	13-3/16" D x 12-5/8" W, 5/8" Bore, CW	WW74X11	WHL-476
Check Valve	1	1/2", Swaged Inlet	WW58X3	VAL-2189
Distributor	1	1/2" Inlet, 8 Outlets @ 3/16"	WW51X292	DST-139
Expansion Valve	1	3/8" in, 1/2" out, 4 ton, sweat, ext. equal., 30" cap, 15% bleed, superheat 5 to 9	WW51X317	VAL-2471
Filter	1	21-1/2" x 27" x 5/8", Std. Media	WW85X33	FLR-751
Fuse (FU-B)	1	2 Amp, 250V., Glass Tube,	WW23X70	FUS-211
Motor	1	115-208/230V, 60 Hz., 1 Ph., Open Shell, Rev. (Wire as CW), 1725 RPM, 3/4 HP, 1-speed, FLA 10.8/5.4, LRA 24.7, Sleeve Bearings, w/Base, Wind. Res. — Ohms @ 77°F.: 230V Main = 2.92-2.52; 115V Main = .731-.629	WW94X25	MOT-2582
Motor Pulley	1	3.8" OD, 5/8" Bore, Pitch Varies 3.4 @ 0 Turns To 2.5 @ 5 Turns	WW34X15	SHE-735
Relay (F)	1	Type DPST, Contacts 240/480V, FLA 6/3, LRA 35/18, Coil 24V., .53/.61 A.in., .26/.31 A. Hld.,	WW24X75	RLY-886
Shaft	1	19-7/8" LG. x 5/8" OD	WW15X27	SHF-979
Transformer (TNS)	1	24V, Class 2, Rating 75 VA, Pri. 60 Hz.	WG32X39	TRR-385

*New Part - Set Up Within The Last 18 Months.

WIRING DIAGRAM



TROUBLESHOOTING CHART — WHAT TO CHECK

SYSTEM FAULTS	WHAT TO CHECK	CHECKS																													
		RESTRICTION (TXV OR CAP)	RESTRICTION (I.D. COIL)	CHECK VALVE (LEAKING)	EXCESSIVE EVAP. LOAD	REFRIG. OVERCHARGE	REFRIG. UNDERCHARGE	HIGH INDOOR AIRFLOW	REFRIG. AIRFLOW	LOW INDOOR AIRFLOW	THERMAL CUTOFF	CAPACITOR (FAN)	RELAY (FAN)	CIRCUIT BREAKER	FUSIBLE LINK	HEATING ELEMENT	THERMOSTAT	CONTROL TRANSFORMER	LOW VOLTAGE WIRING	HIGH VOLTAGE WIRING	POWER SUPPLY										
REFRIGERANT CIRCUIT																															
Head Pressure (High)	C																					P									
	H																						P	S							
Head Pressure (Low)	C																							P	P						
	H																									S					
Suction Pressure (High)	C																									P	P	P	P		
	H																													S	P
Suction Pressure (Low)	C																													P	P
	H																														P
Indoor Coil Frosting	C																													P	P
	H																														
Liquid Floodback (TXV)	C																													P	
	H																														
Liquid Floodback (Cap Tube)	C																													P	
	H																														
ELECTRICAL																															
I.D. Motor Won't Start	C	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	H	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
Heating Element Inoperative	C																														
	H	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	

P-Primary Causes S-Secondary Causes C-Cooling H-Heating

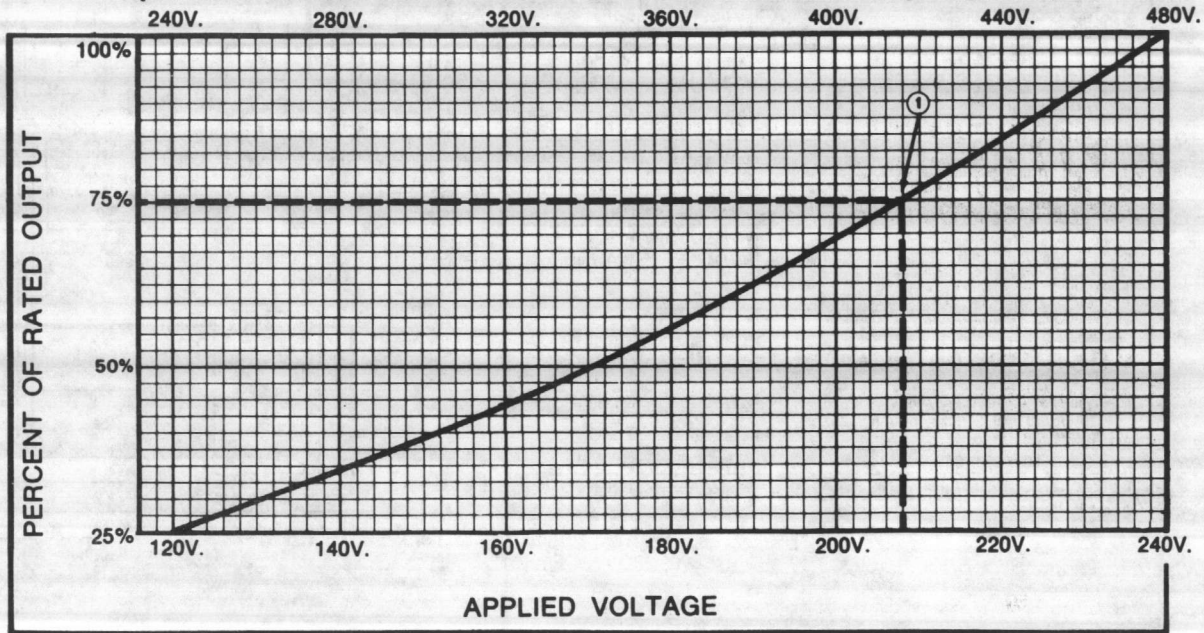
CFM	EXTERIOR		
	.10 RPM BHP WATTS	.20 RPM BHP WATTS	.30 RPM BHP WATTS
1500			
1600			
1700			785 .53 590
1800			810 .56 640
1900		800 .59 655	840 .62 695
2000	790 .60 670	830 .63 705	870 .67 750
2100	810 .65 720	860 .69 770	905 .75 835
2200	850 .71 795	890 .75 840	935 .85 945
2300	885 .79 875	930 .87 970	975 1.0 1110
2400	930 .91 1015	980 1.09 1215	
2500	975 1.07 1200		

TABLE I STANDARD STATIC FAN DRIVE (AS SHIPPED FROM FACTORY)		
MOTOR SHEAVE TURNS OPEN (T.O.)	FAN REVOLUTIONS/MIN. (NOMINAL)	BWE060 DESCRIBE FAN DRIVE COMPONENTS
0	1030	MOTOR: 3/4 HP, 230 60 HZ, CLASS B, 56 FRAME, PROTECTED, S MOTOR SHEAVE: 5/8 VARIABLE PITCH DIA 2 5/8 IN. DIA 3 4-2 4/8 IN. BLOWER SHEAVE: 5/8 FIXED PITCH X 5/8 IN. BORE 5.70 IN.; 1/2 BELT: 4L420
1	1000	
2	950	
3	900	
4 (NOTE 1)	840	
5	780	
6		

NOTE 1. FACTORY SETTING
MAY BE ADJUSTED

ELECTRIC HEATER DE-RATING CHART

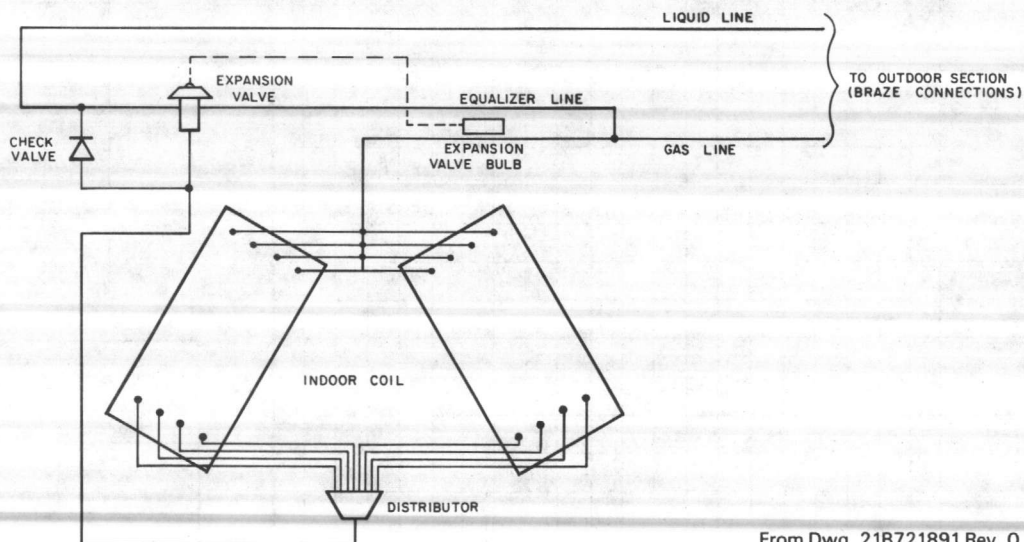
(for 240V or 480V Rated Heaters Installed on Lower Voltage Systems)



① **EXAMPLE:** Calculated Heat Loss — 29,200 BTUH Power Supply — 208V.
The chart indicates that any 240V heater will deliver 75% of its rated capacity at 208V.

$$\frac{29,200 \text{ BTUH}}{.75} = 39,000 \text{ BTUH} \quad \left\{ \begin{array}{l} \text{Select a heater having AT LEAST 39,000 BTUH} \\ \text{capacity at 240V.} \end{array} \right.$$

REFRIGERANT CIRCUIT



From Dwg. 21B721891 Rev. 0



TRANE™

AHU 1 & 2

Maintenance

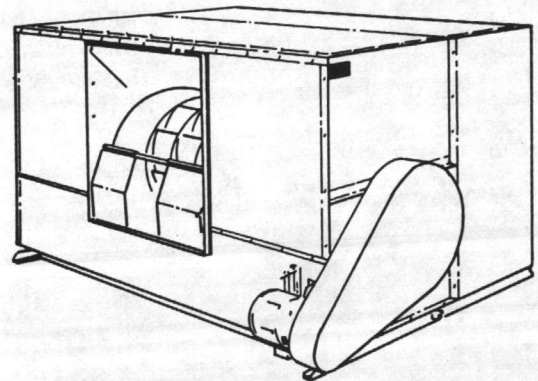
CLCH-M-2

Library	Service Literature
Product Section	Air Handling
Product	Central Station Air Handlers
Model	Climate Changers
Literature Type	Maintenance
Sequence	2
Date	January 1986
File No.	SV-AH-CLCH-CLCH-M-2-186
Supersedes	

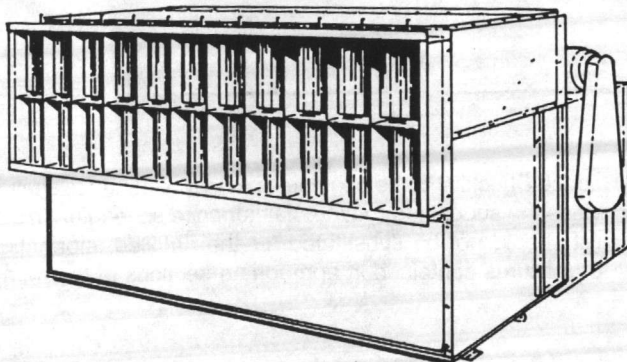
CLIMATE CHANGER® CENTRAL STATION AIR HANDLERS

**DRAW-THRU, BLOW-THRU
SPRAYED COIL AND HIGH
PRESSURE UNITS**

B DEVELOPMENT SEQUENCE



DRAW-THRU



BLOW-THRU

X39640291-01

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change specifications and design without notice. The installation and servicing of the equipment referred to in this booklet should be done by qualified, experienced technicians.

LITERATURE HISTORY CHANGE:

Delta—Flow Coils added to units, changing design sequence to 'E'.

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GENERAL INFORMATION

Central Station Climate Changers® are air handlers designed to provide complete heating, cooling and dehumidifying by means of wide variety of unit sizes, coils, fans and efficiency capabilities. This manual will cover all vertical and horizontal, draw-thru, blow-thru, sprayed coil and high pressure units. A Periodic Maintenance

Checklist at the beginning of the Maintenance section provides the suggested routine maintenance schedule. This checklist should not be substituted for the detailed information and procedures contained in appropriate sections of the manual.

START-UP

WARNING: DISCONNECT ELECTRICAL POWER AND ALLOW ALL ROTATING PARTS TO STOP COMPLETELY BEFORE SERVICING OR INSPECTING THE UNIT. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK, ENTANGLEMENT IN MOVING PARTS OR PRESSURE DIFFERENTIAL WITHIN THE UNIT.

PREPARATION

Perform the following checks and inspections before operating the unit:

1. **With the system de-energized**, check that the electrical connections are complete and tight at the terminals.
2. Make sure the belt guard is in place.
3. Inspect the fan wheels. They should turn freely.
4. As mentioned previously in the Installation Manual, check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.
5. Inspect fan belt tension. Belt tension, sheave alignment and setscrew torque information is given in the applicable section of this manual.
6. Check the piping and valves for leaks. Open or close the valves, depending on their function in the system. If a refrigerant coil is used, the system must be evacuated, leak-tested with dry nitrogen and charged with refrigerant.
8. Remove any foreign material from the drain pan. Check the drain pan and condensate line to make sure they are not obstructed.
9. All unit access panels must be in place. All screws, nuts and bolts must be tight.
11. If the unit includes fan paralleling controls, open them fully.
12. Inspect fan motor and bearing lubrication.

CAUTION: To prevent fan motor or bearing failures, it is necessary that they are lubricated properly. This must be checked before the unit is started for the first time. See the label on the side of the unit, the tag attached to the motor, and the Maintenance section of this manual.

START-UP PROCEDURES

After completing all the items under "Pre-Start-Up," the unit may be started and the following checks and adjustments performed:

NOTE: High Pressure units with self-locking collar fan bearings. During start-up check rotation of fan shaft to determine if fan motor is wired correctly. Incorrect rotation of fan may cause premature bearing and shaft failure. Refer to bearing section in this manual.

1. Measure the motor voltage and amps on all phases to insure proper operation. Compare these readings with the motor nameplate.

2. If the unit includes a spray pump, open the spray pump air valve and purge air from the system. Adjust the spray pump valve until the spray pattern diameter equals the finned height of the top cooling coil. The resulting gauge pressure should be between 7 and 10 psig.
3. If the unit includes fan paralleling control (two-fan, blow-thru units only), adjustment may be required. An indication of an incorrect setting is paralleling of the fan (pulsating operation) and erratic fan motor amperage readings. Adjust the fan paralleling control until fan operation is smooth and the amperage reading is steady.

The fan paralleling control should be closed only far enough to eliminate erratic operation. Rarely should adjustment exceed two inches on either fan. If the devices are closed too far, unit capacity will be reduced.

Each fan paralleling control device has two rods per fan extending upward through the top of the blow-thru fan section. To adjust fan operation for a smooth airflow condition, the following should be done:

- a. Loosen the locking nut on one rod, lower the rod 1/2-inch and retighten. Repeat for the other rod on the fan.
 - b. If the unstable condition still exists, repeat Step A.
 - c. If the unstable condition still exists, relocate the fan paralleling control to the original position and perform Steps A and B on the other fan.
 - d. If the unstable condition still exists, lower both fan paralleling devices to 1-inch from the original position. Repeat Steps A, B, and C, using 1-inch as a base reference.
4. Measure voltage at all three wires. Maximum allowable voltage imbalance is two percent. Voltage imbalance is defined as 100 times the sum of the deviation of the three voltages from the average, divided by twice the average voltage. For example, if the three measured voltages are 221, 230 and 227, the average voltage would be 226 volts. The percent of voltage imbalance is then calculated:

$$\frac{100 \times \{ [226-221] + [230-226] + [227-226] \}}{2 \times 226} = 2.2\% \text{ (Unacceptable)}$$

In this example, 2.2 percent imbalance is not acceptable and the power company should be notified to correct it.

5. If the fan speed is changed more than 5% from the original designed rpm, or if parts such as shafts, fan wheels, bearings, or other drive components are replaced, the unit vibration should be checked.

The unit vibration, measured horizontally and vertically directly on the fan shaft bearing (perpendicular to the shaft centerline), should not exceed 0.2 in/sec. or 3.0 mils, whichever is the lower displacement at the unit operating speed.

MAINTENANCE

PERIODIC MAINTENANCE CHECKLIST

WARNING: DISCONNECT ELECTRICAL POWER AND ALLOW ROTATING PARTS TO STOP BEFORE SERVICING THE UNIT OR REMOVING THE FAN BELT GUARD. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR ENTANGLEMENT IN MOVING PARTS.

The following checklist describes the suggested maintenance schedule to maintain proper operation of the unit. Detailed procedures for owner-operator maintenance checks are given after this checklist. For more information on the unit, refer to the Service Guide or contact a local Trane Service Company.

EVERY MONTH

- 1. Inspect air filters. Clean or replace if clogged.
- 2. Inspect air filter manometer for bag filters or roll filters with manual controls. Change bag filters when manometer reading is 1 inch wg. Change roll filters when manometer reading is 1/2 inch wg.
- 3. Check sump water concentration in Sprayed Coil units to make sure that no corrosive or scaling conditions have been created by poorly treated water.

EVERY THREE TO SIX MONTHS

NOTE: The procedures listed in this section should be completed every three to six months. The frequency of their completion will depend on load and ambient conditions. Detailed procedures following this Maintenance Checklist will give more information on suggested conditions and schedules.

- 1. Check that fan bearing grease lines are tight to the bearings so no grease leaks at the connection.
- 2. Lubricate fan bearings.
- 3. Check bearing locking setscrews and other setscrews for proper tightness. All bearing races must be secure.
- 4. Lubricate fan motors.
- 5. Check sheave alignment and level of shafts.
- 6. Check fan belt tension. Adjust if belts slip. Replace worn or frayed belts with a new matched set.
- 7. Inspect coils for frost or dirt built-up. Clean fins if airflow is clogged.
- 8. Inspect spray humidifier for lime deposits in the spray nozzle. Clean if flow is clogged.
- 9. Inspect steam grid humidifier wrapping. Replace if flow is clogged.

EVERY YEAR

- 1. Inspect electrical wiring for condition. Tighten all connections.
- 2. Inspect the unit casing and accessories for chipping or corrosion. If damage is found, clean and repaint with a good grade of rust resistant zinc chromate paint.

- 3. Inspect the drain pan for sludge or other foreign material. Clear the drain openings and drain line to ensure adequate flow.
- 4. Check damper linkages, setscrews and blade adjustment for proper tightness and operation. Do not lubricate nylon damper rod bushings.
- 5. Check inlet vane linkages, setscrews and vane adjustment for proper tightness, operation, and alignment.
- 6. Recalibrate the filter manometer.
- 7. Clean and check the water system on Sprayed Coil Climate Changers.

MAINTENANCE PROCEDURES

FILTERS

Table 1 lists air filter sizes and quantities required for all filter boxes. Replace with UL Class 2 approved filters only. Always install filters with directional arrows pointing in direction of airflow.

To clean permanent filters, wash under a stream of hot water to remove dirt and lint. Follow with a wash of mild alkali solution to remove old filter oil. Rinse thoroughly and let dry. Recoat both sides of the filter with Air Maze filter oil or an equivalent and let dry. Replace filter element in the unit.

Bag filters should be replaced when pressure differential across the filter is 1 inch wg. A manometer should have been installed for surveillance of pressure drop across the filter.

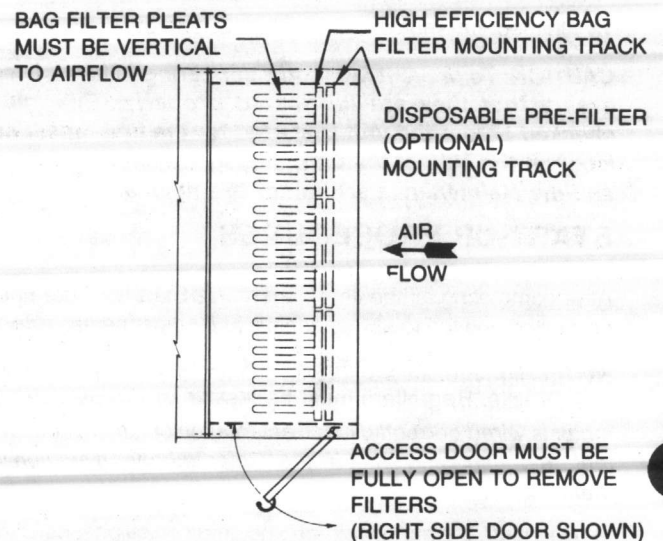


FIGURE 1 - Filter Mounting Track Location (Top View)

TABLE 1 - Filter Sizes and Quantities Per Set

UNIT SIZE	2-INCH FLAT FILTER BOX	COMBINATION & MEDIUM FILTER BOX	HIGH CAPACITY BOX	BAG FILTER AND PREFILTER (HXW)	4-INCH PLEATED FILTER BOX
3	1-20x25	2-16x25	2-20x25	—	—
6	2-20x25	4-16x25	4-20x25	—	—
8	4-16x20	4-20x25	6-20x20	1-24x12 1-24x24	4-16x20
10	4-16x25	6-16x25	6-20x25	2-24x24	4-16x25
12	2-20x20 2-16x25 1-16x20	4-20x25 2-16x25	6-16x20 3-20x25	2-24x12 2-20x20	1-16x20 2-16x25 2-20x20
14	4-16x20 2-20x25	8-16x25	6-20x20 3-20x25	2-24x12 3-20x20	4-16x20 2-20x25
17	6-16x20 2-16x25	8-20x25	3-20x25 9-20x20	1-24x12 3-24x24	6-16x20 2-16x25
21	8-16x20 2-16x25	10-20x25	3-20x25 12-20x20	5-24x20	8-16x20 2-16x25
25	12-16x20	6-20x25 6-16x25	6-20x25 9-20x20	4-24x12 5-20x20	12-16x20
31	7-16x20 7-16x25	8-16x25 12-16x20	8-20x25 12-20x20	10-20x20	7-16x20 7-16x25
35	14-16x25	16-20x25	28-16x25	2-24x12 8-24x24	14-16x25
41	6-16x20 12-20x20	20-20x25	32-16x25	2-24x12 8-24x24	6-16x20 12-20x20
50	7-16x20	28-16x25 14-16x25	35-16x25	15-20x20	7-16x20 14-16x25
63	10-16x25 12-20-25	30-20x25	49-16x25	20-20x20	10-16x25 12-20x25
73	6-20x20 18-20x25	36-20x25	42-20x25	—	—
86	21-20x25 7-20x20	42-20x25	49-20x25	—	—

WARNING: MAXIMUM BAG FILTER PRESSURE DROP IS 1 INCH WG. OPERATION OF THE UNIT AT A PRESSURE DIFFERENTIAL GREATER THAN THIS MAY CAUSE PERSONAL INJURY OR EQUIPMENT DAMAGE FROM COMBUSTION.

Trane recommends the use of optional disposable prefilters with high efficiency bag filters. Prefilters slide into mounting tracks just ahead of the bag filter and serve to prolong the life of bag filters. Figure 1 illustrates bag filter and prefilter installation. Complete the following to install high efficiency bag filters:

1. Ensure power is disconnected. Open filter section access door.

WARNING: DISCONNECT POWER SOURCE BEFORE OPENING FILTER SECTION ACCESS DOOR. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK, HIGH PRESSURES OR MOVING PARTS.

2. Slide bag filters and flat prefilters into the appropriate filter tracks. Bag filters must be installed with pleats vertical to airflow.
3. Slide adjustable blockoff into filter track.
4. Close access door. If door can be closed without compressing the filters, adjust the blockoff by loosening its screws and sliding it towards the door. The door should

squeeze the blockoff against the filters, compressing them together. Tighten the adjusting screws.

NOTE: Filters must have an airtight seal to prevent air bypass. If using other than recommended filters, apply foam gasketing to the vertical edges of the filter holding frame for a tight seal.

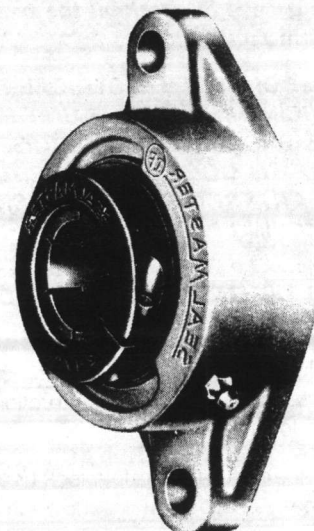


FIGURE 2 - Flange Type Bearing with Grease Fitting and Squeezeloc Tightener

TABLE 2 - Recommendations for Grease Lubricated Fan Bearings

OPERATING CONDITIONS	GREASING INTERVALS	
	-20 F To 140 F	140 F To 200 F
Clean, Dry	3-6 Months	1-3 Months
Dirty, Dry	1-3 Months	1-4 Weeks
Dirty, Wet, High Humidity	1-4 Weeks	1-14 Days
RECOMMENDED GREASES	RECOMMENDED OPERATING RANGE	
Texaco-Multi Fak #2	-20 F to 250 F	
Shell Alvania #2	-20 F to 250 F	
Mobil Mobilux #2	-20 F to 250 F	
Exxon Unirex #2	-20 F to 250 F	
Texaco Premium RB	-20 F to 250 F	
Mobil 532	-20 F to 250 F	
Exxon Beacon	-65 F to 250 F	
Keystone Keystone 84 H	-40 F to 225 F	

NOTE: Greases used should conform to NLGI No. 2 penetration.

FAN BEARING LUBRICATION

Fan bearings (see Figure 2) with grease fittings or with grease line extensions should be lubricated with a lithium base grease which conforms to NLGI Number 2 for consistency and which is free of chemical impurities. See Table 2 for recommended lubricants. Improper lubrication can result in early bearing failure.

To lubricate the fan bearings, complete the following:

1. Bearings are to be lubricated while unit is not running, disconnect main power switch.
2. Connect a manual grease gun to the grease line or fitting.
3. While turning the fan wheel manually, add grease, preferably when bearing is warm, until a light bead of grease appears at the bearing grease seal.

NOTE: On sizes 35 thru 86 CLCH or other size units with internal opposite drive side bearings, it will be necessary to remove unused bearing plate for observation of bearing grease seal.

CAUTION: Do not over-lubricate bearings. Excessive pressure caused by overlubrication can displace bearing grease seals or cause grease to overheat the bearing, resulting in premature bearing failure.

WARNING: DISCONNECT ELECTRICAL POWER SOURCE BEFORE SERVICING THE UNIT. IF UNIT MUST BE ON FOR MAINTENANCE PROCEDURES, EXERCISE EXTREME CAUTION. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR ENTANGLEMENT IN MOVING PARTS.

FAN BEARING TIGHTENING INSTRUCTIONS (DOUBLE LOCK SETSCREW)

The pillow block bearing with double setscrew locking arrangement requires specific tightening instructions. See Figure 3. Complete the following.

1. Rotate the shaft until the double lock bearing setscrews are in the vertically up position as shown in Figure 4.
2. Without V-Belt tension, snug (hand tight) all four setscrews of the double lock bearing in the numerical sequence as shown in Figure 4.

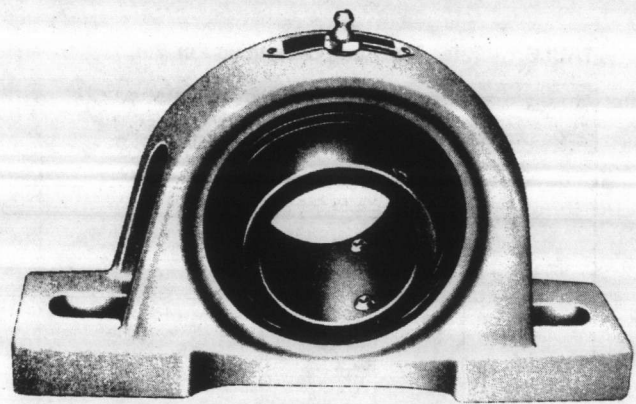


FIGURE 3 - Pillow Block Type Bearing with Grease Fitting and Double Lock Setscrew Arrangement

3. Torque each setscrew of the double lock bearing in the numerical sequence to 66 inch-pounds. See Figure 4.

FAN BEARING SELF-LOCKING COLLAR INSTALLATION

The pillow block bearing with self-locking collar arrangement is used on size 8-35 High Pressure Climate Changer Units. See Figure 5.

NOTE: At or before start-up check the wiring of the three phase fan motor to assure proper shaft rotation. Incorrect fan rotation may loosen the locking collar resulting in pre-mature bearing failure.

Complete the following recommended steps for bearing replacement.

1. Slip the shaft through the pillow block. Be certain the bearing is aligned in position along the shaft to eliminate any possibility of cramping loads.
2. Fasten the unit securely to the base using the proper bolt size.

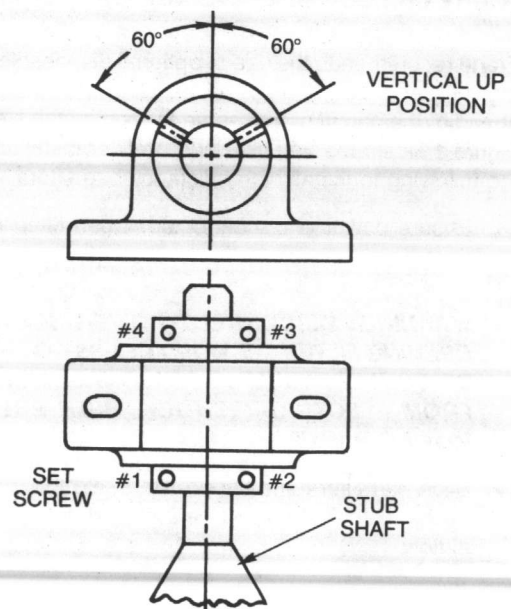


FIGURE 4 - Instruction Sketch for Pillow Block Bearing with Double Lock Setscrew

- Manually rotate fan shaft several times to assure bearing alignment.
- Place the self-locking collar on the shaft with its cam adjacent to the cam on the end of bearing's inner ring. Turn the collar in the direction of shaft rotation. The eccentric recessed cam will drop over and engage the corresponding cam on the bearing inner ring.
- Using a light-weight hammer and drift pin inserted in the drift pin hole strike in the direction of shaft rotation to positively engage the collar. The wide inner ring is now locked to the shaft.
- Tighten the setscrew to recommended torque. See Table 5.

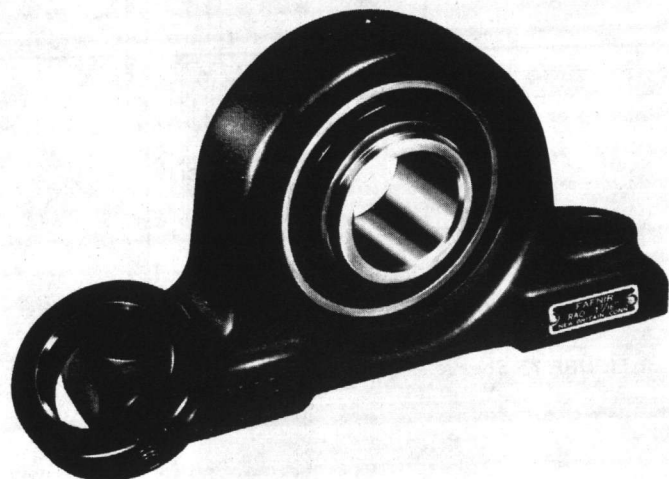


FIGURE 5 - Pillow Block Type Bearing with Grease Fitting and Self-Locking Collar Arrangement

FAN MOTORS

Inspect periodically for excessive vibration or temperature. Operating conditions will vary the frequency of inspection and lubrication. Table 3 lists recommended motor greasing intervals. Motor lubrication instructions are found on the motor tag or nameplate. If not available contact the motor manufacturer for instructions.

To relubricate the motor, complete the following:

WARNING: DISCONNECT POWER SOURCE FOR MOTOR LUBRICATION. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH FROM ELECTRICAL SHOCK OR MOVING PARTS.

- Turn the motor off. Make sure it cannot accidentally restart.
- Remove the relief plug and clean out any hardened grease.
- Add fresh grease through the fitting with a low pressure grease gun.
- Run the motor for a few minutes to expel any excess grease through the relief vent.
- Stop the motor and replace the relief plug.

NOTE: If excessive grease is plugged at the motor shaft, use less grease and/or extend the greasing interval.

Refer to Table 4 for minimum torques of motor mounting and bearing bolts.

TABLE 3 - Motor Greasing Intervals

TYPE OF SERVICE	UP TO 7.5 HP MOTORS	10-40 HP MOTORS	50-150 HP MOTORS
8-16 Hrs., Clean, Dry	5 Years	3 Years	1 Year
12-24 Hrs., Moderate Dirt Or Moisture	2 Years	1 Year	6 Months
Severe - Very Dirty, High Temperature	6 Months	3 Months	2 Months

TABLE 4 - Minimum Hex Head Bolt Torques

BOLT SIZE	TORQUE - FOOT/POUNDS	
	GRADE 2	GRADE 5
1/4" - 20 UNC	4	6
1/4" - 28 UNF	4	7
5/16" - 18 UNC	8	14
5/16" - 24 UNF	9	16
3/8" - 16 UNC	14	24
3/8" - 24 UNF	16	28
7/16" - 14 UNC	30	42
7/16" - 20 UNF	35	45
1/2" - 13 UNC	40	69
1/2" - 20 UNF	47	83
9/16" - 12 UNC	57	99
9/16" - 18 UNF	68	118
5/8" - 11 UNC	86	150
5/8" - 18 UNF	101	176
3/4" - 10 UNC	146	254
3/4" - 16 UNF	173	301
7/8" - 9 UNC	206	358
7/8" - 14 UNF	244	422
1" - 8 UNC	289	500
1" - 14 UNF	347	602

NOTE: Grade 2 bolts have no markings on the capscrew. Grade 5 bolts have 3 radial dashes, 120 degrees apart.

TABLE 5 - Torques for Tightening Locking Screws, Bearings and Sheaves

TORQUE FOR TIGHTENING SETSCREWS				TORQUE FOR TIGHTENING SEALMASTER LOCKING COLLAR				
SET SCREW DIA.	HEX SIZE	RECOM. TORQUE		COLLAR	SCREW DIA.	HEX SIZE	RECOM. TORQUE	
		INCH LBS.	FOOT LBS.				INCH LBS.	FOOT LBS.
1/4"	1/8"	66	5.5	2-015B	8-32	7/8"	70	5.8
5/16"	5/32"	126	10.5	2-13B	8-32	1/6"	70	5.8
3/8"	3/16"	228	19.0	2-17B	10-24	9/64"	90	7.5
7/16"	7/32"	348	29.0					
1/2"	1/4"	504	42.0					
5/8"	5/16"	1,104	92.0					

NOTE: Tighten bearing setscrews to the torque shown before running unit. Setscrews can loosen in shipment.

Fan motors should be stored indoors in a clean and dry atmosphere and on solid ground. The motor shaft should be turned occasionally to prevent brinelling of the bearings. If motors must be stored outdoors in varying, humid climate, use space heaters and cover the motors as completely as possible to keep them dry. If space heaters have not been installed and motors have been subjected to the elements for several months, the following steps are recommended before operating the motors:

- Inspect bearings for moisture and rust. Replace bearings if necessary and repack with new grease.
- Check motor winding. An acceptable reading is from 6 megohms to infinity. If reading is less than 5 megohms, windings should be dried out in an oven or by a blower.

3. Inspect the entire motor for rust and corrosion.
4. Lubricate the motor as instructed in this Maintenance manual, or as indicated by the maintenance tag on the motor.

SHEAVE ALIGNMENT

To prevent interference of the fan frame with the belt, make sure that the belt edge closest to the motor has the proper clearance from the fan frame, as shown in Figure 6.

Align the fan and motor sheaves by using a straightedge as shown in Figure 7. The straightedge must be long enough to span the distance between the outside edges of the sheaves. When the sheaves are aligned, the straightedge will touch both sheaves at points A through D. A string, drawn tight, may be used in the same manner. For uneven width sheaves, place a string in the center groove of both sheaves and pull tight. Adjust sheaves and tighten the sheave setscrews to the proper torques, given in Table 5.

Parallel operation of the fan and motor shafts is necessary to prolong belt life. Place a level on the shafts to check horizontal alignment. Shim if necessary.

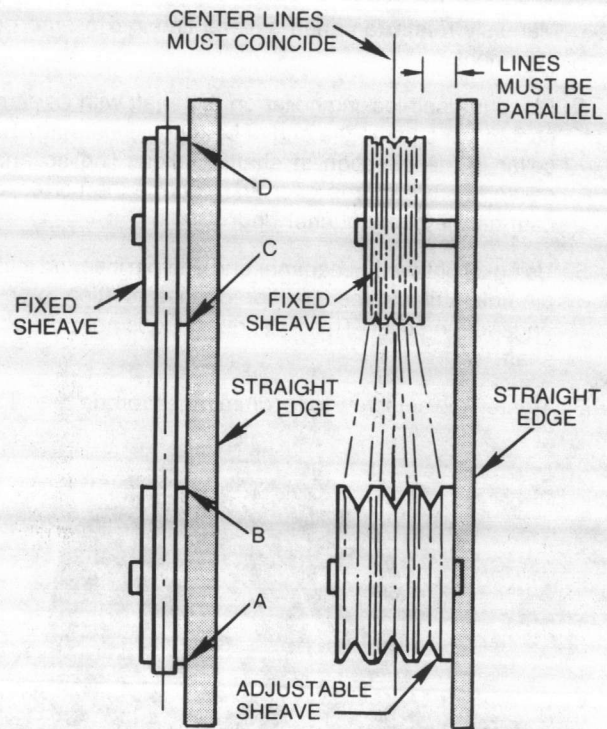


FIGURE 7 - Sheave Alignment

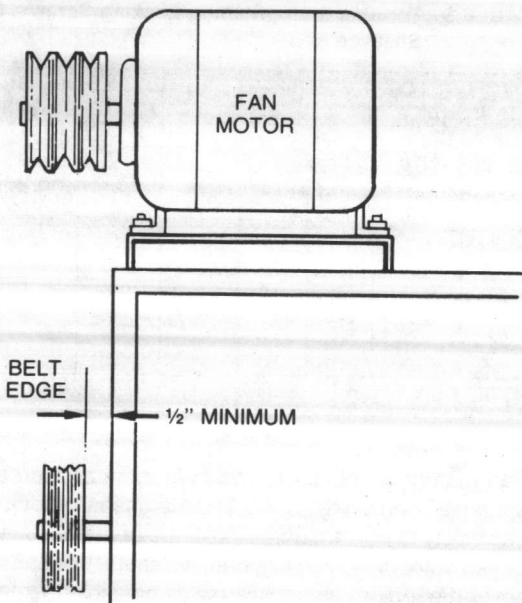


FIGURE 6 - Minimum Allowable Distance Between Frame Work and Fan Sheave

FAN ASSEMBLY SETSCREWS

Check and adjust fan wheel, bearing and sheave setscrews whenever a component is removed or an adjustment is made. Refer to Table 5 for recommended torques.

FAN WHEEL CLAMPS

The clamps that hold the fan hub on the shaft must be properly positioned and tightened to ensure safe fan operation.

NOTE: On fans that are 20 inches or smaller, the clamps should be replaced whenever the wheel or shaft is replaced.

On fans that are 20 inches or smaller, locate the two-piece clamp over the hub so that the hub tabs go through the clamp slots. Finger-tighten the two bolts evenly, then torque down both bolts **evenly** in small increments to 25 foot-pounds. The clamp flanges should meet at both bolt locations before 25 foot-pounds is reached.

On fans that are larger than 20 inches, finger-tighten the three bolts evenly, then torque down all three bolts **evenly**, in small increments, to 35 to 40 foot-pounds. Visually check the spacing between the three clamp flanges to make sure they are consistently tightened.

TABLE 6 - Values for K Factor (Belt Cross-Section Types)

BELT TYPE	A	B	C	D	E	3L	4L	5L	3V	5V	8V	AX	BX	CX	DX
"K" FACTOR	8	13	40	80	95	6	6	6	6	12	25	11	18	54	101

FAN BELT TENSION

NOTE: Fan belt tension should be checked at least twice during the first days of operation, since there is a rapid decrease in tension until belts are run in.

WARNING: DISCONNECT ELECTRICAL POWER SOURCE AND ALLOW ALL ROTATING EQUIPMENT TO STOP COMPLETELY BEFORE INSPECTING OR SERVICING THE UNIT. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR MOVING PARTS.

Proper belt tension is required to ensure maximum bearing and drive component life and is based on fan brake horsepower requirement. Use Chart 1 to find the proper tension and refer to the inset for an example. To use the chart, you must know:

1. Fan design bhp per belt (**not** motor hp)
2. Fan rpm
3. Fan sheave pitch diameter (Figure 8 - found by measuring where the middle of the belt rides in the sheave)
4. Type of belt cross-section (stamped on the belt)

As shown in the example of Chart 1, the correction tension (pounds force) is 9.6 pounds, at 1/2-inch deflection. Deflection is determined by dividing the belt span distance by 64, as shown in Figure 9.

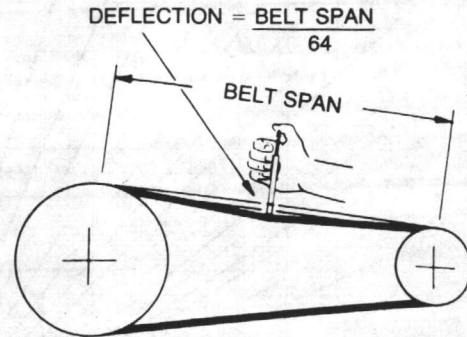


FIGURE 9 - Belt Tension Measurement

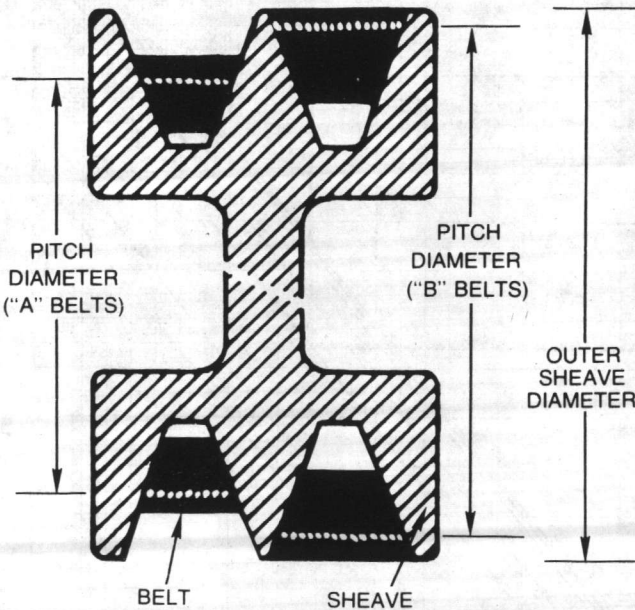


FIGURE 8 - Fan Sheave Pitch Diameter

To measure belt tension, use a belt tensioner as shown in Figure 10. Determine actual deflection by depressing one belt with the belt tensioner and measuring the deflection relative to the other belts or to belt line. Adjust the belt tension to the correct pounds force and tighten all setscrews to the proper torques.

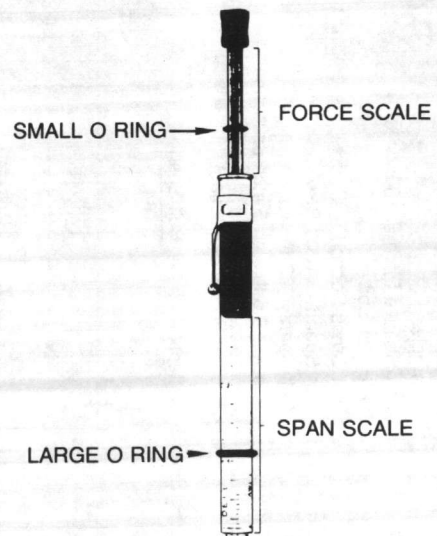


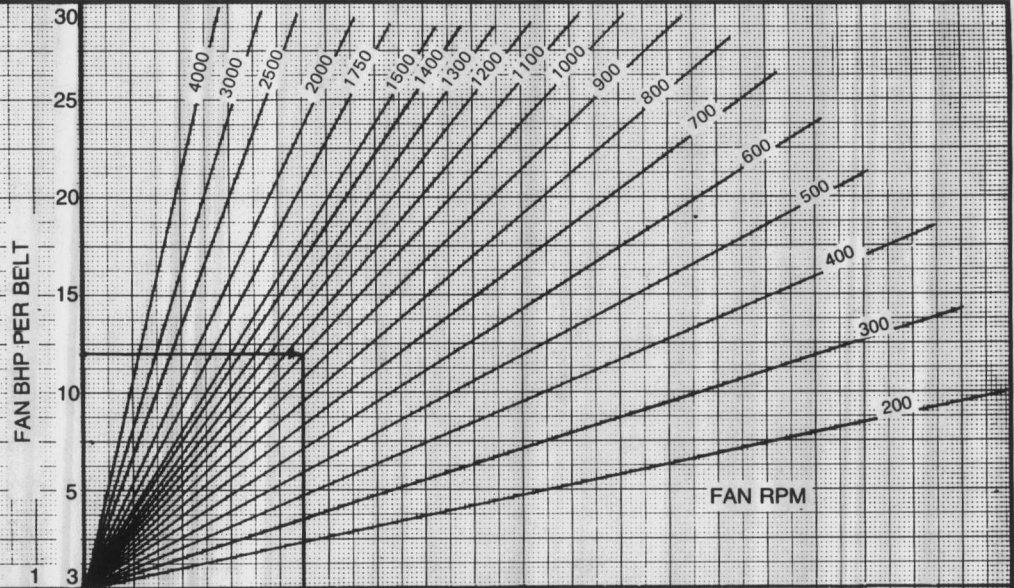
FIGURE 10 - Belt Tensioner

CHART 1 - Belt Tension

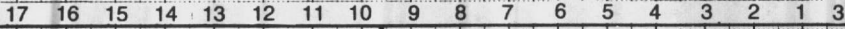
Example:
 Fan Sheave Pitch = 10 Inches
 BHP Per Belt = 12
 Belt Cross Section = C
 Fan Speed = 1000 RPM
 Belt Span = 32 Inches
 Answer: 9.6 lbs. at .5 inch deflection

Pounds Force (Deflection)

$$\text{Deflection (in.)} = \frac{\text{Belt Span}}{64}$$



FORCE (LBS.)



8V
 B & 5V
 A (3V)
 C

D
 E

BELT CROSS SECTION TYPE

FAN SHEAVE PITCH DIA. (INCHES)

For belt cross-section types not given in Chart 1, refer to Table 6 and use the following equations to calculate correct belt tension:

$$F = \frac{T + K}{16}$$

where F = force measured in pounds at specific deflection

K = constant determined by belt cross-section type (See Table 6)

$$T = 24,750 \times \frac{(\text{fan hp per belt})}{(\text{belt speed})}$$

$$\text{Belt speed} = \frac{(\text{fan pitch diameter})}{12} \times (\pi) \times \text{fan rpm (ft/min)}$$

For example, given the following:

Motor sheave pitch diameter: 16.8 inches, eight groove
 Fan sheave pitch diameter: 19.8 inches, eight groove
 Fan horsepower: 262.4 bhp
 Fan rpm: 983 rpm
 Belt type: 8V
 Sheave span: 60.9 inches

$$\text{Belt speed} = \frac{19.8}{12} \times 3.14 \times 983 = 5092$$

$$T = 24,750 \times \frac{(262.4 \text{ bhp}/8 \text{ belts})}{5092} = \frac{24,750 \times 32.8}{5092} = 159.4 \text{ lbs}$$

$$F = \frac{159.4 + 25}{16} = 11.5 \text{ lbs}$$

$$\text{Also, } D = \frac{\text{Belt span (inches)}}{64} = \frac{60.9}{64} = .95 =$$

approximately 15/16 inches

Therefore, the belt tensioner should read 11.5 pounds force at 15/16-inch deflection. This will yield 159.4 pounds force belt tension.

Belt tensions determined by using Chart 1 and Table 6 are minimum values. The correct operating tension for a V-belt drive is the lowest tension at which the belts will not slip under start-up or peak load conditions. It may be necessary, however, to increase the tension of some drives to reduce excessive belt flopping.

CAUTION: Do not over-tension the belts. Excessive tension will reduce fan and motor bearing life, accelerate belt wear and possibly cause shaft failure.

Remove the belt guard and clean the sheaves and belts with a dry cloth. Oil and grease should be kept away from the belts because they can cause deterioration and slippage. The use of belt dressing is **not** recommended.

COIL CLEANING

Coils should be kept clean to maintain maximum performance. If fins become dirty, they should be cleaned. Clean steam, hot water and water cooling coils with steam and detergent, hot water spray and detergent, or one of the commercially available chemical coil cleaners. Clean refrigerant coils with cold water and detergent or one of the commercially available chemical coil cleaners. Rinse coils thoroughly after cleaning.

WARNING: DO NOT USE STEAM OR HOT WATER TO CLEAN A REFRIGERANT COIL. IMPROPER APPLICATION OF HEAT MAY RESULT IN PERSONAL INJURY, DEATH OR EQUIPMENT DAMAGE DUE TO HIGH PRESSURE AND EXPLOSION.

COIL WINTERIZATION

Provisions must be made to drain those coils that are not in use when subjected to freezing temperatures.

CAUTION: Failure to properly drain and vent coils when not in use during freezing temperatures may result in coil freeze-up damage.

Coil types N, NS, and A, may be adequately drained in their pitched position in the unit. In coilless units, the coil, after field installation, is not pitched (unless special pitching coil support channel is ordered for steam coils) and may be adequately drained in their position in the unit.

(Type N is drainable through the return connection.) The installer should have provided appropriate piping for adequate drainage.

Type WL coils are not drainable in either pitched or level position. To drain these coils remove the vent and drain plugs and blow the coils out as completely as possible with compressed air. The coils should then be filled and drained several times with full strength glycol so that it will mix thoroughly with the water retained in the coil. Drain the coil out as completely as possible.

Coil types D, DD and K, plus W, P2, P4, P8, DL and LL are drainable in their factory-installed level position. Coil types D, DD, DL and LL also have Trane factory-installed drain and vent connections. See the Installation Manual for illustrated drain and vent connection locations.

Drainable coils installed in units containing coil types DL or LL will also have factory-installed drain and vent connections.

NOTE: On units with stacked coils, there is a condensate follower located at the end of each coil connection. Figure 11 illustrates the location of the condensate follower provided at the end of the stacked coils.

NOTE: Coil type TT is drainable through its supply connection.

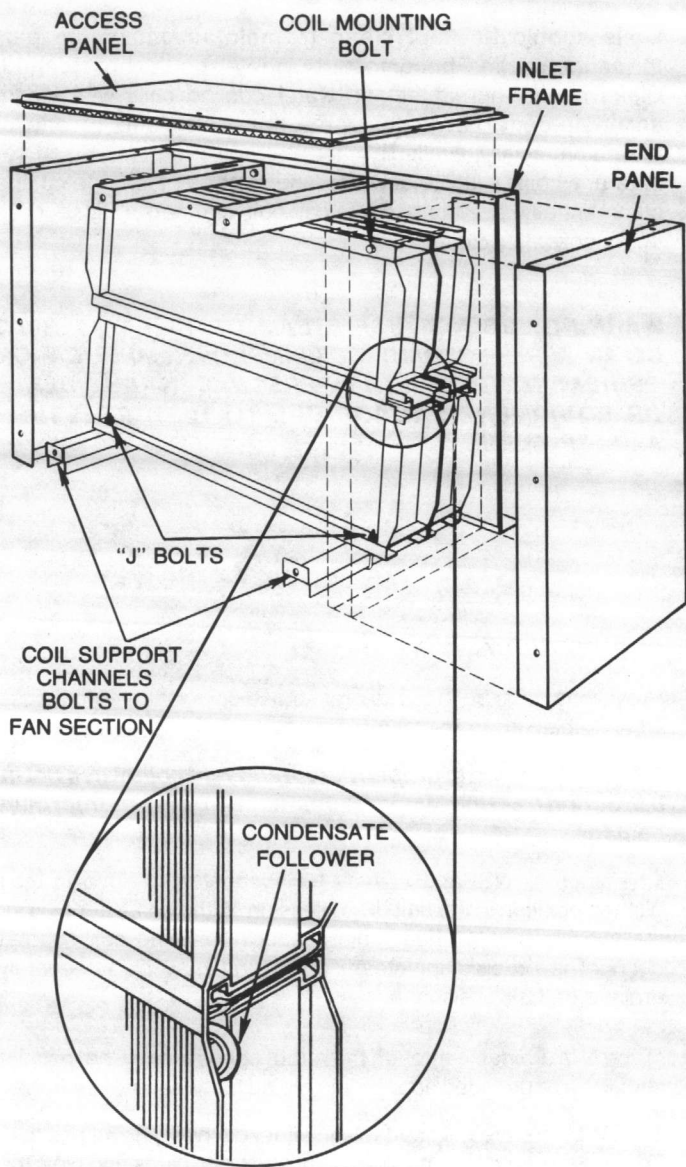


FIGURE 11 - Draw-Thru Coil Section Details with View of Condensate Follower

2. Adjust the gauge until the bubble is centered in the spirit level. Tighten the mounting screws and check to be sure that the gauge remained level.
3. Turn the zero-adjust knob counterclockwise until it stops. Then turn it clockwise approximately three full turns so that there is room for adjustment in either direction.
4. Remove the fill plug and pour in needed gauge fluid until the fluid level is visible in the vicinity of zero on the scale. Adjust for exact zero setting with the zero knob and replace the fill plug.

CAUTION: Use Dwyer red or blue oil only. Other fluids may damage the gauge.

5. Clean the gauge with a soft cloth and soap and water. Rinse carefully.

SPRAYED COIL WATER SYSTEM

To complete the yearly cleaning and check for sprayed coil spray systems, complete the following:

1. Clean the spray tank and the spray pump return line strainer. See Figure 12.
2. Check the spray float valve and pump pressure. Adjust the float so that the water level is 1/2-inch below the overflow pipe.
3. Check that the copper pipe is properly located in the overflow drain and is free of dirt, so that the spray tank water is continually being changed.
4. Clean spray nozzles, if necessary, and check for corrosion. Replace damaged nozzles.

SPRAY HUMIDIFIER NOZZLE

If lime deposits have developed, clean by soaking the nozzle in an industrial cleaning solution intended for that purpose. Rinse thoroughly with water. Follow the application, safety and cleaning instructions of the industrial cleaner.

MANOMETER CALIBRATION

To check and adjust the calibration of the bag filter or roll filter manometer, complete the following:

1. Make sure the manometer is properly installed on the unit wall within three feet of the filter section. Drain oil from the gauge. Disconnect top tube.

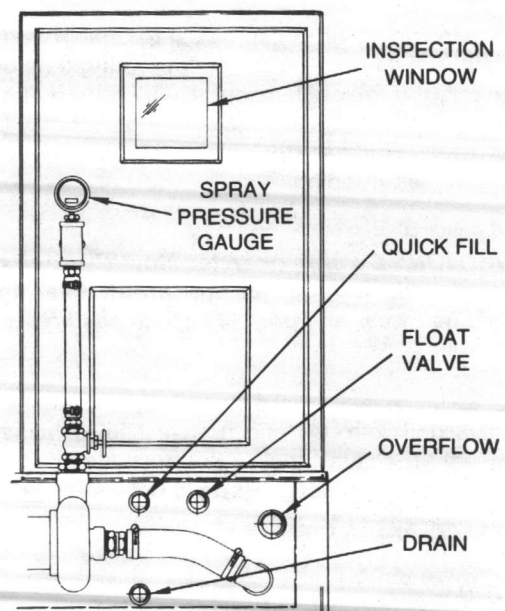


FIGURE 12 - Sprayed Coil Unit Tank Connections

THERMAL EXPANSION VALVE ADJUSTMENT

The importance of proper suction gas superheat cannot be over-emphasized. Accurate superheat measurements should be taken with other trouble analysis procedures to monitor refrigerant flow, coil efficiency and compressor protection. **Refer to compressor or condensing unit service literature for recommended superheat setting.**

Instruments

Because of the importance and sensitivity of superheat measurement and adjustment, the gauges used to measure suction pressure should be of the best quality available. Gauges that are permanently installed on the equipment should not be used. Trane recommends a good quality gauge on a standard refrigerant manifold set. To measure suction temperature, an electronic temperature tester is sufficient.

Measurement

In order to determine suction gas superheat, the pressure at the evaporator outlet must be measured and converted to saturated vapor temperature. Use a Refrigerant-22 pressure temperature conversion chart as given in Table 7 to convert pressure (psig) to temperature (degrees F). The computed saturated vapor temperature is then subtracted from the actual suction temperature, which is also measured on the suction line at the expansion valve sensing bulb location. The difference between these two temperature readings is the suction gas superheat reading.

NOTE: If a pressure tap is not provided at the thermal expansion valve sensing bulb location, suction pressure may be measured at the compressor, if suction line pressure is added to the compressor pressure reading. Suction pressure at the compressor plus estimated suction line pressure loss equals an estimate of suction pressure at the thermal expansion valve sensing bulb location.

To determine actual superheat, complete the following:

1. Cut the suction line insulation to gain access to the suction line at the sensing bulb. If Armaflex insulation is used, slit the insulation for the length of the temperature sensor.
2. Clean the line carefully and attach the electronic temperature sensor. Make sure the sensor is making good contact with the tube. Black electrical tape may be used to prevent sensor contact with ambient air.

NOTE: For accurate measurement, the temperature sensor **must** be properly installed and insulated. Make sure that the insulation covers the sensor completely and seal all connections to the pipe to keep ambient air from affecting the temperature readings.

3. Install the pressure gauge to monitor suction pressure at the expansion valve sensing bulb location. If no pressure tap is provided, install the pressure gauge at the compressor and estimate the suction line pressure loss between the compressor and sensing bulb.
4. Operate the system for approximately 10 to 15 minutes in order for the expansion valve to stabilize.

5. To calculate superheat from pressure and temperature readings, compare the actual vapor temperature of the refrigerant as converted from the suction pressure reading (plus suction line pressure loss, if applicable) to the suction temperature measured by the electronic tester. See the examples given below.

EXAMPLE 1:

SUCTION PRESSURE = 66.0 psig (measured at expansion valve sensing bulb)
 SUCTION TEMPERATURE = 52 F
 SUCTION PRESSURE CONVERTED TO SATURATED VAPOR TEMPERATURE = 38 F
 SUCTION SUPERHEAT = 52-38 = 14 F

EXAMPLE 2:

SUCTION PRESSURE = 65.0 psig (measured at the compressor)
 ESTIMATED SUCTION LINE PRESSURE LOSS = 3 psi
 TOTAL ESTIMATED SUCTION PRESSURE = 68 psig (at the sensing bulb)
 SUCTION TEMPERATURE = 52 F
 SUCTION PRESSURE CONVERTED TO SATURATED VAPOR TEMPERATURE = 40 F
 SUCTION SUPERHEAT = 52-40 = 12 F

Adjustment

To increase the superheat reading, turn the adjusting stem of the expansion valve to close the valve and to limit the amount of refrigerant flowing into the evaporator. **Adjustment should be made at one-half turn at a time. To**

TABLE 7 - Refrigerant-22 Pressure/Temperature Conversion Chart

TEMPERATURE (DEGREES F)	SUCTION PRESSURE (PSIG)
26	49.9
27	51.2
28	52.4
29	53.6
30	54.9
31	56.2
32	57.5
33	58.8
34	60.1
35	61.5
36	62.8
37	64.2
38	65.6
39	67.1
40	68.5
41	70.0
42	71.4
43	73.0
44	74.5
45	76.0
46	77.6
47	79.2
48	80.8
49	82.4
50	84.0

decrease the superheat reading, increase refrigerant flow to the evaporator. Continue with tests and adjustments, one-half turn at a time, until an acceptable reading is obtained. Allow the system to re-stabilize for 10 minutes after each adjustment.

CAUTION: Incorrect superheat readings may be due to plugged filters or blocked refrigerant flow. Before making major adjustments to the expansion valve, check refrigerant level and filter/driers to ensure proper flow. Blocked filters may cause floodback to the compressor, damaging internal components.

TROUBLE ANALYSIS

SYSTEM CHECK

Before repairing or replacing any Climate Changer unit or component, complete the following simple checks. A trouble analysis chart follows this checklist. For more detailed information on the unit, refer to the Service Guide available through your local Trane Sales Office.

WARNING: DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR INSPECTING THE UNIT. DISCONNECT POWER BEFORE REMOVING OR CONNECTING ELECTRICAL WIRES. ALLOW ALL ROTATING EQUIPMENT TO STOP BEFORE SERVICING THE UNIT. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR ENTANGLEMENT IN MOVING PARTS.

- 1. Electrical power is available to unit.
- 2. Unit is turned on.

- 3. Electrical routing and connections are correct. Refer to specific wiring diagrams provided on the unit.
- 4. Filters are clean and properly positioned.
- 5. Fan belt is not broken or slipping.
- 6. Fan sheaves are properly aligned.
- 7. Fan is not hitting housing or inlet cone.
- 8. Dampers are not stuck open or closed.
- 9. Ductwork connections are secure and airtight.
- 10. Piping has no leaks.
- 11. Coils are not clogged or frozen.

TROUBLE ANALYSIS CHARTS

Use the tables in this section to assist in identifying the cause or causes of a malfunction in Climate Changer® operation. The column headed RECOMMENDED ACTION will suggest repair procedures.

NOTE: These tables are intended as a diagnostic aid only. For detailed repair procedures, contact your local Trane Service Company.

WARNING: DISCONNECT ELECTRICAL POWER BEFORE INSPECTING OR SERVICING THE UNIT AND ALLOW ALL ROTATING EQUIPMENT TO STOP COMPLETELY. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR MOVING PARTS.

CLIMATE CHANGER® TROUBLE ANALYSIS

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED ACTION
Motor fails to start.	Blown fuse or open circuit breaker.	Replace fuse or reset circuit breaker.
	Overload trip.	Check and reset overload.
	Improper wiring or connections.	Check wiring with diagram supplied on unit.
	Improper current supply.	Compare actual supply power with motor nameplate recommendations. Contact power company for adjustments.
	Mechanical failure.	Determine that motor and drive turn freely. Check bearings and lubrication.
	Short-circuited stator.	Indicated by blown fuses. Motor must be rewound.
	One phase of a three-phase motor is open.	Check line for open phase.
	Overloaded motor.	Reduce load or replace with larger motor.

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED ACTION
Motor stalls.	Low line voltage.	Check across AC line. Correct voltage if possible.
	Overloaded motor.	Reduce load or replace with a larger motor.
Motor runs and then dies down.	Partial loss of line voltage.	Check for loose connections. Determine adequacy of main power supply.
	Stator shorts when motor warms up.	Replace stator.
Motor does not come up to speed.	Low voltage at motor terminals.	Check across AC line and correct voltage loss if possible.
	Line wiring to motor too small.	Replace with larger sized wiring.
	60 cycle motor connected to 50 cycle supply.	Replace with a 50 cycle motor.
Motor overheats.	Overloaded motor.	Reduce load or replace with a larger motor.
	Motor fan is clogged with dirt, preventing proper ventilation.	Remove fan cover, clean fan and replace cover.
	Three-phase motor has one phase open.	Check wiring. Secure all connections.
	Improper line voltage.	Check across AC line. Consult power company. Step transformer may be necessary.
	Worn bearings.	Replace bearings and seals.
Excessive motor noise.	Motor mounting bolts loose.	Tighten motor mounting bolts.
	Rigid coupling connections.	Replace with flexible connections.
	Worn motor bearings.	Replace bearings and seals.
	Fan rubbing on fan cover.	Remove interference in fan housing.
Rapid motor bearing wear.	Excessive overhung load due to over-tensioned drive.	Check belt tension and overhung load.
	Excessive overhung load due to a small diameter motor sheave.	Replace sheave with larger one.
Loose fan belt.	Motor is poorly positioned.	Adjust tension.
	Worn or damaged belt.	Replace belt or belt set. Check sheave alignment.
	Worn sheaves.	Replace sheaves.
Short belt life.	Worn sheaves.	Replace sheaves.
	Misaligned belt.	Realign drive with MVP sheave set at mean pitch diameter.
	Grease or oil on belts.	Check for leaky bearings. Clean belts and sheaves.
	Belt slipping.	Adjust tension.
	Belts rubbing.	Remove obstruction or realign drive for clearance.
	High ambient temperature.	Provide ventilation. Shield belts. Use gripnotch belts.

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED ACTION
Low coil capacity. (CHILLED WATER)	Air is bypassing coil.	Prevent bypass with blockoffs.
	Coil tubes are blocked.	Clean and unblock tubes.
	Incorrect airflow.	Check fan operating conditions.
	Incorrect gpm.	Check water pumps, valves and lines for obstructions.
	Incorrect water temperature.	Provide proper water temperature.
Low coil capacity. (REFRIGERANT)	Air is bypassing coil.	Prevent bypass with blockoffs.
	Coil tubes are blocked.	Clean and unblock tubes.
	Incorrect airflow.	Check fan operating conditions.
	Expansion valve not operating.	Check sensing bulb location and TEV operation.
	Poor refrigerant distribution.	Check for blockage in distributor and tubes.
Low coil capacity. (STEAM)	Air is bypassing coil.	Prevent bypass with blockoffs.
	Tubes are blocked.	Clean and unblock tubes.
	Incorrect airflow.	Check fan operating conditions.
	Incorrect steam pressure.	Adjust pressure supply.
Fan does not operate.	Electrical.	Check fuses, electrical on-off switch, overload protector and voltage output.
	Mechanical.	Look for broken belts or loose pulleys. Make sure the fan blades are not stopped or obstructed by the fan housing.
Noisy fan.	Fan hitting inlet cone, cutoff, or housing.	Center fan in inlet cone. Secure cutoff in housing. Secure fan on shaft. Repair or replace damaged parts.
	Drive belts not operating properly.	Adjust belt tension. Check for matched set. Replace worn or broken belts and clean oily or dirty belts.
Bearing is excessively hot.	First start after relubrication. (grease distribution)	Allow machine to cool down and restart.
	Over-lubrication.	Clean surface of grease and purge.
	No lubricant.	Apply lubricant. Check bearings for damage.
	Excessive load or speed.	Replace with a larger bearing.
	Misaligned bearing.	Correct alignment. Check shaft level.

For further information on this product or other Trane products, refer to the "Trane Service Literature Catalog", ordering number IDX-IOM-1. This catalog contains listings and prices for all service literature sold by Trane. The catalog may be ordered by sending a \$20.00 check to: The Trane Company, Service Literature Sales, 3600 Pammel Creek Road, La Crosse, WI 54601.



TRANE™

Cust: C&S Mech
ATTN: Roy Cauley
Job: Renor. to Bldg. 420#422

Unit Parts

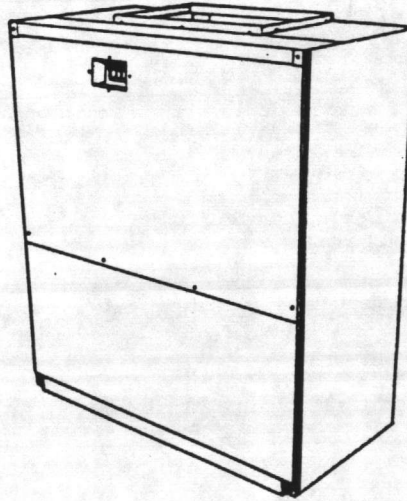
BWE-UP-3A

Library	Service Literature
Product Section	Unitary
Product	Split System-Evap. Fan Coil
Model	BWE
Literature Type	3A
Sequence	May 1989
Date	SV-UN-HPMP-BWE-UP-3A-589
File No.	BWE-UP-3-988
Supersedes	

Split System Heat Pumps

Literature Change:

Genral Update &
Motor Correction



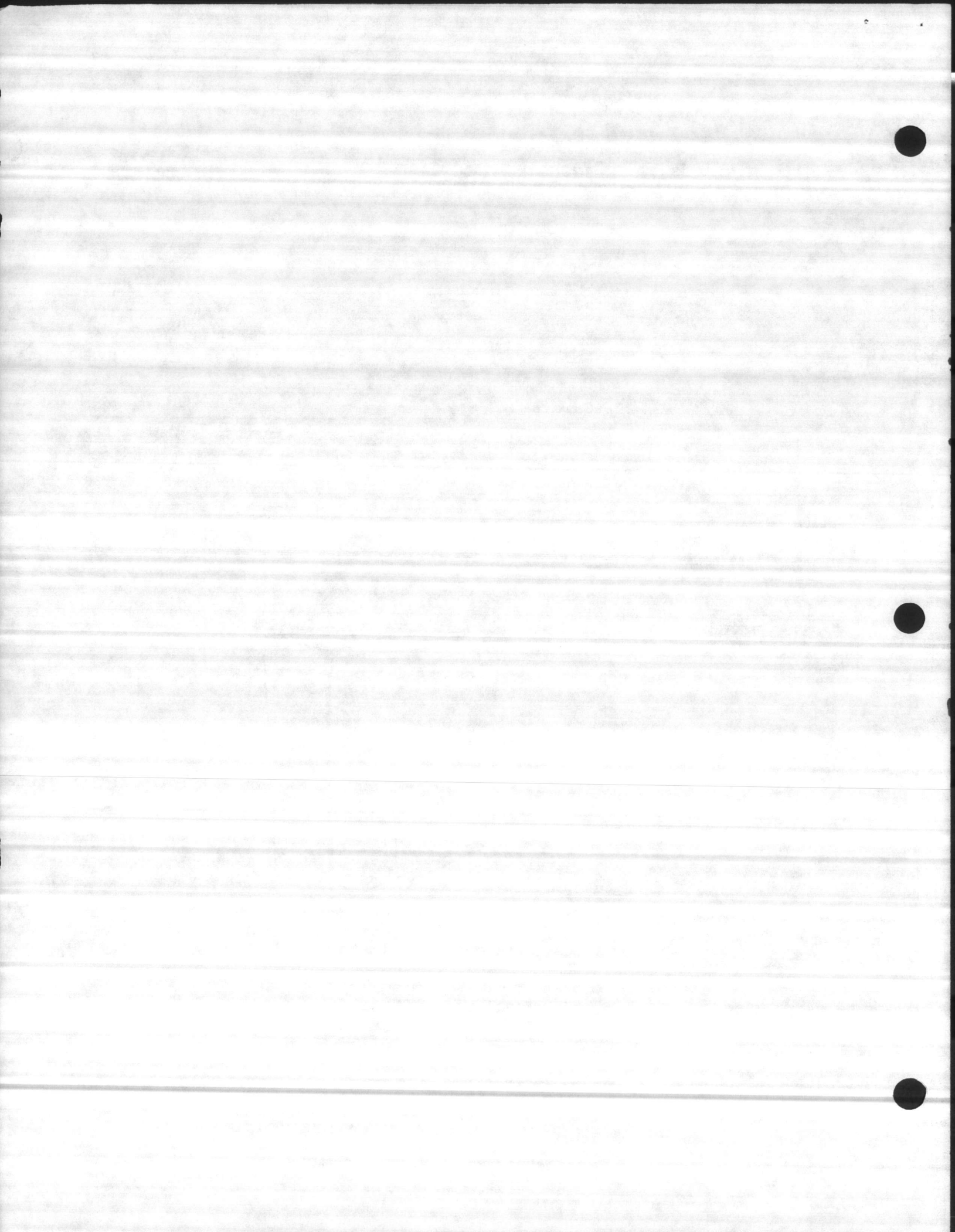
Models

BWE060C100GA	BWE090C400GA
BWE060C300GA -	BWE120CW00GA
BWE060C400GA	BWE120C100GA
BWE090CW00GA	BWE120C400GA
BWE090C100GA	

This parts list is designed for ease of parts selection. Wherever possible, the parts list allows parts selection without the use of the Trane model number. Parts may be selected from the illustrations and/or tables from the parts index located at the back of the parts list.

Contact your local Trane parts distributor for assistance or identification of any parts not identified in this parts list.

Since The Trane Company has a policy of continuous product improvement and parts standardization, it reserves the right to change specifications and design without notice. This parts list identifies known standardized parts and other parts changed by standardization. The installation and servicing of this equipment should be done by qualified, experienced technicians.



Model Number Description

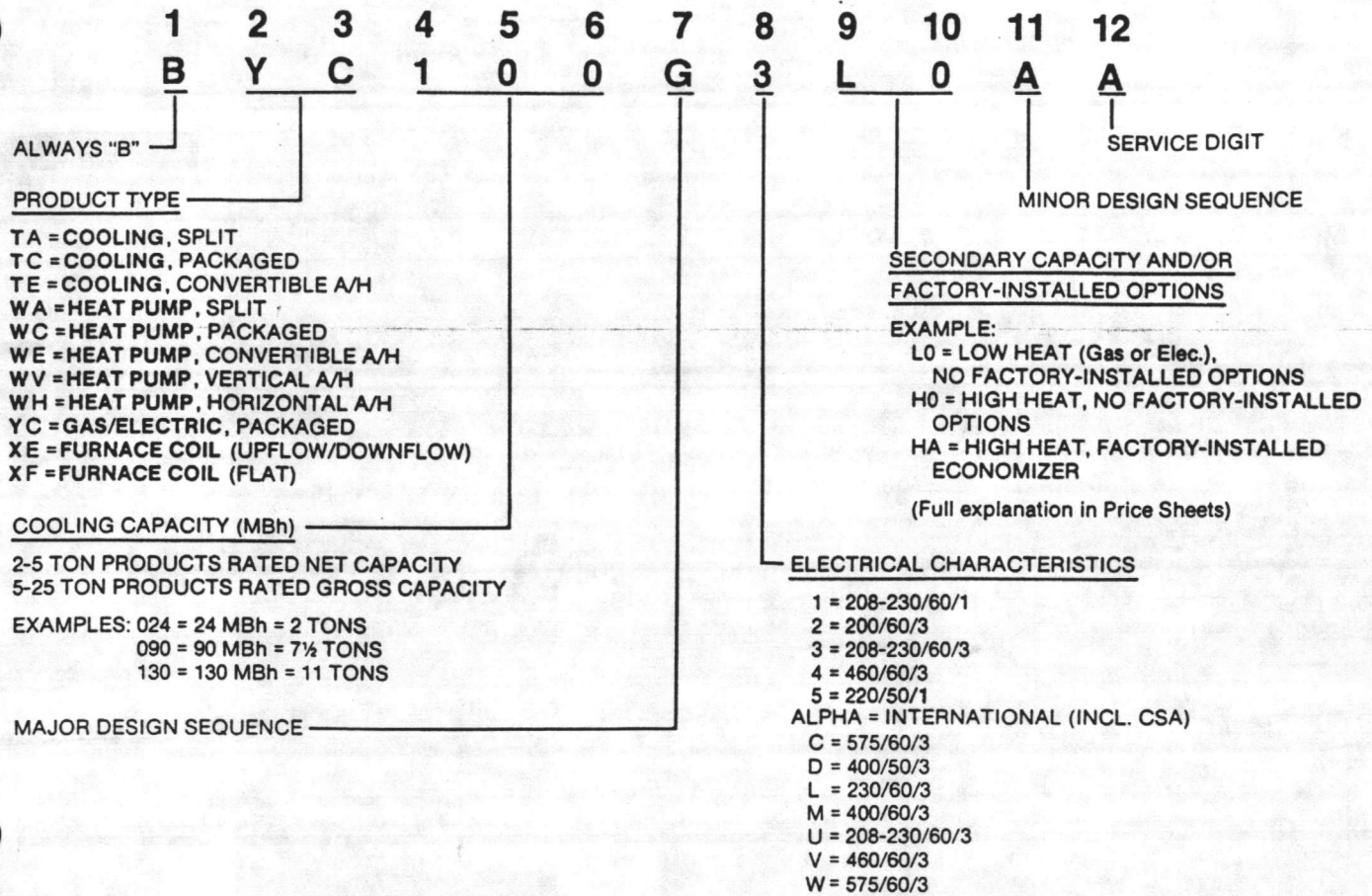
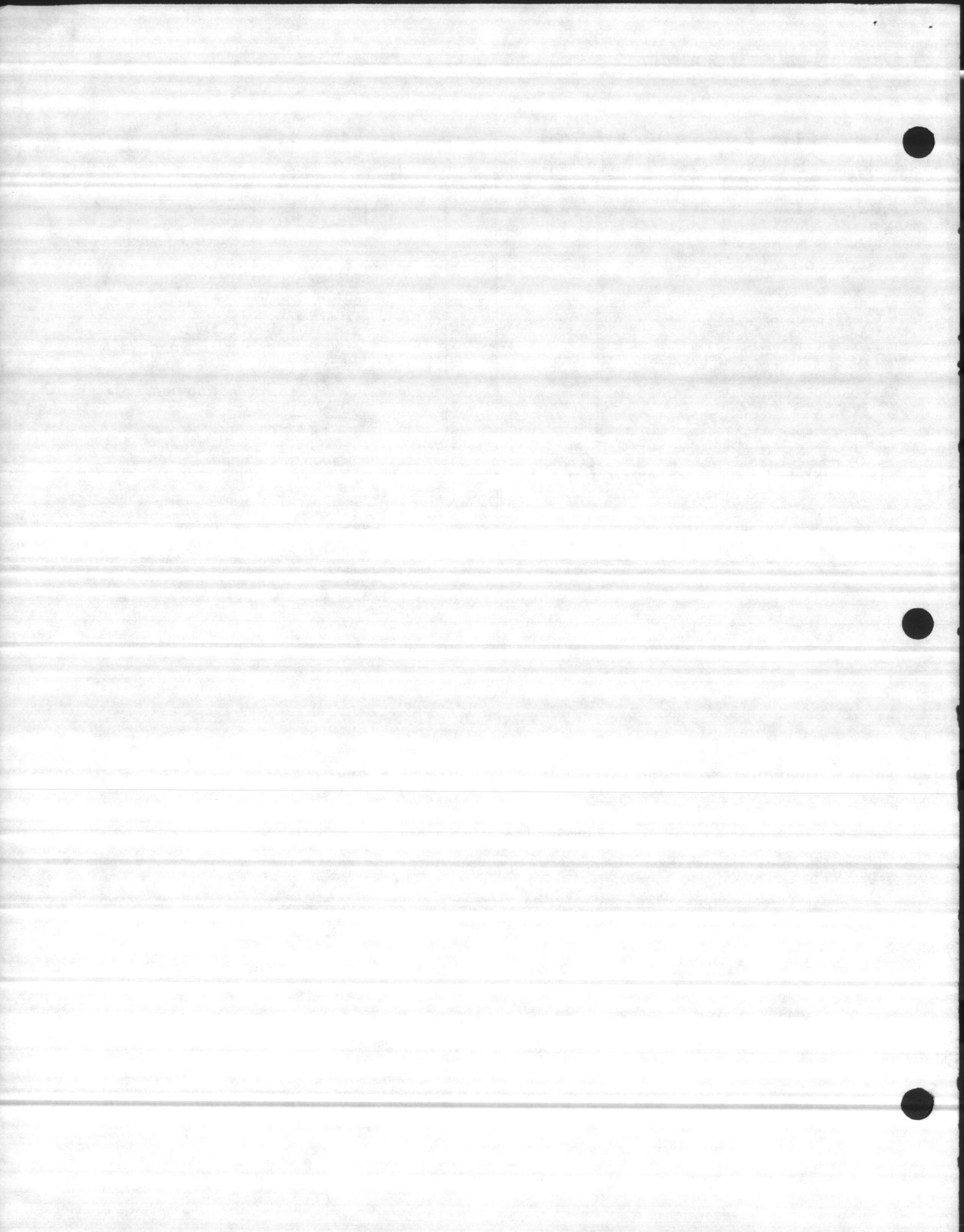
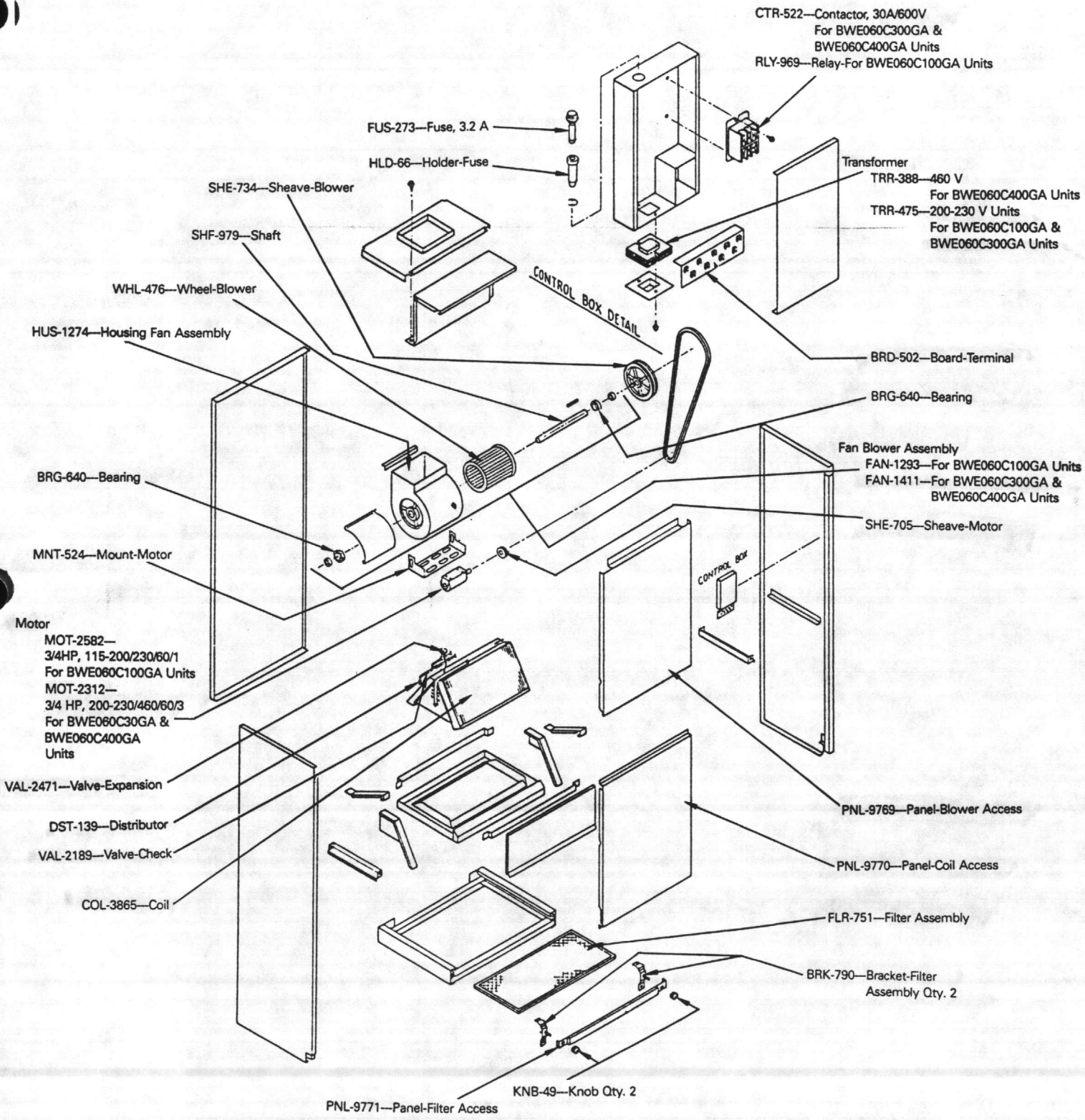


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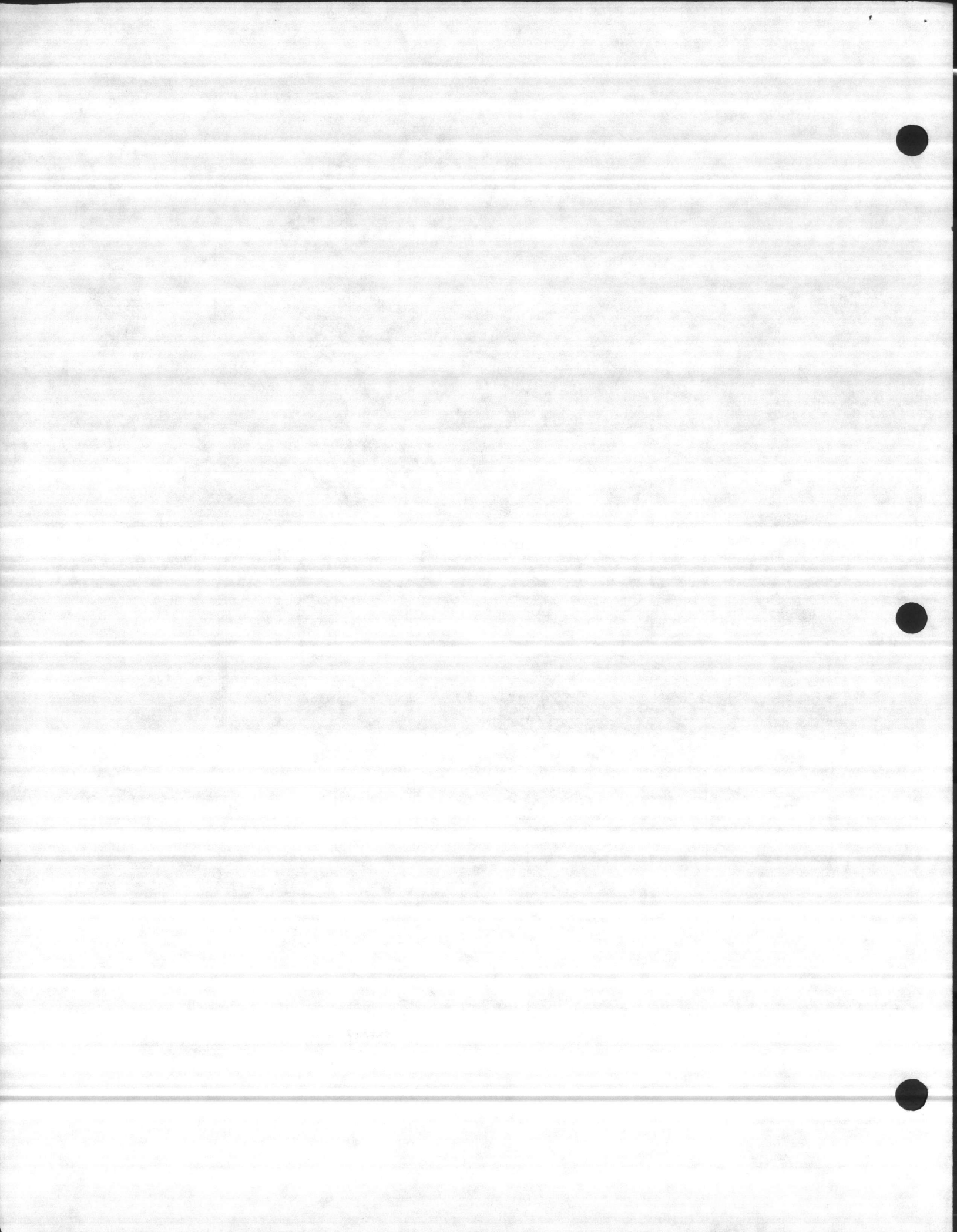


Section 1-Illustration For BWE060 Units



*Not Illustrated
 *BUS-266—Bushing-Anti-short Qty. AR

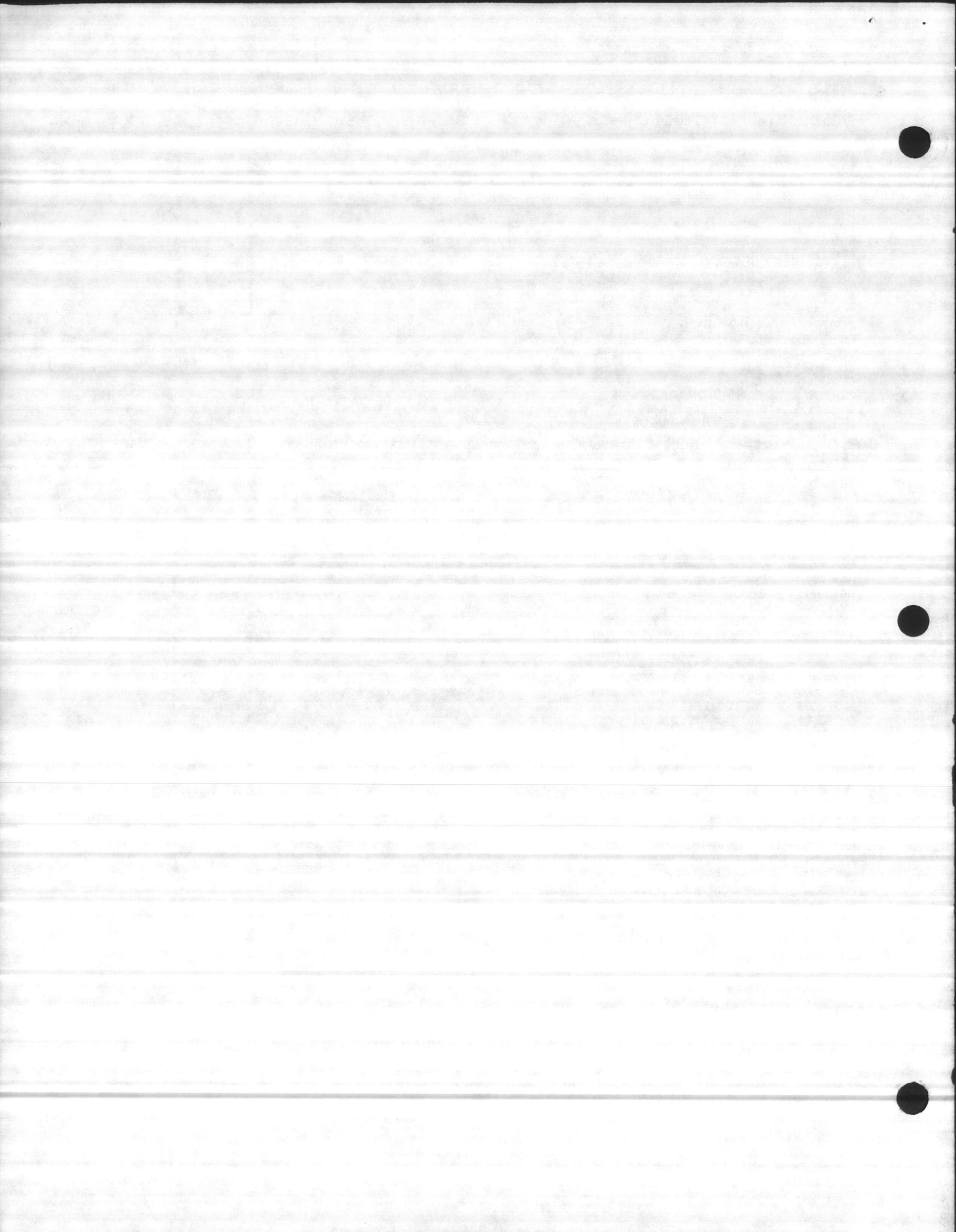
Purchase Belt Locally



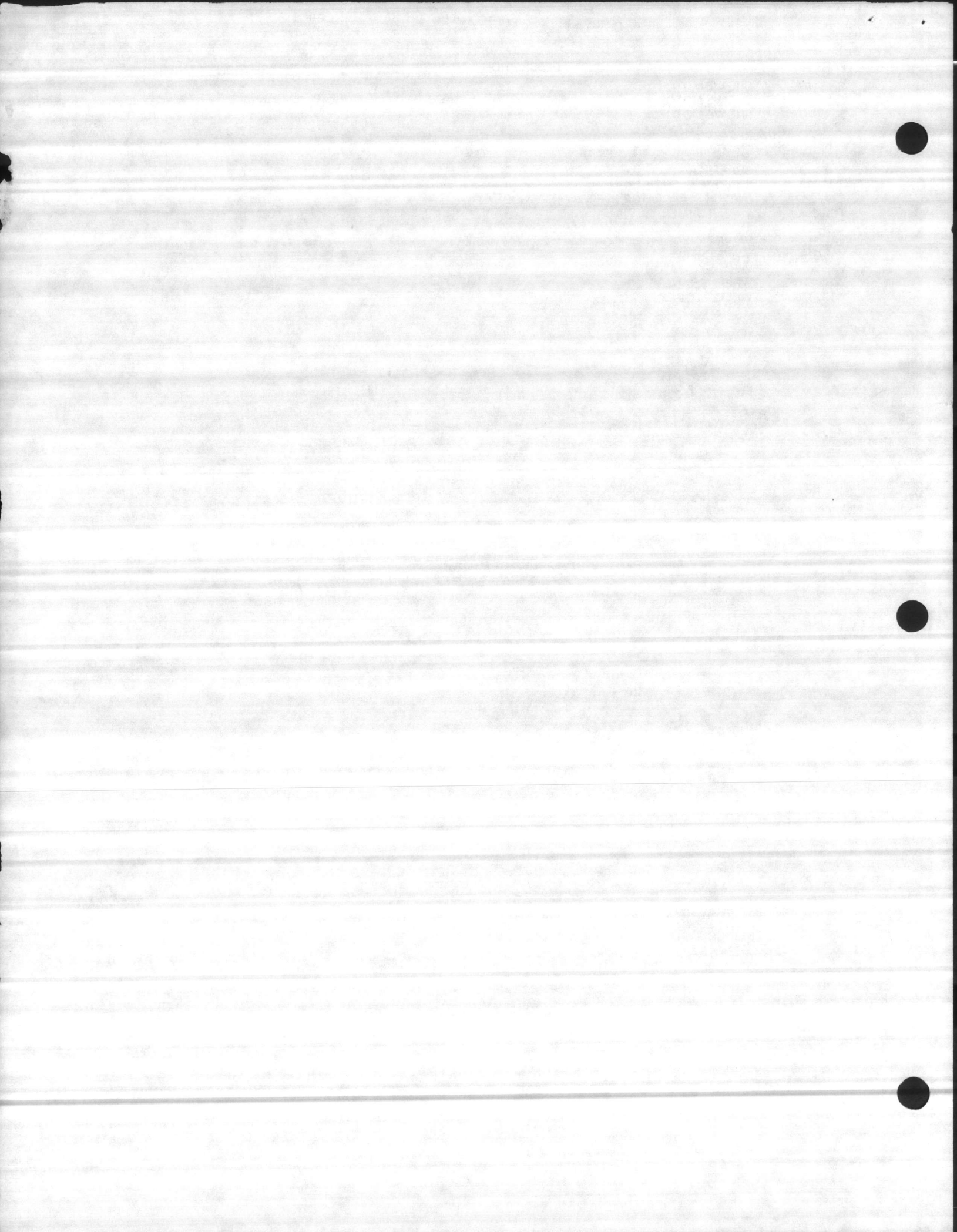
Parts Index

THIS IS A LISTING OF PART NUMBERS CONTAINED IN THE PARTS LIST AND IS IN ALPHA-NUMERIC ORDER TO MAKE PARTS IDENTIFICATION EASIER. THIS INDEX PROVIDES PART NUMBER, DESCRIPTION OF THE PART, SECTION OF THE PARTS LIST THE PART IS LOCATED IN, QUANTITY AND WHETHER THE PART IS RECOMMENDED FOR LOCAL STOCK.

PART NO.	DESCRIPTION	SECTION	NO. REQ.	RLS
ANG-133	ANGLE	2 & 3	2	
B-128	BELT	2	1	+
B-263	BELT	3	1	+
B-502	BELT	2 & 3	1	+
BAF-75	BAFFLE ASSEMBLY	2 & 3	2	
BRD-502	BOARD-TERMINAL	1	1	
BRD-620	BOARD-TERMINAL	2 & 3	1	
BRG-637	BEARING	2 & 3	2	+
BRG-640	BEARING	1	2	
BRK-790	BRACKET-FILTER ASSEMBLY	1	2	
BUS-266	BUSHING-ANTI-SHORT	ALL	AR	
CO-199	CUTOFF-PAINTED	2 & 3	1	
COL-3865	COIL	1	1	
COL-4643	COIL	2	1	
COL-4644	COIL	3	1	
COV-1047	COVER	2 & 3	1	
CTR-503	CONTACTOR, 90A/240V	2 & 3	1	+
CTR-522	CONTACTOR, 30A/600V	ALL	1	+
DST-132	DISTRIBUTOR-INDOOR	2 & 3	1	
DST-139	DISTRIBUTOR-INDOOR	1	1	
FAN-1293	FAN ASSEMBLY	1	1	
FAN-1294	FAN	2 & 3	1	
FAN-1411	FAN ASSEMBLY	1	1	
FLR-751	FILTER ASSEMBLY	1	1	
FLR-767	FILTER, 1X24X24	2 & 3	2	
FUS-273	FUSE, 3.2 A	1	1	+
HLD-66	HOLDER-FUSE	1	1	
HUS-1120	HOUSING-BLOWER	2 & 3	1	
HUS-1274	HOUSING-FAN ASSEMBLY	1	1	
KNB-49	KNOB	1	2	
MNT-471	MOUNT-MOTOR	2 & 3	1	
MNT-524	MOUNT-MOTOR	1	1	
MOT-2293	MOTOR, 1-1/2 HP, 230-460/60/3	2	1	+
MOT-2296	MOTOR, 2 HP, 200-230/60/1	3	1	+
MOT-2312	MOTOR, 3/4 HP, 200-230/460/60/3	1	1	+
MOT-2582	MOTOR, 3/4 HP, 115-200/230/60/1	1	1	+
MOT-2705	MOTOR, 2 HP, 230-460/60/3	3	1	+
MOT-2900	MOTOR, 1-1/2 HP, 200/230/60/1	2	1	+
MOT-3093	MOTOR, 2 HP, 575/60/3	2	1	+
MOT-3094	MOTOR, 2 HP, 575/60/3	3	1	+
PNL-9769	PANEL-BLOWER ACCESS	1	1	
PNL-9770	PANEL-COIL ACCESS	1	1	
PNL-9771	PANEL-FILTER ACCESS	1	1	
PNL-9772	PANEL-BLOWER ACCESS	2	1	
PNL-9773	PANEL-COIL ACCESS	2 & 3	1	
PNL-9774	PANEL-REAR	2 & 3	1	
PNL-9775	PANEL-ACCESS	3	1	
PNL-9776	PANEL-BLOWER ACCESS	3	1	
PNL-9777	PANEL-RIGHT HAND	3	1	
PNL-9778	PANEL-LOWER REAR	2	1	
PNL-9779	PANEL-ACCESS ASSEMBLY	2	1	
PNL-9780	PANEL-SIDE ASSEMBLY	2	1	
PNL-9781	PANEL-SIDE	3	1	
PNL-9782	PANEL-FILTER ASSEMBLY	2 & 3	1	
PNL-9783	PANEL-SIDE ASSEMBLY	2	1	
PNL-9784	PANEL-ACCESS ASSEMBLY	2 & 3	1	
PNL-9785	PANEL-REAR	3	1	
RLY-969	RELAY	1	1	+



PART NO.	DESCRIPTION	SECTION	NO. REQ.	RLS
SHE-197	SHEAVE-MOTOR	3	1	+
SHE-705	SHEAVE-MOTOR	1	1	+
SHE-707	SHEAVE-MOTOR	2 & 3	1	+
SHE-732	SHEAVE-BLOWER	2 & 3	1	+
SHE-734	SHEAVE-BLOWER	1	1	+
SHE-865	SHEAVE-BLOWER	2 & 3	1	+
SHF-913	SHAFT	2 & 3	1	
SHF-979	SHAFT	1	1	
SWT-507	SWITCH-EVAPORATOR DEFROST CONTROL	2 & 3	1	+
TRR-388	TRANSFORMER, 460V	1	1	+
TRR-475	TRANSFORMER, 200/230V	1	1	+
VAL-2188	VALVE-EXPANSION INDOOR	2 & 3	1	+
VAL-2189	VALVE-CHECK	ALL	1	+
VAL-2471	VALVE-EXPANSION	1	1	+
WHL-320	WHEEL-BLOWER	2 & 3	1	
WHL-476	WHEEL-BLOWER	1	1	





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Installation

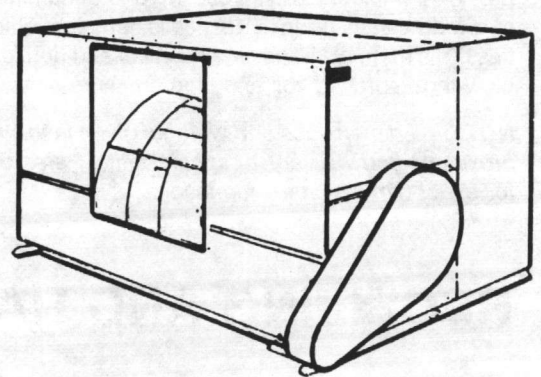
CLCH-IN-3A

Library	Service Literature
Product Section	Air Handling
Product	Central Station Air Handlers
Model	Climate Changers
Literature Type	Installation
Sequence	3A
Date	August 1986
File No.	SV-AH-CLCH-CLCH-IN-3A-886
Supersedes	CLCH-IN-3 (186)

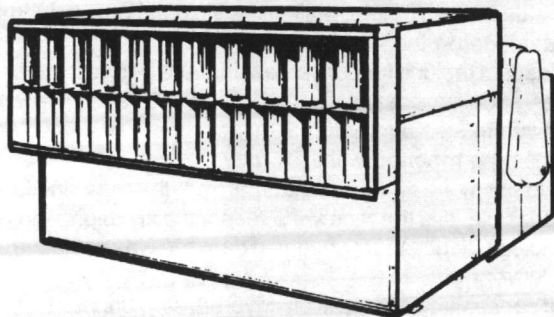
CLIMATE CHANGER® CENTRAL STATION AIR HANDLERS

**DRAW-THRU, BLOW-THRU
SPRAYED COIL AND HIGH
PRESSURE UNITS**

B DEVELOPMENT SEQUENCE



DRAW-THRU



BLOW-THRU

The Trane Company
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X39640290-02

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change specifications and design without notice. The installation and servicing of the equipment referred to in this booklet should be done by qualified, experienced technicians.

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Literature Change History:

CLCH-IM-10 (June 81)

Introduce infinity variable fin series. Change design sequence to "C".

CLCH-IN-2 (August 84)

Change bearing type (opposite drive side) on unit sizes 17 thru 31 w/stub shaft. Include weights for units with wide coils. Specific instructions for units shipping with optional coilless. Convert CLCH-IM-10C into separate Installation and Maintenance Manuals (CLCH-IN-2 & CLCH-M-1). Change design sequence to "D".

CLCH-IN-3 (January 1986)

Added level coils and Delta-Flo coils to units. Added cradle dimensions for wide coil unit sizes 3 thru 31. Added and updated Tables (4, 8A and 12). Change design sequence to "E".

CLCH-IN-3A (August 1986)

Corrected Figure 49.

GENERAL INFORMATION

Central Station Climate Changers® are air handlers designed to provide complete heating, cooling and dehumidifying by means of a wide variety of unit sizes, coils, fans and efficiency capabilities. This manual will cover all vertical and horizontal, draw-thru, blow-thru, sprayed coil and high pressure units.

NOTE: All dimensions and weights given in this manual are approximate and will vary for special units. Refer to submittal data for exact dimensional information.

An Installation Checklist is given at the end of the Installation section of this manual to be used by the installing contractor to verify proper installation procedures. These checklists should not be substituted for the detailed information and procedures contained in appropriate sections of the manual.

RECEIVING AND HANDLING

SHIPPING

Central Station Climate Changers® are shipped either assembled or in sections, depending on unit size and accessories. All units or sections of units are attached securely to skids. Nuts, bolts and washers necessary for unit assembly are attached to one of the skids. Motors ship separately when their size or location on the unit prevents safe transit. Access section is shipped unassembled.

To protect against loss from in-transit damage, complete the following upon receipt of the unit:

1. Inspect individual pieces of the shipment before accepting it. Check for rattles, bent corners on cartons or other visible indications of shipping damage.
2. If a carton or unit has apparent damage, open it immediately and inspect the contents before accepting the unit. Do not

refuse the shipment. Make specific notations concerning the damage on the freight bill.

3. Inspect the unit for concealed damage before it is stored and as soon as possible after delivery. Refer to the checklist given in step 8 for internal inspections. Concealed damage must be reported within 15 days.
4. Do not move damaged material from the receiving location if possible. It is the receiver's responsibility to provide reasonable evidence that concealed damage was not incurred after delivery.
5. If concealed damage is discovered, stop unpacking the shipment. Retain all internal packing, cartons and crates. Take photos of the damaged material if possible.
6. Notify the carrier's terminal of the damage immediately by phone and mail. Request an immediate joint inspection of the damage by the carrier and consignee.
7. Notify the Trane sales representative of the damage and ar-

range for repair. Do not repair the unit, however, until damage is inspected by the carrier's representative. Trane is not responsible for shipping damage.

8. Complete the following inspections before installing the unit:
 - a. Verify that the correct unit has been received by comparing nameplate and model number information with submittal data.
 - b. Rotate the fan manually to be sure that it is free to operate. Inspect the fan housing for obstructions which may have entered the unit during shipment.
 - c. Check all dampers in the unit and accessories to be sure they are free to move and have not been damaged in transit.
 - d. Make sure the inlet vanes operate freely. Check that all sets of vanes operate together when opening and closing.

Refer to the Unit Location Recommendations in this manual before setting the unit in place. It is recommended that units are left on their skids for protection and ease of handling until set in place. For proper rigging and hoisting procedures, refer to the Rigging section of this manual and the instruction label on the unit.

RIGGING

Before preparing the unit or component for lifting, estimate the approximate center of gravity for lifting safety. Because of placement of internal components, the unit weight may be unevenly distributed, with more weight in the coil area. Approximate unit weights are given in Tables 1, 2 and 3.

Before hoisting the unit, be sure that the proper method of rigging is used, with straps or slings and spreader bars for protection during lifting. See Figure 1. Refer to the unit label for recommended rigging procedures. Always test-lift the unit to determine exact unit balance and stability before hoisting it to the installation location.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

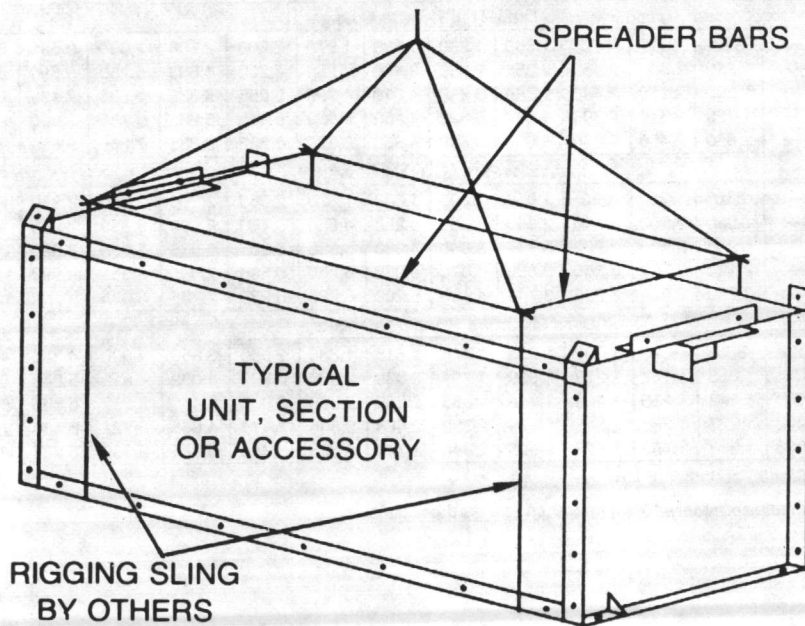


FIGURE 1 - Recommended Rigging Procedure

TABLE 1 - Climate Changer Unit Operating Weights in Pounds (Less Motors)

	UNIT SIZE															
	3	6	8	10	12	14	17	21	25	31	35	41	50	63	73	86
Draw-Thru Climate Changers																
Casing Only	205	275	400	460	700	750	1,015	1,225	1,380	1,455	2,100	2,540	2,750	4,270	4,710	5,030
2 Row	291	424	570	677	978	1,060	1,429	1,639	1,850	2,117	2,832	3,558	3,708	5,529	5,850	6,390
4 Row	328	487	657	785	1,108	1,213	1,618	1,876	2,219	2,453	3,198	3,797	4,260	6,218	6,710	7,420
6 Row	368	552	742	891	1,243	1,369	1,807	2,018	2,381	2,813	3,616	4,261	4,794	6,929	7,560	8,440
8 Row	406	618	828	988	1,373	1,520	1,981	2,321	2,643	3,143	3,984	4,699	5,330	7,611	8,320	9,330
Draw-Thru Climate Changer w/Wide Coil																
Casing Only	225	295	425	490	730	780	1,045	1,260	1,415	1,505	2,190	2,715	2,950	4,845	4,850	5,170
With 2 Row	365	495	665	779	1,089	1,166	1,535	1,738	1,951	2,262	3,041	3,959	4,121	5,781	6,157	6,697
With 4 Row	426	579	788	922	1,257	1,357	1,759	2,005	2,372	2,647	3,467	4,251	4,796	6,578	7,142	7,854
With 6 Row	491	666	908	1,063	1,431	1,552	1,982	2,246	2,557	3,058	3,953	4,818	5,448	7,401	8,117	9,448
With 8 Row	553	754	1,030	1,192	1,599	1,740	2,188	2,526	2,856	3,436	4,381	5,354	6,103	8,190	8,988	9,998
Blow-Thru Climate Changers																
Casing Only	—	605	765	810	880	1,095	1,260	1,425	1,600	1,810	3,250	3,650	4,025	4,580	5,030	5,530
2 Row	—	754	935	1,027	1,158	1,405	1,614	1,839	2,070	2,472	3,982	4,463	4,983	5,839	6,436	7,142
4 Row	—	817	1,022	1,135	1,288	1,558	1,803	2,070	2,339	2,808	4,348	4,907	5,535	6,528	7,240	8,114
6 Row	—	882	1,107	1,241	1,423	1,714	1,992	2,298	2,609	3,168	4,766	5,367	6,069	7,239	8,018	9,046
8 Row	—	948	1,193	1,338	1,553	1,865	2,166	2,521	2,863	3,498	5,134	5,809	6,605	7,921	8,824	9,998
Single-Zone Blow-Thru Climate Changers																
Casing Only	—	386	544	631	760	900	1,080	1,235	1,370	1,560	2,780	3,115	3,435	4,425	4,870	5,280
2 Row	—	535	714	848	1,038	1,210	1,434	1,629	1,840	2,222	3,512	3,928	4,393	5,684	6,276	6,892
4 Row	—	598	801	956	1,168	1,363	1,623	1,860	2,109	2,558	3,878	4,372	4,945	6,373	7,080	7,864
6 Row	—	663	886	1,062	1,303	1,519	1,812	2,088	2,379	2,918	4,296	4,832	5,479	7,084	7,858	8,796
8 Row	—	729	972	1,159	1,473	1,670	1,986	2,311	2,673	3,248	4,664	5,274	6,015	7,766	8,664	9,748
Sprayed Coil Climate Changers																
Casing Only	690	915	1,105	1,270	1,880	2,130	3,100	3,285	3,305	3,485	4,950	5,700	6,230	9,050	10,485	12,355
4 Row	815	1,125	1,360	1,595	2,290	2,595	3,745	4,125	4,145	4,485	6,050	6,950	7,740	10,100	11,700	13,787
6 Row	855	1,190	1,445	1,700	2,425	2,750	3,925	4,285	4,305	4,855	6,465	7,420	8,275	11,710	13,560	15,985
8 Row	890	1,260	1,535	1,800	2,555	2,900	4,195	4,550	4,570	5,175	6,835	7,860	8,810	12,390	14,355	16,910
High Pressure Sprayed Coil Climate Changers																
Casing Only	—	—	1,590	2,130	2,500	2,670	3,210	3,840	4,350	5,100	5,350	6,000	7,200	9,400	12,250	14,910
4 Row	—	—	1,845	2,455	2,910	3,135	3,755	4,485	5,190	6,100	6,450	7,250	8,710	11,350	14,250	17,300
6 Row	—	—	1,930	2,560	3,045	3,290	3,940	4,665	5,350	6,460	6,865	7,720	9,245	12,060	15,100	18,320
8 Row	—	—	2,020	2,660	3,175	3,440	4,115	4,935	5,615	6,790	7,235	8,160	9,780	12,740	15,950	19,210
High Pressure Draw-Thru Climate Changers																
Fan Section Only	—	—	610	770	920	1,060	1,290	1,580	1,870	2,060	2,200	2,330	2,580	2,950	4,090	5,400
Fan and Coil Section	—	—	1,250	1,800	2,150	2,250	2,650	3,400	3,950	4,250	4,600	5,250	5,650	6,850	8,260	10,400
4 Row	—	—	1,590	2,170	2,440	2,765	3,210	4,010	4,795	5,055	5,535	6,335	7,180	8,600	10,260	12,790
6 Row	—	—	1,720	2,310	2,690	3,030	3,370	4,180	4,930	5,445	5,935	6,785	7,930	9,350	11,110	13,810
8 Row	—	—	1,850	2,450	2,740	3,095	3,530	4,350	5,325	5,835	6,335	7,235	8,680	10,000	11,960	14,700
High Pressure Blow-Thru Climate Changers																
Fan Section Only	—	—	610	770	920	1,060	1,290	1,580	1,870	2,060	2,200	2,330	2,580	2,950	4,090	5,400
Fan and Coil Section	—	—	1,650	2,250	2,600	2,850	3,300	4,250	4,850	5,400	6,000	6,850	7,300	9,300	12,140	14,900
4 Row	—	—	1,990	2,620	2,900	3,365	3,860	4,860	5,595	6,205	6,935	7,935	8,830	11,050	14,140	17,290
6 Row	—	—	2,120	2,760	3,240	3,630	4,020	5,030	5,860	6,595	7,335	8,385	9,580	11,800	14,990	18,310
8 Row	—	—	2,250	2,900	3,290	3,745	4,180	5,200	6,225	6,985	7,735	8,835	10,180	12,450	15,840	19,200
Three Deck Multizone Climate Changers																
Casing Only	—	725	885	930	1,000	1,255	1,440	1,615	1,830	2,060	3,350	4,000	4,385	4,950	—	—
2 Row	—	874	1,055	1,147	1,278	1,560	1,794	2,029	2,300	2,722	4,082	4,813	5,343	6,219	—	—
4 Row	—	937	1,142	1,255	1,408	1,718	1,983	2,260	2,669	3,058	4,448	5,257	5,895	6,908	—	—
6 Row	—	1,002	1,227	1,361	1,543	1,874	2,232	2,488	2,839	3,418	4,866	5,721	6,429	7,609	—	—
8 Row	—	1,068	1,313	1,458	1,673	2,025	2,346	2,711	3,093	3,748	5,234	6,159	6,965	8,291	—	—

NOTE: Inlet vane weights will vary from 38 to 93 pounds per fan.

NOTE: Units with Delta-Flo coils will weigh approximately 10% lighter than standard coil weights.

TABLE 2 - Approximate Motor Weights*

Motor Horsepower	¼	⅓	½	1	1½	2	3	5	7½	10	15	20	25	30	40	50	60	75
Motor Weight (Lbs.)	20	20	25	33	44	44	71	82	127	144	187	214	263	300	409	460	560	660

Standard Open Ball Bearing T-Frame Motor.

TABLE 3 - Accessory Weights (LBS.)

UNIT SIZES	3	6	7	8	9	10	12	14	17	21	25	31	35	41	50	63	73	86
Flat Filter Box																		
Throwaway	28	38	42	45	54	68	73	76	92	113	120	135	170	180	210	335	388	457
Low Velocity Permanent	33	47	52	56	67	84	91	97	117	145	155	183	222	234	284	426	494	582
High Velocity Permanent	51	63	69	75	91	108	120	131	156	193	207	257	306	338	365	582	674	794
Medium Filter Box																		
Throwaway	76	101	131	144	167	171	178	228	247	303	324	355	370	456	520	565	655	775
Low Velocity Permanent	84	117	149	162	191	195	204	260	284	348	373	413	429	546	631	695	805	950
High Velocity Permanent	96	141	181	190	227	231	248	312	347	428	456	513	557	706	799	935	1,085	1,275
High Capacity Box																		
Throwaway	111	148	155	170	180	192	229	260	278	330	398	425	470	535	590	680	788	928
Low Velocity Permanent	120	166	184	194	208	223	261	305	324	393	468	512	574	660	735	865	1,002	1,180
High Velocity Permanent	136	198	217	230	257	271	317	360	396	489	576	648	742	852	950	1,160	1,344	1,583
Roll Filter	80	114	—	142	—	158	187	204	219	250	290	363	430	475	500	750	870	1,025
Comb. Filt./Mix Box																		
Throwaway	115	168	200	248	255	286	300	215	358	400	490	620	710	790	885	1,133	1,310	1,550
Low Velocity Permanent	122	184	217	266	279	310	324	345	393	441	540	686	780	874	997	1,165	1,465	1,730
High Velocity Permanent	134	208	249	298	315	346	368	397	456	521	635	786	906	1,035	1,265	1,505	1,740	2,060
Deluxe Comb. Filter/Mix Box																		
Throwaway	193	240	263	352	369	376	407	474	501	586	604	732	986	—	—	—	—	—
Low Velocity Permanent	200	256	280	370	393	400	431	504	536	627	654	798	1,056	—	—	—	—	—
High Velocity Permanent	212	280	312	402	429	436	475	556	600	707	739	898	1,182	—	—	—	—	—
Mixing Box	82	118	122	169	175	182	256	270	319	340	380	437	519	623	750	869	1,010	1,185
High Efficiency Bag Filter																		
Filter Sections	—	—	—	191	—	227	249	319	329	403	454	592	606	682	718	751	—	—
Bag Filters	—	—	—	11	—	14	18	23	25	30	41	50	64	64	75	100	—	—
Prefilters	—	—	—	2	—	3	4	5	5	6	9	11	13	13	17	22	—	—
*Diffuser Section	—	—	—	55	—	79	84	88	107	130	138	153	191	202	232	357	—	—
External Face and Bypass	40	58	79	96	100	112	154	161	170	216	292	417	457	470	618	925	1,070	1,265
Internal Face and Bypass	30	53	74	77	92	100	109	113	124	184	223	327	334	363	441	535	620	730
Face Dampers	39	55	65	91	102	106	111	115	142	225	232	297	312	370	446	543	630	742
Straight Thru Discharge Plenum	50	65	90	100	130	110	130	150	170	180	200	300	400	400	—	—	—	—

*Weight given is sum of diffuser section, duct extension and canvas duct.

INSTALLATION

UNIT LOCATION RECOMMENDATIONS

When selecting and preparing the unit operating site, consider the following:

1. Consider the weight of the unit. Tables 1, 2 and 3 list operating weights.
2. Allow sufficient space for the recommended clearances, access panel removal, and maintenance access. Refer to Figure 2. Zero clearance to combustible materials is approved for units with or without steam or hot water heating coils.
NOTE: For units with optional wide coil, always maintain a 2-foot clearance from coil section end panel to permanent wall or obstruction.
3. The foundation or mounting platform must be large enough to include unit and accessory dimensions, given in specific sales submittals.
4. Rubber-in-shear or spring isolators are recommended. For floor-mounted units, anchor the unit to the floor or foundation to prevent strains on the piping and ductwork.
5. Installer must provide suspension or support frame for ceiling-mounted units size 35 and larger. Use the weights given in Tables 1, 2 and 3.
6. Prepare the floor or foundation so that it is level. The unit must be mounted level to ensure proper hydronic coil drainage and condensate flow.
7. Coil piping and condensate drain requirements must be considered. For units with Type F cooling coils, the installer must provide and install a condensing unit and piping. Allow room for proper ductwork and electrical connections. Support all piping and ductwork independently of unit to prevent excess noise and vibration.
8. Optional coilless horizontal draw-thru unit sizes 3, 6, 8, 10, 14 and 21 require the contractor to field install coil in unit per COIL INSTALLATION INSTRUCTIONS given in the installation manual (included with coil shipment). On ceiling-mounted unit applications it is recommended to install coil in unit **before** hoisting unit to operating position.

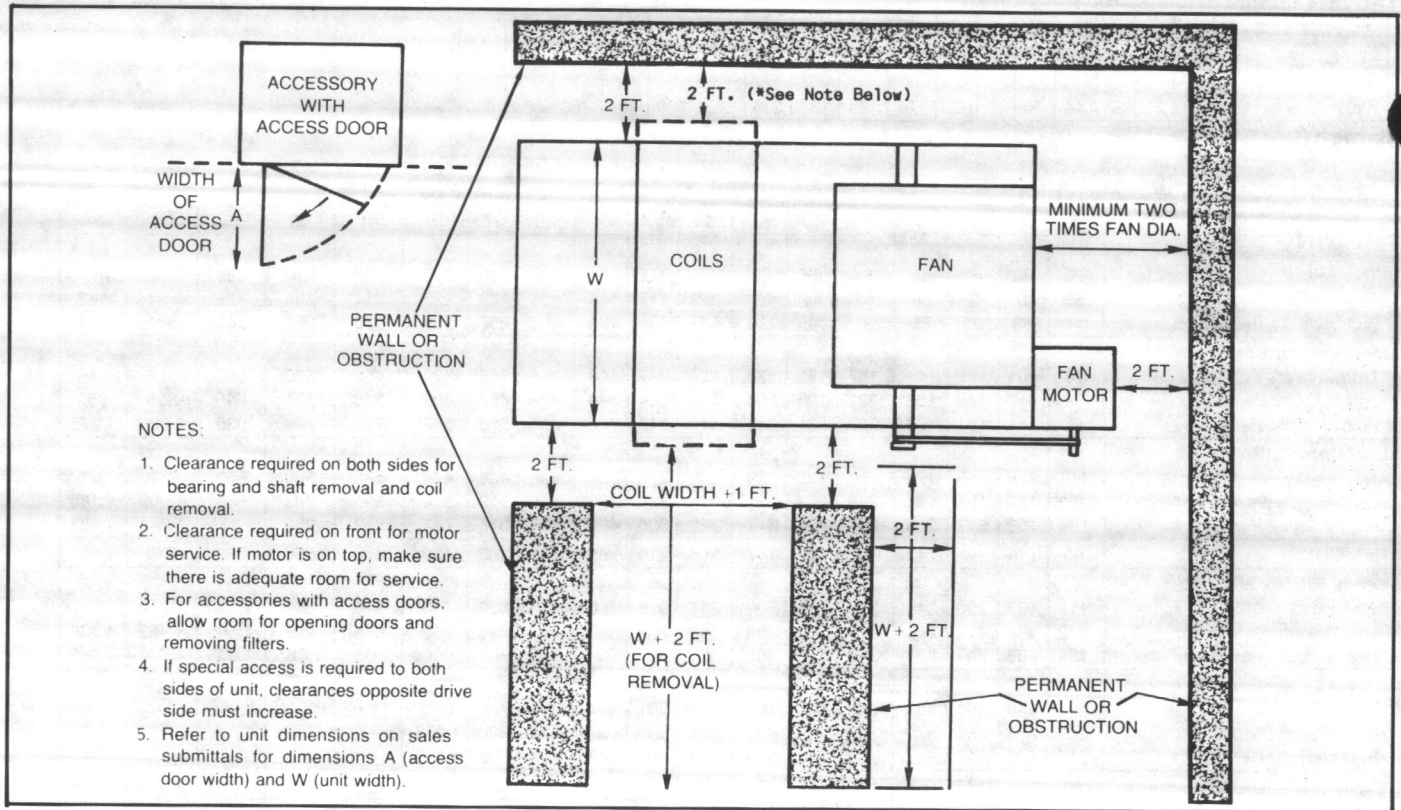


FIGURE 2 - Recommended Clearances

*NOTE FOR WIDE COIL UNITS: Always maintain a 2-foot clearance from coil section end panel to permanent wall or obstruction.

MOUNTING VIBRATION ISOLATORS

Vibration isolators and isolator mounting legs, when supplied, are shipped with the unit and attached to the shipping skid. Locate the mounting legs at all corners of the unit or component section or at appropriate support sites. Fasten the isolators to the floor securely before mounting the unit. See Figure 3.

NOTE: If mounting the unit on a raised platform or foundation, be sure to allow room for the mounting legs and isolators, which extend beyond the unit dimensions.

Level the unit after installation by adjusting the isolator levelling bolts. For ceiling-mounted units, use threaded rods or adjustable isolators to level the unit.

Be sure to consider the additional unit height if isolators are used when making duct, piping and electrical connections. For large Draw-Thru and Sprayed Coil units, the coil section must be mounted on a higher base than the fan section in order to compensate for the height of the fan section isolators.

NOTE: Non-Trane isolators must be properly sized to ensure adequate support of the unit. Allow at least 20 percent weight addition when sizing isolators.

If using spring-type isolators, the isolator levelling bolt must be adjusted to provide adequate isolation, as unit weight may cause the upper isolator housing to rest on the lower housing. See Figure 4. Clearance B must be between 1/4-inch and 1/2-inch under full unit weight. To increase the clearance, lift the unit off the mountings and turn the levelling bolt clockwise. Recheck the unit level and shim as necessary under the isolators.

After the isolator height is adjusted correctly, adjust the horizontal snubber bolt to minimize any horizontal movements.

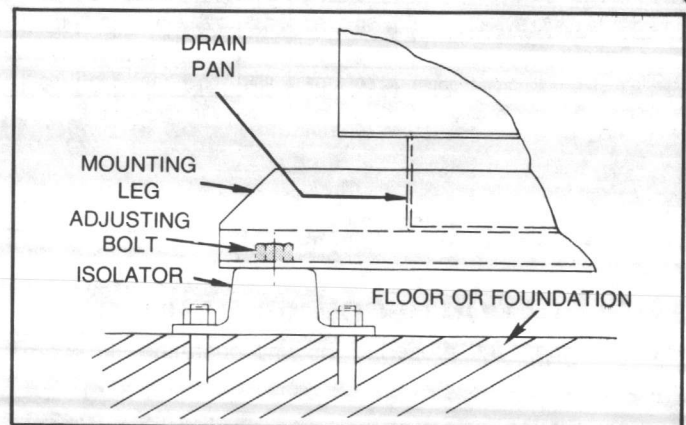


FIGURE 3 - Anchoring the Unit

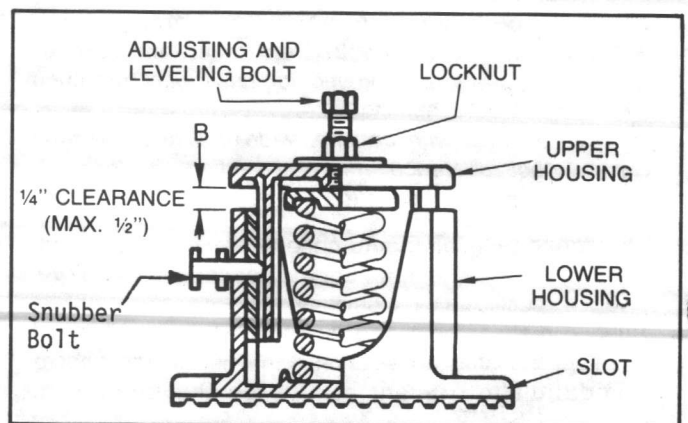


FIGURE 4 - Spring-Type Isolator Adjustment

MOUNTING — CLIMATE CHANGER AIR HANDLERS DRAW-THRU UNITS

NOTE: No draw-thru units and or accessories have factory gasketed panels or drain pan gasketing unless specified on the order.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL, DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

NOTE: On certain horizontal draw-thru units that ship from the factory in sections, a splash angle must be field installed connecting the coil section to the fan section. See Figure 9. The following units apply,

- Horizontal D. T. Unit size 50 (with back vertical discharge).
- Horizontal D. T. Unit Size 63 (with front or back vertical discharge).
- Horizontal D. T. Unit size 63 (with extra length casing).

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

Floor-Mounted — Horizontal Unit Sizes 3-50 and Vertical Unit Sizes 3-31. Ship from factory as one assembly (Fan Section, Coil Section and Drain Pan).

NOTE: For optional coilless horizontal draw-thru units (size 3, 6, 8, 10, 14 and 21) refer to COIL INSTALLATION INSTRUCTIONS given in the installation manual to properly install coil in unit.

1. Remove the diagonal shipping angles which secure coil(s) if they interfere with the use of access doors.
2. Attach accessories, if used. Gasketing not provided unless specified on sales order.
3. Anchor the isolators to the floor and mount the unit on the isolators. See Figure 3. For some applications it may be necessary to shorten the isolator adjusting bolt to properly secure unit to isolator.
4. Level the unit for proper coil drainage and condensate removal from the drain pan.
5. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
6. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight. Refer to the "Start-Up" section of the maintenance manual.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

Floor-Mounted — Horizontal Unit Sizes 63-86 and Vertical Unit Sizes 35-50. Ship from factory in 2 sections, (fan section and coil section).

NOTE: On certain horizontal draw-thru units that ship from the factory in sections, a splash angle must be field installed connecting the coil section to the fan section. See Figure 9. The following units apply,

- Horizontal D. T. Unit size 50 (with back vertical discharge).
- Horizontal D. T. Unit Size 63 (with front or back vertical discharge).
- Horizontal D. T. Unit size 63 (with extra length casing).

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

1. Remove the diagonal shipping angles which secure coil(s) if they interfere with the use of access doors.
2. Fasten isolators to floor.
3. Horizontal Units Size 63 — To assemble multi-section horizontal units, remove the drain pan from the coil section discharge flange and set in place. Then set the fan and coil sections on the drain pan, as shown in Figure 5. Bolt the sections together, attach gasketing if supplied. Make sure that the coil section support channels are also attached to the fan section. Mount assembled unit on isolators and fasten unit to isolators.
4. Horizontal Units Size 73 and 86 — To assemble unit, mount the fan section on the isolators and fasten. Attach flexible connector to the fan section. Then fasten the splash guard to the fan section. See Figure 8. Mount the coil section on the base with the required distance between fan and coil sections. See Figure 7. Each fan section and coil section have separate factory assembled drain pans. Each drain pan must be trapped separately.

NOTE: Coil section base is provided by the installer. Height of coil section base should be equal to working height of fan section isolators. Be sure the base is high enough to allow room for a piping trap. See Figure 7. Refer to drain trap sketches in piping section.

Attach flexible connection to the coil section.

Fasten splash guard to coil section. Panel removal may be necessary to attach splash guard to coil section on size 86 units.

5. Vertical Units Size 35-50 — To assemble multi-section vertical discharge units, attach the fan section to the top of coil section. Removal of front panel on coil section is necessary to assemble fan section. Install gasketing if supplied. Drain pan is factory assembled to coil section. Mount assembled unit on isolators and fasten unit to isolators. See Figure 6.
6. Attach accessories, if used. Gasketing not provided unless specified on sales order.
7. Level the unit, fan and or coil sections to assure proper coil drainage and removal of condensate from the drain pan.

8. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
9. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

Floor-Mounted — Horizontal and Vertical Spray Coil Unit Sizes 3-31. Ship from factory as one assembly (Fan Section, Coil Section and Drain Pan).

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

NOTE: The complete spray section is gasketed on all vertical and horizontal sizes. Also, the factory installs a gasket at the joint between the spray section and coil section.

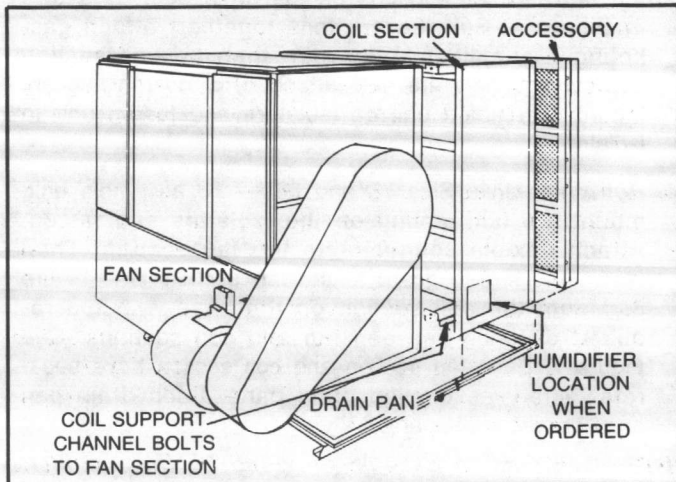


FIGURE 5 - Exploded View of the Horizontal Draw-Thru Unit Size 63

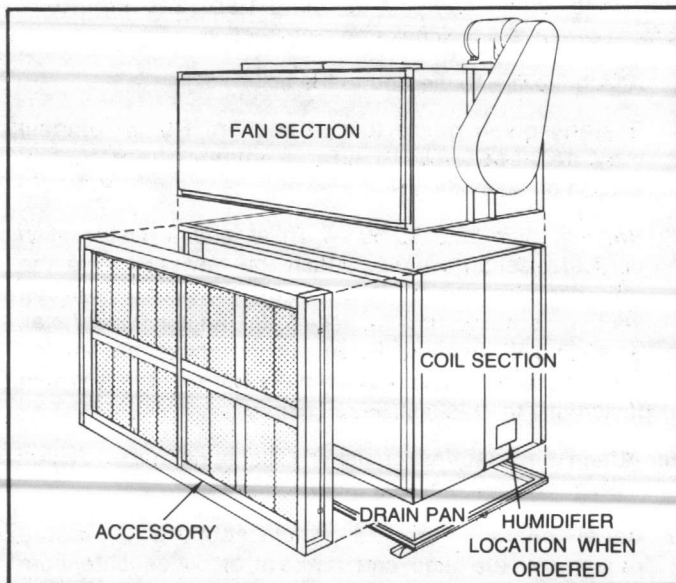


FIGURE 6 - Exploded View of the Vertical Draw-Thru Unit Sizes 35 through 50

NOTE: Check the bearing, and sheave setscrews for proper torque settings. Refer to Applicable section in this manual.

1. Remove the diagonal shipping angles which secure coil(s) if they interfere with the use of access doors.
2. Attach accessories, if used. Gasketing not provided unless specified on sales order.
3. Anchor the isolators to the floor and mount the unit on the isolators. See Figure 3. For some applications it may be necessary to shorten the adjusting bolt to properly secure unit to isolator.
4. Level the unit for proper coil drainage and condensate removal from the drain pan. On horizontal units the drain pan empties back into the sump.
5. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
6. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight. Refer to the "Start-Up" section of this manual.

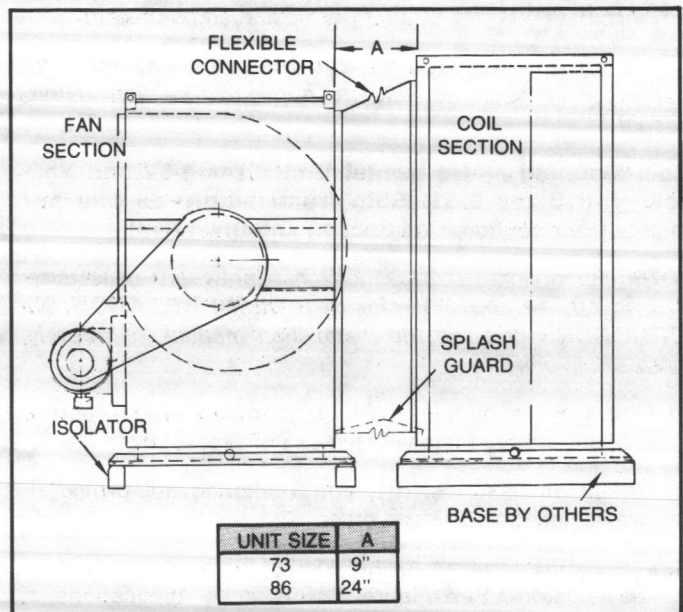


FIGURE 7 - Mounting Clearance Dimensions for Draw-Thru Units Sizes 73-86

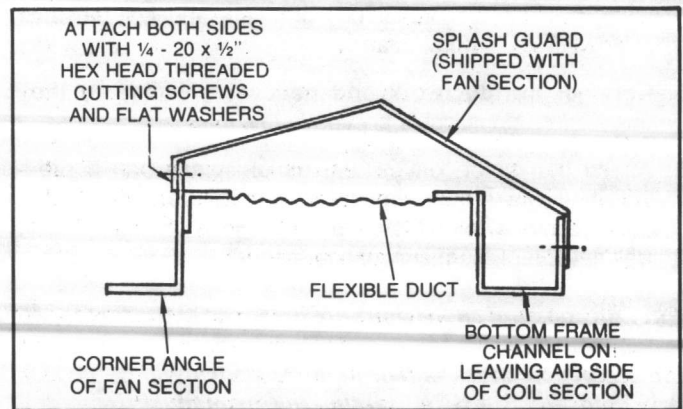


FIGURE 8 - Splash Guard Installation

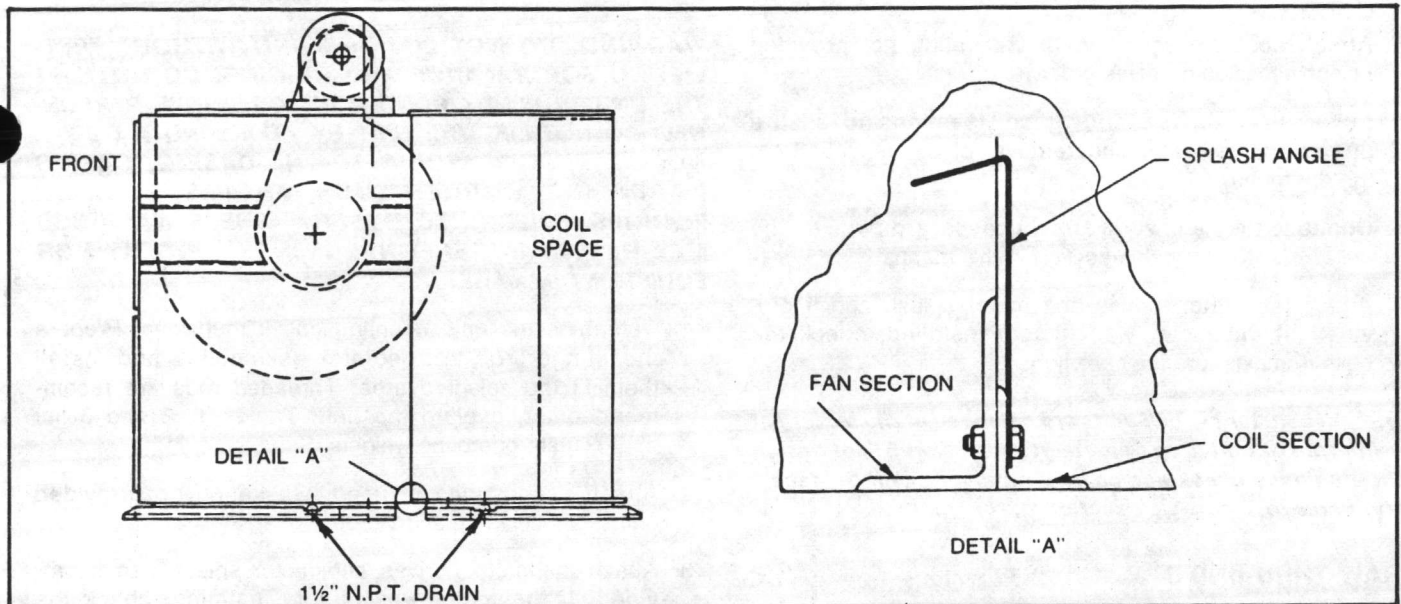


FIGURE 9 - Splash Angle Installation

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

Floor-Mounted — Vertical Spray Coil Unit Sizes 35-50 ship from factory in 2 sections (fan section, coil section). **Horizontal Spray Coil Unit Sizes 35-63** ship from factory in 3 sections (coil section, fan section, fan drain pan section). **Horizontal Spray Coil Unit Sizes 73-86** ship from factory in 2 sections (fan section, coil section).

Note: The complete spray section is gasketed on all vertical and horizontal sizes. Also, the factory installs a gasket at the joint between the spray section and coil section.

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Remove the diagonal shipping angles which secure coil(s) if they interfere with the use of access doors.
2. Fasten isolators to floor.
3. Horizontal Units Size 35-63 — Attach the spray section to isolators. Fasten the two mounting legs to the fan section drain pan. Set the fan section on the drain pan and bolt in place. Attach the drain pan and fan section to the spray section. See Figure 10.

4. Horizontal Units Size 73 and 86 — To assemble unit, mount the fan section on the isolators and fasten. Attach flexible connector to the fan section. Mount the coil section on the base with the required distance between fan and coil sections. See Figure 7. Drain pan is factory assembled to each section.

NOTE: Coil section base is provided by the installer. Height of coil section base should be equal to working height of fan section isolators. Be sure the base is high enough to allow room for a piping trap. See Figure 7. Refer to drain trap sketches in piping section.

Attach flexible connection to the coil section.

5. Vertical Units Size 35-50 — Set the spray section over the isolators and bolt together. Place the fan section on top of the coil section and bolt together. Gasketing not provided between fan section and coil section unless specified on the sales order. Drain pan (sump assembly) is factory assembled to spray coil section.

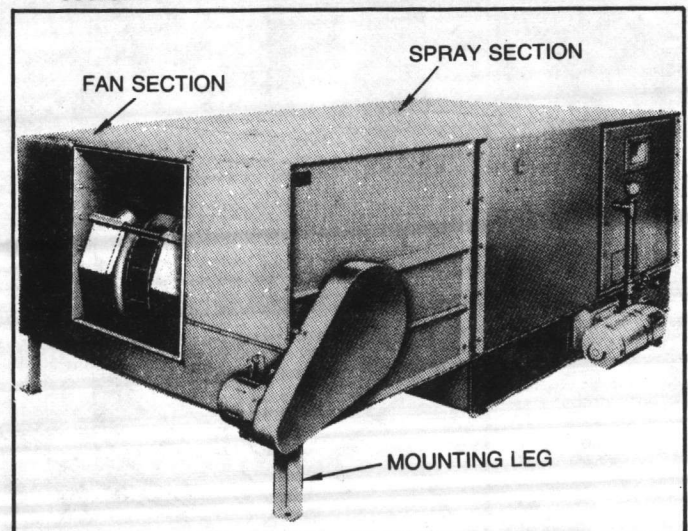


FIGURE 10 - Typical Horizontal Sprayed Coil Climate Changer

6. Attach accessories, if used. Gasketing not provided unless specified on sales order.
7. Level the unit, fan and or coil sections to assure proper coil drainage and removal of condensate from the drain pan.
8. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
9. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

DRAW-THRU UNITS

Ceiling-Mounted — Horizontal Unit Sizes 3-31. Ship from factory as one assembly (Fan Section, Coil Section and Drain Pan).

NOTE: For optional coilless horizontal draw-thru units (size 3, 6, 8, 10, 14 and 21) refer to COIL INSTALLATION INSTRUCTIONS given in CLCH-IN-1 to properly install coil in unit. On ceiling-mounted unit applications it is recommended to install coil in unit **before** hoisting unit to operating position.

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

Note: All ceiling suspended units with wide coil application **must** use a cradle (angle iron). See Figure 11A for details.

Note: Because of their weight, unit sizes 3-31 (wide coil only) and 35-86 (wide coil and standard units) require suspension support frames, to be provided by the installer. Figures 11A, 12 and 13 give the configuration and dimension of these frames. Note that two frames are required for sizes 73 and 86. See Figure 13.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Determine the unit mounting hole dimensions. Prepare the hanger rod and isolator assemblies and install them in the selected area. Threaded rods are recommended for leveling the unit. Tables 1, 2 and 3 list approximate operating weights. See Figure 11.
2. Attach accessories, if used. Gasketing not provided unless specified on sales order.
3. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

NOTE: Check to determine that the motor is clean and dry prior to start-up.

4. Hoist the unit to the hanger or suspension rods and attach. See Figure 11.
5. Level the unit for proper coil drainage and condensate removal from the drain pan. Refer to drain trap sketches in piping section.
6. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual. Isolate piping separately.

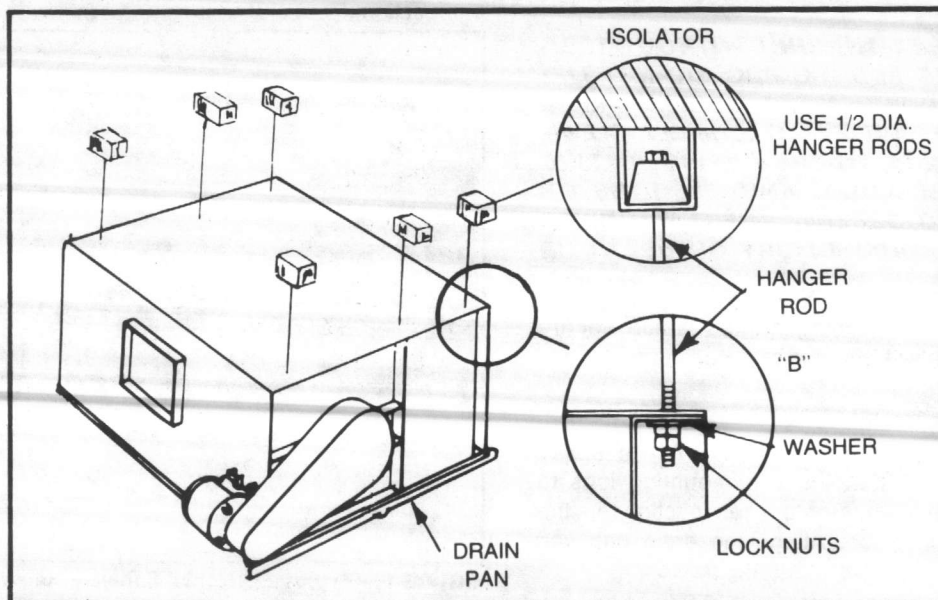
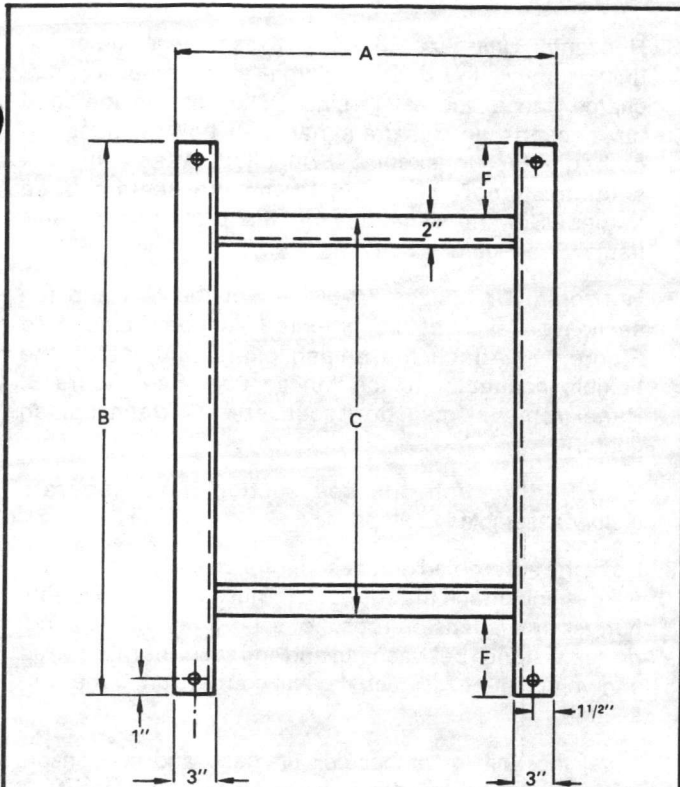


FIGURE 11 - Suspension Method for Horizontal Units Up to Size 31



Vertical Dimensions (Inches) With Wide Coil

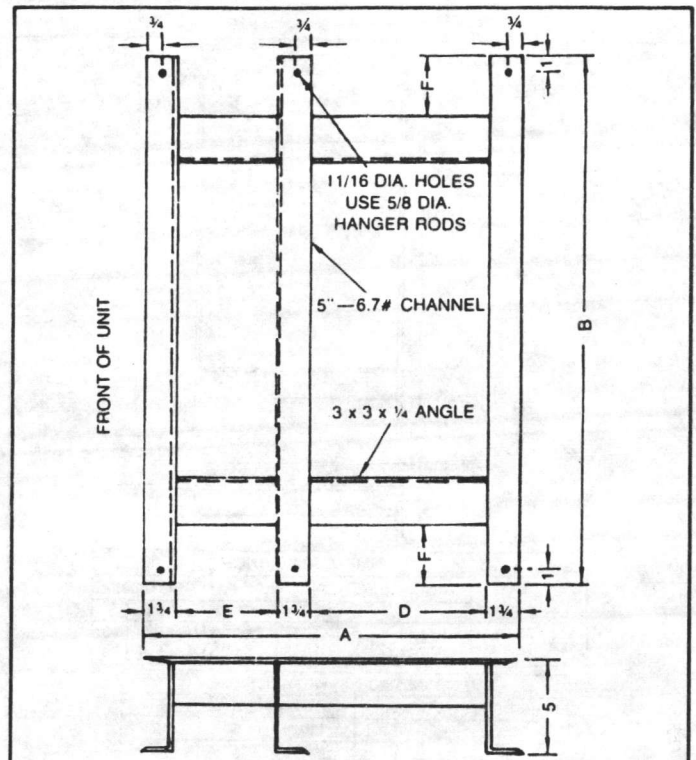
UNIT SIZE	A	B	C	F
3	23 ^{7/8}	54	34	10
6	23 ^{7/8}	75	55	10
8	28 ^{7/8}	66	46	10
10	28 ^{7/8}	75	55	10
12	32 ^{7/8}	81	61	10
14	32 ^{7/8}	90	70	10
17	32 ^{7/8}	111	91	10
21	36 ^{7/8}	129	109	10
25	42 ^{7/8}	135	115	10
31	42 ^{7/8}	135	115	10

Horizontal Dimensions (Inches) With Wide Coil

UNIT SIZE	A	B	C	F
3	32 ^{3/4}	54	34	10
6	34 ^{3/4}	75	55	10
8	44 ^{3/4}	66	46	10
10	44 ^{3/4}	75	55	10
12	48 ^{3/4}	81	61	10
14	48 ^{3/4}	90	70	10
17	48 ^{3/4}	111	91	10
21	52 ^{3/4}	129	109	10
25	52 ^{3/4}	135	115	10
Arr. 1 & 2	52 ^{3/4}	135	115	10
25	58 ^{3/4}	135	115	10
Arr. 3 & 4	58 ^{3/4}	135	115	10
31	52 ^{3/4}	135	115	10
Arr. 1 & 2	52 ^{3/4}	135	115	10
31	58 ^{3/4}	135	115	10
Arr. 3 & 4	58 ^{3/4}	135	115	10

Figure 11A — Ceiling Suspension Mounting Frame and Dimensions for Wide Coil Unit Sizes 3 thru 31.

CEILING-MOUNTED — Horizontal Unit Sizes 35-50 ship from factory as one assembly (fan section, coil section, and drain pan). Horizontal Unit Sizes 63-86 ship from factory in 2 sections (fan section and coil section).



UNIT SIZE	DIMENSIONS (INCHES)				
	A	B	D	E	F
# 35	79 ^{1/2}	132 ^{3/8}	40 ^{1/16}	34 ^{3/16}	10 ^{1/2}
# 41	84 ^{1/2}	135 ^{5/8}	43 ^{1/16}	36 ^{3/16}	10 ^{1/2}
# 50	90 ^{1/2}	135 ^{5/8}	46 ^{1/16}	39 ^{3/16}	10 ^{1/2}
# 63	97 ^{1/2}	143 ^{3/8}	50 ^{1/16}	42 ^{3/16}	14 ^{1/2}

UNIT SIZE	DIMENSIONS (INCHES) WITH WIDE COIL				
	A	B	D	E	F
35	79 ^{1/2}	149 ^{9/8}	40 ^{1/16}	34 ^{3/16}	19 ^{1/2}
41	84 ^{1/2}	159 ^{9/8}	43 ^{1/16}	36 ^{3/16}	22 ^{1/2}
50	90 ^{1/2}	159 ^{9/8}	46 ^{1/16}	39 ^{3/16}	22 ^{1/2}
63	97 ^{1/2}	152 ^{5/8}	50 ^{1/16}	42 ^{3/16}	19 ^{1/2}

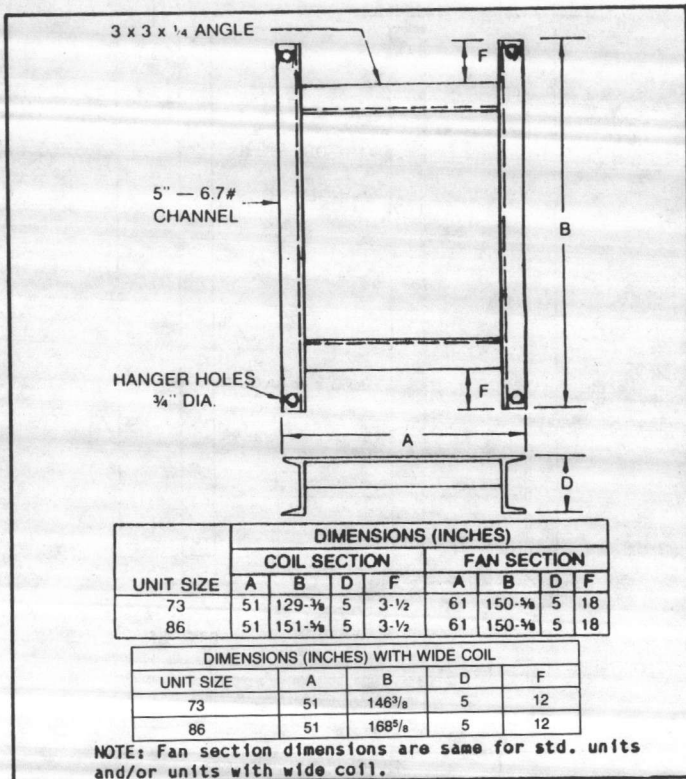
NOTE: Above sketch does not apply to Sprayed Coil Units.

FIGURE 12 - Ceiling Suspension Mounting Frame and Dimensions for Unit Sizes 35 to 63

NOTE: On certain horizontal draw-thru units that ship from the factory in sections, a splash angle must be field installed connecting the coil section to the fan section. See Figure 9. The following units apply,

- Horizontal D. T. Unit size 50 (with back vertical discharge).
- Horizontal D. T. Unit Size 63 (with front or back vertical discharge).
- Horizontal D. T. Unit size 63 (with extra length casing).

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL, DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.



6. Horizontal Unit Size 63 — To assemble multi-section units, remove the drain pan from the coil section discharge flange and set in place. Then set the coil and fan sections on the drain pan and bolt sections together, attach gasketing if supplied. Attach the coil section support channels to the fan section base angles. Set the assembly on the prepared support frame. See Figure 12.

7. Horizontal Unit Sizes 73-86 — Set the coil and fan section on each of the prepared support frame. See Figure 13. Attach the splash guard and fasten the flexible connector to the fan section. See Figure 8. Panel removal may be necessary to attach splash guard.

Each fan section and coil section have separate factory assembled drain pans.

8. Hoist the assembled unit or separate pieces with support frames and attach the support frames (sizes 3-86) to the hanger or suspension rods. For size 73-86 units, the required distance between fan and coil sections must be as shown in Figure 7. Attach flexible connection to the coil section.

9. Level the unit for proper coil drainage and condensate removal from the drain pan. Refer to drain trap sketches in piping section.

10. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual. Isolate piping separately.

BLOW-THRU UNITS

Floor-Mounted — Three-Deck Unit Sizes 6-25 and Multi-zone Unit Sizes 6-31 ship from factory as one assembly (fan section, coil section w/drain pan and zone damper section).

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

1. Fasten isolators to the floor.
2. Mount the unit on the isolators and fasten.
3. Install accessories.
4. Level the unit for proper coil drainage and condensate removal from the drain pan.
5. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.

NOTE: See Figure 30 for duct installation.

1. Determine the unit mounting hole dimensions. Prepare the hanger rod and isolator assemblies and install them in the selected area. Threaded rods are recommended for leveling the unit. Tables 1, 2 and 3 list approximate operating weights.
2. Remove the diagonal shipping angles which secure coil(s) if they interfere with the use of access doors.
3. Attach accessories, if used. Gasketing not provided unless specified on the sales order.
4. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight. Refer to the "Start-Up" section of the maintenance manual.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

NOTE: Check to determine that the motor is clean and dry prior to start-up.

5. Horizontal Unit Sizes 3-50 — Attach the coil section support channels to the fan section base angles. Set the assembly on the prepared support frame. Reference Figures 11A and 12.

6. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

Floor-Mounted — Multizone Blow-Thru Unit Sizes 35-41 and Three Deck Unit Sizes 31-35 ship from factory in 3 sections (coil section, fan section and zone damper section).

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Fasten isolators to floor.
2. If ordered, mount zone damper assembly to discharge opening of coil section. First remove shipping angle in discharge opening. Attach zone damper with gasketing factory provided. Attach splitter panel (dividing plate) to zone damper. Gasketing not provided for dividing plate.

CAUTION: When installing the damper assembly to the hot deck and bypass section, make sure it is mounted squarely, otherwise the damper blades may twist and fail to operate.

3. Remove the 90° cover panel.
4. Apply gasketing to the fan section mounting flange.
5. Set the assembled coil and damper sections on the isolators and fasten in place.
6. Gain access thru the 90° cover panel (removed previously) and bolt the fan section to the coil section through the gasketing. Be sure to bolt the fan section to the tie angle assembly, mounted on the coil section.

NOTE: Horizontal bolting across top and bottom of fan section to coil section require internal access through the 90° cover panel. Vertical bolting along side of fan section to coil section does not require internal access.

7. Apply gasketing to the 90° cover panel.
8. Attach the coil section 90° cover panel.
9. Install accessories.
10. Level the unit for proper coil drainage and condensate removal from the drain pan.
11. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.

NOTE: See Figure 30 for duct installation.

12. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

Floor-Mounted — Multizone Blow-Thru Unit Sizes 50-63 ship from factory in 4 sections (fan section, cooling coil section, heating coil section and zone damper section). Refer to Figure 15.

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Fasten isolators to floor.
2. Remove the shipping angles attached to the front or top of the coil section.
3. Vertical Discharge Units: Place hot deck on top of cold deck and bolt in place with gasketing factory provided. The front panel of coil section ships attached across the discharge opening. It must be removed and installed with gasketing to the front of the coil section. (This does not apply to horizontal discharge units.) Next, bolt the splitter panel (dividing plate) to the panel over the cooling coil.
4. Horizontal Discharge Units: Place the hot deck on top of cold deck and bolt in place with gasketing factory provided. Next, bolt the splitter panel (dividing plate) to the panel over the cooling coil.
5. Apply gasketing to the damper section or double-duct frame. Refer to Figure 14. Gasketing is not required at the center of the damper section where the dividing plate will be fastened.
6. Assemble the damper or double duct frame to the coil section bolting through the gasketing.

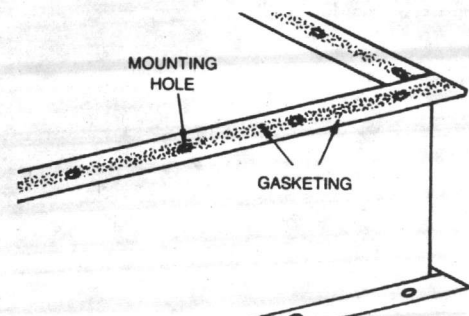


FIGURE 14 - Installation of Gasketing on the Damper Section

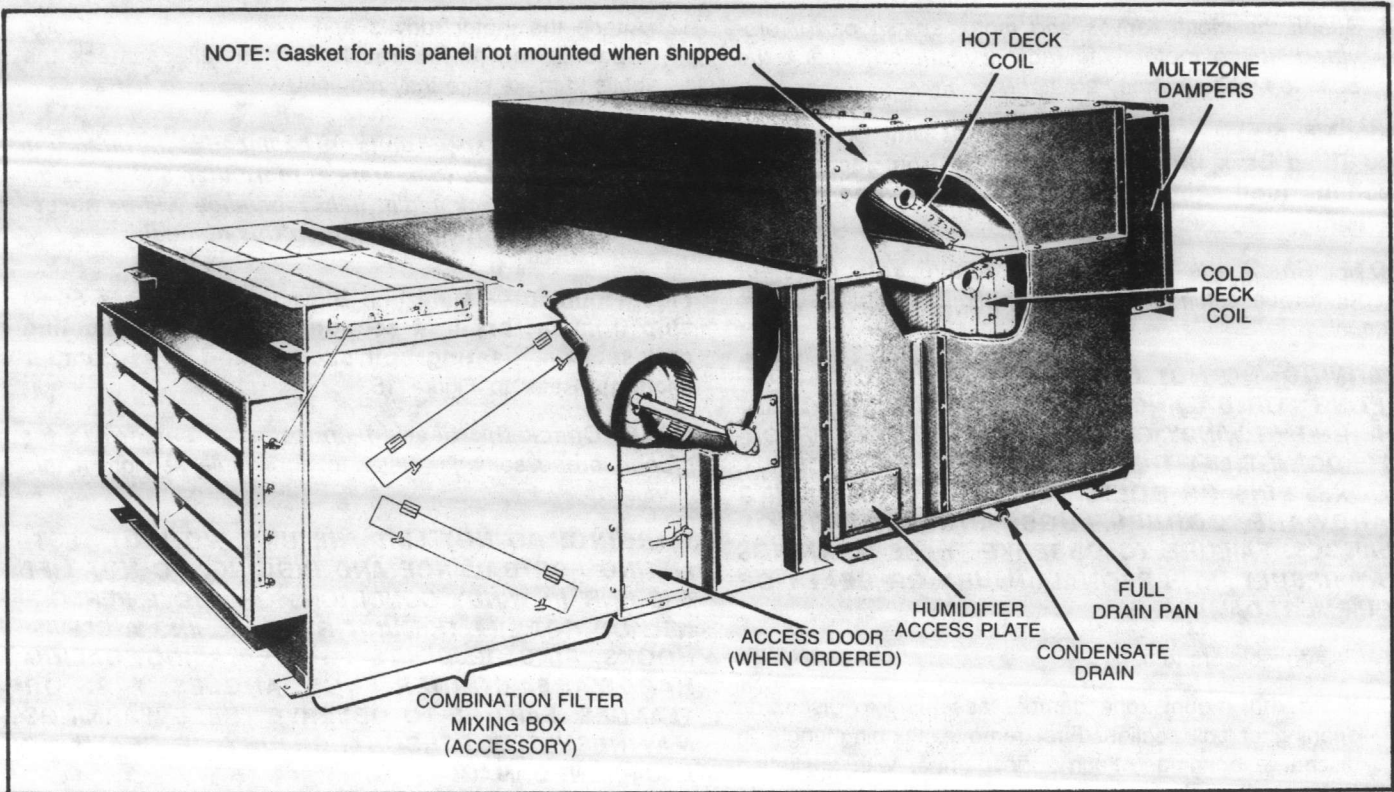


FIGURE 15 - Multizone Blow-Thru Climate Changers

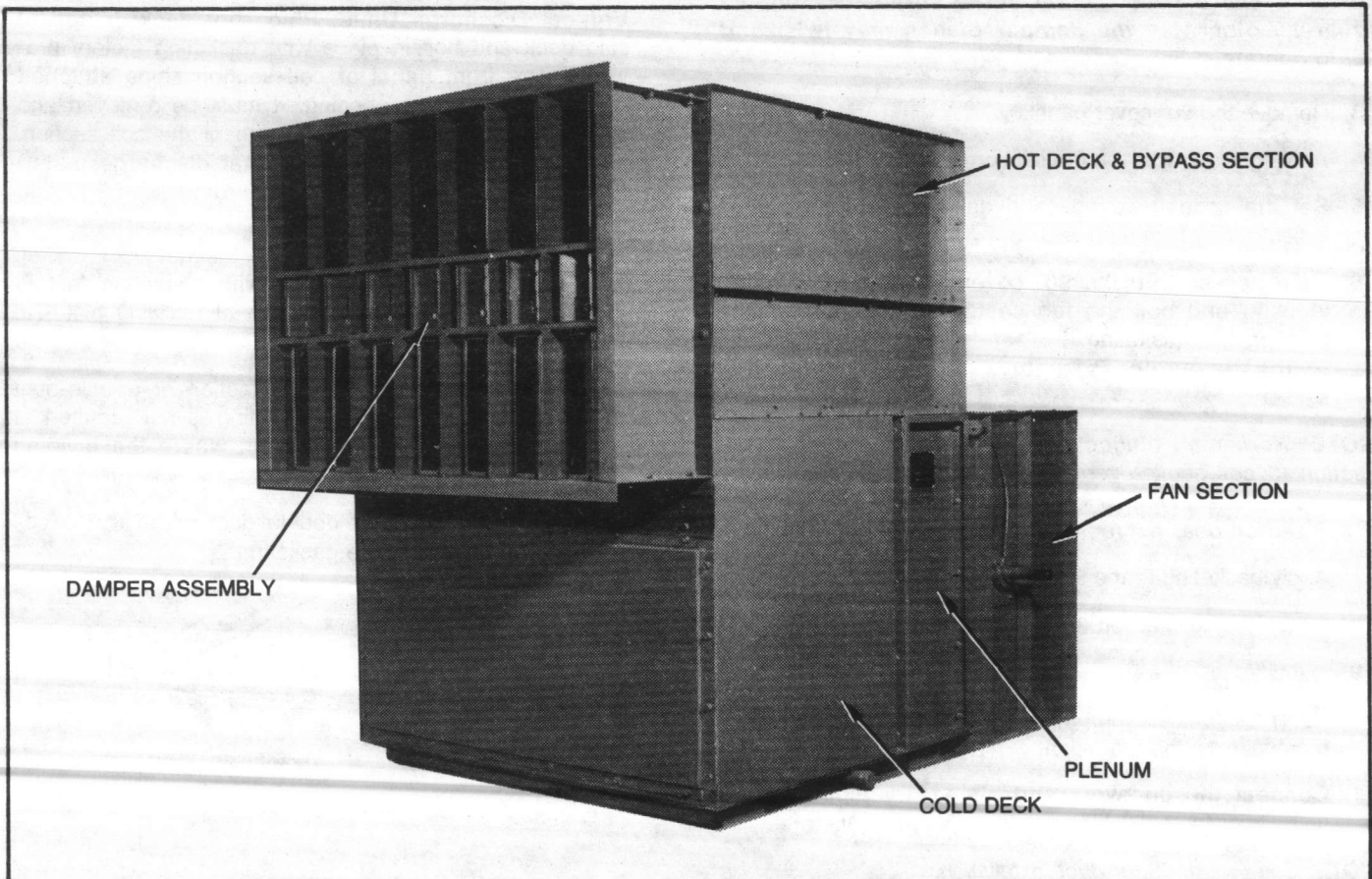


FIGURE 16 - Typical Three Deck Horizontal Discharge Climate Changer

CAUTION: When installing the damper assembly to the hot deck and bypass section, make sure it is mounted squarely, otherwise the dampers may twist and fail to operate.

7. Bolt the hot and cold deck dividing plate to the center of the damper section.
8. Remove the 90° cover panel of the coil section.
9. Apply gasketing to the fan section mounting flange. Set the assembled coil and damper sections on the isolators and fasten in place.
10. Gain access thru the 90° cover panel (removed previously) and bolt the fan section to the coil section through the gasketing. Be sure to bolt the fan section to the tie angle assembly mounted on the coil section.

Note: Horizontal bolting across top and bottom of fan section to coil section requires internal access through the 90° cover panel. Vertical bolting along side of fan section to coil section does not require internal access.

11. Apply the gasketing to the 90° cover panel.
12. Attach the coil section 90° cover panel.
13. Install accessories.
14. Level the unit for proper coil drainage and condensate removal from the drain pan.
15. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
16. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight. Refer to the "Start-Up" section of this manual.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

Floor-Mounted — Three Deck Blow-Thru Unit Sizes 41-63 ship from factory in 4 sections (cooling coil section, fan section, vent and heating coil section, and zone damper section). See Figure 16 for assembly.

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Fasten the isolators to the floor.
2. With gasketing applied to the top of the cooling coil section, mount the hot deck and bypass section to the

cooling coil section. Bolt the bypass deck divider plate to the panel over the cooling coil.

3. Remove the shipping angles used to support the hot deck and bypass zone divider plates.
4. Vertical Discharge Units — Apply gasketing to the mounting flange of the fill-in section and mount the fill-in section to the cooling, bypass and hot deck section.
5. Apply gasketing to the damper assembly. See Figure 14. Gasketing is not required at the center of the damper section where the divider plate will be fastened.
6. Attach the damper section to the coil section, bolting through the gasketing.

CAUTION: When installing the damper assembly to the hot deck and bypass section, make sure it is mounted squarely, otherwise the damper blades may twist and fail to operate.

NOTE: Be sure control rods are in correct position.

7. Bolt the hot deck and bypass zone divider plates to the center dividers of the damper assembly. These must be bolted from the hot deck and cold deck side only. Gasketing not required.
8. Remove the 90° cover panel of the coil section.
9. Apply gasketing around the fan section mounting flange.
10. Set the assembled coil and damper sections over the isolators. Fasten in place.
11. Gain access thru the 90° cover panel (removed previously) and bolt the fan section to the coil section through the gasketing. Be sure to bolt the fan section to the tie angle assembly mounted on the coil section.

NOTE: Horizontal bolting across top and bottom of fan section to coil section require internal access through the 90° cover panel. Vertical bolting along side of fan section to coil section does not require internal access.

12. Apply the gasketing to the 90° cover panel.
13. Attach the coil section 90° cover panel.
14. Attach any accessories.
15. Level the unit for proper coil drainage and condensate removal from the drain pan.
16. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
17. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight. Refer to the "Start-Up" section of this manual.

Floor-Mounted — Multizone Blow-Thru Unit Sizes 73-86 ship from factory in 6 sections (fan section, cooling coil section, heating coil section, canvas duct section, inlet panel (size 73), extended plenum (size 86), and either double duct frame section or zone damper section).

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Fasten isolators to the floor.
2. Remove the shipping angles attached to the front or top of the coil section.
3. Vertical Discharge Units: Place hot deck on top of cold deck and bolt in place with gasketing, factory provided. The front panel of coil section ships attached across the discharge opening. It must be removed and installed with gasketing to the front of the coil section. (This does not apply to horizontal discharge units.) Next, bolt the splitter panel (dividing plate) to the panel over the cooling coil.
4. Horizontal Discharge Units: Place the hot deck on top of cold deck and bolt in place with gasketing factory provided. Next, bolt the splitter panel (dividing plate) to the panel over the cooling coil.
5. Apply gasketing to the damper section or double-duct frame. Refer to Figure 14. Gasketing is not required at the center of the damper section where the dividing plate will be fastened.
6. Assemble the damper or double duct frame to the coil section bolting through the gasketing.

CAUTION: When installing the damper assembly to the hot deck and bypass section, make sure it is mounted squarely, otherwise the damper blades may twist and fail to operate.

7. Bolt the hot and cold deck dividing plate to the center of the damper section.
8. Attach inlet panel (size 73) or extended plenum (size 86) to coil section inlet with gasketing, factory provided. Bolting for these sections is accomplished from exterior of the unit. See Figure 17.
9. Attach flex connector between fan section and coil section (size 73). Attach flex connector between fan section and extended plenum coil section (size 86). Refer to Figure 17 for dimensions.
10. Level the unit, fan and/or coil sections to assure proper coil drainage and removal of condensate from the drain pan.
11. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
12. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

NOTE: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% design rpm a balance check and/or field rebalance will be necessary. Refer to the "Start-Up" section.

HIGH PRESSURE CLIMATE CHANGER — ALL SIZES

NOTE: Check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.

WARNING: DO NOT LIFT THE UNIT WITHOUT TEST-LIFTING FOR BALANCE AND RIGGING. DO NOT LIFT THE UNIT IN WINDY CONDITIONS OR ABOVE PERSONNEL. DO NOT LIFT THE UNIT BY ATTACHING A CLEVIS, HOOKS, PINS OR BOLTS TO THE CASING, CASING HARDWARE, CORNER LUGS, ANGLES, TABS OR FLANGES. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH OR EQUIPMENT DAMAGE.

1. Attach the mounting legs (Spray Coil Units only) and spring isolators to the fan section, as illustrated in Figure 18.
2. Set the fan section in place and fasten isolators to the floor.
3. Blow-Thru Units — Apply factory provided gasketing to the sections where canvas duct is to be attached.
4. Set the coil section in place. Attach the flexible connection. Place the bottom flange of the flexible connection in the V channel of the coil section.
5. Attach the splash guard to the bottom of the fan inlet opening, as in Figure 8.
6. Attach flexible connection to the fan section. Place the bottom flange of the flexible connection in the V channel of the fan section. Tighten bolts from exterior of the unit.
7. Blow-Thru Units — Attach horizontal tension restraints (installer-supplied) to the coil section. Span the flexible connection and anchor the restraints to the fan section. See Figure 17. These restraints will counteract reaction forces due to airflow and will relieve pressure from the flexible connection.
8. Install accessories.
9. Level the unit, fan and/or coil sections to assure proper coil drainage and removal of condensate from the drain pan.
10. Connect the ductwork and necessary piping to the unit. Refer to applicable section in this manual.
11. Attach the motor, drives and motor splash pan if provided. If the motor was factory installed, check the bolts to make sure they are tight.

Note: All constant speed units are balanced at the factory at design rpm. If unit is to operate at more than 5% of design rpm a balance check and/or field rebalance will be necessary. Refer to "Start-Up" section in this manual.

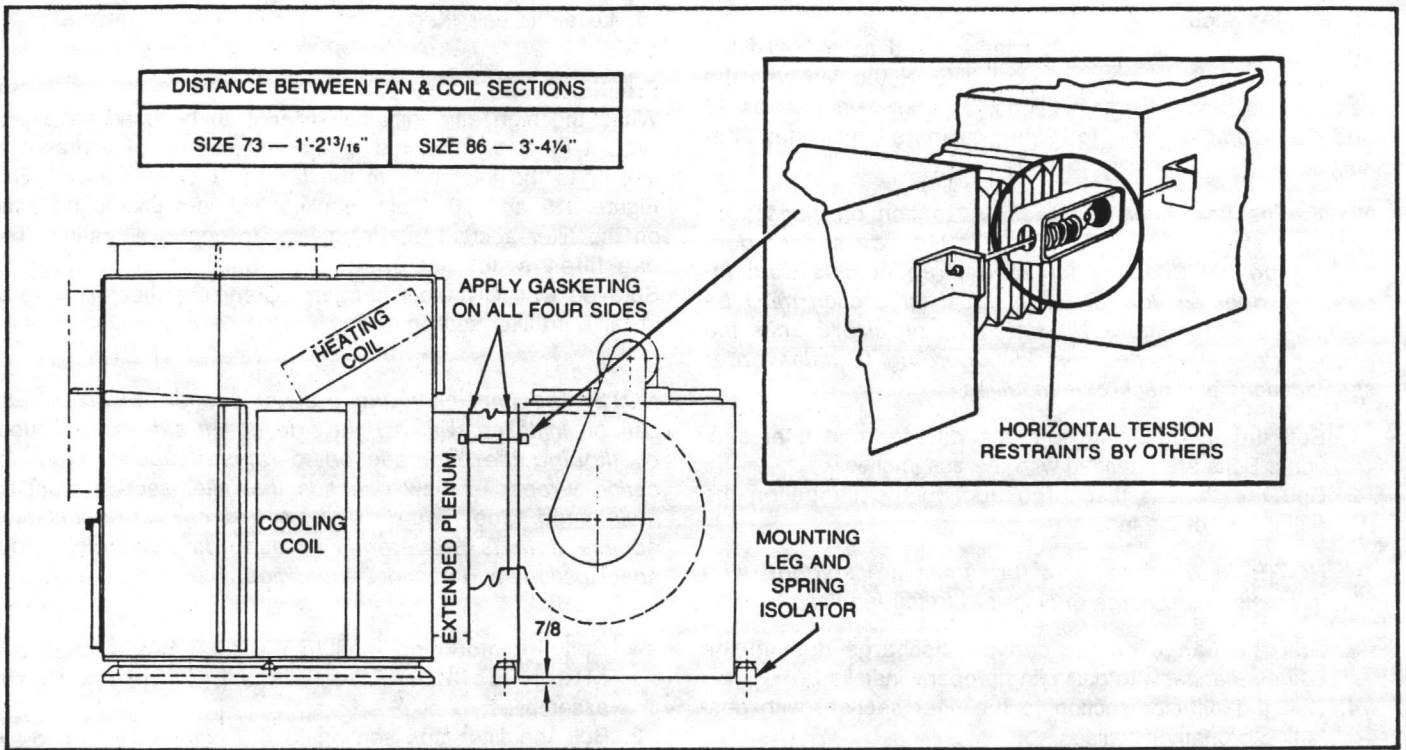


FIGURE 17 - Fan and Coil Section Ductwork Connections for Blow-Thru High Pressure Units

ACCESSORIES

Matching bolt holes are provided on all accessories for attachment to the unit or to other accessories. Mounting hardware is shipped with each accessory. Mounting legs on filter boxes and mixing boxes are to be attached to isolators and fastened to the floor or suspension device.

HIGH EFFICIENCY BAG FILTER

Before installing the bag filter accessory, be sure adequate clearance is provided to open the filter box and remove filters. Four feet of clearance on the access side of the filter section is recommended. Table 3 lists filter, filter section and diffuser section weights.

The high efficiency bag filter can be used as a prefilter when placed on the inlet side of the fan, a final filter

when placed on the outlet of the fan, or as both when placed in both locations. When used as a prefilter, the canvas duct and diffuser sections are not used, but isolators should be installed by the contractor to ease vibration. When used as a final filter, the canvas duct and diffuser sections are used, but isolators are not required. Installation instructions for both applications follow.

NOTE: The high efficiency bag filters can be operated at up to 100 percent relative humidity, but must not make direct contact with water droplets. Care must be taken to ensure that these filters are not used as prefilters with Sprayed Coil Climate Changers and to avoid water carry-over in standard units.

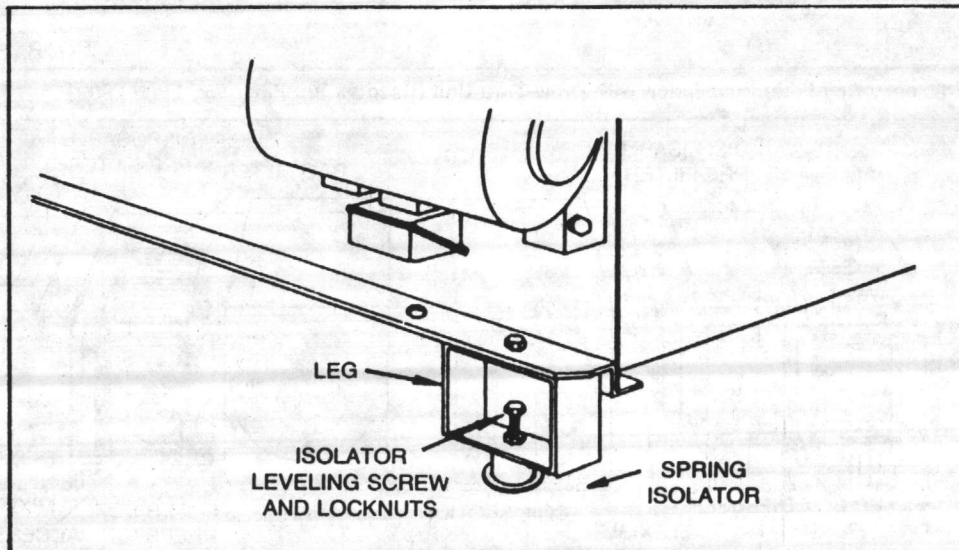


FIGURE 18 - Attaching the Mounting Leg and Spring Isolator to the High Pressure Sprayed Coil Unit

Final Filter Section

When the high efficiency bag filter is used as a final filter, it must be mounted on the outlet side of the fan with the canvas duct and diffuser sections, as shown in Figures 19 and 20. Complete the following to install the final filter section:

NOTE: The final filter and prefilter section on sizes 6-86 can be installed with a right side or left side access door by flipping the filter section to desired access door location. Proper air flow direction thru filter section must be maintained. See Figure 19. Note that on size 3 units the access door is predetermined according to sales order specifications and cannot be modified.

1. Bolt the mounting legs to the diffuser and filter sections. Bolts are provided with the assemblies.
2. Bolt the canvas discharge duct to the flange on the outlet side of the fan.

NOTE: Single-zone blow-thru units are shipped with the canvas discharge duct bolted to the fan flange.

3. Bolt the flange on the canvas discharge duct to the diffuser flange, with gasketing properly installed.
4. Bolt the diffuser section to the filter section, with gasketing properly installed.
5. For U.L. listed units, the canvas discharge duct is not provided. Install a field-provided connector which meets the requirements of NFPA 90A Sect. 2.1.1 to 2.1.2.3.

6. Level the unit.

Prefilter Section

When the high efficiency bag filter is to be used as a pre-filter, it must be mounted to the coil section of a draw-thru unit or to the inlet side of the fan on a blow-thru unit. See Figures 19 and 20. Field-supplied isolators should be used on the filter section mounting legs to control vibration. The bag filter is not designed to be used as a prefilter on Sprayed Coil Climate Changers. Complete the following to install a prefilter section:

NOTE: The final filter and prefilter section on sizes 6-86 can be installed with a right side or left side access door by flipping the filter section to desired access door location. Proper air flow direction thru filter section must be maintained. See Figure 19. Note that on size 3 units the access door is predetermined according to sales order specifications and cannot be modified.

1. Bolt the mounting legs to the filter box section and attach isolators. Bolts are provided with the assemblies.
2. Bolt the filter box section to the coil section on draw-thru units, or to the fan inlet with gasketing installed on blow-thru units.
3. Level the unit.

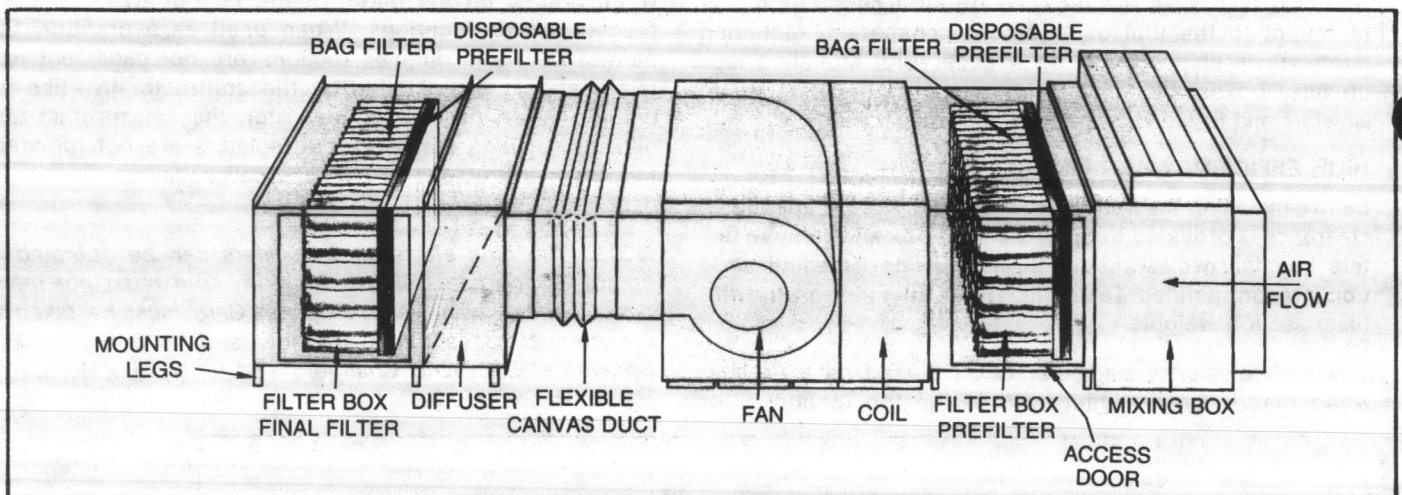


FIGURE 19 - High Efficiency Bag Filter Installation with Draw-Thru Unit (Used as Pre-Filter and Final Filter)

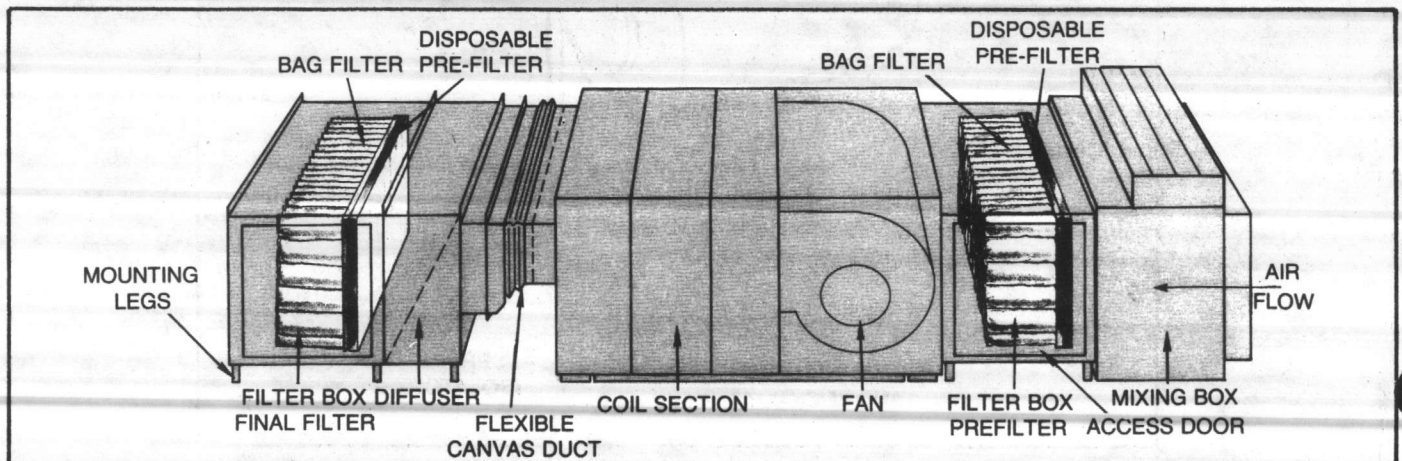


FIGURE 20 - High Efficiency Bag Filter Installation with Single-Zone Blow-Thru Unit (Used as Pre-Filter and Final Filter)

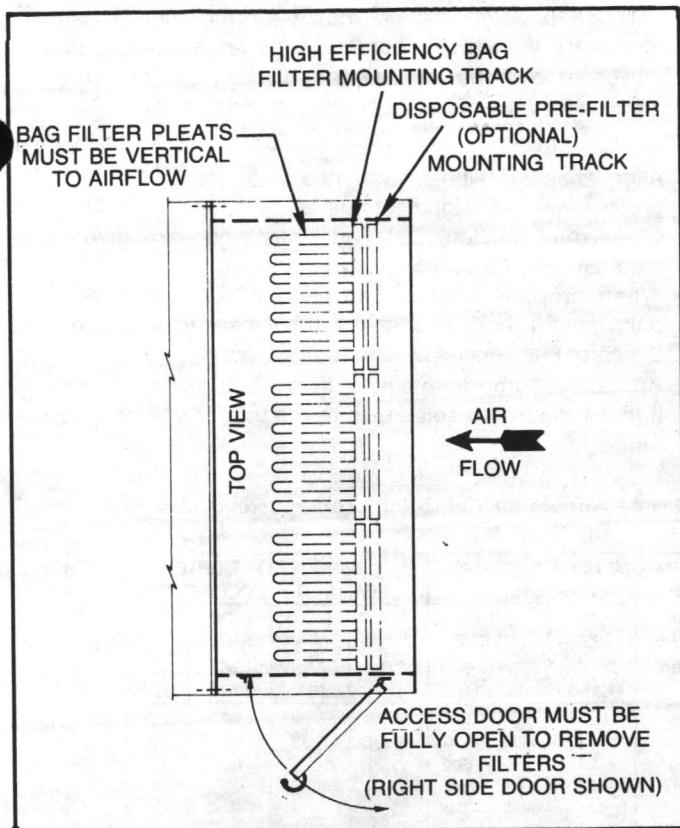


FIGURE 21 - Filter Mounting Track Location (Top View)

Filter Installation

Trane recommends the use of disposable prefilters with high efficiency bag filters. Prefilters slide into mounting tracks just ahead of the bag filter. Bag filter and prefilter size and quantity requirements are the same. See Figure 21 for filter arrangement and complete the following:

1. Ensure power is disconnected. Open filter section access door.

WARNING: DISCONNECT POWER SOURCE BEFORE OPENING FILTER SECTION ACCESS DOOR. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH FROM ELECTRICAL SHOCK, HIGH PRESSURE OR MOVING PARTS.

2. Remove adjustable blockoff from filter track.
3. Slide bag filters and flat prefilters into the appropriate filter tracks. Bag filters must be installed with pleats vertical to airflow.
4. Slide adjustable blockoff into filter track.
5. Close the access door. If door can be closed without compressing the filters, adjust the blockoff by loos-

ening its adjusting screws, moving the blockoff and tightening the screws. The door should squeeze the blockoff against the filters, compressing them.

NOTE: Filters must have an airtight seal to prevent air bypass. If using other filters, apply foam gasketing to the vertical edges of the filter-holding frame to ensure a tight fit.

For roll filter installation and operation checks, refer to RF-IM-1.

MANOMETER INSTALLATION

A manometer should be used with each bag filter accessory to monitor filter loading and is available from Trane. It should be located to read the pressure drop between the inlet and outlet of the filters. A 1-inch wg pressure difference indicates clogged filters.

WARNING: BAG FILTER FINAL RESISTANCE IS 1 INCH WATER GAUGE. FAILURE TO CHANGE BAG FILTERS AT THIS POINT MAY CAUSE PERSONAL INJURY, DEATH OR EQUIPMENT DAMAGE AS FILTERS WITH DUST MAY BE COMBUSTIBLE.

Five feet of double-column plastic tubing is provided with the gauge along with adapters for connection to 1/8" NPT fittings. To install the manometer, complete the following:

1. Mount the manometer in the two 27/64-inch diameter holes drilled in top or side wall of the filter box, using the self-tapping screws provided. Turn the screws down snug, but not tight.
2. Adjust the gauge until the bubble is centered in the spirit level. Tighten the mounting screws and check to be sure that the gauge remained level.
3. Turn the zero adjust knob counterclockwise until it stops. Then turn it clockwise approximately three full turns so that there is room for adjustment in either direction.
4. Remove the fill plug and pour in the provided gauge fluid until the fluid level is visible in the vicinity of zero on the scale. Adjust for exact zero setting with the zero knob and replace the fill plug.
5. Install a tubing adapter on each side of the filter.
6. Connect the coded red striped tube to the high pressure connection at the top of the gauge (left side) and insert the other end into the field-drilled port and adapter upstream of the bag filters.
7. Connect the uncoded tube to the low side connection at the top of the gauge (right side) and insert the other end into the field-drilled port and adapter downstream of the filter bags.

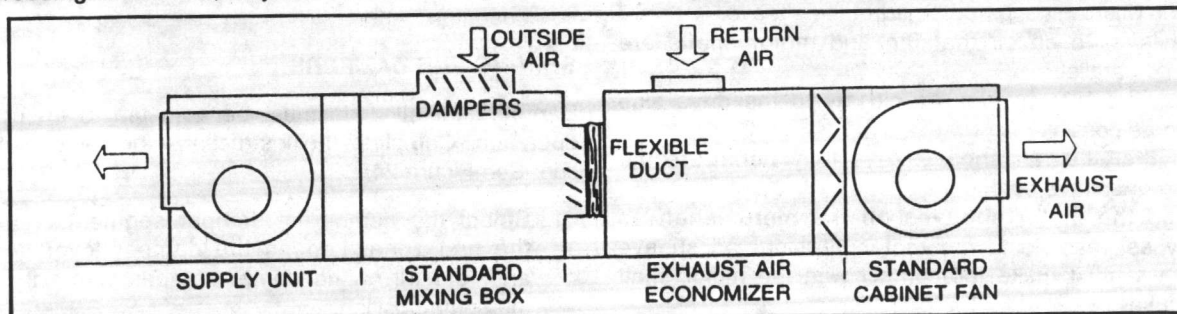


FIGURE 22 - Exhaust Air Economizer Installation

EXHAUST AIR ECONOMIZER

The Exhaust Air Economizer system consists of the economizer section and a Cabinet Fan. The accessory is attached to a Climate Changer with a standard or combination mixing box accessory, as shown in Figure 22. Cabinet Fan size should be identical to Climate Changer size, except as noted below.

NOTE: Unit sizes 35 to 63 can use either the same size Cabinet Fan or a size 31 Cabinet Fan.

The economizer section contains a single damper set, similar to a face damper, which is used to prevent back-wheeling of the exhaust fan when it is shut off. Low leak and Ultra-low leak dampers can be used on the damper assembly. Refer to the Dampers section of this manual for operating torques.

CAUTION: To avoid equipment damage, the pressure differential across the damper must not exceed 3 inches during operation.

To install the Exhaust Air Economizer, complete the following:

1. Bolt the Exhaust Air Economizer to the Cabinet Fan with the bolts and gasketing provided.
2. If the unit is floor-mounted, fasten the isolators to the floor and mount the accessory on the isolators. If the unit is ceiling-mounted, follow proper safety precautions and hoist the accessory into position, attaching it to the hanger rods.
3. Attach the contractor supplied canvas duct to the mixing box flange with sheet metal screws (not provided).
4. Screw the canvas duct flange onto the economizer section flange from inside the economizer with sheet metal screws (not provided).
5. Attach the return air intake to the economizer section.
6. Level the unit. Secure all fasteners.

FAN MOTOR ASSEMBLY

On units that ship motors separately, the fan shafts, sheaves and drive assembly must be checked and aligned before unit operation. Complete the following:

WARNING: DISCONNECT ELECTRICAL POWER BEFORE INSPECTING FAN MOTOR ASSEMBLY. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH FROM ELECTRICAL SHOCK OR MOVING PARTS.

1. Check that the fan shafts fully penetrate the bore of sheaves or sheave bushings. Bushed sheaves should have the bushing flange outboard of the sheave.
2. Use a level to check that fan and motor shafts are level and parallel.
3. Position the fan sheaves as closely to the drive side bearing as possible.
4. Check that the fan sheave keys fully penetrate the bushing or sheave bore.
5. Position the motor sheaves on the motor shaft as closely as possible to the motor housing. All sheave setscrews must make full contact with the motor shaft or shaft key.

NOTE: In some cases, motor shafts may not fully penetrate the sheave bore, but the sheave width must never exceed the recommended maximum per NEMA (MG1-14.43 a) for the respective motor size.

6. Align sheaves with a straightedge or string. For multi-groove sheaves, align center lines.
7. Check belt tension. Detailed instructions are given in the Maintenance section of this manual.
8. When properly aligned and tensioned, check that no point on the belt nearest the drive bearing is within 1/2-inch of unit flanges or structural supports.
9. After drive components have been positioned correctly, tighten all sheave setscrews to the torque values given Table 4.

Table 4 - Torques for Tightening Locking Screws, Bearings and Sheaves

TORQUE FOR TIGHTENING SETSCREWS				TORQUE FOR TIGHTENING SEALMASTER LOCKING COLLAR				
SET SCREW DIA.	HEX SIZE ACROSS FLATS	RECOM. TORQUE		COL-LAR	SCREW DIA.	HEX SIZE ACROSS FLATS	RECOM. TORQUE	
		INCH LBS.	FOOT LBS.				INCH LBS.	FOOT LBS.
1/4"	5/16"	66	5.5	2-015B	8-32	7/8"	70	5.8
5/16"	5/32"	126	10.5	2-13B	8-32	1/8"	70	5.8
3/8"	3/16"	228	19.0	2-17B	10-24	9/64"	90	7.5
7/16"	7/32"	348	29.0					
1/2"	1/4"	504	42.0					
5/8"	5/16"	1,104	92.0					

NOTE: Tighten bearing setscrews to the torque shown before running unit. Setscrews can loosen in shipment.

DAMPERS

DRIVE ROD ASSEMBLY — BLOW-THRU MULTIZONE UNITS

On all Blow-Thru Multizone units, the zone damper drive rods are recessed to prevent damage during shipment. Before attaching ductwork, complete the following steps and then set the damper zones as instructed after this list. Refer to Figures 23 to 24B.

1. Loosen the damper rod clip screws and extend each drive rod 2-1/2 inches beyond the edge of the damper assembly flange. See Figure 23.
2. Check each set of damper blades to make sure that they are at 90-degree angles to each other. Move the dampers to be sure they are not binding.
3. Tighten all damper rod clip screws.
4. Under certain operating conditions, condensate may form on the cold deck portion of the damper section. To prevent this, insulate around the damper rods. Be sure that the insulation does not affect damper operation.

SETTING THE DAMPERS

Dampers on all units must be adjusted to ensure proper operation. Complete the instructions for each damper section. See Figure 24A.

1. Select the number of damper segments required for the first zone. Loosen the damper lever set screws and turn all of the damper blades within the zone to the same position.

2. Tighten the damper lever set screws for this zone.
3. Cut the damper linkage bar at the last lever. Figure 24A illustrates an example that uses two damper segments.
4. Set all other zones with the same procedure given above.

NOTE: Damper operators must be connected to damper drive rods on the linkage side of the zone damper section.

DAMPER OPERATORS

Damper operators, levers and linkages, if not factory provided, are to be provided and installed by the contractor. Tables 5 through 8 list approximate values of damper torques to size the damper operators. When two motors are required, use synchronous motors. See Table 8A for actuator torques used with Multizone and 3-Deck Multizone damper units.

To install the operators, connect the motor to the damper drive rods on the linkage side of the zone damper section. Mount damper levers as close to the side of the unit as possible.

High-efficiency mixing box damper torques, given in Table 8, will vary with blade position (percent open), damper arrangement (top/back or top/bottom), pressure differential, cfm conditions and installation. The values given in Table 8 represent the maximums for all of the above conditions up to 0.4 inches of pressure difference and at a blade setting of 25 to 75 percent open. Greater pressure differences or incorrect adjustment will not be compensated for.

When low leak and ultra-low leak dampers are installed, operators should be sized according to operating torques given in Tables 5 through 7. Since low leak and ultra-low

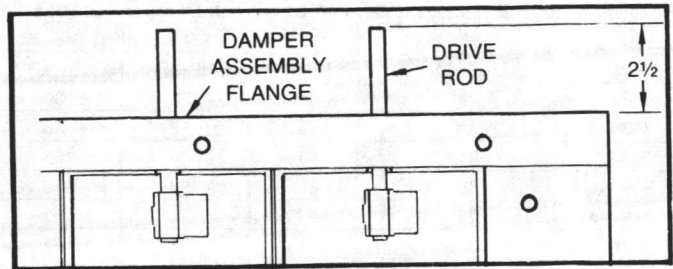


FIGURE 23 - Zone Damper Blade Assembly

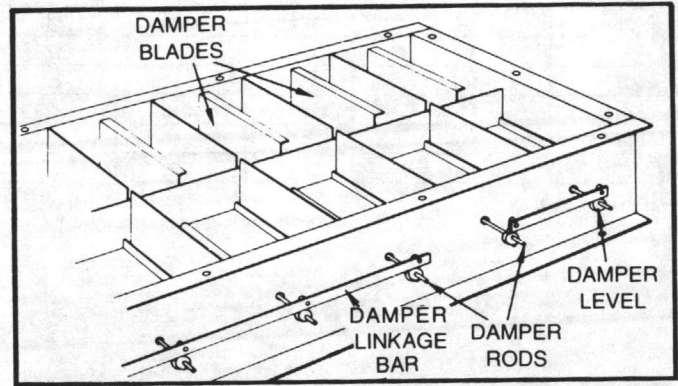


FIGURE 24A - Setting the Zone Damper Rods and Damper Linkage

leak damper operating torques are much higher than those for standard dampers, care must be taken to choose a properly sized operator. Stroke distance from full-closed to full-open is 90 degrees.

Low leak dampers with blade seal material, should not be installed in positions where temperatures might exceed 150 F.

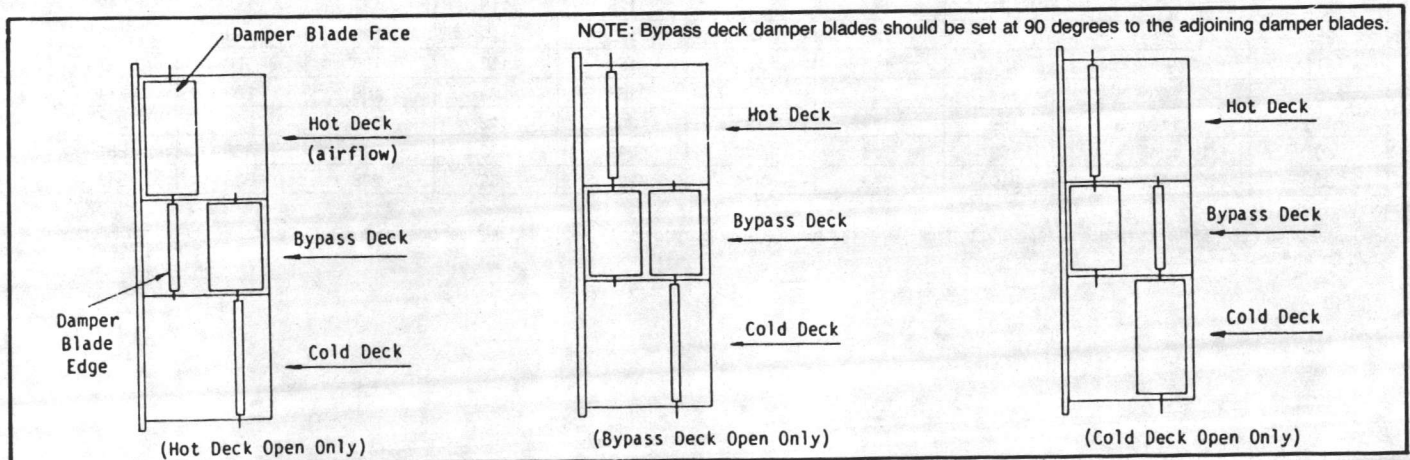


FIGURE 24B - Proper Three-Deck Multizone Damper Blade Configuration

TABLE 5 - External Face and Bypass Low Leak Damper Torques (In./Lbs.)

UNIT SIZE	STANDARD DAMPER	LOW LEAK DAMPER				ULTRA-LOW LEAK DAMPER			
		1" ΔP	2" ΔP	3" ΔP	4" ΔP	1" ΔP	2" ΔP	3" ΔP	4" ΔP
3	30	36	37	39	41	39	41	43	44
6	33	43	47	50	53	50	54	57	60
7	33	43	47	50	52	49	53	56	59
8	35	47	52	56	59	55	60	64	67
9	36	47	51	55	58	54	58	62	65
10	36	52	58	63	67	62	68	73	77
12	38	67	65	71	76	70	77	83	88
14	40	63	71	79	85	77	86	94	100
17	42	68	78	87	93	85	95	103	110
21	77	108	120	131	139	128	141	151	159
25	84	121	136	149	159	146	161	173	183
31	93	142	161	177	190	174	193	210	222
35	100	159	182	202	217	198	221	241	256
41	110	190	216	239	256	234	261	283	300
50	124	214	250	280	304	273	310	339	363
63	145	259	305	343	373	335	381	419	449

NOTE:

On larger units with external face and bypass dampers it may be necessary to use two opposed damper operators to avoid excessive bending of damper shaft linkage.

TABLE 6 - Internal Face and Bypass Low Leak Damper Torques (In./Lbs.)

UNIT SIZE	STANDARD DAMPER	LOW LEAK DAMPER				ULTRA-LOW LEAK DAMPER			
		1" ΔP	2" ΔP	3" ΔP	4" ΔP	1" ΔP	2" ΔP	3" ΔP	4" ΔP
3	30	33	35	36	37	35	37	38	39
6	33	40	43	45	47	44	47	49	51
7	33	39	42	44	46	44	46	48	50
8	35	45	48	52	54	51	55	58	60
9	36	44	46	49	51	48	51	54	56
10	36	48	53	57	60	56	61	65	68
12	38	52	57	62	65	61	66	71	74
14	40	56	63	68	72	67	73	78	83
17	42	62	70	77	82	76	84	90	96
21	77	101	111	119	125	118	127	135	142
25	84	111	122	130	138	129	139	148	155
31	93	129	143	154	164	152	166	178	187
35	100	143	160	174	186	171	188	203	214
41	110	159	179	195	208	192	212	228	241
50	124	183	206	226	242	222	245	265	281
63	145	219	249	274	293	269	298	323	343

NOTE:

On larger units with internal and external face and bypass dampers it may be necessary to use two opposed damper operators to avoid excessive bending of damper shaft linkage.

TABLE 7 - Mixing Box, Combination Filter Mixing Box Low Leak Damper Torques (In./Lbs.)

UNIT SIZE	STANDARD DAMPER	LOW LEAK DAMPER				ULTRA-LOW LEAK DAMPER			
		1" ΔP	2" ΔP	3" ΔP	4" ΔP	1" ΔP	2" ΔP	3" ΔP	4" ΔP
3	7	11	13	14	15	14	15	17	18
6	9	16	18	20	22	20	23	25	27
7	10	17	20	23	25	22	25	27	29
8	11	20	23	26	28	25	29	32	34
9	12	20	23	25	27	25	28	30	32
10	13	24	28	32	35	31	35	39	42
12	14	27	32	37	40	35	41	45	48
14	16	31	38	43	47	42	48	53	57
17	18	36	44	50	54	48	56	62	67
21	40	62	71	78	84	77	85	93	98
25	47	73	83	91	98	90	100	108	115
31	57	87	99	109	117	107	119	129	137
35	64	99	112	124	133	122	135	147	156
41	74	114	130	144	154	141	157	170	181
50	89	139	158	174	188	171	191	207	221
63	110	169	192	212	227	208	231	251	266

NOTE:

On larger units with internal and external face and bypass dampers it may be necessary to use two opposed damper operators to avoid excessive bending of damper shaft linkage.

TABLE 8 - High Efficiency Mixing Box Damper Torque

UNIT SIZE	TORQUE (FT.-LBS.) AT 0.4" ΔP 25 TO 75% OPEN
3	0.65
6	1.10
8	1.50
10	1.85
12	2.25
14	2.70
17	3.15
21	3.75
25	4.50
31	5.30
35	6.20
41	7.20
50	9.10
63	10.75

TABLE 8A — Multizone and Three-Deck — Multizone Zone Damper — Actuator Torques (In./Lbs)

UNIT SIZE	3	6	8	10	12	14	17	21	25	31	35	41	50	63
Torque (In./Lbs)	27	29	31	32	33	34	36	38	41	45	48	51	57	66

VARIABLE INLET GUIDE VANES

Inlet vanes are used to regulate fan capacity and to reduce horsepower at lower system requirements.

Inlet guide vane operator motors, if not factory provided, are to be provided and installed by the contractor, according to the operating torques given in Tables 9, 10, and 11. Control lever stroke and radius is given in Figure 25.

Before operation, check the vanes and assembly for freedom of movement. If resistance above the torques given in Tables 9, 10 and 11 is encountered, check for vane damage or linkage misalignment. **Do not force the vanes.** See Figure 25 for typical inlet vane operation. Figures 26 and 27 illustrate FC and AF inlet vanes.

TABLE 9 - Torque and Force Required to Operate Inlet Vanes - AF Fans - Unit Sizes 35-86

UNIT SIZE	TO OPEN OR CLOSE INLET VANES	FAN OUTLET VELOCITY			
		2,000 FPM		3,000 FPM	
		TORQUE (IN.-LBS.)	FORCE (LBS.)	TORQUE (IN.-LBS.)	FORCE (LBS.)
35	Open	70.0	7.7	158.0	16.7
	Close	17.0	1.9	39.0	4.3
41	Open	94.0	10.3	214.0	23.5
	Close	23.0	2.6	53.0	5.9
50	Open	128.0	14.1	287.0	31.5
	Close	31.0	3.4	71.0	7.8
63	Open	172.0	18.9	388.0	42.6
	Close	42.0	4.6	96.0	10.6
73	Open	172.0	18.9	388.0	42.6
	Close	42.0	4.6	96.0 <td 10.6	
86	Open	172.0	18.9	388.0	42.6
	Close	42.0	4.6	96.0	10.6

When automatic vane control is used, adjustment must be made to avoid forcing the vanes past either the full-open or full-closed positions. A locking lever is furnished if the inlet vanes are to be used with manual control.

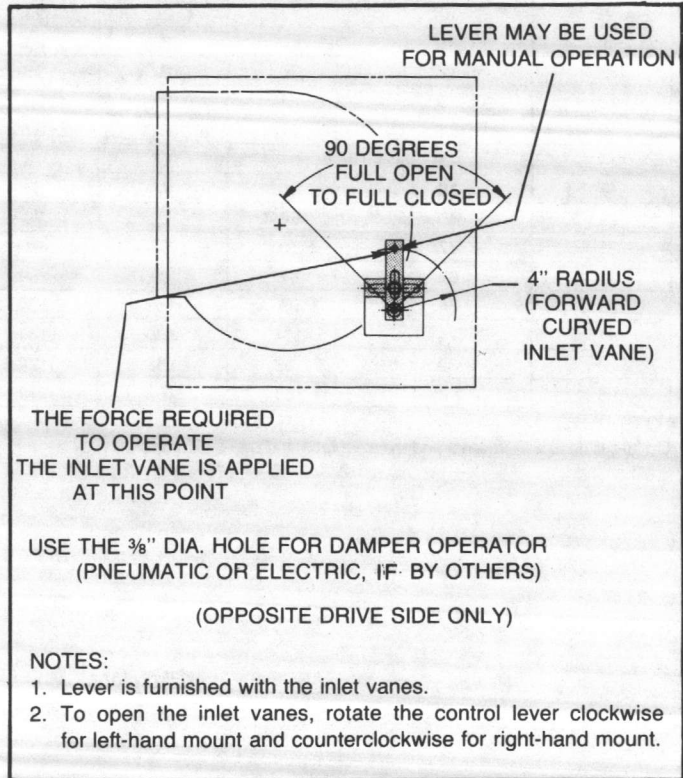


FIGURE 25 - Inlet Vane Operation

TABLE 10 - Torque and Force to Operate Inlet Vanes - FC Fans - Unit Sizes 6-31

NO. OF FANS AND FAN SIZE	TO OPEN OR CLOSE INLET VANES	FAN OUTLET VELOCITY			
		2,000 FPM		3,000 FPM	
		TORQUE (IN.-LBS.)	FORCE (LBS.) 4" ARM	TORQUE (IN.-LBS.)	FORCE (LBS.) 4" ARM
1-10½	Open	5.7	2.2	19.6	5.1
	Close	2.9	0.8	6.5	1.9
1-12¼	Open	10.0	2.5	22.5	5.7
	Close	3.5	0.9	7.8	2.1
1-13½	Open	10.9	2.8	24.5	6.2
	Close	3.9	1.0	8.7	2.3
1-15	Open	14.1	3.6	31.9	8.0
	Close	5.0	1.3	11.4	3.0
1-16½	Open	18.0	4.5	40.5	10.3
	Close	6.4	1.6	14.4	3.7
1-18¼	Open	23.1	5.8	52.2	13.3
	Close	8.3	2.1	18.6	4.8
1-20	Open	24.0	6.0	54.0	13.7
	Close	9.0	2.3	19.5	5.1
1-22	Open	25.0	6.3	56.0	14.2
	Close	9.5	2.4	21.0	5.3
1-25	Open	26.5	6.7	59.7	15.1
	Close	10.0	2.5	22.5	5.6
2-13½	Open	21.8	5.5	49.1	12.4
	Close	7.8	2.0	17.5	4.6
2-15	Open	28.3	7.1	63.9	16.0
	Close	10.1	2.6	22.8	5.7
2-16½	Open	36.0	9.0	81.1	20.3
	Close	12.8	3.2	28.9	7.3
2-18¼	Open	46.3	11.6	104.4	26.3
	Close	16.5	4.2	37.3	9.4
2-20	Open	48.0	12.0	108	27.2
	Close	18.0	4.5	39.0	9.9

TABLE 11 - Torque and Force Required to Operate Inlet Vanes — FC Fans — Unit Sizes 35-63

UNIT SIZE	FAN SIZE	TO OPEN OR CLOSE INLET VANES	FAN OUTLET VELOCITY					
			2000 FPM		3000 FPM		4000 FPM	
			TORQUE (IN.-LBS.)	FORCE* (LBS.)	TORQUE (IN.-LBS.)	FORCE* (LBS.)	TORQUE (IN.-LBS.)	FORCE* (LBS.)
35	25	Open	26.5	6.7	59.7	15.1	—	—
		Close	10.0	2.5	22.5	5.6	—	—
	27	Open	115	29	190	48	240	60
		Close	40	10	90	23	140	35
41	27	Open	115	29	190	48	240	60
		Close	40	10	90	23	140	35
	30	Open	120	30	200	50	260	65
		Close	50	13	100	25	150	38
50	30	Open	120	30	200	50	260	65
		Close	50	13	100	25	150	38
63	30	Open	120	30	200	50	260	65
		Close	50	13	100	25	150	38

*NOTE: Force is calculated using a 4" lever arm.

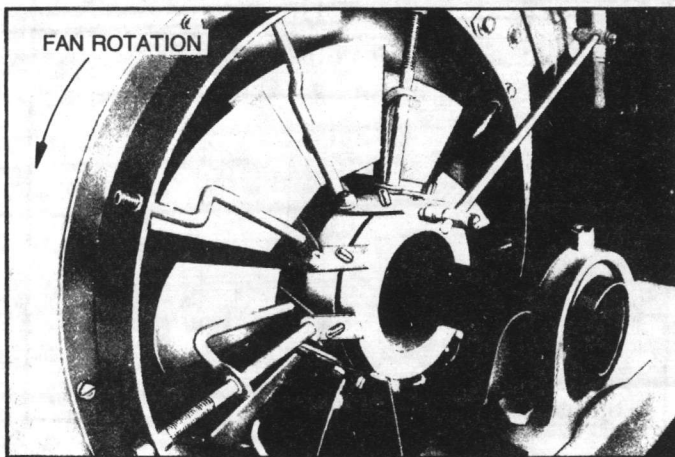


FIGURE 26 - Forward Curved Inlet Vanes

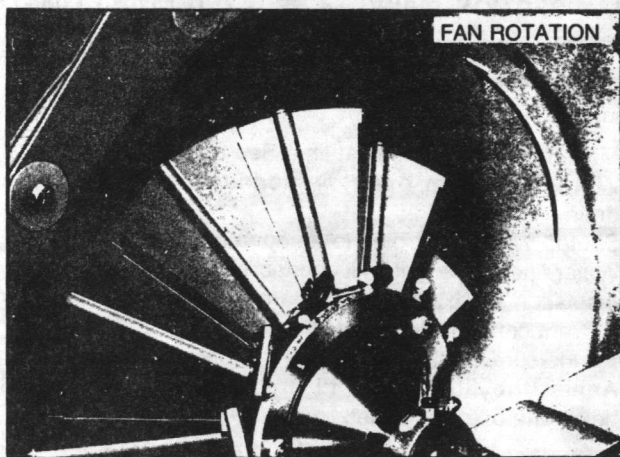


FIGURE 27 - Airfoil Inlet Vanes

DUCT CONNECTIONS

All air ducts should be installed in accordance with the standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems Other than Residence Type (NFPA 90A), and Residence Type Warm Air Heating and Air Conditioning Systems (90B).

NOTE: Installations that have supply ductwork without return ductwork may be restricted by local codes to serve a space exceeding 25,000 cubic feet in volume.

All inlet and discharge air duct connections to the unit should be made with a flexible material. Typically, about three inches is needed for this connection to rigid ductwork. Do not draw the flexible material tight; leave it sufficiently loose to prevent the transmission of any noise or vibration to the ductwork.

Duct turns and transitions must be made carefully to minimize air friction losses. Avoid sharp turns and use splitters or turning vanes when elbows are necessary, as shown in Figure 28. Make turns in the same direction of rotation as the fan. Discharge ductwork should run in a straight line, unchanged in size or direction, for at least a distance of 1-1/2 fan diameters. See Figure 28.

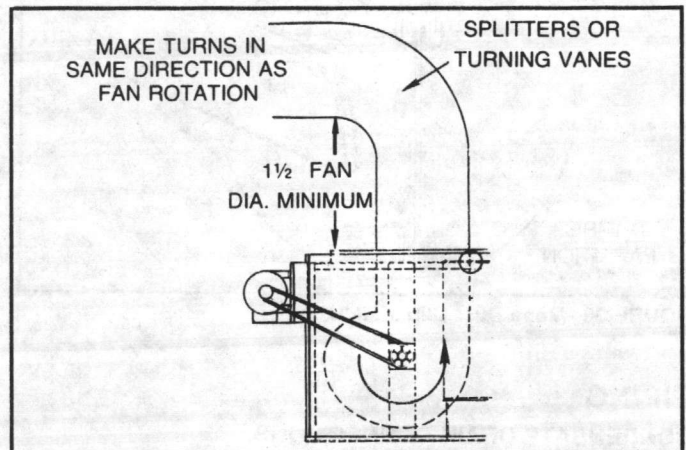


FIGURE 28 - Discharge Ductwork Recommendations

On two-fan units, both fan discharge openings should be jointed to a common duct after the recommended length of straight run. Figure 29 illustrates a proper duct run that will prevent unequal handling of air by the fans. Maximum duct transition should be 30 degrees. The included angle between joining ducts should not exceed 60 degrees. If necessary, split the duct at any point beyond the common connection.

For multizone units, zone duct clips are provided for attaching the ductwork to each zone. Refer to Figure 30. Inset the clips on the damper partitions as required for the number of zones. Approximately 7/16-inches of space will be left between each zone when the duct collar is placed in the duct clip.

NOTE: When attaching the ductwork to multizone units,

ensure that the duct connection does not interfere with damper blade travel. If necessary, attach the ductwork to the outside of the fan discharge in order to leave the damper clear of obstructions. A clearance of one inch (minimum) is required between ductwork and low leak dampers for proper damper operation.

Note: For units with optional wide coil, the contractor will need to extend the drain pan nipples under the extended drain pan before connecting the drain trap. Nipple length extension is determined by unit size. For size 3-31 units, add an additional 7½-inches in length. Size 41-50 units, add an additional 12-inches in length. Size 35, 63, 73 and 86 units, add an additional 8½-inches in length.

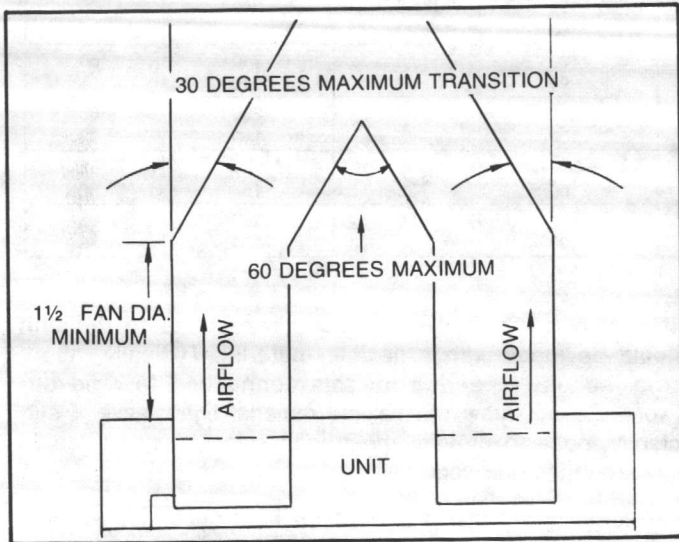


FIGURE 29 - Discharge Ductwork Recommendations for Two-Fan Units

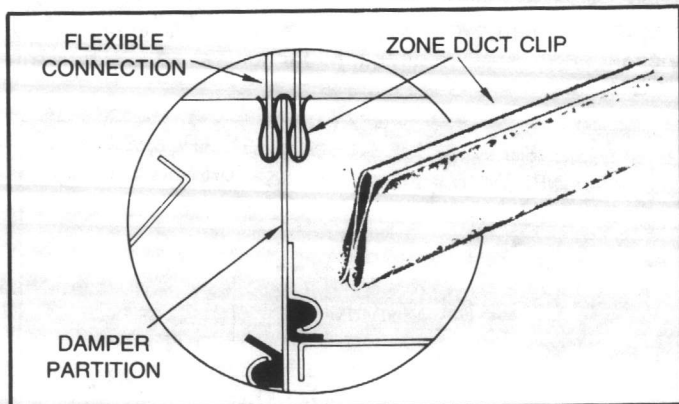


FIGURE 30 - Zone Duct Clip Installation

PIPING

CONDENSATE DRAIN CONNECTIONS

CAUTION: Failure to provide adequate condensate piping may result in water damage to the equipment or building.

Threaded condensate drain connections are provided on both sides of the coil section drain pan. Pitch the line downward toward an open drain and install a plugged tee to facilitate cleaning. Make sure the drain pan connection openings are unobstructed. Trap the drain line as shown in Figure 31 for draw-thru units and Figure 32 for blow-thru units. Draw-thru units size 73 and 86 have additional drain connections on both sides of the fan section. Run these drain connections into the coil section drain line or to a separate open drain.

Drain connection size on unit sizes 3 through 31 is 1-1/4-inch NPT (external). Drain connections on units size 35 to 86 is 1-1/2-inch NPT (internal). Install pipe caps or plugs on all unused unit drain connections.

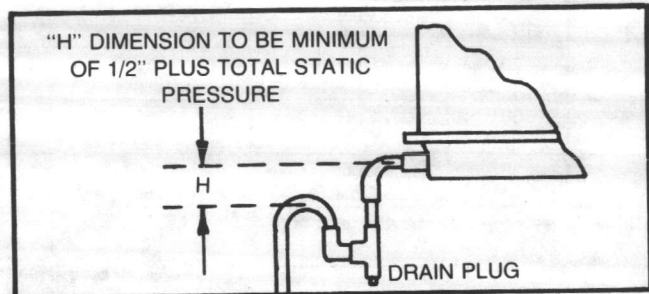


FIGURE 31 - Drain Trap for Draw-Thru Units

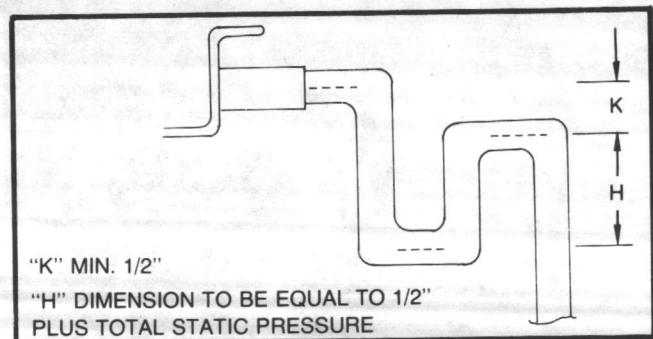


FIGURE 32 - Drain Trap for Blow-Thru Units

SPRAY SECTION PIPING — SPRAYED COIL CLIMATE CHANGER

Sprayed coil units require the following piping to the spray section:

1. Make-up water to the float line. See Figure 33A.
2. Water line from overflow connection to a trapped drain.
3. Shutoff valve and piping to an open or trapped drain.
4. Water line to the quick-fill connection.
5. Insulation of external piping around the spray pump to prevent condensate runoff.
6. Fill the spray tank.
7. Adjust the float valve to maintain a level 1/2-inch below the overflow outlet.

NOTE: Air must be purged from the system and spray pump valve must be adjusted for proper water flow. Instructions are given in the Start-Up section of the CLCH maintenance manual.

CAUTION: Water treatment is required for Sprayed Coil Climate Changers if the supply water is scale forming or corrosive. If necessary, engage the services of a qualified water treatment specialist. The object of water treatment is to prevent the fouling of the coil surfaces or undue metal damage. THE TRANE COMPANY CAN ASSUME NO RESPONSIBILITY FOR EQUIPMENT FAILURES WHICH ARE THE RESULT OF UNTREATED OR IMPROPERLY TREATED WATER.

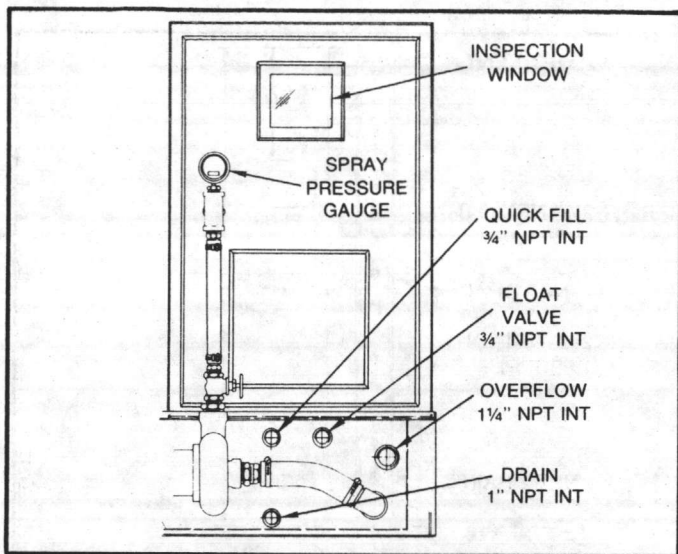


FIGURE 33A - Sprayed Coil Unit Tank Connections

GENERAL COIL PIPING RECOMMENDATIONS

1. Proper installation, piping and trapping is necessary to insure satisfactory coil operation and to prevent operational damage.
2. When selecting coil location, allow sufficient space for access to the coil for routine maintenance and service.
3. Support all piping independently of the coils.
4. Provide swing joints or flexible fittings in all connections that are adjacent to heating coils in order to absorb thermal expansion and contraction strains.
5. The Trane Company recommends that a short pipe nipple be used on coil headers prior to making up any welded flange or welded elbow type connections. This allows the use of a back-up pipe wrench when it is necessary to further rotate the welded flange or elbow when lining up bolt holes on the prefabricated piping.

NOTE: Use a "Back-Up Wrench" when attaching piping to coils with copper headers. Do not use brass fittings or brass pipe connectors. Brass distorts easily and causes connection leaks.

Delta-Flo coils have copper headers which extend outside the unit casing so that back-up pipe wrenches can be used.

6. When attaching the piping to the coil header, make the connection only tight enough to prevent leaks. Maximum recommended torque is 200 foot-pounds. Use pipe sealer on all threaded connections. **The use of Teflon tape or paste is not recommended by Trane.**
7. After completing the piping connections, seal the gap between the pipe and casing with tape or mastic before insulating the pipes.
8. To connect supply and return coil piping, outer coil panels must be removed. If not ordered, drain and vent access holes must be drilled. See Item 9.
9. Provisions must be made to drain those coils that are not in use when subjected to freezing temperatures.

CAUTION: Failure to properly drain and vent coils when not in use during freezing temperatures may result in coil freeze-up damage.

Coil types N, NS and A may be adequately drained in their pitched position in the unit. In coilless units, the coil, after field installation, is not pitched (unless special pitching coil support channel is ordered for steam coils) and may be adequately drained in their position in the unit.

(Type N is drainable through the return connection.) The installer must provide appropriate piping for adequate drainage.

Type WL coils are not drainable in either pitched or level position. To drain these coils remove the vent and drain plugs and blow the coils out as completely as possible with compressed air. The coils should then be filled and drained several times with full strength ethylene glycol so that it will mix thoroughly with the water retained in the coil. Drain the coil out as completely as possible.

Coil types D, DD, and K, plus W, P2, P4, P8, DL and LL are drainable in their factory-installed level position. Coil types D, DD, DL and LL also have Trane factory-installed drain and vent connections. Figures 34 through 39 illustrate coil drain and vent connections.

Drainable coils installed in units containing coil types DL or LL will also have factory-installed drain and vent connections.

NOTE: On units with stacked coils, there is a condensate follower located at each end of the coil connection. Figure 33B illustrates the condensate follower provided at the end of the stacked coils.

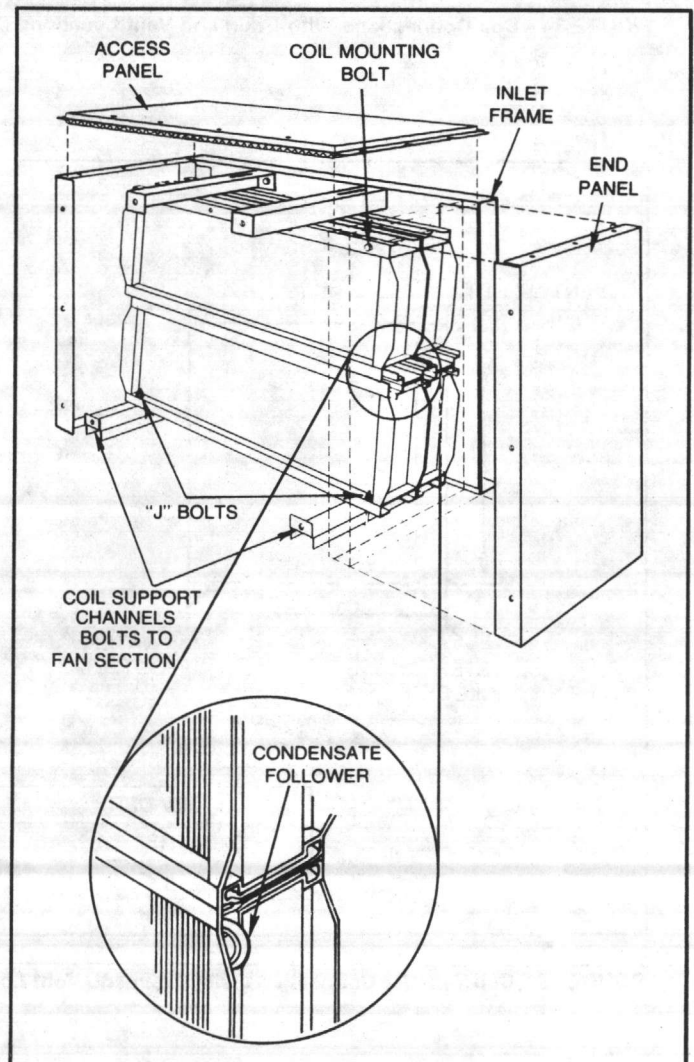


FIGURE 33B - Draw-Thru Unit Coil Section Details with View of Condensate Follower

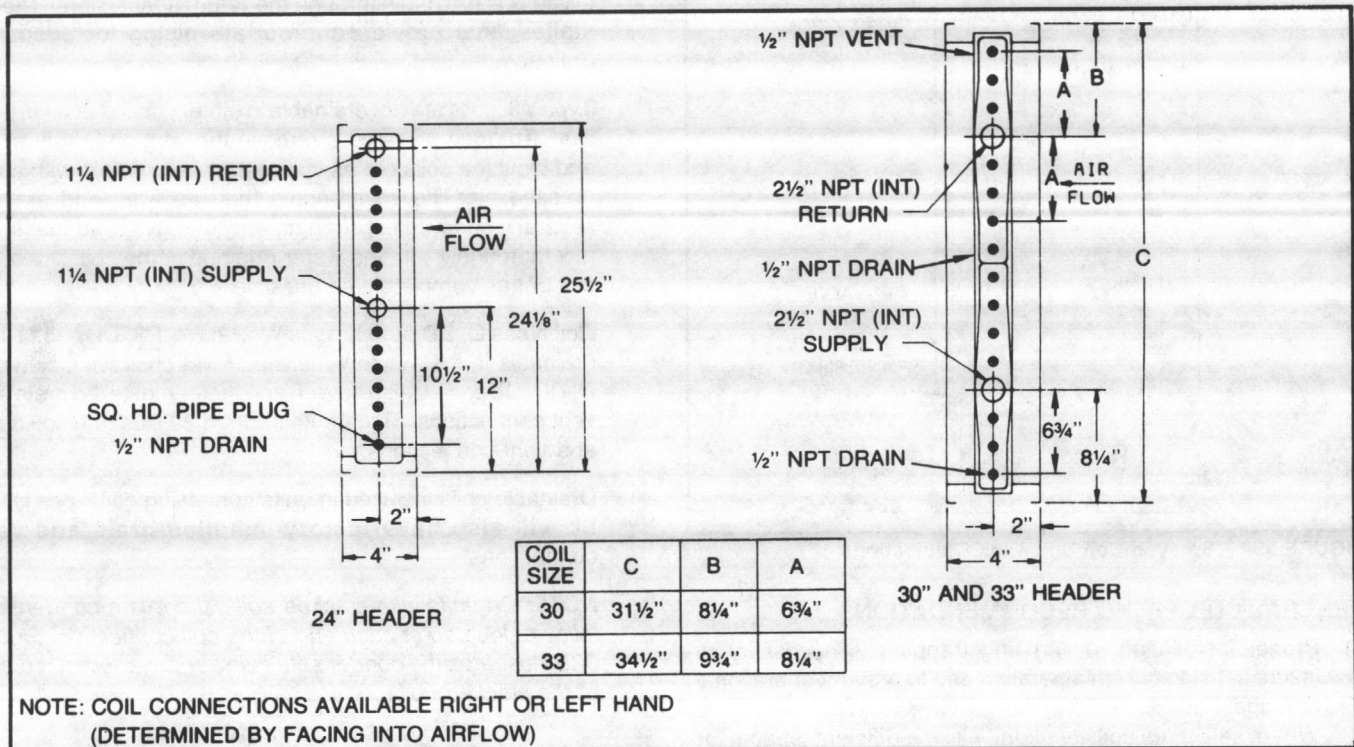


FIGURE 34 - Coil Connections With Drain and Vent Locations (Type WC 24" and Type WS 30" and 33" Headers)

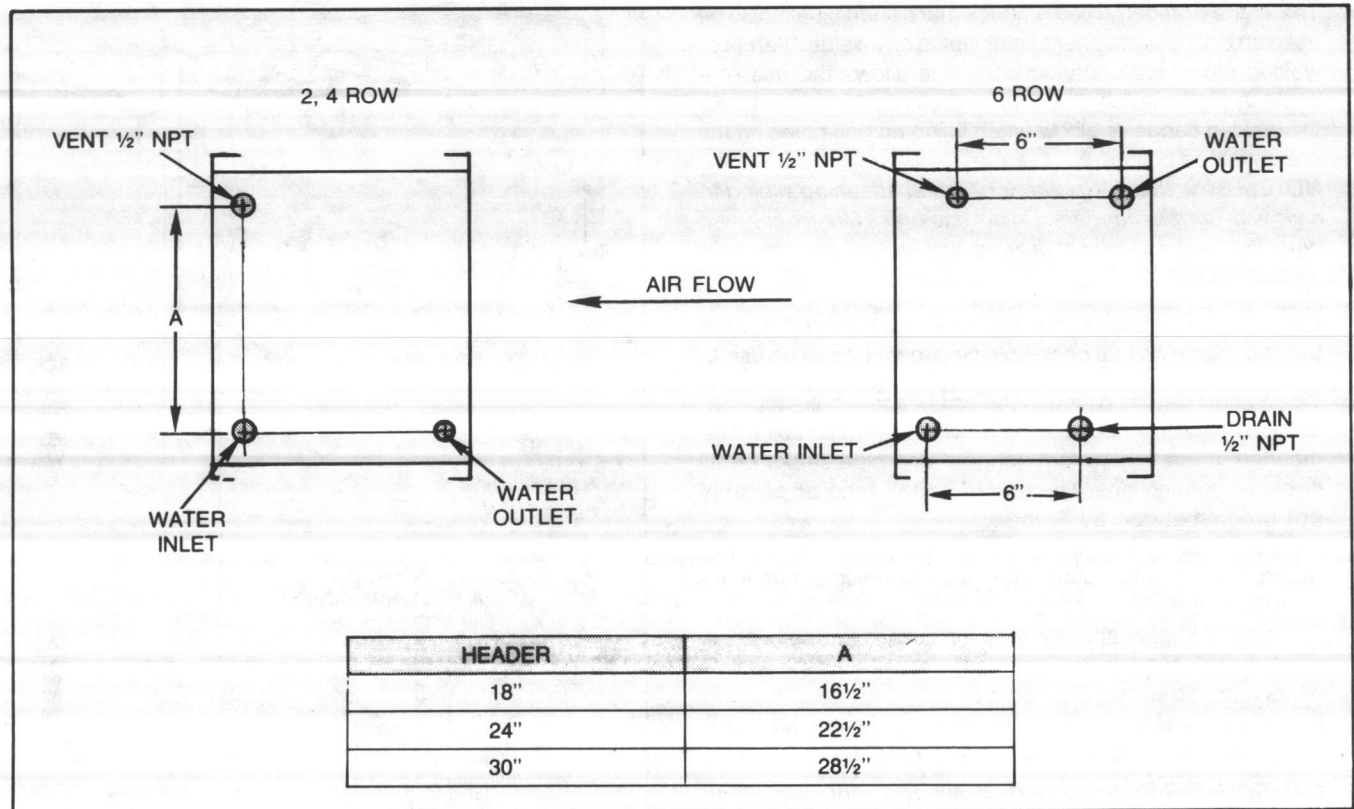


FIGURE 35 - Coil Type P2 Connections with Drain and Vent Locations (18", 24" and 30" Headers)

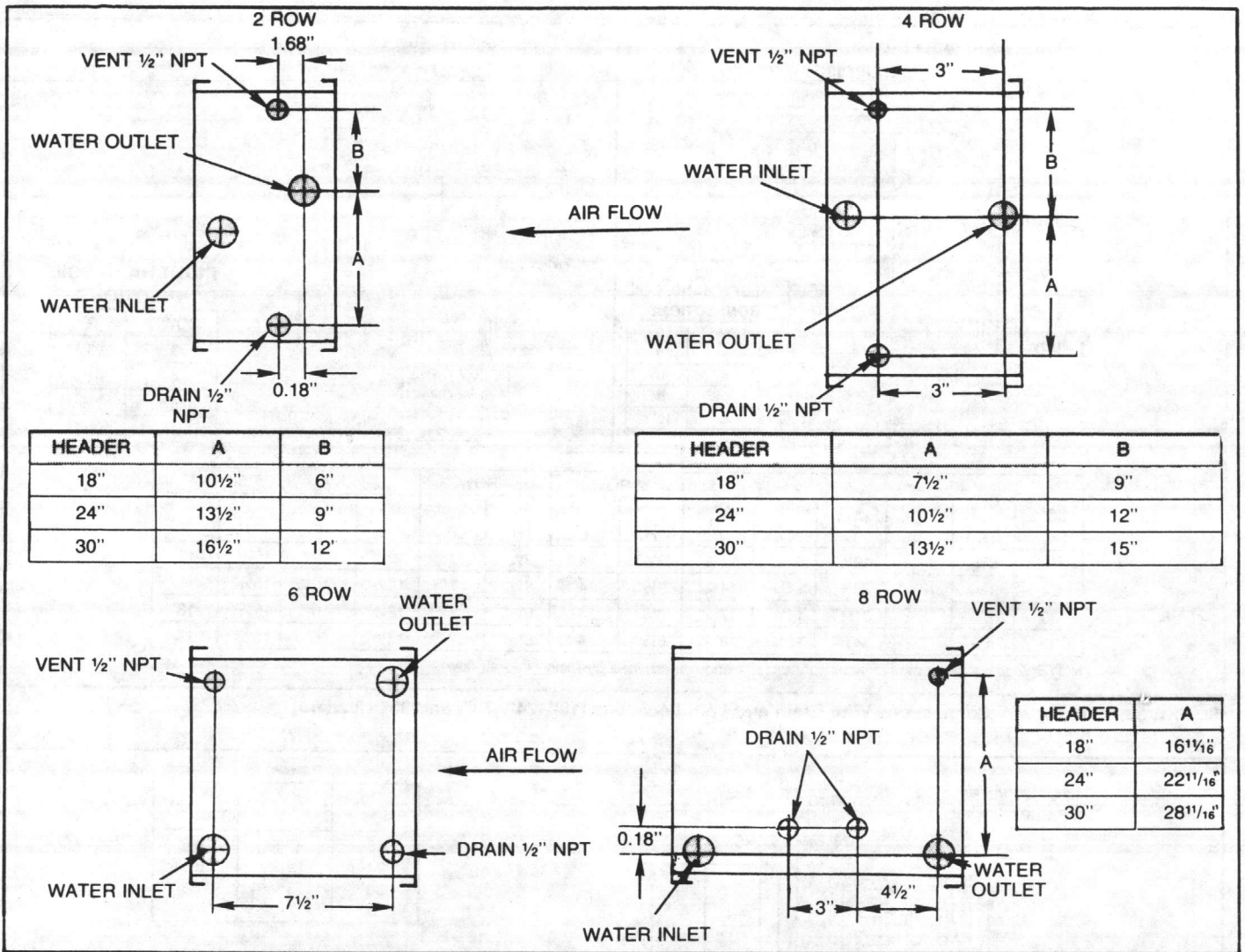


FIGURE 36 - Coil Type P4 Connections with Drain and Vent Locations (18", 24", and 30" Headers)

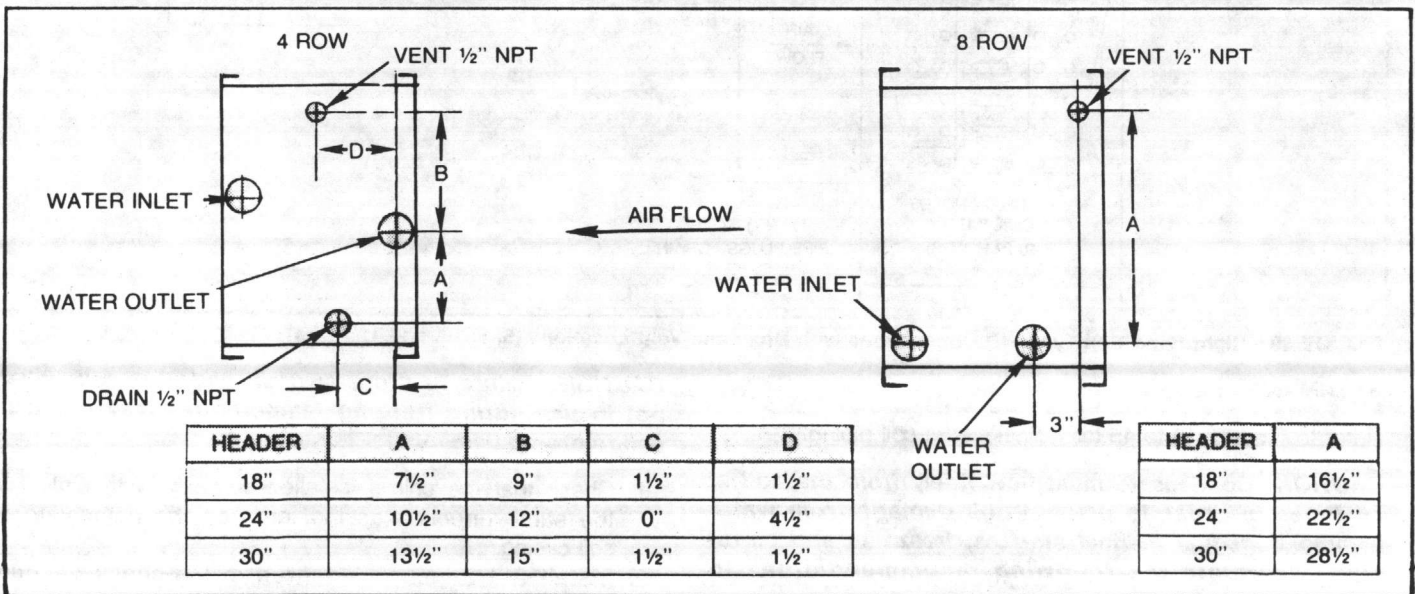


FIGURE 37 - Coil Type P8 Connections with Drain and Vent Locations (18", 24", and 30" Headers)

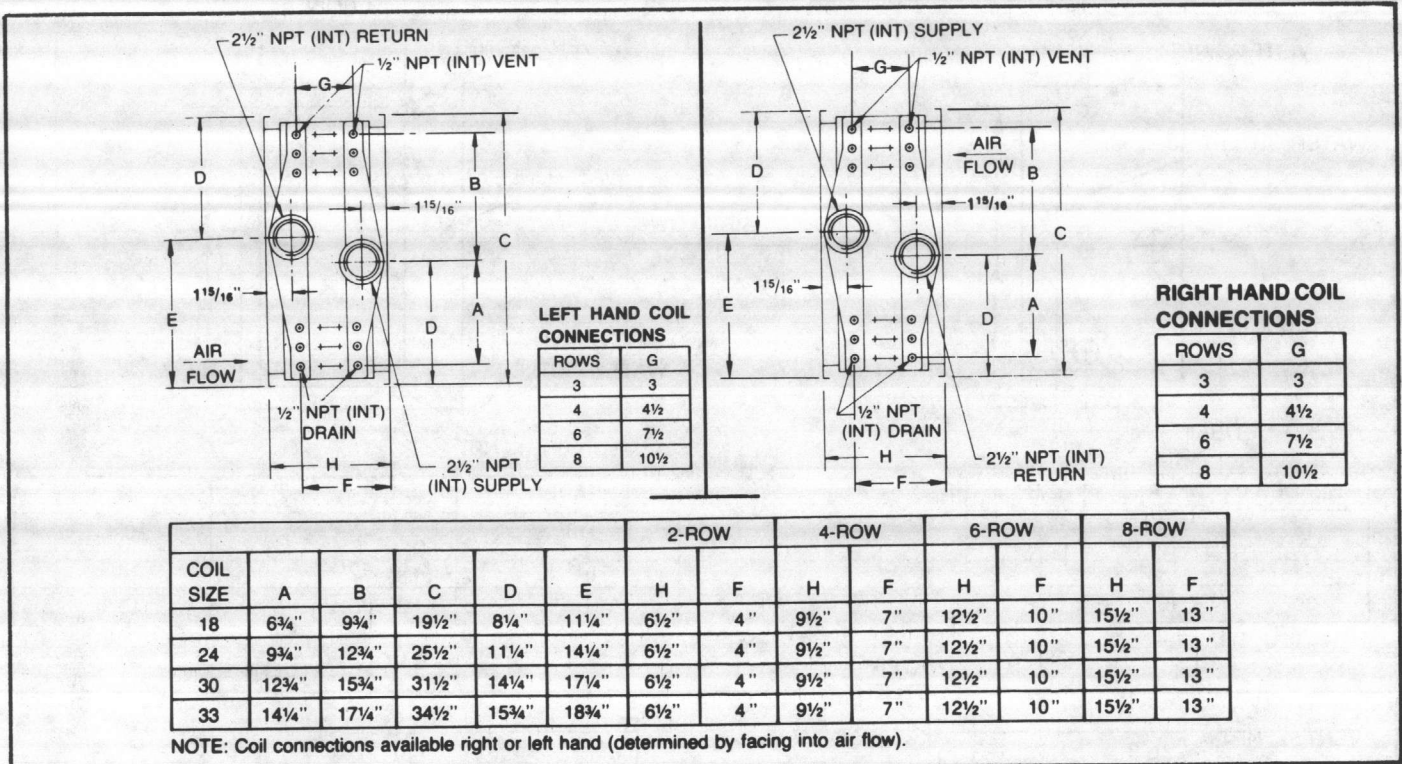


FIGURE 38 - Coil Type W Connections With Drain and Vent Locations (18", 24", 30", and 33" Headers)

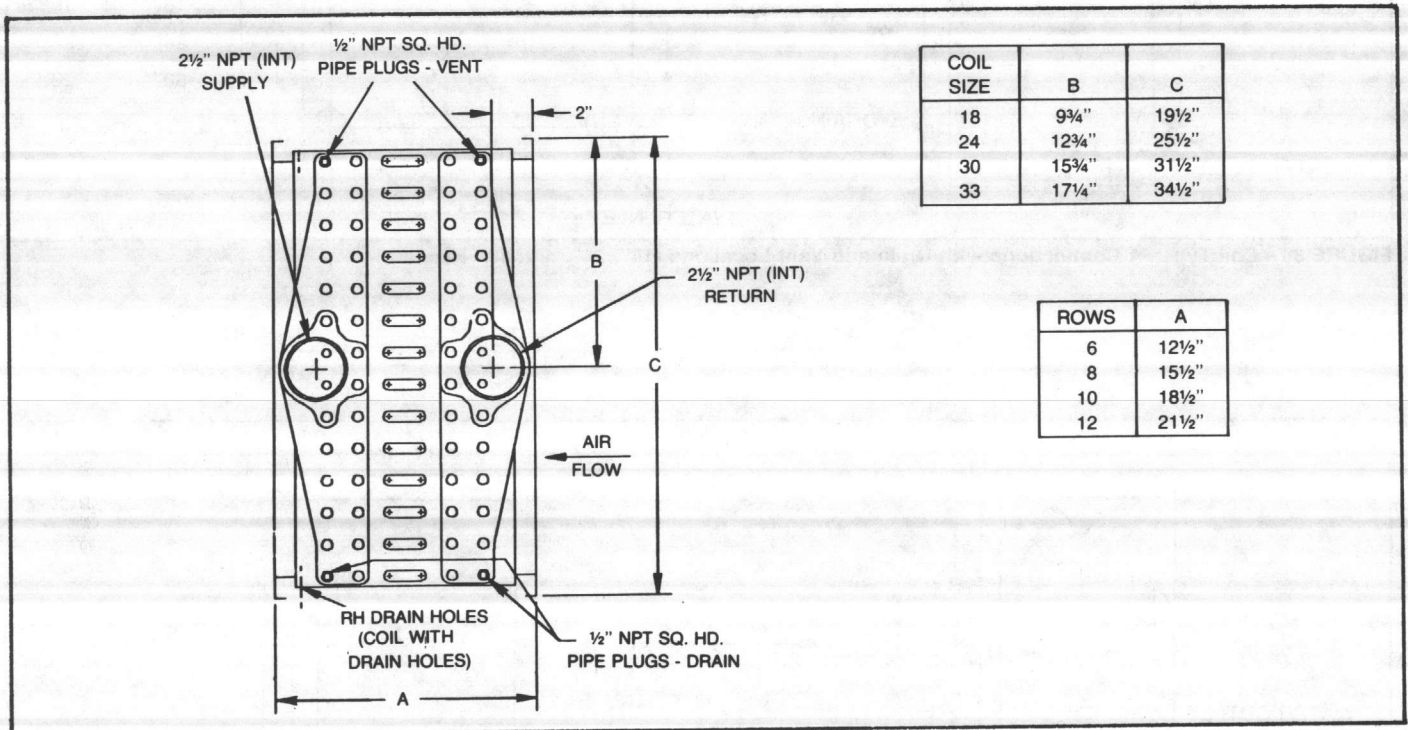


FIGURE 39 - Right Hand Coil Type WD Connections with Drain and Vent Locations (6, 8, 10, and 12 Rows)

STEAM COIL PIPING

Refer to Figures 40 to 45 for typical steam coil piping.

CAUTION: Condensate must flow freely from the coil at all times in order to prevent coil damage from water hammer, unequal thermal stresses, freeze-up and corrosion. Complete the following recommendations to prevent coil damage.

CAUTION: Failure to properly drain and vent coils when not in use during freezing temperatures may result in coil freeze-up damage.

1. Check that the coil is installed correctly, with airflow in the same direction as indicated on the nameplate or coil casing.
2. Install a 1/2-inch, 15-degree swing-check vacuum breaker in the unused condensate return tapping as close as possible to the coil.

TABLE 12 — Cooling and Heating Coil — Connection Sizes (Inches NPT)

COIL TYPE	HEADER HEIGHT	SUPPLY	RETURN	VENT	DRAIN
W	18, 24, 30, 33	2.5	2.5	0.5	0.5
D	18, 24, 30, 33	2.5	2.5	0.5	0.5
DD	18, 24, 30, 33	2.5	2.5	0.5	0.5
WD	18, 24, 30, 33	2.5	2.5	0.5	0.5
K	18, 24, 30, 33	2.5	2.5	0.5	0.5
P2	18, 24, 30	0.75	0.75	0.5	0.5
P4	18, 24, 30	1.0	1.0	0.5	0.5
P8	18, 24, 30	1.25	1.25	0.5	0.5
WC	18	1.0	1.0	0.5	0.5
	24	1.25	1.25	0.5	0.5
	30, 33	2.5	1.5	0.5	0.5
WA	18, 24, 30, 33	2.5	2.5	0.5	0.5
N, NS	18	2.0	1.0	NA	NA
	24	2.5	1.25	NA	NA
	30, 33	3.0	1.25	NA	NA
A, AA	18	2.5	1.0	NA	NA
	24, 30, 33	2.5	1.25	NA	NA
TT	18, 24, 30, 33	0.75	0.75	NA	NA
DL	18, 24, 30, 33	1.5	2.0	0.375	0.375
WL	18, 24, 30, 33	1.5	2.0	0.375	0.375
LL	18, 24, 30, 33	2.5	2.5	0.375	0.375

Notes:

- Connections are NPT internal.
- Coil Type NS drains through supply connections.

- Vent the vacuum breaker line to the atmosphere or connect it to the return main at the discharge side of the steam trap.

NOTE: Vacuum breaker relief is mandatory when the coil is controlled by a modulating steam supply or a two-position (ON-OFF) automatic steam supply valve.

- Run the return pipe at the full size of the steam trap connection except for the short nipple screwed directly into the coil condensate connection. **Do not bush or reduce the coil return tapping size.**
- With automatic controls, or where the possibility of low pressure supply steam exists, use float and thermostatic traps with atmospheric pressure gravity drain and continuous discharge operation. Locate the steam trap discharge at least 12 inches below the condensate return tapping. Use bucket traps **only** when supply steam is unmodulated and pressure is 25 psig or higher.
- When coils are installed in a series, size the steam traps for each coil using the capacity of the first coil in airflow direction.
- Always trap each coil separately to prevent holdup in one or more coils.
- Always install strainers as close as possible to the inlet side of the trap.
- Use a V-port modulating valve to obtain gradual modulating action.
- Control each coil bank separately when installing coils for series airflow with automatic steam control valves.

CAUTION: Always open the steam supply control valve slowly to prevent possible coil damage.

- Do not modulate systems with overhead or pressurized returns unless the condensate is drained by gravity to

TABLE 13 - Refrigerant Coil (Type F) Piping Sizes (Inches)

HEADER HEIGHT	NO. OF CIRCUITS	CONNECTION SIZE (INCHES)	
		LIQUID	SUCTION
18	2	7/8	1 1/8
	3	7/8	1 1/8
	6	1 1/8	2 1/8
	12	1 1/8	2 1/8
24	2	7/8	1 1/8
	4	7/8	1 1/8
	8	1 1/8	2 1/8
	16	(2) 1 1/8	(2) 2 1/8
30	2	7/8	1 1/8
	4	7/8	1 1/8
	5	7/8	2 1/8
	10	1 1/8	2 1/8
	20	(2) 1 1/8	(2) 2 1/8
33	3	7/8	1 1/8
	7	1 1/8	2 1/8
	11	1 1/8	2 1/8
	22	(2) 1 1/8	(2) 2 1/8

NOTE: Connections are piping OD.

- a receiver (vented to the atmosphere) and returned to the main by a condensate pump.
- At start-up on units with fresh air dampers, slowly turn the steam on full for at least 10 minutes before opening the fresh air intake.
- Pitch all supply and return steam piping down a minimum of 1 inch per 10 feet in the direction of flow.
- Do not drain the steam mains or take-offs through the coils. Drain the mains ahead of the coils through a steam trap to the return line.
- Overhead returns require 1 psig of pressure at the steam trap discharge for each 2-foot elevation to assure continuous condensate removal.

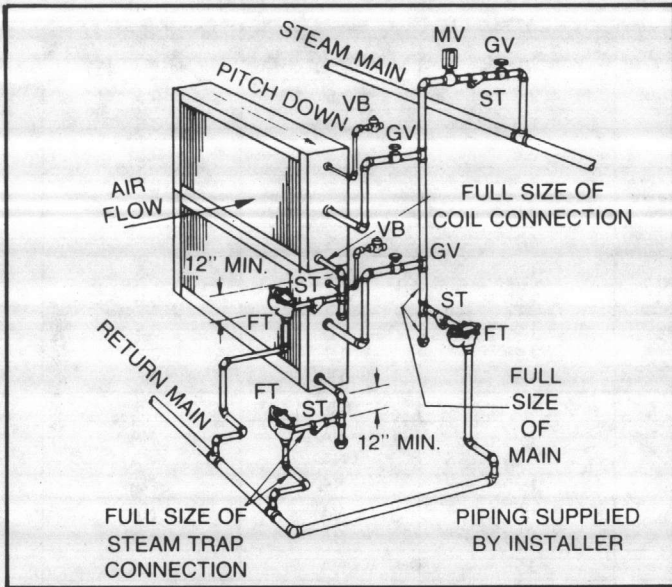


FIGURE 40 - Typical Piping for Type NS Steam Coils and Horizontal Tubes for Horizontal Airflow

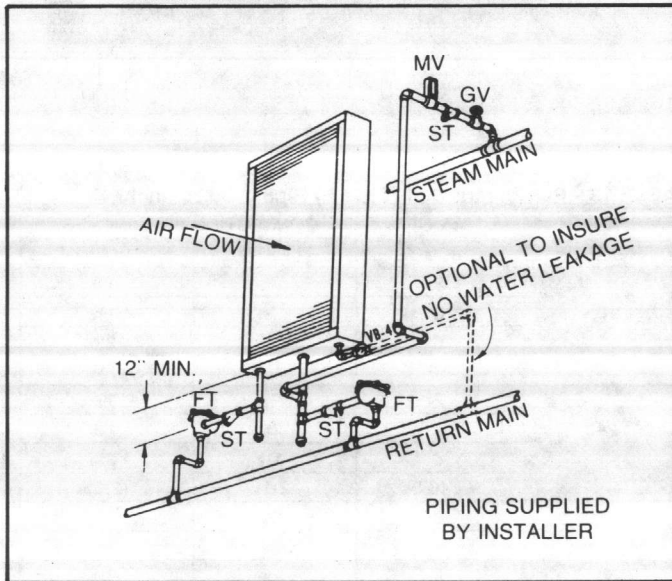


FIGURE 41 - Typical Piping for Type NS Steam Coils and Vertical Tubes for Vertical Airflow

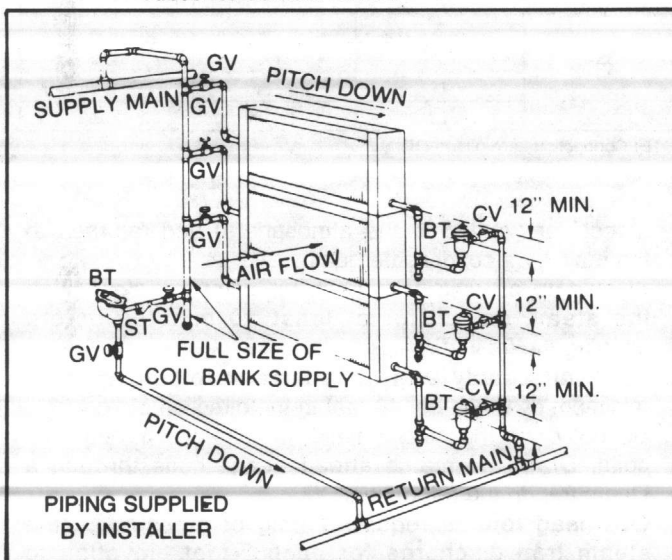


FIGURE 42 - Typical Piping for Type A Steam Coils, High Pressure, Horizontal Tubes for Horizontal Airflow

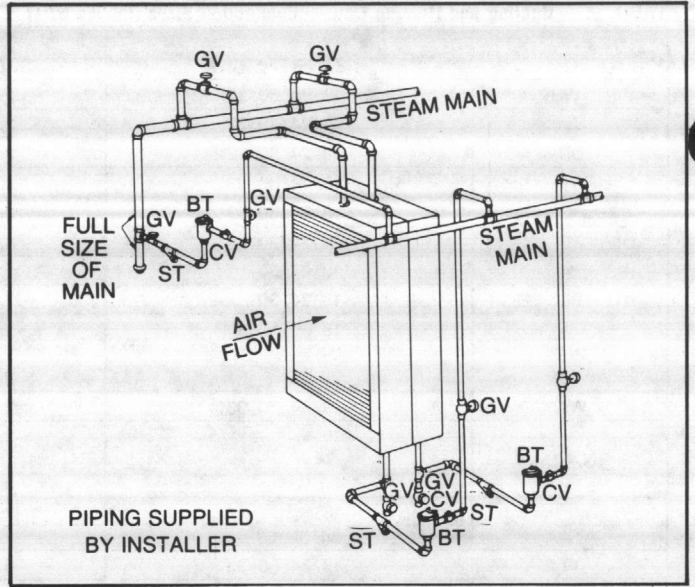


FIGURE 43 - Typical Piping for Type A Steam Coils, High Pressure, Vertical Tubes for Horizontal Airflow

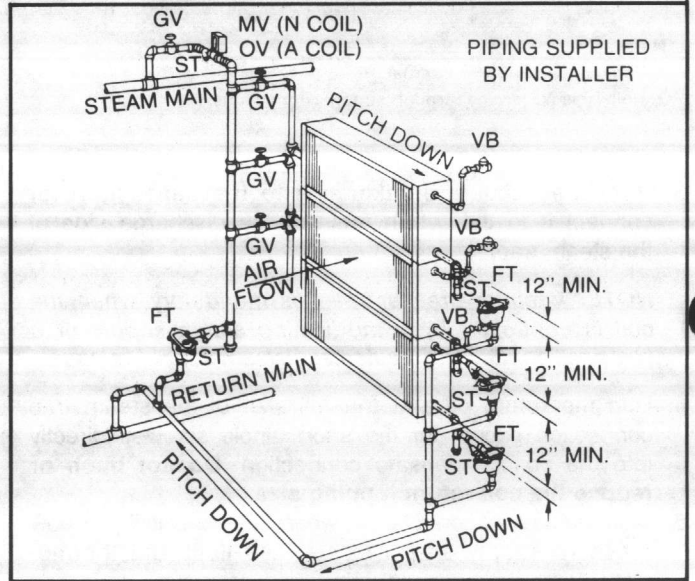


FIGURE 44 - Typical Piping for Type A or N Steam Coils, Horizontal Tubes for Horizontal Airflow

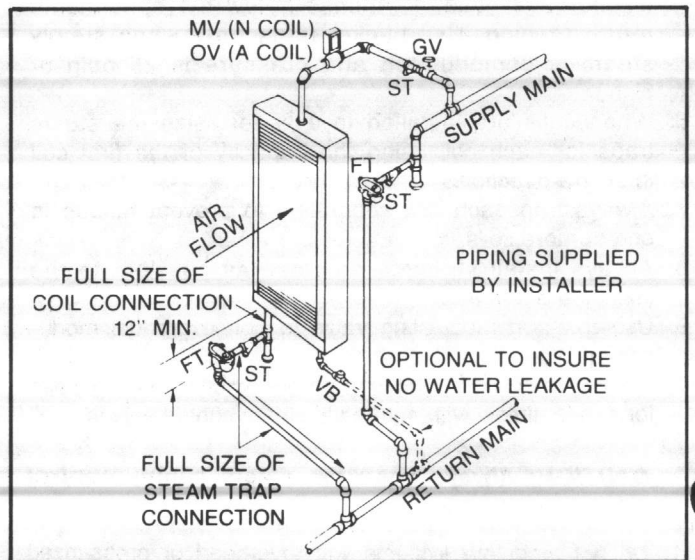


FIGURE 45 - Typical Piping for Type A or N Steam Coils, Vertical Tubes for Horizontal Airflow

HOT WATER COIL PIPING

Refer to Figures 46 to 48 for typical hot water coil piping.

1. Check that the coil is installed correctly, with airflow in the same direction as indicated on the nameplate or coil casing.
2. Type W, WL, DL, and WC hot water coils are self-venting only if the water velocity exceeds 1.5 feet per second. If it is below this rate, vent the coils by either of the following methods:
 - a. Install an air vent in the top pipe plug tapping of the return header.
 - b. Vent from the top of the return header horizontally to the return piping if the return line rises and is above the top of the coil.

CAUTION: Do not throttle or modulate the water flow for coils that are exposed to freezing air. Coil damage may result from freeze-up.

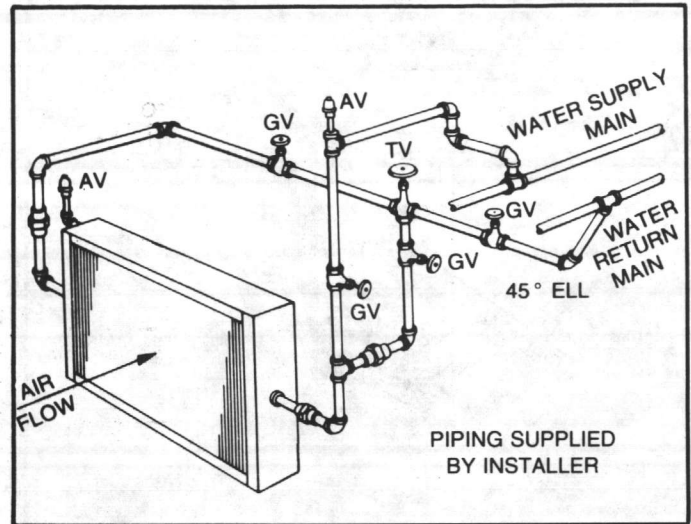


FIGURE 48 - Typical Piping for Type W or WA, 1-Row Water Coil

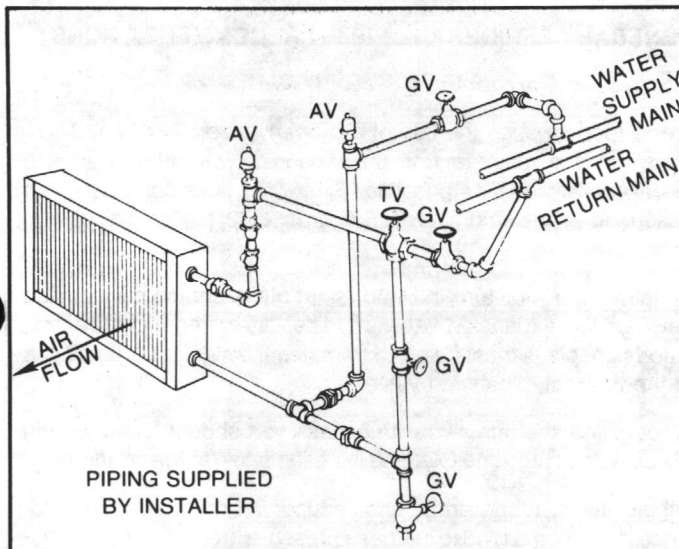


FIGURE 46 - Typical Piping for Type WC Water Coil

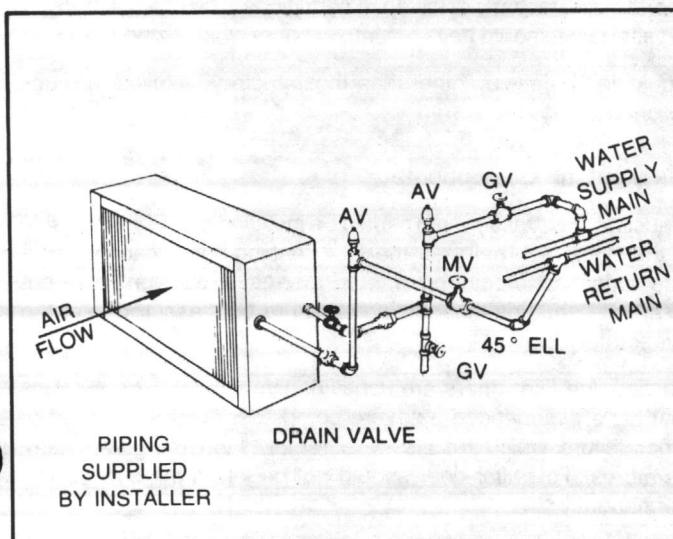


FIGURE 47 - Typical Piping for Type W, Two-Row Water Coil

WATER COOLING COIL PIPING

Refer to Figures 49, 50 and 50A for typical water cooling coil piping.

1. Check that the coil is installed correctly, with airflow in the same direction as indicated on the nameplate or coil casing.
2. Vent both supply and return lines.
3. Install a strainer ahead of the control valve, if used.
4. Install a drain line and shutoff valve in the supply line near the coil.
5. Check for coil fin damage and straighten if necessary.
6. Type W, D, K, DL, WL and LL water coils are self-venting only if the water velocity exceeds 1.5 fps. Type DD and WD coils are self-venting only if the water velocity exceeds 2.5 fps. If water velocity is below these minimum values, vent by one of the following methods.
 - a. Install an air vent in the top pipe plug tapping of the return header, or;
 - b. When the return line rises above the top of the coil, vent from the top of the return header horizontally to the return piping.

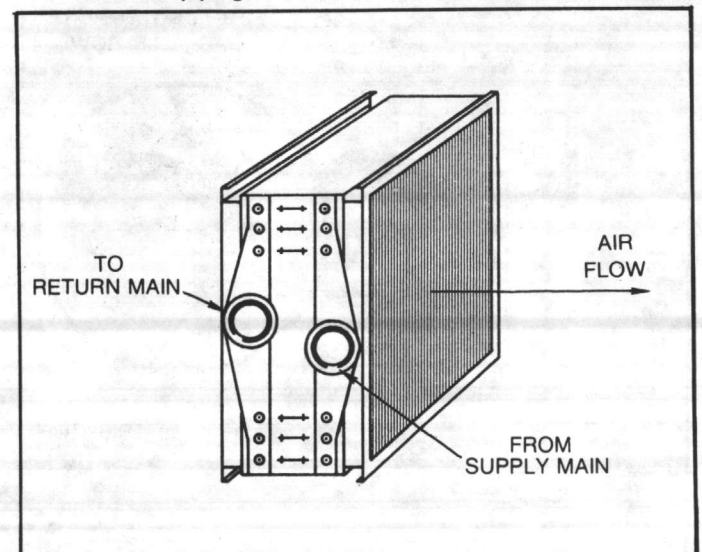


Figure 49 - Typical Piping for Type D, W or K Water Cooling Coils with End Connections.

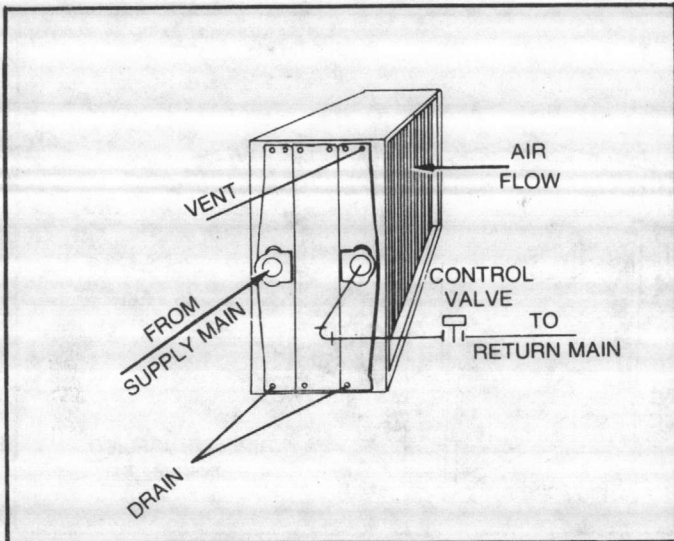


Figure 50 - Typical Piping for Type DD Water Cooling Coil with Center Connections.

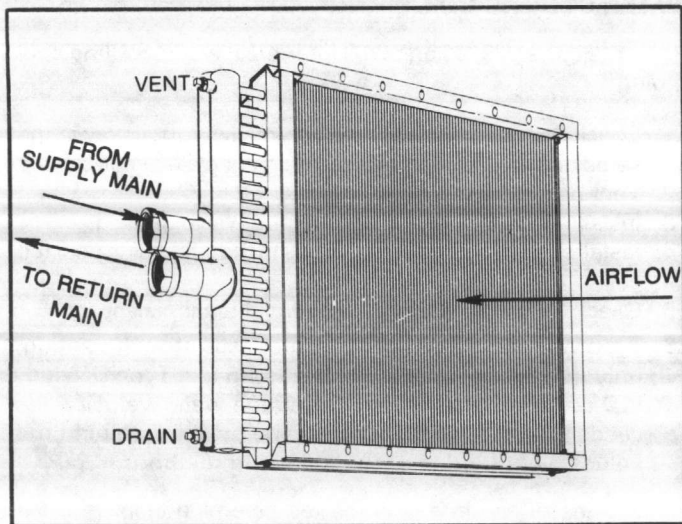


Figure 50A - Typical Piping for 2-Row, Type WL and DL Water Coil with Drain and Vent Locations.

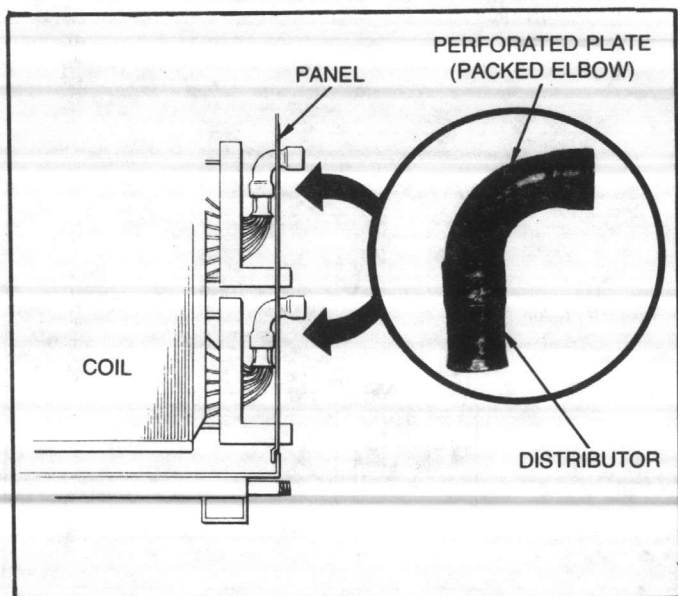


FIGURE 51 - Type F Refrigerant Coil

REFRIGERANT COIL PIPING

NOTE: This coil has been dehydrated and charged with a holding charge. To prevent leaks and system contamination, do not break the seals until the coil is installed.

Check that the coil is installed correctly, with airflow in the same direction as indicated on the coil nameplate or casing. The suction connection must be at the bottom of the suction header.

Follow accepted refrigeration piping practices and safety precautions. See Figure 51 for typical refrigerant coil piping. General refrigerant piping recommendations for component selection and line sizing follow. Specific recommendations should be provided with the high-side components, including instructions for pressure testing, evacuation, and system charging.

Leak-test the entire refrigeration system after piping is complete. Charge the unit according to approximate weight requirements and operating pressures. Measure superheat and adjust the thermal expansion valve setting if necessary.

GENERAL REFRIGERANT PIPING RECOMMENDATIONS

Liquid Line Components

Trane recommends the use of a properly sized liquid line filter-drier, installed upstream from the expansion valve and as close to the evaporator coil as possible. Filter-drier selection should be based on a maximum pressure drop of 2 psi at the design condition.

In addition, a moisture indicator/sight glass should be installed between the expansion valve and filter-drier. The moisture indicator/sight glass must be sized to match the size of the liquid line at the thermal expansion valve.

A liquid line shutoff valve with access port should be sized with the selected liquid line OD, and installed close to the condenser.

Other valves, tube bends, and reducers should be minimized, since these items tend to increase pressure drop and reduce sub-cooling at the expansion valve.

The Thermal Expansion Valve (TEV) must be selected for proper size and capacity. A slightly oversized valve will allow the unit to operate satisfactorily at low-load conditions. The use of a hot gas bypass valve should be taken into account when sizing the TEV.

Liquid line receivers, other than those factory-installed, are **not** recommended.

Suction Line Components

A suction line pressure tap should be installed on the leaving side of the evaporator coil near the TEV sensing bulb location. Accurate superheat measurement and thermal expansion valve adjustment demands that suction pressure be measured near the evaporator coil.

Suction line filter-driers are usually only necessary on systems that have experienced a severe compressor motor burn-out or other failure which results in extremely high refrigerant temperatures. This filter-drier should not be left in the suction line permanently.

Liquid Line Sizing

All compressors have a Refrigerant Charge Limit (RCL) that must not be exceeded. Since the RCL and pressure drop are in direct conflict with each other, Trane recommends that the liquid line be sized as small as possible, while maintaining a low enough pressure drop to ensure 5 degrees F of subcooling at the expansion valve.

Suction Line Sizing

Suction line tubes must be sized to maintain refrigerant vapor velocities that are high enough to ensure oil entrainment under all operating conditions.

Although not harmful, it is not necessary to pitch horizontal suction lines toward the compressor when the refrigerant coil is used with Trane condensing units, which are designed with a gas trap in the suction line just prior to the compressor. This gas trap helps the crankcase heater to stop temperature-induced migration during the off cycle. However, it also eliminates gravity flow to the compressor sump.

WIRING

WARNING: DISCONNECT ELECTRICAL POWER SOURCE BEFORE SERVICING THE UNIT OR CONNECTING ELEC-

TRICAL WIRES. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR ENTANGLEMENT IN MOVING PARTS.

Wiring to the unit fan motor and the spray pump motor (sprayed coil units only) must be provided by the installer and must comply with all national and local electrical codes. The installer must also furnish a fused disconnect switch in compliance with national and local electrical codes.

CAUTION: Use copper conductors only for terminal connections. Use of aluminum or other type of wiring may result in galvanized corrosion or overheating and resultant equipment damage.

Fan motors require motor overload protective devices that are rated or selected in compliance with the National Electric Code. Specific unit and motor connection diagrams are provided on the unit. If wiring directly to the motor, provide a flexible connection at the motor to permit fan belt adjustment. Fractional-horse-power motors may be factory-connected to a terminal box on the unit. If this construction is provided, complete field wiring to this connection box.

INSTALLATION CHECKLIST

Complete this checklist as the unit is being installed to verify that all recommended installation procedures are accomplished before the unit is started. This checklist does not replace the detailed instructions given in appropriate places in the Installation section of this manual. Read the entire section carefully to become familiar with the installation before installing the unit.

WARNING: DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR INSPECTING THE UNIT. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK OR ENTANGLEMENT IN MOVING PARTS.

RECEIVING AND HANDLING

- 1. Unit and accessories are inspected for shipping damage or material shortage. Report any claims immediately.
- 2. Unit nameplate data agrees with submittal and ordering information.

LIFTING

- 1. Center of gravity is approximated.
- 2. Proper rigging devices are installed, including slings and spreader bars.
- 3. Unit is hoisted to its approximate location.

UNIT LOCATION

- 1. Floor or foundation is prepared to support unit weight and to be level.
- 2. Sufficient access is provided for unit size, clearances and maintenance access.
- 3. Foundation or mounting platform is sized for unit, accessories and mounting legs.
- 4. For ceiling-mounted units, suspension frame is selected and prepared.

MOUNTING

- 1. Vibration isolators are installed and fastened to the floor.
- 2. Shipping angles are removed.
- 3. Multi-section units are assembled.

NOTE: Some units require further assembly after part of the unit is mounted.

- 4. Support frame are constructed and attached for ceiling-mounted units.
- 5. Assembled units are mounted on isolators or ceiling supports.
- 6. Unit assembly is complete.
- 7. Mutli-section units are joined with flexible connection material.
- 8. Tension restraints are installed on high-pressure units.
- 9. Splash guards are installed where necessary.
- 10. Unit is fastened to isolators.
- 11. Unit is level.

ACCESSORIES

- 1. Bag filter section is installed.
- 2. Filters are installed.
- 3. Manometers, if necessary, are installed.
- 4. Exhaust Air Economizer is installed.
- 5. All accessories are installed.

FAN MOTOR ASSEMBLY

- 1. Shafts are properly installed in bearings.
- 2. Sheaves are properly located on shafts.
- 3. Shafts are level and parallel.
- 4. Sheaves are aligned.
- 5. Belt tension is correct.
- 6. Belt is at least 1/2-inch from unit flanges or structural supports.
- 7. **All sheave and bearing set screws are tightened to the correct torques.**
- 8. Belt guard is installed.

DAMPERS

- 1. Blow-Thru Multizone units — Drive rod assembly is adjusted.
- 2. Cold deck damper rods are insulated (if necessary).
- 3. Dampers are set for each zone.
- 4. Damper operators (furnished by the installer) are installed and adjusted.

INLET VANES

- 1. Vanes and rod assemblies move freely. Lubricate if necessary.
- 2. Operators and linkage (furnished by the installer) are installed and adjusted.

DUCTWORK

- 1. Intake and discharge connections are made with flexible connection.
- 2. Discharge ductwork is unchanged in size or direction for at least 1-1/2 fan diameters in length.
- 3. Adequate clearance is allowed between duct connections and dampers.

PIPING

- 1. Condensate drain lines are trapped, installed and connected to the coil drain pan.
- 2. Unused drain connections are plugged.
- 3. Spray section piping is complete for sprayed-coil units.
- 4. Provisions are made for properly draining and venting all coils.
- 5. Supply and return coil connections are made.
- 6. Supply and return piping is complete.

WIRING

- 1. Supply power is connected to fan motor.
- 2. Wiring direct to fan motor is flexible connection.
- 3. If terminal box is provided, field-wiring to terminal box is complete.
- 4. Supply power is connected to spray pump motor (sprayed-coil units only).
- 5. Fused disconnect switch is installed within sight of unit.
- 6. Motor overload protective devices are installed.

START-UP

WARNING: DISCONNECT ELECTRICAL POWER AND ALLOW ALL ROTATING PARTS TO STOP COMPLETELY BEFORE SERVICING OR INSPECTING THE UNIT. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH FROM ELECTRICAL SHOCK, ENTANGLEMENT IN MOVING PARTS OR PRESSURE DIFFERENTIAL WITHIN THE UNIT.

PREPARATION

Perform the following checks and inspections before operating the unit:

1. **With the system de-energized**, check that the electrical connections are complete and tight at the terminals.
2. Make sure the belt guard is in place.
3. Inspect the fan wheels. They should turn freely in the proper direction of rotation.
4. As mentioned previously in the Installation section, check the bearing and sheave setscrews for proper torque settings. Refer to applicable section in this manual.
5. Inspect fan belt tension and sheave setscrews. Belt tension, sheave alignment and setscrew torques for the motor assembly are given in this manual.
6. Check the piping and valves for leaks. Open or close the valves, depending on their function in the system. Drain lines should be open. If a refrigerant coil is used, the system must be evacuated, leak-tested with dry nitrogen, and charged with refrigerant.
7. Check that the air filters are in place and that all dampers are set properly.
8. Remove all foreign material from the drain pan. Check the drain pan and condensate line to make sure they are not obstructed.
9. All unit access panels must be in place. All screws, nuts and bolts must be tightened to their proper torques.
10. On high-pressure units, the coil piping hole gaskets must be installed properly.
11. If the unit includes fan paralleling control, open it fully.
12. Inspect fan motor and bearing lubrication.

CAUTION: To prevent fan motor or bearing failures, it is necessary that they are lubricated properly. This must be checked before the unit is started for the first time. See the label on the side of the unit, the tag attached to the motor and the Climate Changer Maintenance Manual.

START-UP PROCEDURES

After completing all the items under "Pre-Start-Up," the unit may be started and the following checks and adjustments performed:

NOTE: High Pressure units with self-locking collar fan bearings. During start-up check rotation of fan shaft to determine if fan motor is wired correctly. Incorrect rotation of fan may cause premature bearing and shaft failure.

1. Measure the motor voltage and amps on all phases to insure proper operation. Compare these readings with the motor nameplate.
2. If the unit includes a spray pump, open the spray pump air valve and purge air from the system. Adjust the spray pump valve until the spray pattern diameter equals the finned height of the top cooling coil. The resulting gauge pressure should be between 7 and 10 psig.
3. If the unit includes fan paralleling control (two-fan, blow-thru units only), adjustment may be required. An indication of an incorrect setting is paralleling of the fan (pulsating operation) and erratic fan motor amperage readings. Adjust the fan paralleling control until fan operation is smooth and the amperage reading is steady.

The fan paralleling control should be closed only far enough to eliminate erratic operation. Rarely should adjustment exceed two inches on either fan. If the devices are closed too far, unit capacity will be reduced.

Each fan paralleling control device has two rods per fan extending upward through the top of the blow-thru fan section. To adjust fan operation for a smooth airflow condition, the following should be done:

- a. Loosen the locking nut on one rod, lower the rod 1/2-inch and retighten. Repeat for the other rod on the fan.
 - b. If the unstable condition still exists, repeat Step A.
 - c. If the unstable condition still exists, relocate the fan paralleling control to the original position and perform Steps A and B on the other fan.
 - d. If the unstable condition still exists, lower both fan paralleling devices to 1-inch from the original position. Repeat Steps A, B, and C, using 1-inch as a base reference.
4. Measure voltage at all three wires. Maximum allowable voltage imbalance is two percent. Voltage imbalance is defined as 100 times the sum of the deviation of the three voltages from the average, divided by twice the average voltage. For example, if the three measured voltages are 221, 230 and 227, the average voltage would be 226 volts. The percent of voltage imbalance is then calculated:

$$\frac{100 \times \{ [226-221] + [230-226] + [227-226] \}}{2 \times 226} = 2.2\% \text{ (Unacceptable)}$$

In this example, 2.2 percent imbalance is not acceptable and the power company should be notified to correct it.

5. If the fan speed is changed more than 5% from the original designed rpm, or if parts such as shafts, fan wheels,

bearings, or other drive components are replaced, the unit vibration should be checked.

The unit vibration, measured horizontally and vertically directly on the fan shaft bearing (perpendicular to the shaft centerline), should not exceed 0.2 in/sec. or 3.0 mils, whichever is the lower displacement at the unit operating speed.

SHEAVE ALIGNMENT

To prevent interference of the fan frame with the belt, make sure that the belt edge closest to the motor has the proper clearance from the fan frame, as shown in Figure 52.

Align the fan and motor sheaves by using a straightedge as shown in Figure 53. The straightedge must be long enough to span the distance between the outside edges of the sheaves. When the sheaves are aligned, the straightedge will touch both sheaves at points A through D. A string, drawn tight, may be used in the same manner. For uneven width sheaves, place a string in the center groove of both sheaves and pull tight. Adjust sheaves and tighten the sheave setscrews to the proper torques, given in Table 4.

Parallel operation of the fan and motor shafts is necessary to prolong belt life. Place a level on the shafts to check horizontal alignment. Shim if necessary.

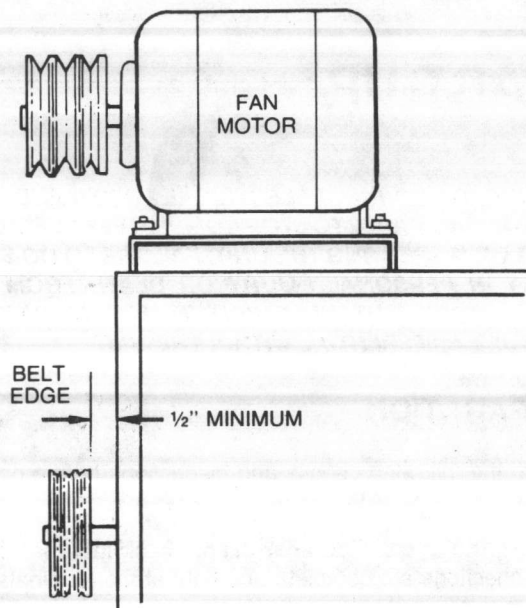


Figure 52 - Minimum Allowable Distance Between Frame Work and Fan Sheave.

FAN ASSEMBLY SETSCREWS

Check and adjust fan wheel, bearing and sheave setscrews whenever a component is removed or an adjustment is made. Refer to Table 4 for recommended Torques.

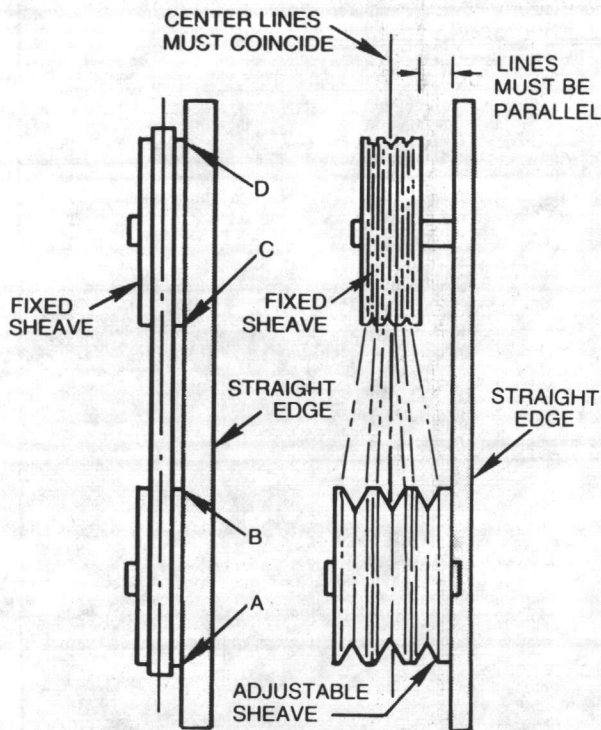


Figure 53 - Sheave Alignment

FAN WHEEL CLAMPS

The clamps that hold the fan hub on the shaft must be properly positioned and tightened to ensure safe fan operation.

NOTE: On fans that are 20 inches or smaller, the clamps should be replaced whenever the wheel or shaft is replaced.

On fans that are 20 inches or smaller, locate the two-piece clamp over the hub so that the hub tabs go through the clamp slots. Finger-tighten the two bolts evenly, then torque down both bolts **evenly** in small increments to 25 foot-pounds. The clamp flanges should meet at both bolt locations before 25 foot-pounds is reached.

On fans that are larger than 20 inches, finger-tighten the three bolts evenly, then torque down all three bolts **evenly**, in small increments, to 35 to 40 foot-pounds. Visually check the spacing between the three clamp flanges to make sure they are consistently tightened.

FAN BELT TENSION

NOTE: Fan belt tension should be checked at least twice during the first days of operation, since there is a rapid decrease in tension until belts are run in.

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Proper belt tension is required to ensure maximum bearing and drive component life and is based on fan brake horsepower requirement. Use Chart 1 to find the proper tension and refer to the inset for an example. To use the chart, you must know:

1. Fan design bhp per belt (not motor hp)
2. Fan rpm
3. Fan sheave pitch diameter (Figure 54 - found by measuring where the middle of the belt rides in the sheave).
4. Type of belt cross-section (stamped on the belt)

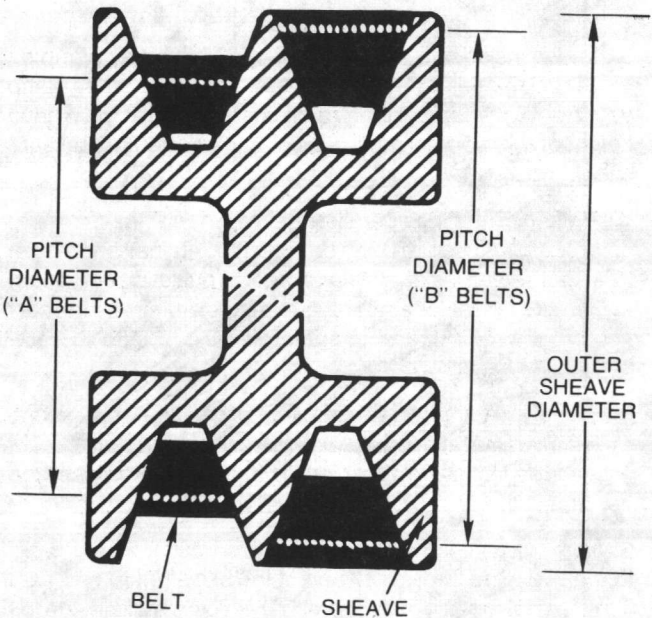


Figure 54 - Fan Sheave Pitch Diameter

As shown in the example of Chart 1, the correction tension (pounds force) is 9.6 pounds, at 1/2-inch deflection. Deflection is determined by dividing the belt span distance by 64, as shown in Figure 55.

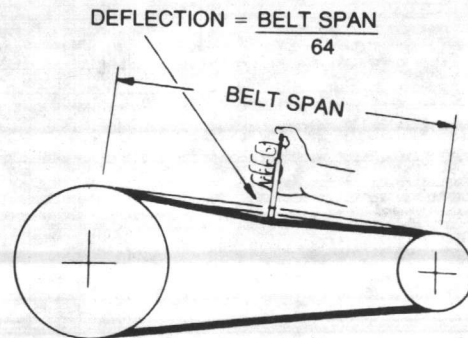


Figure 55 - Belt Tension Measurement

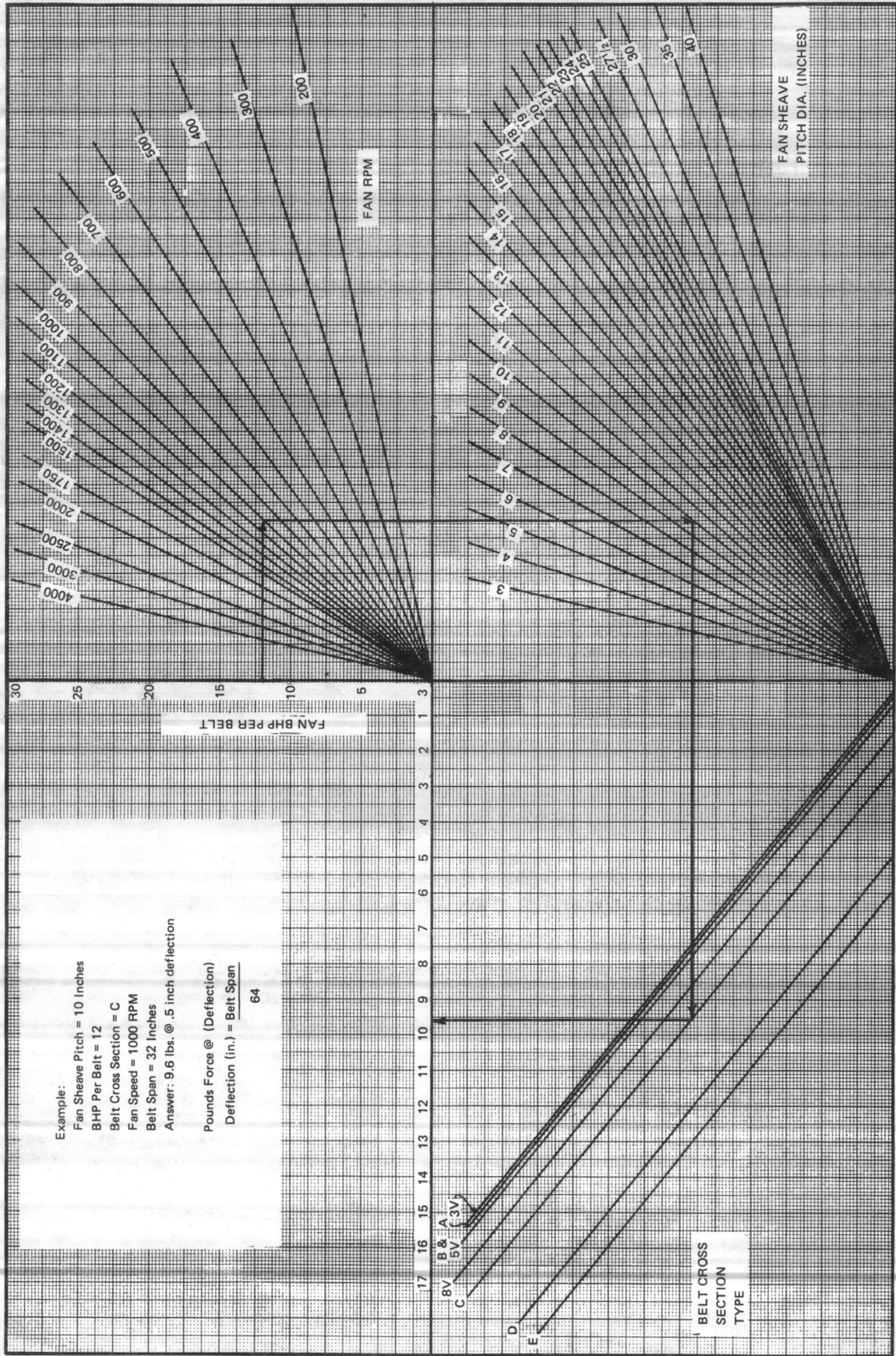
Table 14 — Values for K Factor (Belt Cross-Section Types)

BELT TYPE	A	B	C	D	E	3L	4L	SL	3V	5V	6V	AX	BX	CX	DX
"K" FACTOR	8	13	40	80	95	6	6	6	6	12	25	11	18	54	101

CHART 1 - Belt Tension

Example:
 Fan Sheave Pitch = 10 Inches
 BHP Per Belt = 12
 Belt Cross Section = C
 Fan Speed = 1000 RPM
 Belt Span = 32 Inches
 Answer: 9.6 lbs. @ .5 inch deflection

Pounds Force @ (Deflection)
 Deflection (in.) = $\frac{\text{Belt Span}}{64}$



To measure belt tension, use a belt tensioner as shown in Figure 56. Determine actual deflection by depressing one belt with the belt tensioner and measuring the deflection relative to the other belts or to belt line. Adjust the belt tension to the correct pounds force and tighten all setscrews to the proper torques.

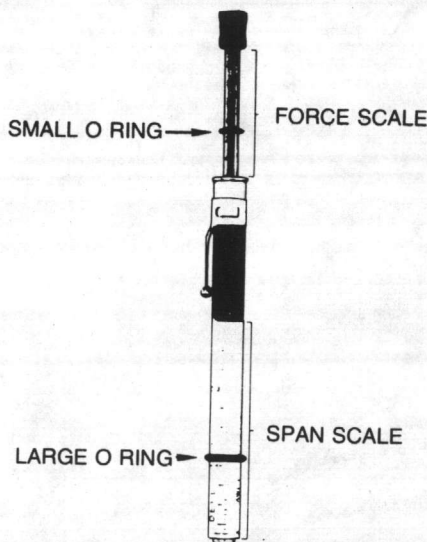


Figure 56 - Belt Tensioner

For belt cross-section types not given in Chart 1, refer to Table 14 and use the following equations to calculate correct belt tension:

$$F = \frac{T + K}{16}$$

where F = force measured in pounds at specific deflection

K = constant determined by belt cross-section type (See Table 14).

$$T = 24,750 \times \frac{(\text{fan hp per belt})}{(\text{belt speed})}$$

$$\text{Belt speed} = \frac{(\text{fan pitch diameter})}{12} \times (\pi) \times \text{fan rpm (ft/min)}$$

For example, given the following:

Motor sheave pitch diameter: 16.8 inches, eight groove
 Fan sheave pitch diameter: 19.8 inches, eight groove
 Fan horsepower: 262.4 bhp
 Fan rpm: 983 rpm
 Belt type: 8V
 Sheave span: 60.9 inches

$$\text{Belt speed} = \frac{19.8}{12} \times 3.14 \times 983 = 5092$$

$$T = 24,750 \times \frac{(262.4 \text{ bhp}/8 \text{ belts})}{5092} = \frac{24,750 \times 32.8}{5092} = 159.4 \text{ lbs}$$

$$F = \frac{159.4 + 25}{16} = 11.5 \text{ lbs}$$

$$\text{Also, } D = \frac{\text{Belt span (inches)}}{64} = \frac{60.9}{64} = .95 =$$

approximately 15/16 inches

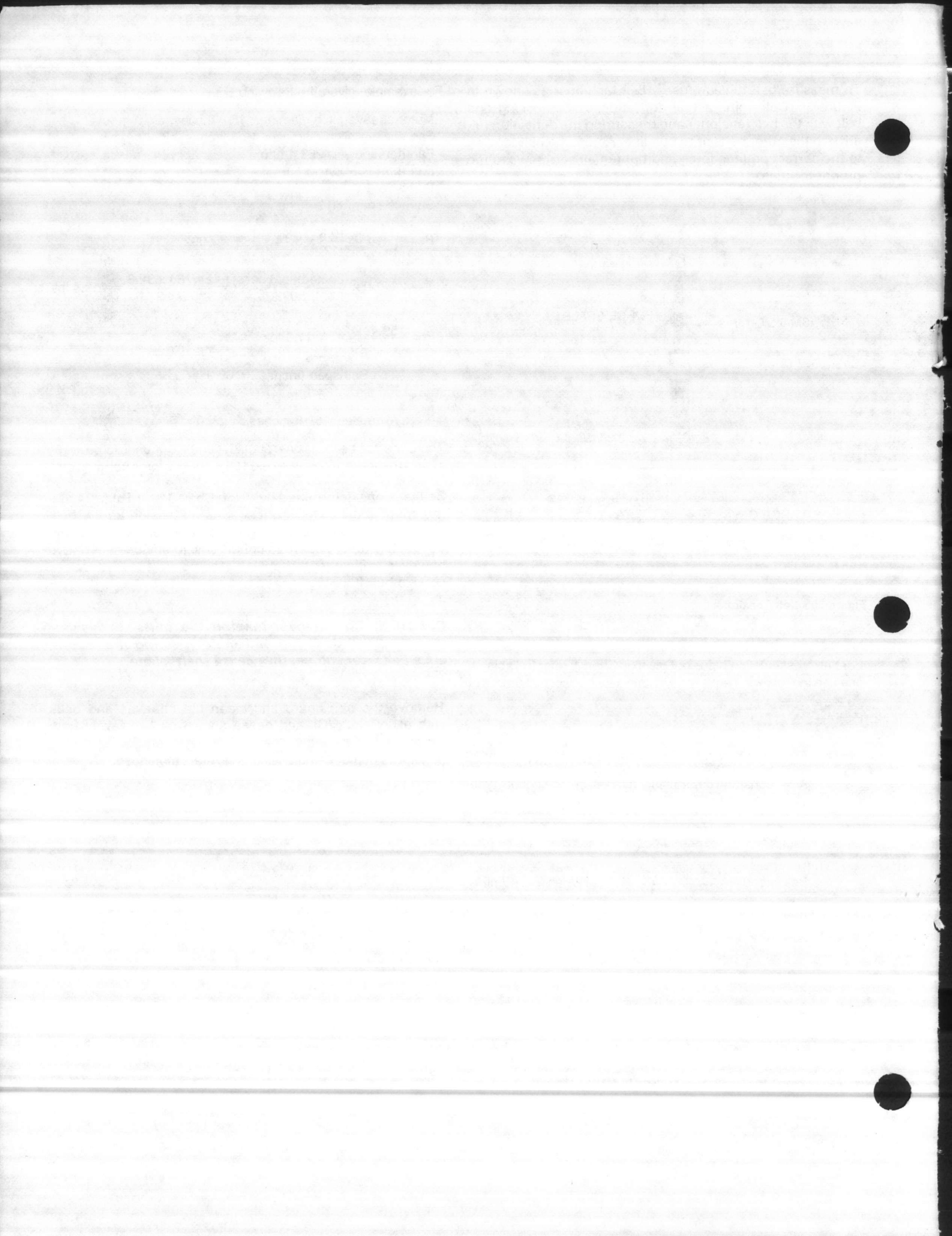
Therefore, the belt tensioner should read 11.5 pounds force at 15/16-inch deflection. This will yield 159.4 pounds force belt tension.

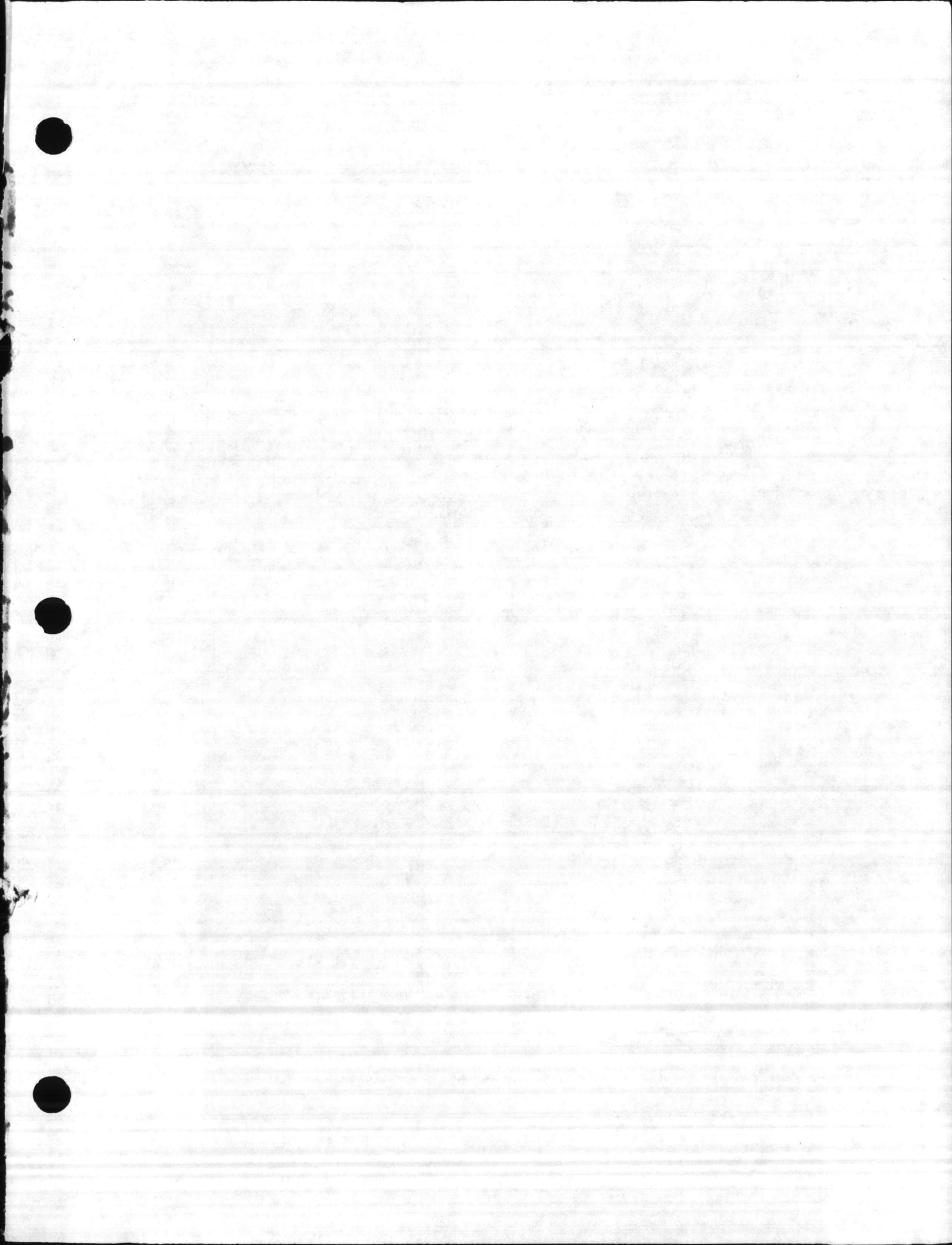
Belt tensions determined by using Chart 1 and Table 14 are minimum values. The correct operating tension for a V-belt drive is the lowest tension at which the belts will not slip under start-up or peak load conditions. It may be necessary, however, to increase the tension of some drives to reduce excessive belt flopping.

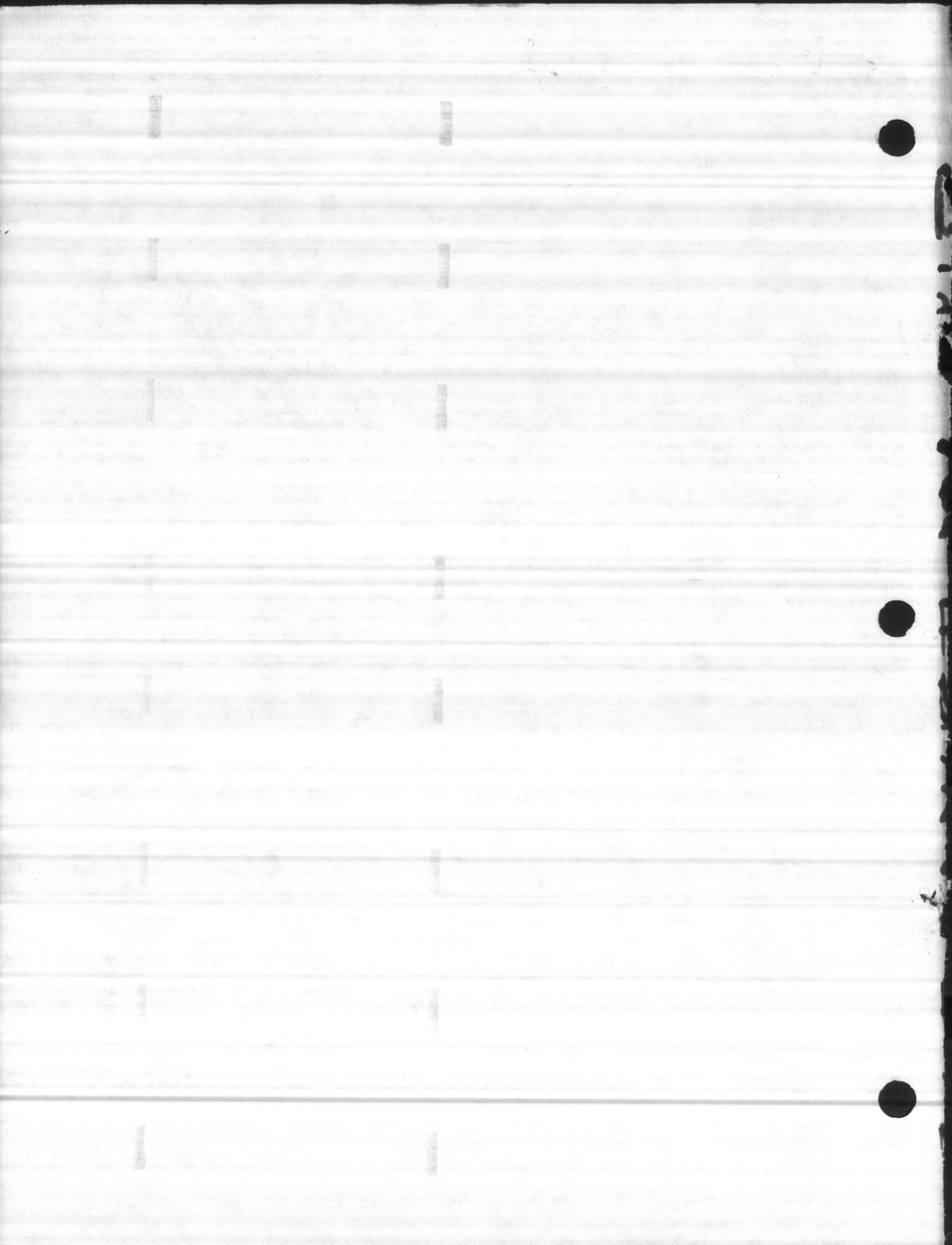
CAUTION: Do not over-tension the belts. Excessive tension will reduce fan and motor bearing life, accelerate belt wear and possibly cause shaft failure.

Remove the belt guard and clean the sheaves and belts with a dry cloth. Oil and gease should be kept away from the belts because they can cause deterioration and slippage. The use of belt dressing is **not** recommended.

For further information on this product or other Trane products, refer to the "Trane Service Literature Catalog", ordering number IDX-IOM-1. This catalog contains listings and prices for all service literature sold by Trane. The catalog may be ordered by sending a \$20.00 check to: The Trane Company, Service Literature Sales, 3600 Pammel Creek Road, La Crosse, WI 54601.









TRANE™

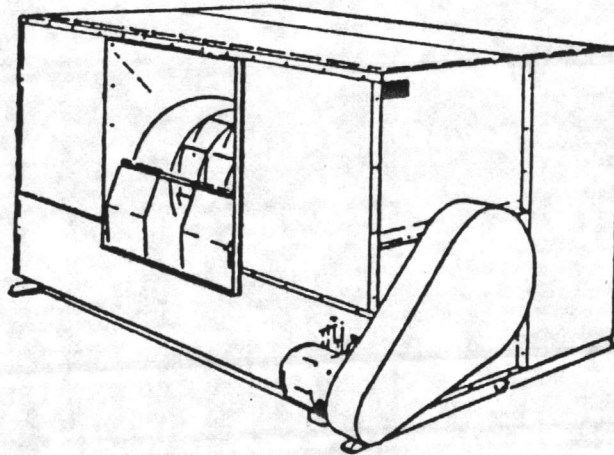
Cust: C & S Mech.
Attn: Ray Cully
Job: Renov to Bldg 420 #42

Unit Parts

CLCH-UP-11D

Library	Service Literature
Product Section	Air Handling
Product	Central Station AH-Climate Changer
Model	CLCH
Literature Type	Unit Parts
Sequence	11D
Date	October, 1988
File No.	SV-AH-CLCH-UP-11D-1088
Supersedes	CLCH-UP-11C-188

Central Station Climate Changers® Draw Thru



Literature Changes

Updated Bearings in
Fan Assembly-Section 1
Also added H & J
Design Sequences-No
Effect To Parts List

Models

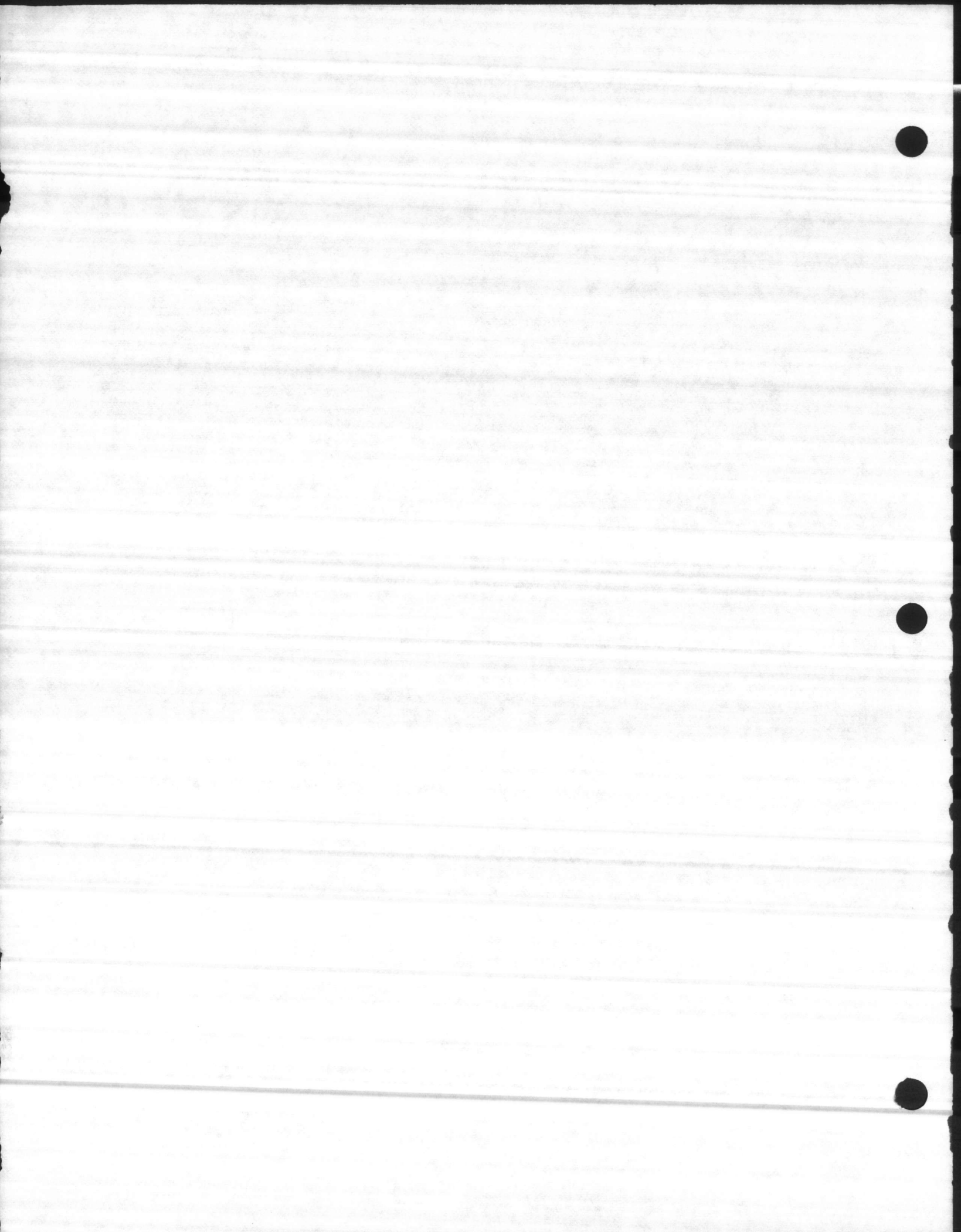
CCDB-003 thru 063

"C,D,E,F,G,H & J" Design Sequences

This parts list is designed for ease of parts selection. Wherever possible, the parts list allows parts selection without the use of the Trane model number. Parts may be selected from the illustrations and/or tables from the parts index located at the back of the parts list.

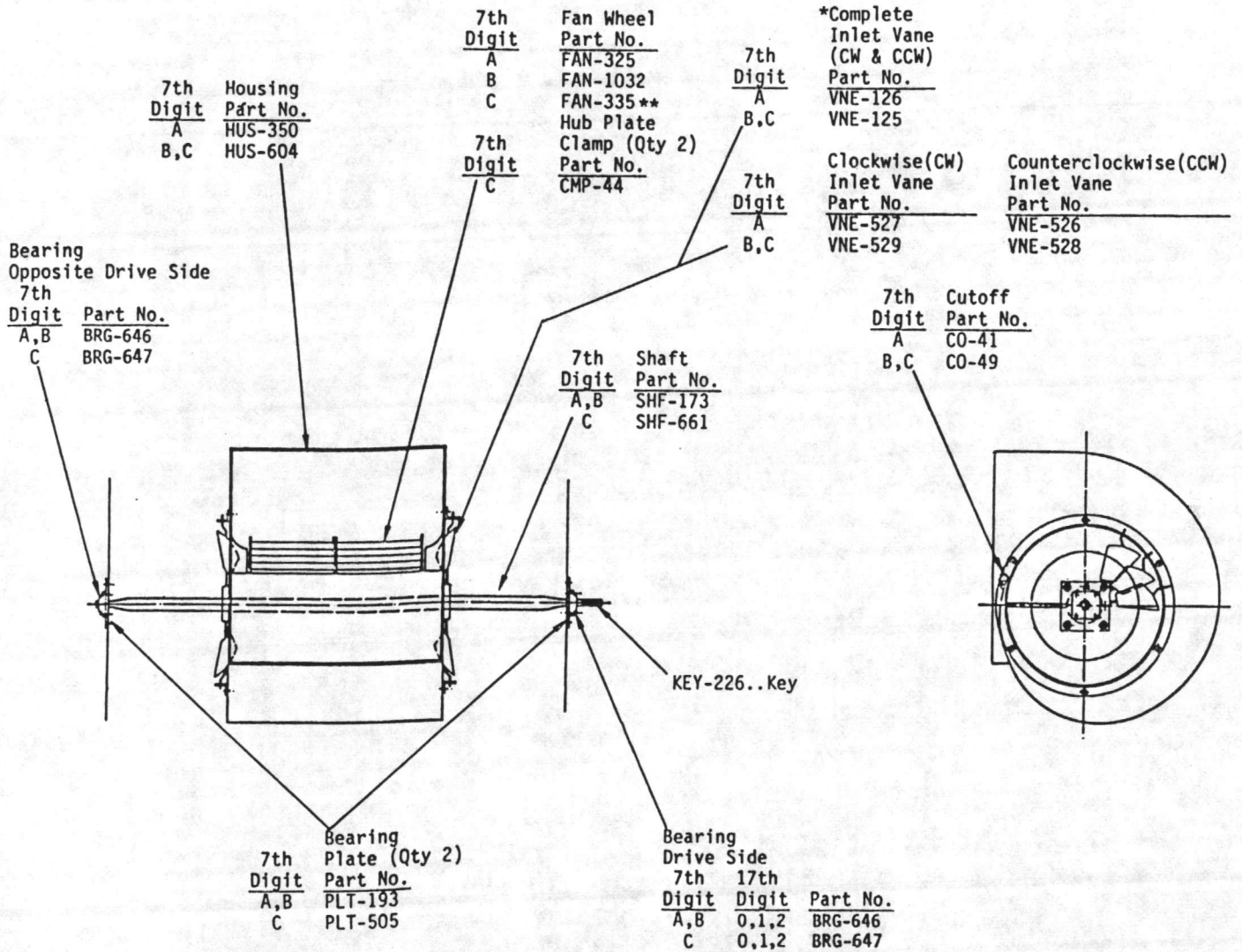
Contact your local Trane parts distributor for assistance or identification of any parts not identified in this parts list.

Since The Trane Company has a policy of continuous product improvement and parts standardization, it reserves the right to change specifications and design without notice. This parts list identifies known standardized parts and other parts changed by standardization. The installation and servicing of this equipment should be done by qualified, experienced technicians.



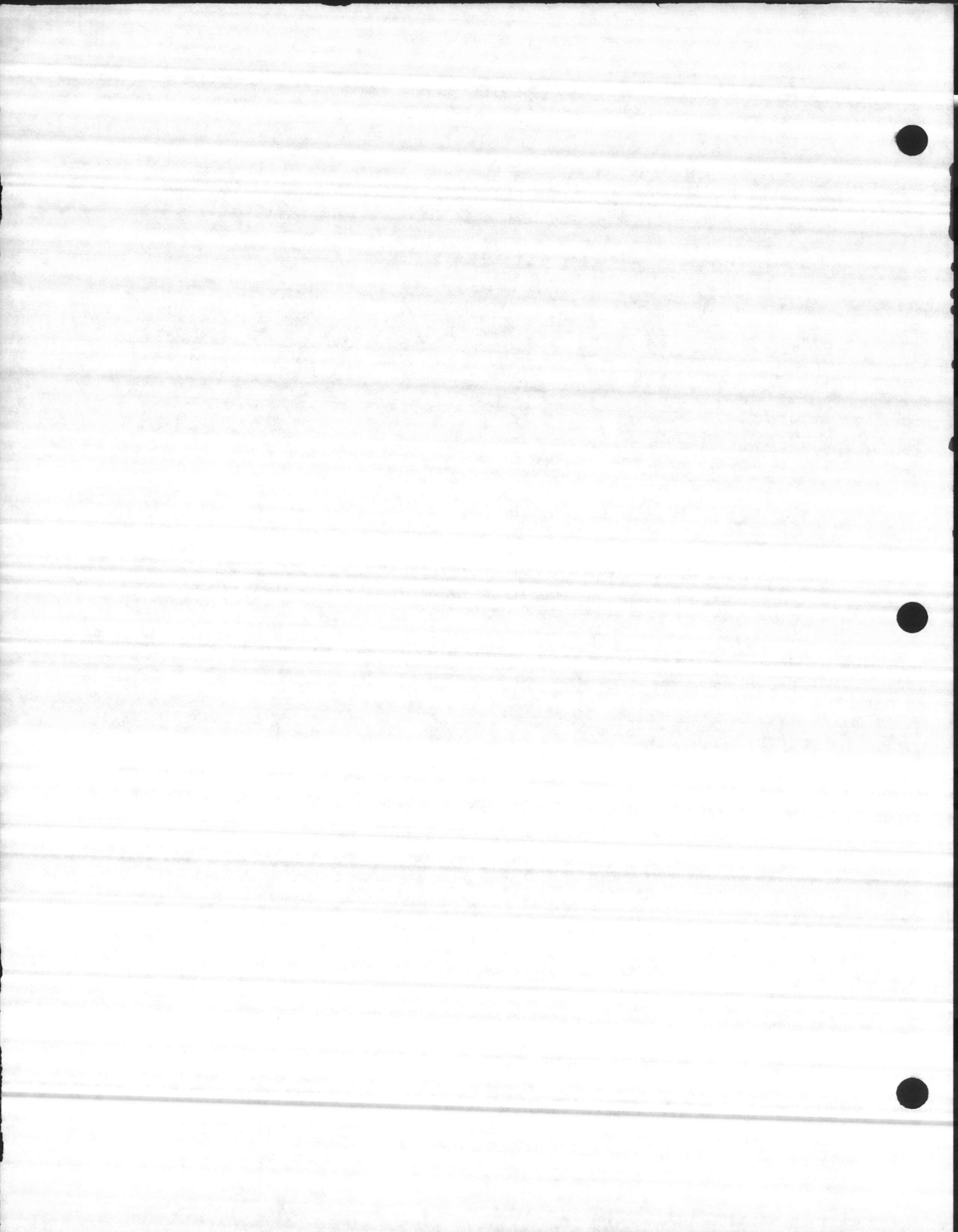
Fan Assembly Unit Size 06

(Illustration shown includes Inlet Vanes)



*Use only with a "1" in the 13th Digit Place.
This is a Complete Vane Assy and includes both Clockwise and Counterclockwise Vane and Cone.
If a Clockwise (CW) OR Counterclockwise (CCW) ONLY is required see selection on this page.
For Component Parts see Section 1A.

**Hub Plate Clamps are required and ship with FAN-335.



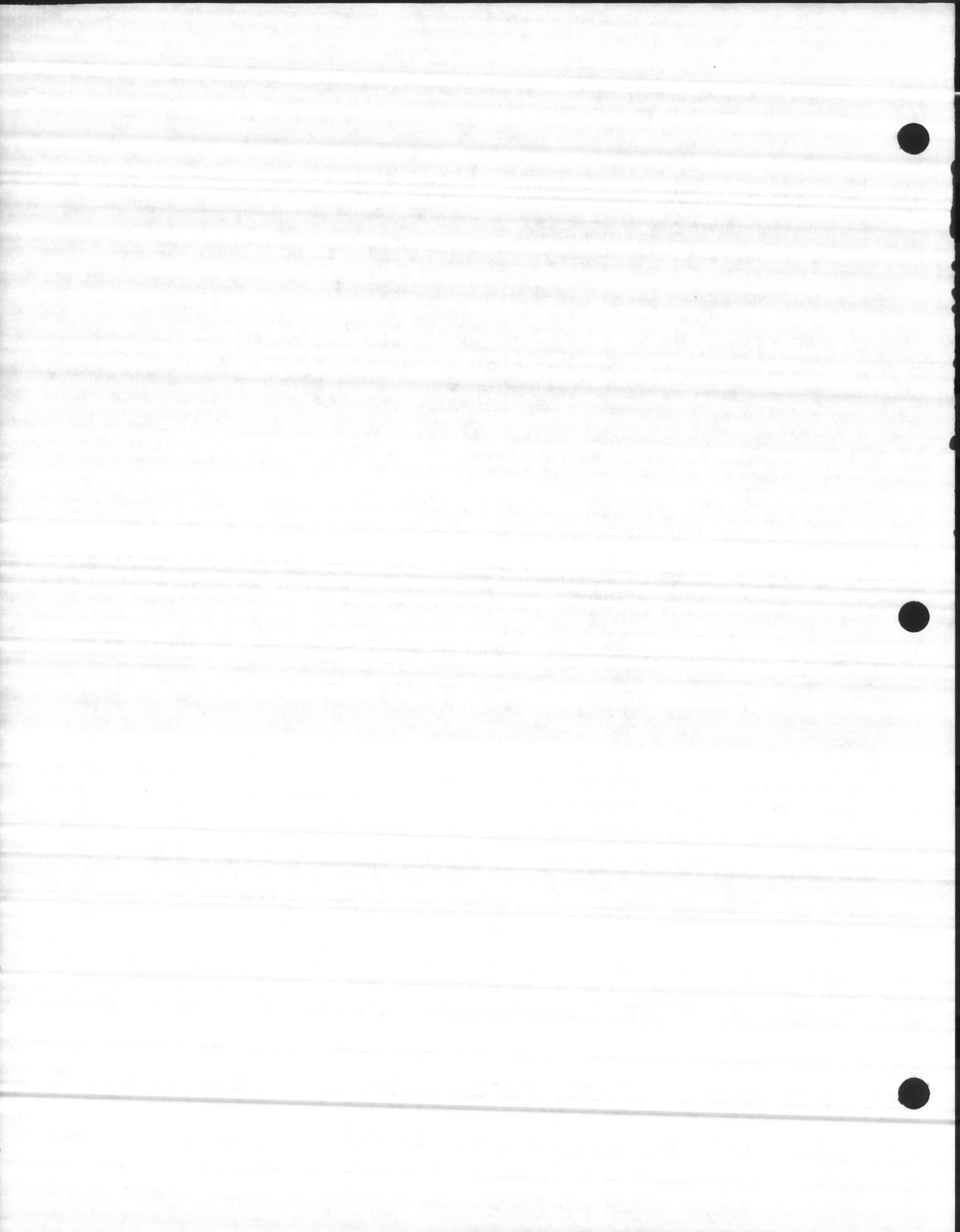
Section 8 - Filters for Flat Filter Box

Use the 5th & 6th Digit Place of the Model Number to determine UNIT SIZE.
 Use the 22nd Digit Place of the Model Number to select FILTER.

22nd Digit Place	Filter Part No.	Unit Size & Quantity Required																
		03	06	07	08	09	10	12	14	17	21	25	31	35	41	50	63	
B	FLR-63	1	2						2									12
C	FLR-115	1	2						2									12
D	FLR-358	1	2						2									12
B	FLR-40			1	4			1	4	6	8	12	7		6	7		
C	FLR-369			1	4			1	4	6	8	12	7		6	7		
D	FLR-355			1	4			1	4	6	8	12	7		6	7		
B	FLR-39							4	2	2	2		7	14		14	10	
C	ELN-23							4	2	2	2		7	14		14	10	
D	FLR-356							4	2	2	2		7	14		14	10	
B	FLR-99			2		4			2						12			
C	FLR-250			2		4			2						12			
D	FLR-357			2		4			2						12			

Description of Filters

FLR-63...Filter, 25 x 20 x 2, Throwaway
 FLR-115..Filter, 25 x 20 x 2, Low Velocity
 FLR-358..Filter, 25 x 20 x 2, High Velocity
 FLR-40...Filter, 20 x 16 x 2, Throwaway
 FLR-369..Filter, 20 x 16 x 2, Low Velocity
 FLR-355..Filter, 20 x 16 x 2, High Velocity
 FLR-39...Filter, 25 x 16 x 2, Throwaway
 ELN-23...Filter, 25 x 16 x 2, Low Velocity
 FLR-356..Filter, 25 x 16 x 2, High Velocity
 FLR-99...Filter, 20 x 20 x 2, Throwaway
 FLR-250..Filter, 20 x 20 x 2, Low Velocity
 FLR-357..Filter, 20 x 20 x 2, High Velocity



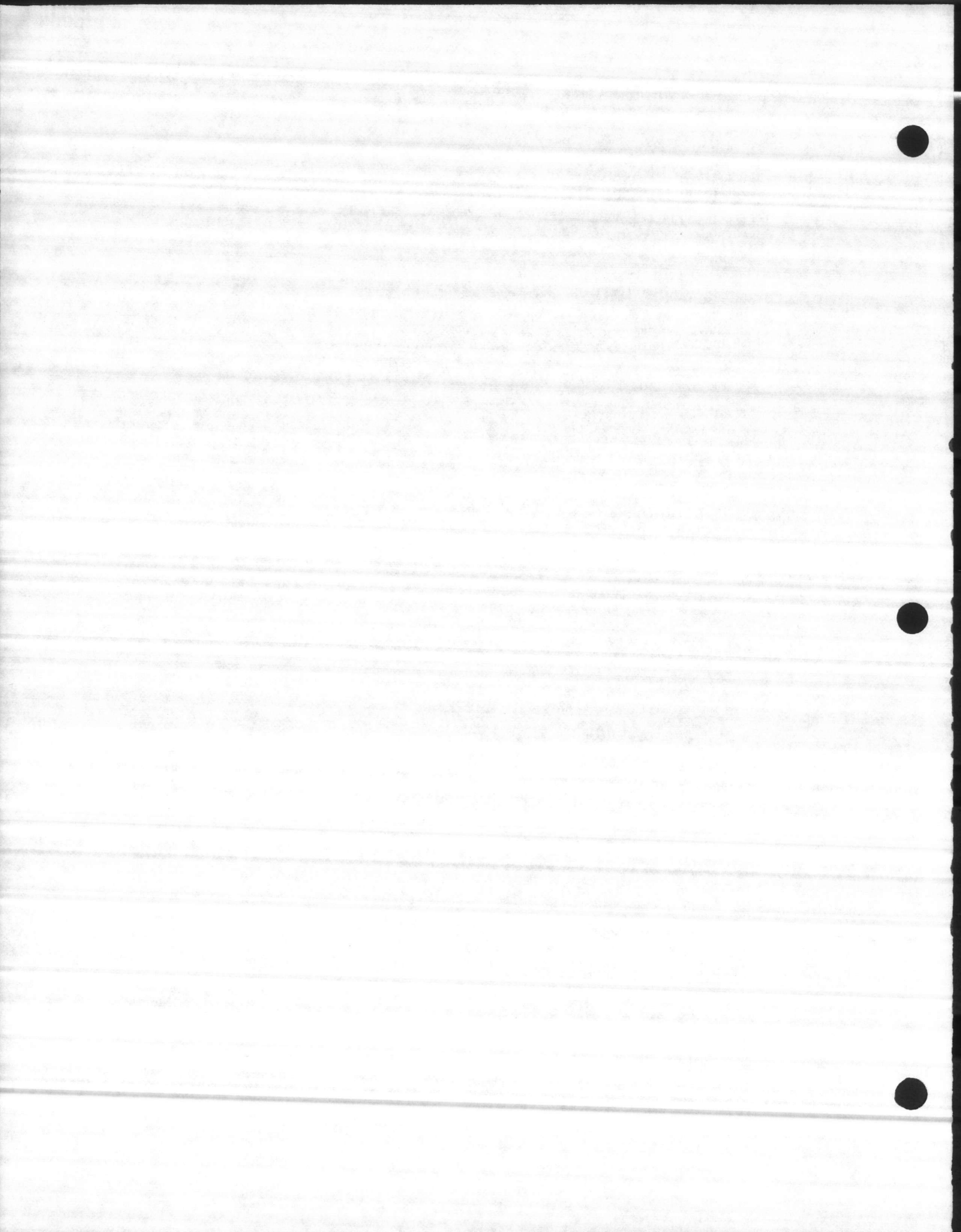
Parts Index

THIS IS A LISTING OF THE PART NUMBERS CONTAINED IN THE PARTS LIST AND IS IN ALPHA-NUMERIC ORDER TO MAKE PARTS IDENTIFICATION EASIER. THIS INDEX PROVIDES PART NUMBER, DESCRIPTION OF THE PART, SECTION OF THE PARTS LIST THE PART IS LOCATED IN, QUANTITY AND WHETHER THE PART IS RECOMMENDED FOR LOCAL STOCK.

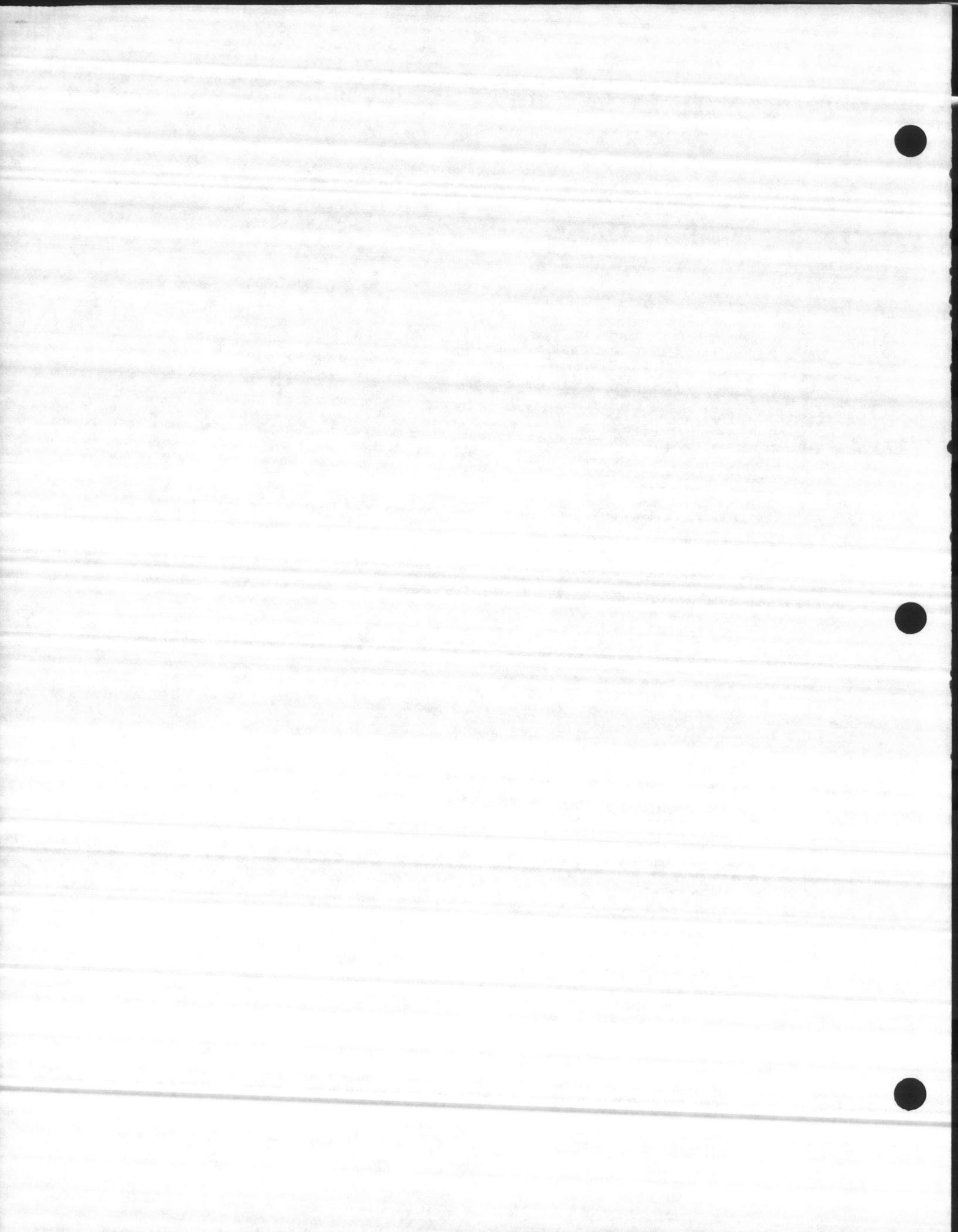
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
ARM-20	ARM, 2 1/4 X 3/4 (MIXING BOX SECTIONS)		AR	
ARM-58	ARM-CRANK, .380 DIA., FACTORY MTD. CONTROLS	14	1	
ARM-100	ARM-CRANK, .432 DIA., FACTORY MTD. CONTROLS	14	1	
BAL-15	BALL, 5/16" DIA, INLET VANE ASSEMBLY	1A	AR	
BAL-34	BALL JOINT, INLET VANE ASSEMBLY	1A	4	
BAL-46	BALL-INLET VANE ASSEMBLY, CLOCKWISE	1A	11	+
BAL-47	BALL-INLET VANE ASSEMBLY, COUNTER CLOCKWISE	1A	11	
BLD-188	BLADE, 8 1/32 X 29 1/32 (DAMPER SECTIONS)		AR	
BLD-191	BLADE, 29 1/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-193	BLADE, 50 1/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-194	BLADE, 39 13/32 X 9 3/32 (DAMPER SECTIONS)		AR	
BLD-197	BLADE, 50 1/32 X 9 3/32 (DAMPER SECTIONS)		AR	
BLD-200	BLADE, 54 13/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-201	BLADE, 54 13/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-202	BLADE, 64 13/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-203	BLADE, 64 13/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-204	BLADE, 84 13/32 X 9 3/32 (DAMPER SECTIONS)		AR	
BLD-206	BLADE, 50 27/32 X 9 3/32 (DAMPER SECTIONS)		AR	
BLD-207	BLADE, 50 27/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-208	BLADE, 53 27/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-209	BLADE, 53 27/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-210	BLADE, 53 27/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-211	BLADE, 53 27/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-212	BLADE, 55 11/32 X 9 3/32 (DAMPER SECTIONS)		AR	
BLD-213	BLADE, 55 11/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-214	BLADE, 55 11/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-215	BLADE, 6 3/16 X 7/8 (DAMPER SECTIONS)		AR	
BLD-216	BLADE, 6 3/16 X 50 1/32 (DAMPER SECTIONS)		AR	
BLD-219	BLADE, 39 13/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-220	BLADE, 54 13/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-221	BLADE, 64 13/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-222	BLADE, 84 13/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-223	BLADE, 50 27/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-224	BLADE, 53 27/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-226	BLADE, 79 5/32 X 8 1/32 (DAMPER SECTIONS)		AR	
BLD-228	BLADE, 79 5/32 X 6 3/16 (DAMPER SECTIONS)		AR	
BLD-229	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 06	5	AR	
BLD-230	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 07/12	5	AR	
BLD-231	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 08	5	AR	
BLD-232	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 09	5	AR	
BLD-233	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 10	5	AR	
BLD-234	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 14	5	AR	
BLD-235	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 17	5	AR	
BLD-236	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 21	5	AR	
BLD-237	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 25	5	AR	
BLD-238	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 31	5	AR	
BLD-239	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 03	5	AR	
BLD-240	BLADE-DELUXE COMB. FILTER BOX, UNIT SIZE 35	5	AR	
BLD-339	BLADE-COUNTER CLOCKWISE FOR VNE-128	1B	6	
BLD-340	BLADE-COUNTER CLOCKWISE FOR VNE-128	1B	3	
BLD-341	BLADE-CLOCKWISE FOR VNE-128	1B	6	
BLD-342	BLADE-CLOCKWISE FOR VNE-128	1B	3	
BLD-351	BLADE-CLOCKWISE FOR VNE-155	1B	6	
BLD-352	BLADE-CLOCKWISE FOR VNE-155	1B	3	
BLD-353	BLADE-COUNTER CLOCKWISE FOR VNE-155	1B	6	
BLD-354	BLADE-COUNTER CLOCKWISE FOR VNE-155	1B	3	
BLD-355	BLADE-COUNTER CLOCKWISE FOR VNE-142	1B	6	
BLD-356	BLADE-COUNTER CLOCKWISE FOR VNE-142	1B	3	
BLD-357	BLADE-CLOCKWISE FOR VNE-142	1B	6	
BLD-358	BLADE-CLOCKWISE FOR VNE-142	1B	3	
BLD-378	BLADE, 39 13/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-379	BLADE, 50 1/32 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-380	BLADE, 50 27/32 X 9 3/32 (DAMPER SECTIONS)		AR	
BLD-381	BLADE, 42 1/16 X 10 3/16 (DAMPER SECTIONS)		AR	
BLD-463	BLADE-COUNTER CLOCKWISE FOR VNE-131,136	1B	6	
BLD-464	BLADE-COUNTER CLOCKWISE FOR VNE-131,136	1B	3	
BLD-465	BLADE-CLOCKWISE FOR VNE-131,136	1B	6	
BLD-466	BLADE-CLOCKWISE FOR VNE-131,136	1B	3	
BLD-467	BLADE-COUNTER CLOCKWISE FOR VNE-139	1B	6	



PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
BLD-468	BLADE-COUNTER CLOCKWISE FOR VNE-139			
BLD-469	BLADE-CLOCKWISE FOR VNE-139	1B	3	
BLD-470	BLADE-CLOCKWISE FOR VNE-139	1B	6	
BLD-471	BLADE-CLOCKWISE FOR VNE-143	1B	3	
BLD-472	BLADE-CLOCKWISE FOR VNE-143	1B	6	
BLD-473	BLADE-COUNTER CLOCKWISE FOR VNE-143	1B	3	
BLD-474	BLADE-COUNTER CLOCKWISE FOR VNE-143	1B	6	
BLD-475	BLADE-COUNTER CLOCKWISE FOR VNE-129,133,141	1B	3	
BLD-476	BLADE-COUNTER CLOCKWISE FOR VNE-129,133,141	1B	6	
BLD-477	BLADE-CLOCKWISE FOR VNE-129,133,141	1B	3	
BLD-478	BLADE-CLOCKWISE FOR VNE-129,133,141	1B	6	
BLD-483	BLADE-COUNTER CLOCKWISE FOR VNE-330,332	1B	3	
BLD-484	BLADE-CLOCKWISE FOR VNE-330,332	1B	11	
BLD-520	BLADE-COUNTER CLOCKWISE FOR VNE-126	1B	11	
BLD-521	BLADE-COUNTER CLOCKWISE FOR VNE-126	1B	4	
BLD-522	BLADE-CLOCKWISE FOR VNE-126	1B	3	
BLD-523	BLADE-CLOCKWISE FOR VNE-126	1B	4	
BLD-524	BLADE-COUNTER CLOCKWISE FOR VNE-127,130	1B	3	
BLD-525	BLADE-COUNTER CLOCKWISE FOR VNE-127,130	1B	6	
BLD-526	BLADE-CLOCKWISE FOR VNE-127,130	1B	3	
BLD-527	BLADE-CLOCKWISE FOR VNE-127,130	1B	6	
BLD-528	BLADE-COUNTER CLOCKWISE FOR VNE-132,134	1B	3	
BLD-529	BLADE-COUNTER CLOCKWISE FOR VNE-132,134	1B	6	
BLD-530	BLADE-CLOCKWISE FOR VNE-132,134	1B	3	
BLD-531	BLADE-CLOCKWISE FOR VNE-132,134	1B	6	
BLD-532	BLADE-CLOCKWISE FOR VNE-331,333	1B	3	
BLD-533	BLADE-COUNTER CLOCKWISE FOR VNE-331,333	1B	11	
BLD-534	BLADE-CLOCKWISE FOR VNE-125	1B	11	
BLD-535	BLADE-CLOCKWISE FOR VNE-125	1B	4	
BLD-536	BLADE-COUNTER CLOCKWISE FOR VNE-125	1B	3	
BLD-537	BLADE-COUNTER CLOCKWISE FOR VNE-125	1B	4	
BLD-538	BLADE-CLOCKWISE FOR VNE-138	1B	3	
BLD-539	BLADE-CLOCKWISE FOR VNE-138	1B	6	
BLD-540	BLADE-COUNTER CLOCKWISE FOR VNE-138	1B	3	
BLD-541	BLADE-COUNTER CLOCKWISE FOR VNE-138	1B	6	
BLD-542	BLADE-CLOCKWISE FOR VNE-137	1B	3	
BLD-543	BLADE-CLOCKWISE FOR VNE-137	1B	6	
BLD-544	BLADE-COUNTER CLOCKWISE FOR VNE-137	1B	3	
BLD-545	BLADE-COUNTER CLOCKWISE FOR VNE-137	1B	6	
BLD-546	BLADE-CLOCKWISE FOR VNE-135	1B	3	
BLD-547	BLADE-CLOCKWISE FOR VNE-135	1B	6	
BLD-548	BLADE-COUNTER CLOCKWISE FOR VNE-135	1B	3	
BLD-549	BLADE-COUNTER CLOCKWISE FOR VNE-135	1B	6	
BLD-550	BLADE-CLOCKWISE FOR VNE-92,93,104,106	1B	3	
BLD-551	BLADE-COUNTER CLOCKWISE FOR VNE-92,93,104,106	1A	11	
BLD-552	BLADE-CLOCKWISE FOR VNE-95,96,107,107,111,112	1A	11	
BLD-553	BLADE-COUNTER CLOCKWISE FOR VNE-95,96,107,108 VNE-111,112	1A	11	
BLD-554	BLADE-CLOCKWISE FOR VNE-98,99,113,114,117,118	1A	11	
BLD-555	BLADE-COUNTER CLOCKWISE FOR VNE-98,99,113,114 VNE-117,118	1A	11	
BLD-556	BLADE-CLOCKWISE FOR VNE-101,102,119,120, VNE-123,124	1A	11	
BLD-557	BLADE-COUNTER CLOCKWISE FOR VNE-101,102,119, VNE-120,123,124	1A	11	
BLK-56	BLOCK, 30A/600V, 2 POLE, CONTROL PANEL	1A	11	
BLK-71	BLOCK, 30A/600V, 3 POLE, CONTROL PANEL	12	AR	
BLK-73	BLOCK, 60A/600V, 3 POLE, CONTROL PANEL	12	AR	
BLK-76	BLOCK, 60A/250V, 3 POLE, CONTROL PANEL	12	AR	
BLK-83	BLOCK, 30A/250V, 3 POLE, CONTROL PANEL	12	AR	
BLK-97	BLOCK, 60A/250V, 2 POLE, CONTROL PANEL	12	AR	
BLK-121	BLOCK, 4 POLE TERMINAL, HEATER ASSEMBLY	12	AR	
BLK-122	BLOCK, 5 POLE TERMINAL, HEATER ASSEMBLY	13	AR	
BLK-117	BLOCK, 30A/250V, 2 POLE, CONTROL PANEL	13	AR	
BLK-118	BLOCK, 60A/600V, 2 POLE, CONTROL PANEL	12	AR	
BLK-119	BLOCK, 48A/600V, 4 POLE, CONTROL PANEL	12	AR	
BLK-120	BLOCK, 48A/600V, 5 POLE, CONTROL PANEL	12	AR	
BLK-126	BLOCK, 380A/600V, 3 POLE, CONTROL PANEL	12	AR	
BLK-127	BLOCK, 900A/600V, 1 POLE, CONTROL PANEL	12	AR	
BLK-128	BLOCK, 760A/600V, 3 POLE, CONTROL PANEL	12	AR	
BLK-148	BLOCK, 30A/300V, 4 POLE, CONTROL PANEL	12	AR	
BLK-161	BLOCK, 350A/600V, 3 POLE, CONTROL PANEL	12	AR	
BOD-72	BODY-VALVE FOR VAL-2545	12	AR	
BOD-73	BODY-VALVE FOR VAL-2546	15	1	
BOD-74	BODY-VALVE FOR VAL-2547	15	1	
BOD-75	BODY-VALVE FOR VAL-2548	15	1	
BOD-76	BODY-VALVE FOR VAL-2549	15	1	
BOD-77	BODY-VALVE FOR VAL-2550	15	1	
BOD-78	BODY-VALVE FOR VAL-2551	15	1	
BOD-79	BODY-VALVE FOR VAL-2552	15	1	



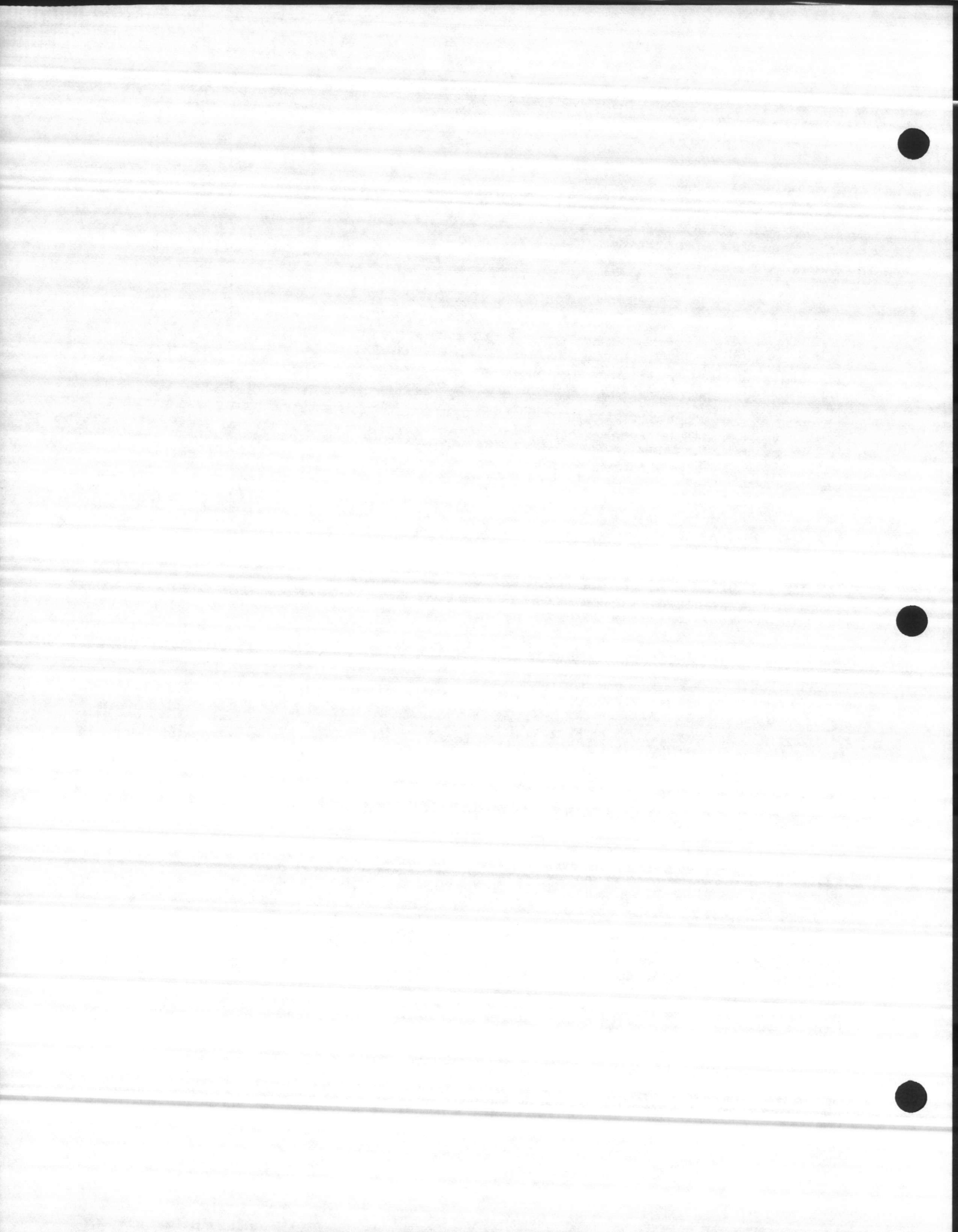
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
BOD-80	BODY-VALVE FOR VAL-2553	15	1	
BOD-81	BODY-VALVE FOR VAL-2554	15	1	
BOD-82	BODY-VALVE FOR VAL-2555	15	1	
BOD-83	BODY-VALVE FOR VAL-2556	15	1	
BOD-84	BODY-VALVE FOR VAL-2557	15	1	
BOD-85	BODY-VALVE FOR VAL-2558	15	1	
BOD-86	BODY-VALVE FOR VAL-2559	15	1	
BOD-87	BODY-VALVE FOR VAL-2560	15	1	
BOD-88	BODY-VALVE FOR VAL-2561	15	1	
BOD-89	BODY-VALVE FOR VAL-2562	15	1	
BOD-90	BODY-VALVE FOR VAL-2563	15	1	
BOD-91	BODY-VALVE FOR VAL-2564	15	1	
BOD-92	BODY-VALVE FOR VAL-2565	15	1	
BOD-93	BODY-VALVE FOR VAL-2566	15	1	
BOD-94	BODY-VALVE FOR VAL-2567	15	1	
BOD-95	BODY-VALVE FOR VAL-2568	15	1	
BON-23	BONNET FOR BON-79/80/81/93/94/95	15	1	
BRD-82	PRINTED CIRCUIT BOARD-CONTROL PANEL	12	1	
BRG-125	BEARING, 5/16 FOR FACTORY MOUNTED CONTROLS & UNIT CONTROL MODULE	15	AR	
BRG-125	BEARING-INLET VANE ASSEMBLY	1A	2	+
BRG-125	BEARING-DELUXE COMB. FILTER BOX	5	AR	
BRG-192	BEARING-FAN ASSEMBLY	1	AR	+
BRG-215	BEARING-FAN ASSEMBLY	1	AR	+
BRG-242	BEARING-DAMPER SECTIONS		AR	+
BRG-243	BEARING-DAMPER SECTIONS		AR	+
BRG-244	BEARING-CENTER OF SHAFT (DAMPER SECTIONS)		AR	+
BRG-245	BEARING-CENTER OF SHAFT (DAMPER SECTIONS)		AR	+
BRG-295	BEARING-FAN ASSEMBLY	1	AR	+
BRG-327	BEARING-INLET VANE ASSEMBLY	1A	AR	+
BRG-504	BEARING-BOTH ENDS OF SHAFT (DAMPER SECTIONS)		AR	+
BRG-536	BEARING-FAN ASSEMBLY	1	AR	+
BRG-545	BEARING-INLET VANE ASSEMBLY	1A	3	+
BRG-546	BEARING-INLET VANE ASSEMBLY	1A	AR	+
BRG-550	BEARING, 5/16, FACTORY MOUNTED CONTROLS & UNIT CONTROL MODULE	15	AR	
BRG-550	BEARING-INLET VANE ASSEMBLY	1A	2	+
BRG-568	BEARING-CAM FOLLOWER, INLET VANE ASSEMBLY	1A	3	+
BRG-636	BEARING-INLET VANE ASSEMBLY	1A	11	+
BRG-646	BEARING-FAN ASSEMBLY, 15/16, 2 BOLT FLANGE	1	AR	+
BRG-648	BEARING-FAN ASSEMBLY, 1 7/16, 2 BOLT FLANGE	1	AR	+
BUS-95	BUSHING-DAMPER SECTIONS		AR	+
BUS-272	BUSHING-DAMPER SECTIONS		AR	+
BRG-642	BEARING-FAN ASSEMBLY	1	AR	+
BRG-643	BEARING-FAN ASSEMBLY	1	AR	+
BRG-644	BEARING-FAN ASSEMBLY	1	AR	+
BRG-645	BEARING-FAN ASSEMBLY	1	AR	+
BRG-647	BEARING-FAN ASSEMBLY	1	AR	+
BRG-648	BEARING-FAN ASSEMBLY	1	AR	+
BUS-95	BUSHING-DAMPER SECTIONS		AR	+
BUS-197	BUSHING-CENTER OF BLADE ASSY.(DAMPER SECTIONS)		AR	+
BUS-272	BUSHING-INLET VANE ASSEMBLY	1A	2	+
BUS-272	BUSHING-BOTH ENDS OF SHAFT (DAMPER SECTIONS) FOR SHF-1289/1298/1300/1301/1302/1303		AR	+
CLP-156	CLIP FOR SENSORS (SEN-97 & SEN-98) FACTORY MOUNTED CONTROLS	14	AR	
CMP-42	CLAMP, DELUXE COMB. FILTER BOX	5	AR	
CMP-44	CLAMP-FAN WHEEL, FAN ASSEMBLY	1	2	
CMP-131	CLAMP-FAN WHEEL, FAN ASSEMBLY	1	2	
CMP-132	CLAMP-FAN WHEEL, FAN ASSEMBLY	1	2	
CMP-133	CLAMP-FAN WHEEL, FAN ASSEMBLY	1	2	
CMP-135	CLAMP-FAN WHEEL, FAN ASSEMBLY	1	2	
CNE-59	INLET CONE-FAN ASSEMBLY	1	2	
CNE-61	INLET CONE-FAN ASSEMBLY	1	2	
CNE-63	INLET CONE-FAN ASSEMBLY	1	2	
CNE-65	INLET CONE-FAN ASSEMBLY	1	2	
CNE-101	INLET CONE-FAN ASSEMBLY	1	2	
CNE-101	INLET CONE FOR VNE-92,93	1A	1	
CNE-102	INLET CONE-FAN ASSEMBLY	1	2	
CNE-102	INLET CONE FOR VNE-95,96	1A	1	
CNE-103	INLET CONE-FAN ASSEMBLY	1	2	
CNE-103	INLET CONE FOR VNE-98,99	1A	1	
CNE-104	INLET CONE-FAN ASSEMBLY	1	2	
CNE-104	INLET CONE FOR VNE-101,102	1A	1	
CNE-111	INLET CONE-FAN ASSEMBLY	1	2	
CNE-111	INLET CONE FOR VNE-104,106	1A	1	
CNE-112	INLET CONE-FAN ASSEMBLY	1	2	
CNE-112	INLET CONE FOR VNE-107,111	1A	1	
CNE-113	INLET CONE-FAN ASSEMBLY	1	2	



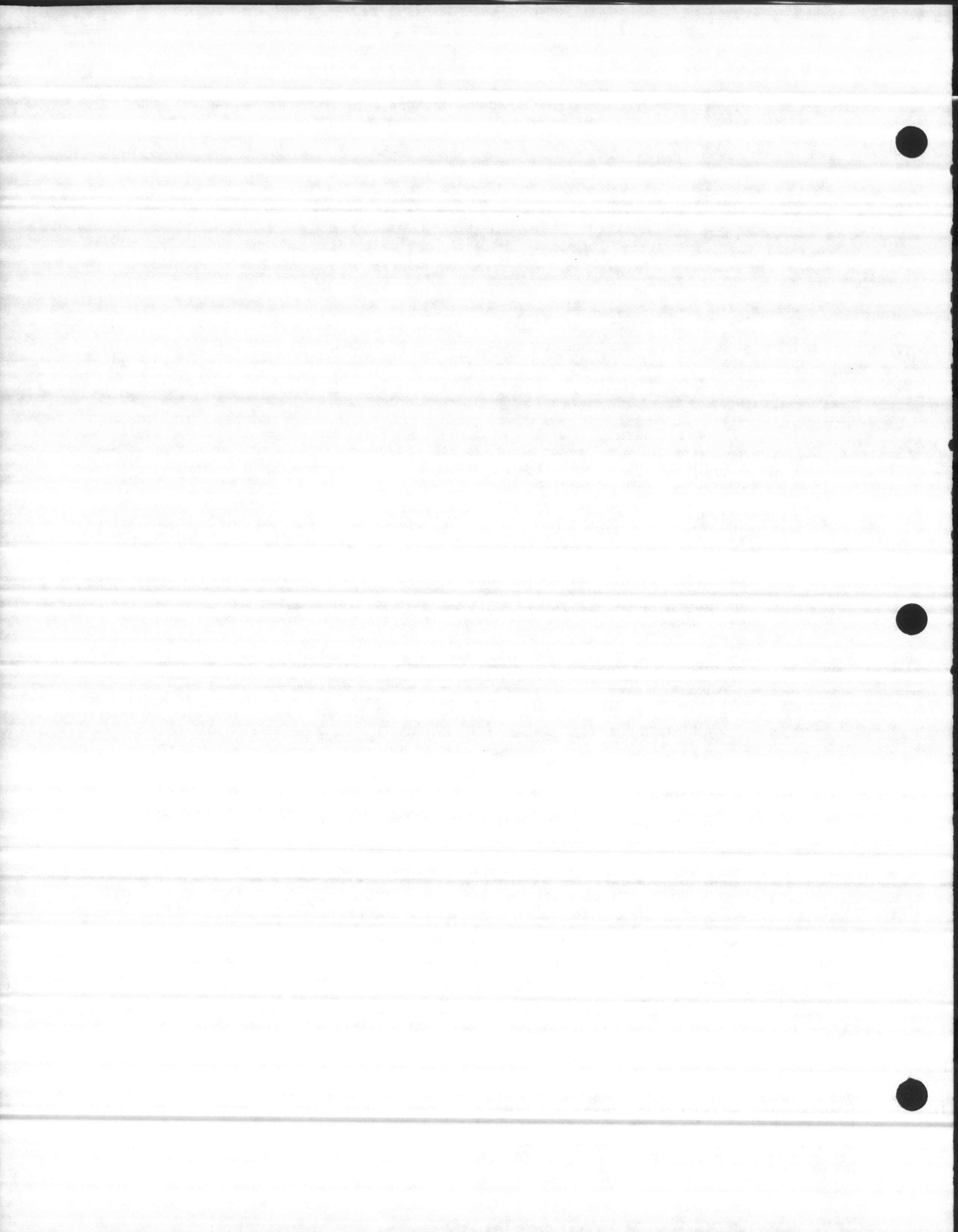
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
CNE-113	INLET CONE FOR VNE-108,112	1A	1	
CNE-114	INLET CONE-FAN ASSEMBLY	1	2	
CNE-114	INLET CONE FOR VNE-113,117	1A	1	
CNE-115	INLET CONE-FAN ASSEMBLY	1	2	
CNE-115	INLET CONE FOR VNE-114,118	1A	1	
CNE-116	INLET CONE-FAN ASSEMBLY	1	2	
CNE-116	INLET CONE FOR VNE-119,123	1A	1	
CNE-117	INLET CONE-FAN ASSEMBLY	1	2	
CNE-117	INLET CONE FOR VNE-120,124	1A	1	
CNT-661	CONTROLLER-STEP, 18 STEP, BARBER COLEMAN	12	AR	
CNT-662	CONTROLLER-STEP, 10 STEP, BARBER COLEMAN	12	AR	
CNT-663	CONTROLLER-STEP, 6 STEP, BARBER COLEMAN	12	AR	
CNT-689	CONTROLLER-STEP, 18 STEP, HONEYWELL	12	AR	
CNT-690	CONTROLLER-STEP, 10 STEP, HONEYWELL	12	AR	
CNT-691	CONTROLLER-STEP, 6 STEP, HONEYWELL	12	AR	
CNT-931	CONTROL-LOW LIMIT TEMPERATURE, FACTORY MOUNTED CONTROLS	14	AR	
CNT-932	CONTROL-HIGH LIMIT TEMPERATURE, FACTORY MOUNTED CONTROLS	14	AR	
CNT-984	CONTROLLER-PROGRAMMABLE, UNIT CONTROL MODULE FOR PNL-9397 AND PNL-9398	15	1	
CNT-985	CONTROLLER-STATIC PRESSURE, UNIT CONTROL MODULE FOR PNL-9397 AND PNL-9398	15	1	
CO-37	CUTOFF-FAN ASSEMBLY	1	1	
CO-40	CUTOFF-FAN ASSEMBLY	1	1	
CO-41	CUTOFF-FAN ASSEMBLY	1	1	
CO-42	CUTOFF-FAN ASSEMBLY	1	1	
CO-43	CUTOFF-FAN ASSEMBLY	1	1	
CO-44	CUTOFF-FAN ASSEMBLY	1	1	
CO-48	CUTOFF-FAN ASSEMBLY	1	1	
CO-49	CUTOFF-FAN ASSEMBLY	1	1	
CO-50	CUTOFF-FAN ASSEMBLY	1	1	
CO-166	CUTOFF-FAN ASSEMBLY	1	1	
CO-167	CUTOFF-FAN ASSEMBLY	1	1	
CO-168	CUTOFF-FAN ASSEMBLY	1	1	
CO-169	CUTOFF-FAN ASSEMBLY	1	1	
CO-170	CUTOFF-FAN ASSEMBLY	1	1	
CO-203	CUTOFF-FAN ASSEMBLY	1	1	
CO-204	CUTOFF-FAN ASSEMBLY	1	1	
CO-229	CUTOFF-FAN ASSEMBLY	1	1	
CTR-382	CONTACTOR, 30A/600V, 115V COIL, WITHOUT AUXILIARY SWITCH	12	1	+
CTR-392	CONTACTOR, 40A/600V, 115V COIL, WITH AUXILIARY SWITCH, 3 POLE	12	1	+
CTR-412	CONTACTOR, 10A/600V, 115V COIL, WITHOUT AUXILIARY SWITCH, NORMALLY CLOSED	12	1	+
CTR-413	CONTACTOR, 17A/600V, WITHOUT AUXILIARY SWITCH	12	1	+
CTR-414	CONTACTOR, 40A/600V, 115V COIL, WITHOUT AUXILIARY SWITCH, 2 POLE	12	1	+
CTR-416	CONTACTOR, 20A/600V, 115V COIL, WITHOUT AUXILIARY SWITCH	12	1	+
CTR-417	CONTACTOR, 25A/600V, 115V COIL, WITHOUT AUXILIARY SWITCH	12	1	+
CTR-418	CONTACTOR, 40A/600V, 115V COIL, WITHOUT AUXILIARY SWITCH, 3 POLE	12	1	+
CTR-419	CONTACTOR, 40A/600V, 115V COIL, WITH AUXILIARY SWITCH, NORMALLY OPEN	12	1	+
CTR-420	CONTACTOR, 20A/600V, 115V COIL, WITH 2 AUXILIARY SWITCHES	12	1	+
CTR-421	CONTACTOR, 30A/600V, 115V COIL, WITH 2 AUXILIARY SWITCHES	12	1	+
CTR-422	CONTACTOR, 40A/600V, 115V COIL, WITH 2 AUXILIARY SWITCHES	12	1	+
CTR-423	CONTACTOR, 14A/600V, 115V COIL, WITH AUXILIARY SWITCH	12	1	+
CTR-424	CONTACTOR, 20A/600V, 115V COIL, WITH AUXILIARY SWITCH	12	1	+
CTR-425	CONTACTOR, 25A/600V, 115V COIL, WITH AUXILIARY SWITCH	12	1	+
CTR-426	CONTACTOR, 30A/600V, 115V COIL, WITH AUXILIARY SWITCH	12	1	+
CTR-427	CONTACTOR, 40A/600V, 115V COIL, WITH AUXILIARY SWITCH, 2 POLE	12	1	+
ELN-23	FILTER, 25 X 16 X 2, LOW VELOCITY		AR	
FAN-240	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-264	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-271	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-277	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-324	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-325	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-326	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-327	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-328	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-329	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-334	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-335	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-336	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-338	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-605	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-731	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-734	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-737	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-743	FAN WHEEL-FAN ASSEMBLY	1	1	



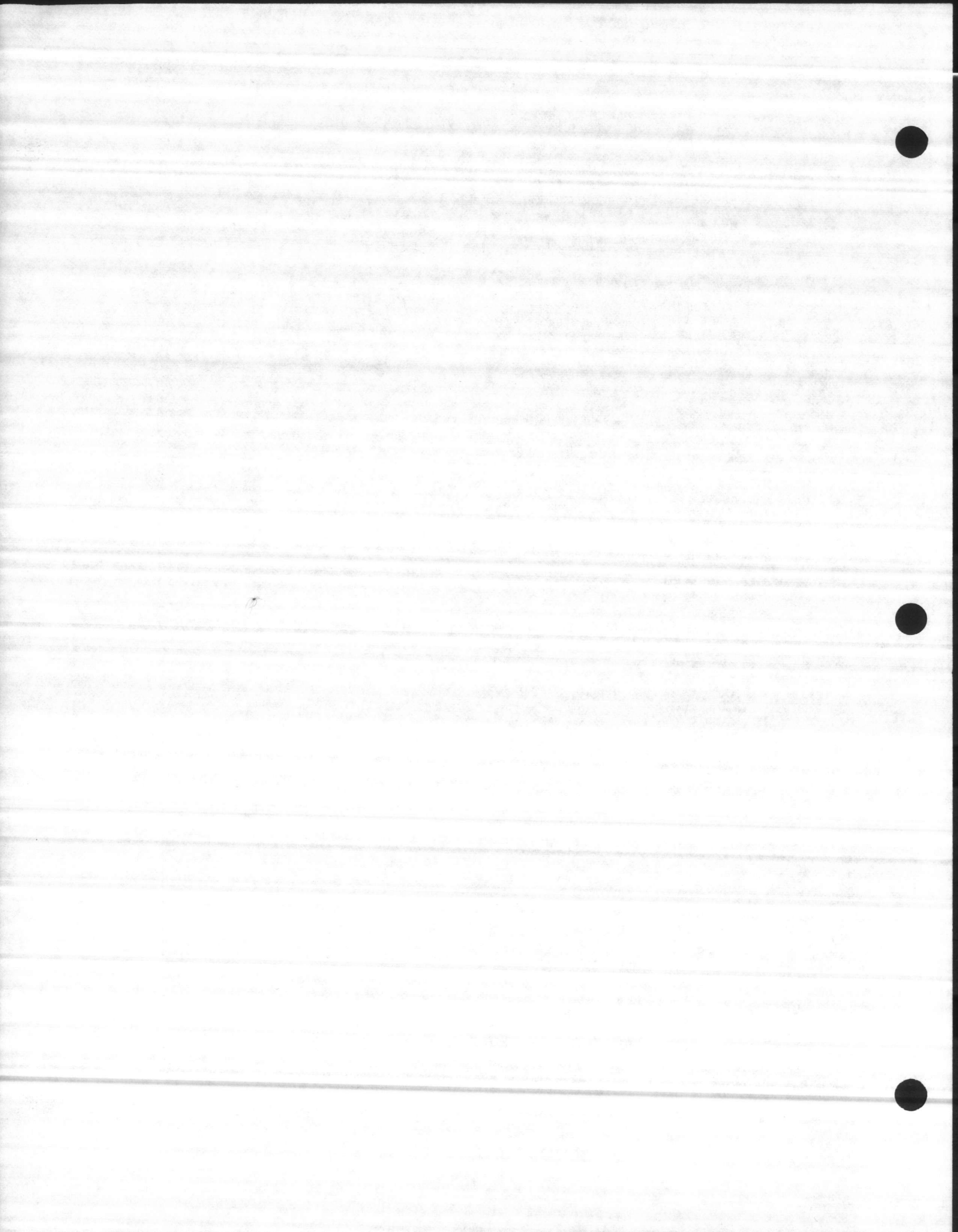
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
FAN-799	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1032	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1033	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1034	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1035	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1036	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1037	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1038	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1041	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1042	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1043	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1044	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1045	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1046	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1047	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1048	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1049	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1050	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1051	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1052	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1054	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1055	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1056	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1057	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1058	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1059	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1060	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1062	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1063	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1065	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1066	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1106	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1157	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1158	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1159	FAN WHEEL-FAN ASSEMBLY	1	1	
FAN-1160	FAN WHEEL-FAN ASSEMBLY	1	1	
FLR-39	FILTER, 25 X 16 X 2, THROWAWAY			AR
FLR-40	FILTER, 20 X 16 X 2, THROWAWAY			AR
FLR-63	FILTER, 25 X 20 X 2, THROWAWAY			AR
FLR-99	FILTER, 20 X 20 X 2, THROWAWAY			AR
FLR-115	FILTER, 25 X 20 X 2, LOW VELOCITY			AR
FLR-250	FILTER, 20 X 20 X 2, LOW VELOCITY			AR
FLR-355	FILTER, 20 X 16 X 2, HIGH VELOCITY			AR
FLR-356	FILTER, 25 X 16 X 2, HIGH VELOCITY			AR
FLR-357	FILTER, 20 X 20 X 2 HIGH VELOCITY			AR
FLR-358	FILTER, 25 X 20 X 2, HIGH VELOCITY			AR
FLR-369	FILTER, 20 X 16 X 2, LOW VELOCITY			AR
FUS-127	FUSE, 1.6 AMP, 250V, CONTROL PANEL	12		AR
FUS-137	FUSE, 20 AMP, 250V, CONTROL PANEL	12		AR
FUS-138	FUSE, 25 AMP, 250V, CONTROL PANEL	12		AR
FUS-139	FUSE, 40 AMP, 250V, CONTROL PANEL	12		AR
FUS-140	FUSE, 60 AMP, 250V, CONTROL PANEL	12		AR
FUS-141	FUSE, 20 AMP, 600V, CONTROL PANEL	12		AR
FUS-142	FUSE, 25 AMP, 600V, CONTROL PANEL	12		AR
FUS-143	FUSE, 40 AMP, 600V, CONTROL PANEL	12		AR
FUS-144	FUSE, 60 AMP, 600V, CONTROL PANEL	12		AR
FUS-145	FUSE, 2 AMP, 250V, CONTROL PANEL	12		AR
FUS-146	FUSE, 3.2 AMP, 250V, CONTROL PANEL	12		AR
FUS-147	FUSE, 4 AMP, 250V, CONTROL PANEL	12		AR
FUS-148	FUSE, 1 AMP, 600V, CONTROL PANEL	12		AR
FUS-149	FUSE, 1.6 AMP, 600V, CONTROL PANEL	12		AR
FUS-150	FUSE, 2 AMP, 600V, CONTROL PANEL	12		AR
FUS-151	FUSE, 3.2 AMP, 600V, CONTROL PANEL	12		AR
GKT-1545	GASKET-BOTTOM FOR BOD-79	15		1
GKT-1546	GASKET-BOTTOM FOR BOD-80	15		1
GKT-1547	GASKET-BOTTOM FOR BOD-81	15		1
HUB-29	HUB-INSIDE FOR VNE-127,128,129,130,131,132, VNE-133,134,136	1A		1
HUB-30	HUB-OUTSIDE FOR VNE-127,128,129,130,131,132, VNE-133,134,136	1A		1
HUB-31	HUB-INSIDE FOR VNE-139,143	1A		1
HUB-32	HUB-OUTSIDE FOR VNE-139,143	1A		1
HUB-33	HUB-INSIDE FOR VNE-135,137,138	1A		1
HUB-34	HUB-OUTSIDE FOR VNE-135,137,138	1A		1
HUB-35	HUB-INSIDE FOR VNE-141,142,155	1A		1
HUB-36	HUB-OUTSIDE FOR VNE-141,142,155	1A		1
HUB-46	HUB-INSIDE FOR VNE-125,126	1A		1
HUB-47	HUB-OUTSIDE FOR VNE-125,126	1A		1



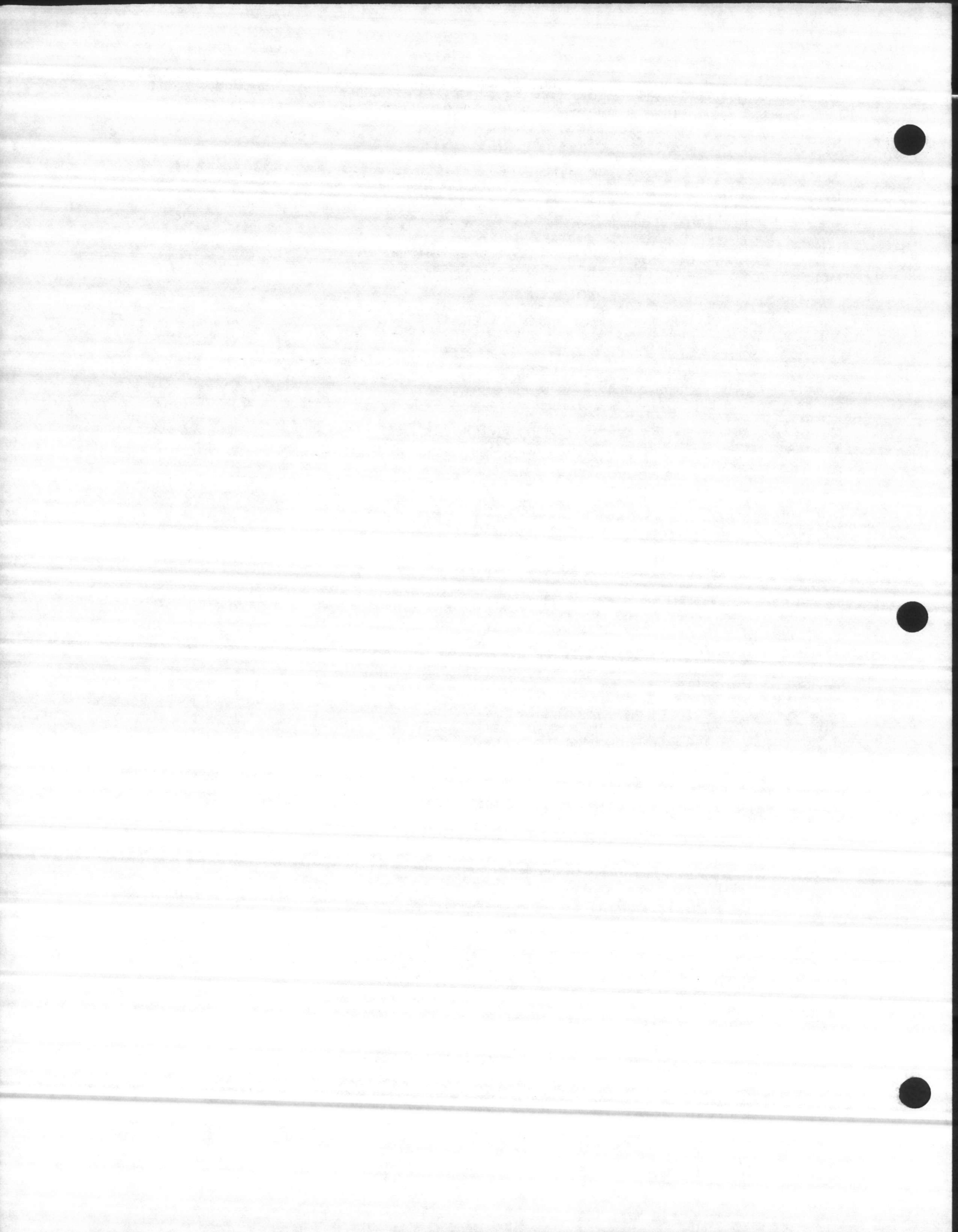
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
HUB-52	HUB-INSIDE FOR VNE-330,331,332,333	1A	1	
HUB-53	HUB-OUTSIDE FOR VNE-330,331,332,333	1A	1	
HUS-284	HOUSING-FAN ASSEMBLY	1	1	
HUS-349	HOUSING-FAN ASSEMBLY	1	1	
HUS-350	HOUSING-FAN ASSEMBLY	1	1	
HUS-351	HOUSING-FAN ASSEMBLY	1	1	
HUS-352	HOUSING-FAN ASSEMBLY	1	1	
HUS-353	HOUSING-FAN ASSEMBLY	1	1	
HUS-598	HOUSING-FAN ASSEMBLY	1	1	
HUS-604	HOUSING-FAN ASSEMBLY	1	1	
HUS-605	HOUSING-FAN ASSEMBLY	1	1	
HUS-719	HOUSING-FAN ASSEMBLY	1	1	
HUS-720	HOUSING-FAN ASSEMBLY	1	1	
HUS-726	HOUSING-FAN ASSEMBLY	1	1	
HUS-727	HOUSING-FAN ASSEMBLY	1	1	
HUS-984	HOUSING-FAN ASSEMBLY	1	1	
HUS-985	HOUSING-FAN ASSEMBLY	1	1	
HUS-1127	HOUSING-FAN ASSEMBLY	1	1	
HUS-1128	HOUSING-FAN ASSEMBLY	1	1	
KEY-18	KEY-FAN ASSEMBLY	1	1	
KEY-46	KEY-FAN ASSEMBLY	1	1	
KEY-47	KEY-FAN ASSEMBLY	1	1	
KEY-49	KEY-FAN ASSEMBLY	1	1	
KEY-141	KEY-FAN ASSEMBLY	1	1	
KEY-162	KEY-FAN ASSEMBLY	1	1	
KEY-165	KEY-FAN ASSEMBLY	1	1	
KEY-226	KEY-FAN ASSEMBLY	1	1	
KEY-252	KEY-FAN ASSEMBLY	1	1	
KIT-1185	KIT-DUCT MOUNTING FOR CONTROL SYSTEM X13650326-02, 07 & 08 UNIT CONTROL MODULE	15	1	
KIT-1194	KIT-CARTRIDGE & PACKING ASSEMBLY FOR BOD-72/73/74/75/76/82/83/84/85/86/87/88/89/90	15	1	
KIT-1195	KIT-PACKING, LESS CARTRIDGE FOR BOD-72/73/74/ BOD-76/77/78/82/83/84/85/86/87/88/89/90/91/92	15	1	
KIT-1196	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-72	15	1	
KIT-1197	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-73	15	1	
KIT-1198	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-74	15	1	
KIT-1199	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-75	15	1	
KIT-1200	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-76	15	1	
KIT-1201	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-77	15	1	
KIT-1202	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-78	15	1	
KIT-1203	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY, BOTTOM GASKET FOR BOD-79	15	1	
KIT-1204	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY, BOTTOM GASKET FOR BOD-80	15	1	
KIT-1205	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY, BOTTOM GASKET FOR BOD-81	15	1	
KIT-1206	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-82	15	1	
KIT-1207	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-83	15	1	
KIT-1208	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-84	15	1	
KIT-1209	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-85	15	1	
KIT-1210	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-86	15	1	
KIT-1211	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-87	15	1	
KIT-1212	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-88	15	1	
KIT-1213	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-89	15	1	
KIT-1214	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-90	15	1	
KIT-1215	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-91	15	1	
KIT-1216	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY FOR BOD-92	15	1	
KIT-1217	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY, TOP GASKET FOR BOD-93	15	1	
KIT-1218	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY, TOP GASKET FOR BOD-94	15	1	
KIT-1219	KIT-VALVE REPAIR, INCLUDES PACKING STEM AND PLUG ASSEMBLY, TOP GASKET FOR BOD-95	15	1	
LEV-18	LEVER, 6 9/16 X 4 1/16 (DAMPER SECTIONS)			AR
LEV-19	LEVER, 5 1/4 X 3 1/8 (DAMPER SECTIONS)			AR
LEV-20	LEVER, 1 3/8 X 7/8 (DAMPER SECTIONS)			AR
LEV-21	LEVER, 2 15/16 X 7/8 (DAMPER SECTIONS)			AR
LEV-22	LEVER, 7 5/32 X 4 11/16 (DAMPER SECTIONS)			AR
LEV-36	CRANKARM, .760/765 BORE, MIXING, COMB. MIXING & FILTER BOX ACTUATOR ASSEMBLY, 90 OR 180 DEGREE OPENING FOR UNIT SIZE 21 THRU 63	15	1	
LEV-56	LEVER (MIXING BOX SECTIONS)			AR
LEV-56	LEVER FOR VNE-125 THRU 133	1A	3	
LEV-72	LEVER, 3 9/16 X 5 11/16 (DAMPER SECTIONS)			AR
LEV-73	LEVER, 5 1/16 X 1 9/16 (DAMPER SECTIONS)			AR
LEV-74	LEVER, 1 1/4 X 1 5/8 (DAMPER SECTIONS)			AR
LEV-75	LEVER, 5 1/4 X 4 11/16 (DAMPER SECTIONS)			AR



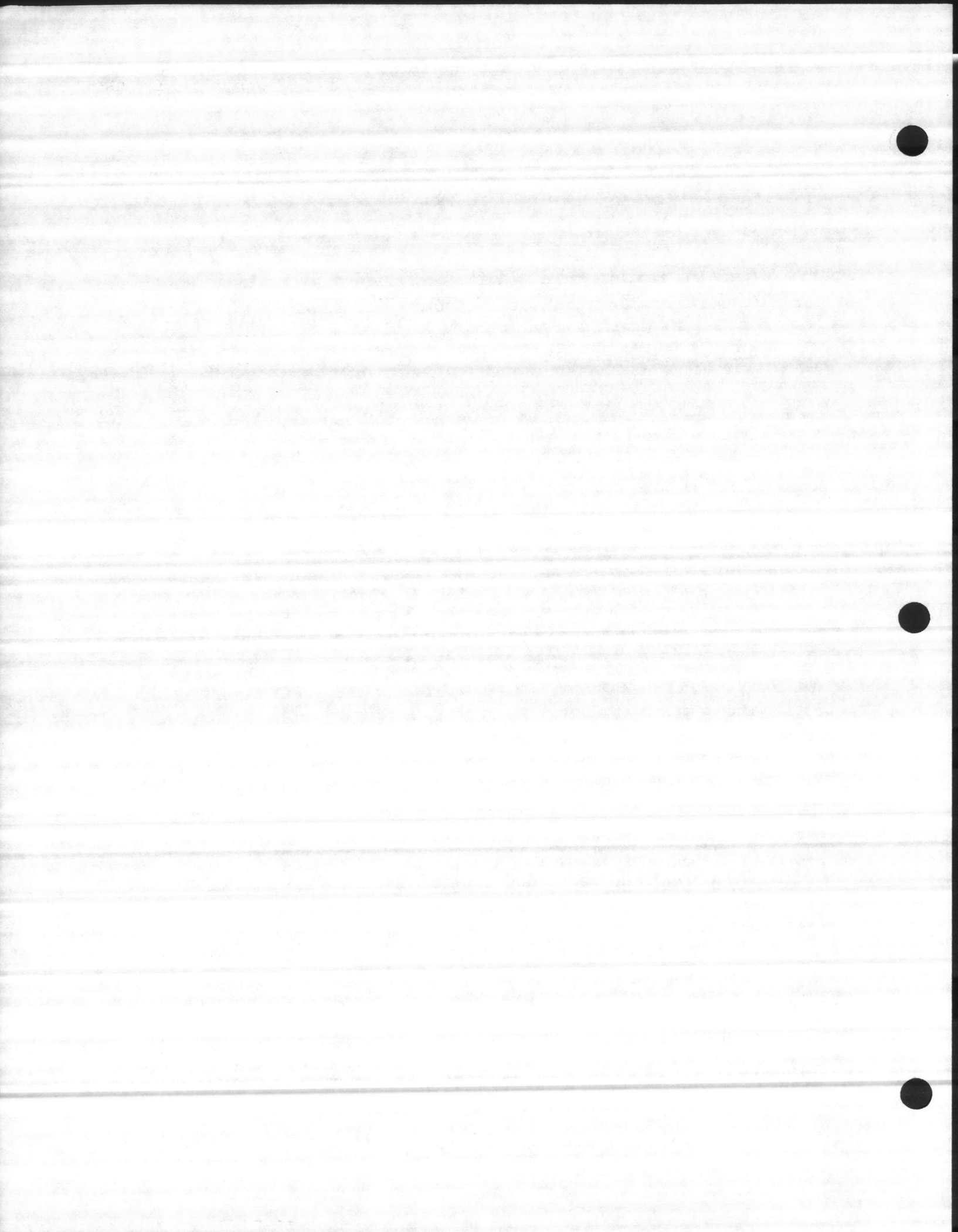
PART NO.	DESCRIPTION	SECTION	NO. REQ.	HSP
LEV-76	LEVER, 4 3/4 X 5/8 (DAMPER SECTIONS)		AR	
LEV-77	LEVER, 4 1/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LEV-78	LEVER, 3 1/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LEV-89	LEVER FOR VNE-134,135,136,137,138,139,141,142, VNE-143,155,VNE-330 THRU 333	1A	3	
LEV-96	LEVER, 3 9/16 X 11/16 (DAMPER SECTIONS)		AR	
LEV-127	LEVER, 3 1/32 X 1 9/32 (DAMPER SECTIONS)		AR	
LEV-133	LEVER, 2 15/16 X 7/8 (DAMPER SECTIONS)		AR	
LEV-135	LEVER, INLET VANE ASSEMBLY		AR	
LEV-136	CRANKARM, .760/765 BORE FOR UNIT CONTROL MODULE	1A	2	
LEV-136	LEVER, INLET VANE ASSEMBLY	15		
LNK-79	LINKAGE, 14 13/16 X 1 1/2 (DAMPER SECTIONS)	1A	1	
LNK-95	LINKAGE, 6 5/8 X 5/8 (DAMPER SECTIONS)		AR	
LNK-96	LINKAGE, 4 1/8 X 5/8 (DAMPER SECTIONS)		AR	
LNK-97	LINKAGE, 5 7/8 X 5/8 (DAMPER SECTIONS)		AR	
LNK-98	LINKAGE, 9 1/16 X 5/8 (DAMPER SECTIONS)		AR	
LNK-99	LINKAGE, 8 1/16 X 5/8 (DAMPER SECTIONS)		AR	
LNK-100	LINKAGE, 12 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-101	LINKAGE, 7 13/16 X 5/8 (DAMPER SECTIONS)		AR	
LNK-102	LINKAGE, 14 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-103	LINKAGE, 9 3/16 X 5/8 (DAMPER SECTIONS)		AR	
LNK-104	LINKAGE, 5 5/32 X 5/8 (DAMPER SECTIONS)		AR	
LNK-105	LINKAGE, 11 1/2 X 5/8 (DAMPER SECTIONS)		AR	
LNK-106	LINKAGE, 15 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-107	LINKAGE, 16 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-108	LINKAGE, 8 31/32 X 5/8 (DAMPER SECTIONS)		AR	
LNK-109	LINKAGE, 5 3/4 X 5/8 (DAMPER SECTIONS)		AR	
LNK-110	LINKAGE, 5 3/8 X 5/8 (DAMPER SECTIONS)		AR	
LNK-112	LINKAGE, 5 X 5/8 (DAMPER SECTIONS)		AR	
LNK-115	LINKAGE, 6 X 5/8 (DAMPER SECTIONS)		AR	
LNK-117	LINKAGE, 32 1/2 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-118	LINKAGE, 4 3/4 X 5/8 (DAMPER SECTIONS)		AR	
LNK-119	LINKAGE, 31 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-120	LINKAGE, 10 1/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-121	LINKAGE, 6 3/4 X 5/8 (DAMPER SECTIONS)		AR	
LNK-122	LINKAGE, 33 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-123	LINKAGE, 12 3/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-124	LINKAGE, 7 3/4 X 5/8 (DAMPER SECTIONS)		AR	
LNK-125	LINKAGE, 38 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-126	LINKAGE, 47 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-128	LINKAGE, 13 1/16 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-129	LINKAGE, 7 3/4 X 5/8 (DAMPER SECTIONS)		AR	
LNK-132	LINKAGE, 6 19/32 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-133	LINKAGE, 8 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-134	LINKAGE, 12 1/16 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-135	LINKAGE, 10 1/2 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-136	LINKAGE, 16 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-137	LINKAGE, 78 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-139	LINKAGE, 5 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-140	LINKAGE, 11 7/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-141	LINKAGE, 23 1/2 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-142	LINKAGE, 25 1/2 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-143	LINKAGE, 12 11/16 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-144	LINKAGE, 12 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-145	LINKAGE, 36 1/2 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-146	LINKAGE, 15 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-147	LINKAGE, 14 3/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-148	LINKAGE, 39 1/2 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-149	LINKAGE, 7 13/16 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-150	LINKAGE, 18 5/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-151	LINKAGE, 7 5/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-152	LINKAGE, 20 1/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-153	LINKAGE, 18 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-154	LINKAGE, 25 5/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-155	LINKAGE, 9 5/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-156	LINKAGE, 21 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-157	LINKAGE, 11 7/16 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-158	LINKAGE, 30 5/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-159	LINKAGE, 24 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-160	LINKAGE, 12 1/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-161	LINKAGE, 33 5/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-162	LINKAGE, 32 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-163	LINKAGE, 12 7/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-164	LINKAGE, 39 1/8 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-165	LINKAGE, 40 3/4 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-166	LINKAGE, 15 15/16 X 1 1/2 (DAMPER SECTIONS)		AR	
LNK-167	LINKAGE, 49 3/8 X 1 1/2 (DAMPER SECTIONS)		AR	



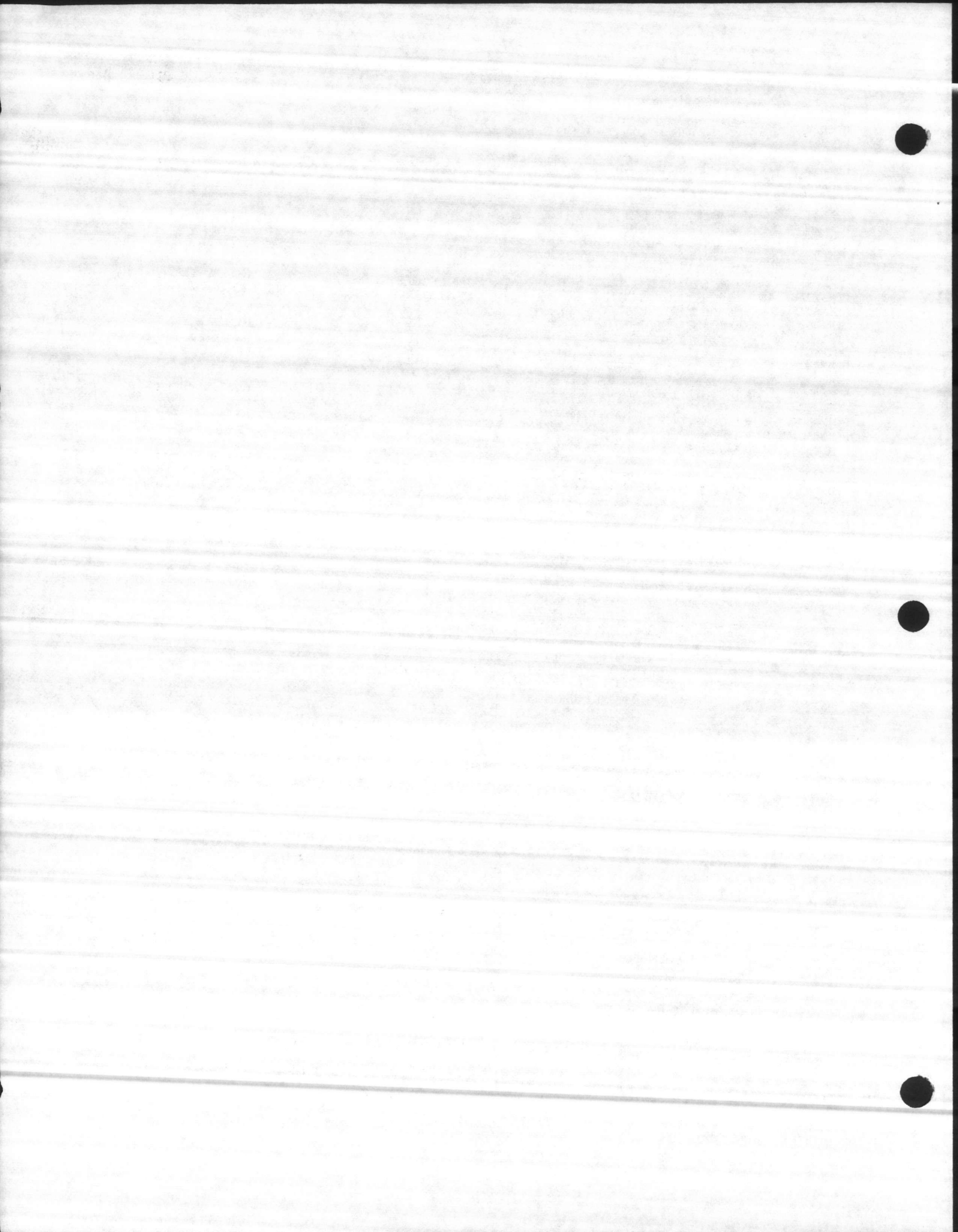
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
LNK-174	LINKAGE-DELUXE COMBINATION FILTER BOX	5	AR	
LNK-175	LINKAGE-DELUXE COMBINATION FILTER BOX	5	AR	
LNK-176	LINKAGE-DELUXE COMBINATION FILTER BOX	5	AR	
LNK-177	LINKAGE-DELUXE COMBINATION FILTER BOX	5	AR	
LNK-178	LINKAGE-DELUXE COMBINATION FILTER BOX	5	AR	
LNK-202	LINKAGE, 4 13/32 X 5/8 (DAMPER SECTIONS)		AR	
LNK-203	LINKAGE, 6 X 5/8 (DAMPER SECTIONS)		AR	
LNK-226	LINKAGE, 5 9/32 X 5/8 (DAMPER SECTIONS)		AR	
LNK-227	LINKAGE, 5 9/32 X 5/8 (DAMPER SECTIONS)		AR	
LNK-247	LINKAGE-VALVE ASSEMBLY FOR VAL-2545/2546/2547 VAL-2548/2549/2555/2556/2557/2558/2559/2560 VAL-2561/2562/2563	15	1	
LNK-248	LINKAGE-VALVE ASSEMBLY FOR VAL-2550/2551/ VAL-2564/2565	15	1	
LNK-249	LINKAGE-VALVE ASSEMBLY FOR VAL-2552/2553/ VAL-2554/2566/2567/2568	15	1	
MOT-275	MOTOR, 1/4 HP, 208-230-460/60/3, 1725 RPM, 48 FRAME	2	1	
MOT-1280	ACTUATOR-FACTORY MOUNTED CONTROLS	14	1	
MOT-1634	MOTOR, 1/3 HP, 208-230-460/60/3, 1725 RPM, 48 FRAME	2	1	
MOT-1747	MOTOR, 1.5 HP, 230-460/60/3, 1740 RPM, 145T FRAME	2	1	
MOT-1750	MOTOR, 1.5 HP, 200/60/3, 1740 RPM, 145T FRAME	2	1	
MOT-1751	MOTOR, 2 HP, 230-460/60/3, 1735 RPM, 145T FRAME	2	1	
MOT-1752	MOTOR, 2 HP, 200/60/3, 1735 RPM, 145T FRAME	2	1	
MOT-1753	MOTOR, 3 HP, 230-460/60/3, 1730 RPM, 182T FRAME	2	1	
MOT-1754	MOTOR, 3 HP, 200/60/3, 1730 RPM, 182T FRAME	2	1	
MOT-1755	MOTOR, 5 HP, 230-460/60/3, 1725 RPM, 184T FRAME	2	1	
MOT-1756	MOTOR, 5 HP, 200/60/3, 1725 RPM, 184T FRAME	2	1	
MOT-1757	MOTOR, 7.5 HP, 230-460/60/3, 1750 RPM, 213T FRAME	2	1	
MOT-1758	MOTOR, 7.5 HP, 200/60/3, 1750 RPM, 213T FRAME	2	1	
MOT-1759	MOTOR, 10 HP, 230-460/60/3, 1750 RPM, 215T FRAME	2	1	
MOT-1760	MOTOR, 10 HP, 200/60/3, 1750 RPM, 215T FRAME	2	1	
MOT-1761	MOTOR, 15 HP, 230-460/60/3, 1755 RPM, 254T FRAME	2	1	
MOT-1762	MOTOR, 15 HP, 200/60/3, 1755 RPM, 254T FRAME	2	1	
MOT-1763	MOTOR, 20 HP, 230-460/60/3, 1750 RPM, 256T FRAME	2	1	
MOT-1764	MOTOR, 20 HP, 200/60/3, 1750 RPM, 256T FRAME	2	1	
MOT-1765	MOTOR, 25 HP, 230-460/60/3, 1760 RPM, 284T FRAME	2	1	
MOT-1766	MOTOR, 25 HP, 200/60/3, 1760 RPM, 284T FRAME	2	1	
MOT-1767	MOTOR, 30 HP, 230-460/60/3, 1755 RPM, 286T FRAME	2	1	
MOT-1768	MOTOR, 30 HP, 200/60/3, 1755 RPM, 286T FRAME	2	1	
MOT-1769	MOTOR, 40 HP, 230-460/60/3, 1765 RPM, 324T FRAME	2	1	
MOT-1770	MOTOR, 40 HP, 200/60/3, 1765 RPM, 324T FRAME	2	1	
MOT-1870	MOTOR, 1 HP, 115/60/1, 1725 RPM, 143T FRAME	2	1	
MOT-1871	MOTOR, 1.5 HP, 115-230/60/1, 1725 RPM, 145T FRAME	2	1	
MOT-1872	MOTOR, 3/4 HP, 208-230-460/60/3, 1725 RPM, 56 FRAME	2	1	
MOT-1999	MOTOR, 50 HP, 230-460/60/3	2	1	
MOT-2000	MOTOR, 60 HP, 230-460/60/3	2	1	
MOT-2004	MOTOR, 1 HP, 200/60/3, 1800 RPM	2	1	
MOT-2005	MOTOR, 1 HP, 230-460/60/3, 1800 RPM	2	1	
MOT-2033	ACTUATOR-FACTORY MOUNTED CONTROLS	14	1	
MOT-2096	MOTOR, 1/2 HP, 208-230-460/60/3, 1725 RPM, 56 FRAME	2	1	
MOT-2121	MOTOR, 1 HP, 200/60/3, 1750 RPM, 143T FRAME TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2122	MOTOR, 1 HP, 230-460/60/3, 1750 RPM, 143T FRAME	2	1	
MOT-2123	MOTOR, 1 HP, 200/60/3, 1750 RPM, 143T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2124	MOTOR, 1 HP, 230-460/60/3, 1750 RPM, 143T FRAME, HI EFFICIENCY DRIPPROOF	2	1	
MOT-2125	MOTOR, 1.5 HP, 200/60/3, 1750 RPM, 145T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2126	MOTOR, 1.5 HP, 230-460/60/3, 1750 RPM, 145T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2127	MOTOR, 1.5 HP, 200/60/3, 1750 RPM, 145T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2128	MOTOR, 1.5 HP, 230-460/60/3, 1750 RPM, 145T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2129	MOTOR, 2 HP, 200/60/3, 1750 RPM, 145T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2130	MOTOR, 2 HP, 230-460/60/3, 1750 RPM, 145T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2131	MOTOR, 2 HP, 200/60/3, 1750 RPM, 145T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2132	MOTOR, 2 HP, 230-460/60/3, 1750 RPM, 145T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2133	MOTOR, 3 HP, 200/60/3, 1750 RPM, 182T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2134	MOTOR, 3 HP, 230-460/60/3, 1750 RPM, 182T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2135	MOTOR, 3 HP, 200/60/3, 1750 RPM, 182T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2136	MOTOR, 3 HP, 230-460/60/3, 1750 RPM, 182T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2137	MOTOR, 5 HP, 200/60/3, 1750 RPM, 184T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	



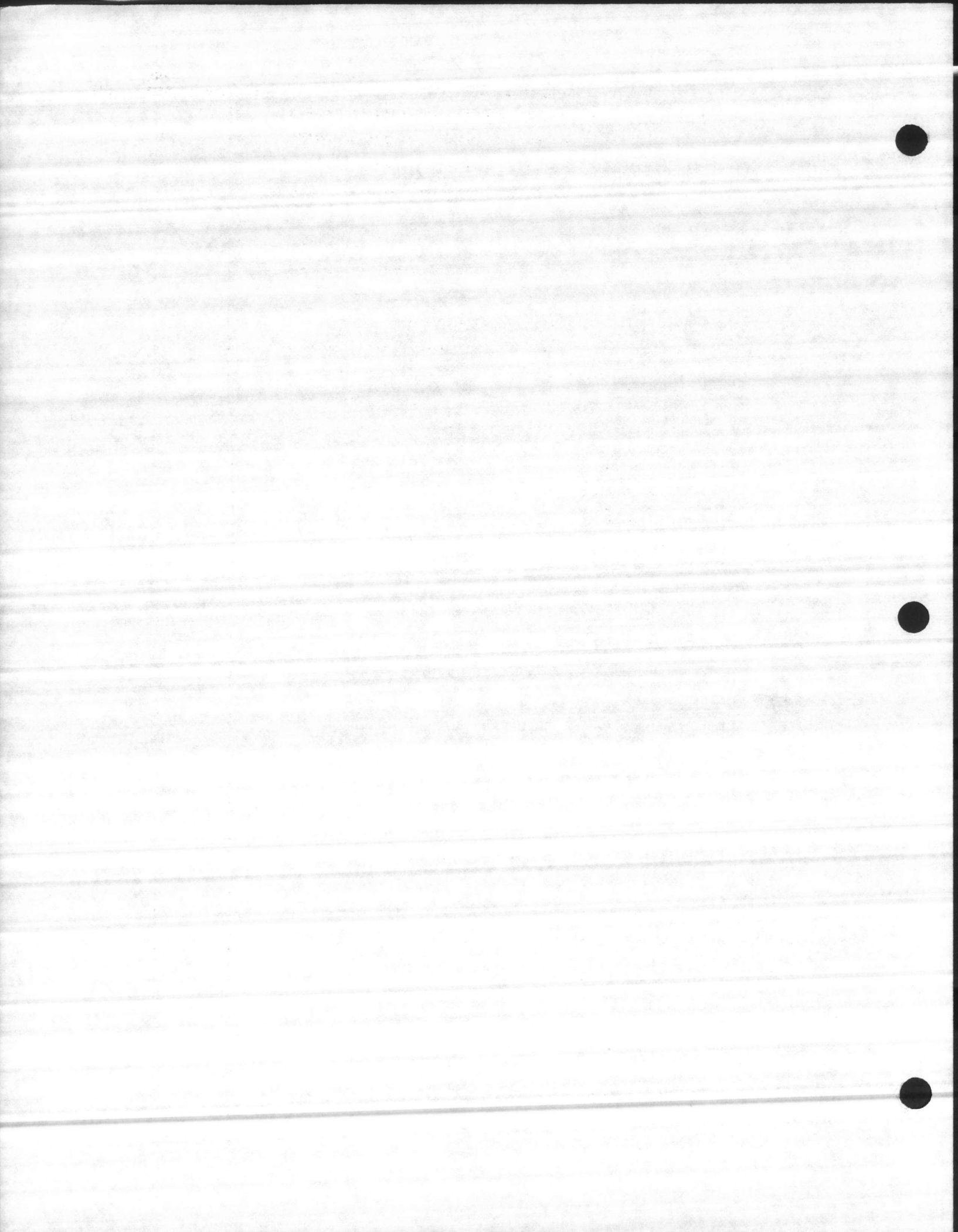
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
MOT-2138	MOTOR, 5 HP, 230-460/60/3, 1750 RPM, 184T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2139	MOTOR, 5 HP, 200/60/3, 1750 RPM, 184T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2140	MOTOR, 5 HP, 230-460/60/3, 1750 RPM, 184T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2141	MOTOR, 7.5 HP, 200/60/3, 1750 RPM, 213T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2142	MOTOR, 7.5 HP, 230-460/60/3, 1750 RPM, 213T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2143	MOTOR, 7.5 HP, 200/60/3, 1750 RPM, 213T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2144	MOTOR, 7.5 HP, 230-460/60/3, 1750 RPM, 213T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2145	MOTOR, 10 HP, 200/60/3, 1750 RPM, 215T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2146	MOTOR, 10 HP, 230-460/60/3, 1750 RPM, 215T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2147	MOTOR, 10 HP, 200/60/3, 1750 RPM, 215T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2148	MOTOR, 10 HP, 230-460/60/3, 1750 RPM, 215T FRAME, HI EFFICIENCY DRIPPROOF	2	1	
MOT-2149	MOTOR, 15 HP, 200/60/3, 1800 RPM, 254T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2150	MOTOR, 15 HP, 230-460/60/3, 1800 RPM, 254T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2153	MOTOR, 20 HP, 200/60/3, 1800 RPM, 256T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2154	MOTOR, 20 HP, 230-460/60/3, 1800 RPM, 256T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2155	MOTOR, 20 HP, 200/60/3, 1800 RPM, 256T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2157	MOTOR, 25 HP, 200/60/3, 1800 RPM, 284T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2158	MOTOR, 25 HP, 230-460/60/3, 1800 RPM, 284T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2159	MOTOR, 25 HP, 200/60/3, 1800 RPM, 284T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2160	MOTOR, 25 HP, 230-460/60/3, 1800 RPM, 284T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2161	MOTOR, 30 HP, 200/60/3, 1800 RPM, 286T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2162	MOTOR, 30 HP, 230-460/60/3, 1800 RPM, 286T FRAME, TOTALLY ENCLOSED FAN COOLED	2	1	
MOT-2163	MOTOR, 30 HP, 200/60/3, 1800 RPM, 286T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2164	MOTOR, 30 HP, 230-460/60/3, 1800 RPM, 286T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2165	MOTOR, 40 HP, 200/60/3, 1800 RPM, 324T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2166	MOTOR, 40 HP, 230-460/60/3, 1800 RPM, 324T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2415	MOTOR, 1/6 HP, 115/60/1, 1725 RPM, 48 FRAME	2	1	
MOT-2416	MOTOR, 1/4 HP, 115/60/1, 1725 RPM, 48 FRAME	2	1	
MOT-2417	MOTOR, 1/3 HP, 115/60/1, 1725 RPM, 48 FRAME	2	1	
MOT-2420	MOTOR, 1/2 HP, 115-230/60/1, 1725 RPM, 56 FRAME	2	1	
MOT-2421	MOTOR, 3/4 HP, 115/208-230/60/1, 1725 RPM, 56 FRAME	2	1	
MOT-2429	ACTUATOR-FACTORY MOUNTED CONTROLS & UNIT MOUNTED CONTROLS	14/15	1	
MOT-2430	ACTUATOR-FACTORY MOUNTED CONTROLS	14	1	
MOT-2431	ACTUATOR-FACTORY MOUNTED CONTROLS	14	1	
MOT-2432	ACTUATOR-FACTORY MOUNTED CONTROLS	14	1	
MOT-2433	ACTUATOR-FACTORY MOUNTED CONTROLS	14	1	
MOT-2518	MOTOR, 20 HP, 230-460/60/3, 1800 RPM, 256T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2519	MOTOR, 15 HP, 230-460/60/3, 1800 RPM, 254T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2520	MOTOR, 15 HP, 200/60/3, 1800 RPM, 254T FRAME, HI EFFICIENCY OPEN DRIPPROOF	2	1	
MOT-2648	MOTOR, 5 HP, 230-460/60/3, 1800 RPM, 184T FRAME, HI EFFICIENCY VAV OPEN	2	1	
MOT-2649	MOTOR, 5 HP, 230-460/60/3, 1800 RPM, 184T FRAME, HI EFFICIENCY VAV TEFC	2	1	
MOT-2650	MOTOR, 7.5 HP, 230-460/60/3, 1800 RPM, 213T FRAME, HI EFFICIENCY VAV OPEN	2	1	
MOT-2651	MOTOR, 7.5 HP, 230-460/60/3, 1800 RPM, 213T FRAME, HI EFFICIENCY VAV TEFC	2	1	
MOT-2652	MOTOR, 10 HP, 230-460/60/3, 1800 RPM, 215T FRAME, HI EFFICIENCY VAV OPEN	2	1	
MOT-2653	MOTOR, 10 HP, 230-460/60/3, 1800 RPM, 215T FRAME, HI EFFICIENCY VAV TEFC	2	1	
MOT-2654	MOTOR, 15 HP, 230-460/60/3, 1800 RPM, 254T FRAME, HI EFFICIENCY VAV OPEN	2	1	
MOT-2655	MOTOR, 15 HP, 230-460/60/3, 1800 RPM, 254T FRAME, HI EFFICIENCY VAV TEFC	2	1	
MOT-2656	MOTOR, 20 HP, 230-460/60/2, 1800 RPM, 256T FRAME, HI EFFICIENCY VAV OPEN	2	1	
MOT-2657	MOTOR, 20 HP, 230-460/60/3, 1800 RPM, 256T FRAME, HI EFFICIENCY VAV TEFC	2	1	
MOT-2658	MOTOR, 25 HP, 230-460/60/3, 1800 RPM, 284T FRAME, HI EFFICIENCY VAV OPEN	2	1	
MOT-2659	MOTOR, 25 HP, 230-460/60/3, 1800 RPM, 284T FRAME, HI EFFICIENCY VAV TEFC	2	1	
MOT-2660	MOTOR, 30 HP, 230-460/60/3, 1800 RPM, 286T FRAME, HI EFFICIENCY VAV OPEN	2	1	



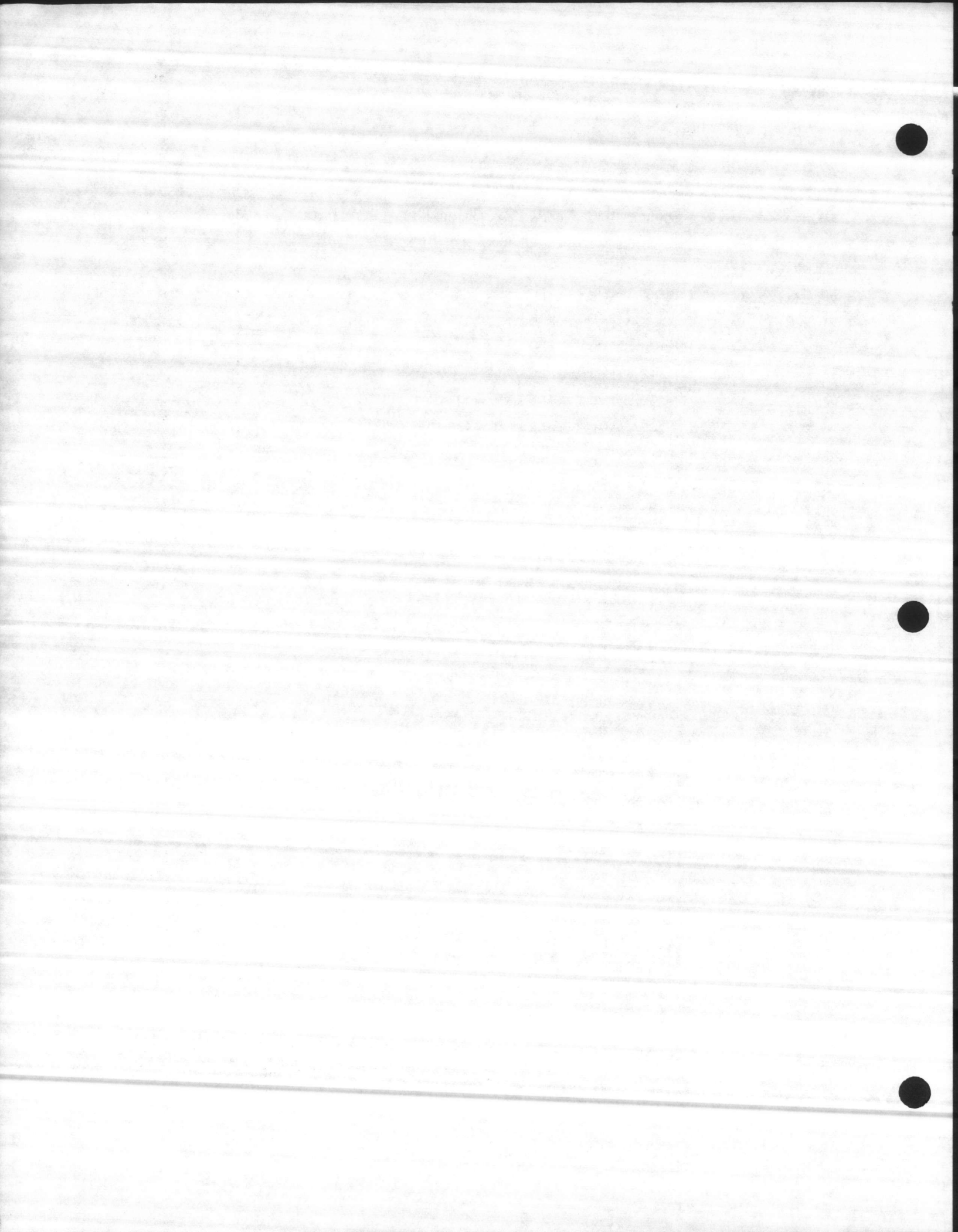
PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
ROD-148	ROD-DRIVE, DAMPER SECTIONS		AR	
ROD-164	ROD-DRIVE, DAMPER SECTIONS		AR	
ROD-269	ROD, 10 X 7/16, DELUXE COMB. FILTER BOX	5	AR	
ROD-270	ROD, 7 1/2 X 7/16, DELUXE COMB. FILTER BOX	5	AR	
ROD-282	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-333	ROD-CENTER SUPPORT FOR VNE-127,130,138,155	1A	3	
ROD-334	ROD-CENTER SUPPORT FOR VNE-131,132,134,135, VNE-136,141	1A	3	
ROD-334	ROD-CENTER SUPPORT FOR VNE-139	1A	5	
ROD-339	ROD-CENTER SUPPORT FOR VNE-126,128	1A	3	
ROD-340	ROD-CENTER SUPPORT FOR VNE-129,133,137,142	1A	3	
ROD-401	ROD-CENTER SUPPOORT FOR VNE-143	1A	5	
ROD-419	ROD-CENTER SUPPORT FOR VNE-330 THRU 333	1A	5	
ROD-430	ROD, 5/16 OD X 13" FOR UNIT SIZE 06-25, UNIT MOUNTED CONTROLS	15	1	
ROD-431	ROD, 5/16 OD X 22" FOR UNIT SIZE 31-63 WITH FC FAN WHEEL	15	1	
ROD-432	ROD, 5/16 OD X 27" FOR UNIT SIZE 35-63 WITH MOUNTED CONTROLS	15	1	
ROD-433	ROD, 5/16 OD X 7", UNIT CONTROL MODULE	15	1	
ROD-451	ROD-CENTER SUPPORT FOR VNE-125	1A	3	
ROD-452	ROD FOR VNE-92,93,104,106	1A	11	
ROD-453	ROD FOR VNE-95,96,107,108,111,112	1A	11	
ROD-454	ROD FOR VNE-98,99,113,114,117,118	1A	11	
ROD-455	ROD FOR VNE-101,102,119,120,123,124	1A	11	
ROD-456	ROD-CONTROL FOR VNE-125,126	1A	2	
ROD-457	ROD-CONTROL FOR VNE-131,136,137,142,155	1A	2	
ROD-458	ROD-CONTROL FOR VNE-132,134,135,141	1A	2	
ROD-459	ROD-CONTROL FOR VNE-127,128,130	1A	2	
ROD-460	ROD-CONTROL FOR VNE-129,133,138	1A	2	
ROD-461	ROD-CONTROL FOR VNE-139,143	1A	2	
ROD-462	ROD-CONTROL FOR VNE-330,332	1A	2	
ROD-463	ROD-CONTROL FOR VNE-331,333	1A	2	
ROD-464	ROD-CONTROL FOR VNE-92,104	1A	2	
ROD-465	ROD-CONTROL FOR VNE-93,106	1A	2	
ROD-466	ROD-CONTROL FOR VNE-95,107,108	1A	2	
ROD-467	ROD-CONTROL FOR VNE-96,111,112	1A	2	
ROD-468	ROD-CONTROL FOR VNE-98,113,114	1A	2	
ROD-469	ROD-CONTROL FOR VNE-99,117,118	1A	2	
ROD-470	ROD-CONTROL FOR VNE-101,119,120	1A	2	
ROD-471	ROD-CONTROL FOR VNE-102,123,124	1A	2	
ROD-475	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-476	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-477	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-478	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-479	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-480	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-481	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-482	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-483	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
ROD-484	ROD-CONNECTING, DELUXE COMB. FILTER BOX	5	AR	
SEL-300	SEAL FOR VNE-127,128,129,130,131,132,133, VNE-134,136	1A	1	
SEL-301	SEAL FOR VNE-139,131,142,143,330,331,332,333	1A	1	
SEL-401	SEAL FOR VNE-135,137,138	1A	1	
SEL-408	SEAL FOR VNE-125,126	1A	1	
SEN-98	SENSOR-PNEUMATIC TEMPERATURE, FACTORY MOUNTED CONTROLS	14	AR	
SEN-99	SENSOR-AIR FLOW & DIRTY FILTER, FACTORY MOUNTED CONTROLS	14	AR	
SEN-123	SENSOR-SUPPLY AIR, UNIT CONTROL MODULE	15	1	
SEN-124	SENSOR-ROOM FOR CONTROL SYSTEM X13650326-01, X13650326-02,04,08 UNIT CONTROL MODULE	15	1	
SEN-125	PROBE-STATIC PRESSURE FOR CONTROL SYSTEM X13650326-03,04,07,08 UNIT CONTROL MODULE	15	1	
SEN-130	SENSOR-ELECTRONIC TEMPERATURE, FACTORY MOUNTED CONTROLS & UNIT CONTROL MODULE	14/15	AR	
SHF-163	SHAFT-FAN ASSEMBLY	1	1	
SHF-167	SHAFT-FAN ASSEMBLY	1	1	
SHF-171	SHAFT-FAN ASSEMBLY	1	1	
SHF-172	SHAFT-FAN ASSEMBLY	1	1	
SHF-173	SHAFT-FAN ASSEMBLY	1	1	
SHF-176	SHAFT-FAN ASSEMBLY	1	1	
SHF-241	SHAFT-FAN ASSEMBLY	1	1	
SHF-660	SHAFT-FAN ASSEMBLY	1	1	
SHF-661	SHAFT-FAN ASSEMBLY	1	1	
SHF-662	SHAFT-FAN ASSEMBLY	1	1	
SHF-664	SHAFT-FAN ASSEMBLY	1	1	
SHF-665	SHAFT-FAN ASSEMBLY	1	1	
SHF-666	SHAFT-FAN ASSEMBLY	1	1	
SHF-755	SHAFT-FAN ASSEMBLY	1	1	
SHF-756	SHAFT-FAN ASSEMBLY	1	1	
SHF-757	SHAFT-FAN ASSEMBLY	1	1	



PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
SHF-758	SHAFT-FAN ASSEMBLY	1	1	
SHF-759	SHAFT-FAN ASSEMBLY	1	1	
SHF-760	SHAFT-FAN ASSEMBLY	1	1	
SHF-761	SHAFT-FAN ASSEMBLY	1	1	
SHF-762	SHAFT-FAN ASSEMBLY	1	1	
SHF-763	SHAFT-FAN ASSEMBLY	1	1	
SHF-764	SHAFT-FAN ASSEMBLY	1	1	
SHF-765	SHAFT-FAN ASSEMBLY	1	1	
SHF-766	SHAFT-FAN ASSEMBLY	1	1	
SHF-767	SHAFT-FAN ASSEMBLY	1	1	
SHF-768	SHAFT-FAN ASSEMBLY	1	1	
SHF-769	SHAFT-FAN ASSEMBLY	1	1	
SHF-770	SHAFT-FAN ASSEMBLY	1	1	
SHF-771	SHAFT-FAN ASSEMBLY	1	1	
SHF-772	SHAFT-FAN ASSEMBLY	1	1	
SHF-773	SHAFT-FAN ASSEMBLY	1	1	
SHF-774	SHAFT-FAN ASSEMBLY	1	1	
SHF-775	SHAFT-FAN ASSEMBLY	1	1	
SHF-776	SHAFT-FAN ASSEMBLY	1	1	
SHF-777	SHAFT-FAN ASSEMBLY	1	1	
SHF-918	SHAFT-FAN ASSEMBLY	1	1	
SHF-919	SHAFT-FAN ASSEMBLY	1	1	
SHF-920	SHAFT-FAN ASSEMBLY	1	1	
SHF-1269	JACKSHAFT FOR VNE-125,127	1A	1	
SHF-1270	JACKSHAFT FOR VNE-126	1A	1	
SHF-1271	JACKSHAFT FOR VNE-128,130	1A	1	
SHF-1272	JACKSHAFT FOR VNE-129	1A	1	
SHF-1273	JACKSHAFT FOR VNE-131,132,133	1A	1	
SHF-1274	JACKSHAFT FOR VNE-330	1A	1	
SHF-1275	JACKSHAFT FOR VNE-331,332	1A	1	
SHF-1276	JACKSHAFT FOR VNE-333	1A	1	
SHF-1277	JACKSHAFT FOR VNE-92,93,104,106	1A	1	
SHF-1278	JACKSHAFT FOR VNE-95,96,98,99,101,102,107, VNE-108,111,112,113,114,117,118,119,120, VNE-123,124	1A	1	
SHF-1289	SHAFT, REQUIRES 3 BUS-272 (DAMPER SECTIONS)			AR
SHF-1300	SHAFT, REQUIRES 3 BUS-272 (DAMPER SECTIONS)			AR
SHF-1301	SHAFT, REQUIRES 3 BUS-272 (DAMPER SECTIONS)			AR
SHF-1302	SHAFT, REQUIRES 3 BUS-272 (DAMPER SECTIONS)			AR
SHF-1303	SHAFT, REQUIRES 3 BUS-272 (DAMPER SECTIONS)			AR
SWT-528	SWITCH-SIDE, 2 SPDT, 10A/250V	12	AR	+
SWT-529	SWITCH-SIDE, SPDT, 10A/250V	12	AR	+
SWT-553	SWITCH-DIRTY FILTER & AIR FLOW, FACTORY MOUNTED CONTROLS	14	AR	
TER-111	TERMINAL, 30A/600V, 5 POLE, CONTROL PANEL	12	AR	
TER-149	TERMINAL, 310A/600V, 3 POLE, CONTROL PANEL	12	AR	
THT-356	THERMOSTAT-MANUAL, HEATER ASSEMBLY	12	AR	
THT-474	THERMOSTAT-LOW LIMIT TEMPERATURE, UNIT CONTROL MODULE	15	1	
THT-475	THERMOSTAT-OUTSIDE AIR FOR CONTROL SYSTEM X13650326-02, 07 & 08 UNIT CONTROL MODULE	15	1	
TOL-105	TOOL-PACKING WRENCH FOR BOD-72/73/74/75/76 BOD-77/78/82/83/84/85/86/87/88/89/90/91/92	15	1	
TRR-14	TRANSFORMER, 250VA, 480/240V, PRI., 120/240V SEC., 50/60 HZ	12	1	+
TRR-25	TRANSFORMER, 350VA, 240/480V PRI., 120/240V SEC.	12	1	+
TRR-183	TRANSFORMER, 200/230/460V PRI., 115V SEC.	12	1	+
TRR-184	TRANSFORMER, 200/230/460V PRI., 115V SEC.	12	1	+
TRR-185	TRANSFORMER, 200/230/460V PRI., 115V SEC.	12	1	+
VAL-2545	VALVE & LINKAGE ASSEMBLY, COOLING, 1/2" FOR X13680043-01, UNIT CONTROL MODULE	15	1	
VAL-2546	VALVE & LINKAGE ASSEMBLY, COOLING, 1/2" FOR X13680043-02, UNIT CONTROL MODULE	15	1	
VAL-2547	VALVE & LINKAGE ASSEMBLY, COOLING, 3/4" FOR X13680043-03, UNIT CONTROL MODULE	15	1	
VAL-2548	VALVE & LINKAGE ASSEMBLY, COOLING, 1" FOR X13680043-04, UNIT CONTROL MODULE	15	1	
VAL-2549	VALVE & LINKAGE ASSEMBLY, COOLING, 1 1/4" FOR X13680043-05, UNIT CONTROL MODULE	15	1	
VAL-2550	VALVE & LINKAGE ASSEMBLY, COOLING, 1 1/2" FOR X13680043-06, UNIT CONTROL MODULE	15	1	
VAL-2551	VALVE & LINKAGE ASSEMBLY, COOLING, 2" FOR X13680043-07, UNIT CONTROL MODULE	15	1	
VAL-2552	VALVE & LINKAGE ASSEMBLY, COOLING, 2 1/2" FOR X13680043-08, UNIT CONTROL MODULE	15	1	
VAL-2553	VALVE & LINKAGE ASSEMBLY, COOLING, 3" FOR X13680043-09, UNIT CONTROL MODULE	15	1	
VAL-2554	VALVE & LINKAGE ASSEMBLY, COOLING, 4" FOR X13680043-10, UNIT CONTROL MODULE	15	1	
VAL-2555	VALVE & LINKAGE ASSEMBLY, HEATING, 1/2" FOR X13680042-01, UNIT CONTROL MODULE	15	1	

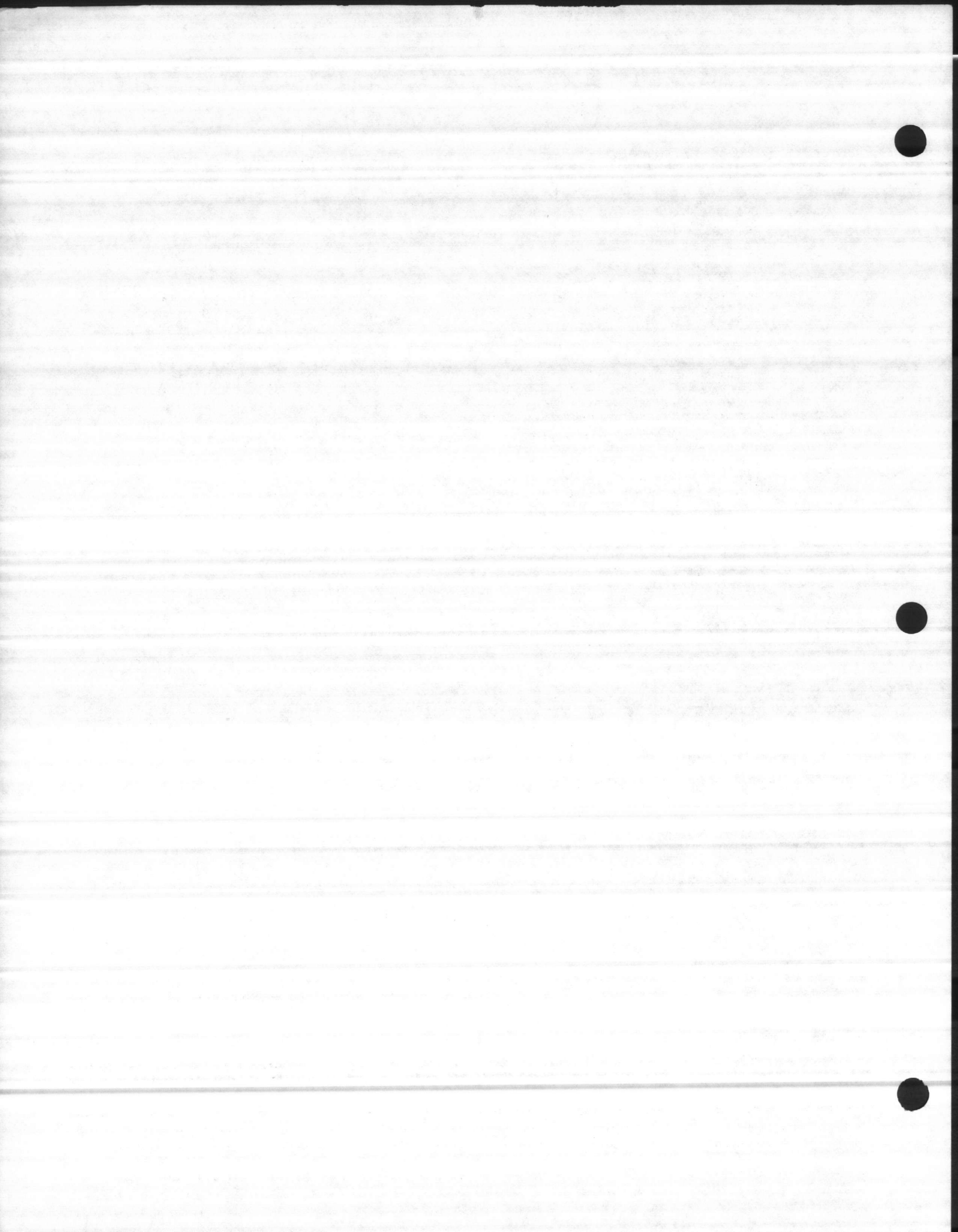


PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
VAL-2556	VALVE & LINKAGE ASSEMBLY, HEATING, 1/2" FOR X13680042-02, UNIT CONTROL MODULE	15	1	
VAL-2557	VALVE & LINKAGE ASSEMBLY, HEATING, 1/2" FOR X13680042-03, UNIT CONTROL MODULE	15	1	
VAL-2558	VALVE & LINKAGE ASSEMBLY, HEATING, 1/2" FOR X13680042-04, UNIT CONTROL MODULE	15	1	
VAL-2559	VALVE & LINKAGE ASSEMBLY, HEATING, 3/4" FOR X13680042-05, UNIT CONTROL MODULE	15	1	
VAL-2560	VALVE & LINKAGE ASSEMBLY, HEATING, 3/4" FOR X13680042-06, UNIT CONTROL MODULE	15	1	
VAL-2561	VALVE & LINKAGE ASSEMBLY, HEATING, 1" FOR X13680042-07, UNIT CONTROL MODULE	15	1	
VAL-2562	VALVE & LINKAGE ASSEMBLY, HEATING, 1" FOR X13680042-08, UNIT CONTROL MODULE	15	1	
VAL-2563	VALVE & LINKAGE ASSEMBLY, HEATING, 1 1/4" FOR X13680042-09, UNIT CONTROL MODULE	15	1	
VAL-2564	VALVE & LINKAGE ASSEMBLY, HEATING, 1 1/2" FOR X13680042-10, UNIT CONTROL MODULE	15	1	
VAL-2565	VALVE & LINKAGE ASSEMBLY, HEATING, 2" FOR X13680042-11, UNIT CONTROL MODULE	15	1	
VAL-2566	VALVE & LINKAGE ASSEMBLY, HEATING, 2 1/2" FOR X13680042-12, UNIT CONTROL MODULE	15	1	
VAL-2567	VALVE & LINKAGE ASSEMBLY, HEATING, 3" FOR X13680042-13, UNIT CONTROL MODULE	15	1	
VAL-2568	VALVE & LINKAGE ASSEMBLY, HEATING, 4" FOR X13680042-14, UNIT CONTROL MODULE	15	1	
VNE-92	INLET VANE-FAN ASSEMBLY	1	1	
VNE-93	INLET VANE-FAN ASSEMBLY	1	1	
VNE-94	INLET VANE-FAN ASSEMBLY	1	1	
VNE-95	INLET VANE-FAN ASSEMBLY	1	1	
VNE-96	INLET VANE-FAN ASSEMBLY	1	1	
VNE-97	INLET VANE-FAN ASSEMBLY	1	1	
VNE-98	INLET VANE-FAN ASSEMBLY	1	1	
VNE-99	INLET VANE-FAN ASSEMBLY	1	1	
VNE-100	INLET VANE-FAN ASSEMBLY	1	1	
VNE-101	INLET VANE-FAN ASSEMBLY	1	1	
VNE-102	INLET VANE-FAN ASSEMBLY	1	1	
VNE-103	INLET VANE-FAN ASSEMBLY	1	1	
VNE-104	INLET VANE-FAN ASSEMBLY	1	1	
VNE-105	INLET VANE-FAN ASSEMBLY	1	1	
VNE-106	INLET VANE-FAN ASSEMBLY	1	1	
VNE-107	INLET VANE-FAN ASSEMBLY	1	1	
VNE-108	INLET VANE-FAN ASSEMBLY	1	1	
VNE-109	INLET VANE-FAN ASSEMBLY	1	1	
VNE-110	INLET VANE-FAN ASSEMBLY	1	1	
VNE-111	INLET VANE-FAN ASSEMBLY	1	1	
VNE-112	INLET VANE-FAN ASSEMBLY	1	1	
VNE-113	INLET VANE-FAN ASSEMBLY	1	1	
VNE-114	INLET VANE-FAN ASSEMBLY	1	1	
VNE-115	INLET VANE-FAN ASSEMBLY	1	1	
VNE-116	INLET VANE-FAN ASSEMBLY	1	1	
VNE-117	INLET VANE-FAN ASSEMBLY	1	1	
VNE-118	INLET VANE-FAN ASSEMBLY	1	1	
VNE-119	INLET VANE-FAN ASSEMBLY	1	1	
VNE-120	INLET VANE-FAN ASSEMBLY	1	1	
VNE-121	INLET VANE-FAN ASSEMBLY	1	1	
VNE-122	INLET VANE-FAN ASSEMBLY	1	1	
VNE-123	INLET VANE-FAN ASSEMBLY	1	1	
VNE-124	INLET VANE-FAN ASSEMBLY	1	1	
VNE-125	INLET VANE-FAN ASSEMBLY	1	1	
VNE-126	INLET VANE-FAN ASSEMBLY	1	1	
VNE-127	INLET VANE-FAN ASSEMBLY	1	1	
VNE-128	INLET VANE-FAN ASSEMBLY	1	1	
VNE-129	INLET VANE-FAN ASSEMBLY	1	1	
VNE-130	INLET VANE-FAN ASSEMBLY	1	1	
VNE-131	INLET VANE-FAN ASSEMBLY	1	1	
VNE-132	INLET VANE-FAN ASSEMBLY	1	1	
VNE-133	INLET VANE-FAN ASSEMBLY	1	1	
VNE-134	INLET VANE-FAN ASSEMBLY	1	1	
VNE-135	INLET VANE-FAN ASSEMBLY	1	1	
VNE-136	INLET VANE-FAN ASSEMBLY	1	1	
VNE-137	INLET VANE-FAN ASSEMBLY	1	1	
VNE-138	INLET VANE-FAN ASSEMBLY	1	1	
VNE-139	INLET VANE-FAN ASSEMBLY	1	1	
VNE-141	INLET VANE-FAN ASSEMBLY	1	1	
VNE-142	INLET VANE-FAN ASSEMBLY	1	1	
VNE-143	INLET VANE-FAN ASSEMBLY	1	1	



PART NO.	DESCRIPTION	SECTION	NO. REQ.	RSP
VNE-155	INLET VANE-FAN ASSEMBLY	1	1	
VNE-330	INLET VANE-FAN ASSEMBLY	1	1	
VNE-331	INLET VANE-FAN ASSEMBLY	1	1	
VNE-332	INLET VANE-FAN ASSEMBLY	1	1	
VNE-333	INLET VANE-FAN ASSEMBLY	1	1	
VNE-336	INLET VANE & CONE (CCW)	1	1	
VNE-337	INLET VANE & CONE (CW)	1	1	
VNE-340	INLET VANE & CONE (CW)	1	1	
VNE-341	INLET VANE & CONE (CCW)	1	1	
VNE-342	INLET VANE & CONE (CCW)	1	1	
VNE-343	INLET VANE & CONE (CW)	1	1	
VNE-526	INLET VANE & CONE (CCW)	1	1	
VNE-527	INLET VANE & CONE (CW)	1	1	
VNE-528	INLET VANE & CONE (CCW)	1	1	
VNE-529	INLET VANE & CONE (CW)	1	1	
VNE-530	INLET VANE & CONE (CCW)	1	1	
VNE-531	INLET VANE & CONE (CW)	1	1	
VNE-532	INLET VANE & CONE (CCW)	1	1	
VNE-533	INLET VANE & CONE (CW)	1	1	
VNE-535	INLET VANE & CONE (CCW)	1	1	
VNE-536	INLET VANE & CONE (CW)	1	1	
VNE-537	INLET VANE & CONE (CCW)	1	1	
VNE-538	INLET VANE & CONE (CW)	1	1	
VNE-539	INLET VANE & CONE (CCW)	1	1	
VNE-540	INLET VANE & CONE (CW)	1	1	
VNE-541	INLET VANE & CONE (CCW)	1	1	
VNE-542	INLET VANE & CONE (CW)	1	1	
VNE-543	INLET VANE & CONE (CCW)	1	1	
VNE-544	INLET VANE & CONE (CW)	1	1	
VNE-545	INLET VANE & CONE (CCW)	1	1	
VNE-546	INLET VANE & CONE (CW)	1	1	
VNE-547	INLET VANE & CONE (CCW)	1	1	
VNE-548	INLET VANE & CONE (CW)	1	1	
VNE-549	INLET VANE & CONE (CCW)	1	1	
VNE-550	INLET VANE & CONE (CW)	1	1	
VNE-551	INLET VANE & CONE (CCW)	1	1	
VNE-552	INLET VANE & CONE (CW)	1	1	
VNE-553	INLET VANE & CONE (CCW)	1	1	
VNE-554	INLET VANE & CONE (CW)	1	1	
VNE-555	INLET VANE & CONE (CCW)	1	1	
VNE-556	INLET VANE & CONE (CW)	1	1	
VNE-557	INLET VANE & CONE (CCW)	1	1	
VNE-558	INLET VANE & CONE (CW)	1	1	
VNE-559	INLET VANE & CONE (CCW)	1	1	
VNE-560	INLET VANE & CONE (CW)	1	1	
VNE-561	INLET VANE & CONE (CCW)	1	1	
VNE-562	INLET VANE & CONE (CW)	1	1	
VNE-563	INLET VANE & CONE (CCW)	1	1	
VNE-564	INLET VANE & CONE (CW)	1	1	
VNE-565	INLET VANE & CONE (CCW)	1	1	
VNE-566	INLET VANE & CONE (CW)	1	1	
VNE-567	INLET VANE & CONE (CCW)	1	1	
VNE-568	INLET VANE & CONE (CW)	1	1	
VNE-569	INLET VANE & CONE (CCW)	1	1	
VNE-570	INLET VANE & CONE (CCW)	1	1	
VNE-571	INLET VANE & CONE (CW)	1	1	
VNE-572	INLET VANE & CONE (CCW)	1	1	
VNE-573	INLET VANE & CONE (CW)	1	1	
VNE-574	INLET VANE & CONE (CCW)	1	1	
VNE-575	INLET VANE & CONE (CW)	1	1	

For further information on this product or other Trane products, refer to the "Trane Service Literature Catalog", ordering number IDX-IOM-1. This catalog contains listings and prices for all service literature sold by Trane. The catalog may be ordered by sending a \$20.00 check to: The Trane Company, Service Literature Sales, 3600 Pammel Creek Road, La Crosse, WI 54601.



Installation and Start-Up Instructions

SAFETY CONSIDERATION

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency or your distributor or branch for information or assistance. The qualified installer or agency must use factory authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and NEC (National Electrical Code) for special installation requirements.

▲ WARNING

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause personal injury or death.

Step 1—Check Equipment and Jobsite

UNPACK UNIT—Move to final location. Remove carton taking care not to damage unit.

INSPECT EQUIPMENT for damage prior to installation. File claim with shipping company if shipment is damaged or incomplete. Check rating plate to be sure unit matches job specifications.

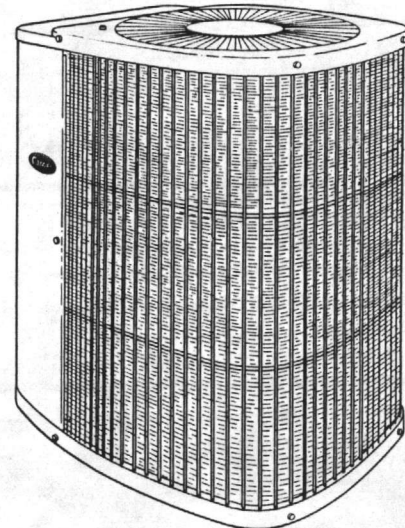
Step 2—Install on a Solid, Level Mounting Pad—If conditions or local codes require the unit be attached to pad, tiedown bolts should be used and fastened thru knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 2.

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping and service. Allow 30 in. clearance to service end of unit and 48 in. above unit. For proper airflow, a 6 in. clearance on one side of unit and 12 in. on all remaining sides must be maintained. Maintain a distance of 24 in. between condensing units. Position so snow or ice from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. above roof surface. Where possible, place unit above a load-bearing wall.

Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

Step 3—Replace indoor AccuRater Piston, if Required—Check indoor coil piston to see if it matches the required piston listed in Table 6. If it does not match, replace indoor coil



A88160

Fig. 1—Model 38TG

piston with piston shipped with this unit. The piston shipped with outdoor unit is correct for any approved indoor coil combination.

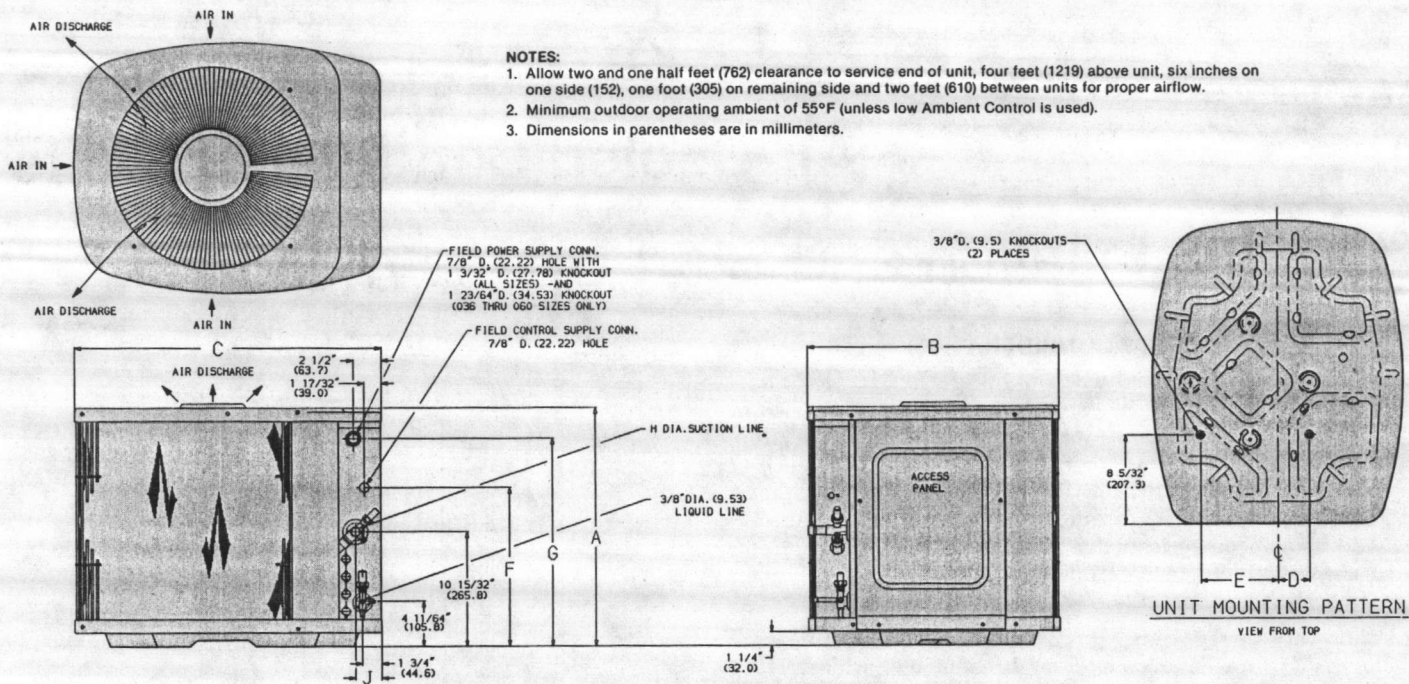
▲ CAUTION

DO NOT BURY MORE THAN 3 FT OF REFRIGERANT TUBING IN GROUND. If any section of tubing is buried, there must be a 6-in. vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to cooler buried section during extended periods of unit shutdown, causing refrigerant slugging and possible compressor damage at start-up.

Step 4—Make Piping Connections—Outdoor units may be connected to indoor sections using accessory tubing package or field-supplied tubing of refrigerant grade, correct size, and condition. The liquid- and vapor-tube diameters can be determined by using Tables 4 and 5. For tubing requirements beyond 50 ft., obtain information from your local distributor.

If either refrigerant tubing or indoor coil is exposed to atmospheric conditions for longer than 5 minutes, it must be evacuated to 1000 microns to eliminate contamination and moisture in the system.

Run refrigerant tubes as directly as possible, avoiding unnecessary turns and bends. Suspend refrigerant tubes so they do not damage insulation on vapor tube and do not transmit vibration to structure. Also, when passing refrigerant tubes through wall, seal opening so vibration is not transmitted to structure. Leave some slack in refrigerant tubes between structure and unit to absorb vibration.



- NOTES:**
1. Allow two and one half feet (762) clearance to service end of unit, four feet (1219) above unit, six inches on one side (152), one foot (305) on remaining side and two feet (610) between units for proper airflow.
 2. Minimum outdoor operating ambient of 55°F (unless low Ambient Control is used).
 3. Dimensions in parentheses are in millimeters.

Fig. 2—Dimensional Drawing

A88147

Table 1—Dimensions

UNIT	SHIPPING WGT. LBS.	A		B		C		D		E		F		G		H		J	
		(FT./IN.)	(mm)	(FT./IN.)	(mm)	(FT./IN.)	(mm)	(IN.)	(mm)	(IN.)	(mm)	(FT./IN.)	(mm)	(FT./IN.)	(mm)	(IN.)	(mm)	(IN.)	(mm)
38TG014	134	1'-9 27/32"	554.8	1'-10 1/2"	571.5	2'-2 3/16"	665.1	4 5/64"	103.4	7 5/64"	179.7	1'-1 51/64"	350.6	1'-6 21/64"	465.6	5/8	15.88	2 23/64"	59.9
38TG018	140	1'-9 27/32"	554.8	1'-10 1/2"	571.5	2'-2 3/16"	665.1	4 5/64"	103.4	7 5/64"	179.7	1'-1 51/64"	350.6	1'-6 21/64"	465.6	5/8	15.88	2 23/64"	59.9
38TG024	142	1'-9 27/32"	554.8	1'-10 1/2"	571.5	2'-2 3/16"	665.1	4 5/64"	103.4	7 5/64"	179.7	1'-1 51/64"	350.6	1'-6 21/64"	465.6	5/8	15.88	2 23/64"	59.9
38TG030	145	2'-1 27/32"	656.4	1'-10 1/2"	571.5	2'-2 3/16"	665.1	4 5/64"	103.4	7 5/64"	179.7	1'-3 29/32"	404.2	1'-10 21/64"	567.2	3/4	19.05	2 23/64"	59.9
38TG036	165	2'-7 27/32"	808.8	1'-10 1/2"	571.5	2'-2 3/16"	665.1	4 5/64"	103.4	7 5/64"	179.7	1'-9 29/32"	556.6	2'-4 21/64"	719.6	3/4	19.05	2 23/64"	59.9
38TG042	210	2'-1 27/32"	656.4	2'-6"	762.0	2'-8 31/32"	837.5	5 1/32"	127.9	9 41/64"	245.0	1'-3 29/32"	404.2	1'-10 21/64"	567.2	7/8	22.22	2 57/64"	73.4
38TG048	220	2'-1 27/32"	656.4	2'-6"	762.0	2'-8 31/32"	837.5	5 1/32"	127.9	9 41/64"	245.0	1'-3 29/32"	404.2	1'-10 21/64"	567.2	7/8	22.22	2 57/64"	73.4
38TG060	245	3'-1 27/32"	961.2	2'-6"	762.0	2'-8 31/32"	837.5	5 1/32"	127.9	9 41/64"	245.0	2'-3 29/32"	709.0	2'-10 21/64"	872.0	7/8	22.22	2 57/64"	73.4

Table 2—Physical Data

MODEL 38TG	014300	018300	024300	030300	036300	036500	036600	042300	042500	042600	048300	048500	048600	060300	060500	060600
REFRIGERANT	R-22															
Factory Charge (lbs-oz.)	2-14	2-15	3-2	3-10	4-10			5-1			6-0			8-12		
CONDENSER FAN	Propeller Type, Direct Drive															
Air Discharge	Vertical															
CONNECTION TYPE																
Vapor	Sweat															
Liquid	Sweat															

OUTDOOR UNITS CONNECTED TO FACTORY APPROVED INDOOR UNITS—Outdoor units contain correct system refrigerant charge for operation with indoor unit of the same size when connected by 25 ft of field-supplied or factory accessory tubing. Check refrigerant charge for maximum efficiency (see Refrigerant Charging).

CONNECT REFRIGERANT TUBING to fittings on outdoor unit vapor and liquid service valves (Fig. 2).

SWEAT CONNECTION—Use refrigerant grade tubing. Service Valves are closed from factory and ready for brazing. After wrapping the service valve with a wet cloth, the tubing set can be brazed to the service valve using either silver bearing or non-silver bearing brazing material. Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.

Table 3—Electrical Data

OUTDOOR UNIT 38TG	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MIN. WIRE SIZE	MAX. LENGTH (Ft.)‡	MAX FUSE† OR HACR TYPE CKT BKR AMPS
		MAX	MIN	LRA	RLA	FLA				
014-300	208/230/1	253	187	35.0	6.6	0.5	8.75	14	100	15
018-300				52.0	9.1	0.5	11.80	14	75	20
024-300				73.0	12.8	0.8	16.80	12	80	25
030-300				90.0	15.0	0.8	19.50	12	70	30
036-300				106.0	20.8	0.8	26.80	10	85	45
042-300				127.0	22.8	1.4	29.90	10	75	50
048-300				141.0	28.5	1.4	37.00	8	95	60
060-300	142.0	30.8	1.4	39.90	8	90	60			
036-500	208/230/3	253	187	79.5	11.8	0.8	15.60	12	110	25
042-500				98.5	16.8	1.6	22.60	10	120	35
048-500				110.0	18.1	1.6	24.20	10	110	40
060-500				130.0	20.1	1.6	26.70	10	100	45
036-600	460/3	506	414	39.8	6.3	0.4	8.30	14	130	15
042-600				49.3	8.5	0.8	11.40	14	95	15
048-600				55.0	9.1	0.8	12.20	14	90	20
060-600				65.0	9.1	0.8	12.20	14	90	20

FLA — Full Load Amps
 HACR—Heating, Air Conditioning, Refrigeration
 LRA — Locked Rotor Amps
 MCA — Minimum Circuit Amps
 RLA — Rated Load Amps

*Permissible limits of the voltage range at which unit will operate satisfactorily.

†Time-delay fuse.

‡Length shown is as measured one way along wire path between unit and service panel for minimum 2% voltage drop.

NOTE: Control circuit is 24 v on all units and requires external power source.

Table 4—Recommended Liquid-Tube Diameters

Size	Liquid-Tube Length (Feet)*	Recommended Diameter (Inches)†
014, 018, 024, 030	0 to 50	1/4
036, 042, 048, 060	0 to 50	3/8

*For tube set over 50 ft, consult long line information.

†Use only 3/8-in. diameter tube on cap-tube indoor coil systems.

Table 5—Recommended Vapor-Tube Diameters

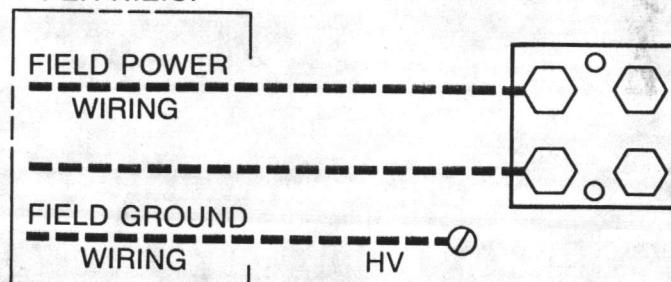
Size	Vapor-Tube Length (Feet)*	Recommended Diameter (Inches)
014, 018, 024	0 to 50	5/8
030, 036	0 to 50	3/4
042	0 to 50	7/8
048, 060	0 to 50	1-1/8

*For tube set over 50 ft, consult long line information.

CAUTION

To avoid damage while brazing, service valves **MUST** be wrapped with a heat-sinking material such as a wet cloth.

DISCONNECT PER N.E.C.



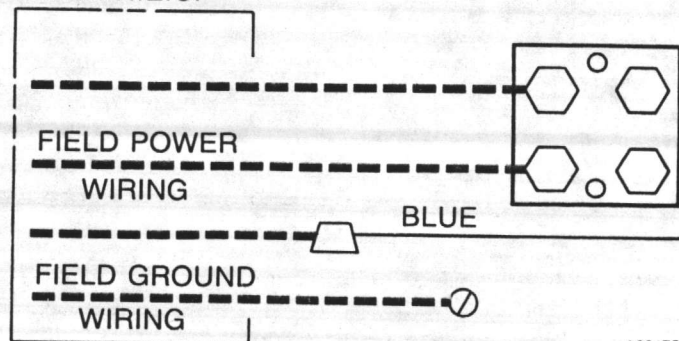
A88174

Fig. 3—Line Power Connections (Single Phase)

CAUTION

A brazing shield **MUST** be used when tubing sets are being brazed to the service valves to prevent damage to the unit surface.

DISCONNECT PER N.E.C.



A88175

Fig. 4—Line Power Connections (Three Phase)

Table 6—AccuRater™ Chart

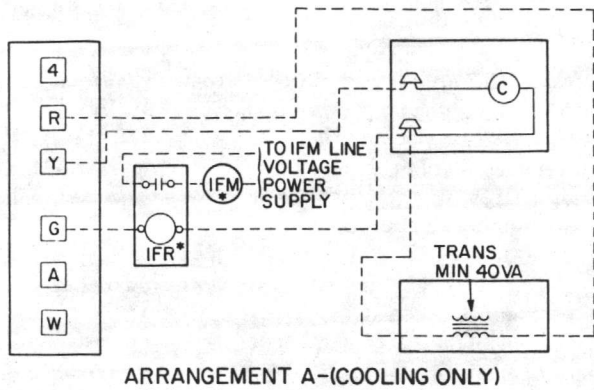
Condensing Unit Size	Piston Identification No.
014	46
018	49
024	63
030	67
036	76
042	80
048	84
060	90

*Piston listed is for any approved coil combination. See pre-sale literature for approved combinations.

**Table 8—Required Vapor-Tube Temperature (F)
(Entering Vapor Service Valve)**

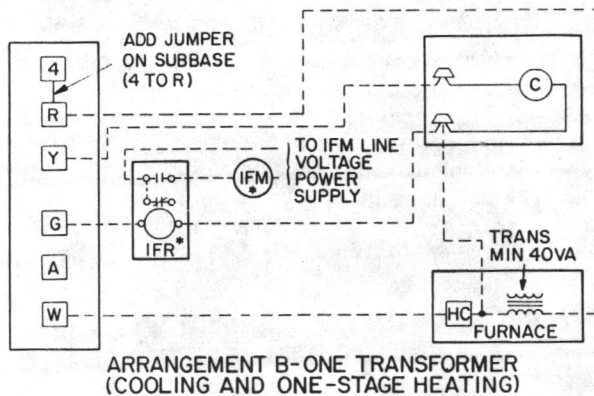
Superheat Temp (F)	VAPOR PRESSURE AT SERVICE PORT (psig)								
	61.5	64.2	67.1	70.0	73.0	76.0	79.2	82.4	85.7
0	35	37	39	41	43	45	47	49	51
2	37	39	41	43	45	47	49	51	53
4	39	41	43	45	47	49	51	53	55
6	41	43	45	47	49	51	53	55	57
8	43	45	47	49	51	53	55	57	59
10	45	47	49	51	53	55	57	59	61
12	47	49	51	53	55	57	59	61	63
14	49	51	53	55	57	59	61	63	65
16	51	53	55	57	59	61	63	65	67
18	53	55	57	59	61	63	65	67	69
20	55	57	59	61	63	65	67	69	71
22	57	59	61	63	65	67	69	71	73
24	59	61	63	65	67	69	71	73	75
26	61	63	65	67	69	71	73	75	77
28	63	65	67	69	71	73	75	77	79
30	65	67	69	71	73	75	77	79	81
32	67	69	71	73	75	77	79	81	83
34	69	71	73	75	77	79	81	83	85
36	71	73	75	77	79	81	83	85	87
38	73	75	77	79	81	83	85	87	89
40	75	77	79	81	83	85	87	89	91

Manufacturer reserves the right to discontinue, or change, specifications or designs without notice and without incurring obligations.



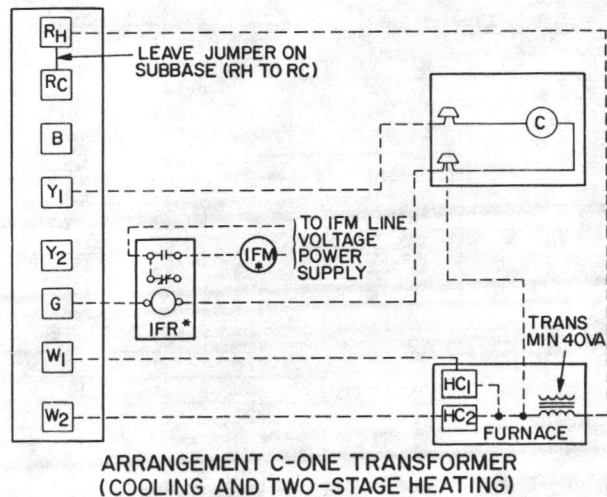
ARRANGEMENT A-(COOLING ONLY)

A87026



ARRANGEMENT B-ONE TRANSFORMER
(COOLING AND ONE-STAGE HEATING)

A87024



ARRANGEMENT C-ONE TRANSFORMER
(COOLING AND TWO-STAGE HEATING)

A87023

*IFM and IFM are located in furnace on heating-cooling applications. If accessory IFM is required for cooling-only applications, locate (IFM) in fan coil.

C	—Contactor (12-va)	Field Splice
HC	—Heating Control	Field Wiring
IFM	—Indoor Fan Motor	Factory Wiring
IFR	—Indoor Fan Relay	
Trans	—Transformer	

NOTE: Refer to unit wiring label for wire colors: C to G and C to Y connections.

Fig. 5—Typical Circuit Connections

Step 5—Make Electrical connections—Be sure field wiring complies with local and national fire, safety and electrical codes, and voltage to system is within limits shown in Table 3 or on unit rating plate. Contact local power company for correction of improper voltage. See Table 3 for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See Table 3. Do not install unit in system where voltage or phase imbalance (3 phase) may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

INSTALL BRANCH CIRCUIT DISCONNECT PER NEC of adequate size to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC (National Electrical Code).

ROUTE GROUND AND POWER WIRES—Remove access panel and control box cover to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided (see Fig. 2) and into unit control box.

CONNECT GROUND AND POWER WIRES—Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 3 and Fig. 4.

CONNECT CONTROL WIRING—Route 24-v control wires through control wiring grommet and connect to brown & blue pigtailed supplied in unit splice box (Fig. 5).

Use furnace or fan coil transformer as 24-v (40-va minimum) supply for system as shown in Fig. 5, or use accessory transformer.

Step 6—Compressor Crankcase Heat—A crankcase heater is required if the refrigerant tubing is longer than 50 feet.

NOTE: The Seasonal Energy Efficiency Ratio (SEER) is obtained with the crankcase heat de-energized. To de-energize the crankcase heater, disconnect the black crankcase heater wires at the contactor. After disconnecting, make sure wires are isolated from all other electrical connections and components to prevent electrical shorting.

Step 7—Install Electrical Accessories, if any. Refer to the individual instructions packaged with the kits or accessories when installing.

Step 8—Start-up

1. When equipped with a crankcase heater, energize heater a minimum of 24 hours before starting unit. To energize heater only, set thermostat at OFF position and close electrical disconnect to outdoor unit.
2. Fully Backseat (open) liquid and vapor tube service valves.
3. Unit is shipped with valve stem(s) frontseated, and caps installed. Replace stem caps after system is opened to refrigerant flow (backseated). Replace caps finger tight and tighten additional 1/12 turn (20 ft-lbs torque) using a back-up wrench on valve body flats to prevent distortion of sheet metal.
4. Close electrical disconnects to energize system.
5. Set room thermostat at desired temperature. Be sure set point is below indoor ambient temperature.
6. Set room thermostat at COOL and fan switch at FAN or Auto, as desired. Operate unit for 15 minutes. Check system refrigerant charge. See Refrigerant Charging, below.

Step 9—Checking Charge

⚠ WARNING

Service valve gauge ports are not equipped with shradar valves. To prevent personal injury, make sure gauge manifold is connected to the valve gauge ports before moving valves off fully backseated position. Wear safety glasses and gloves when handling refrigerant.

⚠ CAUTION

Compressor damage may occur if system is overcharged.

1. Operate unit a minimum of 10 minutes before checking charge.
2. Measure vapor pressure by attaching a gage to vapor valve service port.
3. Measure vapor line temperature by attaching a service thermometer to unit vapor line near vapor valve. Insulate thermometer for accurate readings.
4. Measure outdoor air dry-bulb temperature with a second thermometer.

5. Measure indoor air (entering indoor coil) wet-bulb temperature with a sling psychrometer.
6. Refer to Table 7. Find outdoor temperature and evaporator entering air wet-bulb temperature. At this intersection note the superheat.
7. Refer to Table 8. Find superheat temperature located in previous step and vapor pressure. At this intersection note vapor line temperature.
8. If unit has a higher vapor line temperature than charted temperature, add refrigerant until charted temperature is reached.
9. If unit has a lower vapor line temperature than charted temperature, bleed refrigerant until charted temperature is reached.
10. If outdoor air temperature or pressure at vapor valve changes, charge to new vapor line temperature indicated on chart.
11. This procedure is valid, independent of indoor air quantity.

Step 10—Care and Maintenance—For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your servicing contractor or users manual for the proper frequency of maintenance. Frequency of maintenance may vary depending upon geographic areas, such as coastal applications.

**Table 7—Superheat Charging Table
(Superheat Entering Vapor Service Valve)**

Outdoor Temp (F)	INDOOR COIL ENTERING AIR TEMP (F WB)													
	50	52	54	56	58	60	62	64	66	68	70	72	74	76
55	9	12	14	17	20	23	26	29	32	35	37	40	42	45
60	7	10	12	15	18	21	24	27	30	33	35	38	40	43
65	—	6	10	13	16	19	21	24	27	30	33	36	38	41
70	—	—	7	10	13	16	19	21	24	27	30	33	36	39
75	—	—	—	6	9	12	15	18	21	24	28	31	34	37
80	—	—	—	—	5	8	12	15	18	21	25	28	31	35
85	—	—	—	—	—	—	8	11	15	19	22	26	30	33
90	—	—	—	—	—	—	5	9	13	16	20	24	27	31
95	—	—	—	—	—	—	—	6	10	14	18	22	25	29
100	—	—	—	—	—	—	—	—	8	12	15	20	23	27
105	—	—	—	—	—	—	—	—	5	9	13	17	22	26
110	—	—	—	—	—	—	—	—	—	6	11	15	20	25
115	—	—	—	—	—	—	—	—	—	—	8	14	18	23

—Do not attempt to charge system under these conditions or refrigerant slugging may occur.

Installation, Start-Up and Service Instructions

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SAFETY CONSIDERATIONS

Installation and servicing of air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service air conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on system, turn off main power switches to indoor unit and outdoor unit. Turn off accessory heater power switch if applicable. Electrical shock could cause personal injury.

IMPORTANT: This unit may include a factory-installed fan coil drip eliminator. The eliminator has been installed especially for high-humidity application, for vertical installation only.

⚠ CAUTION

Do not install eliminator-equipped fan coil in horizontal applications.

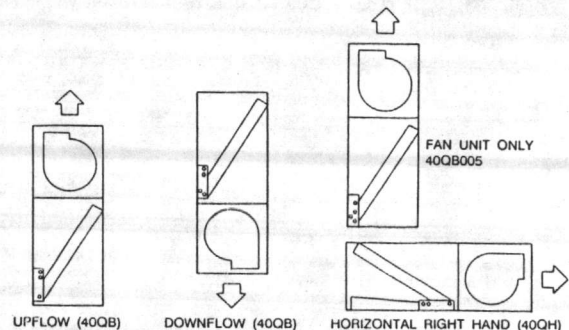
DESCRIPTION AND USAGE

Use 40QB fan coil in vertical upflow and downflow applications only. Use 40QH in horizontal right-hand applications only. *Neither 40QB nor 40QH fan coil can be mounted in horizontal left-hand position.* See Fig. 1.

All Models 40QB,QH can be used in cooling-only applications with accessory cooling controls or in heat pump systems with accessory electric heaters. Standard units consist of a coil with a condensate pan, 3-speed direct-drive fan/motor assembly and filter section with a cleanable filter—all within an insulated cabinet.

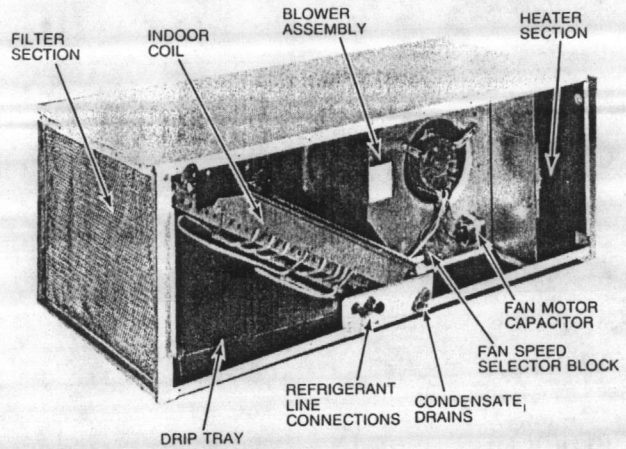
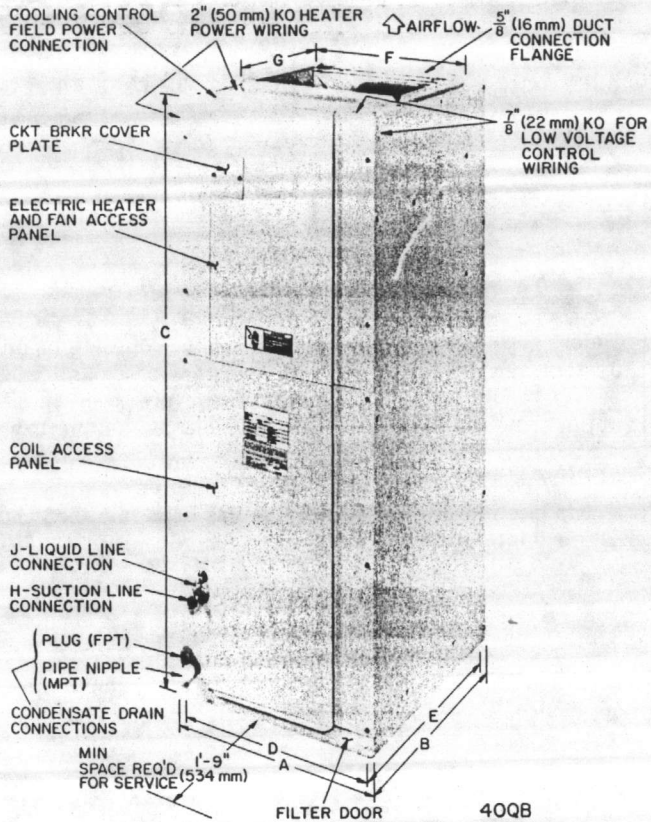
All units must be used with ductwork. Use accessory downflow base for all downflow installations. Installation instructions are provided with accessory. Install units in conditioned or unconditioned spaces. All units are tested per ARI standards (80 F [26.7 C] db, 75 F [23.9 C] wb indoor temperature; 80 F [26.7 C] db outdoor temperature). This approximates 80% relative humidity operation. Condensation on cabinet may occur if relative humidity is above 80%.

Electric Heater—See Table 4 for fan coil/electric heater combinations. Electric heaters have both heating and cooling controls, including a control circuit transformer, indoor fan relay and low-voltage terminal board.



A88474

Fig. 1—40QB,QH Applications



A88582

A88583

Fig. 2—Dimensions and Connections

Cooling Control Kit (accessory) contains a 60-volt transformer, indoor fan relay and low-voltage connections. Cooling control kit is not required when electric heater is used.

AccuRater™ System Refrigerant Control (bypass type) is factory installed on 40QB, QH units. Certain combinations of heat pump or condensing unit and fan coil require field replacement of the piston for optimum efficiency. Refer to heat pump or condensing unit instructions for required piston size. Bypass-type AccuRater components are shown in Fig. 14. The AccuRater piston has a refrigerant metering orifice through it and is field replaceable.

INSTALLATION

Step 1—Inspect Equipment—File claim with shipping company if shipment is damaged or incomplete.

FAN UNIT WITH SEPARATE A-COIL (40QB005/315016-701) A-coil part number 315016-701 can be installed with 40QB005 for vertical upflow application only. Mounting rails are attached to sides of casing to slide in and support A-coil. See Figs. 1 and 3.

Step 2—Mount Fan Coil—The 40QB can stand on floor or base. The 40QH can lie on floor or hang from ceiling. Allow space for wiring, piping and servicing unit. See Fig. 2.

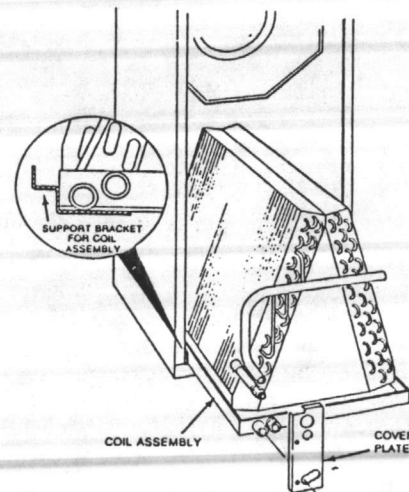
FLOOR MOUNTING IN VERTICAL UPFLOW POSITION (40QB only)—Make duct flush with floor. Set unit on floor over opening. Use fireproof resilient gasket, 1/8 to 1/4 in. (3mm to 6mm) thick, between duct, unit and floor.

Utility Room Installation—When 40QB is located in a utility room that has louvered doors and is mounted for free air return, a field-fabricated side inlet and filter assembly is recommended.

A return-air connection may be made directly into the right side (only) on upflow 40QB units. It is recommended that

when the right-side connection is made, the standard return-air opening be blanked off with sheet metal, even where not required by local code. To make right-side air opening:

1. Cut opening as indicated by dimples on right side of unit in Fig. 4.
2. Blank off standard return air opening in the bottom of unit as required.
3. Install field-fabricated air filter section on right side return air opening. Use field-supplied sheet metal screws as required.



A88540

Fig. 3—

Table 1—Physical Data and dimensions (Fig. 2)

MODEL 40QB,QH		042/043	048/049	060	005/062/063	
OPERATING WEIGHT (Standard Units)	(lb)	165	175		180	
	(Kg)	75	79		82	
FAN		Centrifugal/Direct Drive 1025/925/825				
Rpm (3-speed)		Upflow/Horizontal/Downflow				
Air Discharge		1400	1600		2000	
Nominal	(Cfm)	660	755		944	
PSC Motor	(Hp)		1/2		3/4	
	(kW)		0.372		0.559	
DIMENSIONS	A (ft-in.)			1-9		
	(mm)			524		
	B (ft-in.)	1-10			2-2 1/2	
(mm)	578			622		
C (ft-in.)				4-8		
(mm)				1422		
DUCT INLET	D (ft-in.)			1-7		
	(mm)			483		
E (ft-in.)	1-9			2-0 1/2		
(mm)	534			622		
DUCT OUTLET	F (ft-in.)			1-6		
	(mm)			457		
G (ft-in.)	1-1 7/8			1-5 1/2		
(mm)	351			439		
CONNECTIONS	Suction ODF (Compatible Fitting)	H (in.)		3/4		
		(mm)		19.1		
	Liquid ODF (SAE Flare Fitting)	J (in.)		3/8		
		(mm)		10		
	Plug (FPT)	(in.)		3/4		
	Pipe Adapter (MPT)	(in.)		3/4		
	Horizontal Suspension Mounting Knockouts	(in.)		1/2		
		(mm)		12.5		
	Width Between suspension Mounting Holes	(ft-in.)	1-8 3/4		1-11 3/4	
	(mm)	517		605		
Height Between Suspension Mounting Holes	(ft-in.)		3-8 1/8			
(mm)			1121			
NOMINAL FILTER SIZE (Cleanable)	(in.)	20 x 21		20 x 25		
	(mm)	508 x 533		508 x 635		

HORIZONTAL RIGHT-HAND MOUNTING (40QH only)

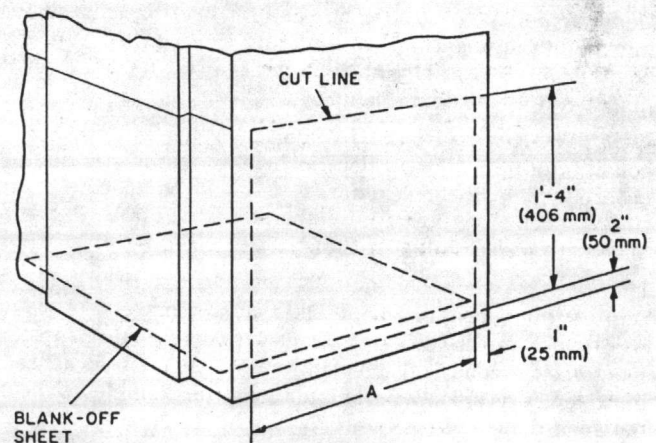
IMPORTANT: To ensure proper condensate drainage, the 40QH (for horizontal right-hand applications *only*), must be installed so it is level within 1/8-in. in both length and width of unit.

1. Install secondary pan if 40QH is installed above living space.
2. Arrange support for 40QH and set it in or above secondary condensate pan. See Fig. 2.
3. When suspending unit from ceiling, 1/2-in. (12.5-mm) knockouts are provided on both sides of unit for 3/8-in. (10-mm) suspension rods. See Fig. 2. Provide means to isolate unit vibration from structure as required.

DOWNFLOW MOUNTING (40QB only)

1. Accessory condensate pan and fireproof base must be used in downflow applications. Part numbers vary with models and application. Contact dealer for correct part numbers. Separate installation instructions are packaged in kits.
2. Make sure motor oiling holes are a minimum of 45° above horizontal center line of motor so motor can be oiled.
3. Install secondary pan if unit is installed above living space.

Step 3—Connect Ductwork to Unit Supply and Return Air Openings—Duct connection flanges are provided on unit air discharge connection (see Fig. 2).



MODEL 40QB,QH	HEIGHT		WIDTH—A	
	(ft-in.)	(mm)	(ft-in.)	(mm)
042/043	1-4	406	1-7 1/2	498
048/049			1-11 1/4	586
060				
005/062/063				

Fig. 4—Right-Side Return Air Connection Details

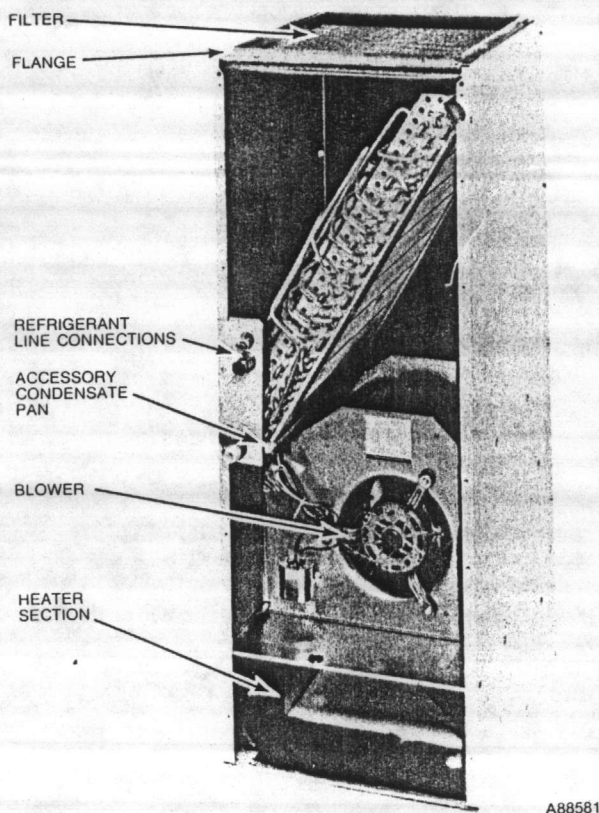


Fig. 5—Downflow Arrangement (40 QB)

The minimum clearance from combustible materials is zero inches for the unit cabinet for all applications, and the ductwork when the unit is to be used for cooling-only applications. When the unit is to be used for heating-only or heating/cooling applications, a minimum clearance of 1-in. from combustible materials must be maintained for the first 36-ins. of supply-air duct (plenum included).

DUCTWORK SPECIFICATIONS—When 40QB,QH fan coil is equipped with electric heater: install air ducts in accordance with the standards of the National Fire Protection Association (NFPA), numbers 90A and 90B, in compliance with paragraph 46.1-E of UL Standard 1096.

If necessary, refer to system Design Manual, Part 2, for system air duct design. Use flexible connectors between ductwork and unit to prevent transmission of vibration. (See Ductwork Acoustical Treatment.) When electric heater is installed, use heat resistant material for flexible connector between ductwork and unit for discharge connection. Ductwork passing through conditioned space must be insulated and covered with vapor barrier. External ductwork must be insulated and weatherproofed.

DUCTWORK ACOUSTICAL TREATMENT—Metal duct systems that do not have one 90° elbow and 10 ft (3m) of main duct to first branch takeoff require internal acoustical insulation lining per the following specifications:

Line the inside of plenum, branch runs and main duct with acoustical insulation in accordance with the latest edition of SMACNA (Sheet Metal and Air Conditioning Contractors National Association) application standard for duct liner. Duct liners should be UL classified batts and blankets with a fire hazard classification working of FHC-25/50 or less.

Ensure main duct lining is extended 6 to 8 ft (1.8 to 2.3m) down the duct from plenum.

As an alternative to above, fibrous glass ductwork may be used if constructed and installed in accordance with the latest edition of SMACNA construction standard on fibrous glass duct.

Both acoustical lining and fibrous ductwork shall comply with National Fire Protection Association as tested by UL Standard 181 for Class I air ducts.

Step 4—Connect Refrigerant Liquid and Suction Lines to refrigerant line connections. See Fig. 2 and Table 1 for line connection sizes, type and location. Use accessory tubing package or field-supplied tubing of refrigerant grade. Insulate entire suction line if field-supplied tubing is used. Tubing package has an insulated suction line. Do not use damaged, dirty or contaminated tubing because AccuRater™ refrigerant flow control may plug up. When tubing package is used and mechanical connections are made within 60 seconds, coil and tubing system do not require purging or evacuation. Always evacuate or purge if field-supplied tubing is used, when sweat connections are made or when tubing must be flared.

Units have 3/4-in. (19.1-mm) Compatible Fitting suction line connection and a 3/8-in. (9.52-mm) SAE flare fitting liquid line connection. Make suction line connection first. Compatible Fitting(s) permits mechanical (quick-connect) or sweat connections as described later in this section. When making liquid line connection, slide flare nut on liquid line, then flare and connect liquid line. It is not necessary to flare liquid line if an accessory flare-to-Compatible Fitting coupler (Part No. 38CQ900061) is used.

MECHANICAL CONNECTION (Mate one set of connections at a time.)

1. Loosen locknut on Compatible Fitting one turn. Do not remove. See Fig. 6.
2. Remove plug and be sure O-ring is in the groove inside the Compatible Fitting.
3. Cut tubing to correct length.
4. Insert tube into Compatible Fitting until it bottoms.
5. Tighten nut until it bottoms on back coupler flange. Keep tube bottomed in Compatible Fitting while tightening nut.

SWEAT CONNECTION (Use refrigerant-grade tubing.)

1. Remove locknut, and rubber O-ring from inside of Compatible Fitting. Refer to Fig. 6.
2. Cut tubing to correct length.
3. Insert tube into Compatible Fitting until it bottoms.
4. Solder with low-temperature 430 F (221 C) solder. Wrap a wet cloth around Compatible Fitting to prevent damaging factory-made joints.
5. Evacuate or purge coil and tubing system with field-supplied refrigerant.

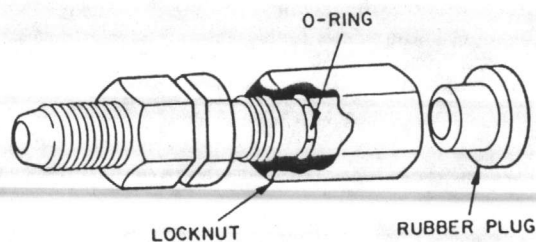
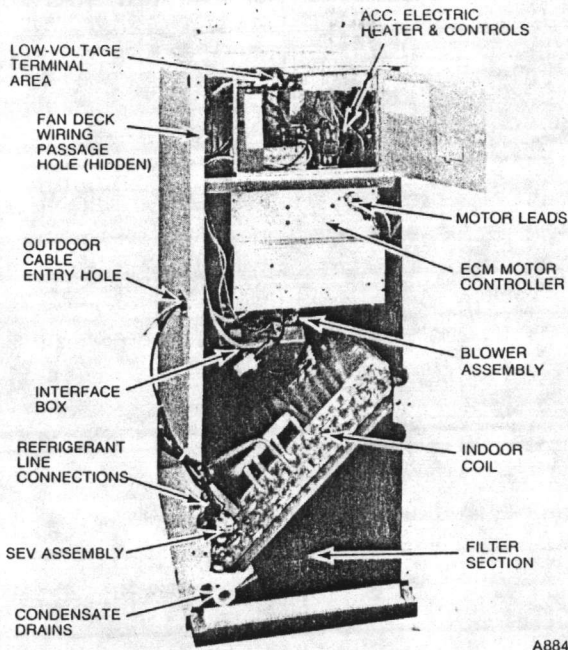
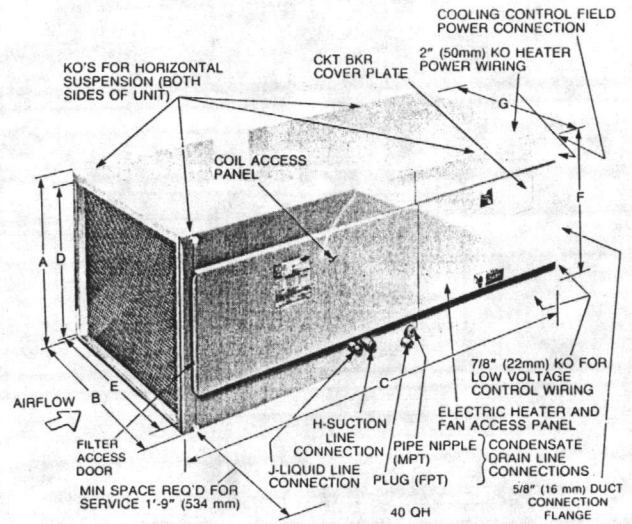


Fig. 6—Compatible Fitting



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Fig. 7—Component Location (Fully-Equipped Unit Shown)

Step 5—Make Primary Condensate Drain Line Connection using the hex center nipple packaged with the unit. This 3/4-in. fitting has one threaded end which is 0.56 in. deep, and one which is 0.69 in. deep. See Fig. 7. Thread the 0.69-in. end into the condensate drain pan opening. Tighten 1/2 turn past finger-tight.

CAUTION

This special fitting *must* be used when connecting to primary drain to avoid damage. Use this fitting only. Do not use any tape or pipe sealing compound on this fitting.

Install a trap in condensate line as close to unit as possible. Trap must be at least 5 in. (125mm) deep and not higher than the bottom of unit condensate drain opening (Fig. 8). Pitch condensate line to open drain or sump. Minimum recommended drain line size is 7/8-in. (22.22-mm) OD copper tubing or 3/4-in. (19-mm) OD galvanized pipe. Insulate condensate drain line(s) located above a living area.

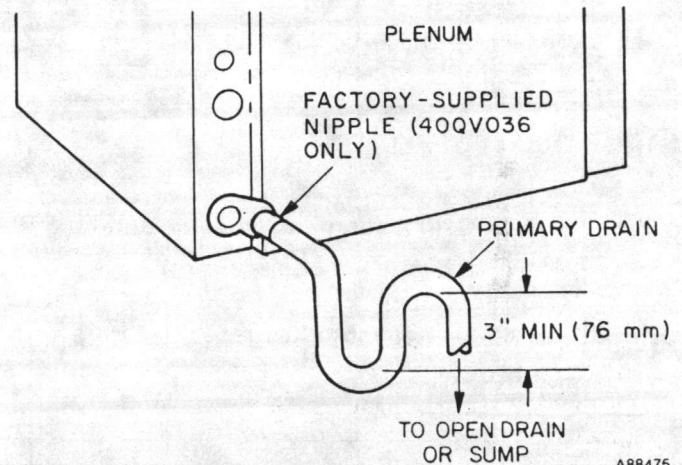
IMPORTANT: When fan coil is installed over a finished ceiling and/or living area, fabricate and install a secondary condensate pan under entire unit to prevent water damage if primary drain becomes clogged. Pipe drain line from pan so any discharge is visible to owner.

Step 6—Make Electrical Connections—Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be within $\pm 10\%$ of voltage indicated on nameplate. (Permissible limits of voltage range at which unit will operate satisfactorily for limited periods of time.) Contact local power company for correction of improper line voltage.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect warranty.

See Tables 2 and 4 for recommended wire and fuse sizes.

INSTALL BRANCH CIRCUIT DISCONNECT SWITCH(ES) PER NEC of adequate size to handle unit cur-



A88475

Fig. 8—Condensate Trap

Table 2—Fan Coil Electrical Data (Units With Field-Installed Cooling Control Kit)

MODEL 40QB,QH	VOLTS (1-Ph)	FLA	BRANCH CIRCUIT		
			Min Wire Size* (AWG)	Max Wire Length ft	Fuse Amps
042/043	230/208	3.8	14	130	15
048/049		4.8			
060		5.6			
005/062/063		4.4			

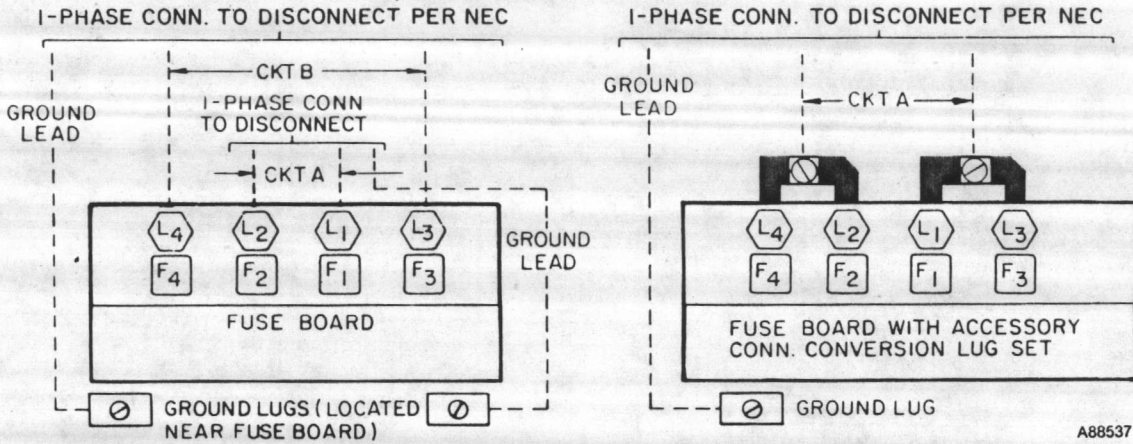
FLA—Full Load Amps

*Copper wire sizes based on 90 C (Use latest National Electrical Code (NEC) for wire sizes.) Use copper wire only.

NOTES:

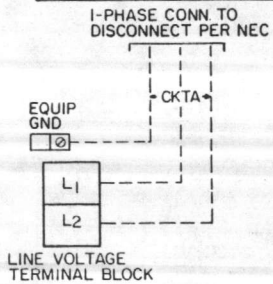
1. Fan motor line power supplied from electric heat line power circuit.
2. See Table 4 for units equipped with electric heater.

7½- TO 30-KW HEATERS

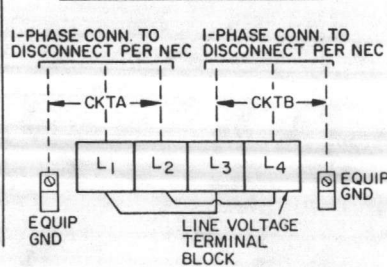


Accessory connection conversion lug set required for one line power circuit.
See text for power wiring and Heater Electrical Data table.

7½- TO 10-KW HEATERS



11 KW TO 30 KW HEATERS



Blower Motor Wiring on 042,043,048,049,060

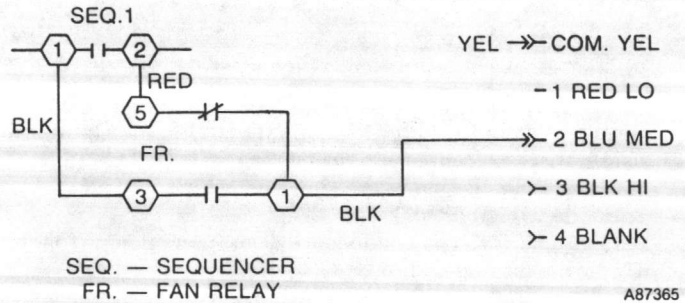


Fig. 9—40QB,QH Heating and Cooling Unit Line Power Connections

Table 3—Available Accessory Heaters

Model 40QB,QH	Available Heaters (kW at 240v)
042/043	7.5, 10, 12, 15, 20
048/049	7.5, 10, 12, 15, 20, 25
060 005/062/063	7.5, 10, 12, 15, 20, 25, 30

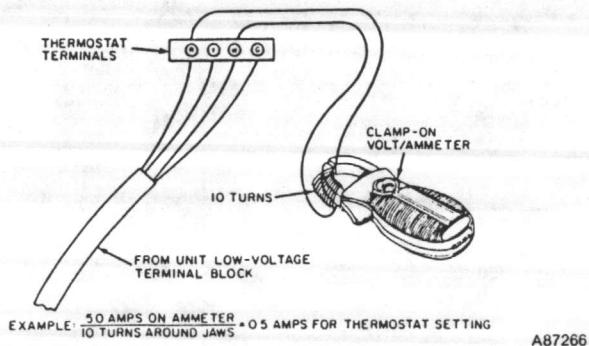


Fig. 10—Amp Draw Check with Ammeter

rent. Locate disconnect switch(es) within sight from and readily accessible from unit per section 440-14 of National Electrical Code (NEC). See Table 4 for supply circuit options. If one line power circuit using one disconnect

switch is required, attach an accessory line power connection conversion lug set (Part No. 40FS900271) to fuse terminals in electric heater. See Fig. 9.

BRING LINE POWER LEADS PER NEC INTO UNIT—Extend leads from disconnect through hole provided (Fig. 2) to cooling control kit or electric heater line power connections. For 30-kW, 1-phase heaters, side inlet for field power connection (Fig. 2) is recommended. Be sure power is off before making connections.

CONNECT GROUND LEAD TO GROUND CONNECTION IN COOLING CONTROL KIT OR ELECTRIC HEATER for safety. Connect power wiring, Fig. 9 and 11. Splice power leads to pigtailed or connect leads to fuse terminals or terminal board. Use wire nuts for splice connections and tape each connection.

Cooling control kit and electric heater are factory wired for 230/24-volt transformer operation. For 208/24-volt operation, interchange blue (208-v) and red (240-v) transformer leads at the primary connection. Cap unused transformer lead with wire nuts.

Step 7—Set Heat Anticipator—To set heat anticipator, move heat anticipator to maximum setting. Determine the W terminal that powers the electric heater controls. With heaters energized, measure amperage between appropriate W and R terminals and set heat anticipator to same value. See Fig. 10 for simple method of obtaining actual amp draw.

Table 4—Electrical Data, Fan Coil with Electric Heater (230-208 V)

MODEL 40QB,QH 042,048,060	KW		PHASE	INTERNAL CIRCUIT PROTECTION	HEATER AMPS 230/208 V			MIN WIRE SIZE* (AWG) 230/208 V		
	240 V	208 V			Single Circuit	Dual Circuit		Single Circuit	Dual Circuit	
						L1,L2	L3,L4		L1,L2	L3,L4
320CF	7.5	5.6	1	—	30.0/27.0	—	—	8/8	—	—
320CG, 330CG	10.0	7.5	1	—	40.0/36.0	—	—	6/6	—	—
320BG	10.0	7.5	1	CB	40.0/36.0	—	—	6/6	—	—
520CG	10.0	7.5	3	—	23.0/20.8	—	—	8/8	—	—
320AH	12.0	9.0	1	F	48.0/43.4	32.0/28.9	16.0/14.5	4/6	6/8	12/12
320AJ, 330AJ	15.0	12.0	1	F	60.0/54.0	40.0/36.0	20.0/18.0	4/6	6/6	10/10
320BJ	15.0	11.3	1	CB	—	40.0/36.0	20.0/18.0	—	6/6	10/10
520CJ	15.0	11.3	3	—	34.7/31.2	—	—	6/6	—	—
520CK	18.0	13.5	3	—	41.6/37.6	—	—	6/6	—	—
320AL, 330AL	20.0	15.0	1	F	80.0/72.0	40.0/36.0	40.0/36.0	2/3	6/6	6/8
320BL	20.0	15.0	1	CB	—	40.0/40.0	36.0/36.0	—	6/6	6/8
048,060	25.0	18.8	3	F	57.7/52.0	—	—	4/4	—	—
520AM			1†		100.00/90.0	0/1	—	—		
048, 060	30.0	22.5	3	F	69.3/62.4	—	—	3/3	—	—
520AN			1†		120.0/108.0	00/0	—	—		

MODEL 40QB,QH 042,048,060	MAX WIRE LENGTH 230/208 V						MIN GND WIRE SIZE 230/208 V			FUSE/CKT BKR AMPS 230/208 V		
	Single Circuit		Dual Circuit				Single Circuit	Dual Circuit		Single Circuit	Dual Circuit	
	ft	m	L1,L2		L3,L4			L1,L2	L3,L4		L1,L2	L3,L4
			ft	m	ft	m						
320CF	91/90	28/27	—	—	—	—	10/10	—	—	45/45	—	—
320CG, 330CG	111/110	34/34	—	—	—	—	10/10	—	—	60/60	—	—
320BG	111/110	34/34	—	—	—	—	10/10	—	—	60/60	—	—
520CG	139/136	43/42	—	—	—	—	10/10	—	—	40/35	—	—
320AH	149/93	45/28	80/80	24/24	80/80	24/24	8/8	10/10	12/12	70/70	50/45	20/20
320AJ, 330AJ	122/77	37/23	—	—	—	—	8/8	10/10	10/10	90/80	60/60	25/25
320BJ	—	—	102/102	31/31	102/102	31/31	—	10/10	10/10	—	60/60	25/25
520CJ	154/152	47/46	—	—	—	—	10/10	—	—	60/50	—	—
520CK	132/130	40/40	—	—	—	—	10/10	—	—	60/60	—	—
320AL, 330AL	149/118	45/36	126/81	38/25	126/81	38/25	6/6	10/10	10/10	110/100	60/60	50/45
320BL	—	—	126/81	38/25	126/81	38/25	—	10/10	10/10	—	60/60	50/45
048,060	155/154	47/47	—	—	—	—	8/8	—	—	80/80	—	—
520AM	192/153	59/47	—	—	—	—	6/6	—	—	150/125	—	—
048,060	166/165	51/51	—	—	—	—	8/8	—	—	100/90	—	—
520AN	203/161	62/49	—	—	—	—	6/6	—	—	175/150	—	—

CB—Circuit Breaker

F —Fuse

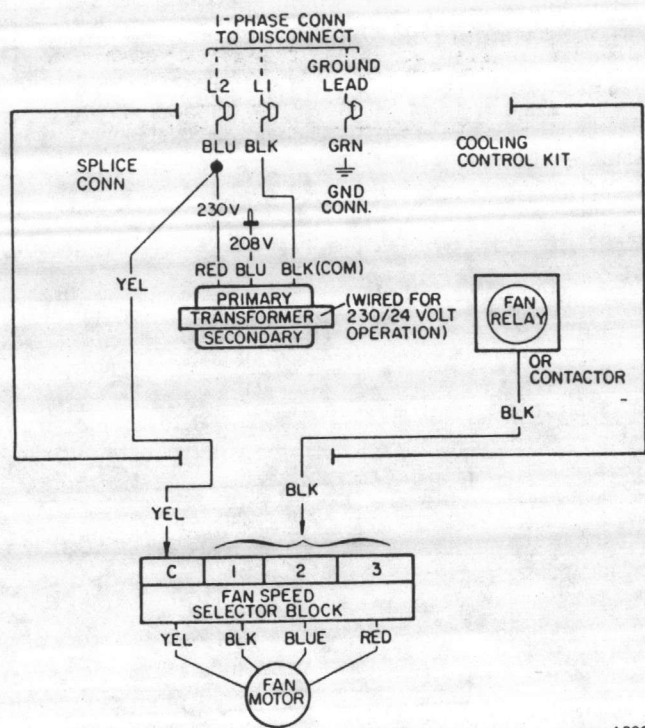
*Minimum wire sizes based on using copper wire with a minimum 90 C insulation rating.

Use copper wire only.

†May be field converted to one-phase operation.

NOTES:

1. Heaters are equipped with a 60-va transformer for system control circuit.
2. Field-selected wire sizes must not create a voltage drop between power source and unit in excess of 2% of unit rated voltage.
3. 005, 043, 049, 062, and 063 sizes not available with factory-installed controls.



SELECTOR BLOCK TERMINATIONS	
C — Common	3 — Low
1 — High	—
2 — Medium	—

NOTE: Tape unused leads.

----- Field Wiring _____ Factory Wiring

Fig. 11—Cooling Unit Line Power Connection

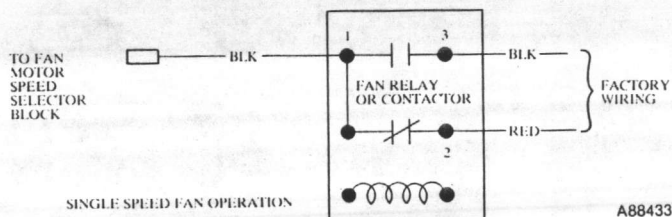


Fig. 12—Single-Speed Fan Operation

Step 8—Set Fan Motor Speed—Three-speed fan motor on all units may be field connected for high, medium or low fan speeds as described below. Fan coil units with cooling control kit or electric heaters come factory connected for high-speed fan operation. High, medium or low fan speed leads are provided on motor for choice of fan speeds. Motor leads are factory connected to Molex fan speed selector block located on fan housing. See Fig. 12.

Line power leads, supplied with cooling control kit or electric heater, are factory connected to selector block for one fan speed as previously described. Change fan speed by changing position of black line power lead on selector block. See Fig. 11 and 12.

One fan speed may be selected on units with cooling control kit or electric heaters.

Step 9—Connect Control Power Wiring (24 Volt) with Cooling Control Kit or Electric Heater—Use 60-va trans-

former supplied as part of cooling control kit or electric heater controls as 24-volt supply for system. A one-transformer control wiring hookup is recommended for ease of installation. When an outdoor unit transformer is used together with control kit (or heater) transformer, a phasing problem may result. If both transformers are used, also use a thermostat with isolating contacts to prevent interconnection of Class 2 (24-volt) outputs.

CONTROL WIRING CONNECTIONS—Top and side of unit have 7/8-in. (22-mm) knockouts for control wiring (see Fig. 2). Connect leads to terminal board as shown in Fig. 13.

START-UP

Refer to outdoor unit Installation, Start-Up and Service booklet for system start-up instructions and refrigerant charging method details.

SERVICE AND MAINTENANCE

⚠ WARNING

Disconnect power to all circuits before servicing unit. A failure to do so may result in personal injury or death.

Remove unit access panels for cleaning, lubrication or parts replacement (Fig. 2).

Minimum Maintenance

1. Check and clean or replace air filter each month or as required.
2. Check cooling coil, drain pan, condensate trap and condensate drain each cooling season for cleanliness. Clean as necessary.
3. Check fan motor and wheel for cleanliness each heating and cooling season. See Fan Motor and Wheel, page 10.
4. Check electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

Return Air Filter—To clean or replace air filter, pull plastic plunger retainers on each side (no tools required) and remove filter access door. Slide out filter. Clean filter with hot, soapy water. Rinse clean and let dry. Filter may be oiled or coated. New filters are available from local dealer. Place filter in channels with heavy mesh facing inlet side and replace door, securing with plunger retainers.

⚠ CAUTION

Never operate unit without a filter or with filter access door removed. Damage to blower motor may result.

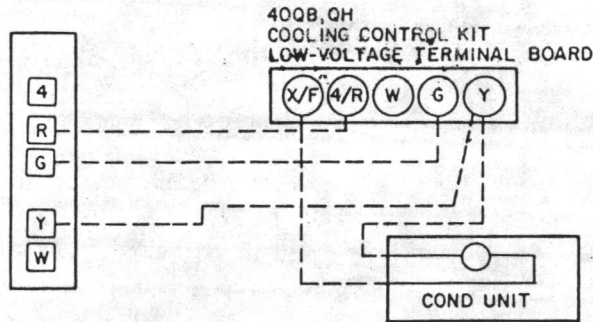
Coil, Drain Pan, and Condensate Drain—Disconnect electrical power before removing any access panels or electrical shock may result.

The coil is easily cleaned when it is dry; therefore, the coil should be checked and cleaned (if necessary) before each season. To check or clean coil, remove both the coil access panel and the fan/heater access panel. Removal of these panels gives full access to the coil. If the coil is coated with dirt or lint, vacuum with a soft brush attachment.

Be careful not to bend the fins. If the coil is coated with oil or grease, it may be cleaned with a mild detergent and water solution. Rinse coil with clear water. Be careful not to splash water on insulation or filter.

Check drain pan and condensate drain at the same time cooling coil is checked. Clean drain pan and condensate drain by removing any foreign matter from pan. Flush pan

ACCESSORY THERMOSTAT AND SUBBASE



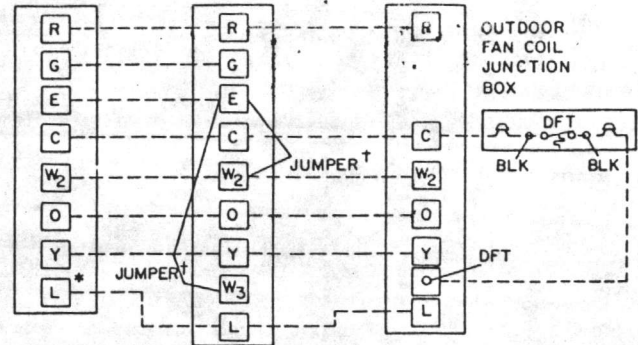
ARRANGEMENT A — 40QB,QH WITH CONDENSING UNIT. COOLING-ONLY SYSTEM. TRANSFORMER IN COOLING CONTROL KIT.

A88263

ACCESSORY THERMOSTAT AND SUBBASE

40QB,QH ELECTRIC HEATER TERMINAL BOARD

COMPRESSOR SECTION TERMINAL BOARD



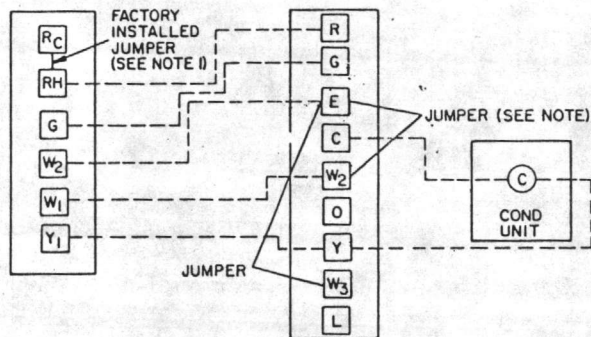
IMPORTANT: Refer to outdoor unit Installation Instructions if outdoor thermostats are used.

ARRANGEMENT D — 40QB,QH WITH HEAT PUMP, COOLING AND 2-STAGE HEATING SYSTEM; SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT. TRANSFORMER IN ELECTRIC HEATER.

A88268

ACCESSORY THERMOSTAT AND SUBBASE

40QB,QH ELECTRIC HEATER LOW-VOLTAGE TERMINAL BOARD



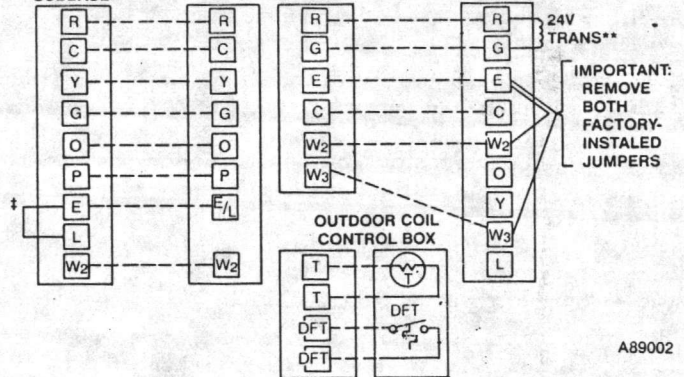
ARRANGEMENT B — 40QB,QH WITH CONDENSING UNIT. COOLING AND/OR 2-STAGE HEATING SYSTEM. TRANSFORMER IN ELECTRIC HEATER.

A88269

ACCESSORY THERMOSTAT AND SUBBASE

COMPRESSOR SECTION TERMINAL BOARDS

40QB,QH ELECTRIC HEATER LOW-VOLTAGE TERMINAL BOARD



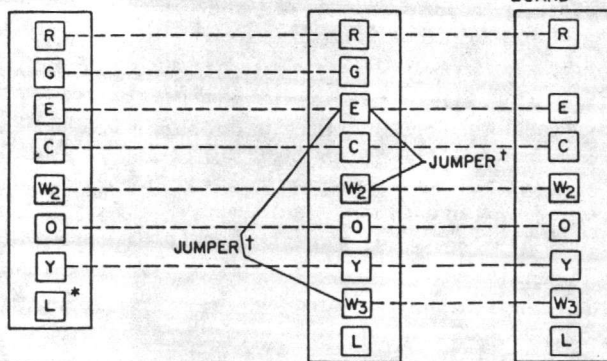
ARRANGEMENT E — 40QB,QH WITH HEAT PUMP, COOLING AND 2-STAGE HEATING SYSTEM. SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT. TRANSFORMER IN ELECTRIC HEATER.

A89002

ACCESSORY THERMOSTAT AND SUBBASE

40QB,QH ELECTRIC HEATER LOW-VOLTAGE TERMINAL BOARD

HEAT PUMP TERMINAL BOARD



IMPORTANT: Refer to outdoor unit Installation Instructions if outdoor thermostats are used.

ARRANGEMENT C — 40QB,QH WITH HEAT PUMP, COOLING AND 2-STAGE HEATING SYSTEM; SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT. TRANSFORMER IN ELECTRIC HEATER.

C — Contactor - - - - - Field Wiring _____ Factory Wiring

*Terminal L is identified as terminal X on some former thermostats (required for system malfunction warning indicator on compressor section).

†Remove one or both factory-installed jumpers (Arrangement C and D) when installing outdoor thermostats (ODT) shown in Installation Instructions for heat pump — outdoor section.

‡Field-supplied jumper required.

**Transformer (60 va) located in furnace interface control kit or electric heater.

NOTE: On 40QB,QH 2-stage heaters, remove factory-installed jumper for 2-stage operation. See Arrangement B.

Fig. 13—Control Wiring Connections

and drain tube with clear water. If drain tube is restricted, it can generally be cleared by high-pressure water. If this does not work, try a plumber's snake or similar probe device.

Fan Motor and Wheel—It should only be necessary to clean the fan motor and the wheel when the cooling coil is cleaned. Lubricate motor every 5 years if motor is used on intermittent operation (thermostat FAN switch at AUTO. position), or every 2 years if the motor is in continuous operation (thermostat FAN switch at ON position).

⚠ WARNING

Disconnect electrical power before removing any access panels. A failure to do so could lead to personal injury or death.

To clean or lubricate fan motor or clean fan wheel, remove blower access panel. Remove 3 electrical leads from bottom of Molex connector located on the fan housing. Note location of wires for reassembly. Remove 6 screws holding fan/motor assembly against the fan scroll and slide assembly out of cabinet. Squeeze the side tabs and pull the Molex connector block off fan housing. Remove brown capacitor leads from motor capacitor mounted on fan housing. Mark the fan wheel, motor, and motor support in relation to the fan housing before disassembly to ensure proper reassembly. (Note position of blades on wheel.) Loosen setscrew holding fan wheel onto motor shaft. Remove fan wheel.

Remove 3 bolts holding motor mount to fan housing and slide motor and mount out of housing. Further disassembly should not be necessary as adequate clearance is available to clean or lubricate motor. The fan motor and wheel may be cleaned by using a vacuum with soft brush attachment. Remove grease with a mild solvent such as hot water and detergent. Be careful not to disturb the balance weights (clips) on the fan wheel vanes. Also, do not drop or bend wheel, as balance will be affected.

To oil motor, remove dust caps or plugs from oil holes located at each end of the motor. Use a teaspoon, 5 cc (5 ml), 3/16 oz or 16 to 25 drops of a good grade of SAE 20 non-detergent motor oil in each oil hole. Allow time for total quantity of oil to be absorbed into each bearing. After oiling motor, be sure to wipe off excess oil from housing and replace cap or plugs on oil port.

To reassemble fan, replace 3 bolts holding motor mount to fan housing. Place fan wheel back onto motor shaft and tighten setscrew. Be sure to position correctly for proper rotation. Replace Molex connector in bracket by snapping into position. Position fan motor assembly and fan wheel in same position as when fan housing was in unit. Secure motor mount to housing, using bolts removed. Make sure mount or motor is grounded to fan housing. Attach green wire to fan housing with screw. Slide blower assembly into fan deck runners and secure assembly to blower deck with screws removed. Reconnect electrical leads into Molex connector at the proper position. Please note that connections are polarized for assembly—*do not force*. Reconnect electrical power to unit and test fan for proper rotation.

Refrigerant Circuit—The 40QB, QH coils have a vapor holding charge. Evacuation or purging is not required if accessory tubing package is used and mechanically connected to Compatible Fittings within 60 seconds. If tubing or coil is left open longer than 60 seconds, field-supplied tubing is used, sweat or flare connections are made—purge or evacuate coil and tubing. Refer to outdoor unit installation booklet for system refrigerant charging method details.

LEAKING MECHANICAL CONNECTION

1. Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve refrigerant pressure in tubing and coil.
2. Back locknut off Compatible Fitting onto tube at indoor coil as in Fig. 14.
3. Cut fitting with hacksaw between threads and O-ring bead.
4. Remove tubing section remaining in threaded portion of fitting. Discard locknut.

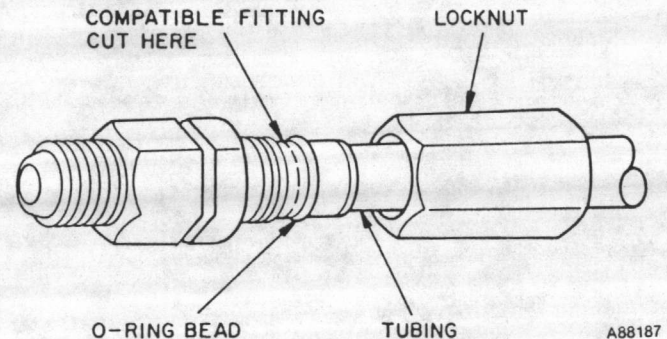


Fig. 14—Repair of Mechanical Connection

Reconnecting Refrigerant Tubing

1. Remove all burrs and filings from remaining portion of Compatible Fitting.
2. Insert tube end into remaining portion of Compatible Fitting.
3. Solder with low-temperature (430 F [22 C]) silver bearing solder.
4. Evacuate indoor coil and tubing system at the outdoor unit service valves.

LEAKING SWEAT CONNECTION—Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve refrigerant pressure in tubing and coil. Clean and flux area around leak and apply low-temperature (430 F [22 C]) solder.

Evacuate or purge evaporator coil and tubing system. Add refrigerant charge (see charging instructions).

ACCURATER™ (BYPASS TYPE) REFRIGERANT FLOW CONTROL SERVICING—See Fig. 15 for bypass-type AccuRater components. Factory-supplied pistons are listed in Table 5. The piston has a refrigerant metering orifice through it. The retainer forms a stop for the piston in the refrigerant bypass mode and a sealing surface for liquid line flare connection. To check, clean or replace piston:

1. Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve pressure in tubing and coil.
2. Shut off power to unit.
3. Remove coil liquid line flare connection from AccuRater.
4. Pull retainer out of body, being careful not to scratch flare sealing surface. If retainer does not pull out easily, carefully use Vise Grip pliers to remove retainer. (If retainer flare seat is damaged, replace with new retainer, Part No. 99CC409892.)
5. Slide piston out by inserting a small soft wire through metering orifice. Ensure metering orifice sealing sur-

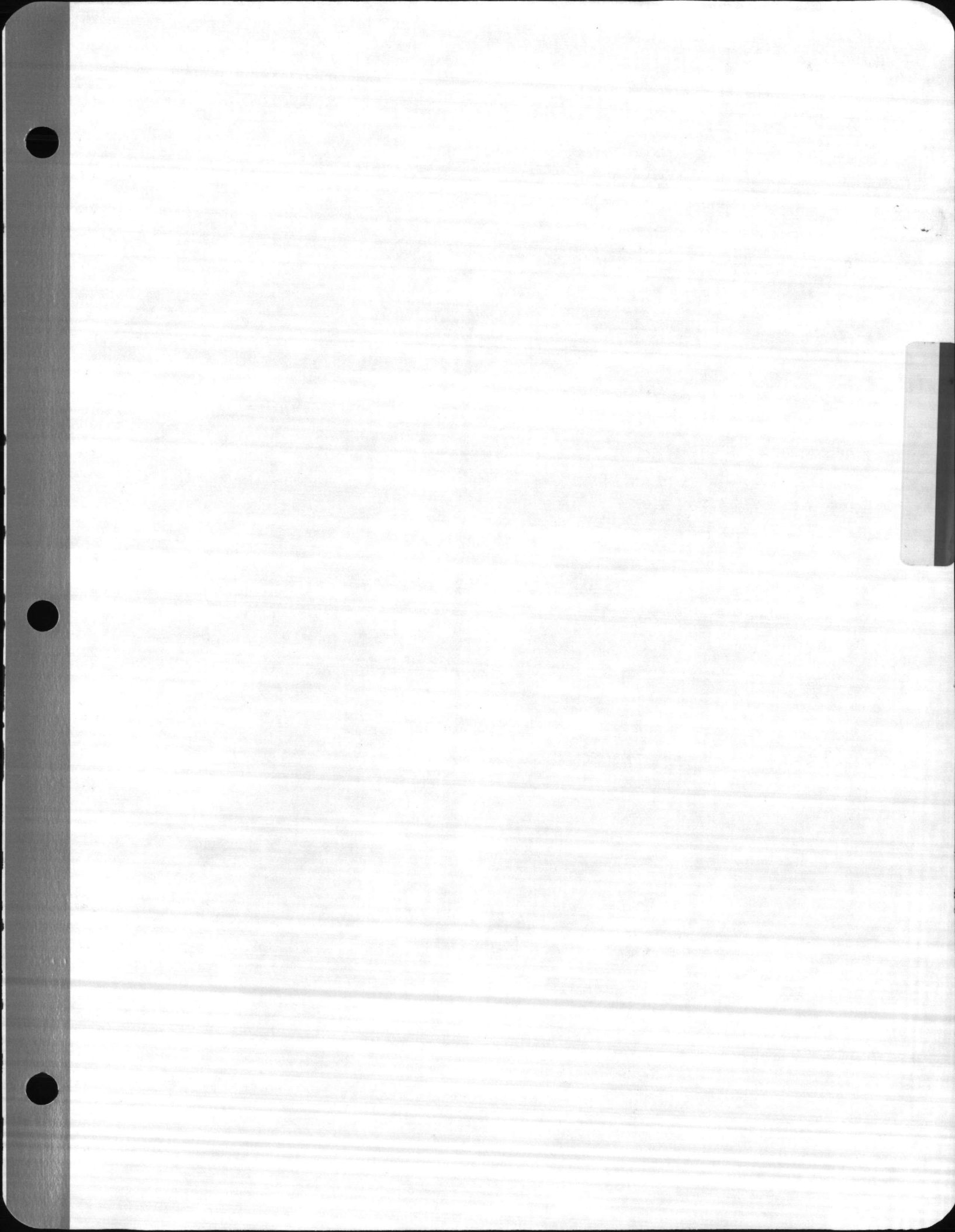
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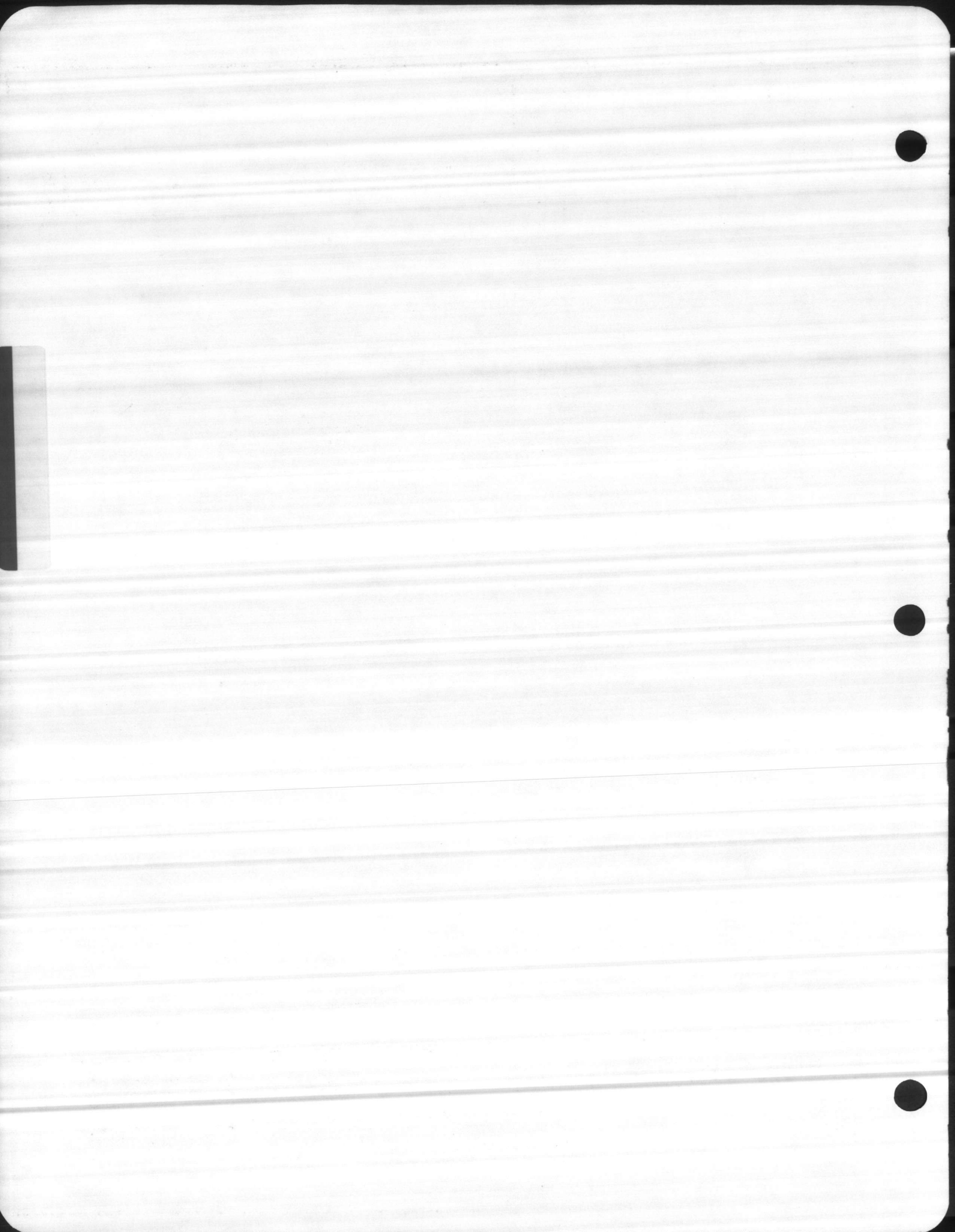
DESCRIPTION:

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JOB: BUILDING M-420 & M-422
CAMP LEJEUNE, NC

CONTRACTOR: SCOTT-GRIFFIN, INC.
ENGINEER: OMNI ENGINEERING
ARCHITECT:

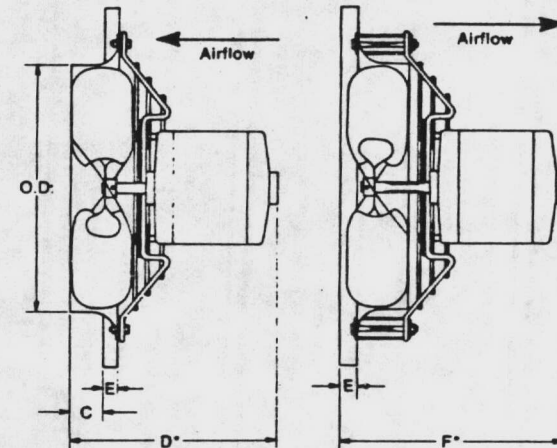
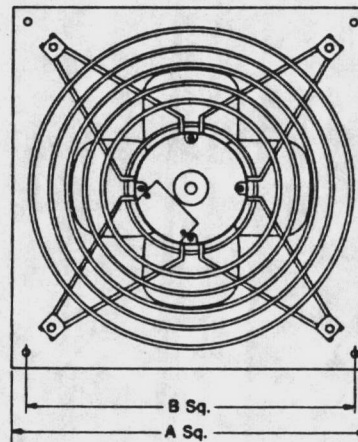
DRWG. 223-1123R
SHEET _____ OF _____
DATE 1/25/89

MARK	MODEL	NO. REQ'D	MOTOR INFORMATION						CFM	SP	T.S.	REMARKS
			H.P.	R.P.M.	VOLTS	CYC	PH	FRAME				
2, 4	SDE-10-24-D	2	1/25	1382	115	60	1	ODP	320	.125	3625	MOTORSIDE GUARD, GRAVITY DAMPER AND SPEED CONTROL

MODEL SD
Direct Drive
Sidewall Propeller Fan

Model Size	A SQ.	B SQ.	C	D*	E	F*	O.D.	Damper Size	Weight
8	13 1/4	12	1	7	1	8	8 3/4	10x10	12
10	15 1/4	13 1/4	1 1/4	7	1	8	10 3/4	12x12	16
12	18 1/4	16 1/4	1 1/2	10 3/4	1	11 1/4	12 3/4	14x14	20
14	20 1/4	18 1/4	1 3/4	11 1/4	1	12 1/4	14 3/4	16x16	27
16	22 1/4	20 1/4	2	11 3/4	1	12 3/4	16 3/4	18x18	30
18	24 1/4	22 1/4	2 1/4	14	1	15	18 3/4	20x20	35
20	26 1/4	24 1/4	2 3/4	14 1/4	1	15 1/4	20 3/4	22x22	39

*Varies with motor size



Model SDE Exhaust

Model SDS Supply

AMCA Certified Ratings

Greenheck Fan Corporation certifies that the SD models shown herein are licensed to bear the AMCA seal. The ratings shown are based on tests made in accordance with AMCA Standard 210 and comply with the requirements of the AMCA Certified Ratings Seal.

The AMCA Certified Ratings Seal applies to air capacities only. Performance shown is for model SDE/S fans without ducts.

GREENHECK
P.O. BOX 128 SCHOFIELD, WISCONSIN 54478
PH. 715-359-6171



Read and save these instructions



DIRECT DRIVE SIDEWALL PROPELLER FANS

INSTALLATION, OPERATING AND MAINTENANCE MANUAL

INSTALLATION

Upon receiving the unit, check for any damage and report it immediately to the shipper. Also assure all accessory items are accounted for.

Move fan to the desired location and determine the method by which the fan is to be mounted as shown below in figures 1, 2 and 3. Optional wall mount housings (Fig. 2) and wall mount collars (Fig. 3) provide a convenient means of mounting sidewall fans while maintaining the proper distance between propeller and damper.

Attach the fan to the wall by inserting a suitable fastener through each of the pre-punched mounting holes in the fan panel. Care should be taken not to bend or distort the fan panel or propeller during installation.

The motor voltage and amperage rating must be checked for compatibility with the electrical supply. Supply wiring to the fan must be properly fused and conform to local and national electrical codes.

TYPICAL INSTALLATIONS

Wall opening size and propeller-to-damper distance are two important dimensions for fan installation. Fans mounted to the wall require a different opening (W.O.) size than those mounted in collars or wall housings. Propeller-to-damper distance (M) is important to reduce turbulence and resulting damper flutter which may lead to premature damper failure.

Fig. #1 shows the recommended wall opening (W.O.) and the minimum distance suggested between the fan and damper for direct installations.

Figs. #2 and 3 show the wall opening (W.O.) required for installations with either a wall housing or collar.

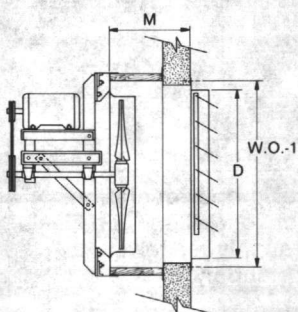


Fig. #1

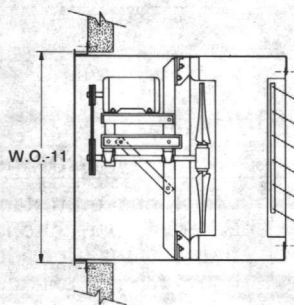


Fig. #2

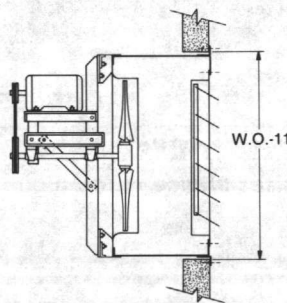


Fig. #3

Fan Size	D Damper Size	M Min.	WO-I Sq.	WO-II Sq.
8	10 x 10	13	10½	14¼
10	12 x 12	13	12½	16¼
12	14 x 14	13	14½	19¼
14	16 x 16	13	16½	21¼
16	18 x 18	13	18½	23¼
18	20 x 20	13	20½	25¼
20	22 x 22	13	22½	27¼
24	26 x 26	13	26½	33¼
30	32 x 32	13	32½	39¼
36	38 x 38	14	38½	45¾
42	44 x 44	15	45½	51¾
48	50 x 50	16	50½	57¾

PRE-STARTING CHECKS

Check all fasteners and set screws for tightness. The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Rotation should be in the same direction as the rotation decal affixed to the unit or as shown in Fig. 4. For 3-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads. For single phase installations follow the wiring diagram located on the motor.

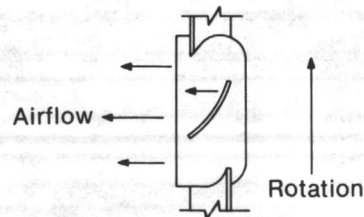
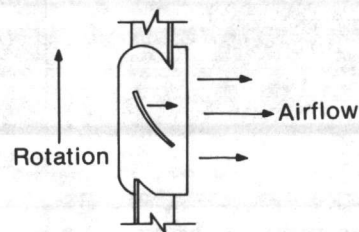


Fig. #4

ROUTINE MAINTENANCE

WARNING

DISCONNECT AND SECURE TO THE "OFF" POSITION ALL ELECTRICAL POWER TO THE FAN PRIOR TO INSPECTION OR SERVICING. FAILURE TO COMPLY WITH THIS SAFETY PRECAUTION COULD RESULT IN SERIOUS INJURY OR DEATH.

Once the fan has been put into operation, a periodic maintenance program should be set up to preserve the reliability and performance of the fan. Items to be included in this program are:

- LUBRICATION
- FASTENERS
- REMOVAL OF DUST/DIRT

MOTOR LUBRICATION

Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further lubrication. Motors equipped with oil holes should be oiled in accordance with the manufacturers instructions printed on the motor. Use a high grade SAE 20 machine oil and use caution not to over lubricate. Motors supplied with grease fittings should be greased according to directions printed on the motor.

FASTENERS

Any fan vibration has a tendency to loosen mechanical fasteners. A periodic inspection should include checking all fasteners for tightness. Particular attention should be paid to set screws or taper-lock bushings attaching the propeller to the motor shaft. In addition, check all fasteners attaching the motor to the motor plate.

REMOVAL OF DUST AND DIRT

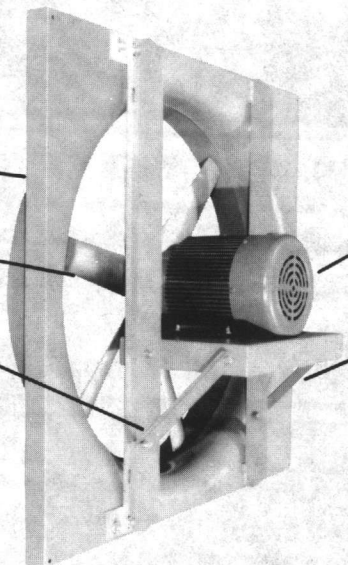
Dirt clogs cooling openings on the motor housing, contaminates bearing lubricant and collects on propeller blades causing severe imbalance if left unchecked. The exterior surface of the motor, fan panel and entire propeller should be thoroughly cleaned periodically. Use caution and do not allow water to enter the motor or bearings. Under no circumstances should motors or bearings be sprayed with steam or water.

TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTIVE ACTION
Reduced airflow	System resistance is too high.	Check backdraft dampers for proper operation. Remove obstructions in ductwork. Clean dirty filters. Check for adequate supply air for exhaust fans or exhaust air for supply fans.
	Fan too close to damper.	Increase distance between fan and damper.
	Unit running backwards.	See pre-starting checks.
	Excessive dirt on propeller.	Clean propeller.
Excessive Noise	Vibration	Clean dirt build-up from propeller. Check all fasteners for tightness. Check for loose dampers, guards or ductwork.
	Defective motor.	Replace motor.

PARTS LIST

- (1) FAN PANEL
- (2) PROPELLER
- (3) DRIVE FRAME ANGLE
- (4) MOTOR
- (5) MOTOR PLATE
- (6) GUSSET ANGLE



DIRECT DRIVE SIDEWALL PROPELLER FAN (TYPICAL)

REPLACEMENT PARTS

Always provide the unit serial number when requesting parts or information.

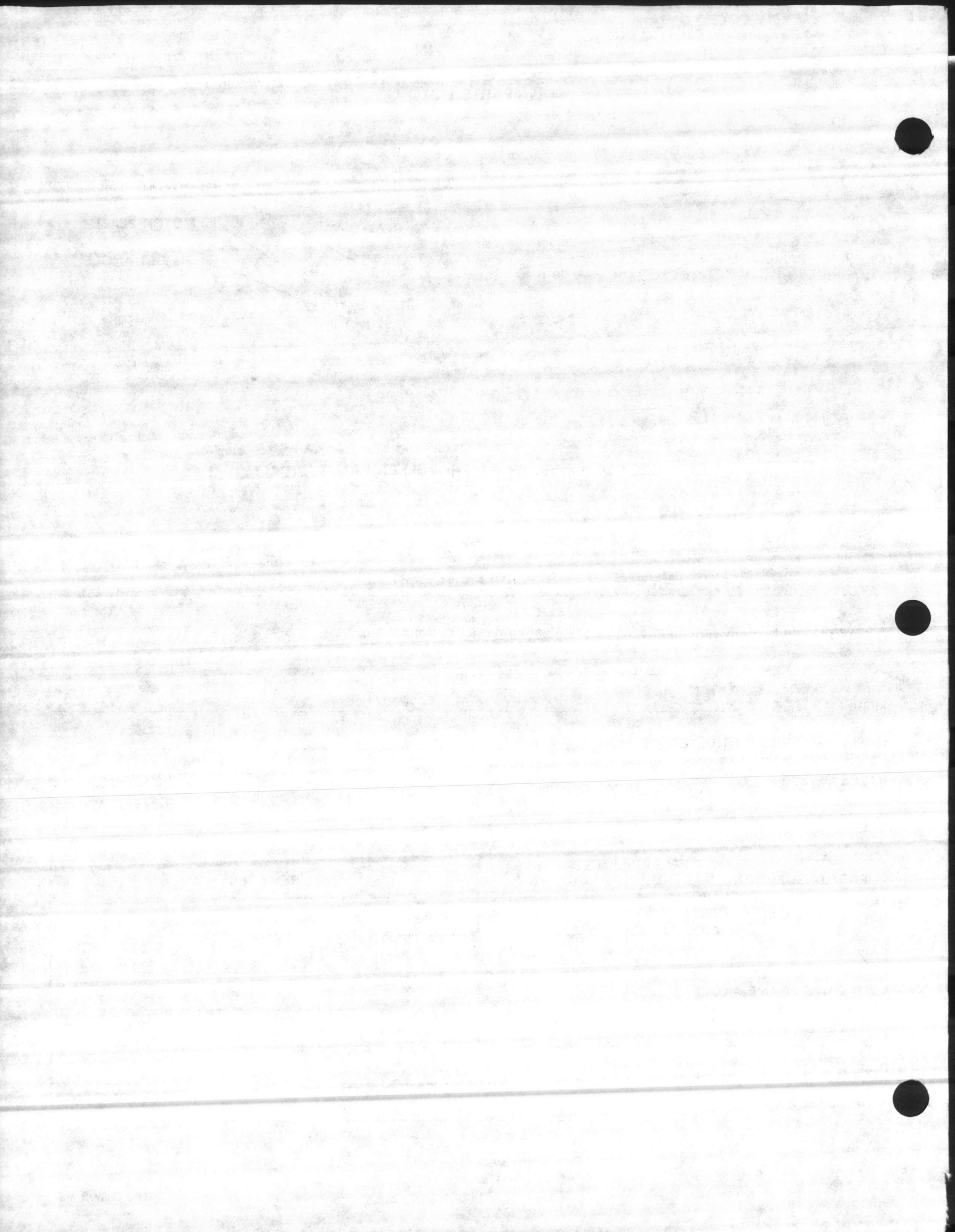
JOB _____

MODEL _____ SERIAL NO. _____

GREENHECK PRODUCTION ORDER NO. _____

SALES OFFICE _____ CITY _____

PART DESCRIPTION	QUANTITY	REMARKS
(1) FAN PANEL		
(2) PROPELLER		
(3) DRIVE FRAME ANGLE		
(4) MOTOR		
(5) MOTOR PLATE		
(6) GUSSET ANGLE		



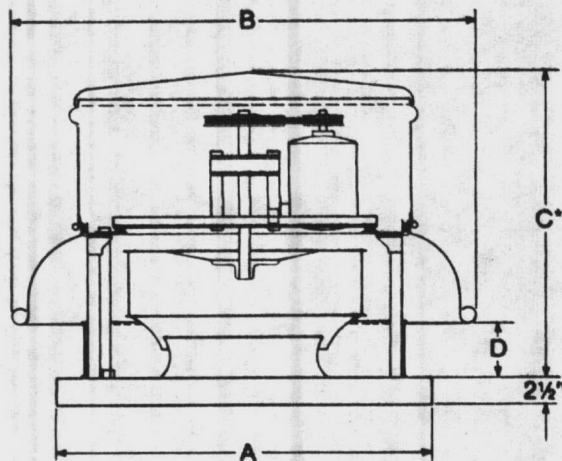
JOB: BUILDING M-420 & M-422
CAMP LEJEUNE, NC

CONTRACTOR: SCOTT-GRIFFIN, INC
ENGINEER: OMNI ENGINEERING
ARCHITECT:

DRWG. 223-1123R
SHEET _____ OF _____
DATE: 1/25/89

MARK	MODEL	NO. REQ'D	MOTOR INFORMATION						CFM	SP	FAN RPM	T.S.	REMARKS
			H.P.	R.P.M.	VOLTS	CYC	PH	FRAME					
1, 3	GB-18-4	2	1/4	1550	115	60	1	ODP	2140	.375	717	3473	DISCONNECT SWITCH, BIRDSCREEN, GRAVITY DAMPER

Model GB Belt Drive Centrifugal Roof Exhauster

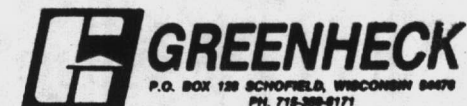
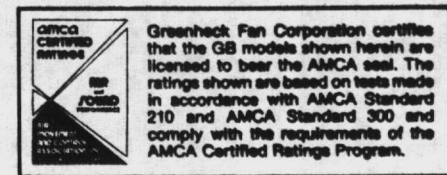


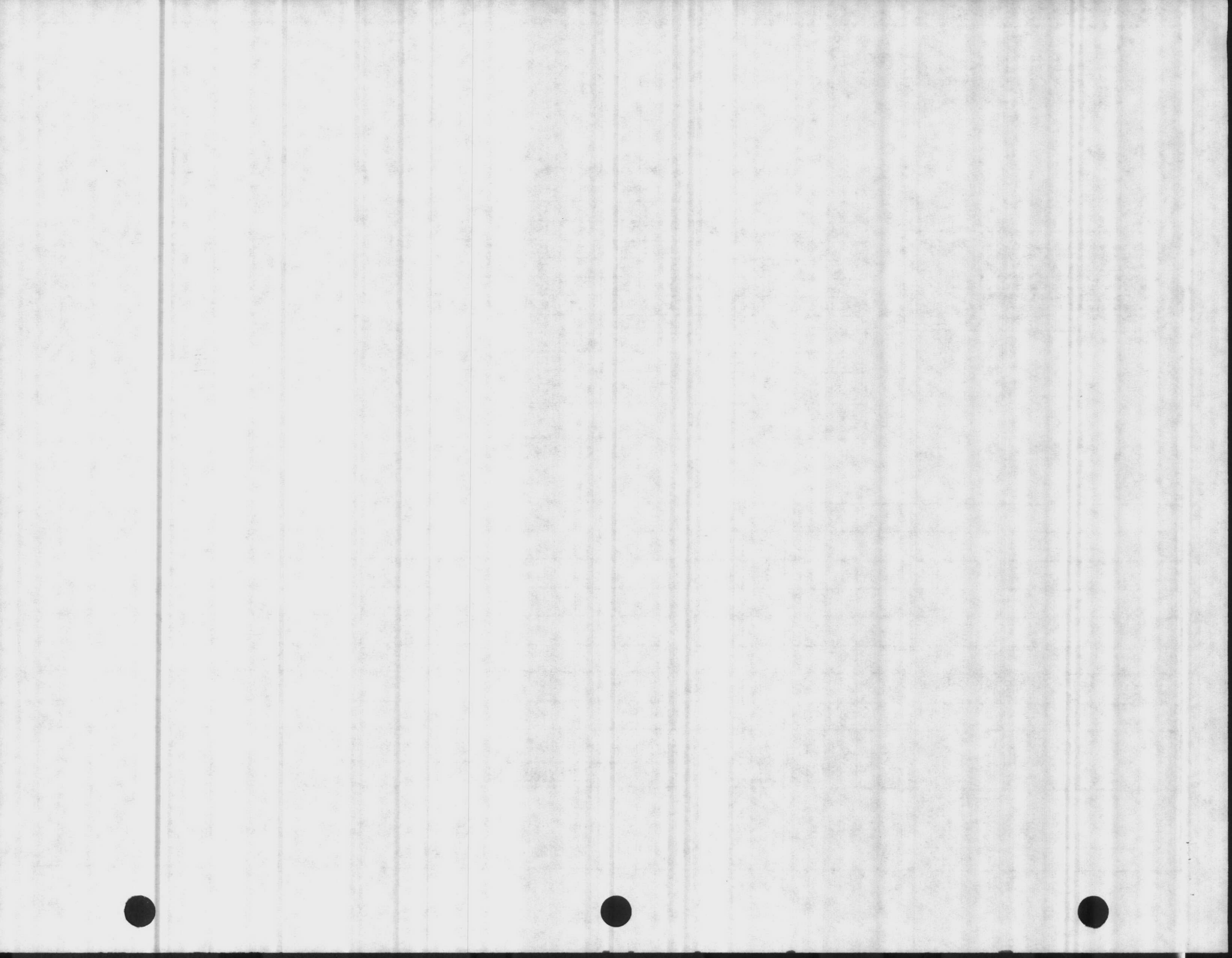
DIMENSIONAL DATA

Model	A	B	C*	D	Damper	Roof Opening	Approx. Weight
GB-7, 8, 9, 10	22	24%	23%	4 1/2	12	14 1/2	49
GB-14	26	28%	23%	3%	16	18 1/2	85
GB-18	30	35 1/2	28	5 1/2	18	20 1/2	99
GB-21	30	35 1/2	28	5 1/2	18	20 1/2	101
GB-24	34	42%	31 1/2	5%	24	26 1/2	123
GB-30	40	50	36	8%	30	32 1/2	208
GB-36	46	58%	38 1/2	8%	36	38 1/2	275
GB-42	52	65%	44	9%	42	44 1/2	331
GB-48	58	73%	47 1/2	11 1/2	48	50 1/2	396
GB-54	64	83	50%	14 1/2	54	58 1/2	558

*May vary depending on motor size.

Dimension A - given is the inside dimension of the curb cap. The roof curb should be 1 1/2" less than the curb cap to allow for roofing and flashing.







Centrifugal Roof Exhausters Models CUBE/CUBE-HP and GB

Installation Operating and Maintenance Manual

Installation

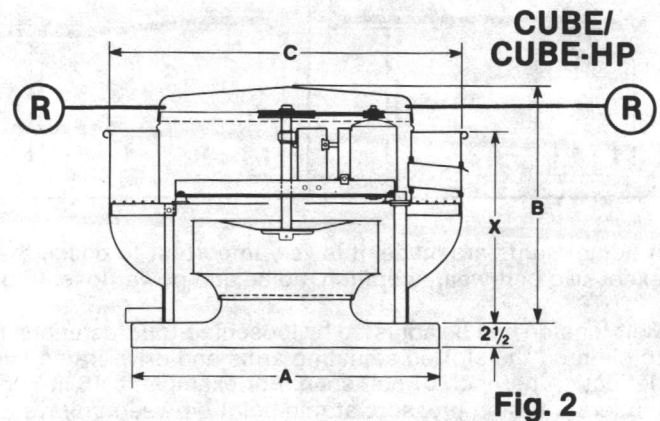
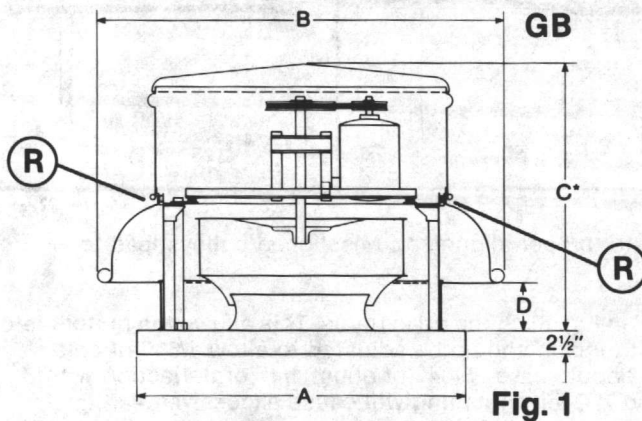
Upon receiving unit, check for any damage and report it immediately to the shipper. Also check to see that all accessory items are accounted for.

Move fan to desired location and fasten securely through mounting holes in base. Shims may be necessary depending upon roofing material thickness. The following diagrams depict dimensions for the GB, CUBE and CUBE-HP.

Access to the motor compartment is accomplished by removing the screws (designated by R in drawings below). The cover can be removed and placed in a flat area where winds will not blow it off the roof.

The motor's amperage and voltage rating must be checked for compatibility to the supply voltage prior to final electrical connection. For NFPA - restaurant CUBE/CUBE-HP applications, the electrical supply must enter the motor compartment through the breather tube. For other non-flammable applications and GB installations, the electrical supply can be routed through the conduit chase provided between the curb cap and the bottom of the motor compartment. Consult local code authorities for your specific requirements.

A drain trough is provided on CUBE and CUBE-HP fans for single - point drainage of water and residue. Some means for collection of this residue must be provided, either a container directly under the trough or use of an adapter and pipe to carry the residue to a remote collection point. An optional grease container with water separator baffles and threaded trough connector are available from your Greenheck representative.



DIMENSIONAL DATA

MODEL	A	B*	C	D	DAMPER	ROOF OPENING
GB ^{7, 8, 9, 10}	22	24-5/8	23-3/4	4-1/2	12	14-1/2
GB-14	26	28-3/4	23-3/4	3-7/8	16	18-1/2
GB-18	30	35-1/2	28	5-1/2	18	20-1/2
GB-21	30	35-1/2	28	5-1/2	18	20-1/2
GB-24	34	42-3/4	31-1/2	5-3/4	24	26-1/2
GB-30	40	50	36	8-1/4	30	32-1/2
GB-36	46	58-3/4	38-1/2	8-7/8	36	38-1/2
GB-42	52	65-1/4	44	9-3/4	42	44-1/2
GB-48	58	73-3/4	47-1/4	11-1/4	48	50-1/2
GB-54	64	83	50-3/4	14-1/2	54	56-1/2

*May vary depending on motor size.
Dimension A given is the inside dimension of the curb cap. The roof curb should be 1-1/2" less than the curb cap to allow for roofing and flashing.

DIMENSIONAL DATA

MODEL	A	B	C	X	DAMPER	ROOF OPENING
CUBE 10	22	23-3/4	23-5/8	17-1/4	12	14-1/2
CUBE 14	26	24-3/4	27-1/2	18-3/8	16	18-1/2
CUBE/CUBE-HP 18	30	28-5/8	34-1/4	21	18	20-1/2
CUBE/CUBE-HP 21	30	28-5/8	34-1/4	21	18	20-1/2
CUBE/CUBE-HP 24	34	33-7/8	40-3/4	25-1/2	24	26-1/2
CUBE/CUBE-HP 30	40	36	48	29-1/8	30	32-1/2
CUBE/CUBE-HP 36	46	39-1/8	56-3/4	29-1/2	36	38-1/2
CUBE 42	52	44-3/4	63-1/4	35-1/4	42	44-1/2
CUBE 48	58	48-1/8	72-1/8	36	48	50-1/2

Dimension A — Given is the inside dimension of the curb cap.
The roof curb should be 1-1/2" less than the curb cap to allow for roofing and flashing.

PRE-STARTING CHECKS

Check all fasteners for tightness. The wheel should rotate freely and be aligned as shown. (Fig. 3) Wheel position is preset and unit test run at the factory. Movement may occur during shipment and realignment may be necessary. Centering can be accomplished by loosening the bolts holding the drive frame to the shock mounts and repositioning the drive frame. Wheel and inlet cone overlap can be adjusted by loosening the set screws in the wheel and moving the wheel to the desired position.

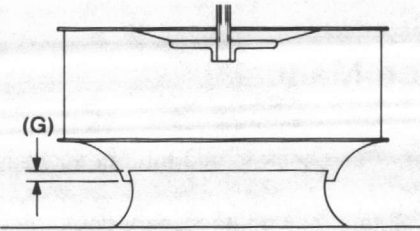


Fig. 3

Wheel Overlap Dimensions.

Model Size	G
7, 8, 9, 10	1/4
14	1/2
18	1/2
18 HP	1/2
21	11/16
21 HP	11/16
24	1/4
24 HP	1/4
30	5/8
30 HP	5/8
36	5/16
36 HP	5/16
42	9/16
48	3/4
54	11/16

Wheel Rotation Guide.
All CUBE/GB Fans Have CW Wheel Rotation

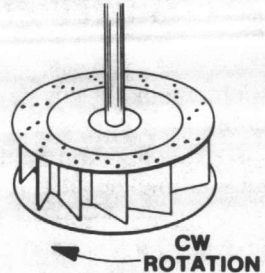


Fig. 4

Direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible burnout. Check wheel rotation, viewing from the shaft side, by momentarily energizing the unit. Rotation should be clockwise as shown in Fig. 4 and correspond to the rotation decal on the unit.

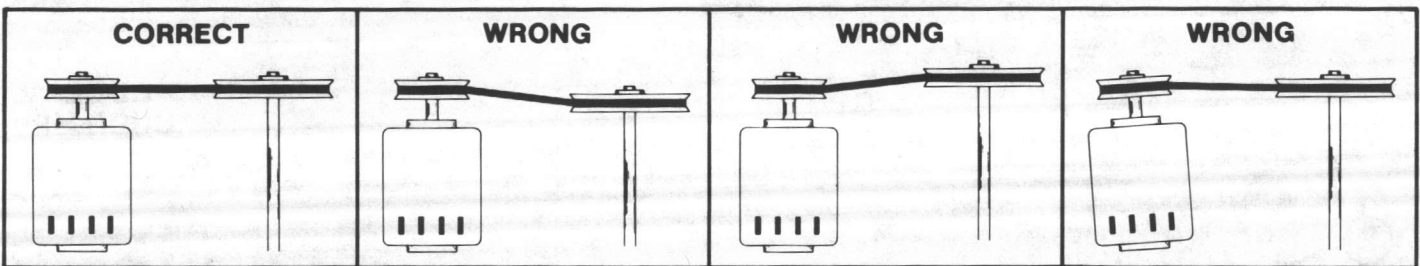


Fig. 5

If adjustments are made, it is very important to check the pulleys for proper alignment. Misaligned pulleys lead to excessive belt wear, vibration, noise and power loss. (Fig. 5)

Belt tension can be adjusted by loosening four fasteners (marked R in Fig. 6) on the drive frame. This allows the motor plate to slide on the slotted adjusting arms and drive frame angles. Belt tension should be adjusted to allow 1/64" of belt deflection per inch of belt span. For example, a 15 inch belt span should have 15/64" or about 1/4" of deflection with moderate thumb pressure at mid-point between pulleys. (Fig. 6 and 7) Over tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at startup and uneven wear.

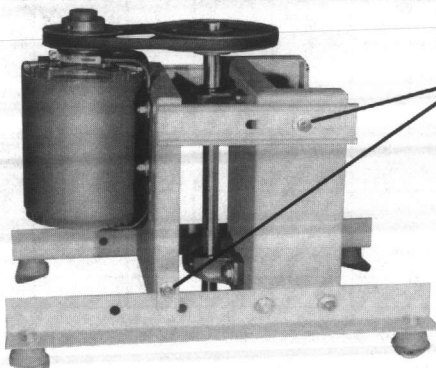


Fig. 6

NOTE:
Identical fasteners on opposing side must also be loosened.

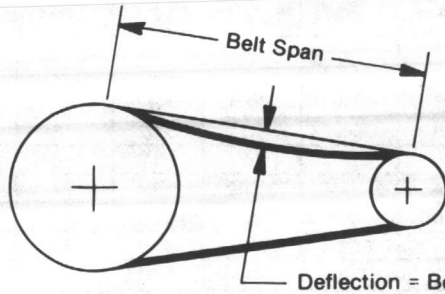


Fig. 7

The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor sheave. Two groove variable pitch pulleys must be adjusted equal number of turns open or closed. Any increase in speed represents a substantial increase in the horsepower required by a unit. Motor amperage should always be checked to avoid serious damage to motor when the speed is varied.

Maintenance

Belts tend to stretch after a period of time. They should be periodically checked for wear and tightness. When replacing belts, use the same type as supplied with unit. Matched belts should always be used on units with multigroove pulleys. Replacement of belts should be accomplished by loosening the tensioning device so belts may be removed by hand. Do not force belts on or off as this may cause breakage of cords leading to premature belt failure. Belts should be adjusted as previously mentioned in the Pre-Startup checks section.

Shaft bearings can be classified into two groups, relubricating and non-relubricating. All bearings are factory lubricated and require no further lubrication under normal use. Normal use being considered -20° F to 180° F and in a relatively clean environment. Units installed in hot, humid, or dirty applications should be equipped with special bearings which will require frequent lubrication. When lubrication is necessary, caution should be employed to prevent overpacking or contamination. Grease fittings should be wiped clean. The unit should be in operation while lubricating and extreme care exercised around moving parts. The grease should be pumped in very slowly until a slight bead forms around the seal. The grease recommended for lubrication is a high-grade lithium base type.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust and grease buildup on motor housing assures proper motor cooling. Greasing of motors is only intended when fittings are provided. Many fractional motors are permanently lubricated for life and require no further lubrication. Motors supplied with grease fittings should be greased in accordance with manufacturers recommendations.

Wheels require very little attention when moving clean air. Occasionally oil and dust may accumulate on the wheel causing unbalance. When this occurs the wheel and housing should be cleaned to assure smooth and safe operation.

The unit should be made non-functional when cleaning wheel or housing. (Removal of fuses, locking disconnect off, etc.)

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

A proper maintenance program will help these units deliver years of dependable service.

TROUBLE SHOOTING

PROBLEM	CAUSE	CORRECTIVE ACTION
REDUCED AIRFLOW	System resistance too high	Check System: Backdraft or control dampers for proper operation, obstruction in ductwork etc.
	Unit running backwards	Correct as shown in Fig. 4
	Excessive dirt buildup on wheels	Clean wheel
	Improper wheel alignment	Center wheel on inlets See Fig. 3
EXCESSIVE NOISE	Bad bearings	Replace
	Belts too tight or too loose	Refer to fig. 6 and corresponding copy
	Wheel improperly aligned and rubbing	Center wheel on inlets See fig. 3
	Loose drive or motor pulleys	Align and tighten as in "Pre-starting Checks System" section
	Foreign objects in wheel or housing	Remove objects, check for damage or unbalance
	Unbalance of wheel caused by excessive dirt and grease buildup	Remove buildup

NOTE: Before taking any corrective action, make certain unit is not capable of operation during repairs.

WARRANTY

The Greenheck Fan Corporation warrants this equipment to be free from defects in material and workmanship for a period of one year from the purchase date.

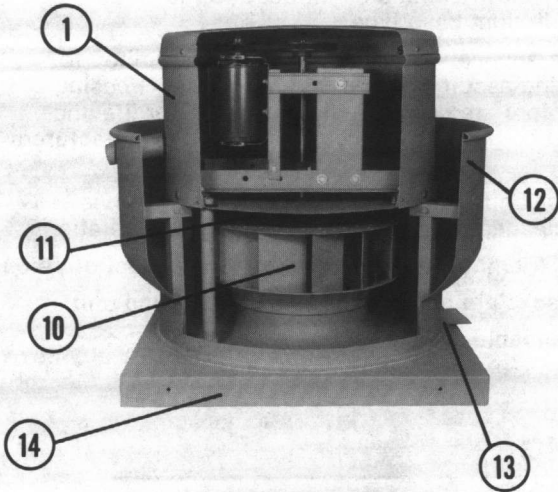
Any units or parts which prove to be defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid.

The motor is warranted by the motor manufacturer for a period of one year. Should the motor prove defective during this period, it should be returned to the nearest authorized motor service station.

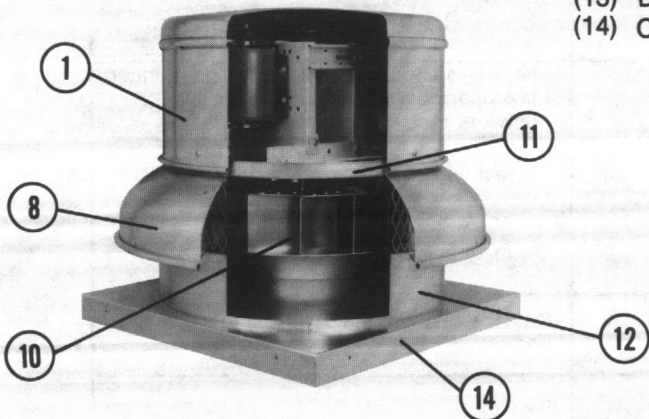
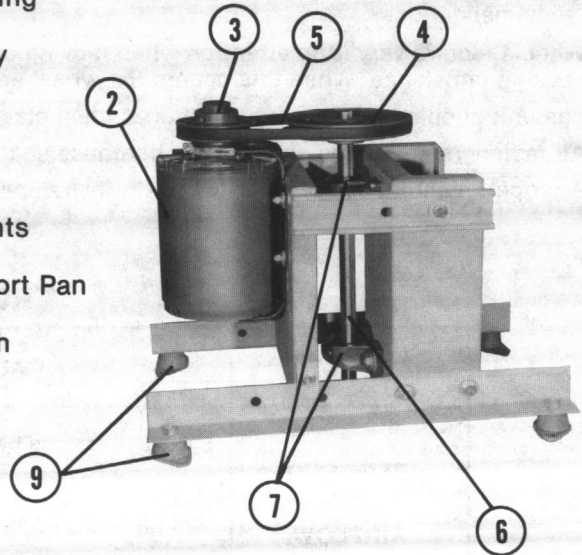
Greenheck Fan Corporation will not be responsible for any installation or removal costs.

Parts List

Always provide unit model and serial number when requesting parts or information.



- (1) Motor Housing
- (2) Motor
- (3) Motor Pulley
- (4) Shaft Pulley
- (5) Belt
- (6) Shaft
- (7) Bearings
- (8) Shroud
- (9) Shock Mounts
- (10) Wheel
- (11) Motor Support Pan
- (12) Wind Band
- (13) Drain Trough
- (14) Curb Cap



REPLACEMENT PARTS

JOB _____

MODEL _____ SERIAL NO. _____

GREENHECK PRODUCTION NO. _____

SALES OFFICE _____ CITY _____

PART NO.	QTY.	PART AND DESCRIPTION
		MOTOR
		BEARING
		MOTOR PULLEY
		BELT
		WHEEL
		SHAFT
		SHAFT PULLEY
		SHOCK MOUNTS
		DISCONNECT SWITCH

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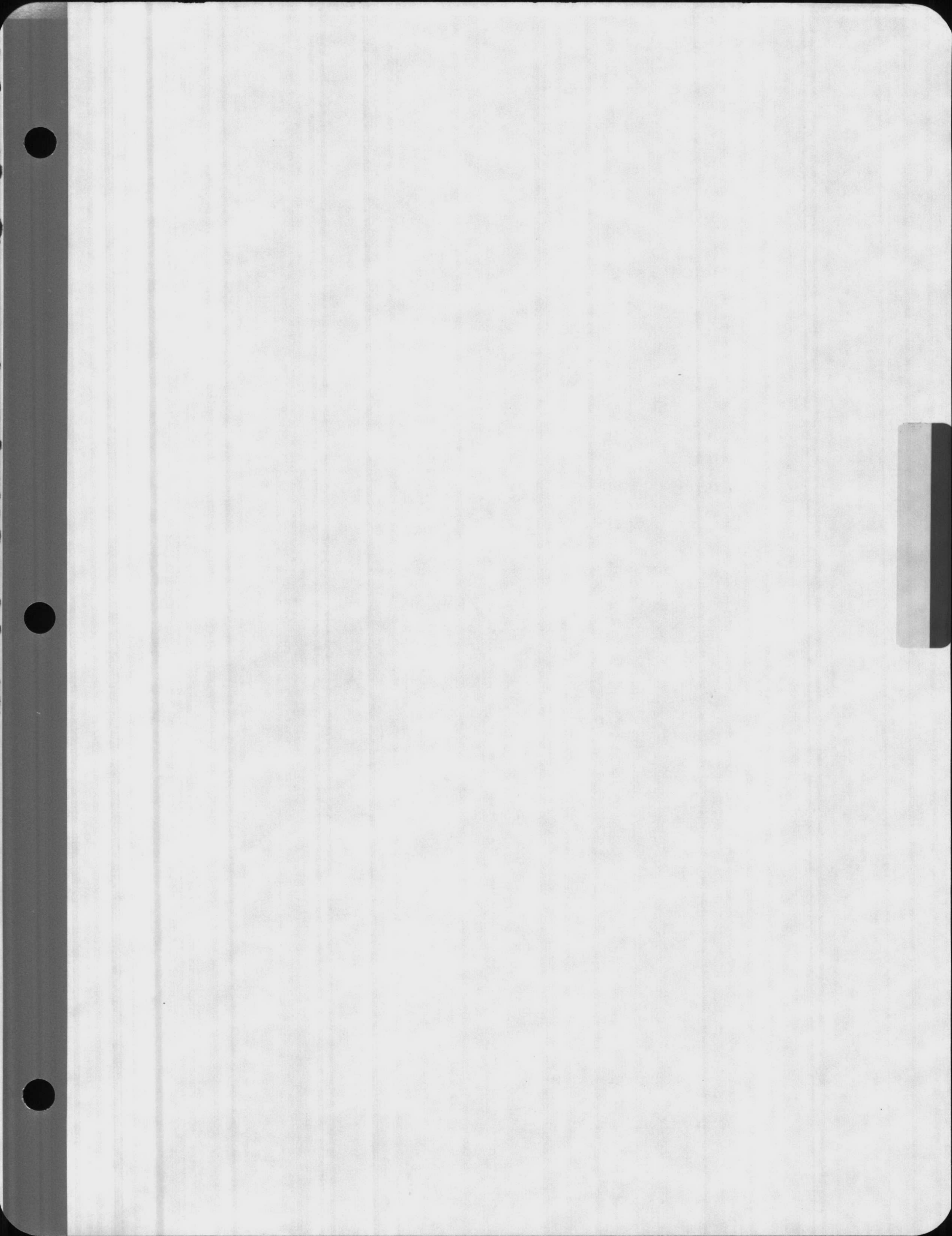
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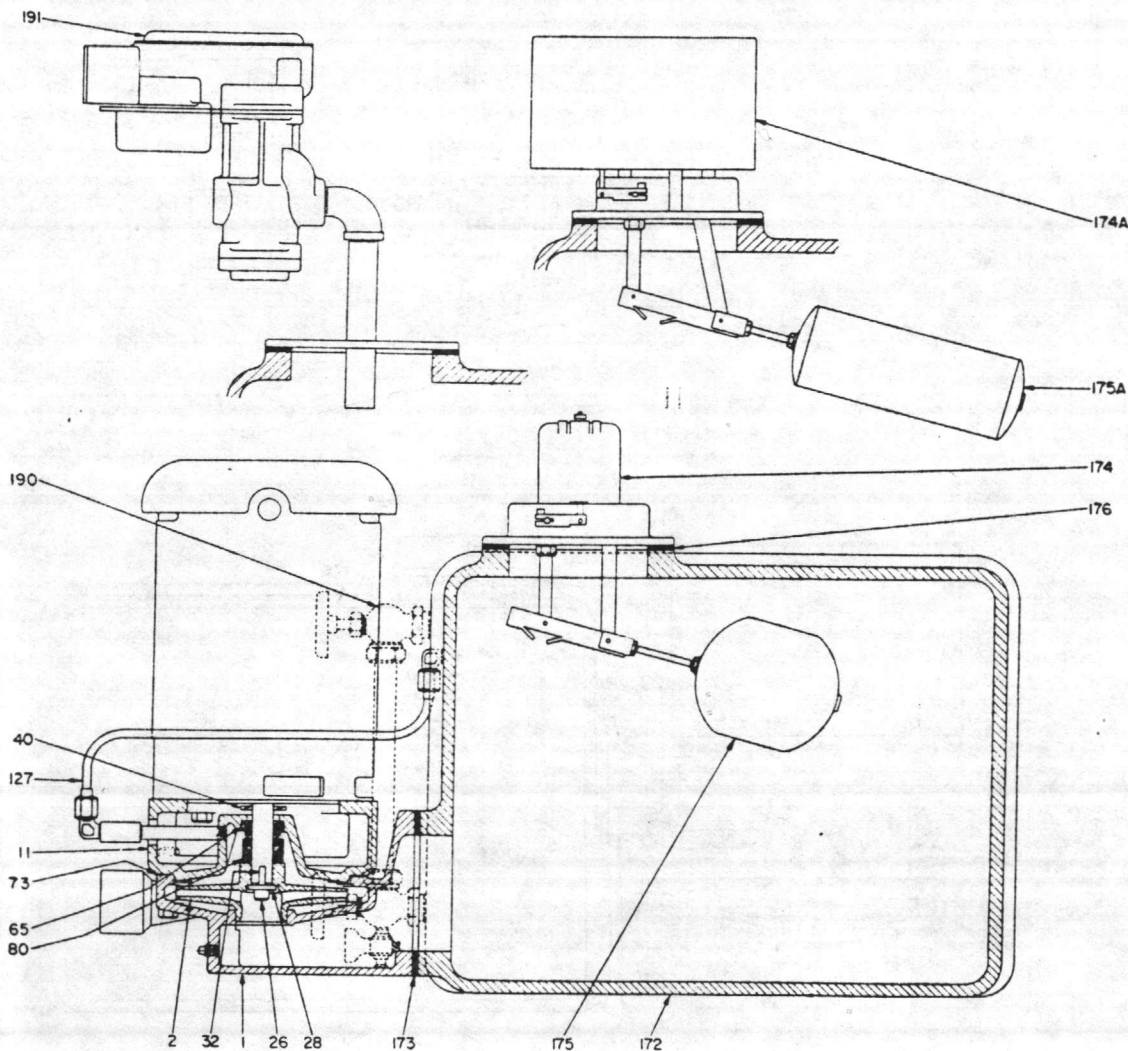
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REPAIR PARTS LIST
TYPES "ACV & AEV" VERTICAL CONDENSATE UNIT
CAST IRON RECEIVERS
(With Type 6 Mechanical Shaft Seal)



Item No.	Name	Material of Construction (St'd Fitted)	Item No.	Name	Material of Construction (St'd Fitted)
1	CASING	CAST IRON	127	SEAL VENT PIPING	COPPER
* 2	IMPELLER	BRONZE	172	RECEIVER	CAST IRON
11	CASING COVER	CAST IRON	*173	RECEIVER GASKET	RUBBER
*26	IMPELLER SCREW	STAINLESS	174	FLOAT SWITCH	Sq. D. #9037
*28	IMPELLER SCREW WASHER	STAINLESS	174A	MECHANICAL ALTERNATOR	Sq. D. #9038
*32	IMPELLER KEY	STAINLESS	175	FLOAT (Float Switch)	COPPER
40	DEFLECTOR (Liquid)	NEOPRENE	175A	FLOAT (Alternator)	COPPER
† *65	MECHANICAL SHAFT SEAL (Stationary Element)	CERAMIC	176	FLOAT SWITCH GASKET	RUBBER
*73	CASING GASKET	ASBESTOS	190	WATER GAUGE	BRASS
† *80	MECHANICAL SHAFT SEAL (Rotating Element)	CARBON	191	MAKE-UP VALVE (When Specified)	McDonnell #101

* FOR DOMESTIC SERVICE WE RECOMMEND THESE PARTS BE CARRIED IN STOCK AS SPARES.

† FURNISHED ONLY IN PAIRS AS COMPLETE UNIT.

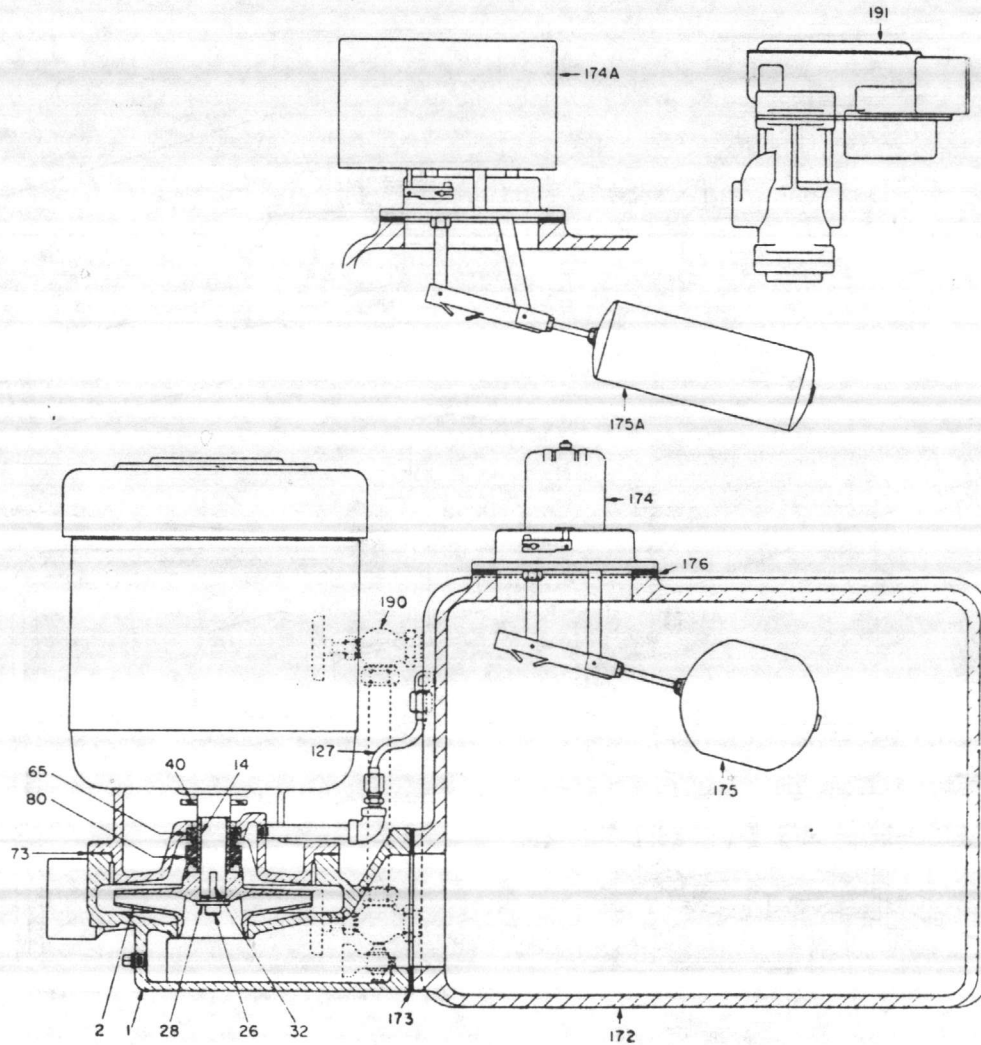
WHEN WRITING THE FACTORY REGARDING YOUR PUMP — ALWAYS INCLUDE SERIAL NUMBER



A MUELLER COMPANY

P.O. Box 1364 Commerce & Exchange
 Conway, Arkansas 72032 501-329-9811

REPAIR PARTS LIST
TYPES "ACV & AEV" VERTICAL CONDENSATE UNIT
CAST IRON RECEIVERS
 (With Type 21 Mechanical Shaft Seal)



Item No.	Name	Material of Construction (S't'd Fitted)	Item No.	Name	Material of Construction (S't'd Fitted)
1	CASING	CAST IRON	127	SEAL VENT PIPING	COPPER
* 2	IMPELLER	BRONZE	172	RECEIVER	CAST IRON
*14	SHAFT SLEEVE	BRONZE	*173	RECEIVER GASKET	RUBBER
*26	IMPELLER SCREW	STAINLESS	174	FLOAT SWITCH	Sq. D. #9037
*28	IMPELLER SCREW WASHER	STAINLESS	174A	MECHANICAL ALTERNATOR	Sq. D. #9038
*32	IMPELLER KEY	STAINLESS	175	FLOAT (Float Switch)	COPPER
40	DEFLECTOR (Liquid)	NEOPRENE	175A	FLOAT (Alternator)	COPPER
† *65	MECHANICAL SHAFT SEAL (Stationary Element)	CERAMIC	176	FLOAT SWITCH GASKET	RUBBER
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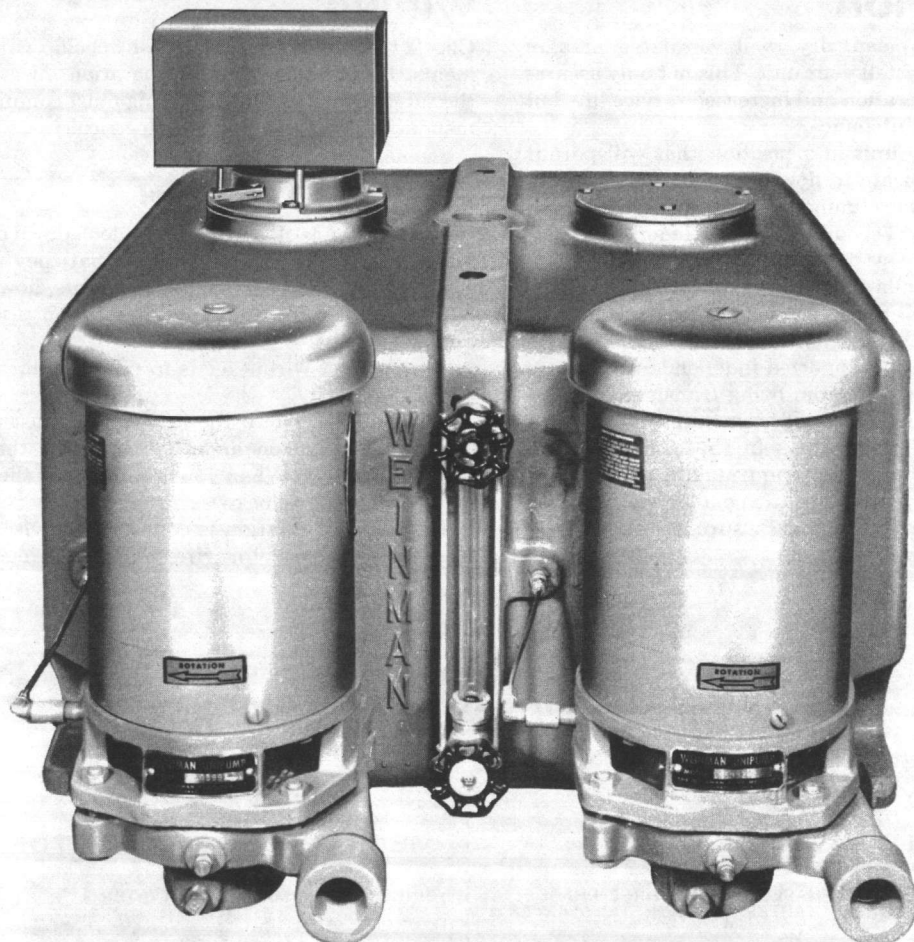
Supersedes March 26, 1962 Issue

for quality, efficiency, dependability...

WEINMAN

CONDENSATE RETURN AND
BOILER FEED UNITS

TYPES ACV, ACKV, AEV, AEKV, ADV and AFV



INSTALLATION and OPERATING INSTRUCTIONS

These instructions are important. Please read them thoroughly before installing your Weinman Unit. Quiet, trouble-free operation depends on proper installation and operation procedure. By carefully following the procedure outlined you will insure top performance from your Weinman equipment over a long period of time.

Keep these instructions on hand for future reference, along with the enclosed parts list which will be of help to you should you need replacement parts.



A MUELLER COMPANY

P.O. Box 1364 Commerce & Exchange
Conway, Arkansas 72032 501-329-9811

WEINMAN

INSTALLATION and OPERATING INSTRUCTIONS
for CONDENSATE RETURN and BOILER FEED UNITS

TYPES ACV, ACKV, AEV,
AEKV, ADV and AFV

How to install, maintain and operate WEINMAN Condensate Return and Boiler Feed Units

Your Weinman Condensate Return and Boiler Feed Units are precision designed and built with quality materials and fine workmanship to warrant superior performance under the toughest operating conditions. To insure continued successful operation it is essential the following installation, maintenance and operation instructions be followed in every detail.

INSTALLATION

- STEP 1:** Choose a clean, dry, well ventilated area in which to install your unit. This not only assures proper operation and increased service life, but speeds maintenance.
- STEP 2:** Install the unit in a position that will permit the condensate to flow by gravity into the receiver. This eliminates the possibility of the return lines becoming moisture laden, thus preventing the system from freeing itself of air.
- STEP 3:** After installation, be certain the unit is perfectly level. Shim it when necessary to level.
- STEP 4:** Connect the discharge piping carefully. Be sure that it is supported independently to prevent pipe strain from being transferred to the pump casing. It's good to install a union, gate valve, and check valve in the discharge line.
- STEP 5:** Hook up the return piping making certain that it slopes slightly toward condensate receiver.
- STEP 6:** Install the vent piping. Be sure it is open to the atmosphere at all times.

WIRING

Check the motor nameplate for specific wiring requirements. For safe and proper operation, fuses installed in the safety switches and all wiring must conform to recommendations of the National Electrical Code.

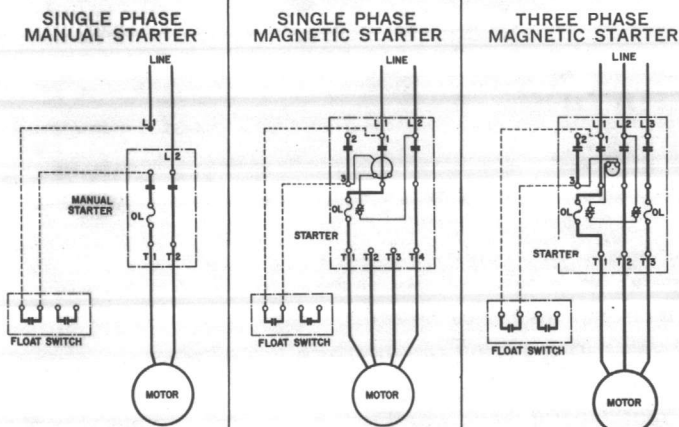
PUMP ROTATION

Pump rotation is clockwise as you look down on the pump. Single phase motors are wired so that they rotate clockwise automatically. Three phase motors, however, should be checked carefully for proper rotation prior to operation. To do this:

1. Connect wiring leads to pump motor in the usual manner.
2. Start the motor the first time by just touching the starter button and then stopping the motor immediately. When you do this check the pump shaft for proper clockwise rotation.
3. If pump rotation is counter-clockwise, switch any two of the motor wires to obtain proper rotation.

TYPICAL WIRING DIAGRAMS

FLOAT SWITCH



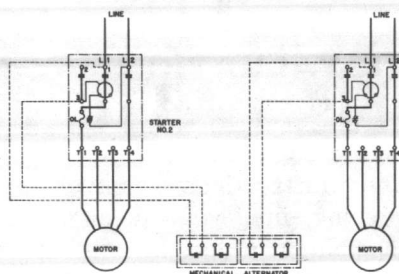
When using manual starter with three position selector switch (Hand-Off-Auto), connect line L1 to "Hand" terminal of switch, and float switch in series to "Auto" terminal and to line L1.

When using magnetic starter with three position selector switch (Hand-Off-Auto), connect float switch to terminals 1 and 2. For low voltage, connect terminals T1 to T2, and T3 to T4. For high voltage, connect terminal T2 to T3.

When using magnetic starter with three position selector switch (Hand-Off-Auto), connect float switch to terminals 1 and 2.

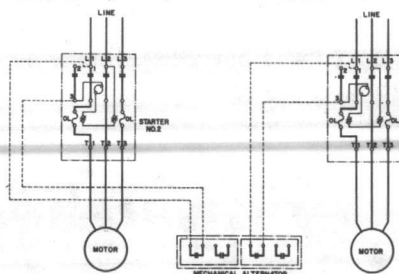
MECHANICAL ALTERNATOR

SINGLE PHASE MAGNETIC STARTER



When using magnetic starter with three position selector switch (Hand-Off-Auto), connect alternator to terminals 1 and 2. For low voltage, connect terminals T1 to T2 and T3 to T4. For high voltage, connect terminal T2 to T3.

THREE PHASE MAGNETIC STARTER



When using magnetic starter with three position selector switch (Hand-Off-Auto), connect alternator to terminals 1 and 2.

LUBRICATION

Under normal condensate service requirements, lubricate motor bearings about once a year. **WARNING! EXCESSIVE GREASING DAMAGES BEARINGS JUST AS QUICKLY AS INSUFFICIENT GREASING.** It is essential to use a good grade of grease. Any of the following brands are acceptable for Weinman Pumps:

American Oil Company.....	Amolith No. 2
Cities Service Oil Company.....	Trojan H2
Humble Oil & Refining Company..	Nebula EP No. 2
Shell Oil Company.....	Alvania No. 2
Sinclair Refining Company.....	Litholine 2
Texaco Inc.....	Multifak 2
Union Oil Company.....	UNOBA No. 2

OPERATION

Operation of Weinman Condensate Return and Boiler Feed Units is simple and easy, if you observe these rules in keeping them in proper condition.

New or repaired water systems must be flushed for several days to eliminate all impurities and make sure the entire system is clean. This simple precaution will give you years more of maintenance-free service.

Heating systems should be flushed thoroughly at the start of each heating season for the same reason.

To flush your Weinman Unit . . . remove the drain plug at the receiver and drain the system water into the sewer. If the system water remains dirty after flushing . . . operate it for several days, draining the water into the sewer until it becomes clean.

DISASSEMBLY

Whenever it is necessary to repair the motor or replace the mechanical seal, the pump can be removed from its casing quickly and easily without disturbing the piping.



INSTALLING A NEW MECHANICAL SEAL

CAUTION: This seal is a precision product and should be handled accordingly. Be especially careful not to scratch or chip the lapped sealing faces of the washer and floating seat. If reinstalling a used seal, both sealing faces should be relapped.

INSTALLING STATIONARY ELEMENT

The seat must be seated securely in the seat ring with the lapped face out. The *unlapped* face is marked and correctly assembled when shipped. Oil the seat ring with *light oil* and seat it firmly and squarely. If this cannot be

done with the fingers, use a sleeve as shown in Fig. 1, inserting the cardboard shipping disc between the sleeve and the lapped face to prevent scratching sealing face.

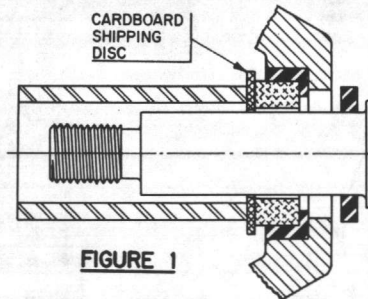


FIGURE 1

INSTALLING ROTATING ELEMENT

Oil shaft with *light oil*. Shaft should be clean and polished smooth. Slide seal body on shaft (washer end *first*) and seat firmly. A sleeve as shown in Fig. 2 will facilitate

this operation and prevent the rubber driving ring from pulling out of place as the seal body is slid along the shaft. Assembly of impeller automatically sets seal in proper position.

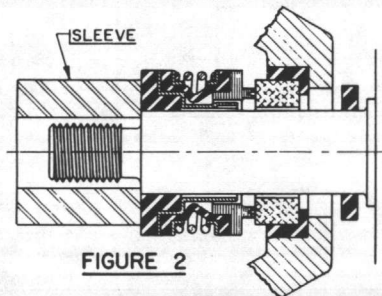
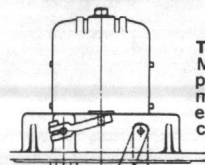


FIGURE 2

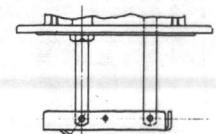
Make sure at all times, and particularly before final assembly, that both sealing faces are absolutely clean. Sealing faces should be oiled with clean, light oil.

NEVER RUN THE SEALING FACES DRY. The liquid being handled insures proper lubrication unless other methods of lubrication have been specified. In some cases a short period of operation is required to clear up slight leakage.

REVERSING FLOAT POSITION WHEN USING MECHANICAL ALTERNATOR



TYPES EG1, EG2. Mount float in this position for vertical mounting, sump operation (Contacts close on liquid rise).



TYPES EG3, EG4. Mount float in this position for vertical mounting, standard operation (Contacts open on liquid rise).

PUMP TROUBLES AND THEIR CAUSES

A. Failure to Pump

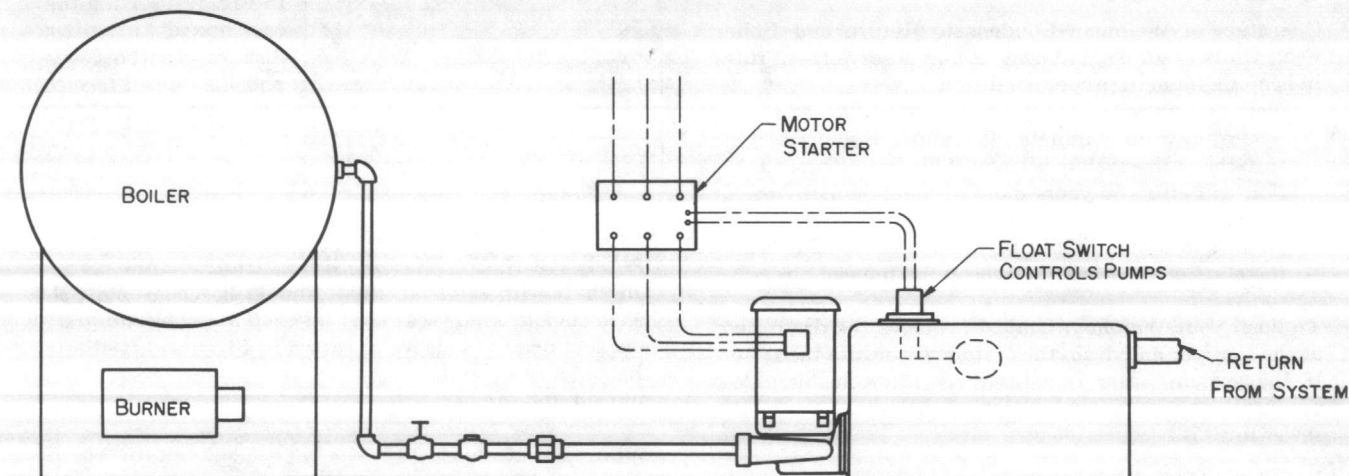
1. No water in the receiver
2. Rotation in wrong direction
3. Speed too low
4. Return water too hot

5. Total head too high

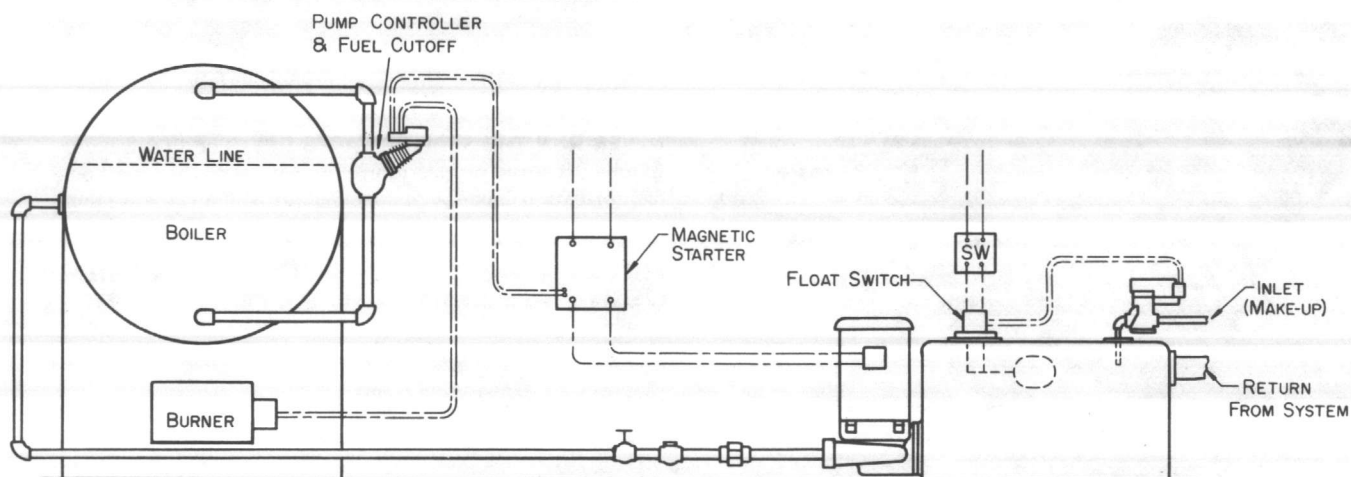
B. Overloaded Driving Unit

1. Total head too low
2. Unit misalignment (check for piping strains)

CONDENSATE RETURN UNIT CIRCUIT



BOILER FEED UNIT CIRCUIT



Mueller Pump
AERMOTOR-MIDLAND-WEINMAN

A MUELLER COMPANY

P.O. Box 1364 Commerce & Exchange
Conway, Arkansas 72032 501-329-9811

Printed in U.S.A.

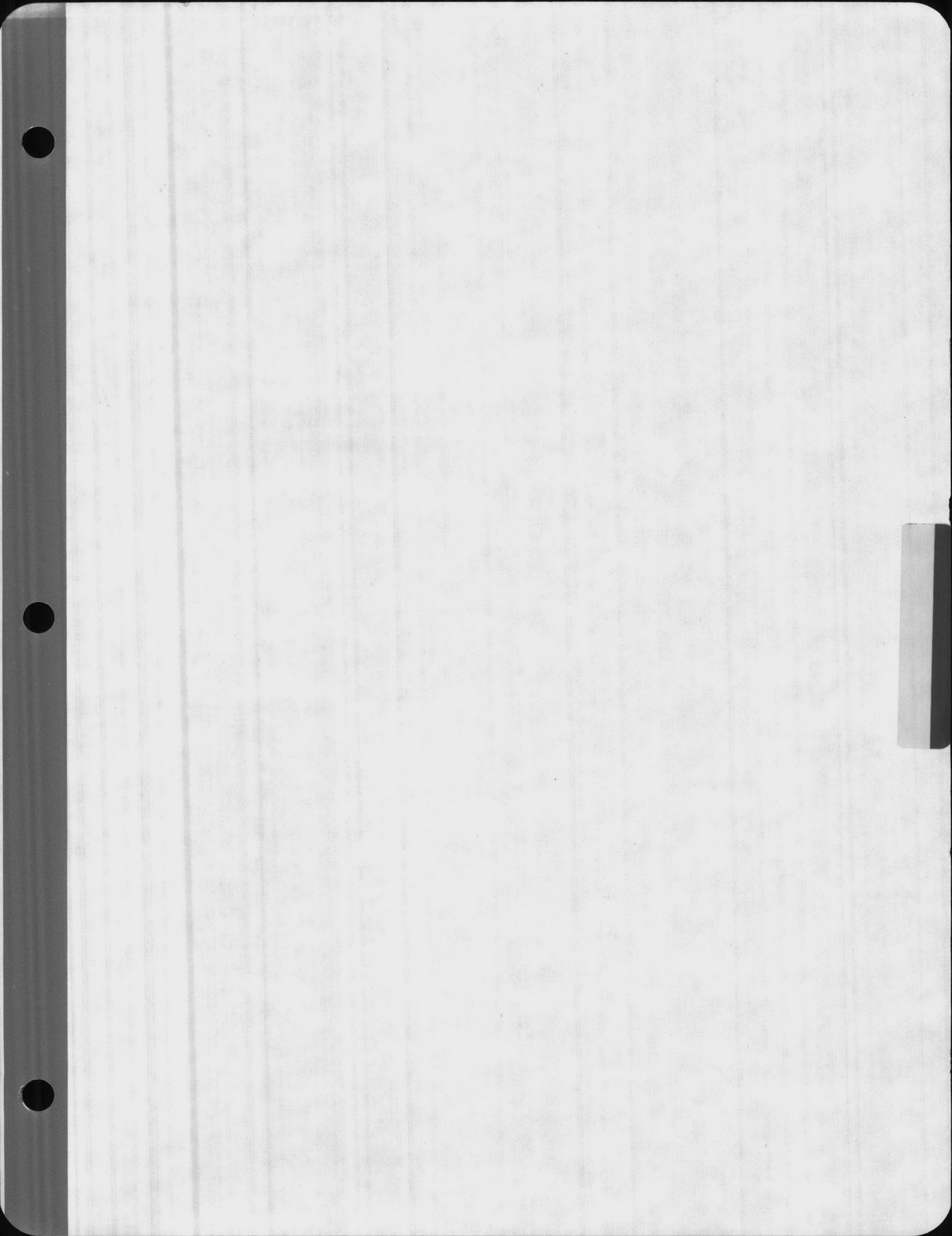
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INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS

SPENCE ENGINEERING COMPANY, INC. TYPE ED SERIES PRESSURE REGULATORS
Walden, New York 12586

A. PLANNING THE INSTALLATION

1. Locate the valve in a straight run of horizontal pipe. See Fig. 1.
2. Allow headroom above the valve for access through the blind flange.
Provide clearance for stem withdrawal underneath.
3. Prevent water hammer and erratic operation by installing traps to provide proper drainage before and after the valve, and before secondary PRV or control valve.
4. Avoid damaging effects of scale and dirt in pipe lines by using a strainer as shown in Fig. 1.
5. Provide a 3-valve by-pass to facilitate inspection without interrupting service.
6. To eliminate excessive noise and erratic regulation with steam and other compressible fluids enlarge the delivery pipe size to effect a reasonable flow velocity at the reduced pressure. A tapered transition is recommended. If possible, avoid a sharp turn close to the regulator outlet and a bull-headed tee connection to the low pressure main.
7. Install initial and delivery pressure gages to indicate performance. If the pressure rating of the delivery system or connected equipment is less than the initial steam pressure, provide a safety valve.

B. INSTALLING MAIN VALVE

1. Flush the piping system thoroughly to clear it of welding beads, scale, sand, etc.
2. Mount the main valve with diaphragm chamber down and arrow on body pointing in the direction of flow.
3. Screwed end valves should be mounted in unions.

C. INSTALLING PILOT

1. Mount the pilot on either side of the main valve by means of $\frac{1}{4}$ " nipple and union provided. Make this connection to the $\frac{1}{4}$ " pipe tap at the inlet of the main valve as shown in Fig. 2.
2. Screw No. 4A bleedport fitting into the $\frac{1}{8}$ " pipe tap at the outlet of the main valve body. Note bleed orifice in this fitting — vital to operation of regulator.
3. Screw No. 8B tee into $\frac{1}{8}$ " pipe tap in pilot. Select tap facing downstream.
4. Screw No. 5A elbow containing restriction orifice into $\frac{1}{8}$ " pipe tap on underside of main valve diaphragm chamber. If the initial pressure or pressure drop is less than 15 psi a No. 5B open elbow is used.
5. Connect tubing bends as illustrated in Fig. 2. Valves with condensation chamber are fitted up according to Fig. 3.

D. CONTROL PIPE

1. Use $\frac{1}{4}$ " pipe for this line which connects the pilot diaphragm chamber to the desired point of pressure control. See Fig. 1.
2. Take the control at a point of minimum turbulence. Avoid control immediately at the valve outlet or after a turn. When the delivery pipe expands in size select a spot at least 4 pipe diameters beyond the point of enlargement.
3. Pitch away from pilot to avoid erratic operation and excessive fouling. Eliminate water pockets.
4. Locate delivery pressure gage in control pipe to show pressure actually reaching pilot diaphragm.

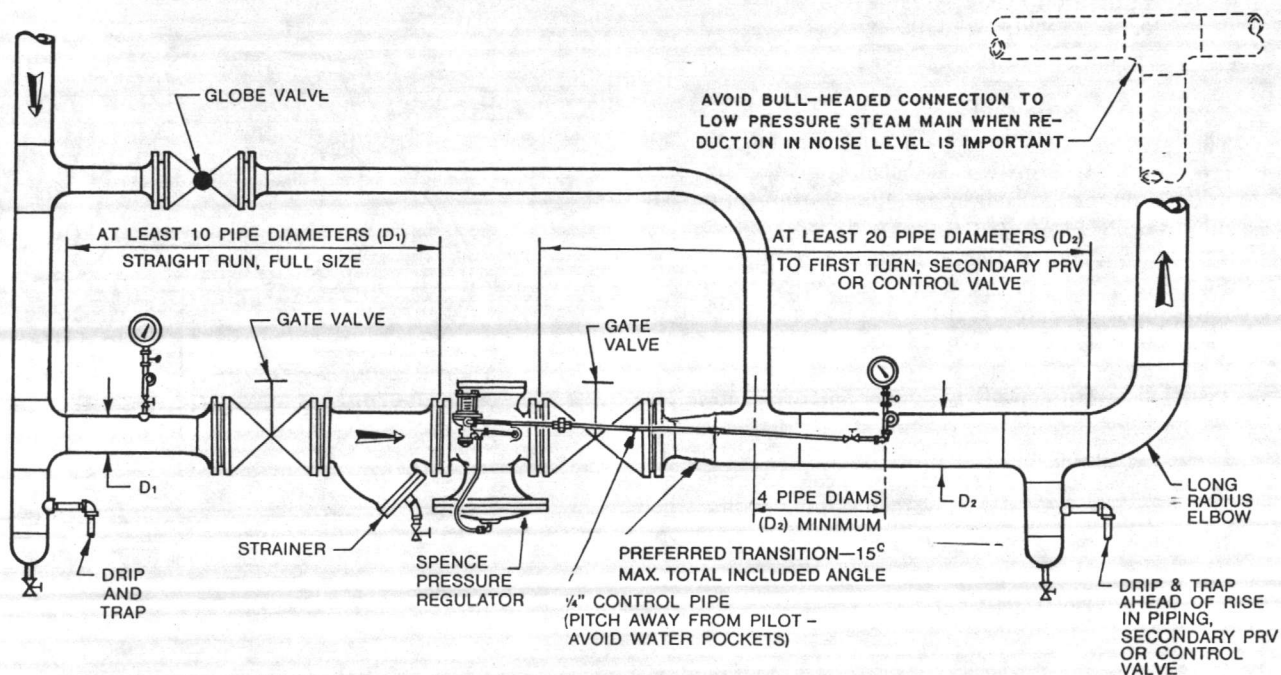


FIG. 1—RECOMMENDED INSTALLATION OF REGULATOR WITH STRAINER

E. INSULATION

1. Insulation may be applied to the upper portion (globe and flanges) of the main valve. Do not insulate the diaphragm chamber, condensation chamber (if used) or any part of the pilot. See Figs. 2 and 3.

F. STARTING UP AND SETTING

1. Use by-pass to fill the delivery system and raise pressure to slightly below normal required.
2. Close pilot by releasing compression on adjusting spring. See Fig. 2.
3. Open $\frac{1}{4}$ " control pipe valve. Crack outlet stop valve.
4. Crack inlet stop valve. Blow down strainer. *Caution: Never open a reducing valve without positive indication the high side is clear of condensate.*
5. Open inlet stop valve and gradually compress adjusting spring until the valve opens and takes control at desired pressure.
6. Alternately choke down on the by-pass and open outlet stop valve until the regulator is on the line.

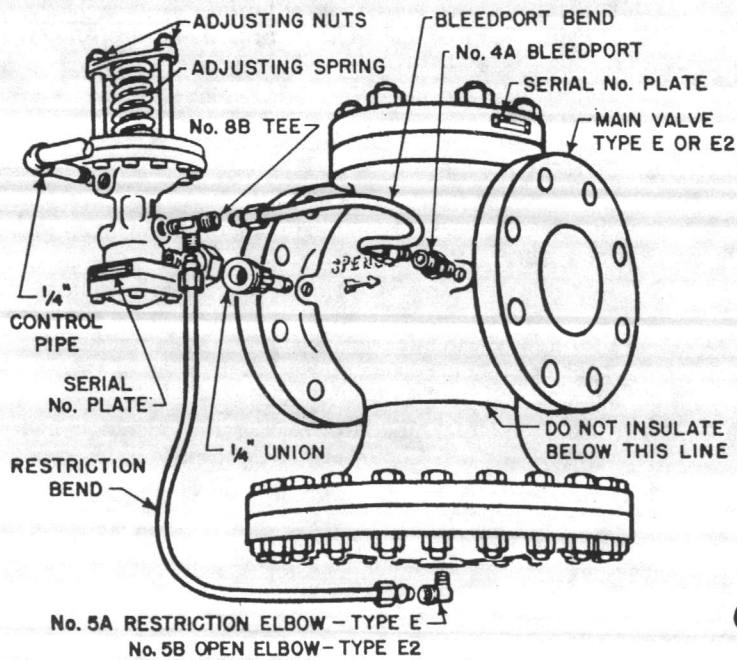


Fig. 2 — Regulator Assembly for Type E or E2 Main Valves

G. OPERATING PRINCIPLE

1. The regulator is operated by initial steam or other fluid pressure. It is normally closed, being held so by initial pressure on the disc and by an internal main spring. The pilot is opened by compressing its adjusting spring.
2. When steam is turned on, it flows through the pilot, see Fig. 2, to the No. 8B tee. Bleedport No. 4A restricts the flow, builds pressure under the diaphragm and opens the main valve. Restriction No. 5A steadies the operation of the regulator.
3. Delivery pressure feeds back through the control pipe to the pilot diaphragm. As this pressure approaches a balance with the thrust of the adjusting spring the pilot throttles the loading pressure. In turn, the main valve takes a position established by the loading pressure where just enough steam flows to maintain the set delivery pressure.

H. TROUBLE SHOOTING

1. Failure to open or sagging delivery pressure.
 - a. Adjusting spring, Fig. 2, may have been tampered with.
 - b. Initial pressure may be down due to partially closed

supply valve, clogged strainer, or other obstruction.

- c. Orifice in No. 5A restriction elbow, Fig. 2, may be plugged. No. 4A bleedport fitting, Fig. 2, may have been omitted and an open coupling substituted.
 - d. Control pipe may be plugged. Most likely points of obstruction are at shutoff valve and entrance to delivery main.
 - e. Main diaphragm (20), Fig. 5, may be broken. Test with air or water before dismantling. See J2b for method of applying pressure.
2. Failure to close or over-riding delivery pressure:
 - a. Adjusting spring, Fig. 2, may have been tampered with.
 - b. Orifice in bleedport No. 4A may be plugged.
 - c. By-pass valve may be leaking.
 - d. Dust sifted on to pilot pressure plate (10), Fig. 4, may prevent closure. See J1b3.
 - e. Main valve or pilot may be held open by foreign matter in seat. To determine which valve leaks:

1. Close stop valves and $\frac{1}{4}$ " control pipe valve.
2. Remove bleedport bend, Fig. 2, so pilot will exhaust to atmosphere.
3. Crack inlet stop valve. Steam will issue from No. 8B tee. Release compression on adjusting spring to see if pilot closes tight. Open and close several times to wash seat.
4. Steam blowing back from bleedport means main valve disc is held open by foreign matter.
5. Steam may wash the obstruction from the seat if the valve is made to open wide. This can be accomplished, even at light loads, if the control point is beyond the outlet stop valve as shown in Fig. 1. Reassemble bleedport bend and place regulator in operation. Then, slowly open and close outlet stop valve.

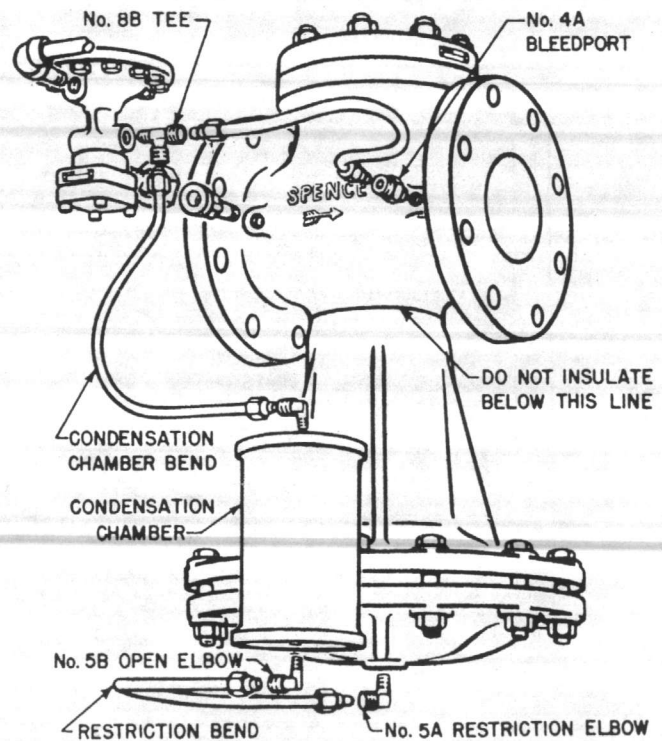


Fig. 3 — Regulator Assembly for Type E5 Main Valve with Condensation Chamber

6. Leakage of either valve requires dismantling to correct. See J2.

3. Erratic regulation may be caused by:

- a. Partial clogging of bleedport No. 4A.
- b. Water pocket in control pipe.
- c. Excessive turbulence at control point. See D2.
- d. Sticking or binding of pilot stem (16), Fig. 4. Look for deposits of compound or bits of scale on it and in bushing (15).

J. MAINTENANCE

1. Inspection

- a. Under normal conditions complete dismantling at regular intervals is not recommended. A valve kept relatively free of dirt will function for years with minimum attention.
- b. After the first few days of operation and twice a year:
 1. Inspect for dirt collected at bleedport No. 4A and restriction elbow No. 5A, see Fig. 2.
 2. Inspect all joints for leakage. Keep bolts tight. Never allow a leak to persist.
 3. Check for dust or other air borne material which may have sifted onto the upper face of pilot pressure plate (10), Fig. 4. An accumulation here can obstruct closure of the pilot. In a very dusty atmosphere an enclosed spring chamber should be used.

2. Dismantling

a. Pilot — Fig. 4

1. Remove compression on spring (4).
2. Remove diaphragm bolts (12) and take off cowl (6) and diaphragm (7).

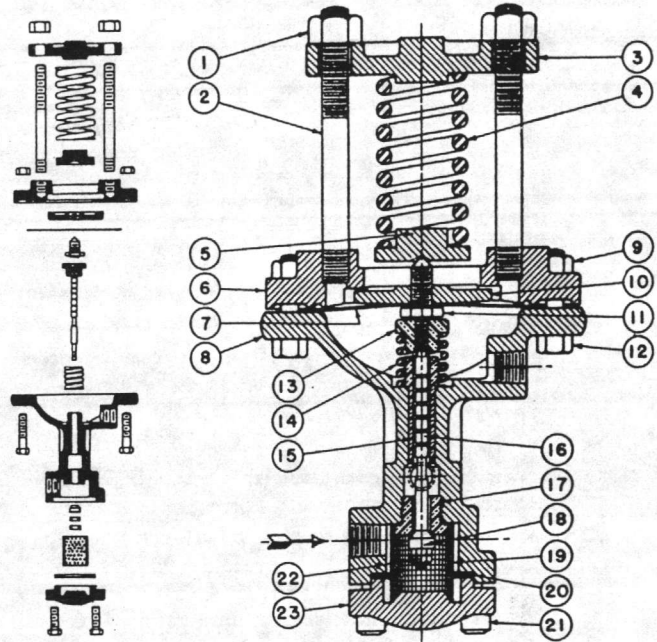


Fig. 4 — Type D Pilot

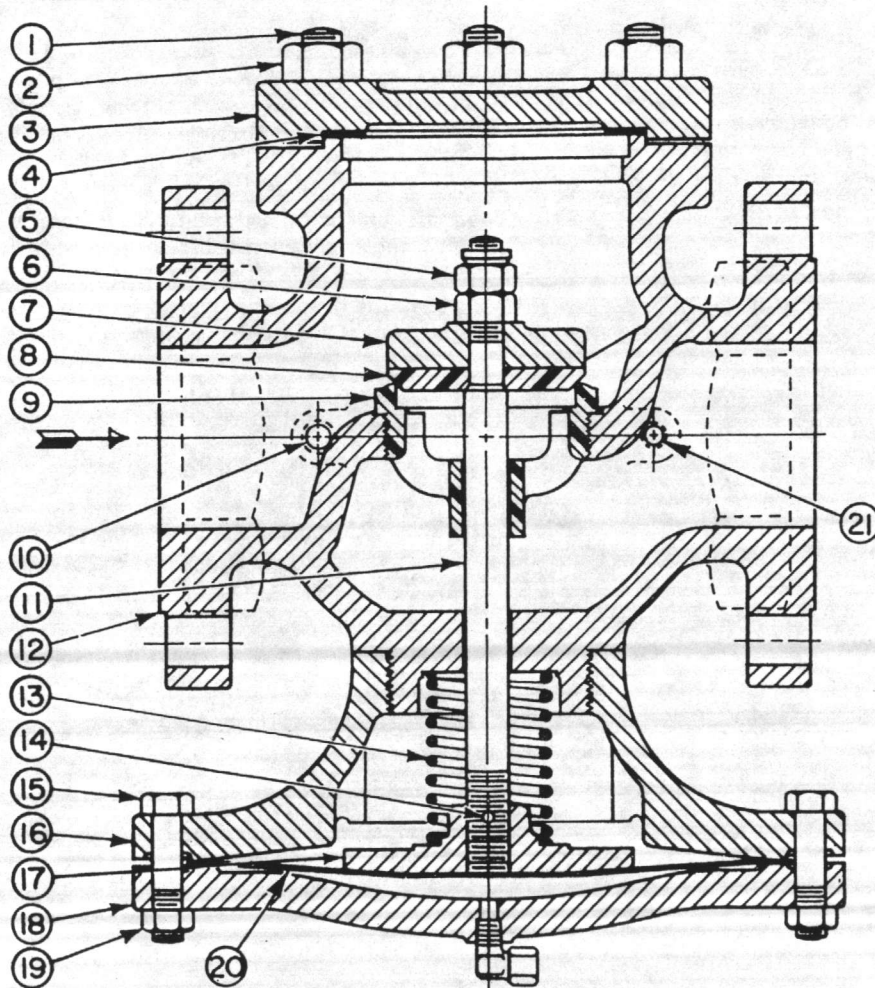
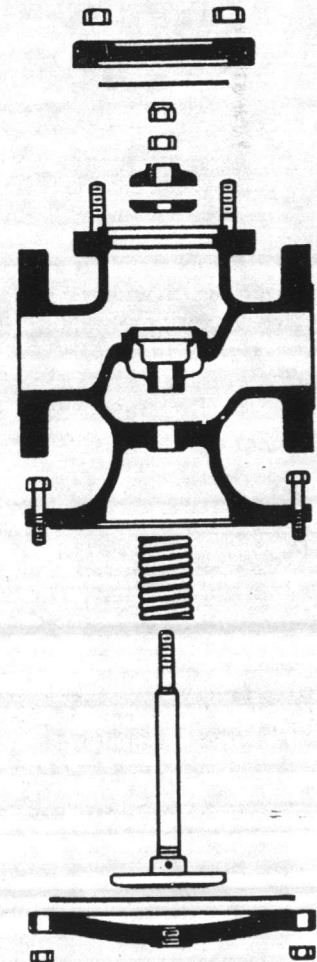


Fig. 5 — Type E Main Valve



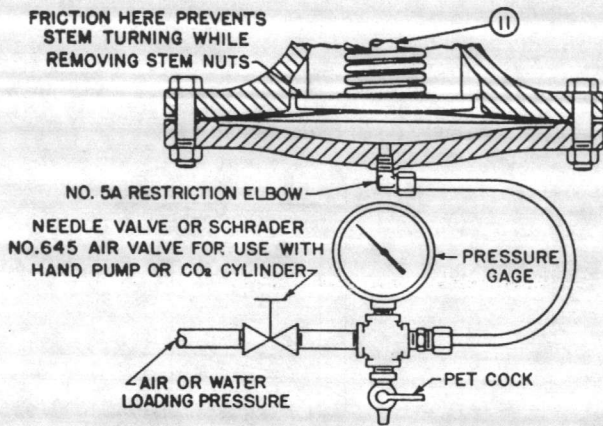


Fig. 6 — Air Loading Arrangement for Removing Stem Nuts

3. Hold pusher plate (13) with a socket wrench while turning off stem nuts (22).
- b. Main Valve — Fig. 5
 1. Connect a source of air or water pressure which can be adjusted by hand to the No. 5A restriction elbow. See Fig. 6.
 2. Apply pressure to jack valve open and prevent stem (11) from turning while removing stem nuts (5 and 6). Usually 50 to 60 psi will suffice. Use paraffin, candle wax or penetrating oil on the threads.
- c. Replacement of seat rings, main valve or pilot.
 1. These joints should be made up with Copaltite, Permatex or equal plastic gasket compound.
 2. Remove old compound from body and seat ring with a wire brush. Apply new compound sparingly to both parts, threads and shoulders. Let stand until tacky before assembling.

K. GRINDING IN

1. Seats and discs should never require more than the lightest touch up with very fine (400 grit) grinding compound. Heavy grinding will produce galling, wider seat-

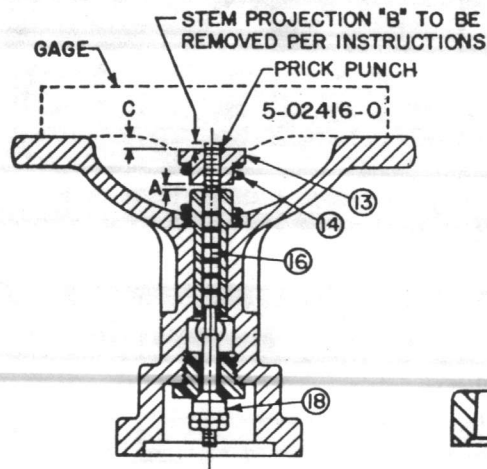


Fig. 7 — Valve Setting, Type D Pilot

ing surface and a groove in the disc, all of which tend to cause leakage. Reface a damaged surface before attempting to grind it in. Grind sparingly.

2. Pilot and main stems (16) and (11) are slotted for rotation with a screwdriver. Valve spring (14) or (13) is omitted from the assembly during grinding.
3. Slip the stem into its normal position. Apply compound to the disc, place it on the stem and tighten with one stem nut.
4. After grinding disassemble and clean all parts with carbon tetrachloride or kerosene.

L. VALVE SETTING

1. Pilot — Fig. 7
 - a. Valve setting is gaged at "C" to establish correct stem length and diaphragm position. Dimension "C" = $1\frac{1}{64}$ ".
 - b. Valve travel "A" = $\frac{3}{64}$ ". This movement should be checked roughly but need not be exact.
 - c. To install new Stem (16) omit Spring (14) and assemble other parts shown.
 - d. Hold Valve Disc (18) tight against its seat and screw Pusher Plate (13) down until dimension "C" = $1\frac{1}{64}$ ".
 - e. Grind off stem projection "B" flush with upper face of Pusher Plate (13)
 - f. Check dimension "C" and if correct lock the position by prick punching the thread at several points.
 - g. Caution: Burrs raised by prick punching should be scraped away. Upper face of Pusher Plate must be smooth and flat.
2. Main Valve — Fig. 8
 - a. Valve setting is gaged at K to establish correct stem length and diaphragm position. Dimension K is supplied with each replacement stem. For metal diaphragm valves, K is cast on the upper face of pressure plate (17).
 - b. To install new stem (11) grind in bevel joint with disc (8) and fasten disc firmly on stem with stem nut.
 - c. Insert stem and disc assembly in valve and screw on pressure plate (17). Omit spring (13) for this operation.
 - d. Hold disc (8) on seat and adjust position of pressure plate (17) until valve setting K is reached.
 - e. Push pressure plate (17) against stops in base (16).
 - f. Remove disc (8), drop out pressure plate and stem, drill and insert dowel pin (14) to lock the joint.
 - g. Grind off stem projection flush with face of pressure plate (17).

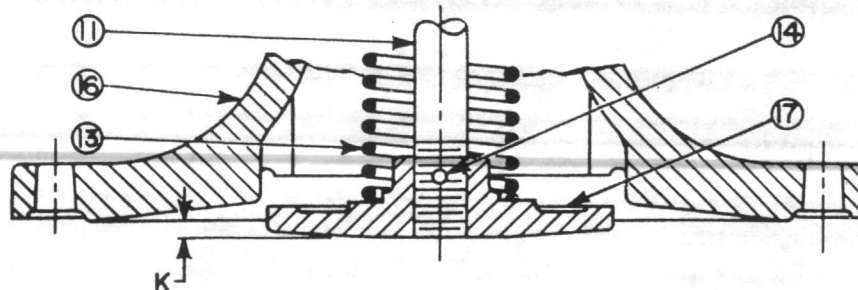


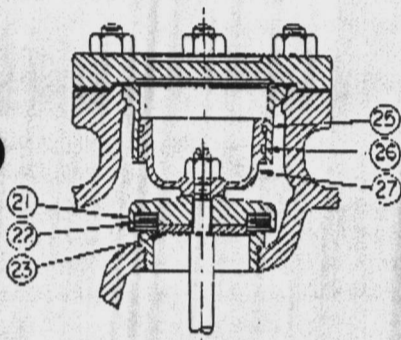
Fig. 8 — Valve Setting, Main Valve

NUMBERS IN TABLE ARE PART NUMBERS

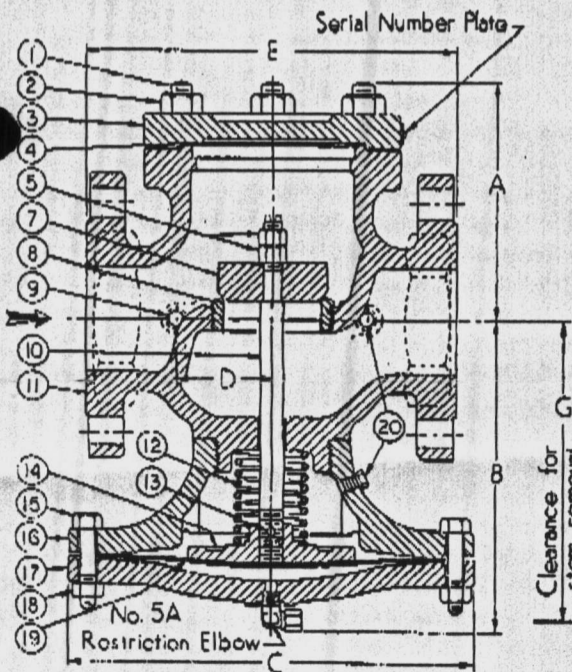
ITEM NO.	PART NAME	MATERIAL	VALVE SIZE IN INCHES					
			3/8	1/2	3/4	1	1-1/8	1-1/2
1	Blind Flg. Stud-125 lb.	Steel	-	-	-	4-10118-U	4-05442-0	4-05443-0
	Blind Flg. Stud-250 lb.	Steel	4-05516-0	4-05516-0	4-05516-0	4-10118-0	4-05442-0	4-05443-0
2	Blind Flg. Nut-125 lb.	Steel	-	-	-	4-02851-0	4-02854-0	4-02856-0
	Blind Flg. Nut-250 lb.	Steel	4-02847-0	4-02847-0	4-02847-0	4-02851-0	4-02854-0	4-02856-0
3	Blind Flange-125 lb.	Cast Iron	-	-	-	4-02173-0	4-02176-0	4-02178-0
	Blind Flange 250 lb.	Cast Iron	4-02213-0	4-02213-0	4-02171-0	4-02173-0	4-02176-0	4-02178-0
4	Blind Flange Gasket (A) (H)	Asbestos	4-02301-0	4-02301-0	4-02381-0	4-02382-0	4-02382-0	4-02383-0
	Blind Flange Gasket (B)	Steel	4-02388-0	4-02388-0	4-02388-0	4-02388-0	4-02388-0	4-02388-0
5	Stem Nut "U" Port	Steel	-	4-02968-0	4-02968-0	4-02968-0	4-02968-0	4-02968-0
6	Integral Disc "U" Port (B)	St. Steel	-	4-01772-0	4-02046-0	4-04431-0	4-02460-0	4-04613-0
	Integral Disc "U" Port	Stellited	-	4-01772-0	4-02046-0	4-02332-0	4-02477-0	4-01332-0
	Integral Disc "N" Port	St. Steel	-	4-01790-2	4-01808-0	4-01832-2	4-01844-0	4-01844-0
	Integral Disc "N" Port	Stellited	-	4-01791-2	4-01809-0	4-01833-2	4-01845-0	4-01845-0
	Integral Disc "1/2" Port	St. Steel	4-01790-2	4-01800-2	4-01832-2	4-01832-2	4-01832-2	4-01832-2
	Integral Disc "F" Port	Stellited	4-01791-2	4-01801-2	4-01834-2	4-01833-2	4-01833-2	4-01833-2
8	Seat Ring "U" Port (B)	St. Steel	-	4-04071-0	4-04071-0	4-04071-0	4-04071-0	4-04071-0
	Seat Ring "U" Port	Stellited	-	4-04112-0	4-04045-1	4-04066-1	4-04078-0	4-04078-0
	Seat Ring "N" Port	St. Steel	-	4-04109-1	4-04069-1	4-04081-1	4-04081-1	4-04081-1
	Seat Ring "N" Port	Stellited	-	4-04110-1	4-04070-1	4-04083-1	4-04083-1	4-04083-1
	Seat Ring "F" Port	St. Steel	4-04109-1	4-04069-1	4-04070-1	4-04083-1	4-04083-1	4-04083-1
9	Pipe Flg 1/4"	Steel	4-03772-0	4-03772-0	4-03772-0	4-03772-0	4-03772-0	4-03772-0
10	Stem "N" & "U" Ports (B)	St. Steel	4-03306-1	4-03306-1	4-03307-1	4-03307-1	4-03307-1	4-03307-1
	Stem "U" Ports	St. Steel	-	4-03331-0	4-03309-1	4-03310-1	4-03310-1	4-03310-1
11	Body-Standard Body	Cast Iron	4-00638-0	4-00638-0	4-00639-0	4-00640-0	4-00643-0	4-00643-0
	Body-Flanged-125 lb.	Cast Iron	-	-	-	4-00641-0	4-00644-0	4-00647-0
	Body-Flanged-250 lb.	Cast Iron	-	-	-	4-00642-0	4-00645-0	4-00648-0
12	Main Spring (A)(B)	Steel	4-09106-0	4-09106-0	4-09107-0	4-09108-0	4-09110-0	4-09110-0
13	Down Pin (B)	Steel	4-03244-0	4-03244-0	4-03245-0	4-03245-0	4-03246-0	4-03248-0
14	Pressure Plate (B)	Cast Iron	4-03693-0	4-03693-0	4-03693-0	4-03693-0	4-03693-0	4-03693-0
15	Diaphragm Bolt	Steel	4-04771-0	4-04771-0	4-04771-0	4-04771-0	4-04771-0	4-04771-0
16	Wash	Cast Iron	4-00473-0	4-00473-0	4-00473-0	4-00473-0	4-00473-0	4-00473-0
17	Hood	Cast Iron	4-03880-0	4-03880-0	4-03880-0	4-03880-0	4-03880-0	4-03880-0
18	Diaphragm Nut	Steel	4-02872-0	4-02872-0	4-02874-0	4-02874-0	4-02874-0	4-02874-0
19	Diaphragm (A)(B)	St. Steel	4-01629-1	4-01629-1	4-01662-0	4-01633-0	4-01633-0	4-01633-0
20	Pipe Flg 1/8"	Steel	4-03769-0	4-03769-0	4-03769-0	4-03769-0	4-03769-0	4-03769-0
21	Disc Holder "U" Port	C.L./Bronze	-	4-03112-0	4-03114-0	4-03114-0	4-03114-0	4-03114-0
	Disc Holder "N" Port	C.L./Bronze	-	-	4-03115-0	4-03117-0	4-03117-0	4-03117-0
	Disc Holder "F" Port	C.L./Bronze	-	-	-	-	-	-
	Disc Holder "R" Port	C.L./Bronze	4-03113-0	4-03113-0	4-03115-0	4-03117-0	4-03117-0	4-03117-0
22	Comp. Disc "U" Port	Nycol	-	4-01772-0	4-01774-0	4-01714-0	4-01714-0	4-01714-0
	Comp. Disc "N" Port	Nycol	-	-	4-01715-0	4-01716-0	4-01716-0	4-01716-0
	Comp. Disc "R" Port	Nycol	-	-	-	-	-	-
	Comp. Disc "F" Port	Nycol	4-01714-0	4-01714-0	4-01715-0	4-01716-0	4-01716-0	4-01716-0
23	Disc Washer "U" Port	Bronze	-	-	4-00091-1	4-00091-1	4-00091-1	4-00091-1
	Disc Washer "N" Port	Bronze	-	-	-	-	-	-
	Disc Washer "R" Port	Bronze	-	-	-	-	-	-
	Disc Washer "F" Port	Bronze	4-00091-1	4-00091-1	4-00091-1	4-00091-1	4-00091-1	4-00091-1
24	Dashpot Cylinder	Stellite	4-04490-0	4-04490-0	4-04490-0	4-04490-0	4-04490-0	4-04490-0
25	Platun Ring	Bronze	4-04490-0	4-04490-0	4-04491-0	4-04492-0	4-04493-0	4-04494-0
27	Dashpot Platen	Bronze	4-03376-0	4-03376-0	4-03378-0	4-03379-0	4-03380-0	4-03380-0

* Two (2) Diaphragms required per valve.
(A) Recommended Spare Parts
(B) Included in Repair Kit

Inner Valve Assembly with Composition Disc & Dashpot



E Valve - 3/8" - 1-1/2"



DIMENSIONS AND WEIGHTS

Size	R - Face to Face In.		Dimensions, Inches							Approx. Shipping Wt. Lb.		
	C.L. Ends	mm	A	B	C	D	E	G	C.L. Ends	125 lb.	250 lb.	
3/8	4-3/8		2-3/4	5-1/4	5-7/8	1-1/4	4-5/8	7-3/8	14			
1/2	4-3/8		2-3/4	5-1/4	5-7/8	1-1/4	4-5/8	7-3/8	14			
3/4	4-3/4		2-7/8	5-1/2	6-1/2	1-3/8	5-5/8	7-7/8	18			
1	4-3/4	6-1/2	3-5/8	6-1/4	7	1-1/2	6-3/4	8-7/8	22	24	27	
1-1/4	4-1/2	6-3/4	4-1/8	6-1/2	7-7/8	1-7/8	6	9-1/8	23	36	40	
1-1/2	7-1/4	6-7/8	4-3/8	7-1/8	8-3/4	2	6-1/4	9-3/4	43	48	51	

When ordering parts it is essential that the valve type, size, service and serial number be stated.
Select parts by item number but order by part number.



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DESCRIPTION:

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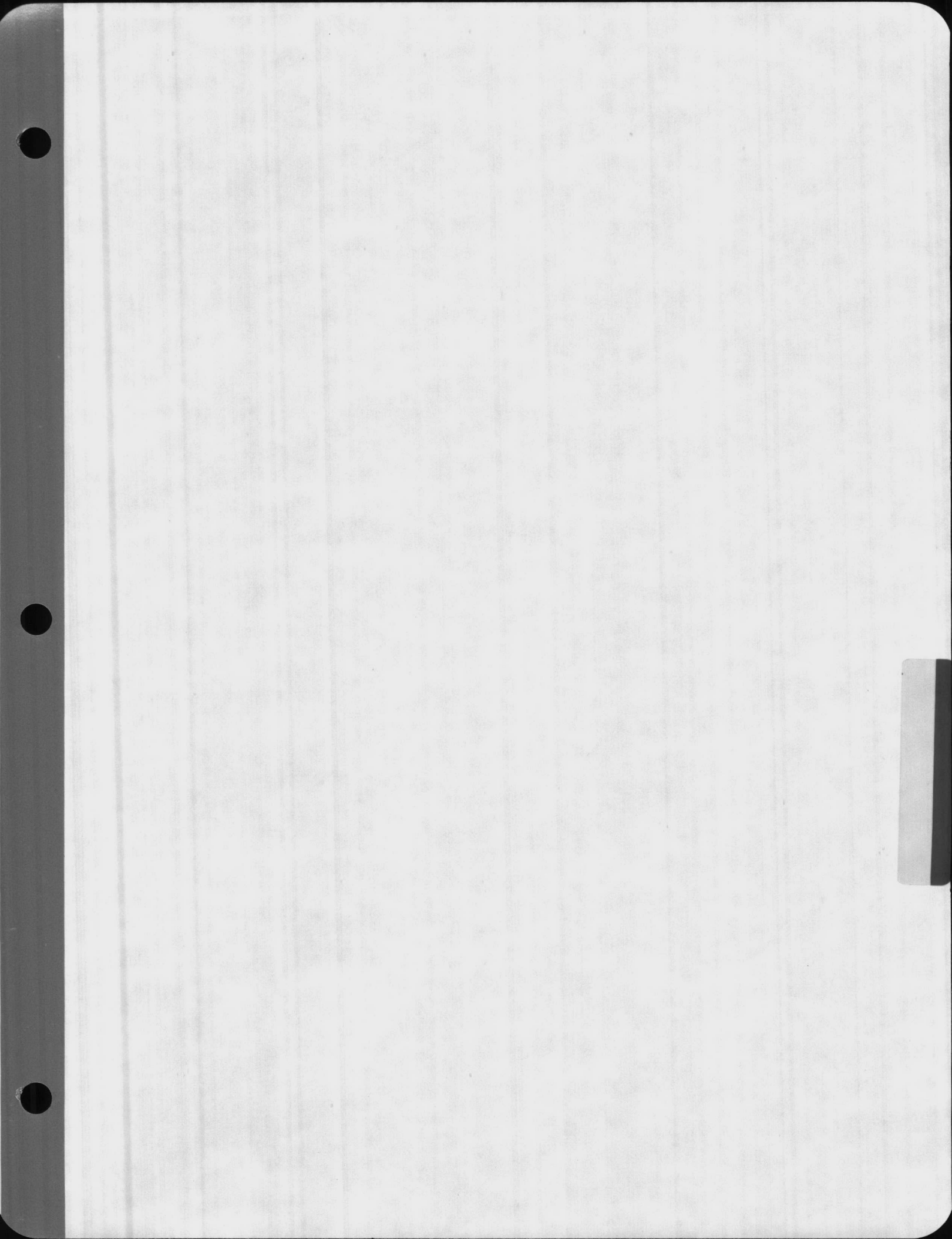
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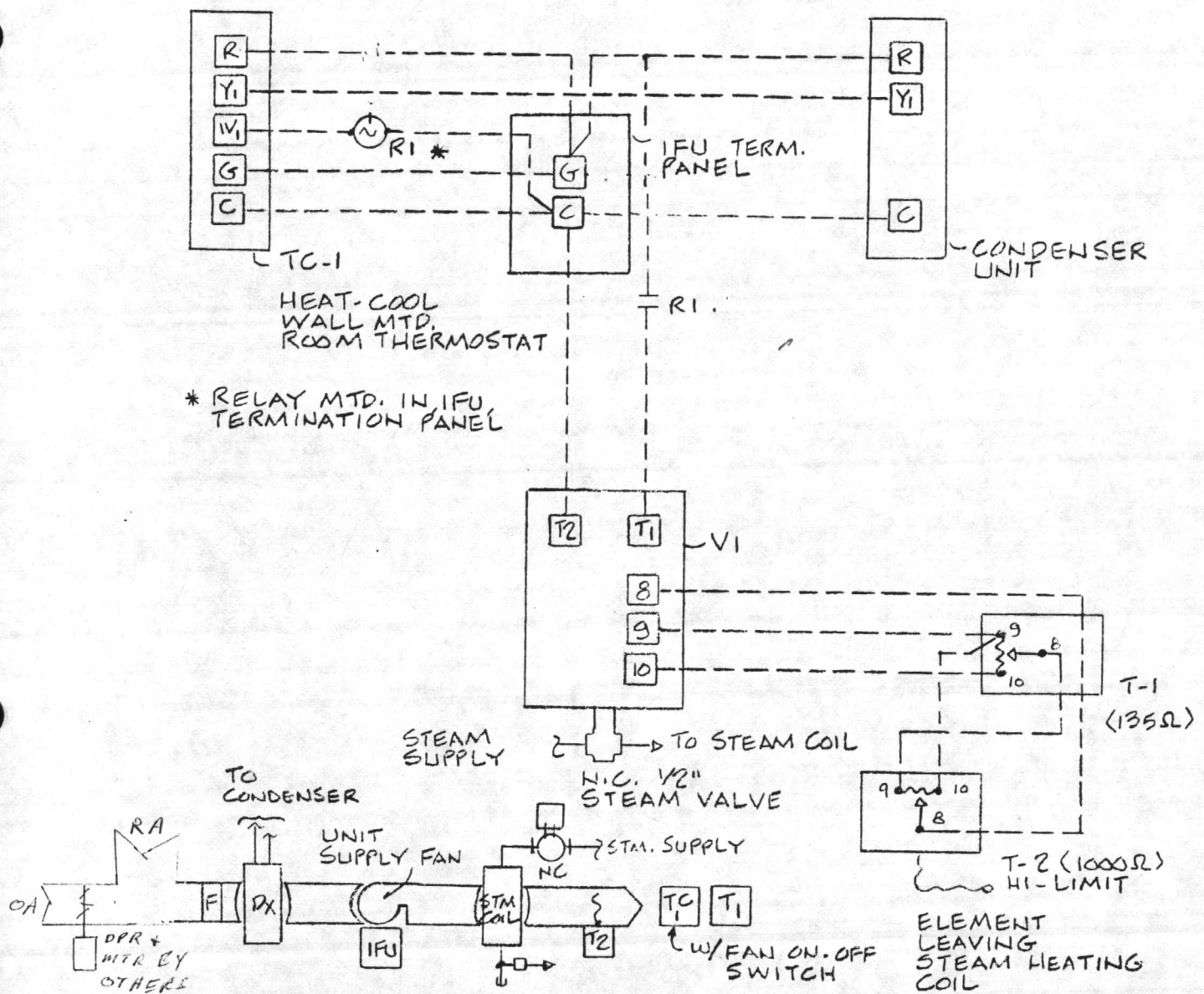
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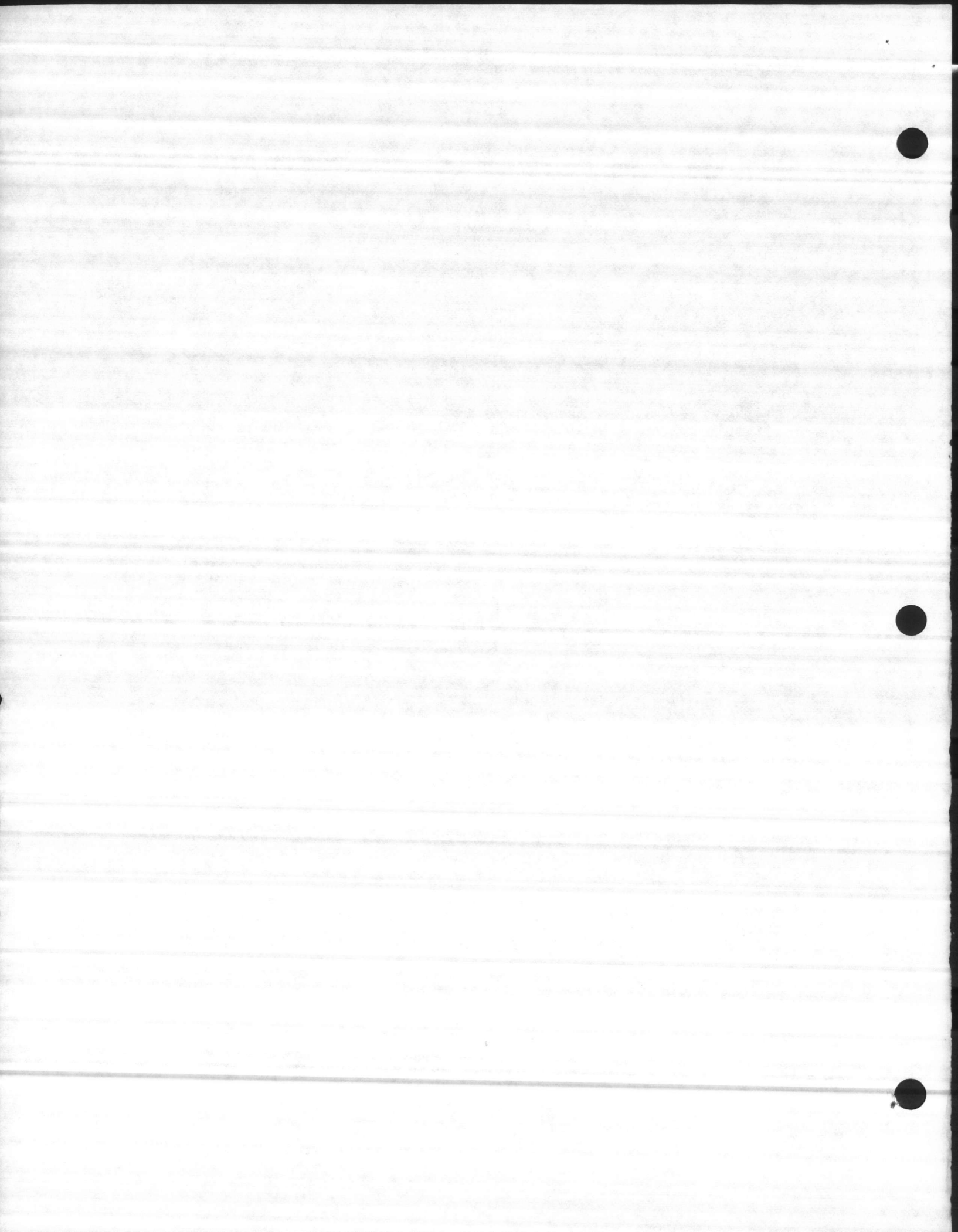
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#16



* RELAY MTD. IN IFU TERMINATION PANEL

FAN COIL UNITS 1 THRU 8
FLOW DIAGRAM
EIGHT LIKE ABOVE REQUIRED

M420 421		
FCU CONTROLS		
10/21/88	88-9	1003
FRENCH		



BILL OF MATERIAL

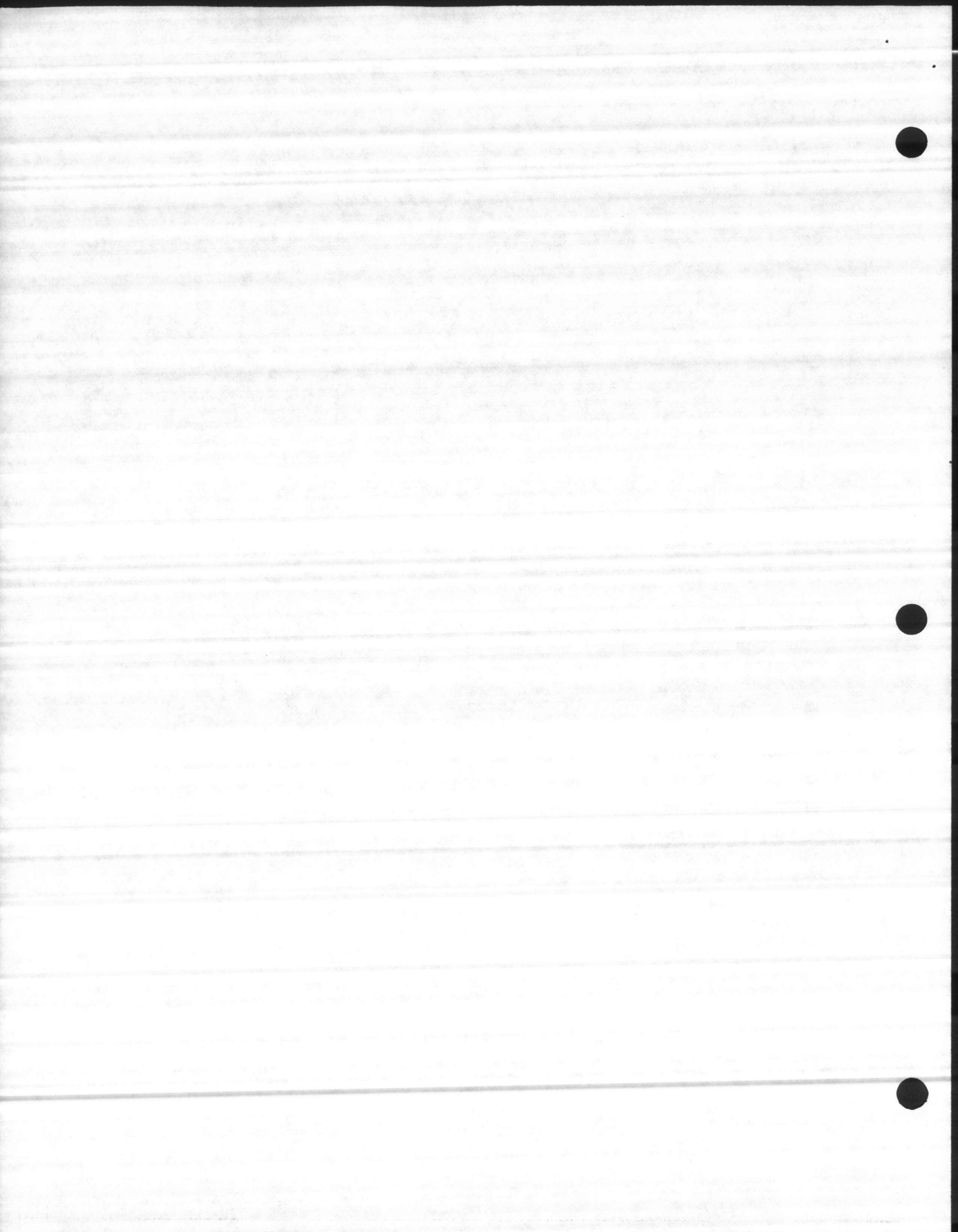
<u>ITEM</u>	<u>QUANT.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>SET POINT/ RANGE/VOLT.</u>
TC-1	8	T874A1010	Cooling T'stat	78°
	8	Q674B1075	Sub-Base	--
TE-1	8	A80ABA-44	Limit T'stat	Set 12.5:1
TE-2	8	T80ABA-1	Heating T'stat	70°
V-1	8	V90 AD-3	N.C. Stm. Valve $\frac{1}{2}$ "	45#/Hr. @ 15 PSI
V-1	8	M110 JGA-1	Valve Motor	24 VAC
V-1	8	Y20EBD-1	Valve Linkage	--

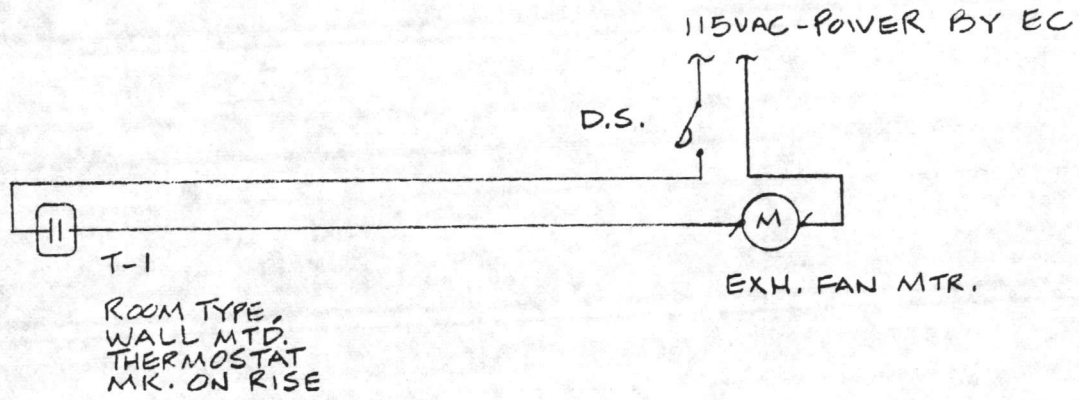
SEQUENCE OF OPERATION

COOLING: Cooling thermostat TC-1 will cycle fan and compressor to maintain set temperature.

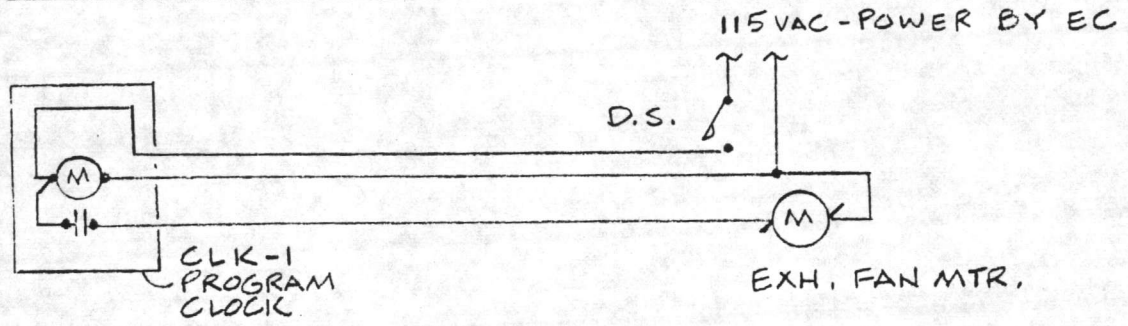
HEATING: TC-1 will enable modulating room thermostat TE-2 to control steam valve V-1. Room thermostat TE-2 will be reset by duct mounted limit thermostat TE-1 at a ratio of 12.5:1.

FAN: With TC-1 fan switch in the "on" position, the fan will run continuously. With the fan switch in "auto" position, the fan will cycle in the heating or cooling mode. With the system switch in the "off" position, the fan, compressor and steam valve will be off.

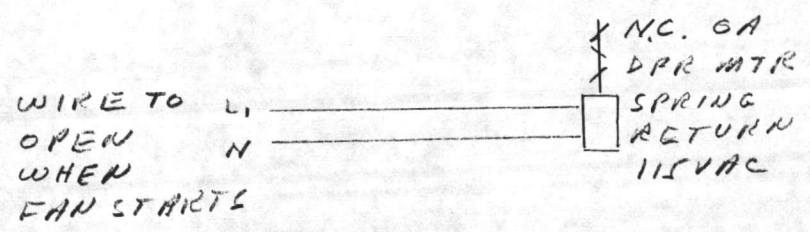




TWO LIKE ABOVE, EXHAUST FANS 2 & 4

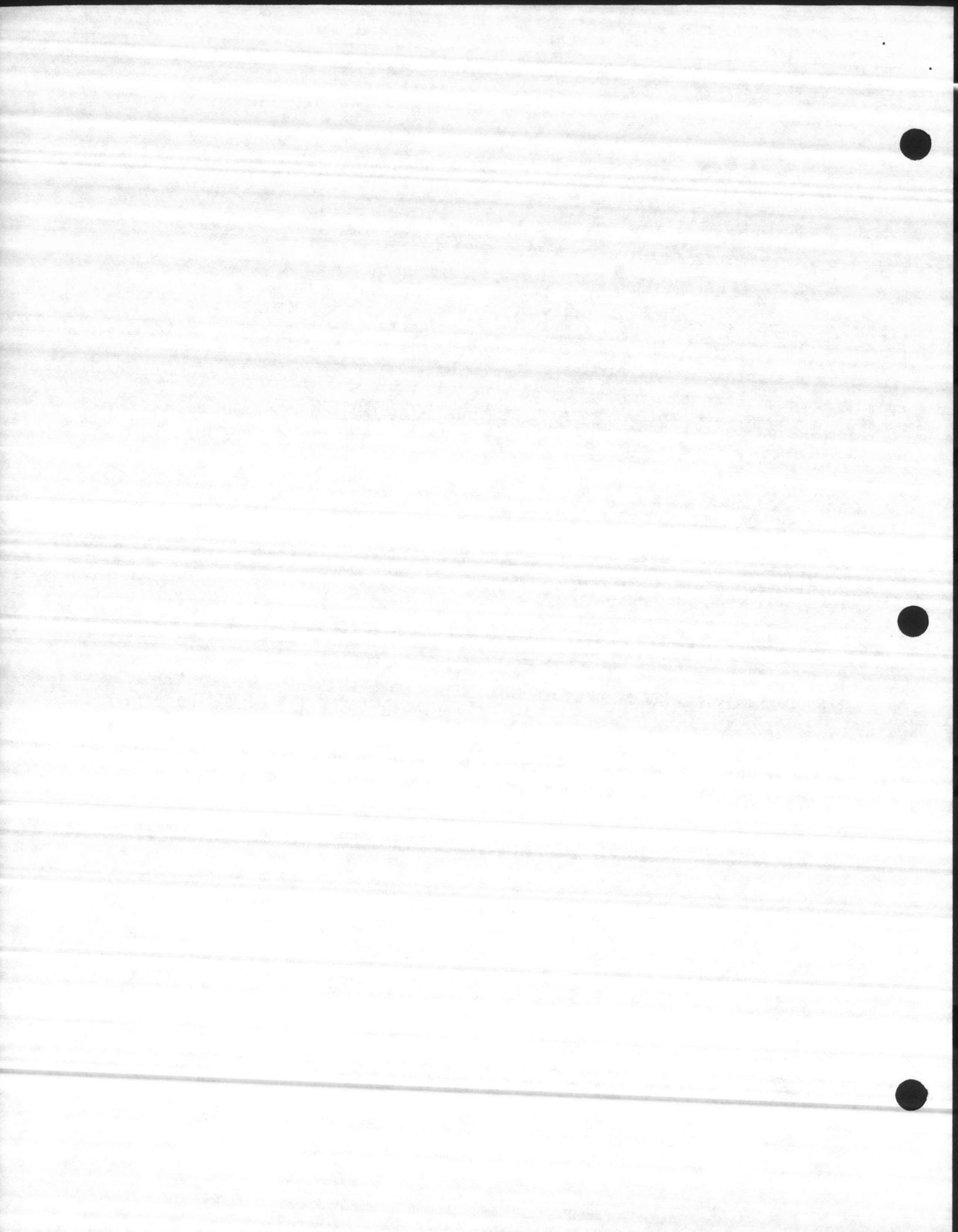


TWO LIKE ABOVE, EXHAUST FANS 1 & 3



O. A. DPR. CONTROL (10 REQ'D)

M420 & 421		
EXH. FAN CONTROLS		
10/21/88 FRENCH	20-9	3 OF 3



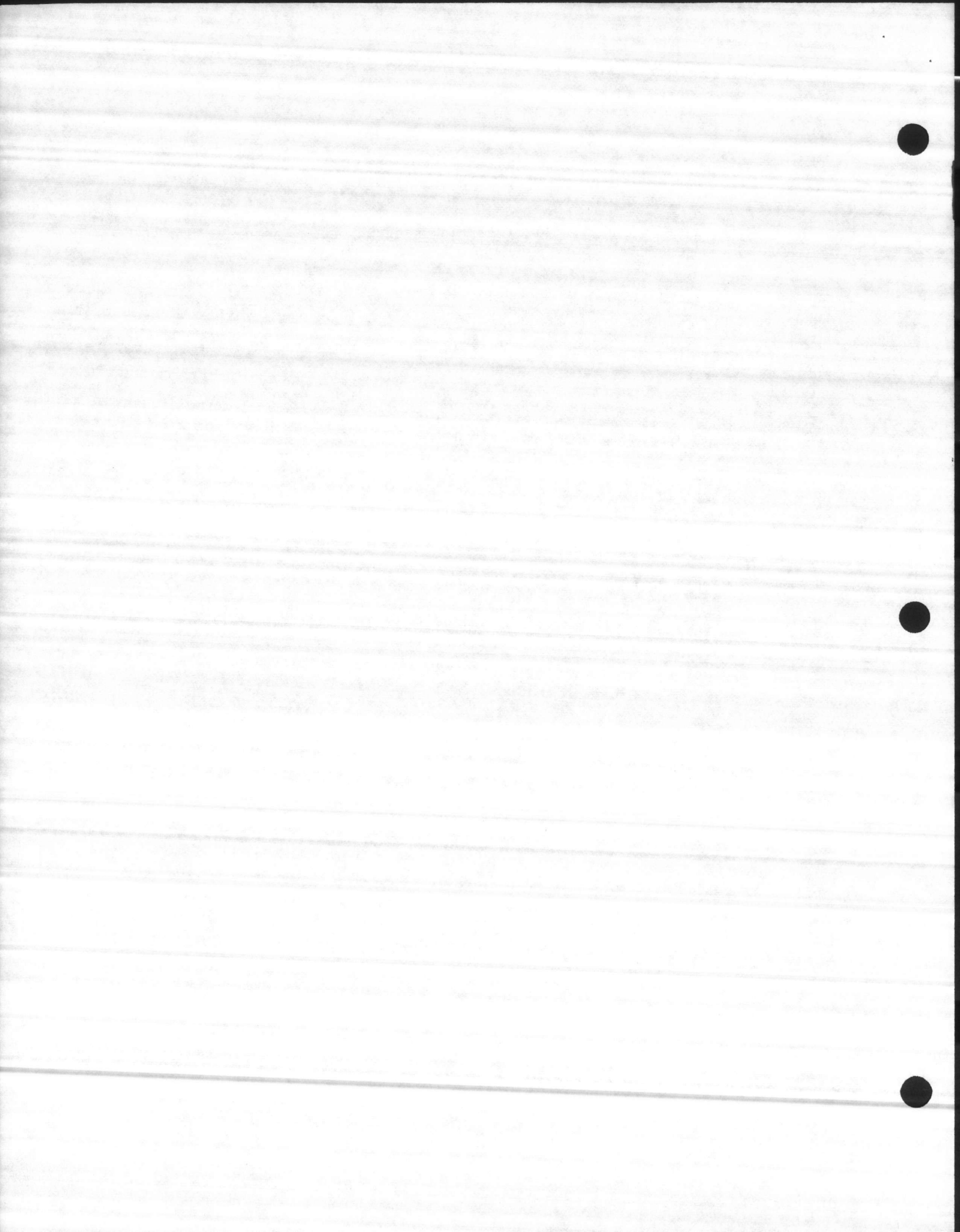
SEQUENCE OF OPERATION

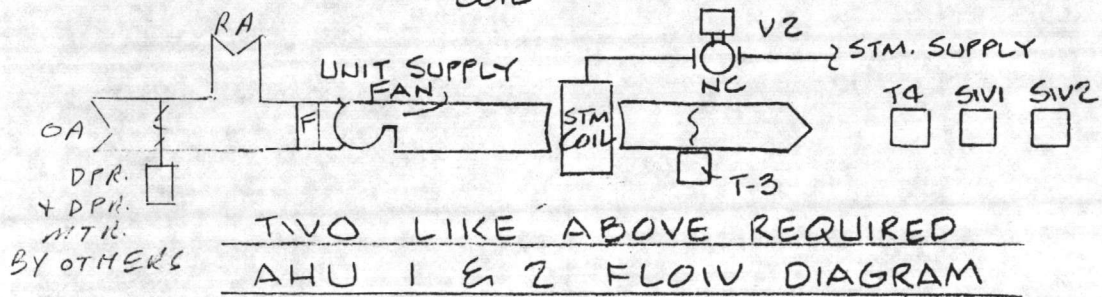
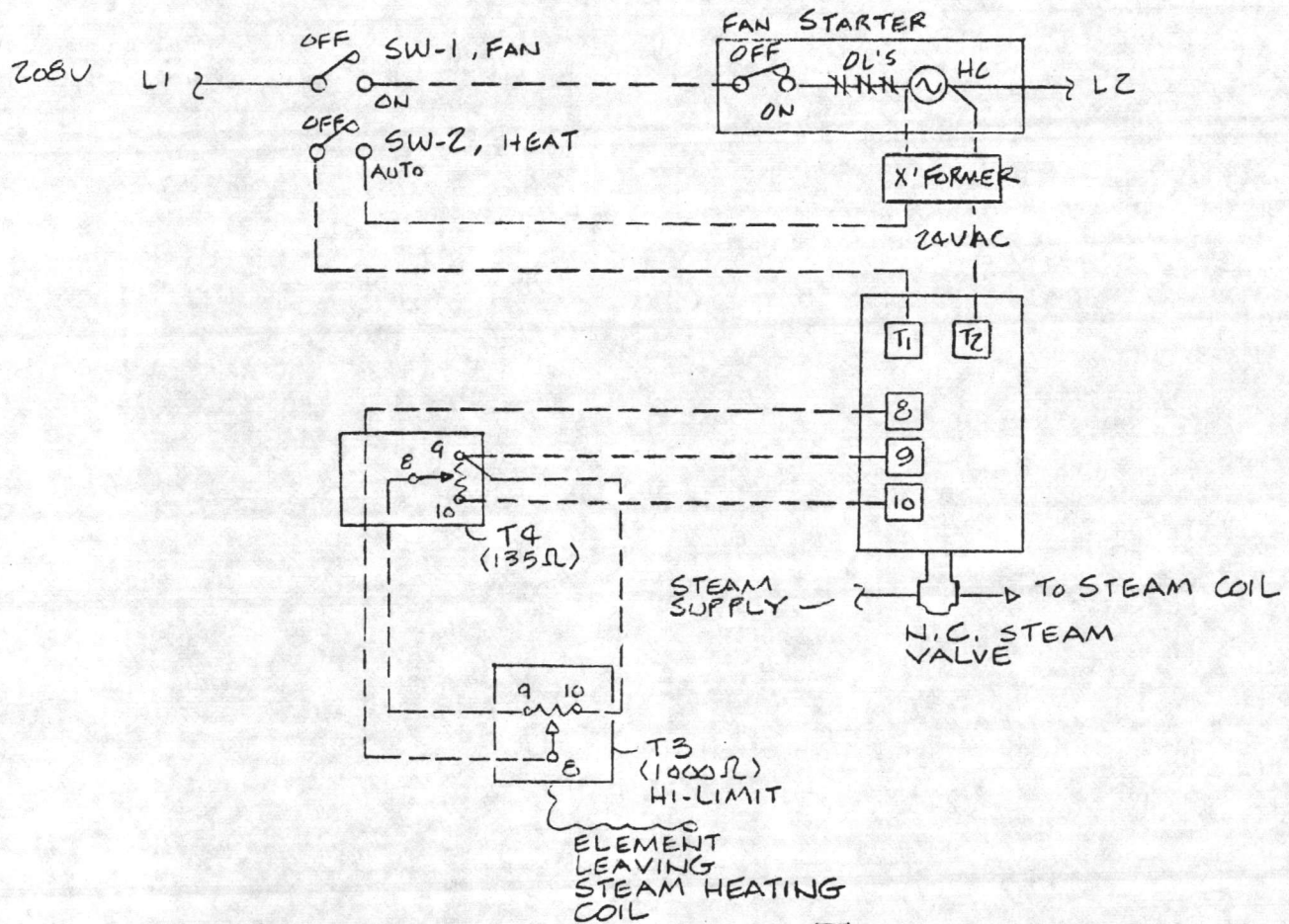
EF 1 & 2: Clock CL-1 will cycle fan on during occupied hours and off during un-occupied hours.

EF 2 & 4: Room thermostat T-1 will start fan on a rise in temperature.

BILL OF MATERIAL

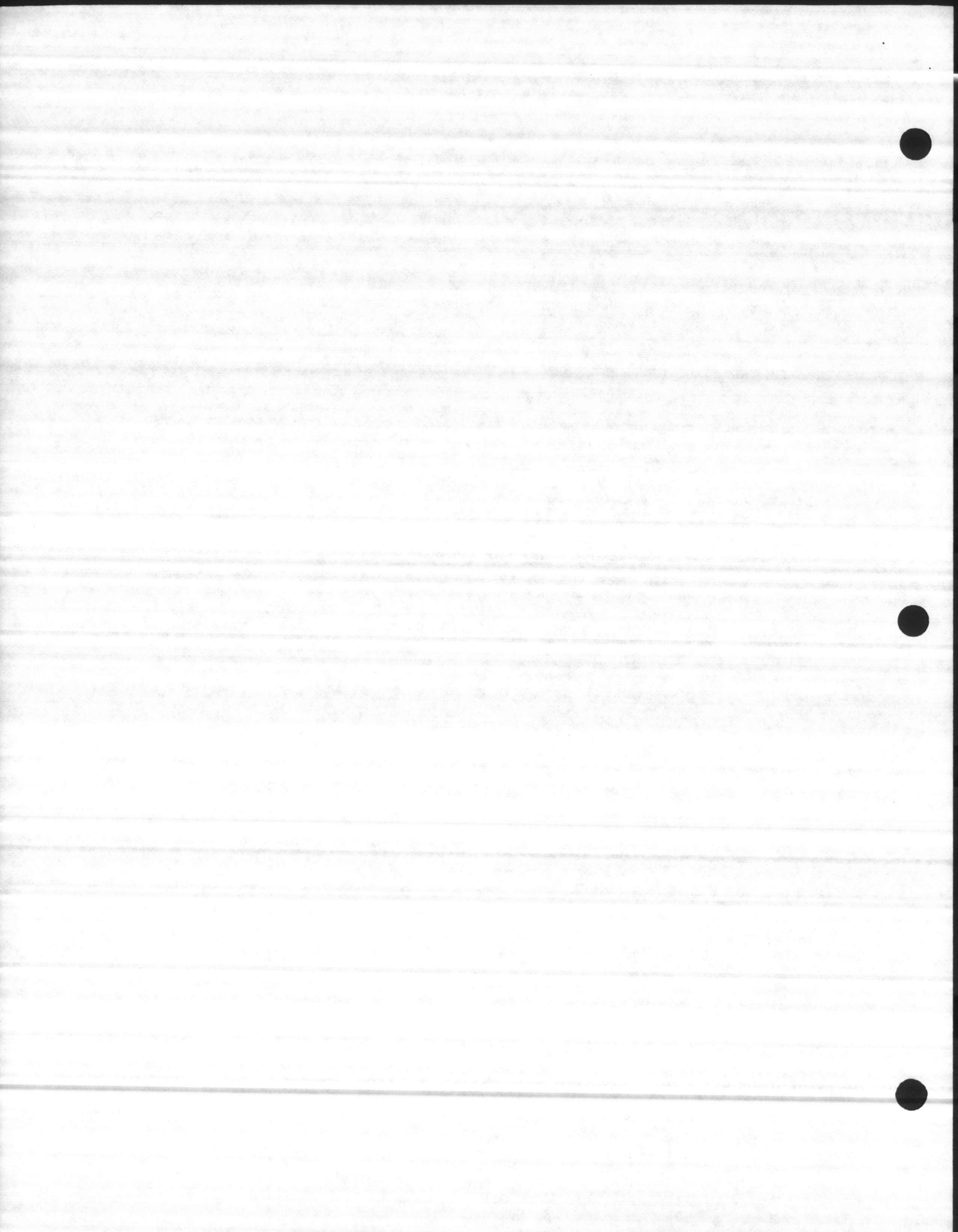
<u>ITEM</u>	<u>QUANT.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>SET POINT/ RANGE/VOLT.</u>
CL-1	2	2A210	7 day clock	115 VAC
T-1	2	T26S-18	Cooling T'stat	85°F





BY OTHERS

M420 + 421		
AHU CONTROLS		
10/21/88 FRENCH	PP-9	2 OF 5

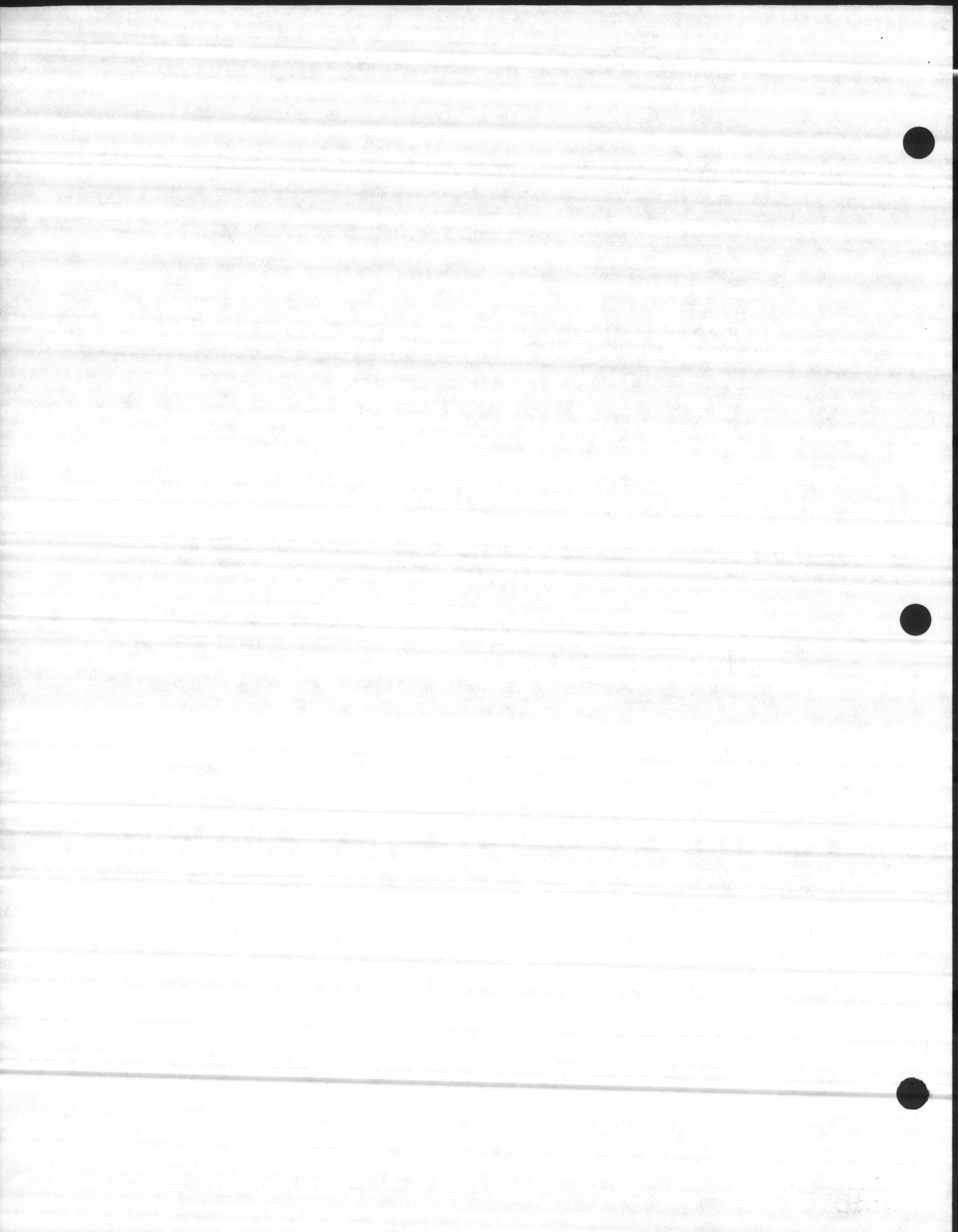


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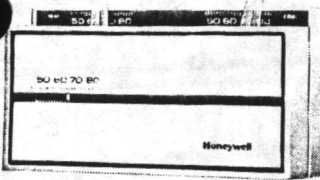
<u>ITEM</u>	<u>QUANT.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>SET POINT/ RANGE/VOLT.</u>
TE-3	2	A80ABA-44	Limit T'stat	Set 12.5:1
TE-4	2	T80ABA-1	Heating T'stat	70°
V-2	2	V90AD-5	N.C. steam valve 1"	150#/Hr. @ 15 PSI
V-2	2	M110JGA-1	Valve motor	24 VAC
V-2	2	Y20EBD-1	Valve linkage	----
SW-1	2	-----	Wall Switch	Heat On/Off Fan On/Off
X-1	2	-----	Transformer	208/24 VAC

SEQUENCE OF OPERATION

HEATING: Heating thermostat TE-4 will modulate steam control valve V-2 to maintain set temperature. Heating thermostat TE-4 will be reset by duct mounted limit thermostat TE-3 at a ratio of 12.5:1.



Thermostats—Multistage



T874 Multistage Thermostats

Provides low voltage control of multistage heating, cooling, and heating-cooling systems including heat pump systems.

Requires a Q674 Thermostat Subbase to provide wiring terminals, mounting base, and system and fan switching. Coiled bimetal elements operate silent, dust-free mercury switches. External levers and scale for temperature setting on top of thermostat case. Electrical Rating: 24 to 30 Vac. Temperature Scale Range: 42 F to 88 F [6 C to 31 C]. Changeover Differential: 3 F [1.7 C] minimum between heating and cooling. Approximate Dimensions (including Q674 subbase): 3-1/2 in. [89 mm] high, 5-5/8 in. [143 mm] wide, 2-1/8 in. [54 mm] deep. For T874 models designed to meet Department of Defense specifications, see page 395.

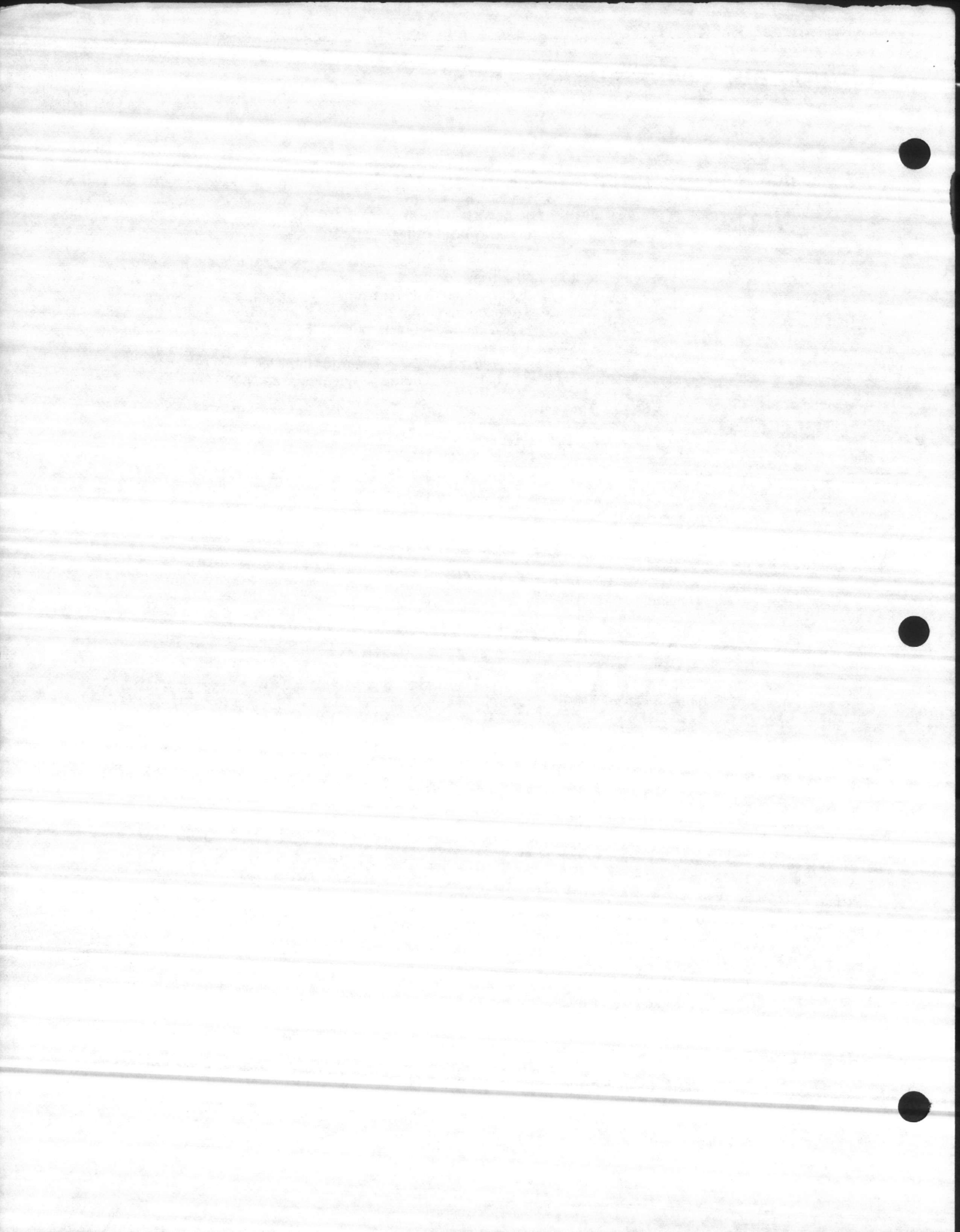
*TRADELINE models. •SUPER TRADELINE model.

Order Number	System Stages			Anticipator Ranges (A)				Remarks
				Heating (adj)		Cooling (fixed)		
	Heat	Cool	Other	Stage 1	Stage 2	Stage 1	Stage 2	
T874A1010	1	1	—	0.1 to 1.2	—	0 to 1.5	—	Includes 194559R Locking Cover and Locking Lever Assembly. Factory-set stops at 72 F [22 C] max ht, 78 F [26 C] min cool.
*T874A1036	1	1	—	0.1 to 1.2	—	0 to 1.5	—	Includes 194559R Locking Cover and Locking Lever Assembly.
*T874A1150	1	1	—	0.1 to 1.2	—	0 to 1.5	—	Field adjustable stops factory-set to prevent setting heat lever above 68 F [20 C] and cooling lever below 78 F [26 C]. 194559R Locking Cover and Locking Lever Assembly.
*T874B1019	1	2	—	0.1 to 1.2	—	0 to 1.2	0 to 1.0	Includes 194559R Locking Cover and Locking Lever Assembly.
T874C1000	2	1	—	0.1 to 1.2	0.1 to 1.2	0 to 1.5	—	Temp. range 40 F to 90 F [4 to 32 C].
*T874C1018	2	1	—	0.1 to 1.2	0.1 to 1.2	0 to 1.5	—	Includes 194559R Locking Cover and Locking Lever Assembly.
T874C1125	2	1	—	0.1 to 1.2	0.1 to 1.2	0 to 1.5	—	12 F [6.7 C] differential between heating stages.
•T874D1165	2	2	—	0.1 to 1.2	0.1 to 1.0	0 to 1.2	0 to 1.0	Heating scale range 42 F to 84 F [5.6 C to 28.9 C], cooling scale range 46 F to 88 F [7.8 C to 31.1 C].
*T874D1223	2	2	—	0.1 to 1.2	0.1 to 1.0	0 to 1.2	0 to 1.0	Includes 194559R Locking Cover and Locking Lever Assembly.
*T874E1016	—	2	—	—	—	0 to 1.2	0 to 1.0	Includes 194559R Locking Cover and Locking Lever Assembly.
*T874F1015	2	—	—	0.1 to 1.2	0.1 to 1.2	—	—	Includes 194559R Locking Cover and Locking Lever Assembly.
T874G1204	2	1	1	0 to 1.0	0.1 to 1.2	—	0 to 1.2	Use with Q674J1043 only.
T874G1246 ^{d,f}	2	1	1 ^a	0 to 1.0 ^c	0.1 to 1.2	—	0 to 1.2	Heat pump thermostat. 194559R Locking Cover and Locking Lever Assembly. Use with Q674F1212 subbase.
T874N1016 ^d	2	1	1 ^b	0.1 to 1.2	0.1 to 1.2	0 to 1.5	—	Heat pump thermostat. 194559R Locking Cover and Locking Lever Assembly. Use with Q674F1220 subbase.
T874R1053	2	1	—	0 to 1.2	0.1 to 1.2	0 to 1.2	—	Use with Q674L1140 subbase.
T874R1152 ^{d,f}	2	1	—	0 to 1.2 ^c	0.1 to 1.2	0 to 1.2	—	Heat pump thermostat. Use with Q674L1207 only.
T874W1015 ^f	3 ^e	2	—	0 to 1.2 ^c	0 to 1.5 ^c	0 to 1.2	0 to 1.0	Use with Q674B1216 only.

^cChangeover operates in cooling mode.

^dChangeover operates in heating mode.

continued next page



Thermostats—Multistage

T874 continued

^cFixed voltage type anticipation.

^dHeat pump thermostat. For replacement of other customer special heat pump thermostats and subbases, contact your heat pump equipment manufacturer. You may also want to contact your Honeywell Sales Representative and/or consult the T874/Q674 specification sheet, Honeywell form 60-2485 for replacement information and internal circuitry of specific models.

^eThird stage of heating has anticipator range of 0 to 1.5 A, fixed.

^fAvailable in Y594 pack. See page 392.

ACCESSORIES:

194559R Locking Cover and Locking Lever Assembly with thermometer. Includes cover, screws, Allen wrench for locking cover, and two self-tapping insulated screws.

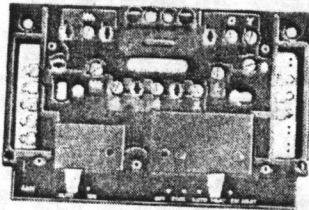
194559S Locking Cover and Locking Lever Assembly without thermometer. Includes cover, screws, Allen wrench for locking cover, and two self-tapping insulated screws.

4074ECK Locking Lever Stops.

C815A Outdoor Thermistor. See page 392.

TG504A1025 Key Lock Cover with blank face and internal thermometer. See page 373.

Thermostat Guards. See page 373.



Q674

Thermostat Subbases

Provides wiring terminals, mounting base, and system and fan switching for T874 Multistage Thermostats.

See order table for application and switch position. Mounts on wall or horizontal outlet box. An adapter plate is available for mounting on vertical outlet box (see ACCESSORIES). Subbases available with no light, one light, or two light emitting diodes (LED's). Approximate Dimensions: 3-1/2 in. [89 mm] high, 5-5/8 in. [143 mm] wide, 5/16 in. [8 mm] deep.

ELECTRICAL RATINGS:

Switch Contacts—2.5 A at 30 Vac (7.5 A inrush).

Optional LED Lights—30 Vac.

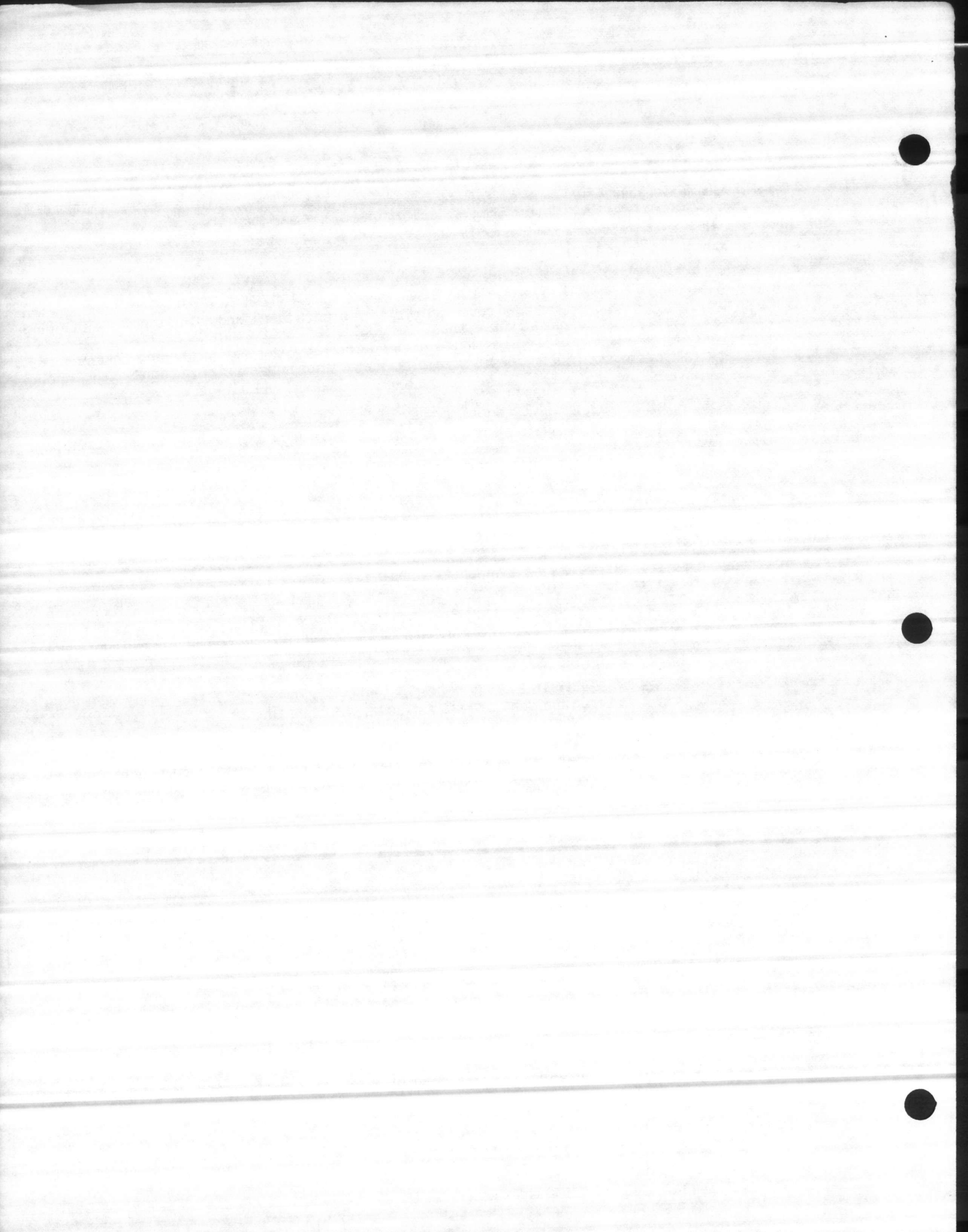
ACCESSORY:

193121A Adapter Plate Assembly for covering old thermostat mounting marks or for mounting on vertical outlet box. Includes cover plate, adapter ring, and two mounting screws. Dimensions: 6.9 x 4.75 in. [175.3 x 120.7 mm].

*TRADELINE models.

Order Number ^a	Switch Positions		LED Indication	Use With
	System	Fan		
*Q674A1019	HEAT-AUTO-COOL	AUTO-ON	—	T874A-D
Q674B1018	HEAT-OFF-COOL	AUTO-ON	—	T874A-D
*Q674B1034	HEAT-OFF-COOL	AUTO-ON	—	T874A-D
Q674B1042	HEAT-OFF-COOL	AUTO-ON	—	T874A-D
Q674B1075	HEAT-OFF-COOL	AUTO-ON	—	T874R1004, T874R1012
Q674B1216	HEAT-OFF-COOL	AUTO-ON	—	T874A-D
*Q674C1058	OFF-AUTO	AUTO-ON	—	T874W1015 only.
*Q674D1040	None	AUTO-ON	—	T874A-F
*Q674E1049	OFF-HEAT-AUTO-COOL	None	—	T874A-F
Q674F1022	OFF-EM. HT.-HEAT-AUTO-COOL	AUTO-ON	—	T874A-D
Q674F1048	OFF-EM. HT.-HEAT-AUTO-COOL	AUTO-ON	1	T874C,D
Q674F1212	OFF-COOL-AUTO-HEAT-EM. HT.	AUTO-ON	1	T874C
Q674F1220	OFF-COOL-AUTO-HEAT-EM. HT.	AUTO-ON	2	T874G1246 only.
*Q674G1070	OFF-AUTO	AUTO-ON	—	T874N1016 only.
*Q674J1043	EM. HT.-AUTO-OFF	None	—	T874A-F
*Q674L1140	EM. HT.-HEAT-OFF-COOL	AUTO-ON	2	T874G1204
Q674L1207	EM. HT.-HEAT-OFF-COOL	AUTO-ON	2	T874R1053
		AUTO-ON	2.	T874R1152 only.

^aYou may also want to contact your Honeywell Sales Representative and/or consult the T874/Q674 specification sheet, Honeywell form 60-2485, for replacement information and internal circuitry of specific models.

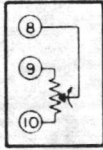


A80 SERIES PROPORTIONAL TEMPERATURE

PROPORTIONAL BULB TEMPERATURE CONTROLS

HEAVY DUTY DUST RESISTANT, SPLASH PROOF ENCLOSURE

Series A80



ACTION ON INCREASE OF TEMPERATURE

Series A80 temperature controllers position a Johnson Controls motor actuator for control of air dampers, valves or similar devices. The temperature elements are of the vapor-pressure type for accuracy and positive action.

Adjustable throttling range on all models permits "on the job" selection of the correct throttling range for stable control. Choice of models in several temperature ranges. Models with one potentiometer, two potentiometers in unison or two potentiometers in sequence permit a selection for most applications.

Temperature elements have 6' of copper capillary and a 1/2" NPT fitting as standard.

Electrical rating is low voltage only.

A duct mounting kit, Part No. FLG10A-601, is available for direct mounting of sensing element through the side of the air duct. Kit includes the mounting flange and necessary screws.

Separable bulb wells are available and should be specified, if required. See Page 61 for specifications of bulb wells. Number shown in chart is for standard brass or copper bulb well.

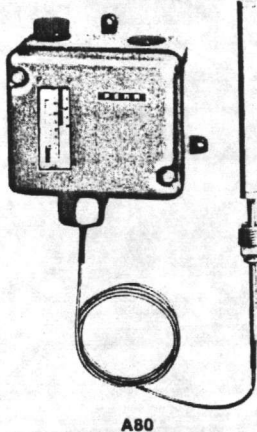
Bulb Sizes: Low Temp. or High Temp. 1 1/16" x 3 1/4". Cross Ambient 1 1/16" x 7".

Dimensions: 6 13/16" H (not including cap. and bulb), 5 13/16" W, 3 3/8" D.

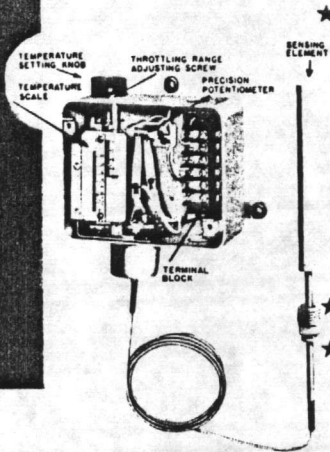
Temperature Elements: 6' copper capillary, 1/2" NPT fitting. For longer capillary write Customer Service.

TO ORDER: Specify,

1. Complete Catalog Number.
2. Capillary length if other than 6'. (Must be built to factory order.)
3. Duct Mounting Kit FLG10A-601, if needed.
4. Bulb Well Number, if required.



A80



A80ACA
Shipping Wt. 5.3 Lbs.

Catalog Number	Scale Range F (C)	Throttling Range at Mid Scale F (C)**		Potentiometer in ohms and Replacement No.	Type of Fill	Maximum Temp. F (C)	Std. Bulb Well*
		Min.	Max.				

ONE POTENTIOMETER

A80ABA-1	-20 to 50 (-30 to 10)	5 (3)	24 (13)	135 POT18A-610R	Low Temp.	140 (60)	WEL18A-602R
A80ABA-2	10 to 90 (-10 to 30)	5 (3)	24 (13)		Cross Ambient	140 (60)	WEL17A-601R
A80ABA-3	60 to 140 (15 to 60)	6 (3)	29 (16)		Cross Ambient	175 (79)	WEL17A-601R
A80ABA-4	120 to 200 (50 to 90)	6 (3)	17 (9)		High Temp.	250 (121)	WEL18A-602R
A80ABA-5	190 to 260 (90 to 125)	9 (5)	20 (11)		High Temp.	330 (166)	WEL18A-602R
A80ABA-22	85 to 245 (30 to 120)	15 (8)	40 (22)	1000 POT18A-600R	High Temp.	300 (149)	WEL18A-602R
A80ABA-41	-20 to 50 (-30 to 10)	5 (3)	24 (13)		Low Temp.	140 (60)	WEL18A-602R
A80ABA-42	120 to 200 (50 to 90)	6 (3)	17 (9)		High Temp.	250 (121)	WEL18A-602R
A80ABA-43	10 to 90 (-10 to 30)	5 (3)	24 (13)		Cross Ambient	140 (60)	WEL17A-601R
A80ABA-44	60 to 140 (15 to 60)	6 (3)	29 (16)	Cross Ambient	175 (79)	WEL17A-601R	

TWO POTENTIOMETERS IN UNISON

A80ACA-1	60 to 140 (15 to 60)	6 (3)	29 (16)	135 POT18A-610R	Cross Ambient	175 (79)	WEL17A-601R
A80ACA-10	60 to 140 (15 to 60)	6 (3)	29 (16)	1000 POT18A-600R	Cross Ambient	175 (79)	WEL17A-601R

TWO POTENTIOMETERS IN SEQUENCE

A80ADA-1	10 to 90 (-10 to 30)	2.5 (1.4)	12 (7)	135 POT18A-611R	Cross Ambient	140 (60)	WEL17A-601R
A80ADA-2	60 to 140 (15 to 60)	3 (1.7)	14.5 (8)		Cross Ambient	175 (79)	WEL17A-601R

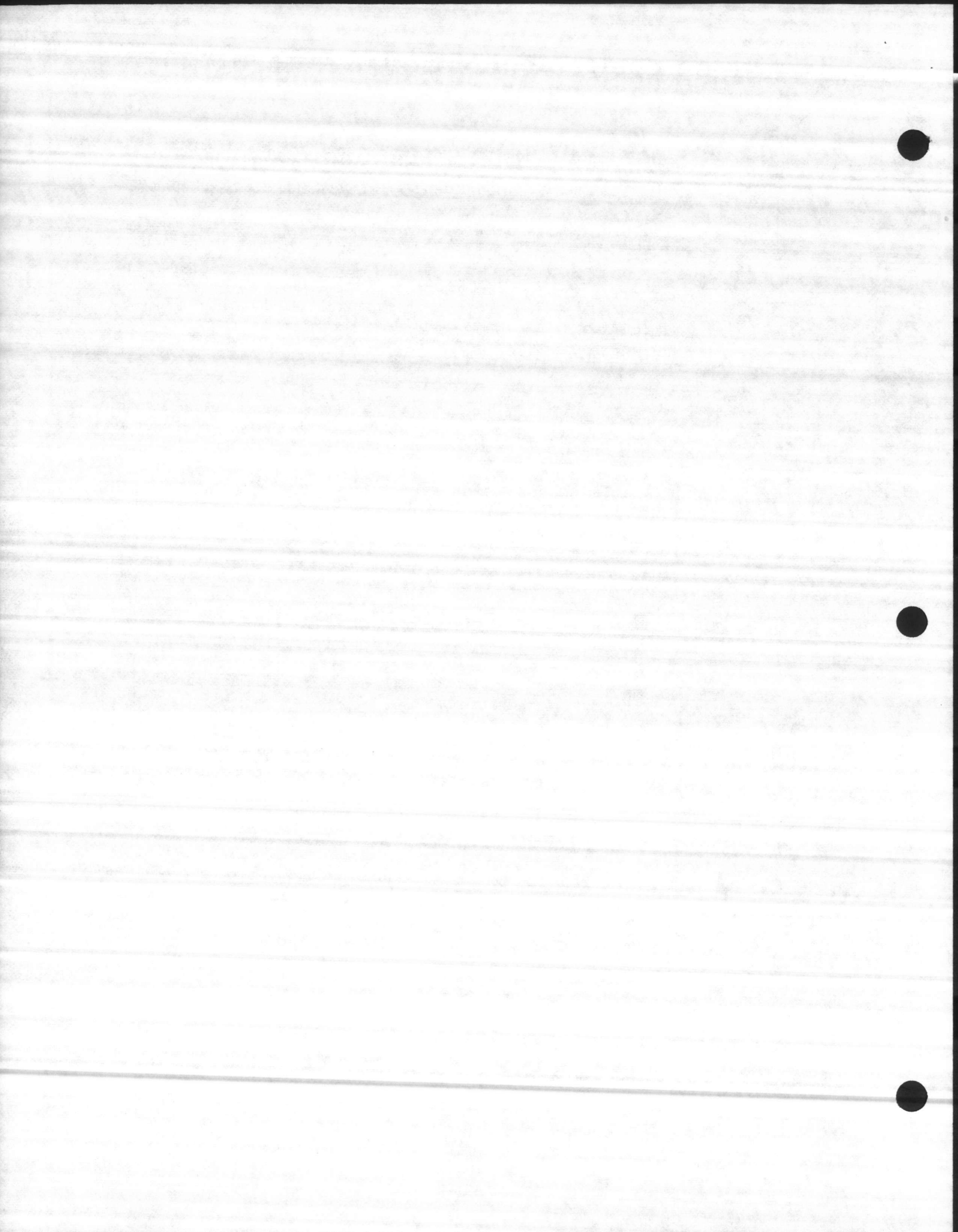
* Bulb well must be ordered separately. Cross ambient controls with capillary lengths longer than 6' take longer bulb wells. Write Customer Service. See Page 61 for other bulb wells.

** Throttling range minimum and maximum will change when control operates at the top of range or at the bottom of range. See Series A80 bulletin for additional information. Throttling ranges shown are for each potentiometer.

REPLACEMENT POTENTIOMETERS, WIPERS, AND COVER

Catalog Number	Description
POT18A-600R	1000 Ohms, Active Band .2 Inches
POT18A-610R	135 Ohms, Active Band .2 Inches
POT18A-611R	135 Ohms, Active Band .1 Inches
CNT19A-606R	Replacement wiper kit includes 2 wipers with connecting leads
CVR10A-603R	Replacement cover for A80 and P80 controllers

★ Non-Stock Item. Must be Built to Order.



T58 SERIES LOW VOLTAGE THERMOSTAT

SPDT WITH CENTER OFF POSITION

These thermostats are designed to operate Johnson Controls M20AGA damper actuators. Models are available to operate one or two actuators.

Differential (Dead-Band): Nominal 4°F (2.2°C).

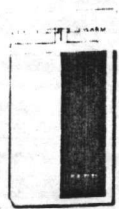
Electrical Connections: Three color coded #18 wire leads, 6" long.

Range: 55 to 95°F (13 to 35°C).

Temperature Scale: Cool-Warm. Center of scale is approx. 75°F (24°C).

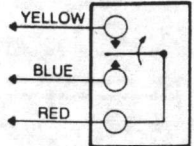
TO ORDER: Specify Catalog Number only.

Catalog Number	Device(s) It Controls	Shipping Wt. Lbs.
T58EA-1	One Type M20AGA	1.0
T58EA-8	Two M20AGA	



T58

Series T58



ACTION ON INCREASE OF TEMPERATURE

T80 SERIES PROPORTIONAL ROOM THERMOSTATS

T80A Series thermostats are proportional action for accurate control of room temperature in heating, air conditioning and ventilating applications. They are used to position a Johnson Controls proportional motor for control of air dampers, valves and similar devices, or Series R23 proportional sequencer for staging of heating, cooling or heating — cooling. Thermostats can be supplied with one potentiometer or with two potentiometers, either in sequence or unison. T80 wall thermostats have a vapor charged element for maximum sensitivity. Vertical styling of cover complements most room decors.

Electrical Ratings: The T80 Series is low voltage only.

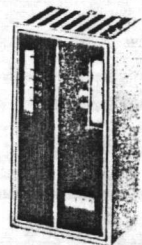
Set Point: Screwdriver slot through hole in top of cover or use optional T26 knob, part KNB-20A-600R (order separately).

Concealed Scale: Order blank Faceplate PLT 225-4 separately. Covers thermometer also.

Dimensions: 5³/₁₆" H, 2²⁵/₃₂" W, 1⁷/₈" D.

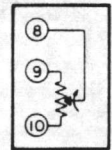
TO ORDER: Specify Catalog Number only. Where thermostat guards are required, see GRD Series.

Catalog Number	Range F (C)	Throttling Range F (C)		Potentiometer		
T80ABA-1	58 to 83 (14 to 28)	—	3 to 8 (1.7 to 4.4)		One	1.3
T80ABA-4	58 to 83 (14 to 28)	3 (1.7)	—		One	1.3
T80ABA-19	58 to 83 (14 to 28)			1000 POT18A-600R	One	1.3
T80ACA-1	58 to 83 (14 to 28)	—		135 POT18A-610R	Two in Unison	1.3
T80ADA-2	58 to 83 (14 to 28)	—	4 to 10 (2.2 to 5.6)	135 POT18A-611R	Two in Sequence	1.3



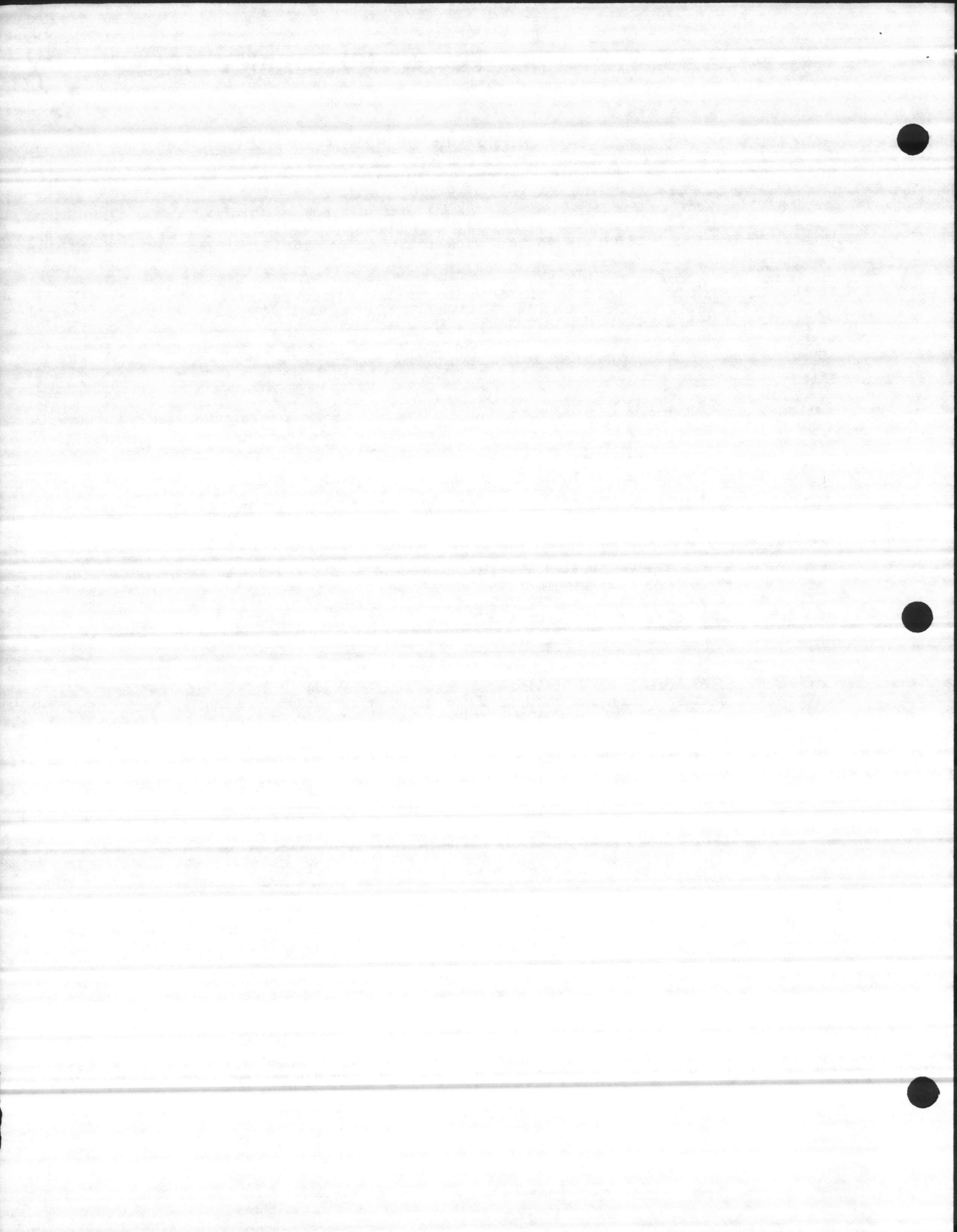
T80

Series T80



ACTION ON INCREASE OF TEMPERATURE

See page 76 for Replacement Potentiometers Wipers and Cover





Johnson Controls, Inc.
 Control Products Division

1250 East Diehl Road
 Naperville, IL 60540

Types V90AA, V90AD Single Seat Two-Way Valves

Application

These two-way valves are for two position (ON/OFF) or proportional control of steam, water or ethylene glycol solutions in air conditioning systems or commercial-industrial applications.

The valves are positioned by Johnson Controls M40, M80 or M81 electric and electronic motor actuators. Clockwise motor rotation on the M40, M80 and M81 drives the valve stem down. (See Fig. 4.)

The M40, M80 and M81 actuators are adapted to the valve bodies by a linkage which not only fastens the valve body and actuator together, but also transforms the angular movement of the actuator output shaft to the straight-line motion required to position the inner valve plug of the valve body. A pinion gear on the M80 and M81 actuator output shaft drives a gear rack that is connected to the valve stem. On the M40, the linkage

utilizes a specially designed cam on the output shaft.

General Description

The 1/2" through 1" valves are newly designed and feature a removable cage-trim design which provides valve plug guiding throughout the travel range and high rangeability. This allows a smaller size valve to replace a larger valve by having the same Cv factor. These valves have tighter shut-offs comparable to maximum shut-off pressures with valves of similar Cv. The new cage-trim design also features improved internal contouring to avoid cavitation at higher pressure drops. An added feature of the new design is easier replacement of internal trim components.

Sizes 1 1/2" and 2" valves have brass bodies with brass trim and 316 stainless steel stem. The E.P.T. valve packing limits the temperature of the media (water or steam) to 281°F (140°C).

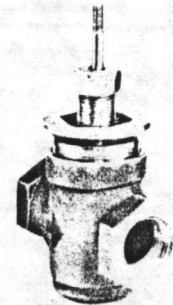


Fig. 1 — V90AD Two-Way Valve.

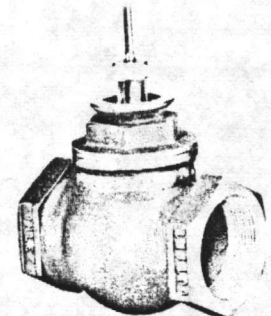
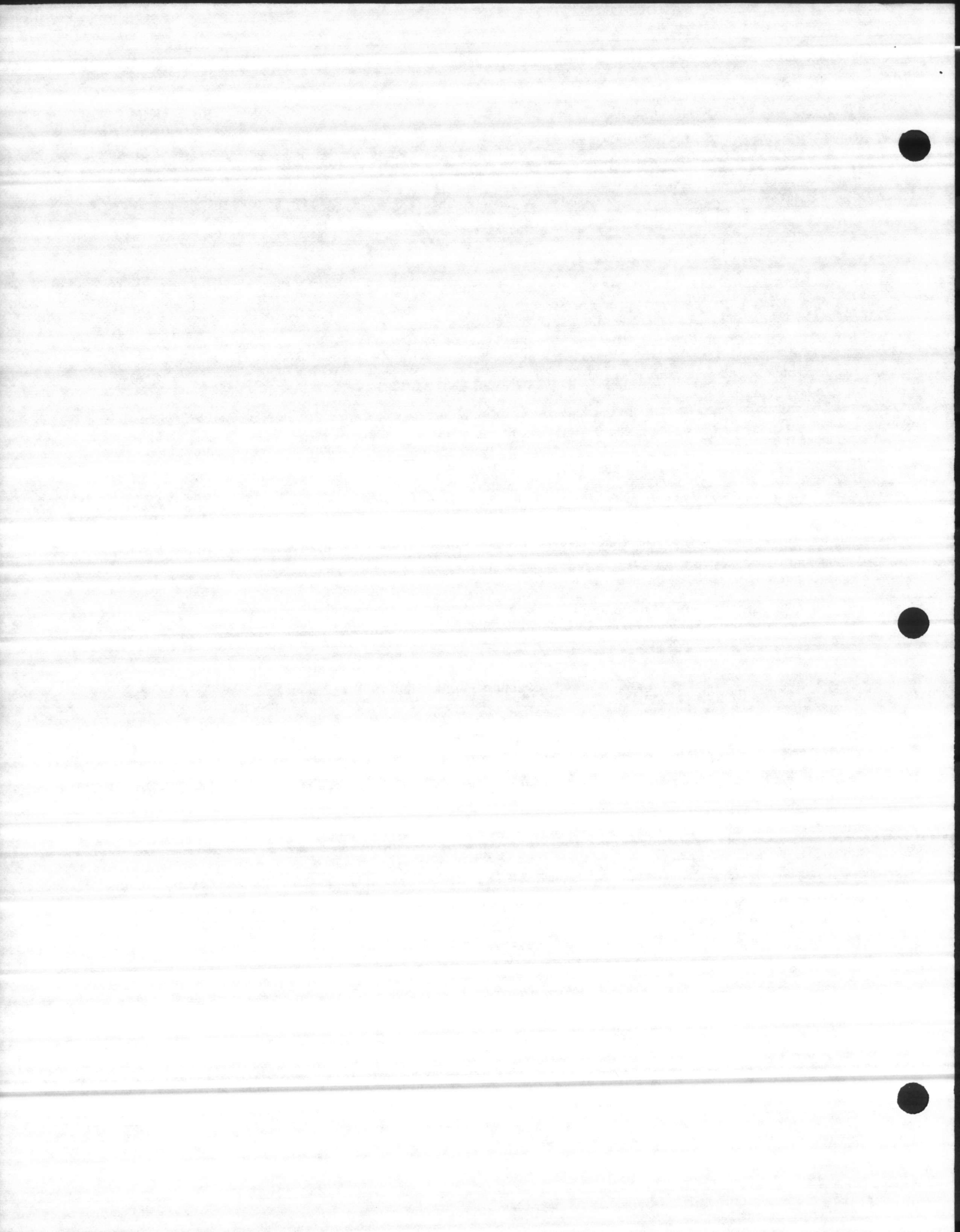


Fig. 2 — V90AA Two-Way Valve.

Specifications

Product Numbers	V90AA-7, -8, -9	V90AA-25, -26	V90AD-1, -2, -3, -4, -5
Ambient Temperature Limits (Valve Only)	-10 to 150°F (-23 to 66°C)	-10 to 150°F (-23 to 66°C)	-10 to 150°F (-23 to 66°C)
Body Rating	125 psig (862 kPa)	125 psig (862 kPa)	Exceeds Requirements of A.N.S.I. B16.15. Class 250
Body Style	Flanged	Screwed Globe, N.P.T. Connections	Screwed Globe, N.P.T. Connections
Sizes	2 1/2", 3", 4"	1 1/2", 2"	1/2", 3/4", 1"
Flow Characteristics	Equal Percentage	Equal Percentage	Equal Percentage
Material			
Body	Cast Iron	Cast Brass, Natural Finish	Cast Brass, Natural Finish
Trim	Brass	Brass	Cage — Cast Brass With Integral Seat Plug — Brass (Molded & Bonded Composition Disc)
Stem	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel
Packing	E.P.T. (Ethylene - Propylene - Terpolymer) U-Cup	E.P.T. (Ethylene - Propylene - Terpolymer) U-Cup	E.P.T. (Ethylene - Propylene - Terpolymer) U-Cup
Max. Body Pressure	Steam 35 psig (241 kPa) Water 125 psig (862 kPa)	35 psig (241 kPa) 125 psig (862 kPa)	35 psig (241 kPa) 345 psig (2379 kPa)
Max. Fluid Temperature	281°F (140°C)	281°F (140°C)	281°F (140°C)



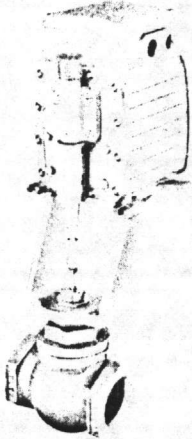


Fig. 3 — M80 Motor Actuator mounted on a V90AA 2" valve.

Sizes 2½" through 4" valves have A.S.A. flange iron bodies. They have brass trim and 316 stainless steel stem. A post guided plug provides equal percentage flow characteristics.

Repairs and Replacement

Replacement of the valve stem and plug subassembly, cage and seat subassembly and packing may be

made in the field on Sizes ½" through 1" valves. Replacement of the valve stem, valve plug and packing may be made in the field on Sizes 1½" through 4" valves.

When ordering replacement parts, give complete valve number and description of the part required. For repairs and additional service, contact the nearest Johnson Controls Commercial Systems wholesaler.

Ordering Information

To order, specify:

1. Valve body Product Number.
2. Valve linkage Product number.
3. Motor actuator Product Number.
4. Factory assembled, if required.
 - a. Specify Q99AAA-1 for ½" through 2" two-way valves.
 - b. Specify Q99AAA-2 for 2½" and larger two-way valves.

Example: One V90AD-1 valve body, one Y20AAA-6 valve linkage and one M80JAA-2 motor actuator, factory assembled, Q99AAA-1.

Installation

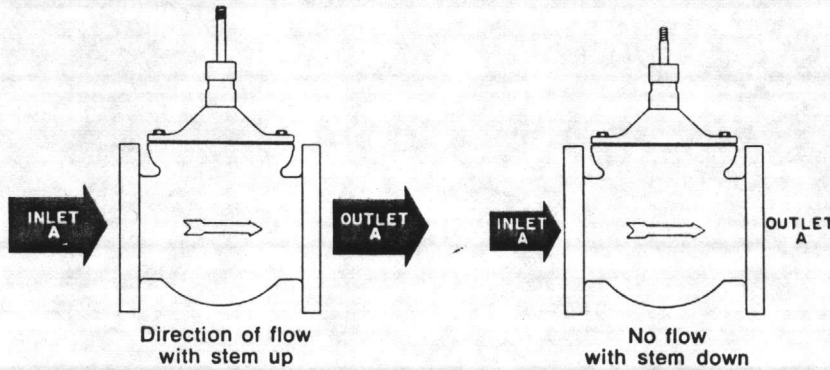
We recommend the V90A be mounted in an upright position in a conveniently accessible location. Sufficient clearance must be allowed for actuator and trim removal. The V90A must be piped so the plug seats against the fluid flow. Check valve body for inlet and outlet designations, or flow arrow.

Checkout Procedure

Make sure valve stem moves freely after valve is installed. Check the valve joints and seats to be sure there are no leaks.

After linkage and motor actuator are assembled to the valve, several complete operating cycles should be observed to be sure all components are functioning properly. The motor actuator driving the valve must be stopped by its internal electrical limits, not by the valve.

FLOW CONTROL



FLOW IDENTIFICATION

V90AA Uses Port identification letters
 V90AD Uses Flow arrow on body

Fig. 4 — Flow identification and control action.



Selection Tables

Product Number	Valve Size Inches	Cv Kv	Maximum Close-Off Pressure ^①						Valve Lift in mm
			Standard M80/M81		Spring Return M80/M81		All Series M40		
			Steam	Water	Steam	Water	Steam	Water	
V90AD-1	½	1.2	35	345	35	266	35	116	½
		1.0	241	2379	241	1834	241	800	13
V90AD-2	½	2.2	35	345	35	266	35	116	½
		1.9	241	2379	241	1834	241	800	13
V90AD-3	½	4.4	35	345	35	266	35	116	½
		3.8	241	2379	241	1834	241	800	13
V90AD-4	¾	8.6	35	221	35	107	35	47	½
		7.3	241	1524	241	738	241	324	13
V90AD-5	1	13.9	35	151	35	73	32	32	¾
		11.9	241	1041	241	503	221	221	19
V90AA-25	1½	20.0	35	91	35	45	21	21	½
		17.5	241	627	241	310	145	145	13
V90AA-26	2	26.0	35	63	31	31	14	14	½
		22.8	241	434	214	214	97	97	13
V90AA-7	2½	51.0	35	74	20	20	None	None	¾
		44.6	241	510	138	138	None	None	19
V90AA-8	3	83.0	35	46	12	12	None	None	1½
		72.6	241	317	83	83	None	None	29
V90AA-9	4	150.0	26	26	9	9	None	None	1½
		131.3	179	179	62	62	None	None	29

① To assure quiet operation and maximum life of valve, maximum pressure drop should be calculated using the formula:

$$P_m = K_m (P_i - P_v)$$

P_m = Maximum permissible pressure drop across valve.

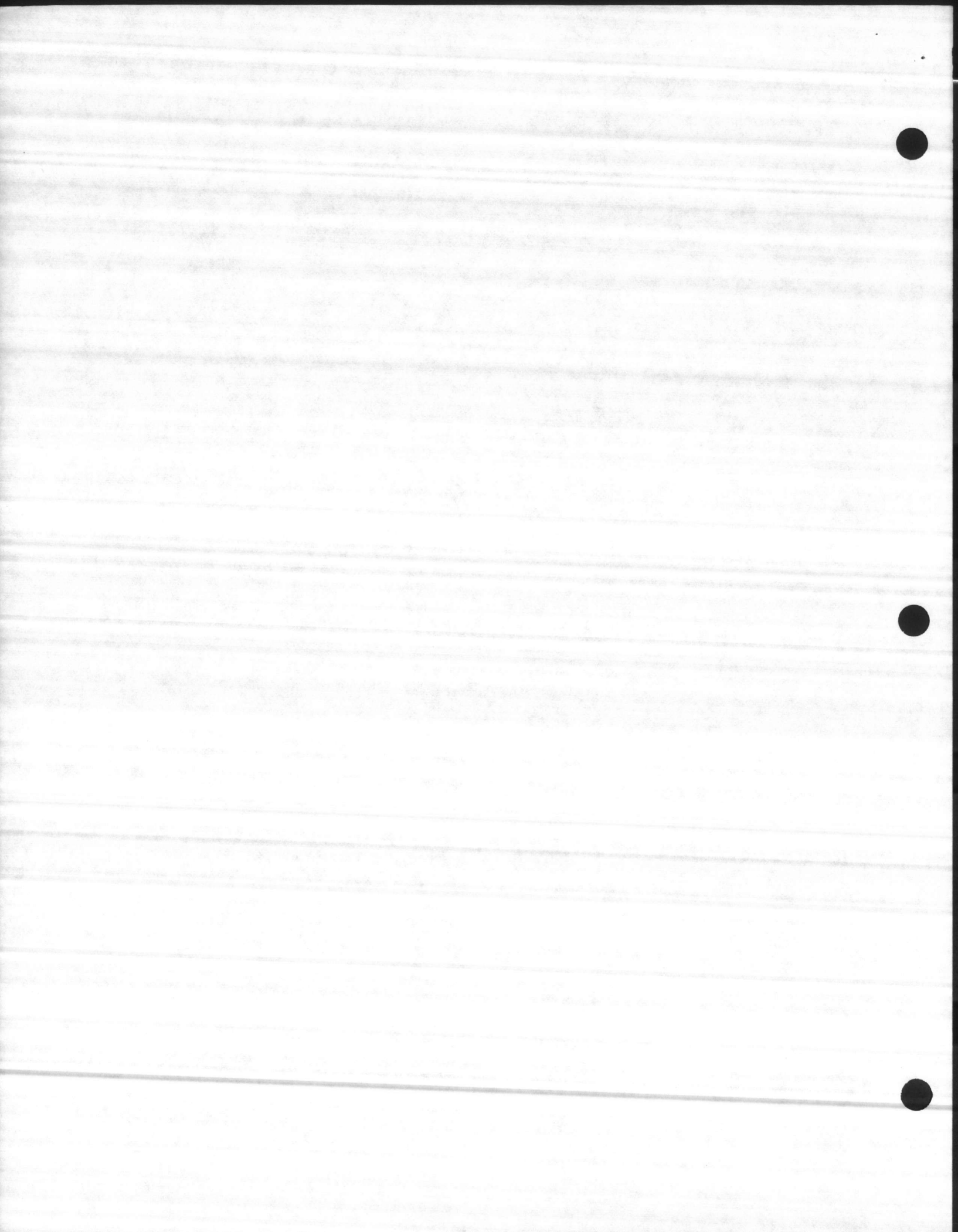
P_i = Inlet pressure is psia (psig + 14.7).

P_v = Vapor pressure of media at maximum expected temperature (see any steam table).

K_m = Valve recovery index. Use 0.7 for V90AD, 0.5 for V90AA.

Product Number	Valve Size Inches	Linkage Required (Order Separately to match Valve and Motor Selected)			Shipping Weight Valve Only lb kg	Code Number ^①
		Standard Series M80/M81	Spring Return M80/M81	All Series M40		
V90AD-1	½	Y20AAA-6	Y20ABA-4	Y20EAA-2	2.0	VB-3754-1
					0.9	
V90AD-2	½	Y20AAA-6	Y20ABA-4	Y20EAA-2	2.0	VB-3754-2
					0.9	
V90AD-3	½	Y20AAA-6	Y20ABA-4	Y20EAA-2	2.0	VB-3754-3
					0.9	
V90AD-4	¾	Y20AAA-6	Y20ABA-4	Y20EAA-2	2.8	VB-3754-4
					1.3	
V90AD-5	1	Y20AAA-6	Y20ABA-4	Y20EAA-2	4.0	VB-3754-5
					1.8	
V90AA-25	1½	Y20AAA-6	Y20ABA-4	Y20EAA-2	6.5	VB-3752-13
					2.9	
V90AA-26	2	Y20AAA-6	Y20ABA-4	Y20EAA-2	8.3	VB-3752-15
					3.8	
V90AA-7	2½	Y20AAB-1	Y20ABB-2	None	30.8	—
					14.0	
V90AA-8	3	Y20AAB-1	Y20ABB-2	None	45.0	—
					20.4	
V90AA-9	4	Y20AAB-1	Y20ABB-2	None	80.0	—
					36.3	

① This is the equivalent Product Number of the valve in Johnson Controls' Cybertronic line.





Johnson Controls, Inc.
 Control Products Division
 1250 East Diehl Road
 Naperville, IL 60540

M100 Series Motor Actuators Include Models M110, M120, M130, M140, and M150

Application

M100 Series motor actuators are used to position dampers, valves, and related equipment in heating, ventilating, air conditioning, and industrial applications.

Models are available with on-off/floating control action, and proportional control action.

Motor actuators are available with an electronic input board and a terminal board factory installed. These electronic boards

are field changeable. This feature allows for quick and easy conversions to accept new controller output signals without having to replace the motor actuator. If repairs are necessary, an R81 Electronic Board Kit can be used for easy field repairs.

Base motor actuators (motor actuators without electronic boards supplied) are also available. When using the base motor actuator, an R81 electronic board kit, that will accept the output signal from

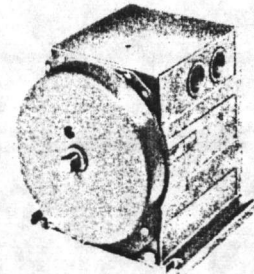
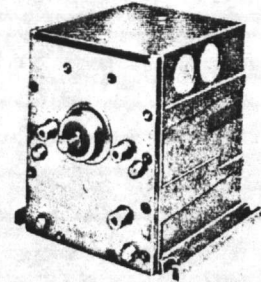


Fig. 1—Load end view of a non-spring return motor actuator (top) and the auxiliary end view of a spring return motor actuator (bottom).

Specifications

Torque (Load End of Shaft)*	M110	25 Lb.-In. (2.8 N.m), Spring Return
	M120	35 Lb.-In. (4.0 N.m)
	M130	50 Lb.-In. (5.6 N.m), Spring Return
	M140	75 Lb.-In. (8.5 N.m)
	M150	150 Lb.-In. (17 N.m)
Rotational Travel	On-Off/Floating Models	45 to 270° (0.8 to 4.7 rad)
	Proportional Models	65 to 270° (1.1 to 4.7 rad)
Timing		60 Seconds for 160° (2.8 rad) Travel
Power Requirement	M110, M130	25 VA., 24 VAC, 50/60 Hz**
	M120, M140, M150	20 VA., 24 VAC, 50/60 Hz**
Ambient Temperature	M110, M130	-35 to 125°F (-37 to 52°C)
	M120, M140, M150	-40 to 125°F (-40 to 52°C)
Shaft Specifications		3/8" Square on Each End
Enclosure Material and Finish	Case	Die-Cast Natural Aluminum
	Cover	Corrosion Resistant Rolled Steel with Dust Gasket, Blue Baked Enamel Finish
Conduit Opening		Four (4) Openings (Not Threaded) for 1/2" Conduit, Openings Sealed with Removable Plugs
Wiring Connections		1/4" x .032 Quick-Connect Spade Terminals
Shipping Weight	M110, M130	9.0 Lb (4.1 kg)
	M120, M140, M150	6.5 Lb (2.9 kg)

* Auxiliary output shaft on spring return models is limited to a maximum dead weight of 10 lbs.

** Digital motor requires 40 VA

the required controller, can be ordered separately and field installed.

The motor actuator should not be stalled by the damper or valve. The motor actuator may be damaged if it is stalled and is not free to complete its full stroke.

CAUTION: Disconnect the electrical power supply before wiring the motor actuator to the circuit to avoid possible electrical shock or damage to the equipment. Always disconnect the 24 VAC power supply to the actuator before attempting any wiring changes.



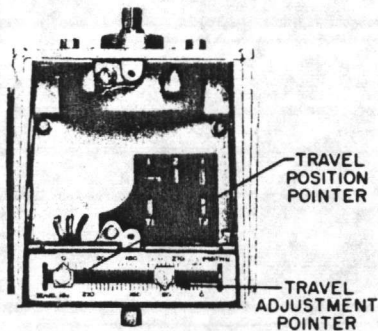


Fig. 2—View of the wiring compartment showing the terminals and travel adjustment of an on-off/floating action motor actuator.

When more than one M100 proportional motor actuator is powered from the same 24 VAC power source, polarity must be maintained. Connect all T2 terminals to the same side of the 24 VAC supply.

Upright mounting of the motor actuator is preferred, however, multi-position mounting is acceptable, as long as the output shaft remains horizontal.

All series M100 motor actuators are designed for use only as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add devices (safety, limit controls) that protect against, or systems (alarm, supervisory systems) that warn of control failure.

Features

- Easy field adjustable travel of the valve seating or damper linkage travel is permitted with the travel adjustment located in the top wiring compartment. Has a wide travel adjustment of up to 270°.
- The control signal input can be changed in the field by removing the electronic board kit (terminal and vertical boards), and replacing them with an R81 electronic board kit that will accept the output signal from the controller.

- Proportional models have no balance relays or mechanical travel limiting switches. No contacts to bounce, arc, or weld.
- Both ends of the output shaft on the motor actuator can be used for linkage connections.
- Wide choice of torques. Torques available are 25, 35, 50, 75, and 150 lb.-in. with one size housing for all motor actuators.

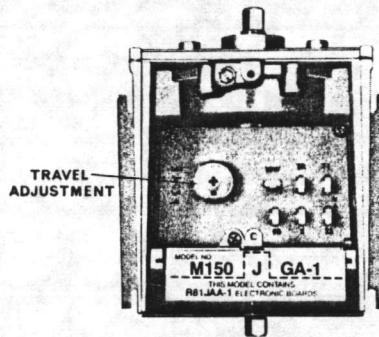


Fig. 3—View of the wiring compartment showing the terminals and travel adjustment of a "J" input proportional action motor actuator.

- Models are available with spring return and non-spring return action.
- Special oil mixture allows Spring Return and Non-spring Return actuators to be used in low ambient conditions without the need for an internal heater.
- The motor actuators have a die-cast aluminum housing with a corrosive resistant steel cover.
- Motor actuators are available to accept one of several different control signal inputs.

General Description

The M100 Series motor actuators are available in two basic versions, spring return and non-spring return action.

The spring return motor actuator

has a heavy duty spring mechanism that returns the motor actuator shaft to its full normal mechanical travel, and returns the damper or valve to its normal position, should the power fail. A brake mechanism will keep the return spring from driving the motor actuator towards its normal position unless the power is interrupted.

An adjustable crank arm is supplied with the spring return motor actuator. The damper crank arm is slotted to allow an adjustable radius from 1-11/16" to 2-7/8". The crank arm can be secured to the motor actuator shaft in position increments of 22 1/2 angular degrees.

The motor actuators with on-off/floating action operate from a SPDT on-off or floating control with a minimum three-wire rating of 1 amp. at 24 VAC.

The motor actuators with proportional action accept various control signal inputs and operate from selected electronic controllers or sensors. (Refer to the Type Number Selection chart.)

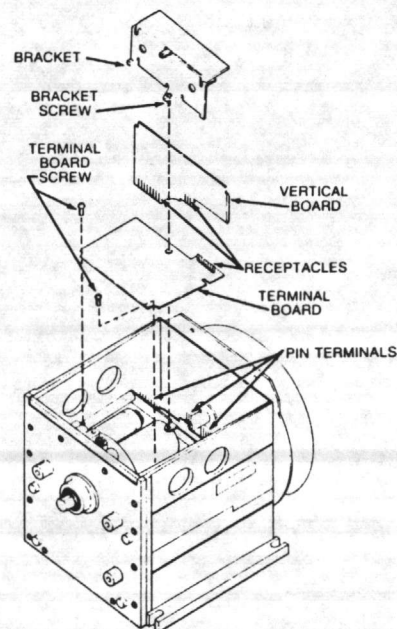
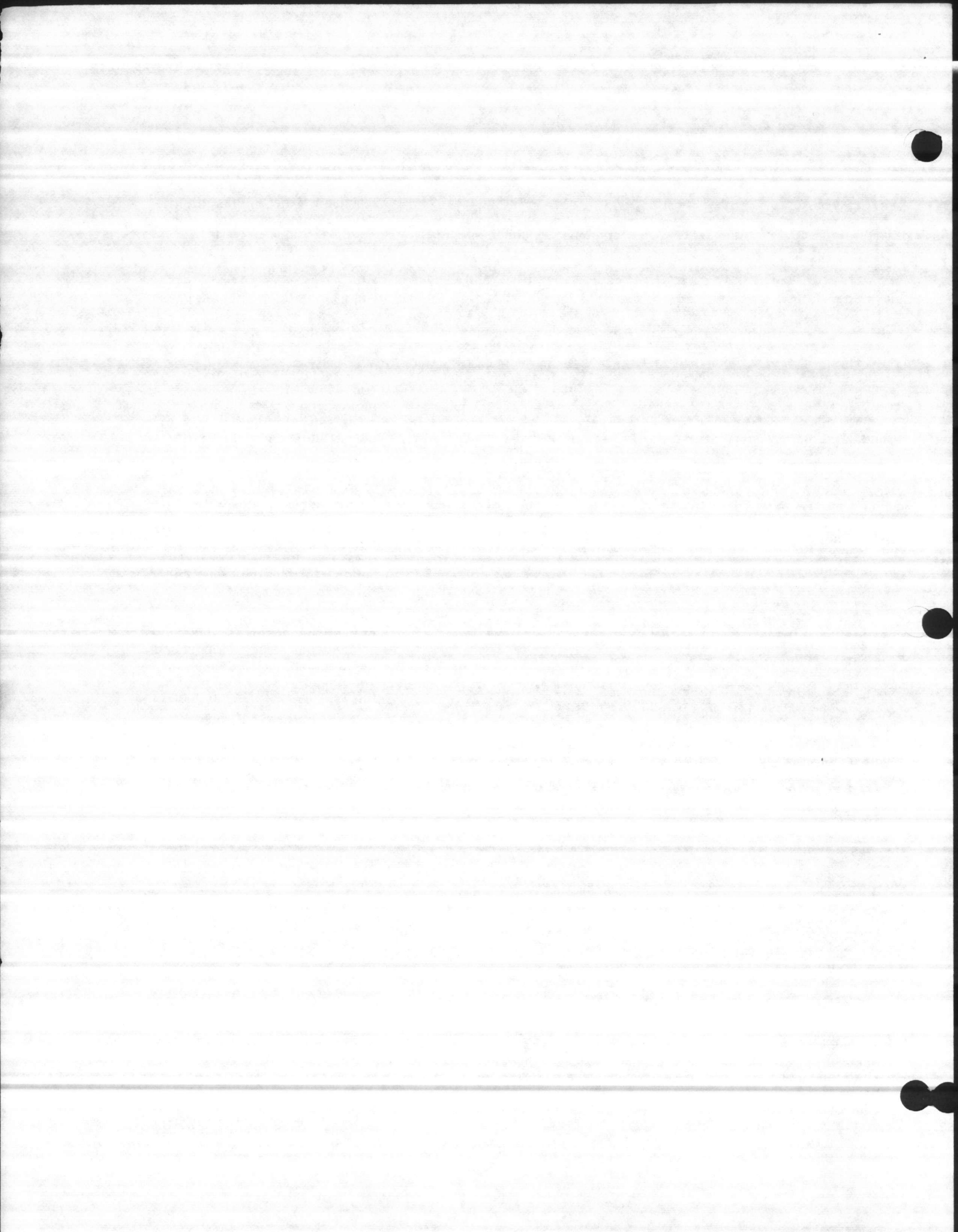


Fig. 4—View of a motor actuator showing how to remove and replace the electronic boards.



Accessories

**Auxiliary Switch Kits
(Externally Mounted)**

S91(J) switch kits are available with one or two SPDT snap-acting switches. The switch kits mount on the auxiliary end of the non-spring return actuator, or on the spring return assembly of the spring return motor actuator.

To order a switch kit, specify S91DJ-1 for the one switch model or S91EJ-1 for the two switch model.

**Electrical Ratings for
S91(J) Switches**

Volts AC	125 V.	250 V.	277 V.
Full Load Amps.	7.2	3.6	2.9
Locked Rotor Amps.	43.2	21.6	17.4
Non-Inductive Amps.	11.0	8.3	7.2
Pilot Duty — 50 VA., 24 VAC 125 VA., 125-277 VAC			
Maximum Connected Load 2000 VA.			

Damper Linkage Components

A right angle mounting bracket plus a variety of crank arms, ball joint connectors, and push rods are available for connecting the motor actuator to a damper.

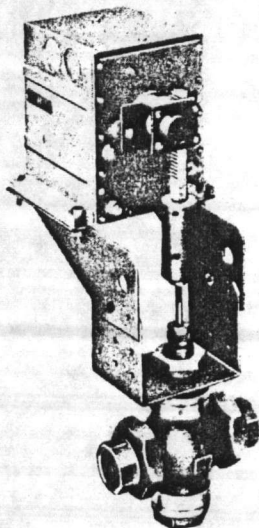
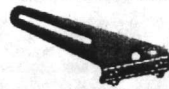


Fig. 5—Motor actuator assembled to a two-way valve.



Damper Bracket
BKT19A-600



Ball-Joint
Connector
SWL10A-601



Crank Arm
LVR27A-600R



Right Angle Bracket
BKT22A-602



Crank Arm Assembly
LVR27A-602

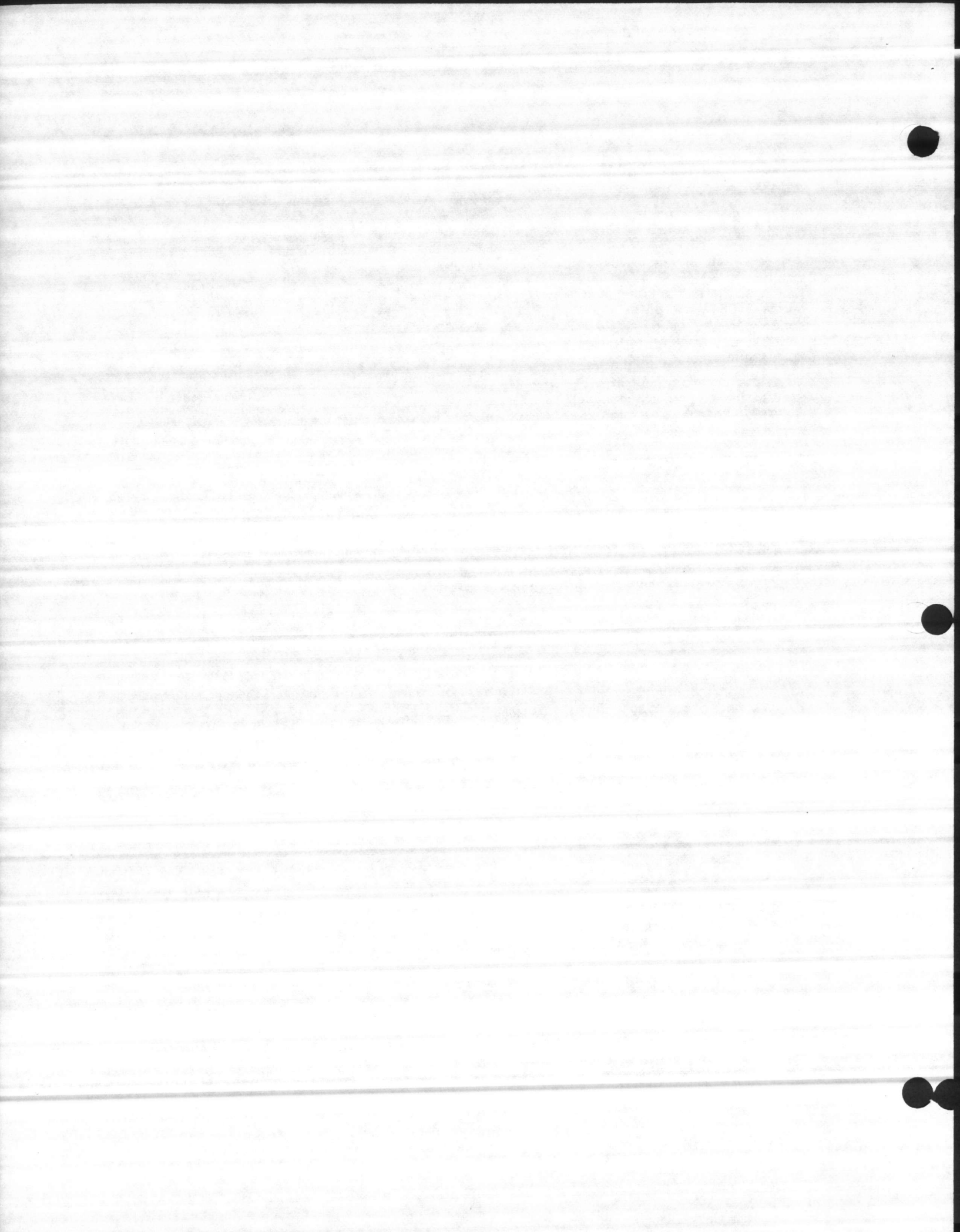
Description	Part Number	Application or Construction
Damper Linkage Sets	Y20DAA-2	For mounting of actuator to top of duct or any flat surface. Contains LVR27A-602, LVR27A-600R, SWL10A-601 (2 ea.), and ROD16-3
	Y20DAB-2	For mounting of actuator to side of duct or wall. Contains LVR27A-602, LVR27A-600R, SWL10A-601 (2 ea.), ROD16-3, and BKT22A-602
	Y20DFC-1	For mounting of actuator to D1100, 1200, and 1300 Dampers only. Rack and pinion damper linkage includes a universal mounting bracket for inside or outside damper frame mounting
Crank Arms	LVR27A-600R	For use on 1/2" or 7/16" diameter damper shafts. Adjustable radius from 3/4" to 4-1/2"
	LVR27A-602	For use on non-spring return and spring return motor actuators. Adjustable radius from 3/4" to 4-1/2"
Ball Joint Connector	BKT19A-600	Damper angle bracket to connect linkage to damper blade
	SWL10A-601	With 1/4" -28 diameter stud - use with LVR27A-602, LVR27A-600R, and BKT19A-600
Push Rods	ROD16-2	5/16" diameter x 48" long plated steel shaft
	ROD16-3	5/16" diameter x 24" long plated steel shaft
Mounting Bracket	BKT22A-602	Right angle mounting bracket

Transformer Capacity	Type of Mounting	Primary Power Supply (VAC)	Transformer Number
40 VA.	Plate, Foot or 1/2" -14 NPS Male Hub (See Fig. 6)	120	Y65AR-1
		240	Y65BR-1
		208/240	Y65SR-1
	1/2" -14 NPS Male Hub (See Fig. 7)	120	Y65AP-1
		480	Y65KP-1
		208/240	Y65SP-1
Cover Mounted (See Fig. 10)	120	Y68AA-1	
	240	Y68DA-1	
50 VA.	Plate (See Fig. 8)	120	Y63AJB-1
		480	Y63KJB-1
	Foot (See Fig. 9)	208/240	Y63SJB-1
		120	Y63ALB-2
		208/240	Y63SLB-2

Three complete damper linkage sets are offered to simplify selection of proper components. (The Y20DFC rack and pinion damper linkage is used with Johnson Controls' D1100, 1200 and 1300 Dampers only.)

Valves and Linkages

Johnson Controls provides a complete line of two-way single seat, three-way diverting, and mixing valves. Linkage Number Y20EBD is required to mount the valves to the M100 Series motor



actuators. Refer to the Y20EBD Instruction Form 996-425 for additional information.

Transformers

An NEC Class 2 transformer is required to provide 24 VAC power supply to the motor actuators. Plate mounted transformers mount on a 4" electrical box.

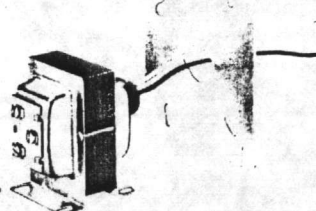


Fig. 6—Plate, foot or conduit hub mounted transformer.

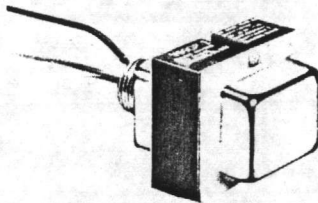


Fig. 7—Conduit hub mounted transformer.

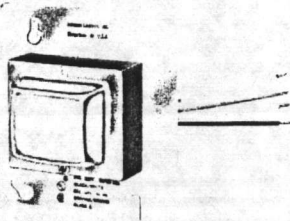


Fig. 8—Plate mounted transformer.

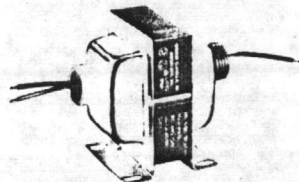


Fig. 9—Foot mounted transformer.



Fig. 10—Cover mounted transformer.

Type Number Selection*

M110	Spring Return, 25 Lb.-In. (2.8 N.m) Torque
M120	Non-Spring Return, 35 Lb.-In. (4.0 N.m) Torque
M130	Spring Return, 50 Lb.-In. (5.6 N.m) Torque
M140	Non-Spring Return, 75 Lb.-In. (8.5 N.m) Torque
M150	Non-Spring Return, 150 Lb.-In. (17 N.m) Torque
A	On-Off/Floating Action, SPDT On-Off or Floating Control Input
B	Proportional Action, 3-Wire 135 to 1000 Ohm Potentiometer Input
C	Digital, CW Action on Signal Increase
D	Digital, CCW Action on Signal Increase
E	Proportional Action, Economizer with Changeover Relay, Refrigeration Programming Relay, Minimum Position, Mixed Air Set Point and Proportional Band
G	Proportional Action, VDC/mA Input, Adjustable Zero and Span, CW Action on Signal Increase
H	Proportional Action, VDC/mA Input, Adjustable Zero and Span, CCW Action on Signal Increase
J	Proportional Action, 0 to -2 VDC, 0 to 24 VDC with Fixed Zero (6 VDC) and Span (4 VDC), and 3-Wire 135 to 1000 Ohm Potentiometer Input, CW Action on Signal Increase
Q	Proportional Action, Thermistor Sensor Input, Jumpered Connections for Direct or Reverse Action
A	120 VAC**
B	208 VAC**
D	240 VAC**
F	480 VAC**
G	24 VAC
H	24 VAC 1:1 Isolation**
A	No Auxiliary Switch
B	One SPDT Auxiliary Switch
C	Two SPDT Auxiliary Switches

* All combinations of the above letters or types are not necessarily available. Contact Customer Service.

** Factory installed cover mounted transformer.

Transformers No. Y65AP-1, Y65KP-1 and Y65SP-1 have a 1/2" conduit fitting that permits direct mounting into the conduit opening of the motor actuator's wiring compartment. See Bulletin No. 3742 for additional transformer information.

Y68AA-1 and Y68DA-1 cover mounted transformers are available for mounting to the top of a motor actuator.

An isolation transformer (24 VAC to 24 VAC) is available. Specify Y68HA-1 for the cover mounted type or Y69GP-1 for the hub mounted type, if required.

Weather Cover Kit

A weather cover kit to shield the motor actuator from rain and

other harmful weather conditions is available. The cover fits over the top of the motor actuator and is secured by a screw and washer.

To order a weather cover kit, specify CVR83A-600R.

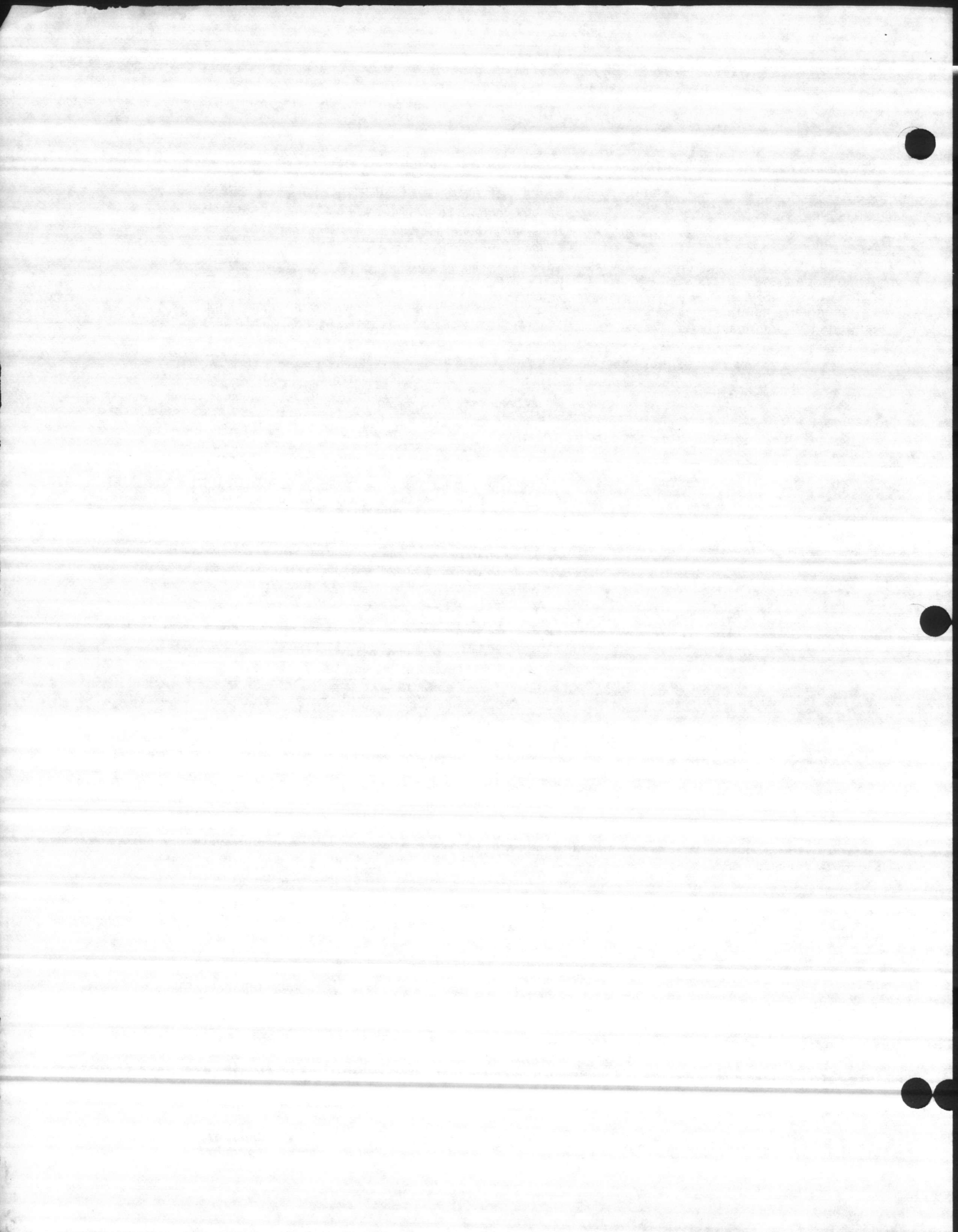
Ordering Information

To order, specify:

1. Complete Product Number.
2. Optional constructions.
3. Accessories.

Repairs and Replacement

The drive motor and gear train are immersed in oil and sealed in a die-cast case, therefore, maintenance is not required.



Field repairs must not be made, except for replacement of the electronic boards (terminal and

vertical boards) or accessories. For a replacement motor actuator, or an R81 electronic

board kit, contact the nearest Johnson Controls Commercial Systems wholesaler.

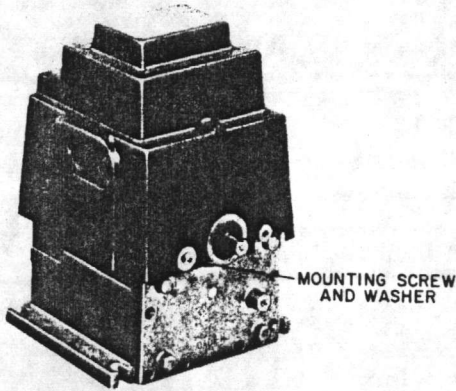


Fig. 11—CVR83A-600R Weather Cover Kit installed on an M100 Series Motor Actuator.

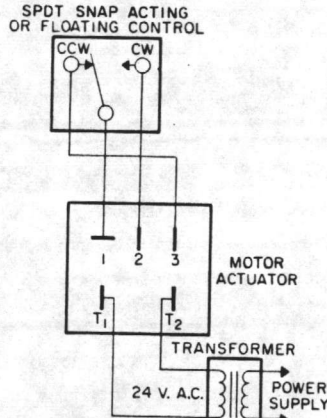


Fig. 12—Typical wiring hookup showing an M100A on-off/floating motor actuator controlled by a SPDT snap-acting or floating control device.

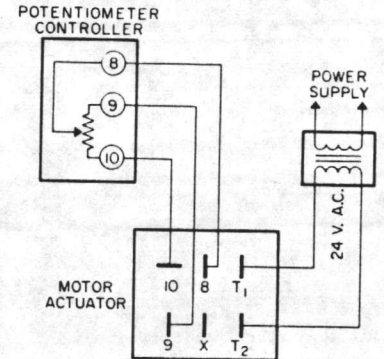


Fig. 13—Typical wiring hookup of a potentiometer controller wired to operate an M100J motor actuator.

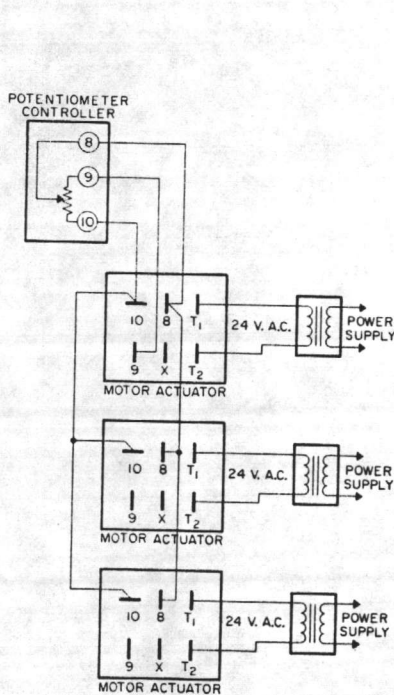


Fig. 14—Typical wiring hookup for a potentiometer controller wired to an M100J motor acuator. Parallel operation of three motor actuators with one potentiometer controller is shown. Use separate transformers when the No. 10 terminals are connected together.

Note: "Precision Slaving" can only be accomplished when using terminals 8 and 10.

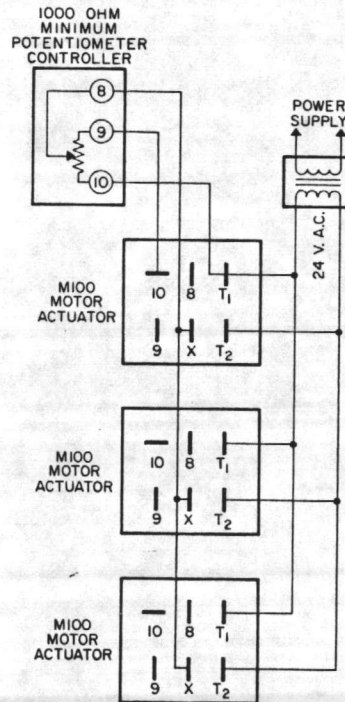
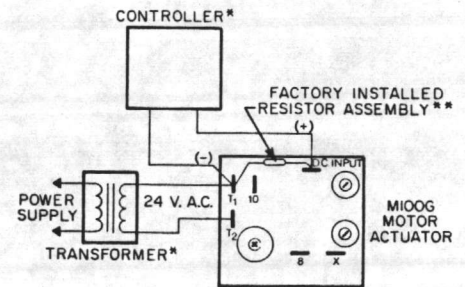


Fig. 15—Typical wiring hookup of three M100J motor actuators controlled by one potentiometer controller. This hookup requires only one transformer.

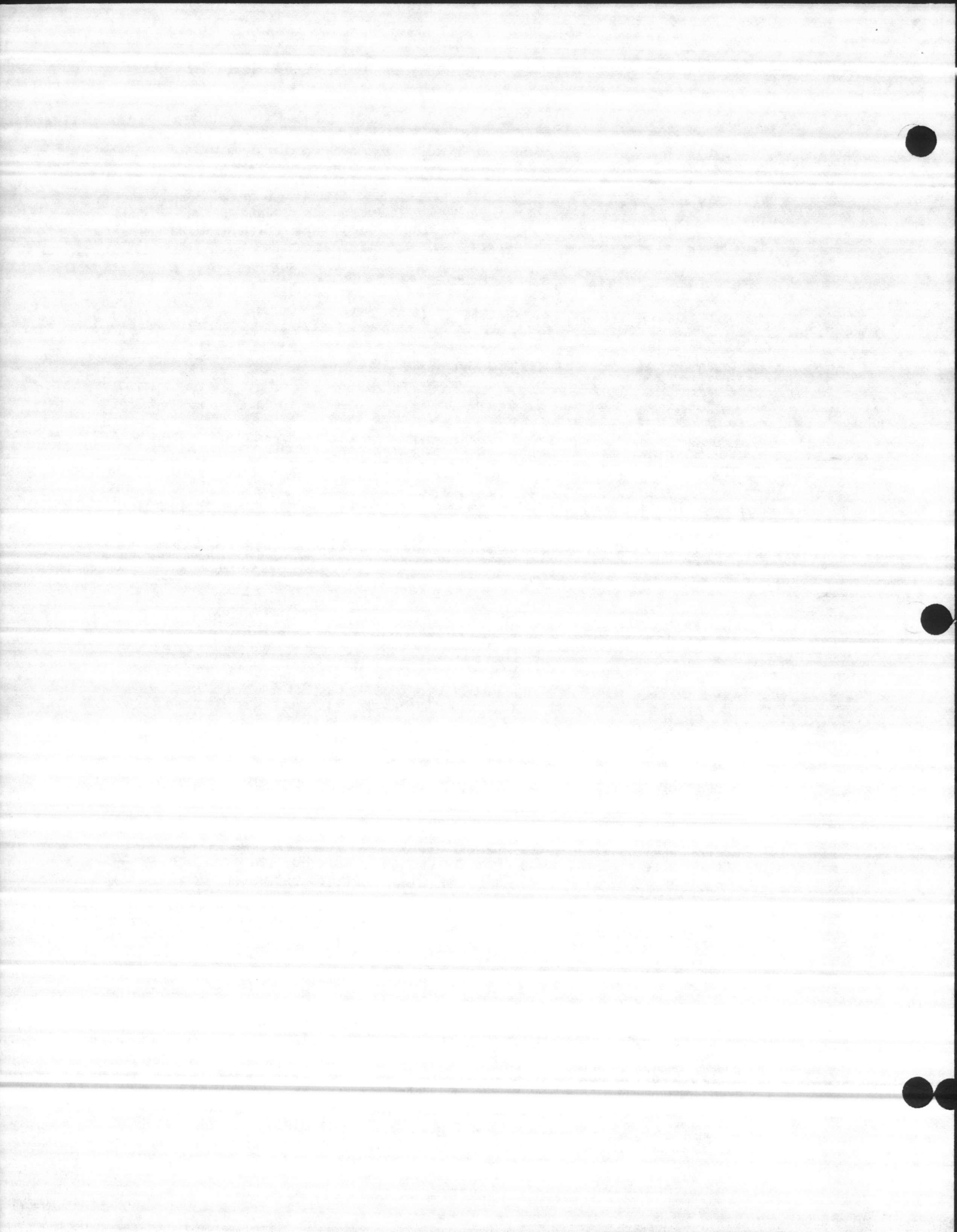
Note: "Precision Slaving" cannot be accomplished when using the "X" terminal. See Application Up-date M022 for more details.



*NOTE: Controller must be powered by a separate transformer other than the transformer powering the motor actuator.

**The resistor must be used when a DC. milliampere controller is used. The resistor must be removed when a DC. voltage controller is used.

Fig. 16—Typical wiring hookup of a controller wired to operate one M100G motor actuator.



ELECTROMECHANICAL 7-DAY TIMERS AND TIMER MODULES

ELECTRICAL AND INDUSTRIAL CONTROLS

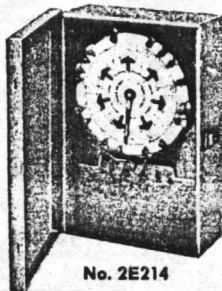
ELECTROMECHANICAL TIMERS



E22110



LR3730 except No. 6X757 No. 2E214



No. 2E214

FEATURES:

- Can be set quickly to automatically switch on or off at any selected time. Program can be different for each day of the week.
- Skipper allows any day or days to be omitted from program.
- 7-day dial with manual override lever provided.
- Snap-out timer mechanism in NEMA 1 Gray finish, steel enclosure with knockouts provided.
- Spring-wound carry-over feature on 2A209, 6X757 and 1A220 provide a maximum of 16 hours of continuous duty during power failure. Rewinds itself during resumption of power.
- 2A210 is compact unit.
- Time-of-Day scheduling of HVAC systems is the major application for this series of timers.

Can provide a different program for each day of the week. Ideal for heating, air conditioning, ventilating, lights, pumps, motors and other electrical devices. Timers have heavy duty gears with clutchless design that cannot slip. Brass

contacts tungsten rated to handle inrush 10 times greater than their rating. All clock motors are permanent magnet, self-lubricating, synchronous type. Snap out mechanism for easy maintenance.

SPECIFICATIONS

Stock No.	Time Setting Min.	Time Setting Max.	Daily ON and OFF Operations Per Pole	H	W	D	Enclosure Type
2A208, 2A209, 2E214, 6X757, 1A219, 1A220	3.5 Hrs.	21.0 Hrs.	3	12 1/2"	8 1/4"	4"	Indoor
2A210	2.0	22.0	6	7 3/4"	5	3	Indoor

No. of Poles	Form	Contact Ratings				Timer Power Required, V @ 60 Hz AC	Stock No.	List	Each	Shpg. Wt.	
		Amps/Pole @ 60 Hz	I*	R*	T*						HP @ 120VAC	HP @ 240VAC
4	4PST; NO	40	40	40	2	5	120	2A208	\$99.50	\$58.70	8.0
	4PST; NO	40	40	40	2	5	120	2A209	267.40	157.77	9.0
	4PST; (2)NO (2)NC	40	40	40	2	5	120	2E214	99.50	58.71	8.3
	4PST; (2)NO (2)NC	40	40	40	2	5	120	6X757	267.40	157.77	8.4
4**	4PDT; NO	15	15	5	1/2	1/2	120	1A219	140.00	81.20	9.5
4**	4PDT; NC	15	15	5	1/2	1/2	120	1A220	335.00	194.30	10.0
1	SPDT	20	20	—	1/2	1	120	2A210	91.40	53.93	2.8

(*) I = Inductive, R = Resistive both at 120 thru 480VAC (120 thru 240VAC on 1A219 and 1A220); T = Tungsten—fluorescent & H.I.D. 120 thru 277VAC.

(**) Can switch 8 circuits, 2 per pole.

TIMER MODULES



E22110

Ideal for Panel Mount Installations



29766



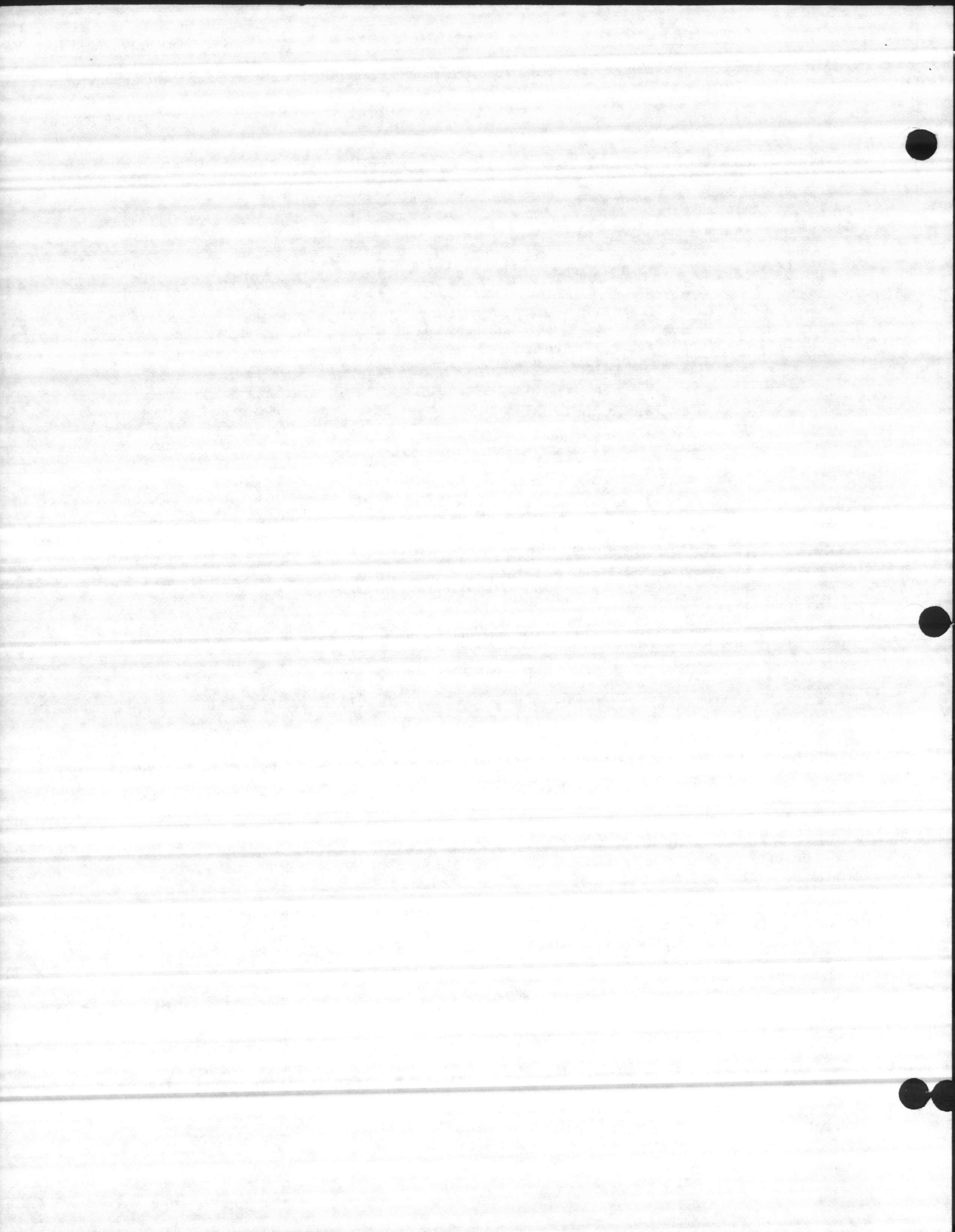
FEATURES:

- Quartz-Drive Motor, Draws 0.1 Watt
- 84 Non-Detachable Trippers, Position Indicates On/Off Mode of Switch
- Can be Mounted in 4 x 4 Electrical Box
- 2A520 has Quartz Battery Reserve to Keep Timer Running for Approximately 90 Hours During Power Failures
- Ambient Temperature Range -10° to 55°C
- Panel Opening for Time Disc is 64mm

ORDERING DATA

Poles	Form	Contact Ratings @ 120/240VAC				Time Settings Min. Max.	Daily On/Off Operations	Input Volts @ 60 Hz	H	W	D	Stock No.	List	Each	Shpg. Wt.		
		I*	R*	T*	HP												
1	SPST	8/6	20/15	8.3/4.1	470/662VA	1/2	9/4	2 Hr. 22 Hr.	12	120VAC	2 3/4"	2 3/4"	1 1/4"	2A518	\$44.50	\$22.12	0.1
1	SPST	8/6	20/15	8.3/4.1	470/662	1/2	9/4	2	22	120	2 3/4"	2 3/4"	1 1/4"	2A520	88.50	44.24	0.1

(*) I = Inductive, R = Resistive, T = Tungsten





Johnson Controls, Inc.
 Control Products Division
 2221 Camden Court
 Oak Brook, IL 60521

Series T26 Line Voltage Thermostat Heating, Cooling, Combination Heating and Cooling Standard Duty and Heavy Duty

Application

T26 line voltage thermostats control heating, cooling, or year 'round air conditioning units in commercial, industrial or residential installations. Typical uses are for unit heaters, fan coils, blast coils, refrigerated storage rooms, electric heat, duct furnaces, greenhouses, etc. Models are available with SPST or SPDT contact action and for standard duty (nominal ¼ hp; 10 amps. non-inductive) or heavy duty (nominal 1 hp; 22 amps. non-inductive) applications. These thermostats are also suitable for low voltage applications.

All Series T26 thermostats are designed for use only as

operating controls. An operating control is not authorized for use where its failure in any mode can result in personal injury and/or loss of property. It is the responsibility of the user to add those necessary devices that protect against undesirable system failure modes.

For line voltage thermostats with integral selector switches refer to T22 Bulletin 3233.

Features

- Energy conservation models available featuring fixed limited ranges.
- Enclosed Pennswitch contact unit — dependable, dustproof, and field proven.

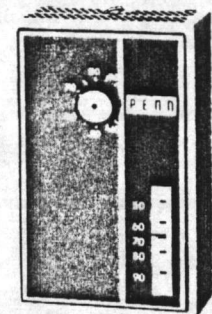
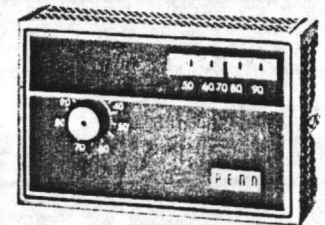
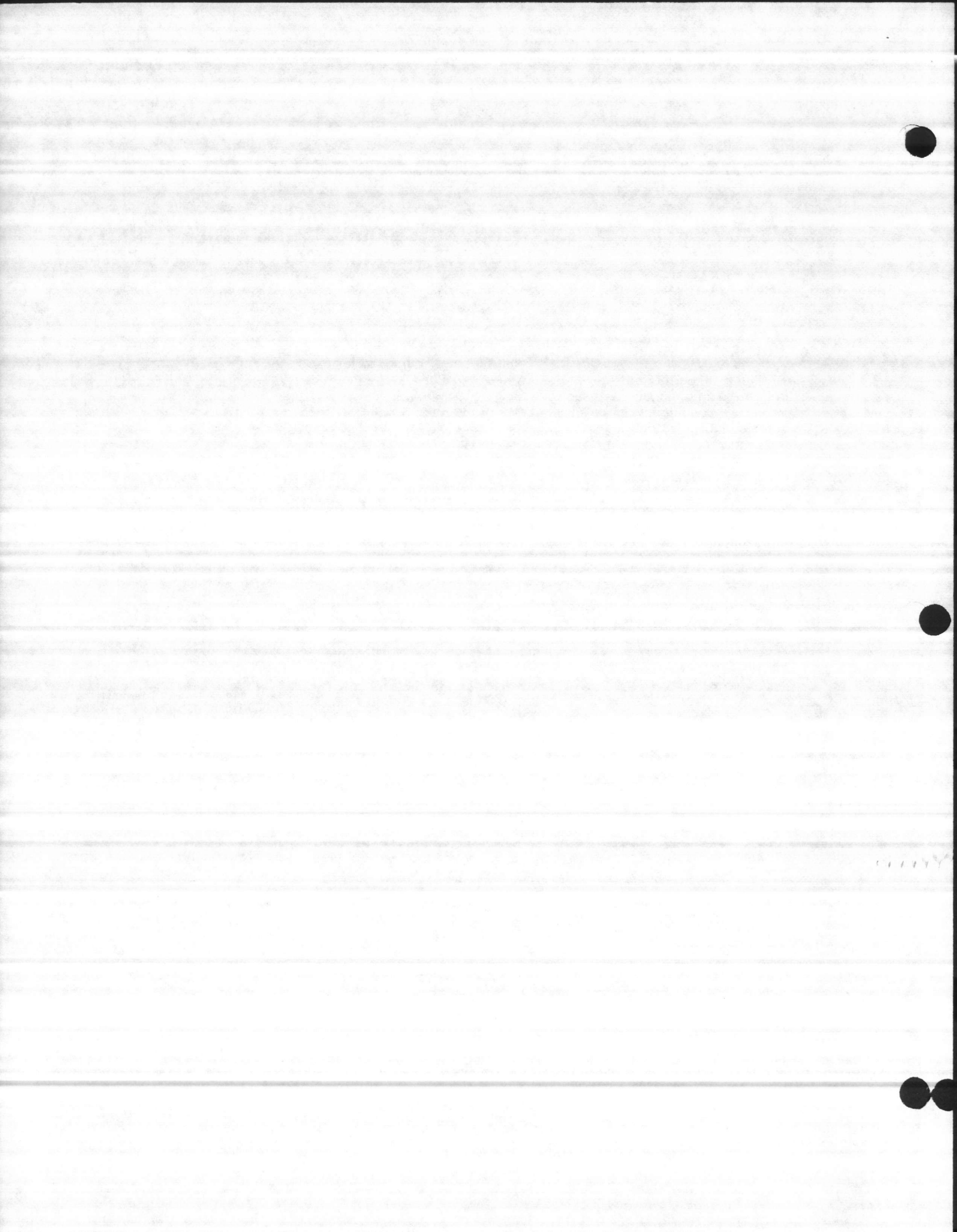


Fig. 1 — T26 Thermostat with horizontal faceplate (top) or vertical faceplate (bottom).

Specifications

Type Number	T26A	SPST, Heating
	T26B	SPST, Heavy Duty Heating
	T26J	SPST, Cooling
	T26S	SPDT, Heating, Cooling, or Heating and Cooling
	T26T	SPDT, Heavy Duty Heating, Cooling, or Heating and Cooling
Differential	Mechanical	Approximately 0.7° F (0.4° C)
	Operating	See Figures 3 and 4
	Base and Cover	Baked on "Tawny Silver" Enamel
Finish	Faceplate	Dark Brown and Light Brown, Aluminum Letters and Markings
	Base	.050" (1.27 mm) Cold Rolled Steel
Material	Cover	.025" (.64 mm) Cold Rolled Steel
	Mounting	Separable Mounting Plate, See Figures 5 and 6
Range	Thermostat	40 to 90° F (5 to 30° C)
	Thermometer	50 to 90° F (10 to 30° C)
Sensing Element	Liquid Filled for Positive Trouble Free Operation	
Shipping Weight	Individual Pack	1.0 lb. (.45 kg)
	Overpack of 20 Units	22 lbs. (10 kg)
Thermometer	Bimetal Type for Accuracy and Clarity, May Be Field Calibrated	
Wiring Connections	Large Screw Type Terminals, Terminal Identification Markings Stamped on Back of Case	

- Field adaptable to vertical/horizontal mounting and for knob, key, or concealed adjustment.
- Knob, key, or concealed set point adjuster.
- Low and high temperature dial stops — concealed and adjustable throughout set point range. Can be set for locked dial. (See Fig. 2.)
- Locking cover with Allen-head screws is standard.
- Close differential without need for anticipator.
- Internal dual Celsius and Fahrenheit scale is standard.
- Separable mounting plate allows easy mounting and



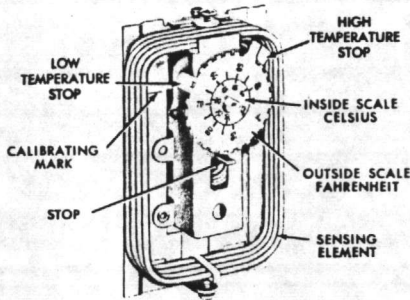


Fig. 2 — Interior of T26. Note how element is wrapped around inside of thermostat for maximum sensitivity. Integral adjustable high and low temperature stops.

wiring without removing thermostat cover.

- Switch mechanism and wiring terminals (#8 screws) go into switch box for safety and isolation of load from sensing element.
- Matching humidistat is available. (See W43A Bulletin 3391.)

General Description

T26 thermostats are extremely versatile. Using different field-installable faceplates, combinations of (1) vertical/horizontal mounting, (2) knob, key, or concealed adjustment and (3) with or without thermometer indication are possible. These thermostats have metal locking covers with Allen-head screws to discourage unauthorized tampering. The standard models are supplied with a faceplate installed for vertical mounting with knob adjustment and thermometer. A field installable faceplate for horizontal mounting is also included on wholesaler models. (See Figs. 1 and 6.) Standard models are SPDT for heating, cooling, or heating and cooling applications.

Standard models can be changed the field as follows:

1. To convert to key adjustment, loosen the screw in the center

of the knob, remove the knob, and the knob becomes the key.

2. To convert to other configurations, for example concealed adjustment, select the faceplate kit that meets the desired requirements from the "Faceplate Selection Table" on Page 3.

The cover and faceplate design makes the thermostats adaptable to any decor. The thermostats have a sturdy steel cover with "tawny silver" finish. The faceplate is dark brown and light brown with aluminum numbers and graduation marks. The internal dial on these thermostats has a dual Fahrenheit-Celsius scale. (See Fig. 2.) When a faceplate with Celsius thermometer and set point scale is used the thermostat is totally Celsius.

The liquid charged sensing element is formed to achieve maximum sensitivity to surrounding air temperature

changes. (See Fig. 2.) Coupled with a highly efficient diaphragm and leverage mechanism, the element operates a totally enclosed Pennswitch contact unit for close differential and dependable switching action without the use of "heat or cool" anticipators.

Elimination of anticipators increases versatility of these thermostats, which may be used on heating and/or cooling over a wide range of current loads, either on 24 V., 120 V. or 240 V. systems.

Operating Differential

The operating temperature differential of any self-contained thermostat depends on: the current flowing through the thermostat (amperage load); the velocity of air over the thermostat; the rate of temperature change to which the thermostat is subjected; and, whether the thermostat is operating heating or cooling equipment.

Electrical Ratings

T26A, T26S

Motor Ratings	120 V.	208 V.	240 V.	277 V.
A. C. Full Load Amps.	6.0	3.5	3.0	—
A. C. Locked Rotor Amps.	36.0	21.0	18.0	—
A. C. Non-Inductive Amps.	10.0	10.0	10.0	10.0
Pilot Duty — 125 VA. 24 to 277 V. A.C.				

T26B and Heating Side of T26T

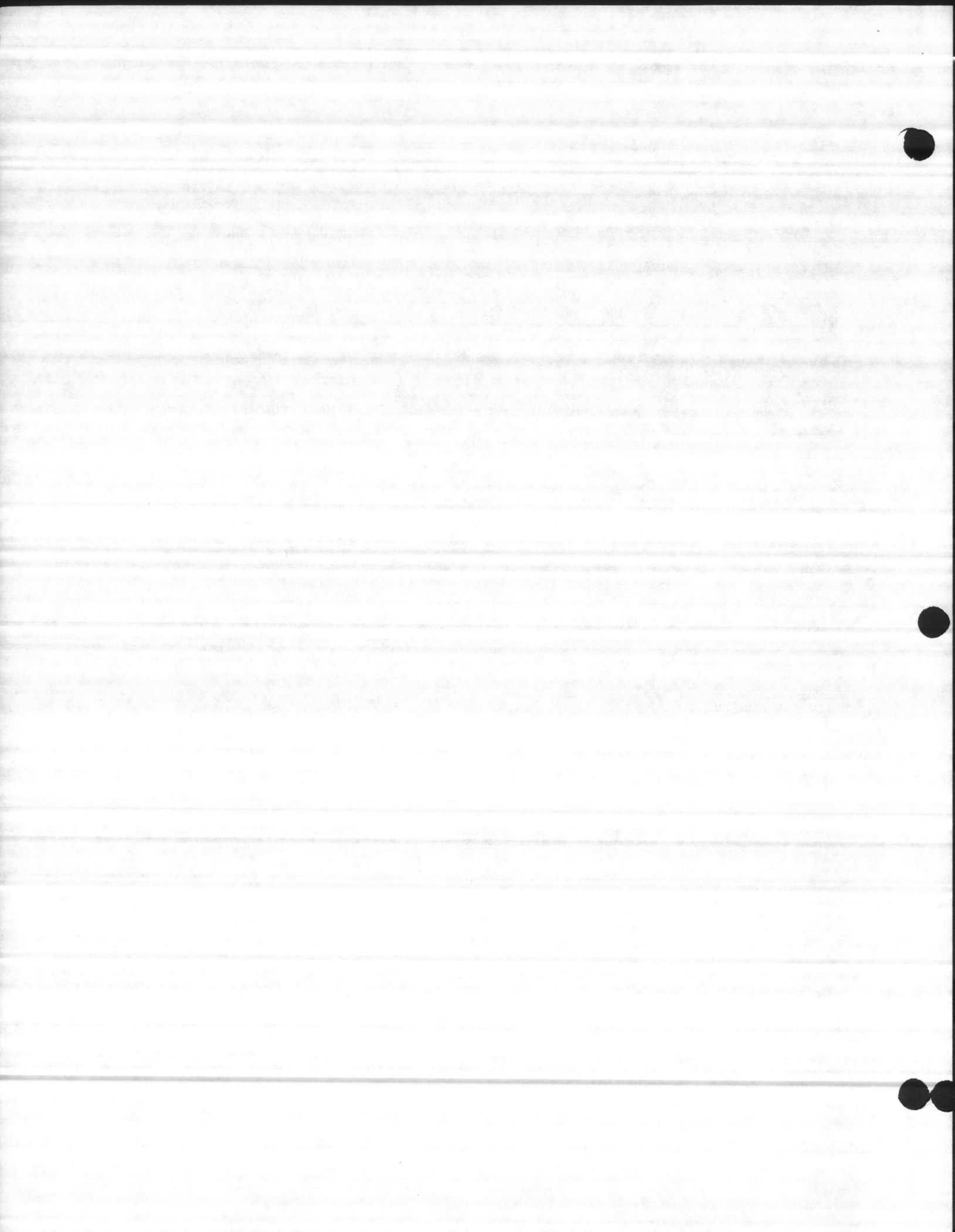
Motor Ratings	120 V.	208 V.	240 V.	277 V.
A. C. Full Load Amps.	16.0	9.2	8.0	—
A. C. Locked Rotor Amps.	96.0	55.2	48.0	—
A. C. Non-Inductive Amps.	22.0	22.0	22.0	22.0
Pilot Duty — 125 VA. 24 to 277 V. A.C.				

Cooling Side of T26T

Motor Ratings	120 V.	208 V.	240 V.
A. C. Full Load Amps.	8.0	8.0	8.0
A. C. Locked Rotor Amps.	48.0	48.0	48.0
Pilot Duty — 125 VA. 24 to 277 V. A.C.			

T26J

Motor Ratings	120 V.	208 V.	240 V.
A. C. Full Load Amps.	6.0	3.5	3.0
A. C. Locked Rotor Amps.	36.0	21.0	18.0
Pilot Duty — 125 VA. 24 to 277 V. A.C.			



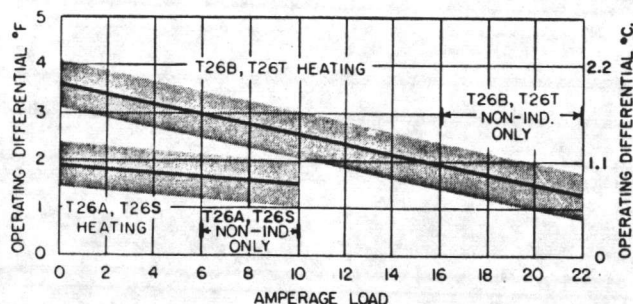


Fig. 3 — Operating differential for T26A and heating side of T26S (lower graph line). Upper graph line illustrates differential for T26B and heating side of T26T.

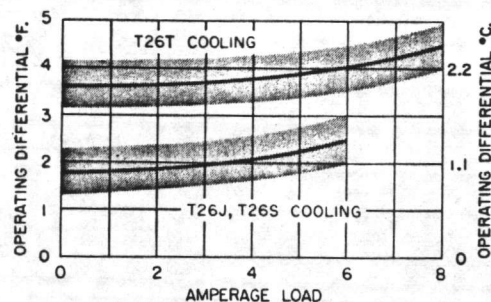


Fig. 4 — Operating differential for T26J and cooling side of T26S (lower graph line). Upper graph line illustrates differential for cooling side of T26T.

The heavy line in each of the above figures is the nominal operating temperature differential. Production thermostats may vary from the norm as indicated by the shaded areas.

Faceplate Selection Table

Kit Number	Mounting Position		Type of Adjustment		Thermometer	
	Vertical	Horizontal	Knob	Concealed	Yes	No
PLT213-5	—	X	—	X	—	X
PLT213-6	X	—	—	X	—	X
PLT213-9*	X	—	X	—	X	—
PLT213-11*	—	X	X	—	X	—
PLT213-15	X	—	—	X	X	—
PLT213-16	—	X	—	X	X	—
PLT213-17	X	—	X	—	—	X
PLT213-18	—	X	X	—	—	X
PLT213-19**	X	—	X	—	X	—
PLT213-20**	—	X	X	—	X	—

* Supplied with standard wholesaler models (vertical is factory installed).
** Celsius Scales.

Faceplates must be ordered in multiples of ten.

Graphs (Figs. 3 and 4) show the operating temperature differentials of these thermostats under various load conditions. These curves are based on tests made in a NEMA standard test box according to NEMA standard DC3-1959. The air velocity was 25 feet per minute (.127 m/sec.) and the rate of temperature change was 6°F (3.3°C) per hour. For air velocities greater than 25 feet per minute and/or for rates of temperature change less than 6°F per hour, the operating differentials will be less than shown in Figures 3 and 4.

Optional Constructions

Brand Nameplates

Available on quantity orders. Contact Customer Service.

Concealed Adjustment

Available on factory order at no extra cost. For field changeover use the concealed faceplate kit and install directly over the faceplate on the cover.

Double Control Trim Plates

For vertical mounting of T26 thermostats side-by-side on a three gang electrical box. May also be used with T22, T25, T80, W43 and W45 controls. Overall dimensions are 5½" high by 9½" long. Order Part No. PLT231-1R.

Energy Conservation Models

Thermostats are available with limited heating or limited cooling ranges. The standard heating

models are set at a maximum of 75°F (24°C) or 65°F (18°C). The cooling models are set at a minimum of 75°F (24°C) or 78°F (26°C). Other limit settings are available on quantity orders.

Faceplates

Available in separate kits for on-the-job installation. All plates have peel-off backing strips. Faceplates are available in all combinations shown in the "Faceplate Selection Table."

Key Adjustment

Remove the knob and keep for key adjustment when set point change is desired.

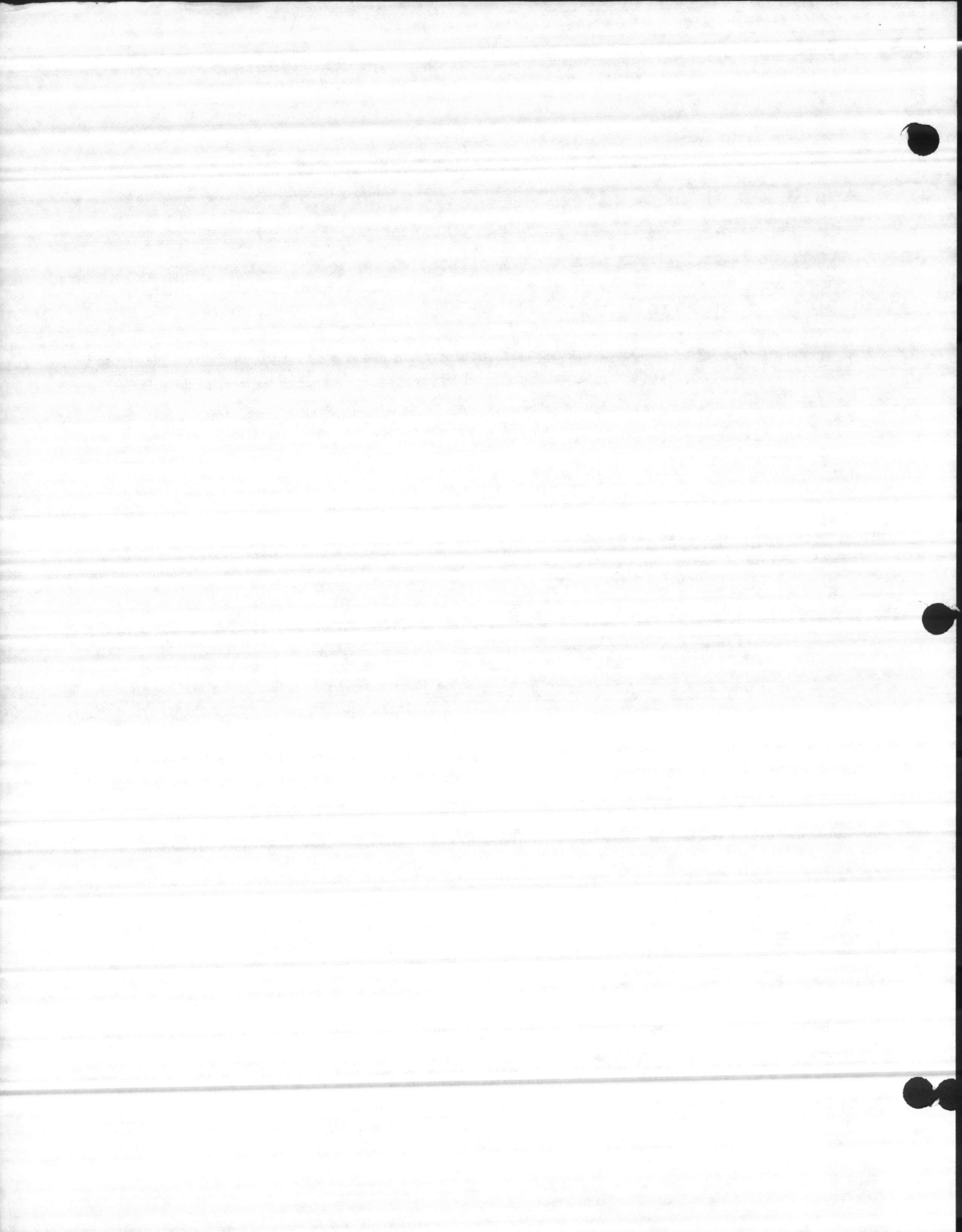
Thermostat Guards

Plastic, wire or cast aluminum guards are available at extra cost. See Control Products Catalog or "GRD" Bulletin No. 3860.

Ordering Information

To order, specify:

1. Product Number, if available.
2. Faceplate kit, if other than standard is required. Order in multiples of ten.



3. Other optional construction features, if required (quantity orders only).
 - a. Faceplate required if other than standard vertical.
 - b. SPST contact action.
 - c. Brand nameplate.

Replacement Parts

Part Number	Description
CVR48A-600R	Cover Assembly for Knob Adjustment Models with Thermometer, °F Scale, Vertical Faceplate Assembled, Horizontal Faceplate Supplied Unassembled
CVR48A-602R	Cover Assembly for Knob Adjustment Models with Thermometer, °C Scale, Vertical Faceplate
KNB20A-600R	Plastic Knob
PLT51A-602R	Conduit Box Mounting Plate
PLT61A-600	Mounting Plate for Thermostat and Selector Switch
PLT231-1R	Double Gang Box Mounting Plate

Repairs and Replacement

Field repairs must not be made except for the knob, cover, and mounting plate. For replacement thermostat or repair parts, contact the nearest Johnson Controls wholesaler.

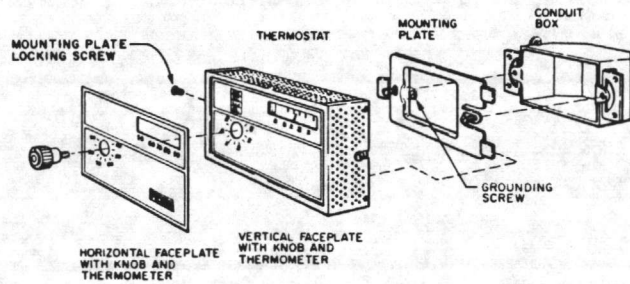


Fig. 5 — Line drawing illustrating method of mounting a vertical thermostat to a horizontal outlet box and installing a horizontal faceplate.

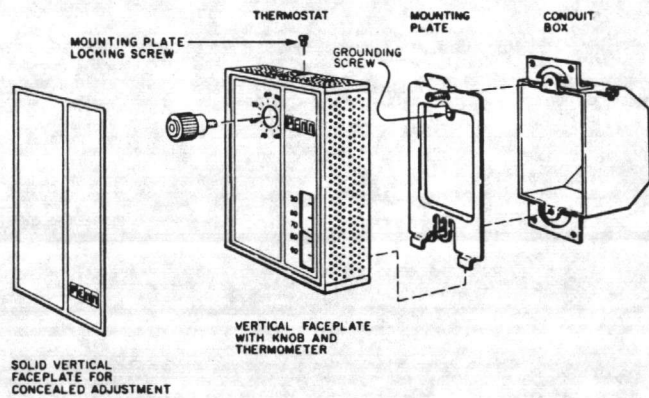
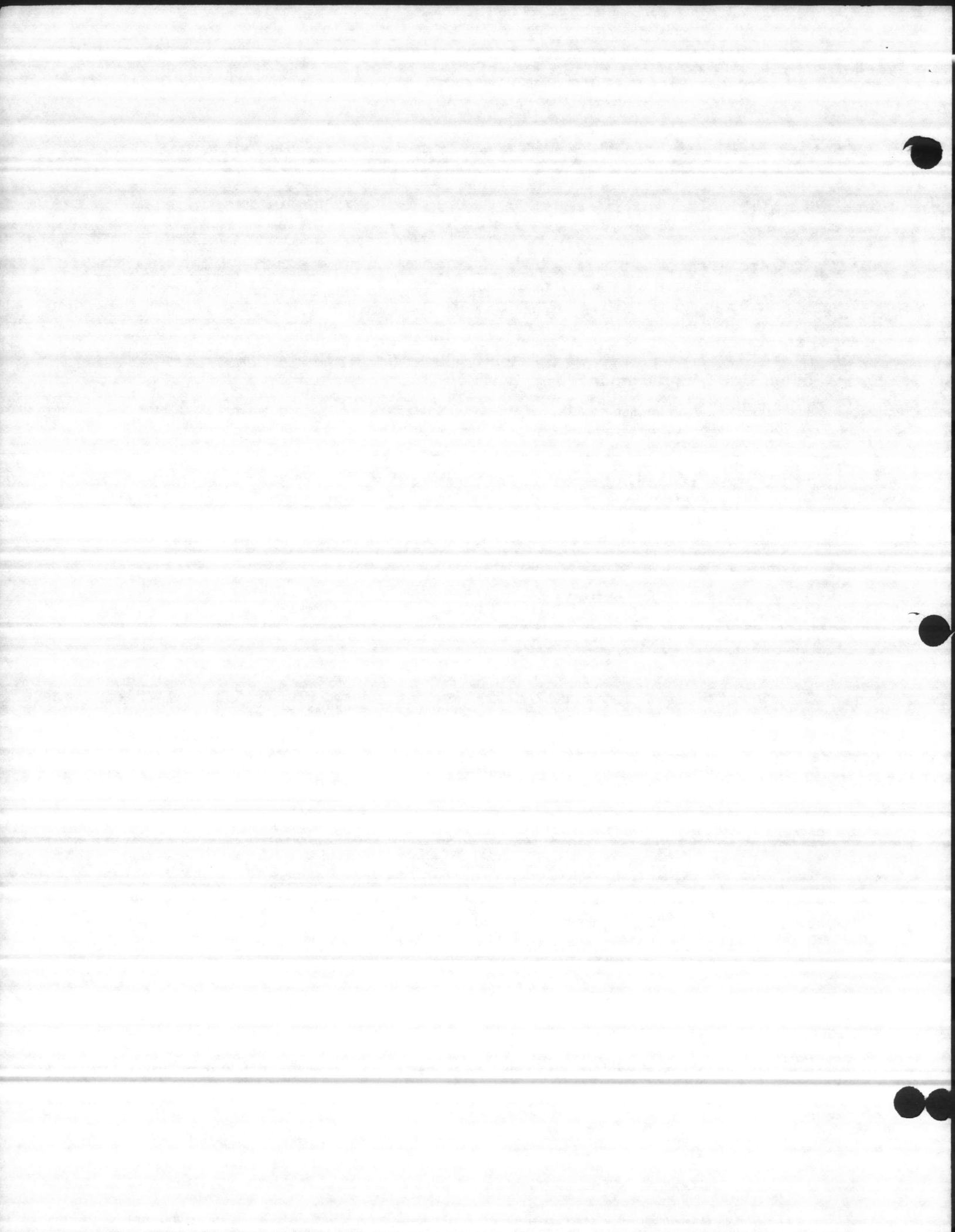
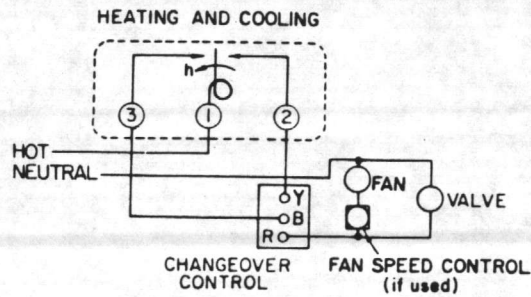
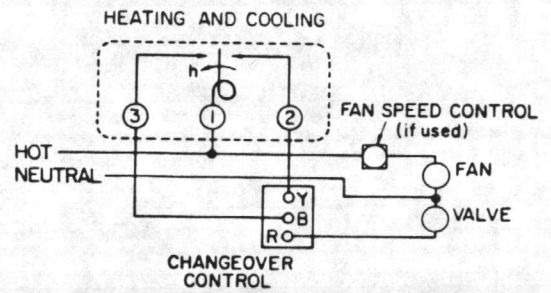
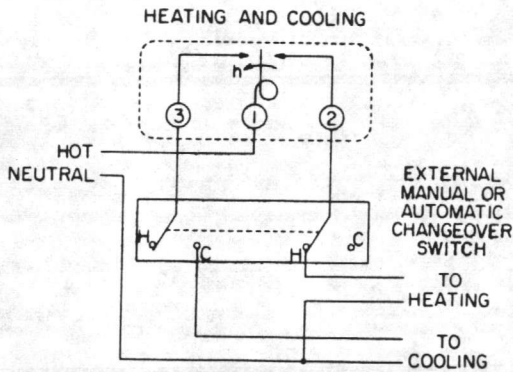
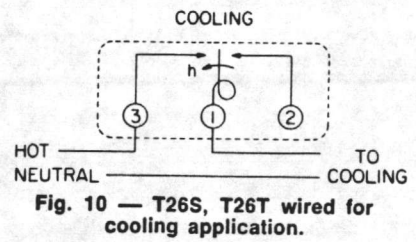
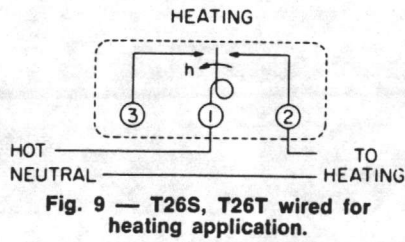
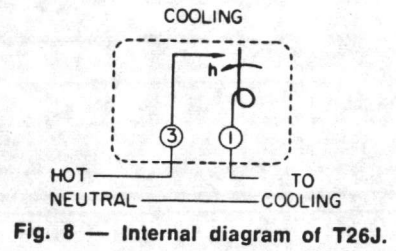
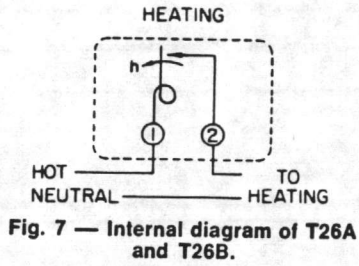
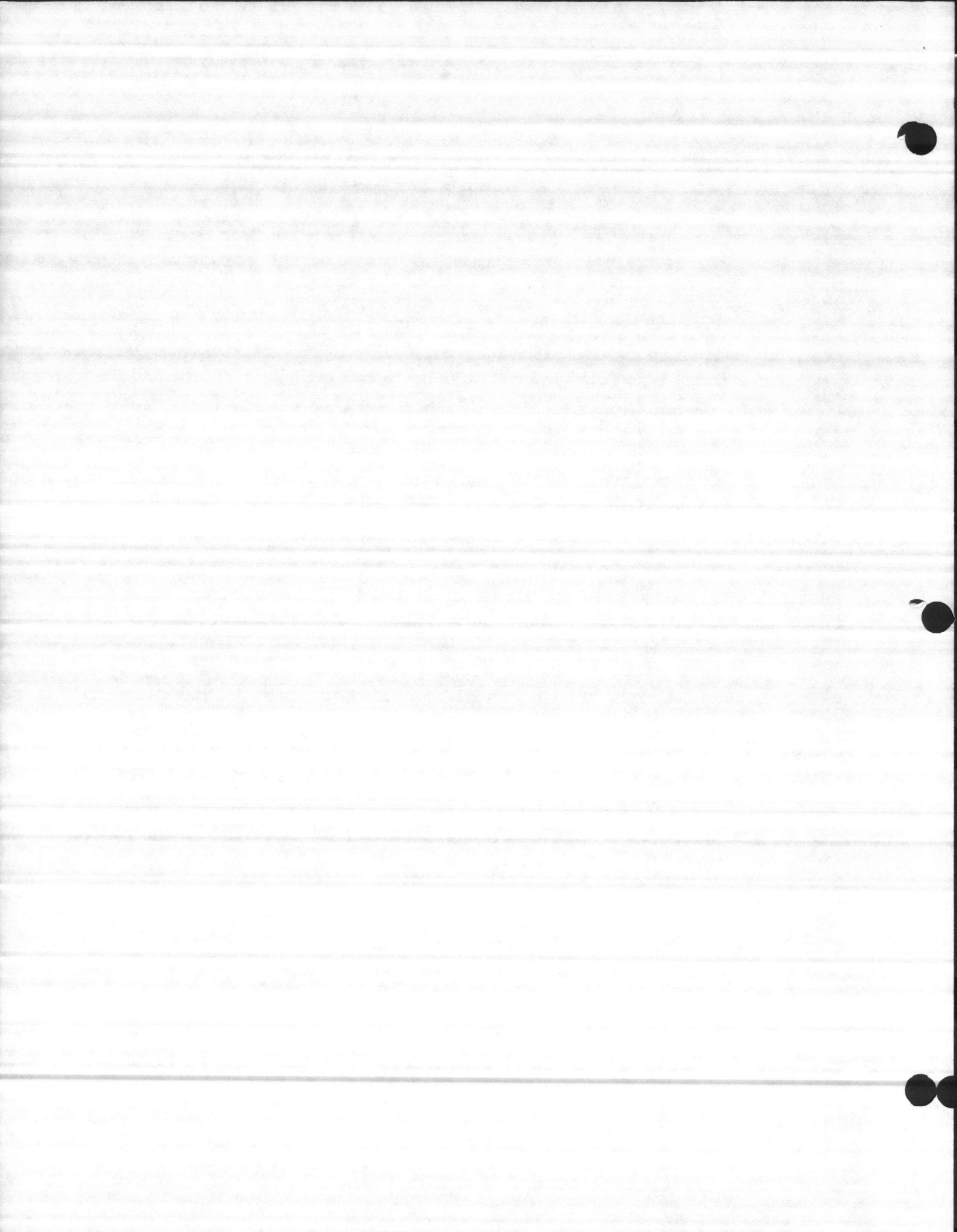


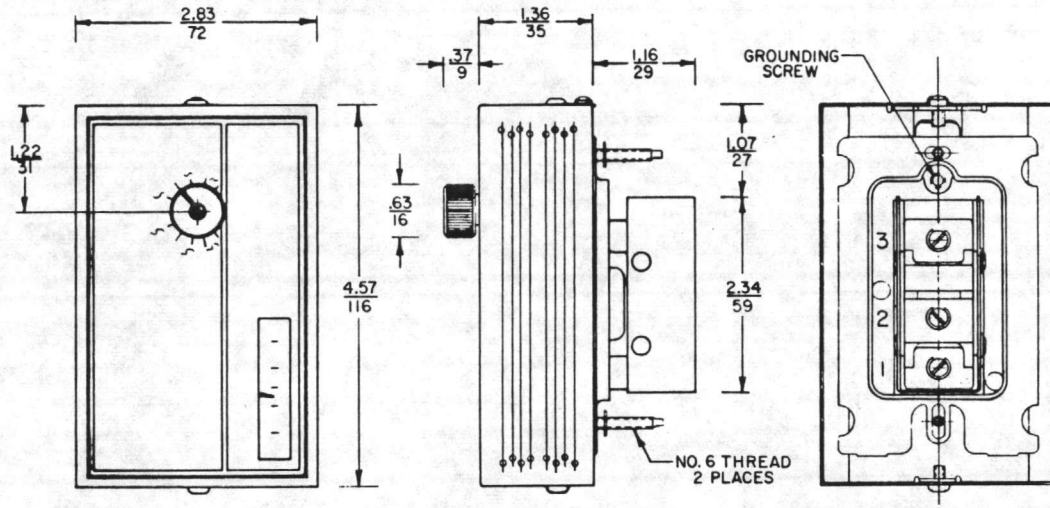
Fig. 6 — Line drawing illustrating method of mounting a vertical thermostat to outlet box. Also shown is a solid vertical faceplate for concealed adjustment when desired.



Typical Application Diagrams

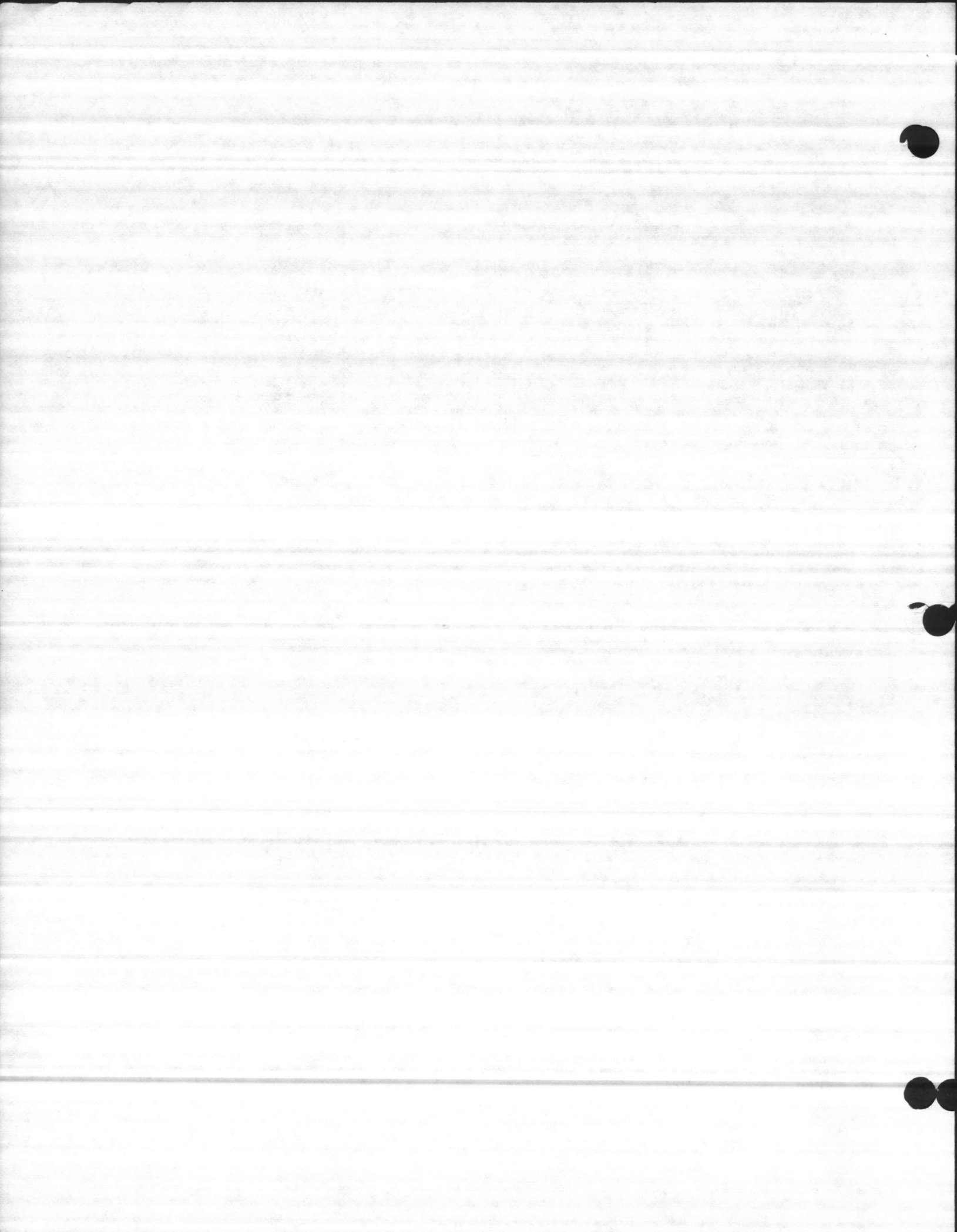






T26 Dimensions $\frac{\text{in}}{\text{mm}}$

Performance specifications appearing herein are nominal and are subject to accepted manufacturing tolerances and application variables.



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DESCRIPTION:

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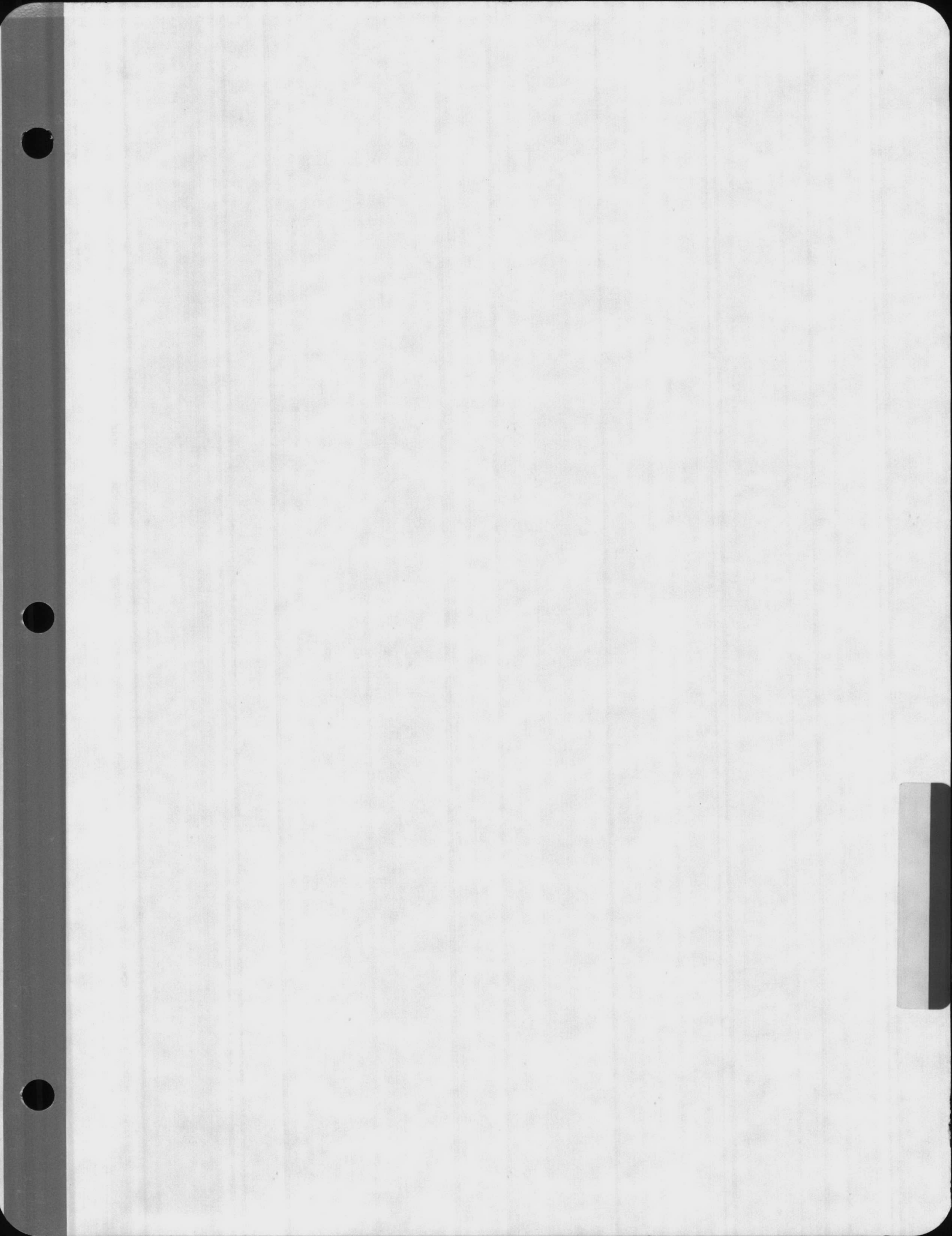


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SERIES 1031, 1032 and 1034 INVERTED BUCKET STEAM TRAPS INSTALLATION AND OPERATING INSTRUCTIONS

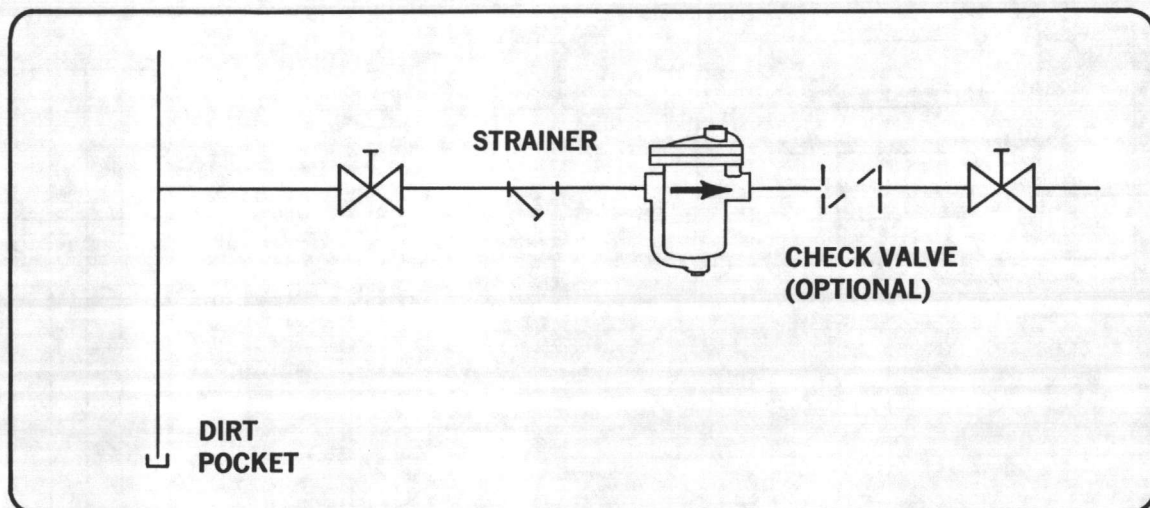
Before installing the Watson McDaniel Series 1031, 1032 or 1034 Inverted Bucket Steam Trap, blow down the piping that leads to the trap's inlet. Use full line pressure. Be sure that the maximum operating pressure (MOP) of the trap is adequate for the installation. The MOP is stamped on the casting.

Install the trap with the inlet below the liquid level of the equipment to be drained. The recommended hookup method is shown below. Make inlet piping as short as possible with a minimum of elbows and other restrictions. Install a dirt pocket in the line ahead of the trap.

To allow maintenance and provide maximum service, install a valve on each side of the trap and a strainer ahead of the inlet. All valves should be of the full ported type to avoid restricting flow.

If the discharge piping is to be elevated, be sure that the differential pressure is adequate at all times to provide proper drainage. Install a check valve (optional) in the discharge piping near the trap to prevent backflow when the system is not in operation.

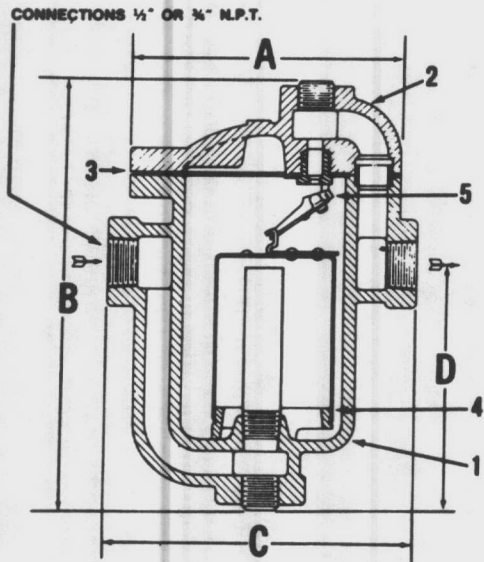
The Watson McDaniel Series 1031, 1032 or 1034 Inverted Bucket Steam Traps are automatically primed by the initial flood of condensate on start-up. When installed they are ready for operation.



WARRANTY

Each Watson McDaniel Company Product is warranted against defects in material and workmanship for one year from date of shipment. This warranty extends to the first retail purchaser only. All defective material must be returned to the person from whom you purchased the Product, transportation prepaid, free of any liens or encumbrances, and if found to be defective will be repaired free of charge or replaced at the warrantor's or seller's option. If the material is replaced, an adjustment will be made for depreciation caused by purchaser use, and the purchaser will be invoiced accordingly. In no event will Watson McDaniel Company be liable to do more than refund the original contract price.

Except for the foregoing warranty, Watson McDaniel makes no express or implied warranty including any implied warranty of merchantability or fitness for a particular purpose. Incidental and consequential damages are excluded, whether under this warranty or otherwise.



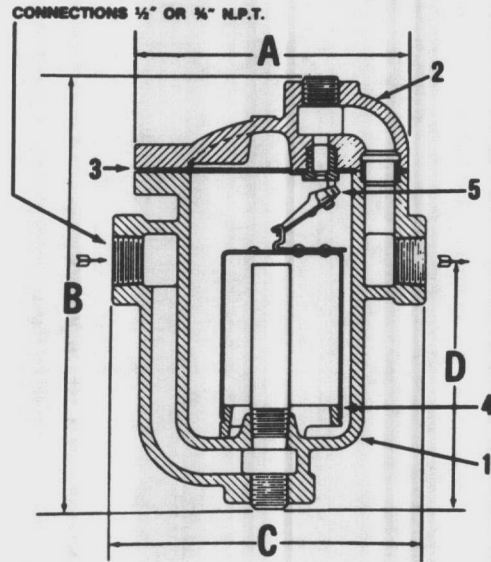
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- *1-BODY and GASKET Part No. 1-7
 - 2-COVER ASSEMBLY Part No. 2-7
 - 3-GASKET Part No. 3-7
 - 4-BUCKET and CLIP Part No. 4-6
 - **5-LEVER and SEAT ASSEMBLY Part No. 5-9.**

WATSON McDANIEL COMPANY
VALLEY FORGE DIV.
 VALLEY FORGE CORPORATE CENTER
 NORRISTOWN, PA. 19403

SERIES 1031

DRAWN A.C.
 DATE 9-1-76 **IB-1031**

*SPECIFY PIPE CONNECTIONS WHEN ORDERING
 **SPECIFY MAXIMUM OPERATING PRESSURE WHEN ORDERING



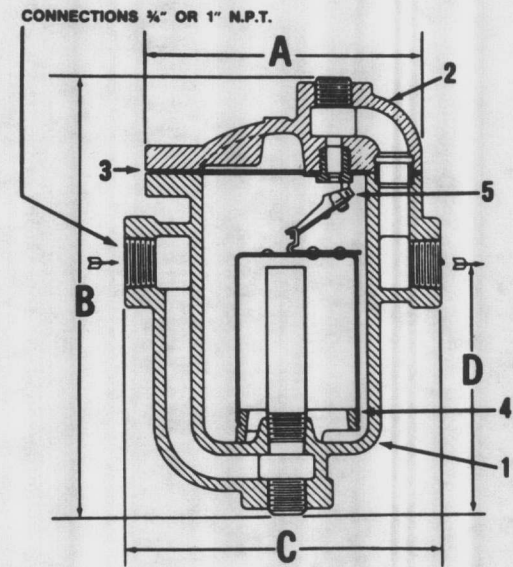
- REPAIR PARTS CONSIST OF:**
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 - 2-COVER ASSEMBLY Part No. 2-8
 - 3-GASKET Part No. 3-7
 - 4-BUCKET and CLIP Part No. 4-7
 - **5-LEVER and SEAT ASSEMBLY Part No. 5-10.**

WATSON McDANIEL COMPANY
VALLEY FORGE DIV.
 VALLEY FORGE CORPORATE CENTER
 NORRISTOWN, PA. 19403

SERIES 1032

DRAWN A.C.
 DATE 9-1-76 **IB-1032**

*SPECIFY PIPE CONNECTIONS WHEN ORDERING
 **SPECIFY MAXIMUM OPERATING PRESSURE WHEN ORDERING



- REPAIR PARTS CONSIST OF:**
- *1-BODY and GASKET Part No. 1-9
 - 2-COVER ASSEMBLY Part No. 2-8
 - 3-GASKET Part No. 3-8
 - 4-BUCKET and CLIP Part No. 4-8
 - **5-LEVER and SEAT ASSEMBLY Part No. 5-11**

WATSON McDANIEL COMPANY
VALLEY FORGE DIV.
 VALLEY FORGE CORPORATE CENTER
 NORRISTOWN, PA. 19403

SERIES 1034

DRAWN A.C.
 DATE 9-1-76 **IB-1034**

*SPECIFY PIPE CONNECTIONS WHEN ORDERING
 **SPECIFY MAXIMUM OPERATING PRESSURE WHEN ORDERING

SIZE AND DIMENSIONS					
SIZE	A	B	C	D	E

CERTIFIED THAT DIMENSIONS ARE CORRECT _____

JOB: _____

ENGINEER: _____

CONTRACTOR: _____

SUBMITTED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____

WATSON McDANIEL COMPANY • AREA CODE 215-666-5711
 975 MADISON AVE., VALLEY FORGE CORPORATE CENTER • NORRISTOWN, PA. 19403

INSTALLATION AND OPERATING INSTRUCTIONS

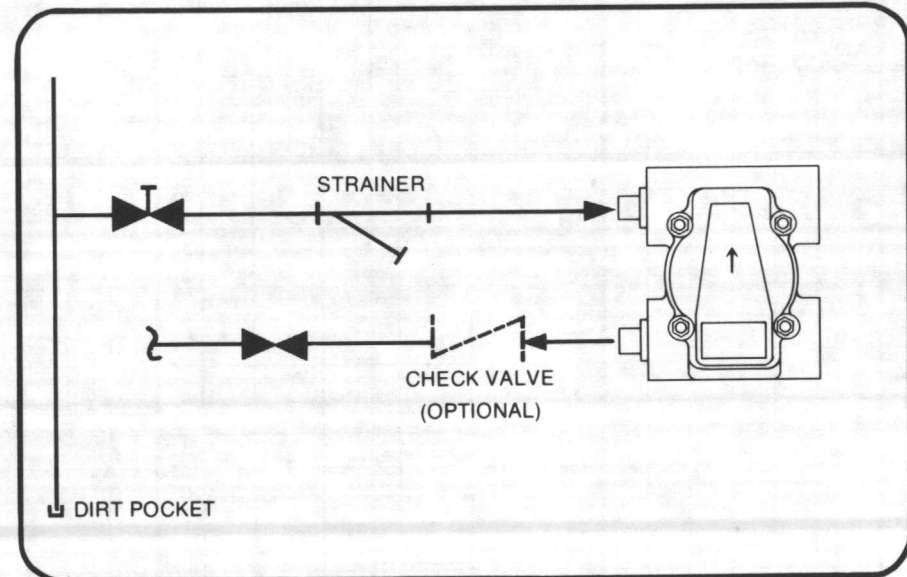
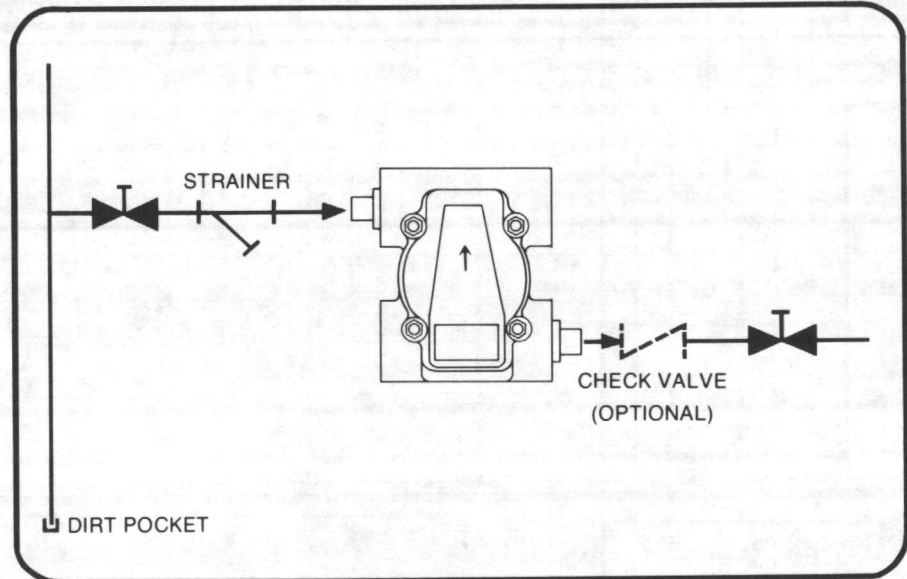
Before installing the Watson McDaniel Series FT Float And Thermostatic Steam Trap, blow down the piping that leads to the trap's inlet. Use full line pressure. Be sure that the maximum operating pressure (MOP) of the trap is adequate for the installation. The MOP is stamped on the casting.

Install the trap with the inlet below the liquid level of the equipment to be drained. The recommended hookup method is shown at right. Make inlet piping as short as possible with a minimum of elbows and other restrictions. Install a dirt pocket in the line ahead of the trap.

To allow maintenance and provide maximum service, install a valve on each side of the trap and a strainer ahead of the inlet. All valves should be of the full ported type to avoid restricting flow.

If the discharge piping is to be elevated, be sure that the differential pressure is adequate at all times to provide proper drainage. Install a check valve (optional) in the discharge piping near the trap to prevent backflow when the system is not in operation.

The Watson McDaniel Series FT Float And Thermostatic Steam Traps are automatically primed by the initial flood of condensate on start-up. When installed they are ready for operation.

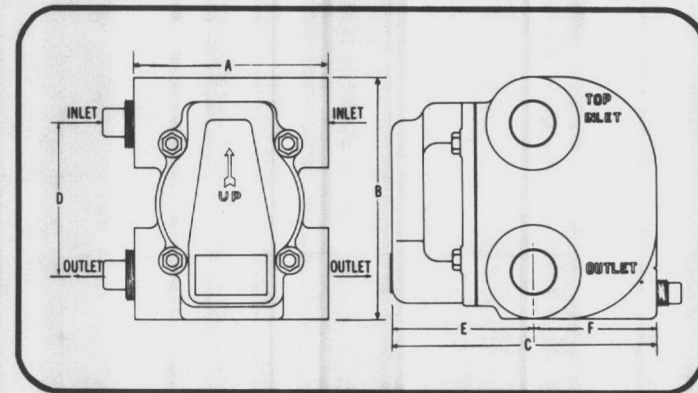
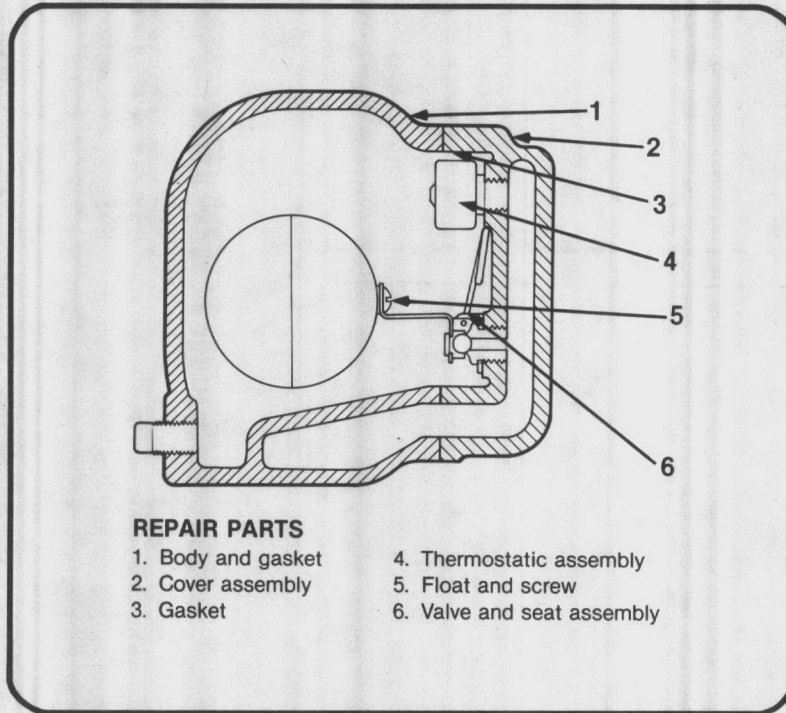


WARRANTY

Each Watson McDaniel Company Product is warranted against defects in material and workmanship for one year from date of shipment. This warranty extends to the first retail purchaser only. All defective material must be returned to the person from whom you purchased the Product, transportation prepaid, free of any liens or encumbrances, and if found to be defective will be repaired free of charge or replaced, at the warrantor's or seller's option. If the material is replaced, any replacement will be invoiced in the usual manner and after inspection of alleged defective material an adjustment will be made for depreciation caused by purchaser use. In no event will Watson McDaniel Company be liable to do more than refund the original contract price.

Incidental and consequential damages are excluded, whether under this warranty or otherwise. All implied warranties, including warranties of merchantability and fitness for a particular purpose, are disclaimed and excluded.

FLOAT and THERMOSTATIC STEAM TRAPS



DIMENSIONS AND WEIGHTS

SERIES	A	B	C	D	E	F	Shipping Weights
FT-3, FT-4, FT-33, FT-34 FT-63, FT-64, FT-123, FT-124	4 $\frac{1}{8}$	5	5 $\frac{1}{8}$	3 $\frac{1}{8}$	2 $\frac{3}{8}$	2 $\frac{3}{8}$	7 lbs. 5 oz.
FT-6, FT-35, FT-36, FT-65 FT-66, FT-125,	5	6 $\frac{1}{16}$	6 $\frac{1}{32}$	4 $\frac{1}{8}$	3 $\frac{1}{16}$	3 $\frac{1}{32}$	13 lbs. 10 oz.
FT-7	6 $\frac{1}{8}$	7 $\frac{1}{16}$	8 $\frac{1}{32}$	5 $\frac{1}{4}$	4 $\frac{1}{32}$	3 $\frac{1}{16}$	20 lbs. 12 oz.
FT-8, FT-37, FT-38 FT-67, FT-68, FT-127, FT-128	6	11	8 $\frac{1}{32}$	7 $\frac{1}{32}$	4 $\frac{1}{32}$	4 $\frac{1}{16}$	39 lbs. 12 oz.

SIZE AND DIMENSIONS						
SIZE	A	B	C	D	E	F

CERTIFIED THAT DIMENSIONS ARE CORRECT _____

JOB: _____

ENGINEER: _____

CONTRACTOR: _____

SUBMITTED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____