



**RecipPak LIQUID CHILLERS
AIR COOLED – RECIPROCATING HERMETIC**

INSTALL., OPER., MAINT.

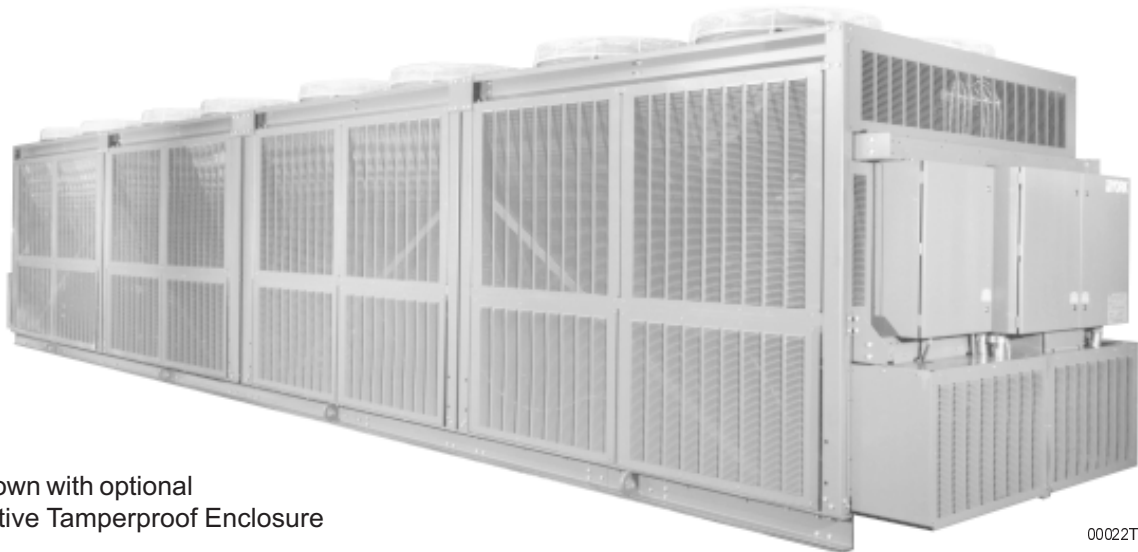
Supersedes: See Back

Form 150.75-NM2 (196)

**60 HZ MODELS
YDAJ87KU6, YDAJ88MU6, YDAJ99MW6**

**50 HZ MODELS
YDAJ87HU7, YDAJ97KU7, YDAJ98MU7,
YDAJ99MU7, YDAJ99MW9**

**STYLE A*
370 - 450 TONS**



Unit shown with optional
Decorative Tamperproof Enclosure

00022TG



200, 230, 460-3-60

*With EPROM's

031-01096-009

 &

031-01300-002

 (Standard, Brine & Metric Models, Combined)

MASTER **SLAVE**

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GENERAL INFORMATION

GENERAL DESCRIPTION

YDA packaged liquid chillers are completely self-contained outdoor units shipped ready for final job installation requiring only liquid connections, and power and control wiring. They are designed primarily for central station air conditioning applications with normal installations being on roof-tops or at ground level beside the building.

The chiller package is composed of two modules, each controlled by its own microprocessor with one module being designated as the "Master" and one module as

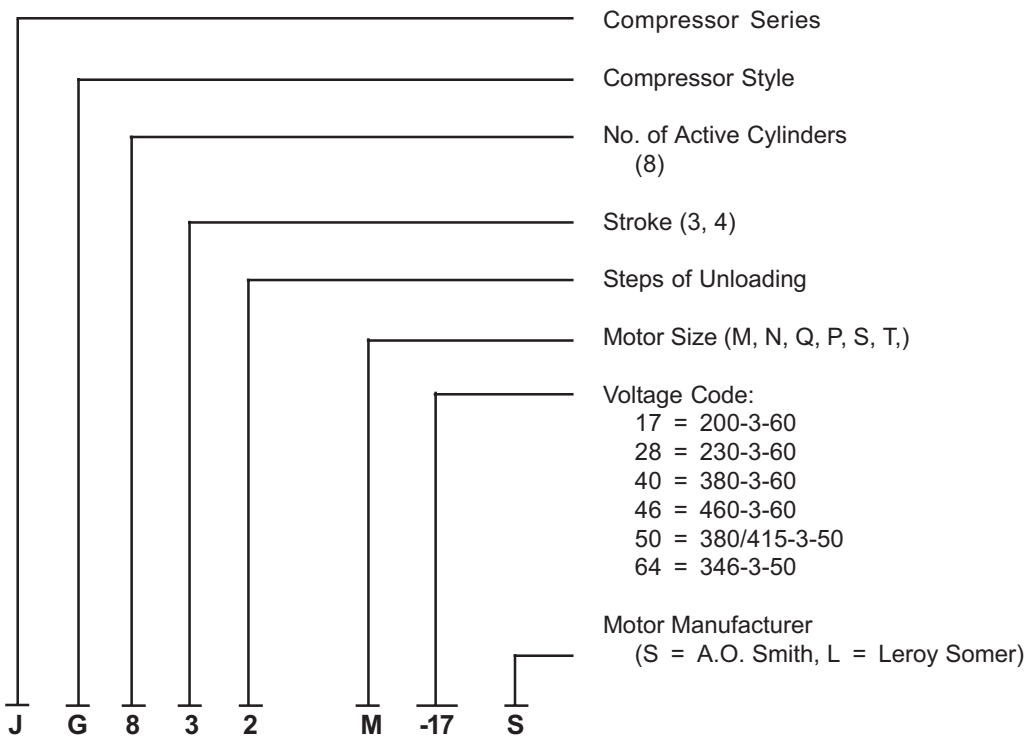
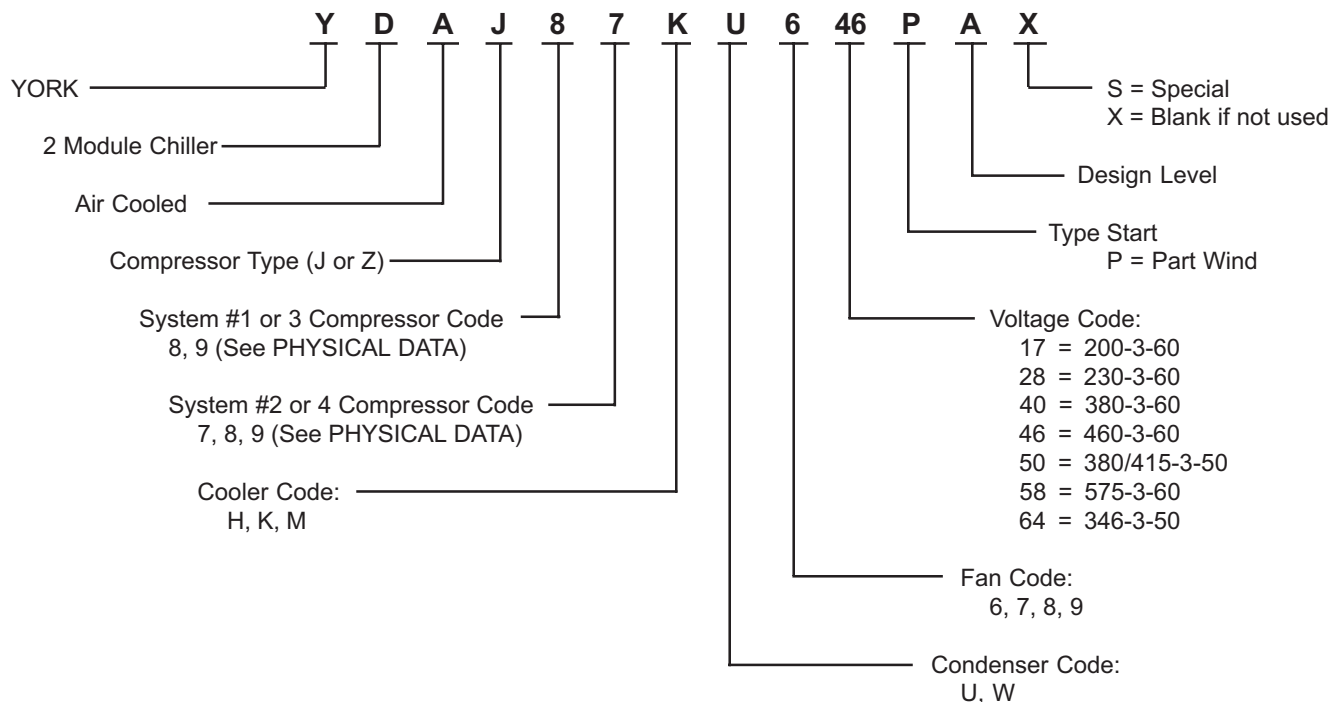
the "Slave." Each module consists of a microprocessor panel, power panel, evaporator, condenser, contactors, fans, and two compressors (each with 2 stages of loading) in separate refrigerant circuits. An RS-485 communications link between the two microprocessors permits a Master/Slave operation with a single operator control point.

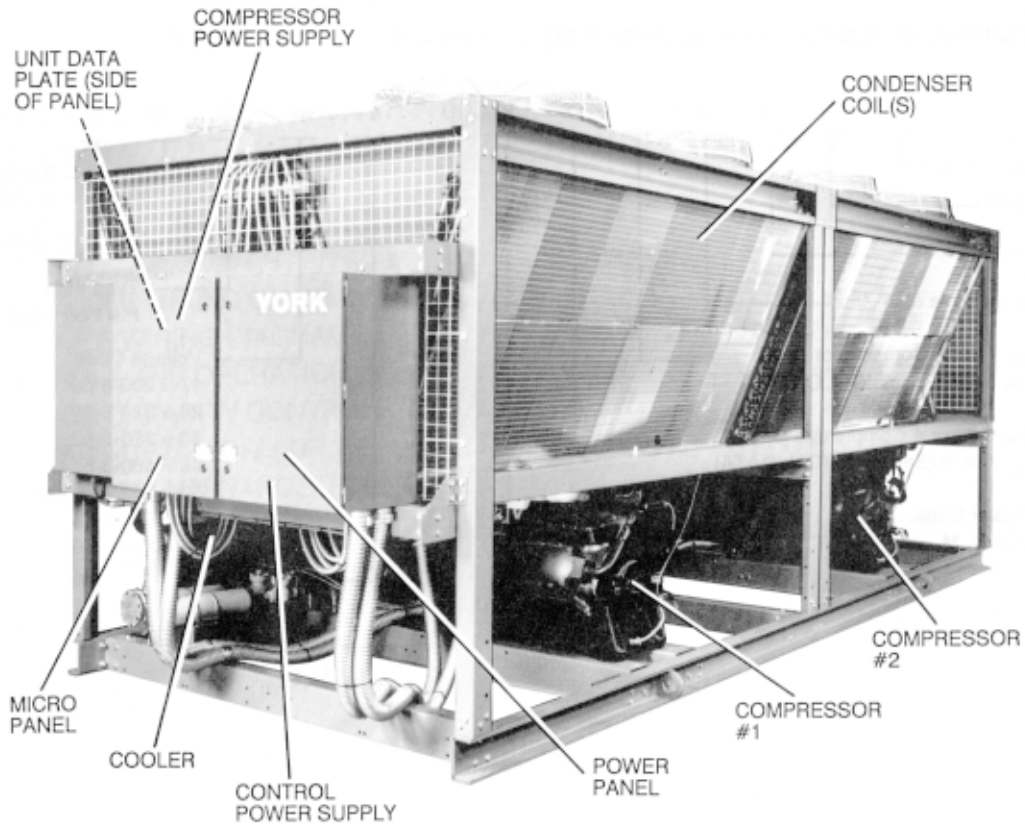
CODE STATUS

The units are designed in accordance with U.L. (200, 230, 460-3-60), N.E.C., ASHRAE/ANSI STANDARD 15, and ASME codes.

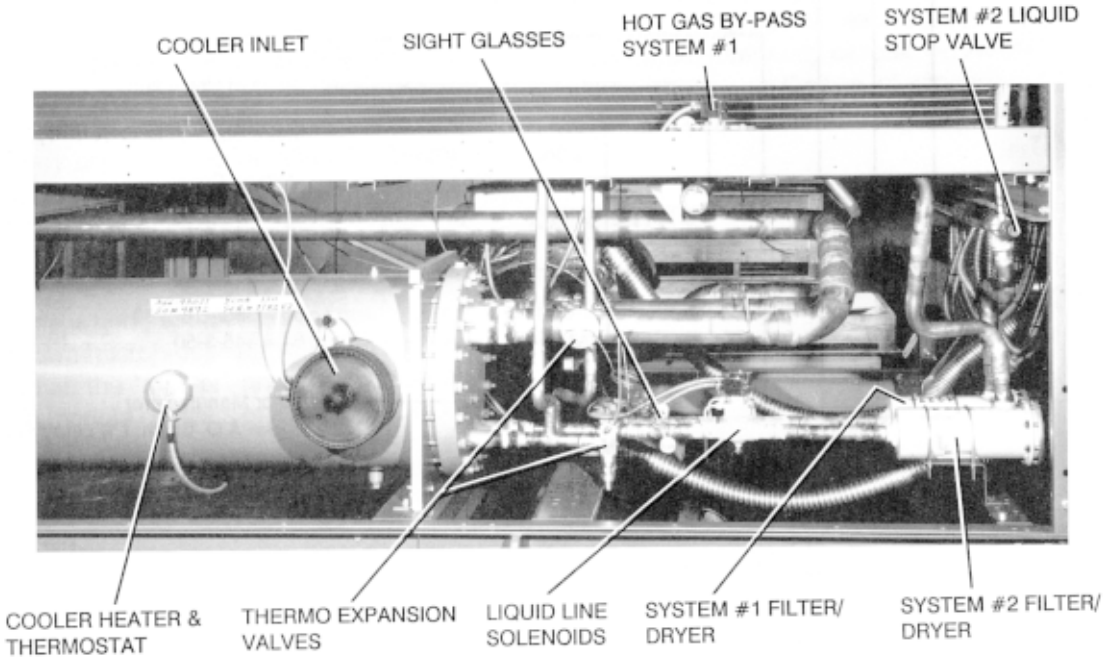
UNIT NOMENCLATURE

The model number denotes the following characteristics of the unit:



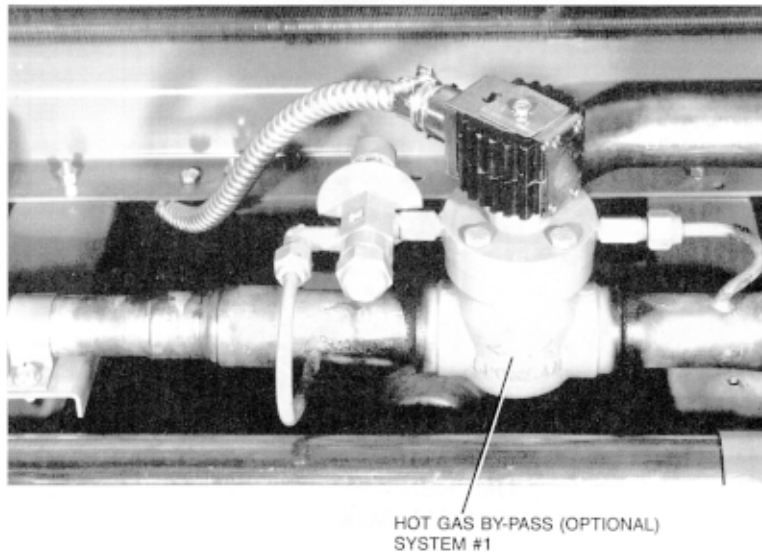


00023TG

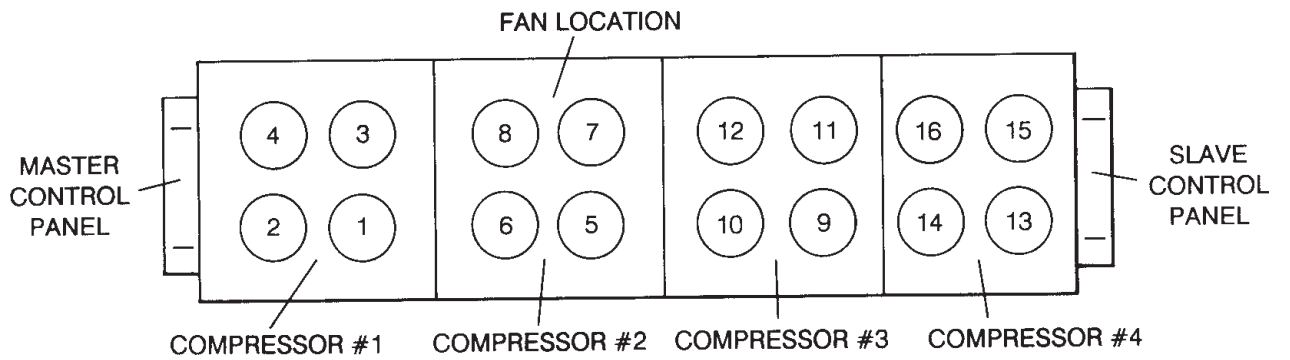


00024TG

FIG. 1 – UNIT COMPONENTS (Typical on each of the two modules)

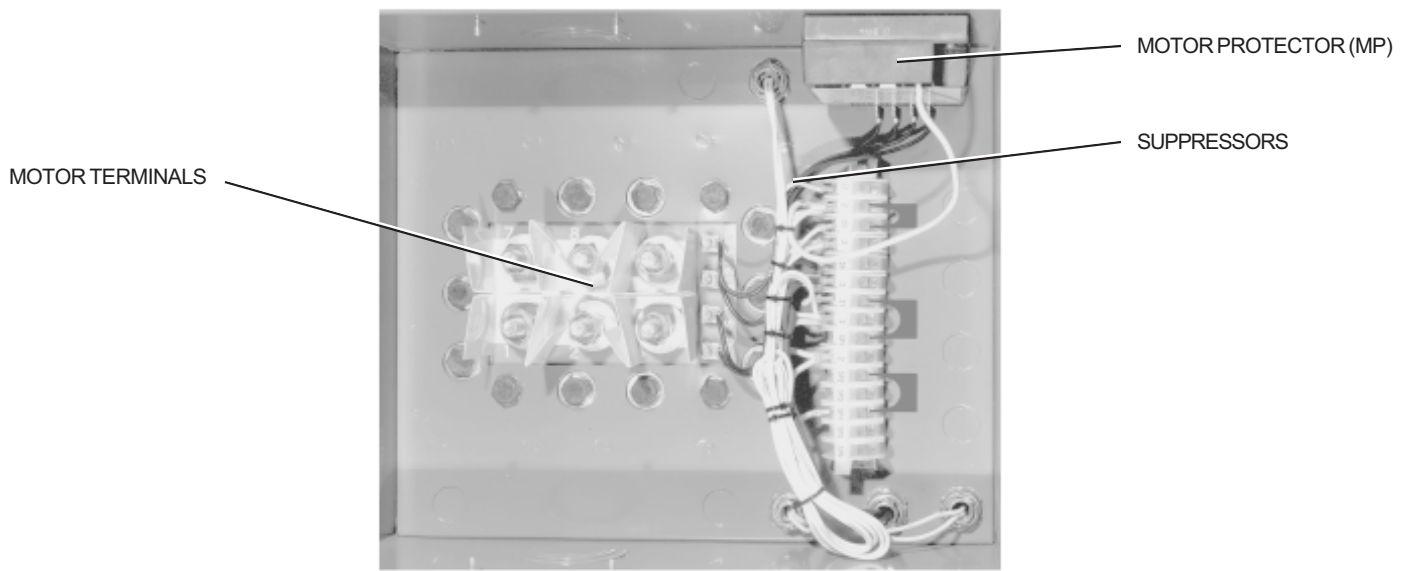


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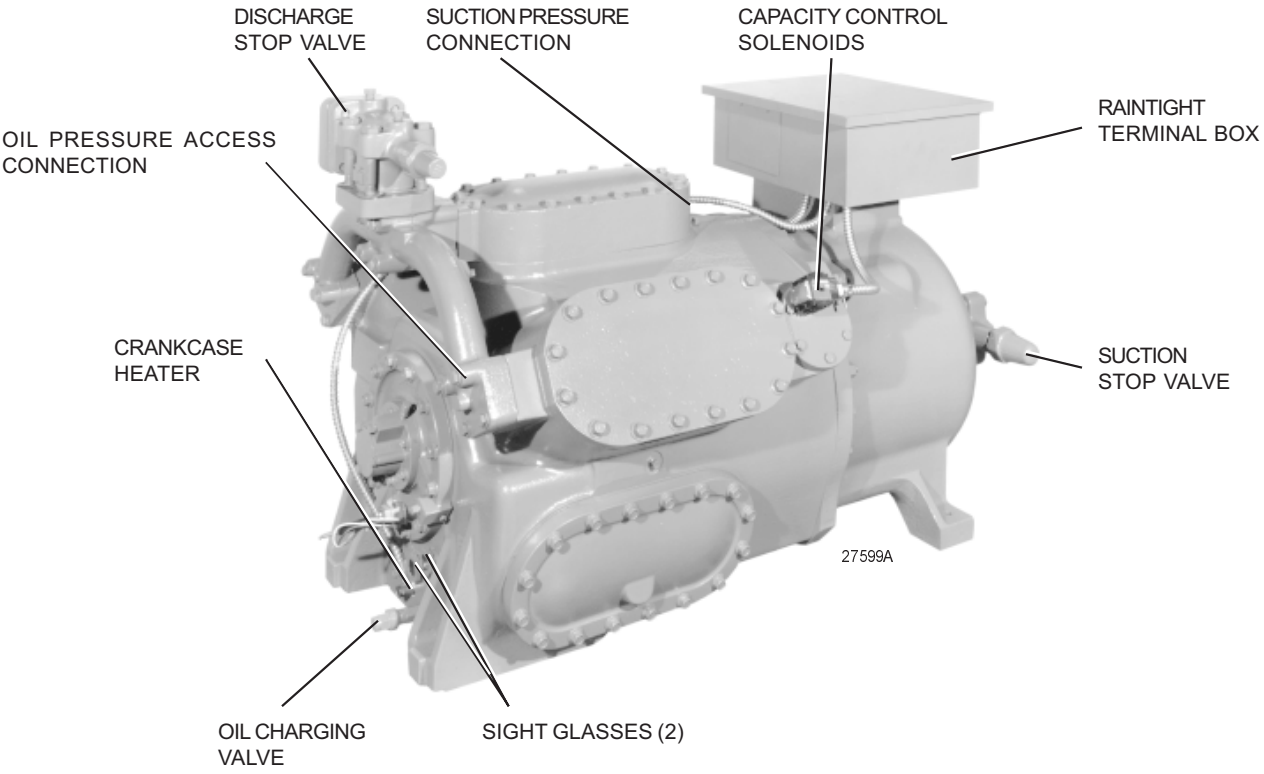
LD01910

FIG. 1 – UNIT COMPONENTS (Cont'd)



27299A

**COMPRESSOR
TERMINAL BOX**

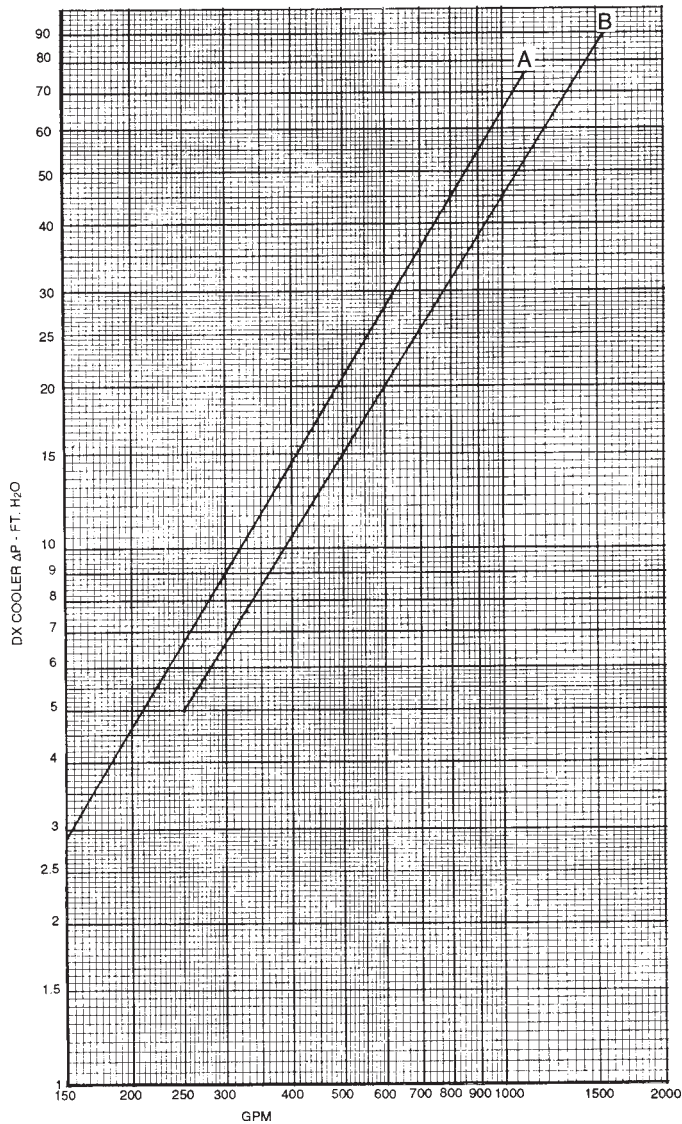


27599A

**6 CYLINDER
MODEL J "G" COMPRESSOR**

FIG. 2 – COMPRESSOR COMPONENTS

OPERATIONAL LIMITATIONS



LD01911

CODE	MODEL
A	YDAJ87HU7, 87KU6, 97KU7
B	YDAJ88MU8, 98MU7, 99MU7, 99MW6, 99MW9

VOLTAGE LIMITATIONS

The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.

VOLTAGES

UNIT POWER	MIN.	MAX.
200-3-60	180	220
230-3-60	207	253
380-3-60	355	415
460-3-60	414	506
380/415-3-50	342	440
346-3-50	311	381
575-3-60	517	633

TEMPERATURES AND FLOWS

MODEL YDA	LVG. WATER TEMP. °F		COOLER GPM		AIR ON COND. - °F	
	Min. ¹	Max.	Min.	Max.	Min. ²	Max. ³
J87HU7	40	50	300	1280	0	130
J87KU6 J97KU7	40	50	400	1444	0	130
J88MU6 J98MU7	40	50	500	1606	0	130
J99MW6 J99MU7	40	50	500	1606	0	130
J99MW9	40	50	500	1606	0	130

NOTES:

1. Units can be used for brine temperatures down to 20°F by resetting standard control.
2. Operation below 25°F requires the Optional Low Ambient kit.
3. Operation above 115°F requires Optional High Ambient kit.
4. The evaporator is protected against freeze-up to -20°F with an electrical heater cable as standard.

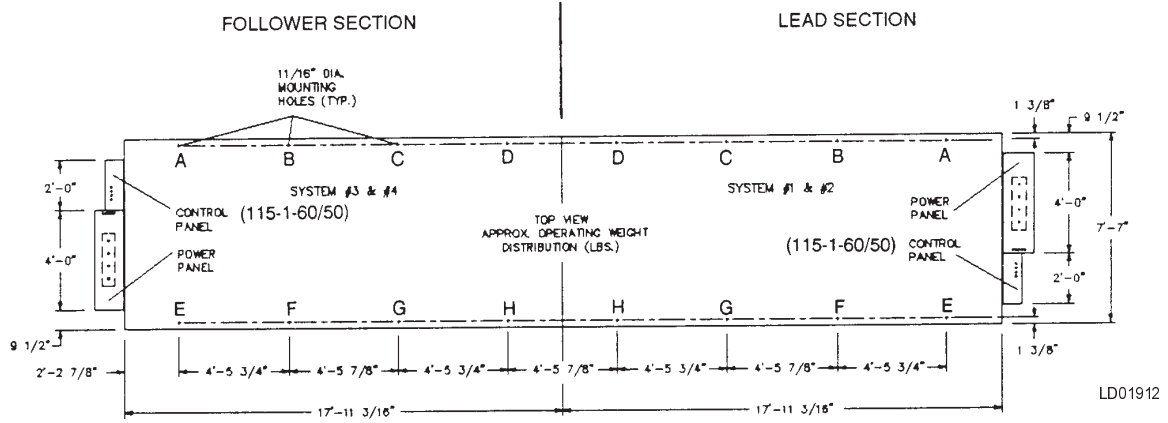
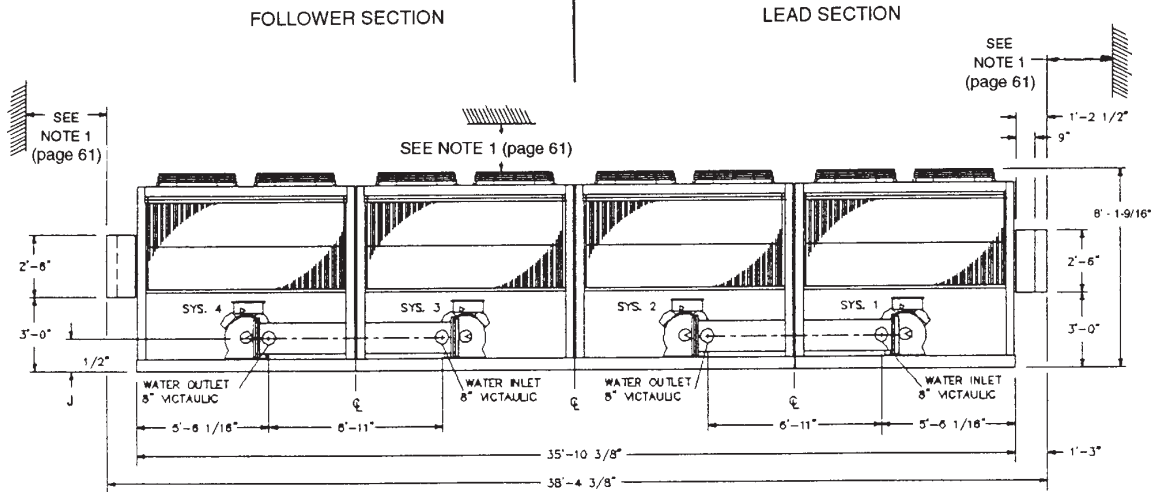
CAUTION: Excessive flow will cause damage to the cooler. Do not exceed max. cooler GPM. Special care should be taken when multiple chillers are fed by a single pump.

FIG. 3 – COOLER WATER PRESSURE DROP

PHYSICAL DATA

MODEL YDA		60 HZ 50 HZ	— J87HU7	J87KU6 J97KU7	J88MU6 J88MU7	J99MW6 J99MU7	— J99MW9	
NOMINAL TONS	60 HZ		—	370.9	398.8	462.1	—	
	50 HZ		331.5	358.3	389.6	413.0	438.0	
NO. OF REFRIG. CIRCUITS			4	4	4	4	4	
COMPRESSOR MODEL	60 HZ	Sys. 1 & 3	—	JG83-S	JG83-S	JG84-V	—	
		Sys. 2 & 4	—	JG64-S	JG83-S	JG84-V	—	
	50 HZ	Sys. 1 & 3	JG83-S	JG84-T	JG84-T	JG84-T	JG84-T	
		Sys. 2 & 4	JG64-S	JG64-S	JG83-S	JF84-T	JG84-T	
UNIT CAPACITY	STANDARD	60 HZ	—	10 Steps	10 Steps	10 Steps	—	
		50 HZ	8 Steps	8 Steps	10 Steps	10 Steps	10 Steps	
CONTROL	OPTIONAL	60 HZ	—	19 Steps	19 Steps	19 Steps	—	
		50 HZ	16 Steps	11 Steps	19 Steps	19 Steps	19 Steps	
CONDENSER – DWP 450 PSIG								
NO. OF FANS (36" Dia. Direct Drive)			16	16	16	16	16	
HP/KW Each (1140 RPM)	60 HZ		3/2.4	3/2.4	3/2.4	3/2.4	—	
	(950 RPM) 50 HZ		3/2.2	3/2.2	3/2.2	3/2.2	3/2.2	
CFM Total	60 HZ		—	248,000	248,000	248,000	—	
	50 HZ		238,400	238,400	238,400	238,400	238,400	
COOLER – DUAL CIRCUITED								
DWP – 235 PSIG REF. SIDE, 150 PSIG WATER SIDE								
DIA. x LENGTH			(2) 16" x 8'	(2) 18" x 8'	(2) 20" x 8'	(2) 20" x 8'	(2) 20" x 8'	
WATER VOLUME (EA)			48	59	69	69	69	
GPM	Min.		240	240	300	400	400	
	Max.		1160	1160	1280	1400	1400	
WEIGHT (LBS.)	SHIPPING	60 HZ	CU / AL	—	33,000	33,850	35,550	—
			CU / CU	—	37,900	38,750	41,800	—
		50 HZ	CU / AL	33,000	33,850	33,850	35,550	36,650
			CU / CU	37,900	38,750	38,750	41,800	37,250
	OPERATING	60 HZ	CU / AL	—	33,500	34,450	36,150	—
			CU / CU	—	38,400	39,350	42,400	—
		50 HZ	CU / AL	33,400	34,350	34,450	36,150	42,900
			CU / CU	38,300	39,250	39,350	42,400	43,500
REFRIG. CHARGE (LBS. R-22)	Sys. 1 & 3		124	139	139	145	145	
	Sys. 2 & 4		132	140	156	162	162	

DIMENSIONS



WEIGHT DISTRIBUTION (LB.)									DIM.
MODEL YDA	A	B	C	D	E	F	G	H	J
J87HU7	1953	1992	2010	2285	1947	2129	2147	2228	1'-6"
J87KU6	1954	1995	2013	2287	1956	2141	2159	2236	1'-5"
J97KU7	1971	2018	2034	2312	2023	2235	2251	2317	1'-6"
J88MU6, J98MU7	1973	2020	2036	2314	2030	2245	2261	2324	1'-6-1/2"
J99MW6, J99MU7	2094	2141	2157	2440	2113	2328	2370	2418	1'-6-1/2"
J99MW9	2162	2209	2225	2508	2181	2397	2439	2486	1'-6-1/2"

CAUTION
 FAILURE TO HEED FOLLOWING RECOMMENDED CLEARANCES MAY RESULT IN REDUCED SYSTEM PERFORMANCE, NUISANCE SHUTDOWNS, AND SERVICE PROBLEMS.

NOTES:

1. Clearances – Minimum YORK required clearances to prevent condenser air recirculation and faulty operation of units are as follows:
 Side to wall 8'-0"* Rear to wall 8'-0"* Control Panel End to wall 5'-0"* Top 50'-0" Distance between adjacent units 12'-0"
- * No more than one wall can be higher than the top of the unit. The aread within the claearnaces shown above and area under the unit must be kept clear of all obstructions that would impede free air flow to the unit. In installations where winter operation is intended and snow accumilations are expected, additional unit height must be provided to insure full air flow.
2. Cooler liquid connection sizes (inlet and outlet) 8" victaulic for the YDAJ87KU6 – YDAJ99MW9.
3. Dimensions are in inches. Drawings are not to scale and are for planning purposes only. Contact nearest YORK office for detail drawings.
4. Modeules have 1-1/8" of space between to facilitate maintenance.
5. Spring isolators (OPTIONAL) will increase overall height of unit by approx. 6". Refer to FORM 150.40-ES3 for details.
6. Be sure to review WARNINGS on page 2 prior to installation.

ELECTRICAL DATA

MODEL YDA	VOLT-AGE CODE	SYSTEM 1 OR 3 WIRING						SYSTEM 2 OR 4 WIRING					
		MCA ¹	DUAL ELEMENT FUSE SIZE		NON-FUSED DISC SW MIN SIZE ⁴	MAX SIZE CKT BKR HACR TYPE ⁵	INCOMING WIRE RANGE (CU ONLY) ⁶	MCA ¹	DUAL ELEMENT FUSE SIZE		NON-FUSED DISC SW MIN SIZE ⁴	MAX SIZE CKT BKR HACR TYPE ⁵	INCOMING WIRE RANGE (CU ONLY) ⁶
			MIN ²	MAX ³					MIN ²	MAX ³			
J87HU7	-50	237	250	400	400	400	(1-2) #4-250MCM	212	200	350	200	350	(1-2) #4-250MCM
J87HU7	-64	257	350	400	400	400	(1-2) #4-250MCM	230	300	350	400	350	(1-2) #4-250MCM
J87KU6	-17	544	700	600	600	800	(1-2) 1/0-500MCM	481	600	800	600	800	(1-2) 1/0-500MCM
J87KU6	-28	486	600	600	600	800	(1-2) 1/0-500MCM	431	600	700	600	700	(1-2) 1/0-500MCM
J87KU6	-40	286	350	400	400	450	(1-2) #4-250MCM	253	300	400	400	400	(1-2) #4-250MCM
J87KU6	-46	239	300	400	400	400	(1-2) #4-250MCM	212	200	350	200	350	(1-2) #4-250MCM
J97KU7	-50	272	350	400	400	450	(1-2) #4-250MCM	212	200	350	200	350	(1-2) #4-250MCM
J87KU6	-58	195	200	200	200	300	(1-2) #4-250MCM	173	200	250	200	250	(1-2) #4-250MCM
J97KU7	-64	295	350	400	400	500	(1-2) #4-250MCM	230	300	350	400	350	(1-2) #4-250MCM
J88MU6	-17	544	700	600	600	800	(1-2) 1/0-500MCM	544	700	800	600	800	(1-2) 1/0-500MCM
J88MU6	-28	486	600	600	600	800	(1-2) 1/0-500MCM	486	600	800	600	800	(1-2) 1/0-500MCM
J88MU6	-40	286	350	400	400	450	(1-2) #4-250MCM	286	350	450	400	450	(1-2) #4-250MCM
J88MU6	-46	239	300	400	400	400	(1-2) #4-250MCM	239	300	400	400	400	(1-2) #4-250MCM
J98MU7	-50	272	350	400	400	450	(1-2) #4-250MCM	237	300	400	400	400	(1-2) #4-250MCM
J88MU6	-58	195	200	200	200	300	(1-2) #4-250MCM	195	200	300	200	300	(1-2) #4-250MCM
J98MU7	-64	295	350	400	400	500	(1-2) #4-250MCM	257	350	400	400	400	(1-2) #4-250MCM
J99MU7	-50	272	350	400	400	450	(1-2) #4-250MCM	272	350	450	400	450	(1-2) #4-250MCM
J99MU7	-64	295	350	400	400	500	(1-2) #4-250MCM	295	350	500	400	500	(1-2) #4-250MCM
J99MW6	-40	339	450	400	400	600	(1-2) 1/0-500MCM	366	450	500	400	600	(1-2) 1/0-500MCM
J99MW6	-46	283	350	400	400	450	(1-2) #4-250MCM	284	350	450	400	450	(1-2) #4-250MCM
J99MW6	-58	230	300	400	400	350	(1-2) #4-250MCM	230	300	350	400	350	(1-2) #4-250MCM
J99MW9	-50	287	350	450	400	400	(1-2) #4-250MCM	287	350	400	400	450	(1-2) #4-250MCM
J99MW9	-64	309	400	500	400	400	(1-2) #4-250MCM	309	400	500	400	500	(1-2) #4-250MCM

MODEL YDA	VOLT-AGE CODE	MCA ¹	DUAL ELEMENT FUSE SIZE		NON-FUSED DISC SW MIN SIZE ⁴	MAX SIZE CKT BKR HACR TYPE ⁵	MCA ¹	
			MIN ²	MAX ³			DUAL POINT (CU ONLY) ⁶	YORK SUPPLIED DISCONNECT (CU ONLY) ^{6,8}
J87HU7	-50	410	500	500	600	500	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J87HU7	-64	446	500	600	600	600	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J87KU6	-17	936	1200	1200	1000	1200	(1-3) #6-350MCM	(1-4) #1/0-350MCM
J87KU6	-28	840	1000	1000	1000	1000	(1-3) #6-350MCM	(1-4) #1/0-350MCM
J87KU6	-40	492	600	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J87KU6	-46	412	500	500	600	500	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J97KU7	-50	445	500	600	600	600	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J87KU6	-58	337	400	450	400	450	(1-3) #6-350MCM	(1) #1-600MCM OR (2) #1-250MCM
J97KU7	-64	483	600	600	600	600	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J88MU6	-17	987	1200	1200	1200	1200	(1-3) #6-350MCM	N/A
J88MU6	-28	884	1000	1200	1000	1200	(1-3) #6-350MCM	(1-4) #1/0-350MCM
J88MU6	-40	519	600	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J88MU6	-46	434	500	600	600	600	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J98MU7	-50	465	600	600	600	600	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J88MU6	-58	355	400	450	400	450	(1-3) #6-350MCM	(1) #1-600MCM OR (2) #1-250MCM
J98MU7	-64	505	600	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J99MU7	-50	493	600	600	600	600	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J99MU7	-64	535	600	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J99MW6	-40	614	700	800	800	800	(1-3) #6-350MCM	(1-2) 500-750MCM
J99MW6	-46	513	600	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J99MW6	-58	418	500	500	600	500	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J99MW9	-50	524	600	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM
J99MW9	-64	562	700	700	600	700	(1-3) #6-350MCM	(1-2) #4/0-500MCM

MODEL YDA	VOLTAGE CODE	SYSTEM 1 OR 3 LOAD RATINGS			SYSTEM 2 OR 4 LOAD RATINGS		
		CPR LRA ⁹	CPR RLA	FAN RLA EA	CPR LRA ⁹	CPR RLA	FAN RLA EA
J87HU7	-50	585	170	5.9	585	150	5.9
J87HU7	-64	668	187	5.8	668	165	5.8
J87KU6	-17	1322	403	10	1322	352	10
J87KU6	-28	1150	350	12	1150	306	12
J87KU6	-40	696	212	5.2	696	185	5.2
J87KU6	-46	575	175	5	575	153	5
J97KU7	-50	760	195	5.9	585	150	5.9
J87KU6	-58	460	140	4.9	460	122	4.9
J97KU7	-64	917	214	5.8	668	165	5.8
J88MU6	-17	1322	403	10	1322	403	10
J88MU6	-28	1150	350	12	1150	350	12
J88MU6	-40	696	212	5.2	696	212	5.2
J88MU6	-46	575	175	5	575	175	5
J98MU7	-50	760	198	5.9	585	170	5.9
J88MU6	-58	460	140	4.9	460	140	4.9
J98MU7	-64	917	217	5.8	668	187	5.8
J99MU7	-50	760	198	5.9	760	198	5.9
J99MU7	-64	917	217	5.8	917	217	5.8
J99MW6	-40	997	254	5.2	997	254	12
J99MW6	-46	830	210	5	830	210	5.2
J99MW6	-58	664	168	4.9	664	168	4.9
J99MW9	-50	760	198	9.7	760	198	9.7
J99MW9	-64	917	217	9.2	917	217	9.2

LEGEND:

- VOLT = Voltage
- MCA = Minimum Circuit Ampacity
- DISC = Disconnect
- N/A = Not Available
- CPR-RLA = Compressor Running Load Amps
- CRP-LRA = Compressor Part Winding Inrush Amps
- FLA = Full Load Amps
- CKT BRK = Circuit Breaker
- HACR = Heating, Air Conditioning and Refrigeration

VOLTAGE CODE

- 17 = 200-3-60 Hz
- 28 = 230-3-60 Hz
- 40 = 380-3-60 Hz
- 46 = 460-3-60 Hz
- 50 = 380/415-3-50 Hz
- 58 = 575-3-60 Hz
- 64 = 346-3-50 Hz

CONTROL POWER SUPPLY

UNIT VOLTAGE	CONTROL POWER SUPPLY	MIN CIRCUIT AMPACITY	MAX DUAL ELEMENT FUSE SIZE	NON-FUSED DISC. SW. SIZE
Std. Models w/o Transformers	115-1-50/60	20A	20A, 250V	30A, 240V

NOTES:

- Minimum Circuit Ampacity (MCA) is based on 125% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 430-24. If Factory Mounted Control Transformer is provided, add the following to the system MCA values in the Tables: -17, add 10 amps; -28, add 9 amps; -40, add 6 amps; -46, add 5 amps; -58, add 4 amps.
- Minimum fuse size is based on 150% of the rated load amps for the; largest motor plus 100% of the rated load amps for all other loads included in the circuit, per U.L. Standard 1995, Section 1995, Section 36.1. It is not recommended in all applications where brown outs, frequent starting and stopping of the unit and/or operation at ambient temperatures in excess of 95°F is anticipated.
- Maximum fuse size is based on 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-12A1.
- The recommended disconnect switch is based on 115% of the rated load amps for all the loads included in the circuit, per U.L. 1995, Fig. 36.2.
- HACR-Type circuit breakers are UL-listed circuit breakers that have been found suitable for use with heating, air conditioning and refrigeration equipment comprising multimotor or combination loads and are marked "Listed HACR-Type", refer to N.E.C. Article 440-21. Maximum HACR circuit breaker rating is based on 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per UL 1995, Fig. 36.2. Canadian and international models may not require HACR-Type circuit breakers.
- The "INCOMING WIRE RANGE" is the minimum and maximum wire size that can be accommodated by unit wiring lugs. The (1), (2), (3) or (4) preceding the wire range indicates the number of termination points available per phase of the wire range specified. The (1-2), (1-3), or (1-4) preceding the wire range indicates that a single multi-termination lug is available per phase that can accept from two (1-2) to four (1-4) wires of the wire range specified. "(1) #1-600MCM or (2) #1-250MCM" indicates that a single lug is supplied and it will accept a single wire up to 600MCM or 2 wires up to 250MCM. Actual wire size and number of wires per phase must be determined based on ampacity and job requirements using N.E.C. wire sizing information. The above recommendations are based on the National Electric Code and using copper connectors only. Field wiring must also comply with local codes.
- A ground lug is provided for each compressor system to accommodate field grounding conductor per N.E.C. Article 250-54. A control circuit grounding lug is also supplied. Incoming ground wire range is #6 - #2/0.
- The supplied disconnect is a "Disconnection Means" as defined in N.E.C. Article 100.B, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect is not intended to be a Load Break Device.
- All unit compressors have a part winding electrical configuration such that the indicated Locked Rotor Amps are Part Wind Locked Rotor Amps.

INSTALLATION

WARRANTY

To protect warranty, this equipment must be installed and serviced by an authorized YORK service mechanic or a qualified service person experienced in chiller installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as relief valves, HP cutout settings, design working pressures and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panel. Before servicing, open and tag all disconnect switches.

INSTALLATION CHECK LIST

The following items, 1 thru 5, must be checked before placing units into operation.

1. Inspect the two modules for shipping damage.
2. Rig each unit per Fig. 4. Remove shipping braces, page 13 after installation.
3. Open unit only to install water piping system. Do not remove protective covers from water connections until piping is ready for attachment. Check water piping to insure cleanliness.
4. Pipe unit using good piping practice and consistent with local code requirements.
5. Check to see that unit is installed and operated within OPERATIONAL LIMITATIONS shown on page 7.

The following pages outline procedures to be followed.

HANDLING

These units are shipped as two separate modules for ease of handling, each containing full operating charge. Care should be taken to avoid damage due to rough handling.

Each module is shipped without export crating unless it is specified by Sales Order.

A unit should be lifted by inserting hooks through the holes provided in unit base rails. Spreader bars should be used to avoid crushing the unit with the lifting chains. (See Fig. 4).

INSPECTION

Immediately upon receiving the unit, it should be inspected for possible damage which may have occurred during transit. If damage is evident, it should be noted on the carrier's freight bill. A written request for inspection

by the carrier's agent should be made at once. See Instruction 50.15-NM for more information and details.

LOCATION AND CLEARANCES

These units are designed for outdoor installations on ground level, rooftop, or beside a building. The location should be selected for minimum sun exposure and to insure an adequate supply of fresh air for the condenser. The units must be installed with sufficient clearances for air entrance to the condenser coil, for air discharge away from the condenser, and for servicing access.

In installations where winter operation is intended and snow accumulations are expected, additional height must be provided to insure normal condenser air flow. (See DIMENSIONS.)

FOUNDATION

The unit should be mounted on a flat and level foundation, floor, or rooftop, capable of supporting the entire operating weight of the equipment. See PHYSICAL DATA for operating weight. If the unit is elevated beyond the normal reach of service personnel, a suitable catwalk must be constructed around the unit. The catwalk must be capable of supporting service personnel, their equipment, and the reciprocating compressors.

Ground Level Locations

It is important that the units be installed on a substantial base that will not settle. A one piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should not be tied to the main building foundations as noise and vibration may be transmitted.

Mounting holes are provided in the steel channel for bolting the unit to its foundation. (See DIMENSIONS)



00020TG

No lifting lugs holes in side of channel

FIG. 4 – RIGGING THE CHILLER (Each section)

For ground level installations, precautions should be taken to protect the unit from tampering by or injury to unauthorized persons. Screws and / or latches on access panels will prevent casual tampering. However, further safety precautions such as a fenced-in enclosure or locking devices on the panels may be advisable. A tamperproof kit is available as an option. Check local authorities for safety regulations.

Rooftop Locations

Choose a spot with adequate structural strength to safely support the entire weight of the unit and service personnel. Care must be taken not to damage the roof. Consult the building contractor or architect if the roof is bonded. Roof installations should have wooden beams (treated to reduce deterioration), cork, rubber or vibration isolators under the base to minimize vibration.

SHIPPING BRACES

Two shipping brackets (typically galvanized steel) which run diagonally along each side of each module, must be removed once the unit is mounted on its foundation. A third bracket on the right rear of the unit should also be removed. This bracket runs across the bottom right corner of the unit behind the compressors.

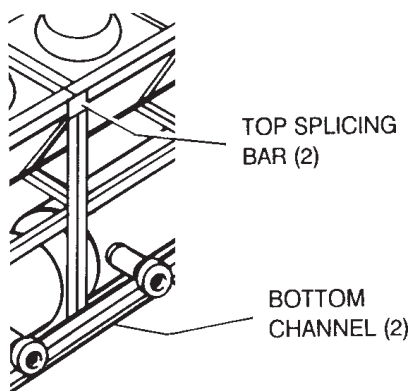
MODULAR INSTALLATION

All chillers require a Splicing Kit to connect the two modules together. This will be field mounted. See Fig. 5). For mounting top splicing bar, loosen eight (8) existing nuts at top end of frame of both modules. Secure top splicing bars in place, using existing nuts and bolts.

Mount bottom channel bars on both sides by loosening eight (8) existing nuts at the bottom end channels. Secure bars in place, using existing nuts and bolts. The Splicing Kit will be shipped in a separate box.

COMMUNICATIONS LINK INSTALLATION

An RS-485 communications link **MUST** be connected between the Master and the Slave Control Panels. One of two installation procedures will be required, depend-



LD01913

FIG. 5 – SPLICING KIT

ing upon when the chiller was manufactured. Please read the note below before proceeding.

NOTES: *In the fall / winter of 1995, a design change will be implemented in the communications link to add transient protection circuit boards (LTP, Lan Transient Protection) to the RS-485 communications link. These boards are designed to protect the RS-485 drivers on the Micro Boards from severe RFI transients that may enter through earth ground and cause a circuitry failure and subsequent communications loss on chillers that have been in service. There is no need to worry if the boards are not included with the chiller. The boards are designed with the intent of being used where communications links are hundreds or thousands of feet long. The circuits are being added as a precaution / enhancement. No prior history of failures exists on 3 and 4 compressor chillers with communications between two micropanels within the chiller. NO RETROFIT IS NECESSARY!*

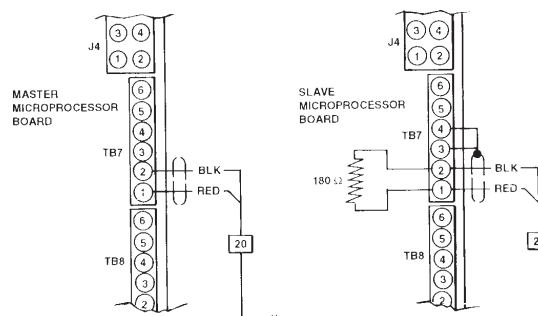
To determine whether to follow installation procedure #1 or #2, open the control panel of the Slave Panel and inspect the TB7 connector on the Micro Board. If a transient Protection Circuit board is installed, (Fig. 7A), use Procedure #2. Otherwise use Procedure #1.

Procedure #1

The 2-wire shielded cable should be connected between TB7 of the Master and TB7 of the Slave Micro Board as shown in Fig. 6. This cable is shipped rolled up in the Slave Panel. Connection points to each Microprocessor are shown in Fig. 6. Also assure that the shield and the 180W resistor are connected at the Slave Panels shown in Fig. 6. Place a wire jumper between TB7-3 & TB7-4 as shown in Fig. 6.

NOTE: *DO NOT connect the shield at the MASTER Microboard.*

Cable routing should be through existing cable entry in the bottom of the Control Panels and should follow the center condenser support the entire length of the chiller.



LD01914

FIG. 6 – RS-485 WIRING CONNECTION

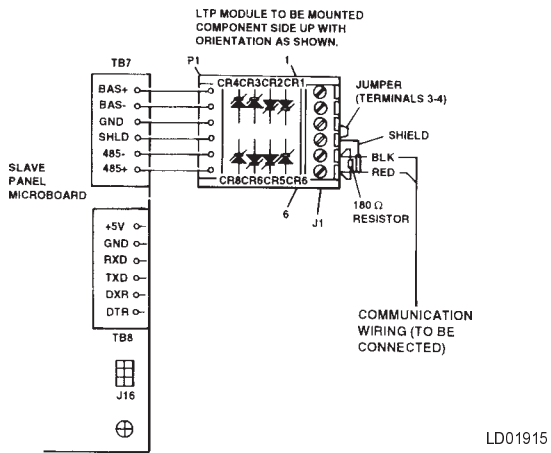


FIG. 7A – TRANSIENT PROTECTION CIRCUIT BOARD (LTP) INSTALLED IN SLAVE PANEL

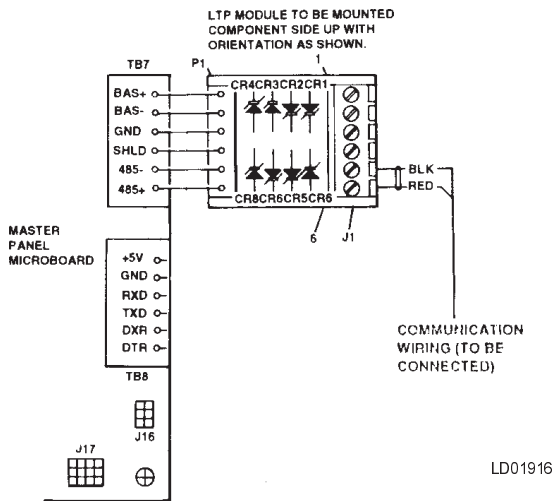


FIG. 7B – TRANSIENT PROTECTION CIRCUIT BOARD (LTP) INSTALLED IN MASTER PANEL

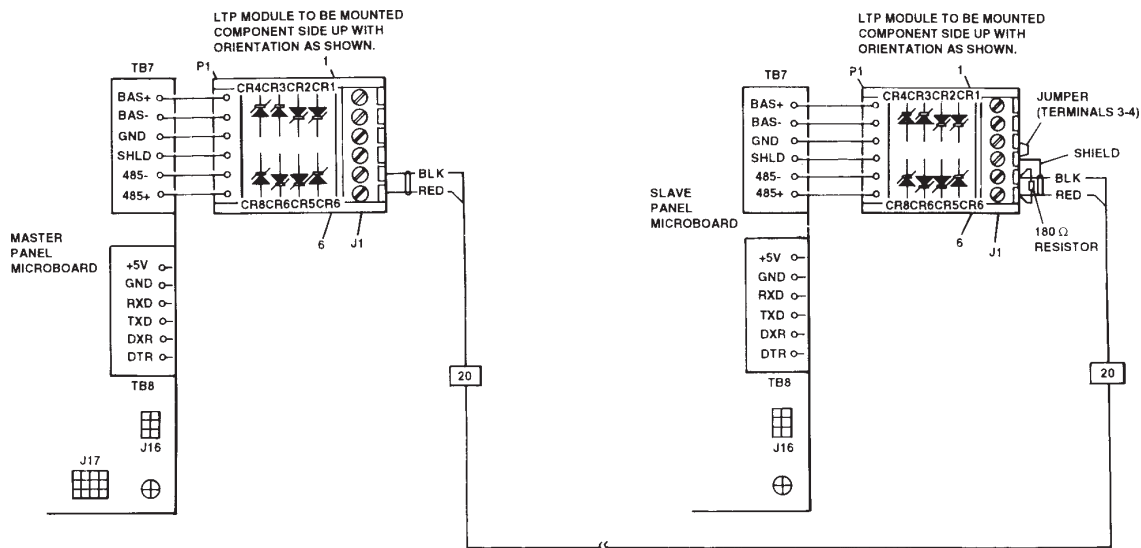


FIG. 8 – COMMUNICATIONS CABLE CONNECTION

Ty-wrap the cable to the support as needed. Additionally, the J19 jumper on both Microprocessor Boards **MUST** be in the RS-485 position (Top 2 pins). See page 37.

Procedure #2

If a transient protection circuit board is installed in the SLAVE PANEL (Fig. 7A), continue, otherwise, perform Procedure #1.

Included in the Splice Kit is a second LTP Board which is to be installed on the Master Micro Board. Install the board as shown in Fig. 7B by carefully loosening the terminals on TB7. Orient the board as shown with the component side up and insert all 6 pins into TB7 as shown. Carefully tighten each terminal.

Carefully, loosen the terminals of J1 on the LTP boards in the Master and Slave control panels and install the cable as shown in Fig. 8. Do not connect the shield in the Master Panel. Assure that the shield, jumper, and 180 ohm resistor are installed in the Slave Panel LTP board as shown in Fig. 8.

MIXED WATER TEMP. SENSOR INSTALLATION

A Mixed Leaving Water Temperature Sensor **MUST** be installed in the common leaving water line coming from the two evaporators. The sensor must be installed a minimum of 5 pipe diameters from the intersection of the leaving water lines. Assure that the sensor is totally immersed in heat conductive compound. (Minnesota Paints type #11149 or equiv.) inside the sensor well.

Connect the sensor plug to the plug which is factory mounted on the cable. The cable should then be routed back to the Master Control Panel. Before placing the connector on the unterminated end of the cable, route the cable through the hole in the bottom of the Control Panel as shown in Fig. 9.

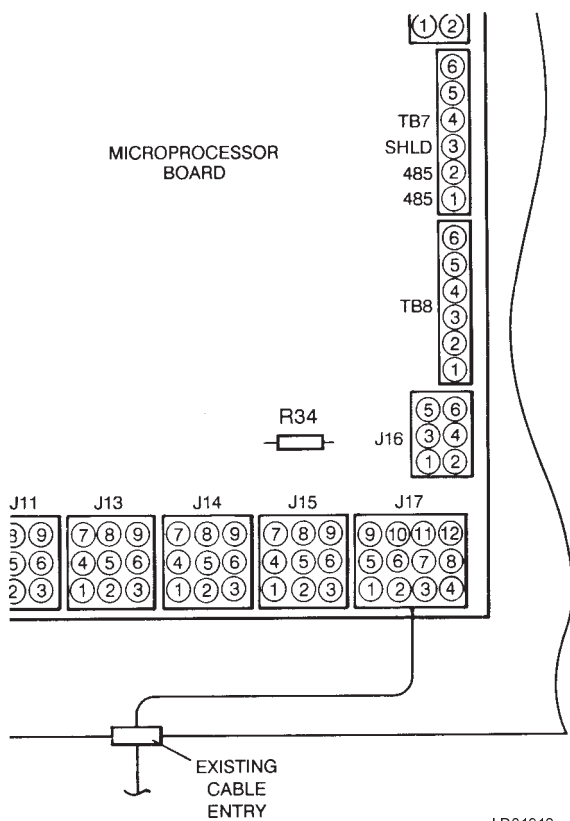


FIG. 9 – MIXED WATER TEMP WIRING

LD01918

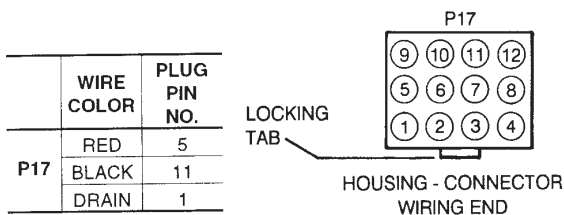


FIG. 10 – MIXED WATER TEMP SENSOR CONNECTOR INSTALLATION

LD01919

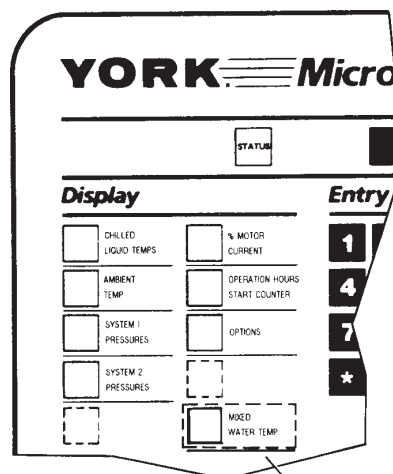
The pins will lock when pushed into the connector. Take care to assure the pins are placed into the correct sockets in the connector. The connector may then be plugged into J17 on the Micro Board as shown above.

The sensor, cable, and connector are included in the Splicing Kit.

“MIXED WATER TEMP”, “SYS 1 & 2 PRESSURES” AND “SYS 3 & 4 PRESSURES” LABEL INSTALLATION

A MIXED WATER TEMP adhesive label MUST be installed on the keypad of the Control Panel. Carefully install the label in the position shown in Fig. 11. This label is included as part of the Splicing Kit.

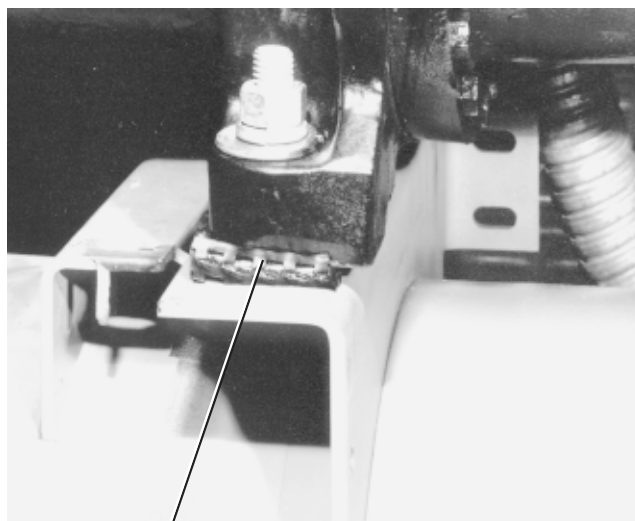
“SYS 1 & 2 PRESSURES” and “SYS 3 & 4 PRESSURES” labels must be installed to indicate dual purpose keys. “SYS 1 & 2 PRESSURES” label should be



KEY MUST ALIGN HORIZONTALLY AND VERTICALLY WITH EXISTING KEYS.

LD01920

FIG. 11 – MIXED WATER TEMP LABEL LOCATION



COMPRESSOR MOUNTING PAD

25112A

applied over the “SYS 1 PRESSURES” label and “SYS 3 & 4 PRESSURES” should be applied over the “SYS 2 PRESSURES” label.

COMPRESSOR MOUNTING

The compressors are mounted on four (4) isolator pads (one under each compressor foot). (See Fig. 12.) The mounting bolts are not to be loosened or adjusted at installation.

COMPRESSOR INSULATION

In high humidity environments, compressor sweating may be noted. In most applications, this is of no concern. However, if it is undesirable, it is the responsibility

of the installer to make provisions to field insulate the compressor or install a factory insulation kit when they become available. Contact your local YORK Sales Office for availability.

WEIGHT DISTRIBUTIONS AND ISOLATOR LOCATIONS FOR EACH MODEL

SPRING ISOLATORS (OPTIONAL)

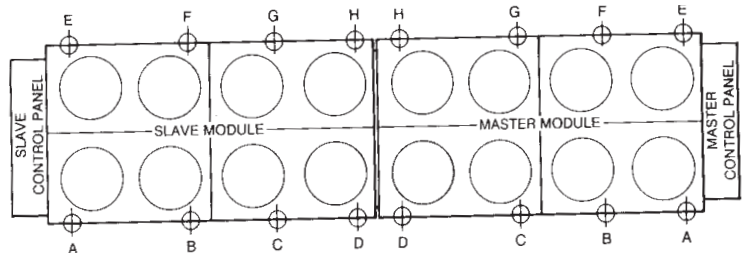
When ordered, sixteen (16) vibration isolators will be furnished with each unit. They are of the level adjusting spring type, manufactured by either Mason Industries or Vibration Mounting & Controls, Inc.

Installation Instructions

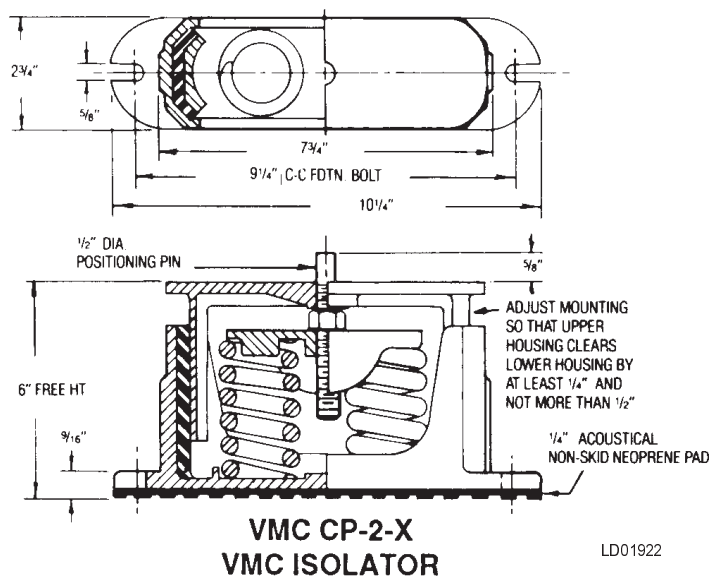
1. Identify manufacturers of isolator and locate at proper mounting point using appropriate table below.
2. Block up equipment so as to install spring mounts with pin on top of housing into Equipment Mounting Holes.
3. Mounting Adjustment Nut is inside the isolator mount located just below the top plate of the mount. Turn nut 2 turns clockwise (down) to load spring mount at each location.
4. Take two additional turns on Adjustment Nut of each mount.
5. Repeat step No. 3 as many times as necessary to bring height of isolator to proper height.
6. Take additional turns on mounts at low side or corner to level the equipment.

MODELS AND ISOLATOR	LOADPOINTS															
	A		B		C		D		E		F		G		H	
	AL	CJ	AL	CJ	AL	CJ	AL	CJ	AL	CJ	AL	CJ	AL	CJ	AL	CJ
YDAJ87KU6	1954	2261	1995	2301	2013	2319	2287	2594	1956	2262	2141	2447	2159	2465	2236	2543
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32
YDAJ87HU7	1953	2259	1992	2299	2010	2317	2285	2592	1947	2254	2129	2436	2147	2454	2228	2534
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32
YDAJ88MU6	1973	2279	2020	2327	2036	2343	2314	2621	2030	2337	2245	2552	2261	2568	2324	2631
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32
YDAJ97KU7	1971	2278	2018	2325	2034	2340	2312	2619	2023	2329	2235	2542	2251	2558	2317	2623
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32
YDAJ98MU7	1973	2279	2020	2327	2036	2343	2314	2621	2030	2337	2245	2552	2261	2568	2324	2631
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32	CP-2-32
YDAJ99MW6	2094	2484	2141	2532	2157	2547	2440	2831	2113	2504	2328	2719	2370	2761	2418	2808
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-35	CP-2-32	CP-2-35	CP-2-32	CP-2-35
YDAJ99MU7	2094	2484	2141	2532	2157	2547	2440	2831	2113	2504	2328	2719	2370	2761	2418	2808
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-35	CP-2-32	CP-2-35	CP-2-32	CP-2-35
YDAJ99MW9	2162	2552	2209	2600	2225	2616	2508	2899	2181	2572	2397	2787	2439	2829	2486	2877
VMC	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-32	CP-2-31	CP-2-32	CP-2-32	CP-2-35	CP-2-32	CP-2-35	CP-2-32	CP-2-35

MODELS	CONDENSERS	WEIGHT	
		SHIPPING	OPERATING
YDAJ87KU6	CU / AL	33,000	33,500
	CU / CU	37,900	38,400
YDAJ87HU7	CU / AL	33,000	33,400
	CU / CU	37,900	38,300
YDAJ88MU6	CU / AL	33,850	34,450
	CU / CU	38,750	39,350
YDAJ97KU7	CU / AL	33,850	34,350
	CU / CU	38,750	39,250
YDAJ98MU7	CU / AL	33,850	34,450
	CU / CU	38,750	39,350
YDAJ99MW6	CU / AL	35,550	36,150
	CU / CU	41,800	42,400
YDAJ99MU7	CU / AL	35,550	36,150
	CU / CU	41,800	42,400
YDAJ99MW9	CU / AL	36,650	37,250
	CU / CU	42,900	43,500



LD01921



TYPE & SIZE	MAX. LOAD LBS. (KG)	SPRING COLOR	DEFL IN. (MM)
CP-2-25	900 (408.2)	RED	1.22 (30.9)
CP-2-26	1200 (544.3)	PURPLE	1.17 (29.7)
CP-2-27	1500 (680.4)	ORANGE	1.06 (26.9)
CP-2-28	1800 (816.4)	GREEN	1.02 (25.9)
CP-2-31	2200 (997.9)	GRAY	0.83 (21.0)
CP-2-32	2600 (1179.3)	WHITE	0.74 (18.7)
CP-2-35 ¹	3000 (1360.8)	GOLD	0.70 (17.7)

NOTE: 1. Free height 1/2" (12.7) higher than shown.

GENERAL LIQUID PIPING

GENERAL – When liquid has been located in its final position, the unit liquid piping may be connected. Normal installation precautions should be observed in order to receive maximum operating efficiencies. Piping should be kept free of all foreign matter. All liquid cooler piping must comply in all respects with local plumbing codes and ordinances.

Since elbows, tees, and valves decrease pump capacity, all piping should be kept as simple as possible.

Hand stop valve should be installed in all lines to facilitate servicing.

Piping to the inlet and outlet connections of the chiller should include high-pressure rubber hose or piping loops to insure against transimission of water pump vibration. This is optional and the necessary components must be obtained in the field.

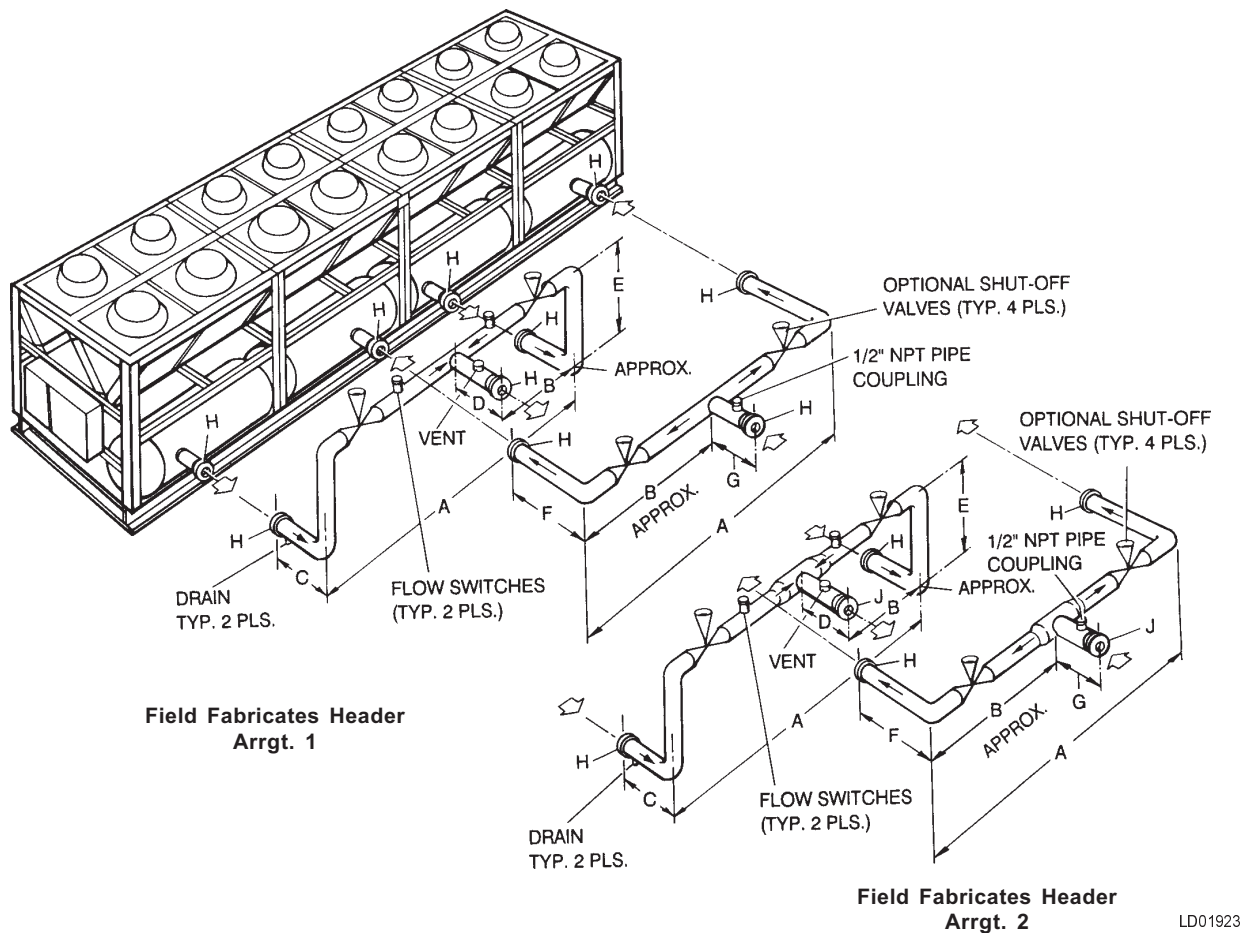
Drain connections should be provided at all low points to permite complete drainage of liquid cooler and piping system.

A small valve or valves should be installed at the highest point or points in the chilled liquid piping to allow any trapped air to be purged. Vent and drain connections should be extended beyond the insulation to make them accessible.

Two tpycial water piping header arrangements are shown in Fig. 13.

The piping to and from each cooler must be designed to suit the individual installation. It is important that the following considerations be observed:

1. The chilled liquid piping system should be laid out so that the circulating pump discharges directly into the cooler. The suction for this pump should be taken from the piping system return line and not the cooler.
2. The inlet and outlet cooler liquid connection sizes are given on page 9.
3. A strainer, preferably 40 mesh, **MUST** be installed in the cooler inlet line just ahead of each cooler.
4. All chilled liquid piping should be thoroughly flushed to free it from foreign material before the system is placed into operation. Use care not to flush any foreign material into or through the cooler.



		DIMENSIONS - INCHES									
		MODEL YDAJ	A	B	C	D	E	F	G	H	J
ARRGT. 1	- , 87HU7	188-1/4	93	18-1/2	15	24	25	20	6-150#	—	
	87KU6, 97KU7	188-1/4	93	18-1/2	15	24	25	20	6-150#	—	
	88MU6, 98KU7	188-1/4	93	18-1/2	15	24	25	20	8-150#	—	
	99MW6, 99MU7, 99MW9	188-1/4	84	24	19	30	33	26	8-150#	—	
ARRGT. 2	- , 87HU7	188-1/4	93	18-1/2	15	24	25	26	6-150#	8-150# or larger	
	87KU6, 97KU7	188-1/4	93	18-1/2	15	24	25	26	6-150#	8-150# or larger	
	88MU6, 98KU7	188-1/4	93	18-1/2	15	24	25	26	8-150#	10-150# or larger	
	99MW6, 99MU7, 99MW9	188-1/4	84	24	19	30	33	30	8-150#	10-150# or larger	

FIG. 13 – FIELD FABRICATED CHILLED WATER PIPING (HEADER ARRANGEMENTS)

- As an aid to servicing, thermometers and pressure gauges should be installed in each of the inlet and outlet water lines. One connection point (plugged) is provided in each cooler nozzle. Thermometers and gauges are not furnished with the unit and are to be furnished by other suppliers.
- The chilled liquid lines that are exposed to outdoor ambients should be wrapped with a supplemental heater cable and insulated to protect against freeze-up during low ambient periods, and to prevent formation of condensation on lines in warm humid climates.

- A chilled water flow switch, (either by YORK or others) **MUST** be installed in the leaving water piping of **EACH** cooler. There should be a straight horizontal run of at least 5 diameters on each side of the switch. Adjust the flow switch paddle to the size of pipe in which it is to be installed. (See manufacturer's instructions furnished with switch). The switches are to be wired to terminals in the respective control panel as shown in the WIRING DIAGRAM.

WARNING: Flow switch must not be used to stop and start chiller. It is intended only as a safety switch.

ELECTRICAL WIRING

Liquid Chillers are shipped with all factory mounted controls wired for operation.

Field Wiring – Power wiring (Fig. 14) must be provided through fused disconnect switches to the unit terminals (or optional molded case disconnect switches) in accordance with N.E.C. or local code requirements. Minimum circuit ampacity and maximum dual element fuse size are given on pages 10 and 11. A 115-1-60/50, 20 amp source must be supplied for each Control Panel through a fused disconnect when Control Panel Transformers (optional) are not provided. Refer to WIRING DIAGRAM.

Affiliated apparatus, such as a chilled water flow switches, auxiliary contacts from the chilled water pump starter, alarms, etc. should be interlocked into the control panel circuits. These field modification may be made

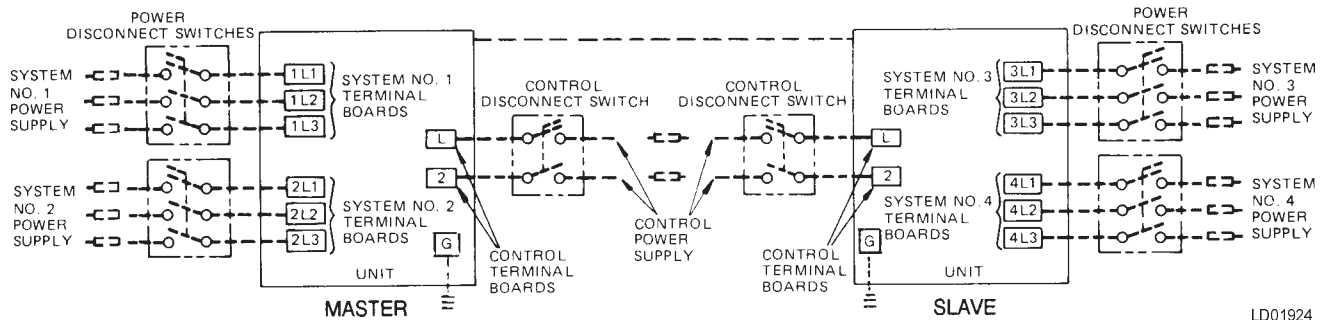
as shown on the WIRING DIAGRAM.

If the Dual Point Wiring Option (Fig. 14) is installed, two power feeds are required. A single feed to the Master Module and a single feed to the Slave Module. This differs from the standard chiller where four feeds are required. Two feeds are also required if Power Disconnect Switch Options are installed.

MULTIPLE UNITS

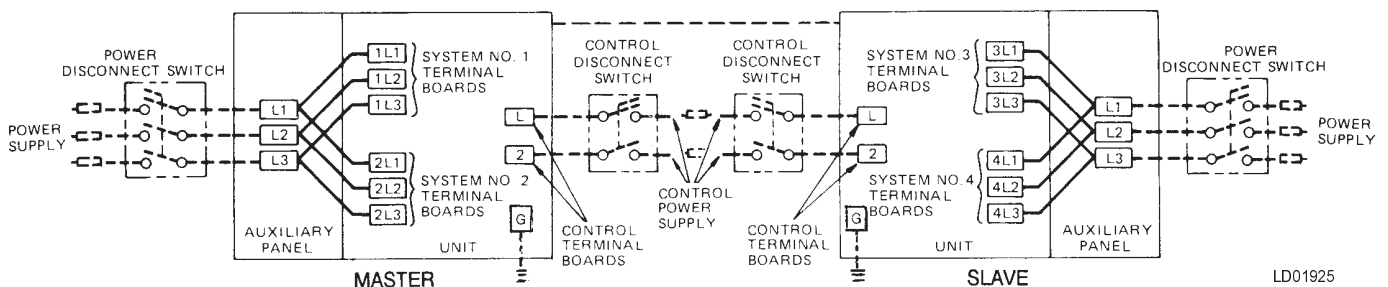
For increased compressor protection and to reduce power inrush at start-up on multiple chiller installations, provisions must be made to prevent simultaneous start-up of two or more units. Also, some method must be employed to automatically cycle one or more of the units on or off to permit more efficient operation at part load conditions. A sequencing kit may be acquired through your local YORK representative.

STANDARD POWER SUPPLY WIRING



LD01924

OPTIONAL DUAL POINT POWER WIRING



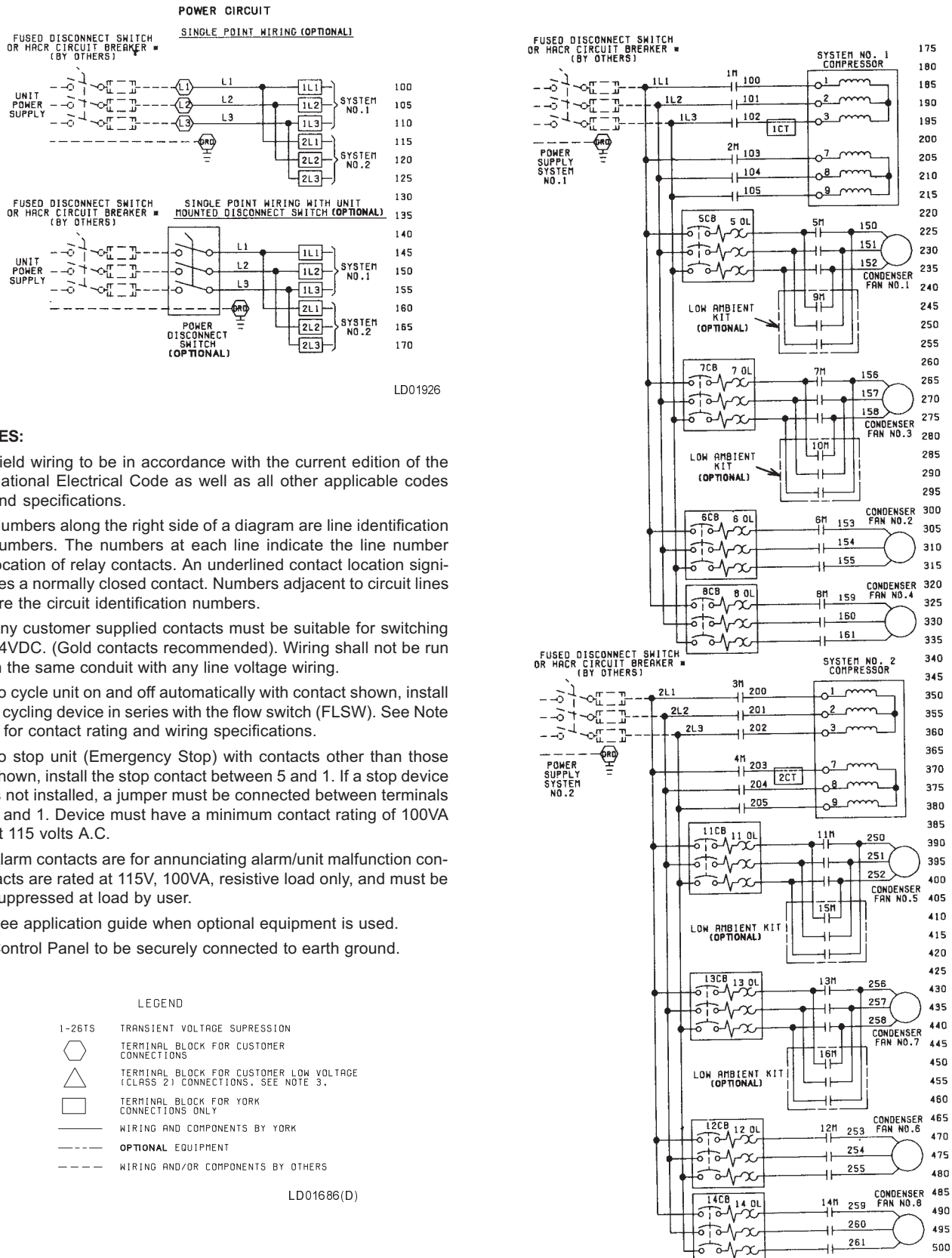
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NOTE:

Single point remote mounted wiring panel recommendations or components can be provided as a special. Consult your YORK representative for details.

FIG. 14 – FIELD POWER WIRING

MASTER MODULE WIRING DIAGRAM



NOTES:

1. Field wiring to be in accordance with the current edition of the National Electrical Code as well as all other applicable codes and specifications.
2. Numbers along the right side of a diagram are line identification numbers. The numbers at each line indicate the line number location of relay contacts. An underlined contact location signifies a normally closed contact. Numbers adjacent to circuit lines are the circuit identification numbers.
3. Any customer supplied contacts must be suitable for switching 24VDC. (Gold contacts recommended). Wiring shall not be run in the same conduit with any line voltage wiring.
4. To cycle unit on and off automatically with contact shown, install a cycling device in series with the flow switch (FLSW). See Note 3 for contact rating and wiring specifications.
5. To stop unit (Emergency Stop) with contacts other than those shown, install the stop contact between 5 and 1. If a stop device is not installed, a jumper must be connected between terminals 5 and 1. Device must have a minimum contact rating of 100VA at 115 volts A.C.
6. Alarm contacts are for annunciating alarm/unit malfunction contacts are rated at 115V, 100VA, resistive load only, and must be suppressed at load by user.
7. See application guide when optional equipment is used.
8. Control Panel to be securely connected to earth ground.

FIG. 15 – MASTER MODULE ELEMENTARY DIAGRAM

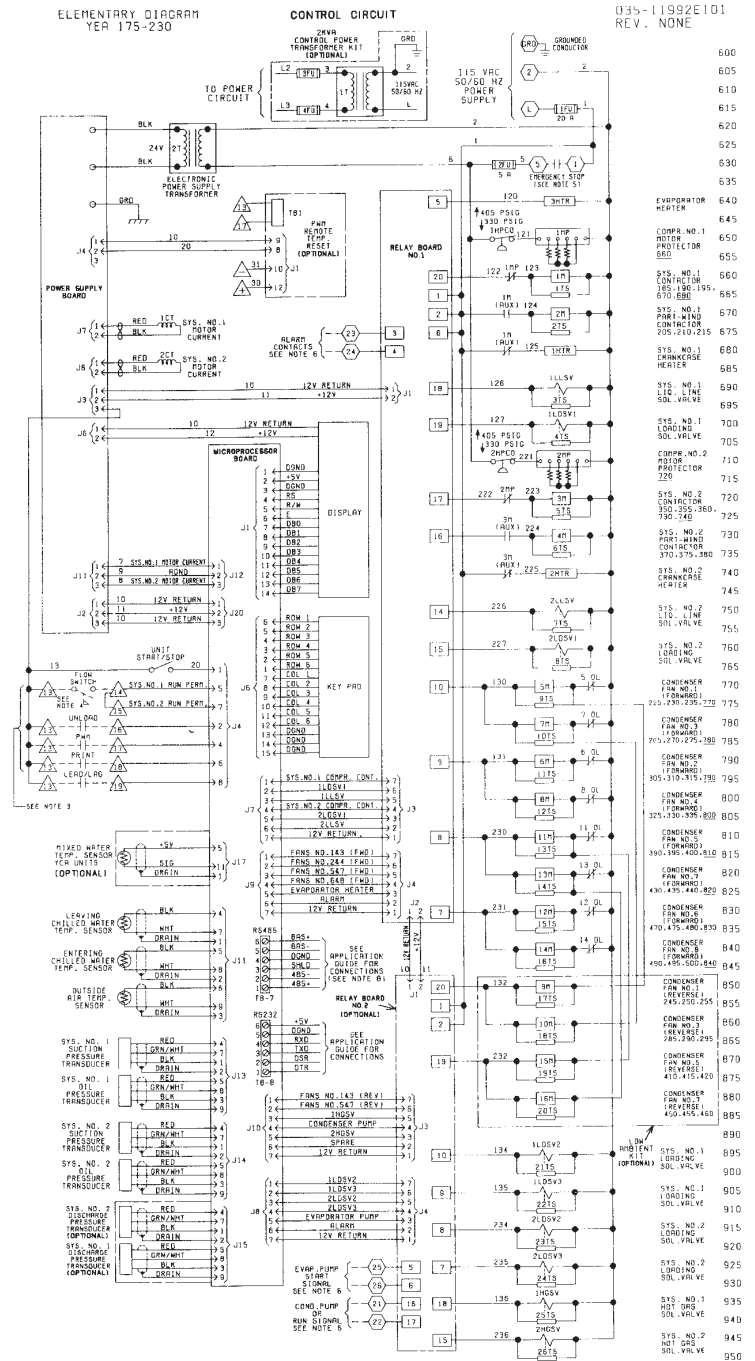
MASTER MODULE WIRING DIAGRAM

CAUTION: No Controls (relays, etc.) should be mounted in the Smart Panel enclosure or connected to power supplies in the control panel. Additionally, control wiring not connected to the Smart Panel should not be run through the cabinet. This could result in nuisance faults.

CAUTION: Any inductive devices (relays) wired in series with the flow switch for start/stop, into the Alarm circuitry, or pilot relays for pump starters wired through motor contactor auxiliary contacts must be suppressed with YORK P/N 031-00808-000 suppressor across the relay/contact coil which activates the contacts.

Any contacts connected to flow switch inputs or BAS inputs on terminals 13-19 of TB3, or any other terminals, must be suppressed with a YORK P/N 031-00808 suppressor across the relay/contact coil which activates the contacts.

CAUTION: Control wiring connected to the control panel should never be run in the same conduit with power wiring.



CONTROL POWER SUPPLY

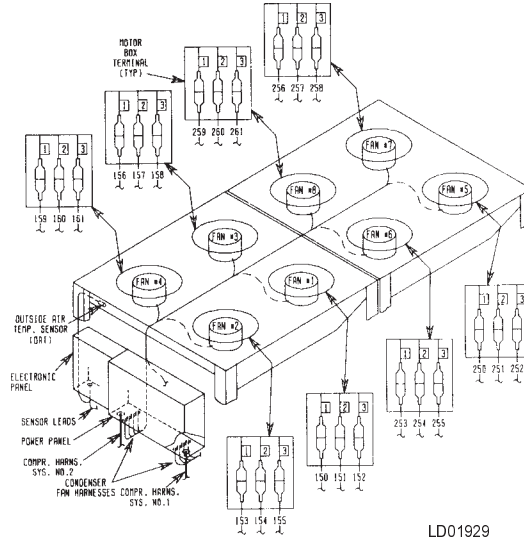
UNIT VOLTAGE	CONTROL POWER SUPPLY	MIN CIRCUIT AMPACITY	MAX DUAL ELEMENT FUSE SIZE	NON-FUSED DISC. SW. SIZE
All Models w/o Transformers	115-1-50/60	20A	20A, 250A	30A, 240A

FIG. 15 – MASTER MODULE ELEMENTARY DIAGRAM (Cont'd)

MASTER MODULE WIRING DIAGRAM

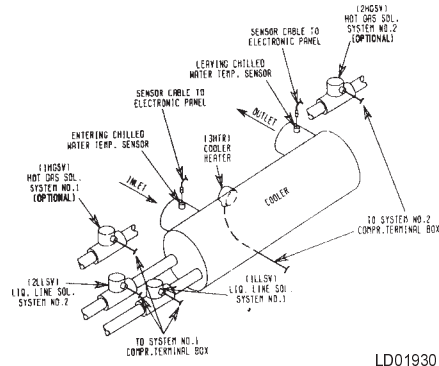
CONNECTION DIAGRAM MASTER MODULE

CONDENSER FANS



LD01929

COOLER

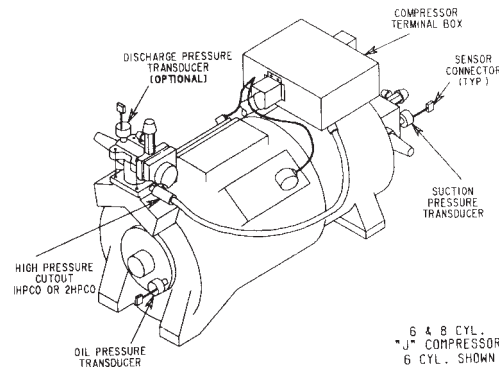


LD01930

COMPRESSORS (SYSTEM NO. 1 AND NO. 2)

LEGEND

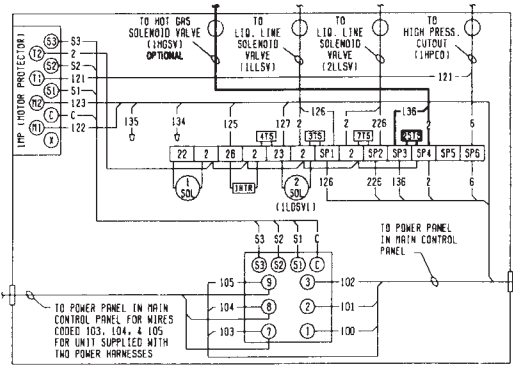
4HTR	COMPR. CRANKCASE HEATER
3LDSV1, 3LDSV2, 3LDSV3	UNIT IDENT. COMPR. LOADING SOLENOID VALVE SYS. NO. 3
1SOL, 2SOL, 3SOL	COMPR. IDENT. LOADING SOLENOID VALVE SYS. NO. 3
1TS - 26TS	TRANSIENT SUPPRESSION



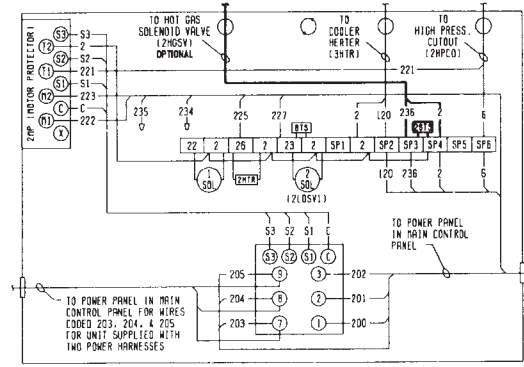
LD01931

FIG. 16 – MASTER MODULE SYSTEM WIRING

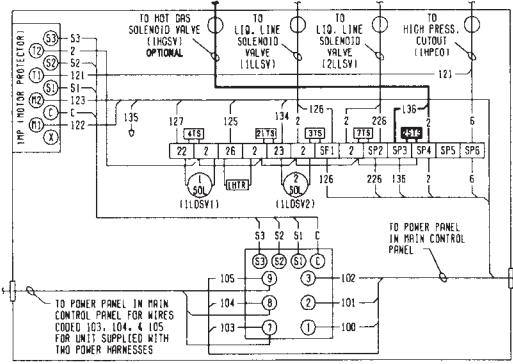
MASTER MODULE WIRING DIAGRAM



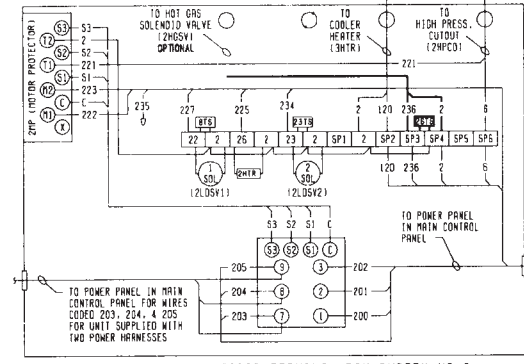
6 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.1
 (UNIT WITH STANDARD UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



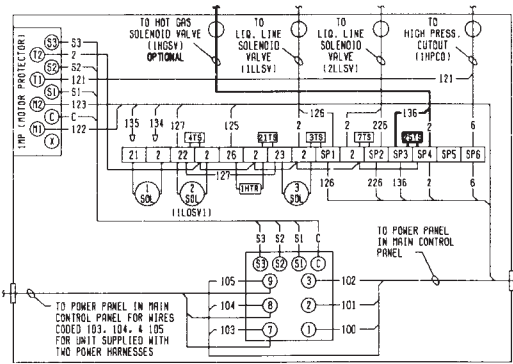
6 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.2
 (UNIT WITH STANDARD UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



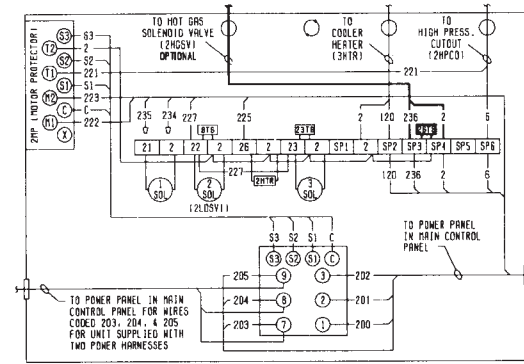
6 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.1
 (UNIT WITH OPTIONAL STEPS OF UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



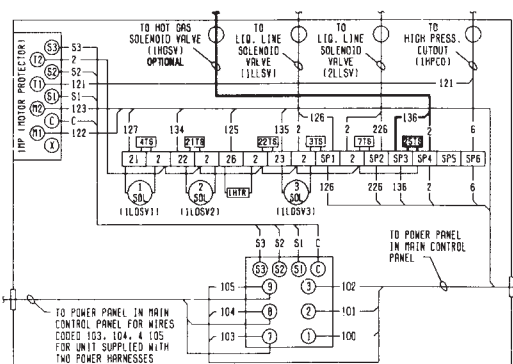
6 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.2
 (UNIT WITH OPTIONAL STEPS OF UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



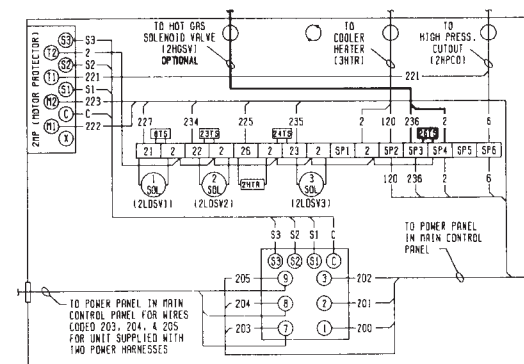
8 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.1
 (UNIT WITH STANDARD UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



8 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.2
 (UNIT WITH STANDARD UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



8 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.1
 (UNIT WITH OPTIONAL STEPS OF UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)



8 CYL. "J" COMPRESSOR TERMINAL BOX SYSTEM NO.2
 (UNIT WITH OPTIONAL STEPS OF UNLOADING WITH OR WITHOUT OPTIONAL HOT GAS)

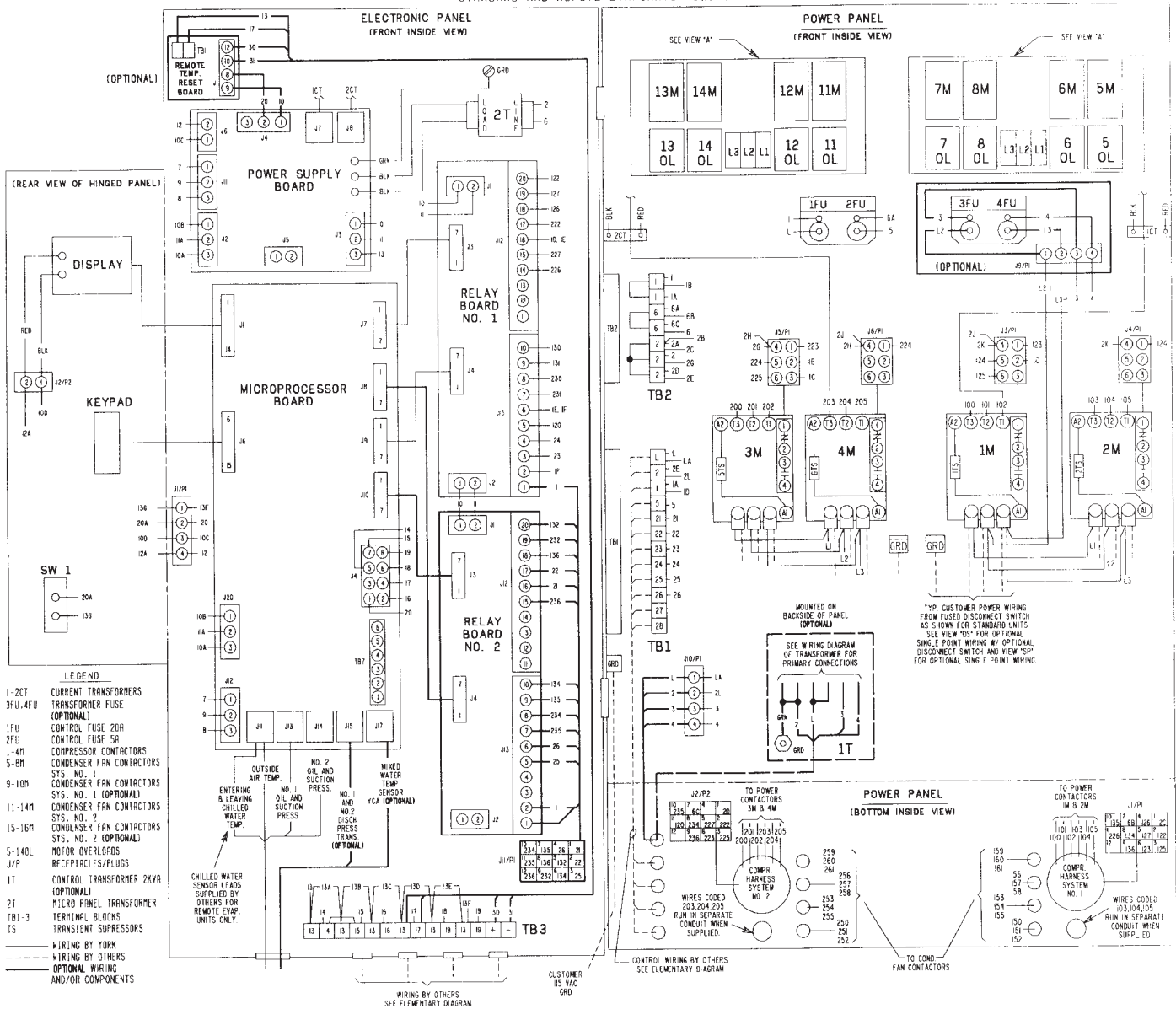
LD01932

FIG. 16 – MASTER MODULE SYSTEM WIRING (Cont'd)

MASTER MODULE WIRING DIAGRAM

CONNECTION DIAGRAM; ELEC. BOX
 YEA 175-230
 STANDARD AND REMOTE EVAPORATOR UNITS

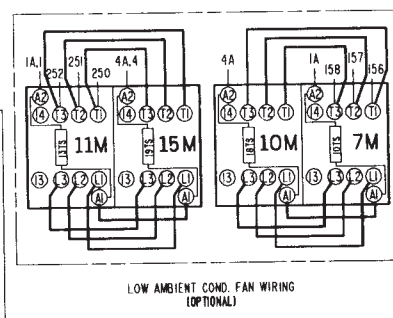
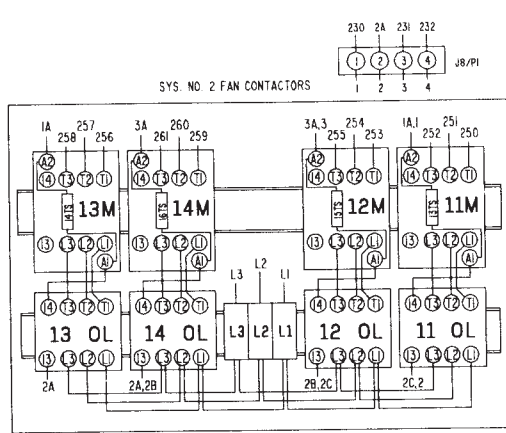
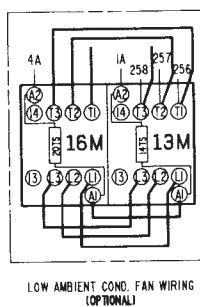
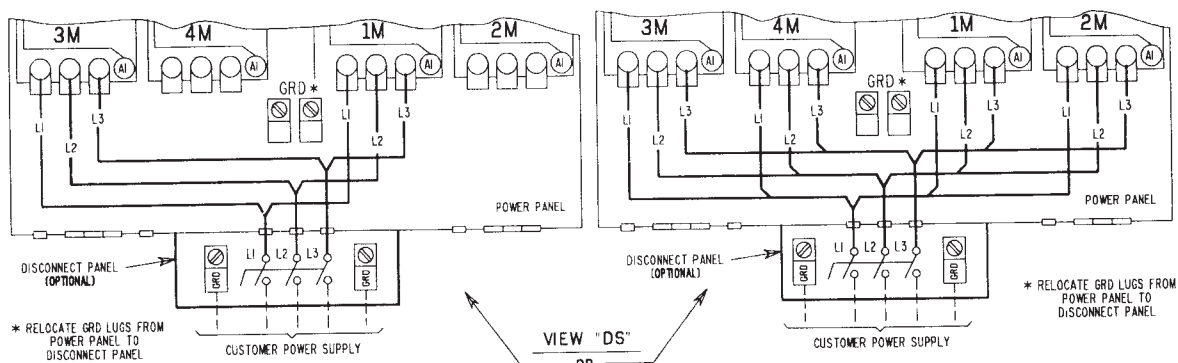
035-11993E102
 REV. NONE



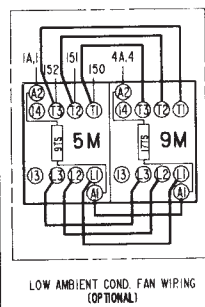
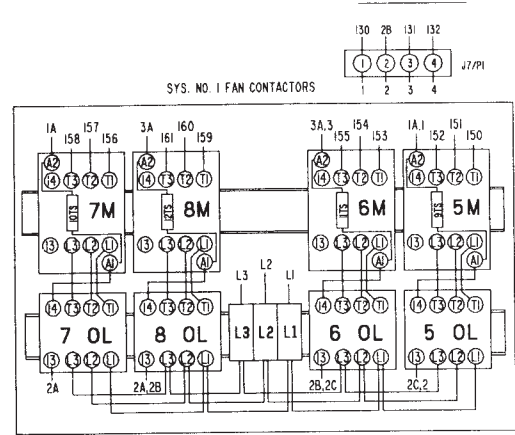
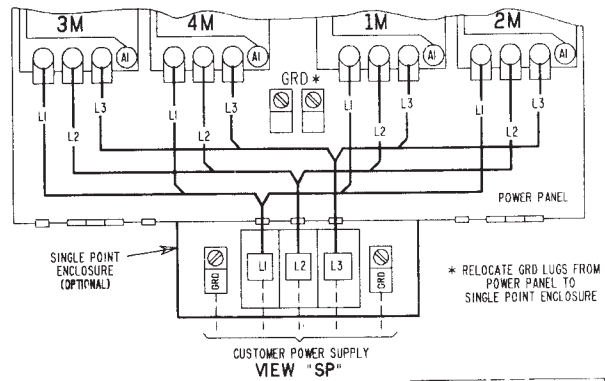
LD01933

FIG. 17 – MASTER MODULE CONNECTION DIAGRAM

MASTER MODULE WIRING DIAGRAM



VIEW "A"









LD01934

FIG. 17 – MASTER MODULE CONNECTION DIAGRAM (Cont'd)

SLAVE MODULE WIRING DIAGRAM

NOTES:

1. Field wiring to be in accordance with the current edition of the National Electrical Code as well as all other applicable codes and specifications.
2. Numbers along the right side of a diagram are line identification numbers. The numbers at each line indicate the line number location of relay contacts. An underlined contact location signifies a normally closed contact. Numbers adjacent to circuit lines are the circuit identification numbers.
3. Any customer supplied contacts must be suitable for switching 24VDC. (Gold contacts recommended). Wiring shall not be run in the same conduit with any line voltage wiring.
4. To cycle unit on and off automatically with contact shown, install a cycling device in series with the flow switch (FLSW). See Note 3 for contact rating and wiring specifications.
5. To stop unit (Emergency Stop) with contacts other than those shown, install the stop contact between 5 and 1. If a stop device is not installed, a jumper must be connected between terminals 5 and 1. Device must have a minimum contact rating of 100VA at 115 volts A.C.
7. See application guide when optional equipment is used.
8. Control Panel to be securely connected to earth ground.

LEGEND	
1-26TS	TRANSIENT VOLTAGE SUPPRESSION
	TERMINAL BLOCK FOR CUSTOMER CONNECTIONS
	TERMINAL BLOCK FOR CUSTOMER LOW VOLTAGE (CLASS 2) CONNECTIONS. SEE NOTE 3.
	TERMINAL BLOCK FOR YORK CONNECTIONS ONLY
	WIRING AND COMPONENTS BY YORK
	OPTIONAL EQUIPMENT
	WIRING AND/OR COMPONENTS BY OTHERS

LD01686(D)

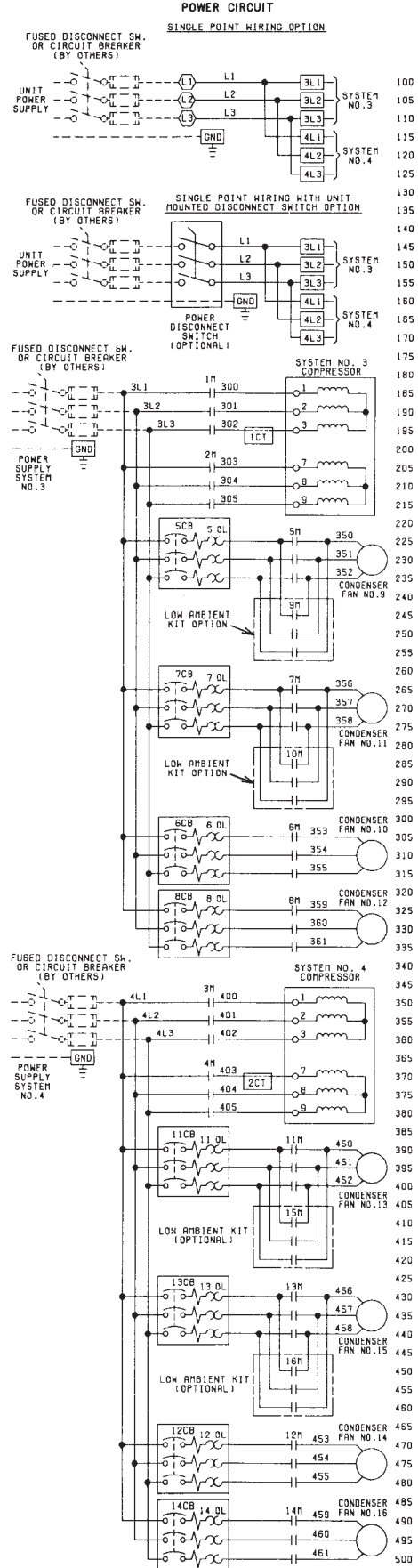


FIG. 18 – SLAVE MODULE ELEMENTARY DIAGRAM

LD01935

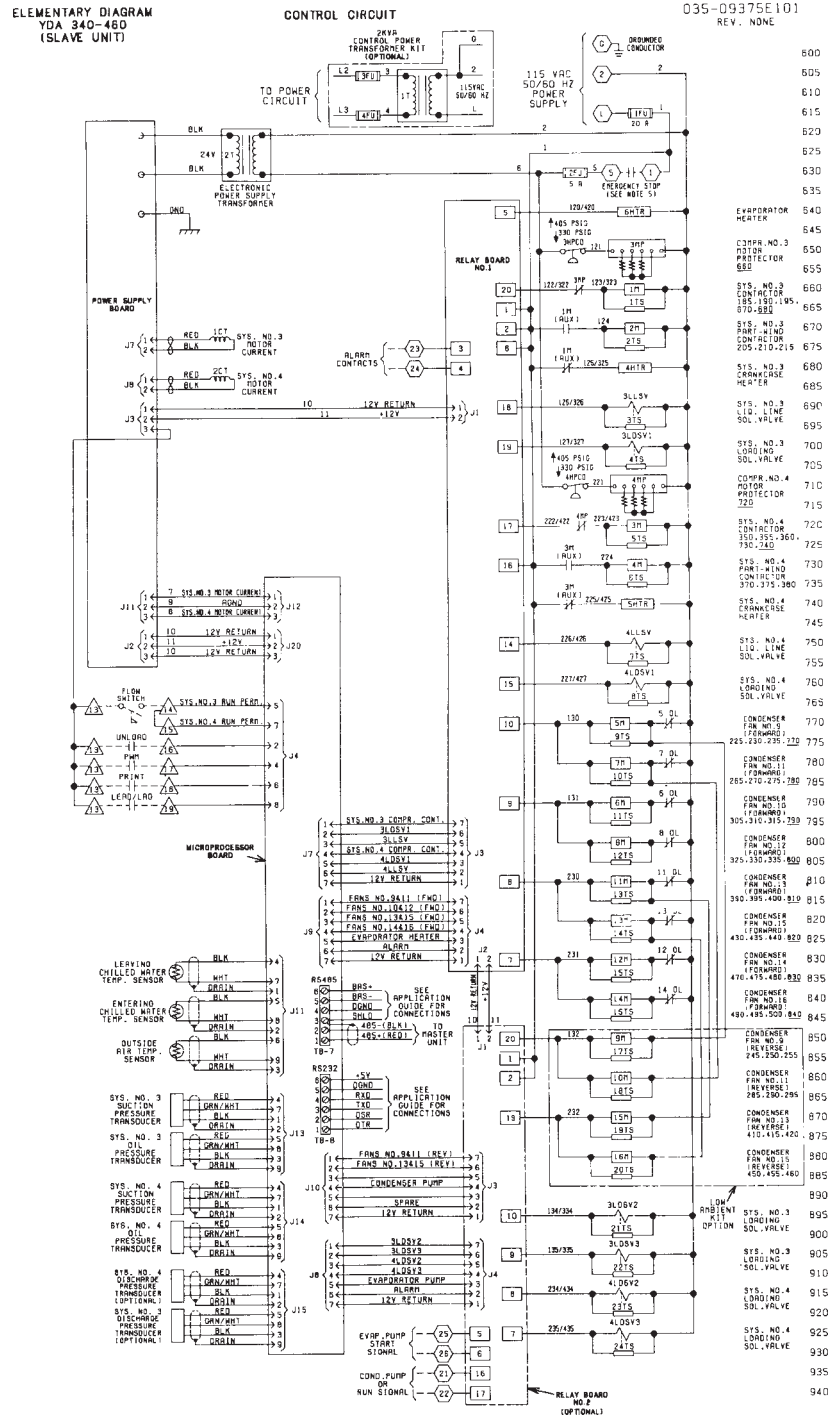
SLAVE MODULE WIRING DIAGRAM

CAUTION: No Controls (relays, etc.) should be mounted in the Smart Panel enclosure or connected to power supplies in the control panel. Additionally, control wiring not connected to the Smart Panel should not be run through the cabinet. This could result in nuisance faults.

CAUTION: Any inductive devices (relays) wired in series with the flow switch for start/stop, into the Alarm circuitry, or pilot relays for pump starters wired through motor contactor auxiliary contacts must be suppressed with YORK P/N 031-00808-000 suppressor across the relay/contactor coil which activates the contacts.

Any contacts connected to flow switch inputs or BAS inputs on terminals 13-19 of TB3, or any other terminals, must be suppressed with a YORK P/N 031-00808-000 suppressor across the relay/contactor coil which activates the contacts.

CAUTION: Control wiring connected to the control panel should never be run in the same conduit with power wiring.



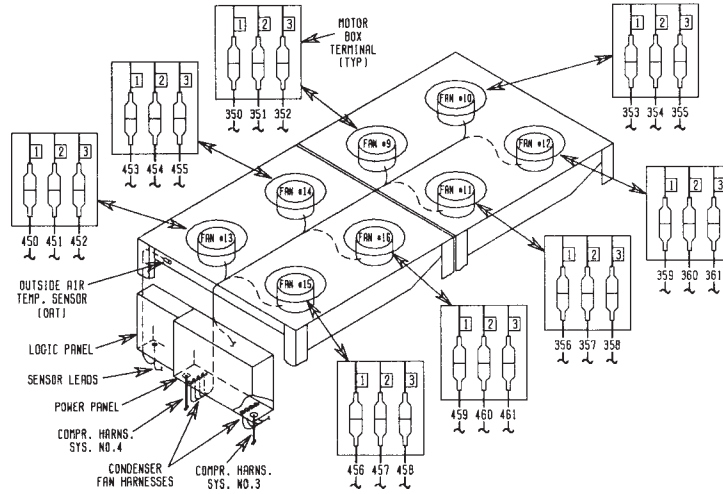
CONTROL POWER SUPPLY				
UNIT VOLTAGE	CONTROL POWER SUPPLY	MIN CIRCUIT AMPACITY	MAX DUAL ELEMENT FUSE SIZE	NON-FUSED DISC. SW. SIZE
All Models w/o Transformers	115-1-50/60	20A	20A, 250A	30A, 240A

FIG. 18 – SLAVE MODULE ELEMENTARY DIAGRAM (Cont'd)

SLAVE MODULE WIRING DIAGRAM

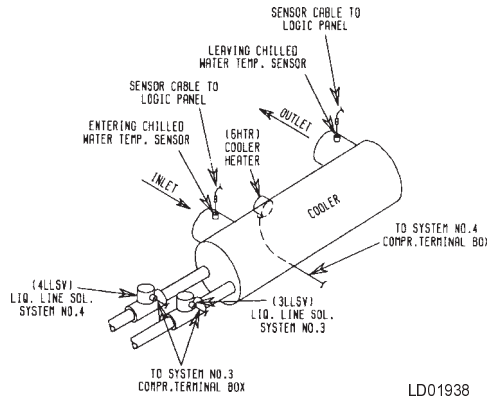
CONNECTION DIAGRAM SLAVE MODULE

CONDENSER FANS



LD01937

COOLER

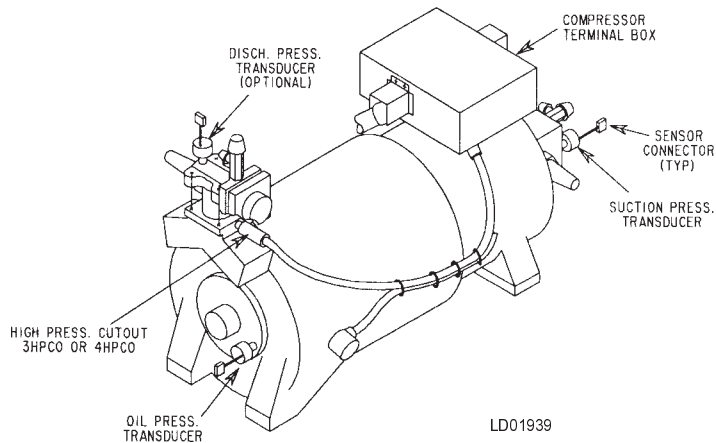


LD01938

COMPRESSORS (SYSTEM NO. 1 AND NO. 2)

LEGEND

4HTR	COMP. CRANKCASE HEATER
3LDSV1, 3LDSV2, 3LDSV3	UNIT IDENT. COMP. LOADING SOLENOID VALVE SYS. NO. 3
1SOL, 2SOL, 3SOL	COMP. IDENT. LOADING SOLENOID VALVE SYS. NO. 3
1TS - 26TS	TRANSIENT SUPPRESSION



LD01939

FIG. 19 – SLAVE MODULE SYSTEM WIRING

SLAVE MODULE WIRING DIAGRAM

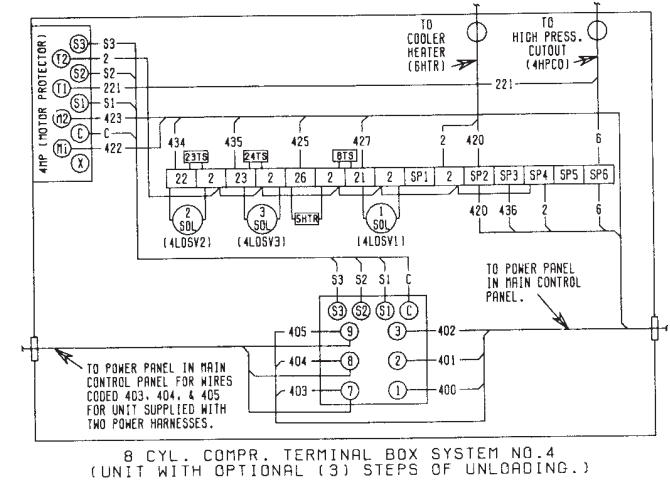
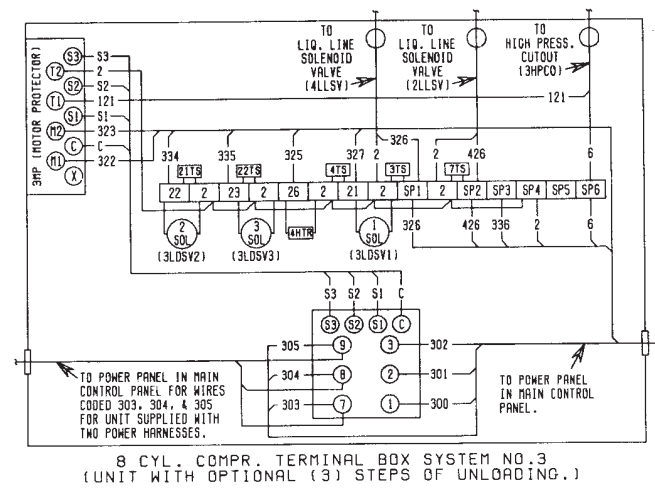
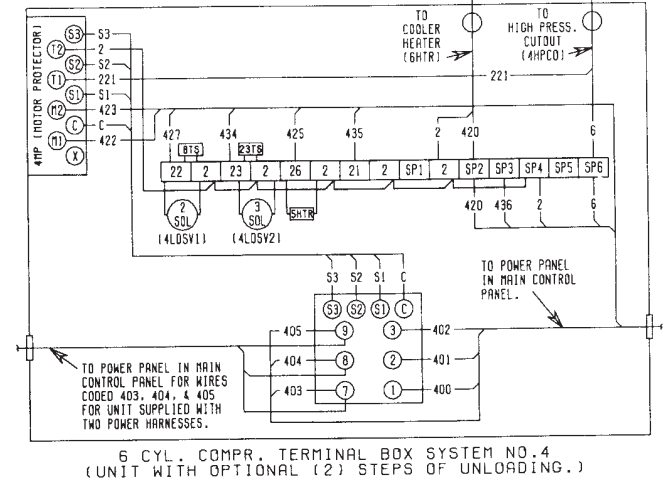
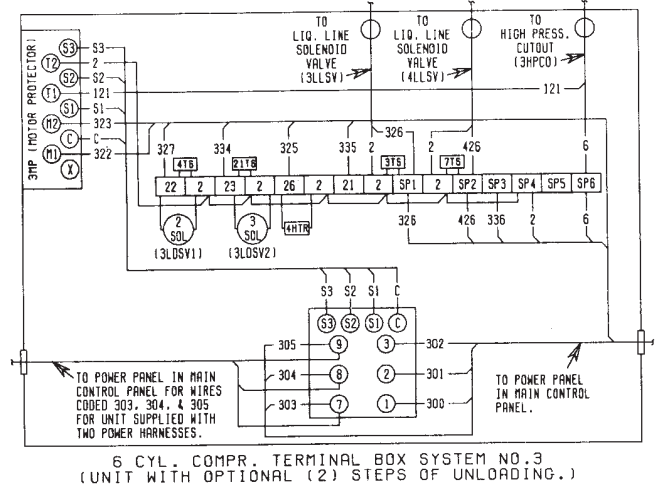
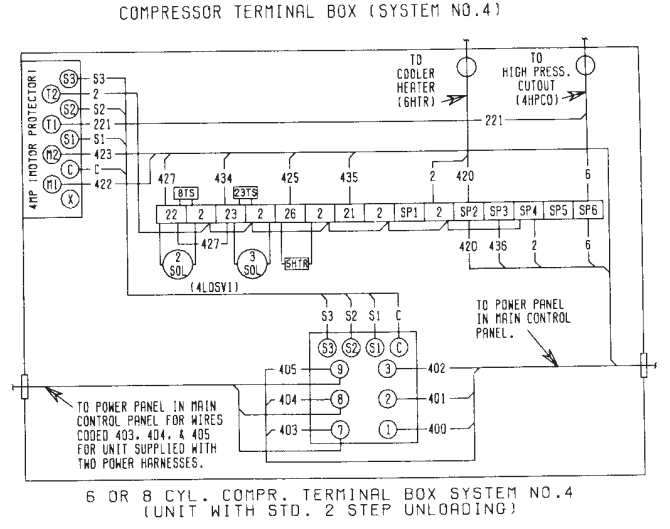
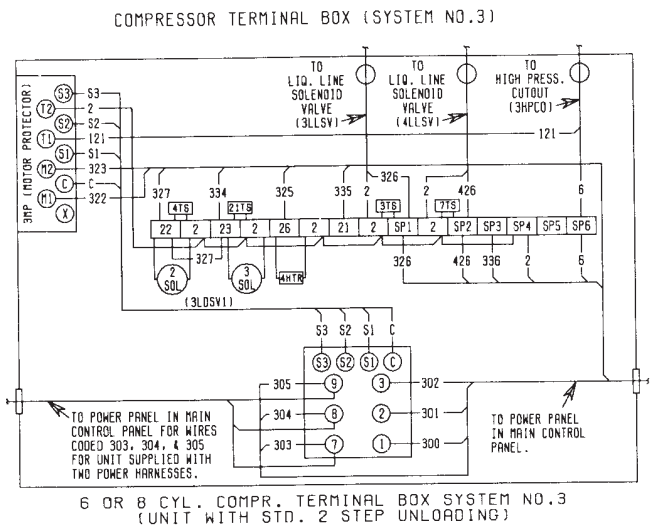


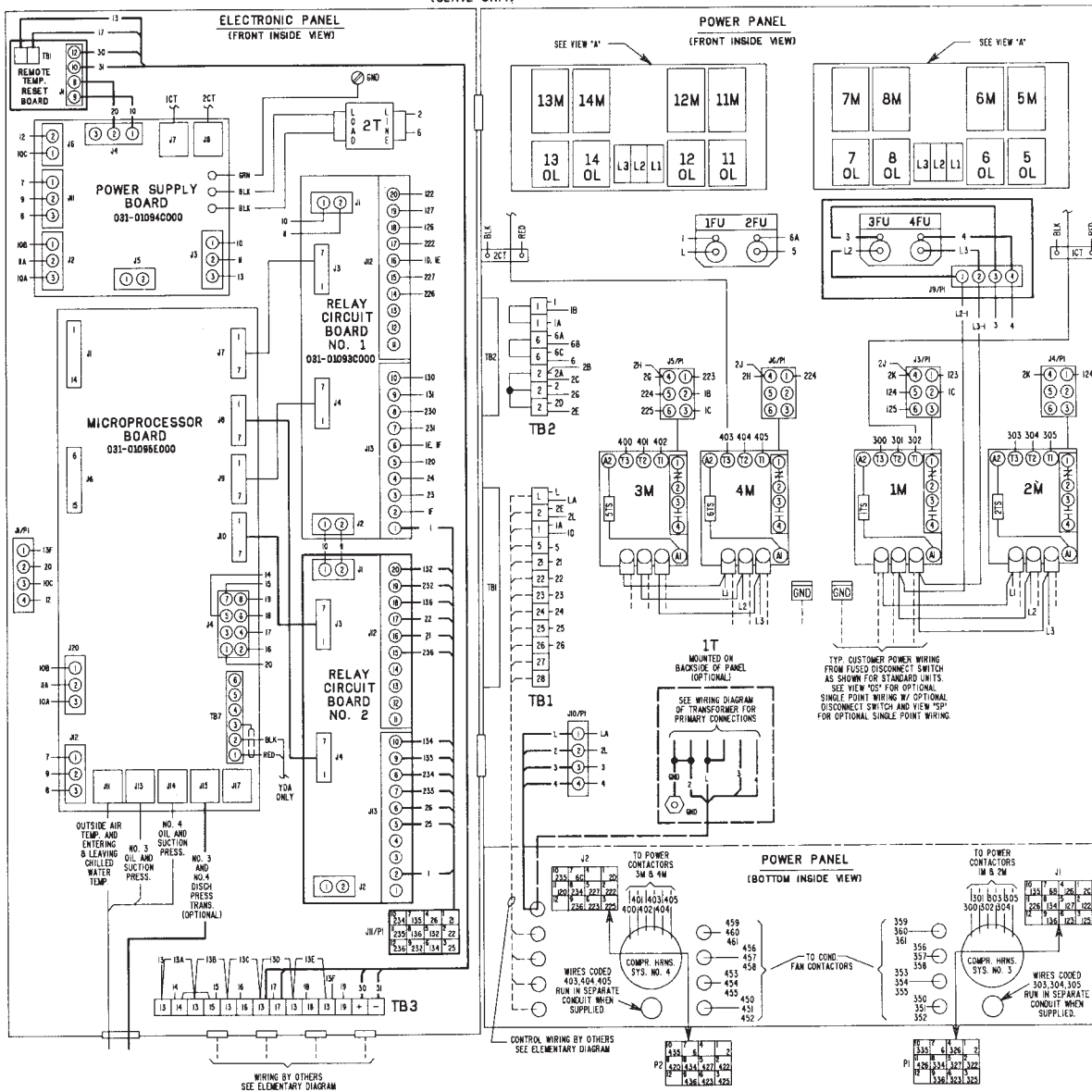
FIG. 19 - SLAVE MODULE SYSTEM WIRING (Cont'd)

SLAVE MODULE WIRING DIAGRAM

CONNECTION DIAGRAM, ELEC. BOX
YDA 340-460
(SLAVE UNIT)

035-09375E102
REV. A

- LEGEND**
- 1CT-2CT CURRENT TRANSFORMERS
 - 3FU,4FU TRANSFORMER FUSE (OPTIONAL)
 - 1FU CONTROL FUSE 20A
 - 2FU CONTROL FUSE 5A
 - 1M-4M COMPRESSOR CONTACTORS SYS. NO. 3
 - 9-10M CONDENSER FAN CONTACTORS SYS. NO. 3 (OPTIONAL)
 - 11-14M CONDENSER FAN CONTACTORS SYS. NO. 4
 - 15-16M CONDENSER FAN CONTACTORS SYS. NO. 4 (OPTIONAL)
 - 5-14OL MOTOR OVERLOADS RECEPTACLES/PLUGS
 - J/P RECEPTACLES/PLUGS
 - 1T CONTROL TRANSFORMER 2KYR (OPTIONAL)
 - 2T MICRO PANEL TRANSFORMER
 - TB1-TB3 TERMINAL BLOCKS
 - TS TRANSIENT SUPPRESSORS
- WIRING BY YORK
----- WIRING BY OTHERS
----- OPTIONAL WIRING
--- AND/OR COMPONENTS



LD01941

FIG. 20 - SLAVE MODULE CONNECTION DIAGRAM

SLAVE MODULE WIRING DIAGRAM

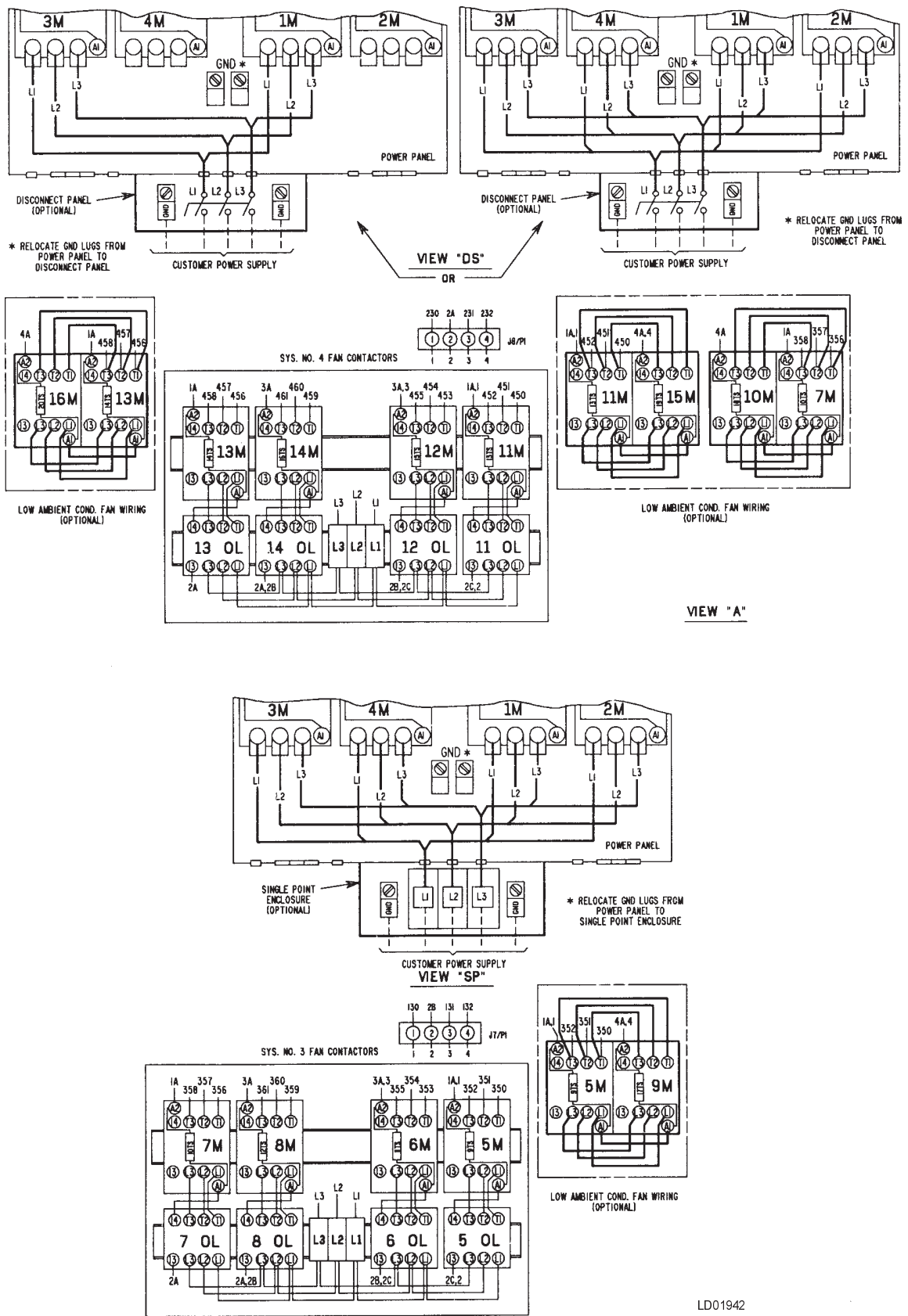


FIG. 20 – SLAVE MODULE CONNECTION DIAGRAM (Cont'd)

UNIT CONTROLS AND OPERATION

YORK MICROCOMPUTER CONTROL CENTER



FIG. 21 – MICROCOMPUTER CONTROL CENTER

26572A

INTRODUCTION

The YORK MicroComputer Control Center is a micro-processor based control system capable of multi-circuit control to maintain chilled liquid temperature. The chiller system is controlled by two control / power panels in a Master / Slave configuration. The Master is recognized by the attached operator display and keypad which provides control from a single operator location.

A 40 character display (2 lines of 20 characters) allows the operator to display system operating parameters as well as access programmed information already in memory. On the Master Control Panel, a keypad for programming and accessing setpoints, pressures, temperatures, motor current, cut-outs, daily schedule, options, and fault information is provided. No Control Panel is present on the Slave Panel.

A master ON / OFF switch is available to activate or de-activate the chiller system. Separate system (SYS) switches for each refrigerant system (up to 4) are provided on each Microprocessor Board.

Remote cycling, unloading, and chilled water temperature reset can be accomplished by used supplied dry contacts.

Compressor starting / stopping and loading / unloading decisions are performed by the Microprocessor to maintain leaving water temperature. These decisions are a

function of temperature deviation from setpoint and rate of change of temperature.

MICROPROCESSOR BOARD

The Microprocessor Boards are the controller and decision makers in the control panels. System inputs from pressure transducers, temperature sensors, and C.T.s are connected directly to the Microprocessor Board. The Microprocessor Board circuitry multiplexes these analog inputs, digitizes them, and constantly scans them to keep a constant watch on the chiller operating conditions. From this information, the Microprocessor then issues commands to the Relay Output Board to control contactors, solenoids, etc. for water temperature control and to react to safety conditions.

Two Microprocessor Boards, one acting as a master and one as a slave controller are present in the chiller. Control and programming for the entire chiller is provided by the Master Microprocessor Board. The master also has direct control of compressor 1 and 2. The Slave Microprocessor Board is responsible for direct control of compressor 3 and 4 as dictated by the Master's requirements. Communications and information transmission between the two micros is accomplished by a 2 wire RS-485 communications link.

Keypad commands are acted upon by the micro to change setpoints, cut-outs, scheduling, operating requirements, and to provide displays.

A +12V REG supply voltage from each Power Supply Board is converted to +5 REG by a voltage regulator located on the Microprocessor Board. This voltage is used to operate integrated circuitry on the board.

Four system switches located on each Microprocessor Board activate or de-activate the individual systems (compressors.)

POWER SUPPLY BOARD

The on-board switching power supply converts 24VAC from the 2T transformer to +12V REG which is supplied to the Microprocessor Board, Relay Board, and 40 Character Display to operate integrated circuitry.

A rectifier and filtering circuit for each motor current circuit rectifies and filters these signals to variable DC. These signals are then fed to the Microprocessor Board.

A Power Supply Board is present in both the Master and Slave Panel.

RELAY OUTPUT BOARD

These boards convert 0-12VDC logic level outputs from the Microprocessor Board to 120VAC levels used by motor contactors, solenoid valves, etc. to control system operation. The common side of all relays on the Relay Output Board is converted to +12V REG.

The open collector outputs of the Microprocessor Board energize the DC relays by pulling the other side of the relay coil to ground. When not energized, both sides of the relay coils will be at +12VDC potential.

Relay Output Boards are present in both the Master and Slave Panel.

CURRENT TRANSFORMER (C.T.)

A C.T. on the 3φ power wiring of each motor sends AC signals proportional to motor current to Power Supply Board which rectifies and filters the signal to variable DC voltage (analog). This analog level is then fed to the Microprocessor Board to allow it to monitor motor current.

40 CHARACTER DISPLAY

The 40 Character Display (2 lines of 20 characters), present only on the Master Panel, is a liquid crystal display used for displaying system parameters and operator messages. The display has a lighted background for night viewing as well as a special feature which intensifies the display for viewing in direct sunlight.

KEYPAD

A single operator keypad, present only on the Master Panel, allows complete control of the system from a central location. The keypad offers a multitude of commands available to access displays, program setpoints, and initiate system commands.

BATTERY BACK-UP

Each Microprocessor Board contains a Real Time Clock integrated circuit chip with an internal battery back-up. The purpose of this battery back-up is to assure any programmed values (setpoints, clock, cut-outs, etc.) are not lost during a power failure regardless of the time involved in a power outage or shutdown period.

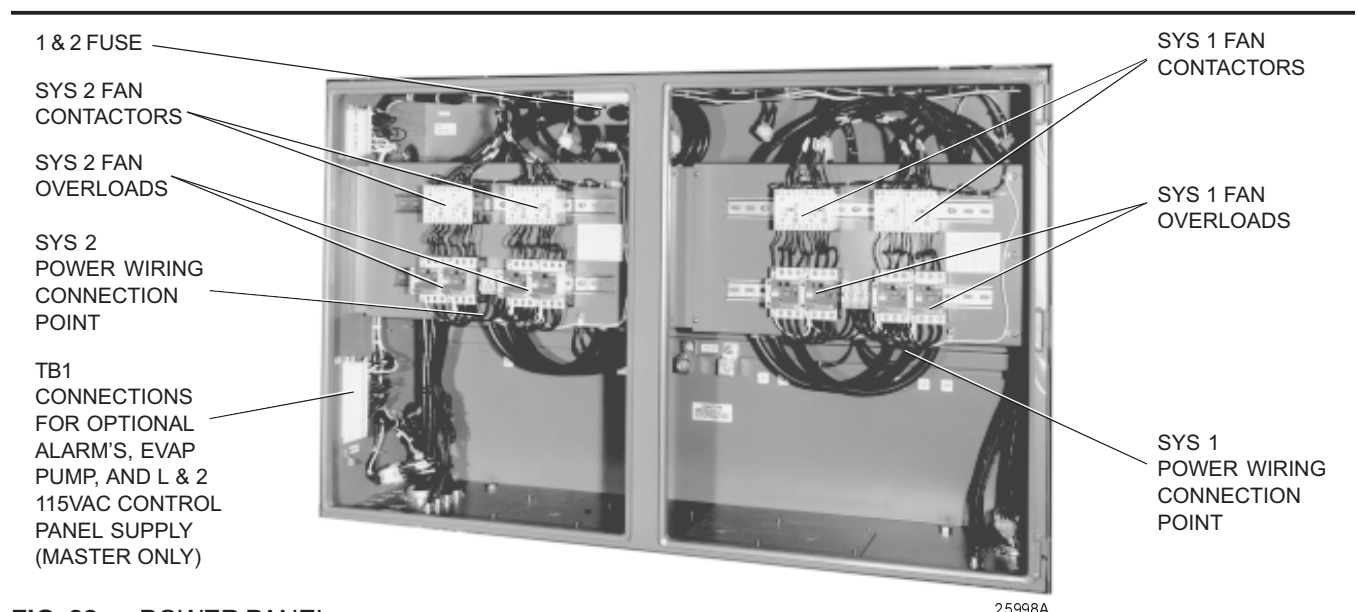
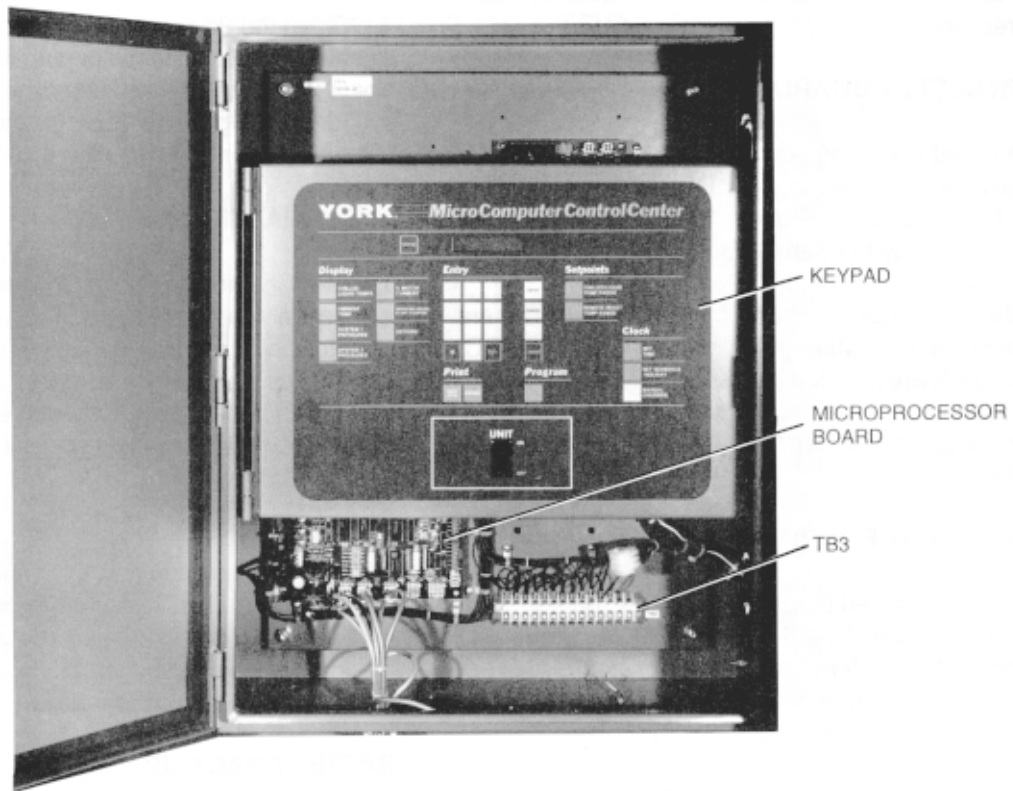


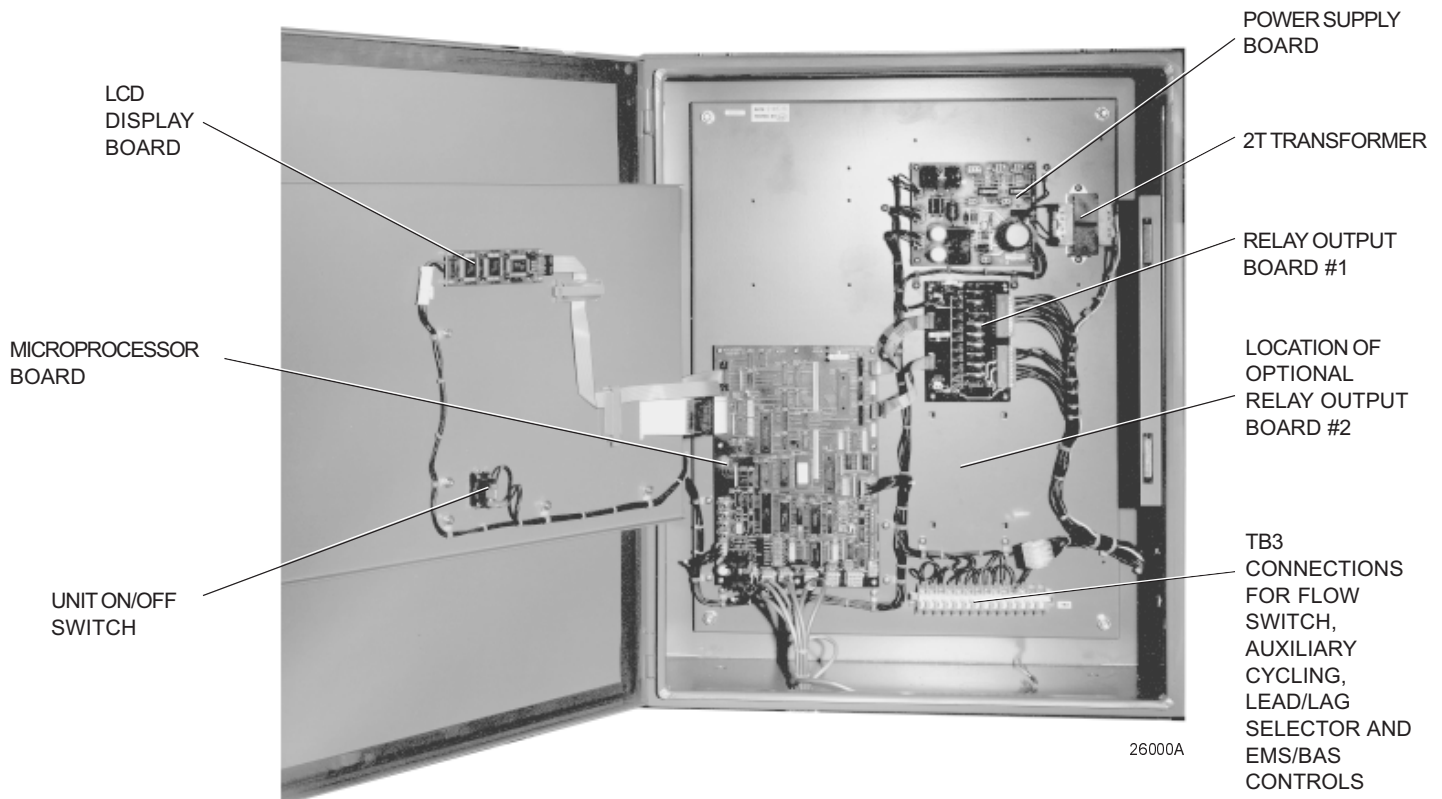
FIG. 22 – POWER PANEL

25998A



00026TG

FIG. 23 – MASTER CONTROL PANEL (EXTERIOR)



26000A

FIG. 24 – CONTROL PANEL (INTERIOR)

“DISPLAY” KEYS



26572A(D)

GENERAL

The DISPLAY keys allow the user to retrieve system pressures, system motor currents, chilled liquid temperatures, outdoor ambient temperature, compressor running times, number of compressor starts, and option information on the chiller package. This data is useful for monitoring chiller operation, diagnosing potential future problems, troubleshooting, and commissioning the chiller.

Data will be displayed on a “40” character display consisting of 2 lines of 20 characters. The display will update all information at a rate of about “2” seconds. Real-time data will be displayed for System 1 and 2 (Master Module). System 3 (Slave Module) is not real time and will only be updated every 10 seconds.

When a DISPLAY pushbutton is pressed, the corresponding message will be displayed for the Master Module and will remain on the display until another pushbutton is pressed. If the same key is pressed again, the corresponding message will be displayed for the Slave Module or the other system.

NOTE: The AMBIENT TEMP, OPTIONS and WATER TEMPERATURE keys will not display a second set of data.

Display Messages may show characters indicating “greater than” (>) or “less than” (<). These characters indicate the actual values are greater than or less than the limit values which are being displayed.

Each of the keys and an example of the typical corresponding display messages will be discussed in the text which follows.

Chilled Liquid Temp



A display indicating evaporator leaving and return water temperature for the Master Module is provided when this pushbutton is pressed.

```
L W T 1 = 4 9 . 2 D E G F
R W T 1 = 5 2 . 0 D E G F
```

When the key is pressed again, the display will be updated for the Slave Module evap. water temps.

```
L W T 2 = 4 9 . 2 D E G F
R W T 2 = 5 2 . 0 D E G F
```

The minimum limit on the display is “8.7 DEG F”. The maximum limit on the display is “84.5 DEG F”.

Ambient Temp



The outdoor ambient temperature is displayed when this pushbutton is pressed.

```
OUTSIDE AMBIENT AIR
= 7 5 . 9 D E G F
```

The minimum limit on the display is “0 DEG F”. The maximum limit on the display is “133.8 DEG F”.

System 1 and 2 Pressures

SYSTEM 1 & 2 PRESSURES

Oil pressure, suction pressure, and discharge* pressure on System 1 will be displayed when this pushbutton is pressed.

```
S Y S # 1 O I L = 7 2 P S I D
S P = 6 0 , D P = 2 2 9 P S I G
```

When the key is pressed again, the display will be updated for System 2.

```
S Y S # 2 O I L = 6 3 P S I D
S P = 6 1 , D P = 1 3 3 P S I G
```

The minimum limits are:

Oil Pressure: 0 PSID
Suction Pressure: 0 PSIG
Discharge Pressure: 0 PSIG

The maximum limits are:

Oil Pressure: 200 PSID
Suction Pressure: 200 PSIG
Discharge Pressure: 400 PSIG

System 3 & 4 Pressures

SYSTEM 3 & 4 PRESSURES

Oil pressure, suction pressure, and discharge* pressure on System 3 will be displayed when this pushbutton is pressed.

```
S Y S # 3 O I L = 6 3 P S I D
S P = 6 1 , D P = 1 3 3 P S I G
```

When the key is pressed again, the display will be updated for System 4.

```
S Y S # 4 O I L = 6 3 P S I D
S P = 6 1 , D P = 1 3 3 P S I G
```

The minimum limits are:

Oil Pressure: 0 PSID
Suction Pressure: 0 PSIG
Discharge Pressure: 0 PSIG

The maximum limits are:

Oil Pressure: 200 PSID
Suction Pressure: 200 PSIG
Discharge Pressure: 400 PSIG

* Discharge Pressure Readout is an option. Without this option, the display will read a fixed value.

% Motor Current

% MOTOR CURRENT

Motor currents for both System 1 and 2 are displayed when this pushbutton is pushed.

The minimum limits on the display is "0% FLA". The maximum limit on the display is "115% FLA".

```
I M T R 1 = 5 7 % F L A
I M T R 2 = 6 5 % F L A
```

When the key is pressed again, the display will be updated for Systems 3 and 4.

```
I M T R 3 = 5 7 % F L A
I M T R 4 = 6 5 % F L A
```

Operating Hours Start Counter

OPER. HOURS START COUNT.

Accumulated running hours on each compressor is displayed. The counters for an individual system count to a total of 99,999 hours before rollover. Accumulated starts on each compressor are also displayed. A total of 99,999 starts can be logged on a system before the counter will rollover.

```
H R S 1 = 1 4 3 , 2 = 3 8 2
S T R 1 = 1 8 , 2 = 3 7
```

The numbers "1" and "2" on the display message indicate compressor #1 and compressor #2.

Pressing the key again will update the display for Systems 3 and 4.

```
H R S 3 = 1 4 3 , 4 = 3 8 2
S T R 3 = 1 8 , 4 = 3 7
```

The numbers "3" and "4" on the display message indicate compressor #3 and compressor #4.

These counters are zeroed at the factory or will indicate only run time and number of starts logged during factory testing at the time of shipment.

Options

OPTIONS

The OPTIONS key provides a display of options which have been selected by the user. These options are selected by the S1 Dip Switch on each Microprocessor Board (Fig. 17). Proper programming of the switch is

important during commissioning of the chiller. The OPTIONS display allows a means of verifying the Dip Switch positions without looking at or handling the actual Microprocessor Board. It also eliminates visual inspection of the sometimes difficult to determine Dip Switch position.

CAUTION: *The switch positioning on the Slave Microprocessor Board **MUST** be identical to the Master for all switches but Switch 7 (Lead/Lag) which may be different but it is not recommended. Otherwise, improper slave operation will result. Slave Microprocessor Board Switch positioning **MUST** and can only be done by visually comparing it to the Master Microprocessor Board.*

When the OPTIONS key is pressed, the following message will first be displayed for 3 seconds:

**THE FOLLOWING
ARE PROGRAMMED**

“8” Option Messages relating only to the Master Microprocessor Board will then follow. Each will be displayed for 3 seconds before the next display is automatically indexed. When all messages are displayed, the display message will automatically change to show a chiller “STATUS” message, just as if the Status key was pressed.

Refer to Table 1 for a list of the displays and the corresponding switch positions in the order they appear. Two possible messages may appear for each of the eight messages depending on the Dip Switch position.

A detailed explanation of the meaning of each message and a guide to programming the associated switch is provided on page 38.

Fig. 17 shows the location and verification of switch positioning of S1.

Fig. 17 shows the location and verification of switch positioning of S1.

**MIXED
WATER TEMP**

Mixed Water Temp

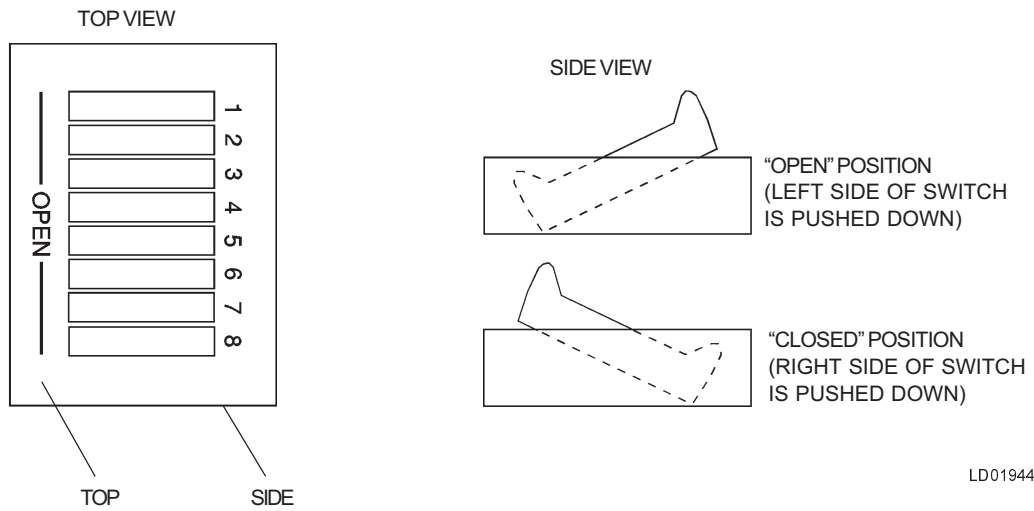
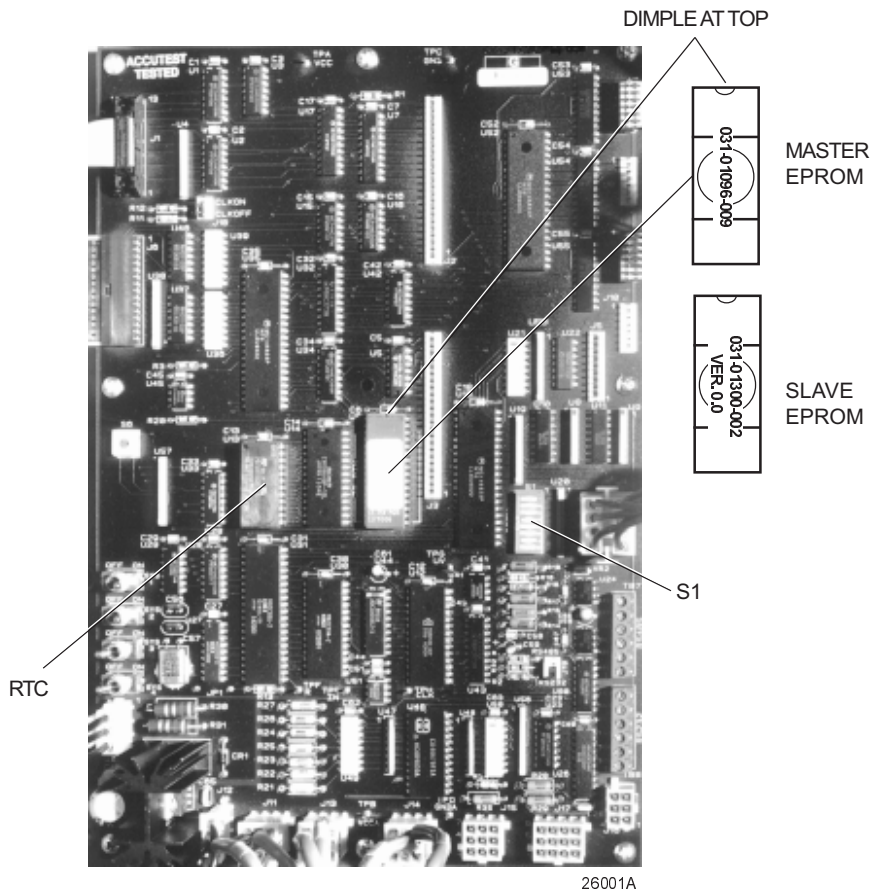
The MIXED WATER TEMPERATURE key provides a display of the mixed leaving water temperature from the two evaporators.

**MIXED WATER
TEMP = 42.1 DEG F**

The minimum limit on the display is “9.1 DEG F”. The maximum limit on the display is “84.2 DEG F”.

TABLE 1 – SWITCH POSITION AND DISPLAY

DISPLAY/ SWITCH	SWITCH “OPEN” MESSAGE	SWITCH “CLOSED” MESSAGE
1	COMFORT COOLING	BRINE & PROCESS DUTY
2	STANDARD AMBIENT	LOW AMBIENT CONTROL
3	LOCAL CONTROL MODE	REMOTE CONTROL MODE
4	RETURN WATER CONTROL	LEAVING WATER CONTROL
5	ENGLISH UNITS READOUT	METRIC UNITS READOUT
6	STANDARD CONDENSER FAN CONTROL	SHARED CONDENSER FAN CONTROL
7	MANUAL LEAD / LAG	AUTOMATIC LEAD / LAG
8	AMBIENT & DISCH PR FAN CONTROL	DISCHARGE PRESSURE FAN CONTROL



LD01943

LD01944

FIG. 25 – DIP SWITCH S1 AND EPROM LOCATION

SWITCH 1**OPEN:**

The chilled liquid temperature setpoint can only be programmed from 40-70°F.*

CLOSED:

The chilled liquid temperature setpoint can be programmed from 15-70°F. *

SWITCH 2**OPEN:**

The low ambient cut-out is fixed at 25°F.

CLOSED:

The low ambient cut-out is programmable from 0-50°F. A low ambient kit **MUST** be installed if the switch is placed in this position.

SWITCH 3**OPEN:**

DO NOT USE this mode at present.

CLOSED:

This should be selected in all applications, otherwise printer communication problems may result. This mode will also be necessary to allow operation of options to be developed in the future.

SWITCH 4**OPEN:**

Chiller control will be from return water temperature. This **MUST NOT** be selected.

CLOSED:

Chiller control will be from leaving water temperature. This **MUST** be selected.

SWITCH 5**OPEN:**

Display messages will show units of measure in English units (°F, PSI, etc.)

CLOSED:

Display messages will show units of measure in Metric units (°C, KPa, etc.)

SWITCH 6**OPEN:**

This **MUST** be selected for chillers with "4" or more fans where each refrigerant system will have fans of its own.

CLOSED:

DO NOT USE.

* Positioning of this switch also affects the range of adjustments of the Suction Pressure Cut-out (page 48) and the Low Leaving Water Temp Cut-out (page 47).

SWITCH 7

OPEN:

MANUAL
LEAD / LAG

SYS 1 can be selected as the lag compressor by closing a user supplied contact between Terminal 13 and 19. See page 72.

CLOSED:

AUTOMATIC
LEAD / LAG

In this mode the micro determines which compressor is assigned to the lead and the lag. A new lead/lag assignment is made whenever both compressors shut down. The micro will then assign the "lead" to the compressor with the shortest anti-recycle time.

SWITCH 8

OPEN:

AMBIENT & DISCH PR
FAN CONTROL

Fan control will be by outside ambient temp. This will be the standard mode of fan control for normal operation. In this mode, maximum chiller efficiency will be achieved. If the Low Ambient option is installed, the fan control will automatically change to pressure control at temperatures below 25°F. See page 76 for fan control sequence.

CLOSED:

DISCHARGE PRESSURE
FAN CONTROL

Fan control is by discharge pressure only. This mode of fan control will increase discharge pressure. It should be used if nuisance low suction pressure faults are experienced. See page 88 for fan control sequence.

*NOTE: Discharge pressure transducers **must** be installed. These are optional (Discharge Pressure Read-out Option) unless a Low Ambient Kit is installed.*

“STATUS” KEY



26572A(D)

GENERAL

Pressing the STATUS key will enable the operator to determine current chiller operating status as a whole and as individual systems. The messages displayed will include running status, cooling demand, fault status, external cycling device status, and anti-recycle timer status. The display will be a single message relating to the highest priority message as determined by the micro. When System Status is being displayed, System 1 and System 2 information will be displayed when the STATUS key is first pressed. System 3 and 4 information will be displayed if the STATUS key is pressed again. Status messages fall into the categories of General and Fault Status with each of the categories discussed below.

GENERAL STATUS MESSAGE

Each of the general status messages with a description of its meaning will follow. In the case of messages which apply to individual systems, SYS 1 and SYS 2 or SYS 3 and SYS 4 messages will both be displayed and may be different. “X”s in the sample displays indicate numerical values will appear in actual displays.

UNIT SWITCH IS IN THE OFF POSITION

This message informs the operator that the “UNIT” switch on the Control Panel is in the OFF position, which will not allow the chiller to run.

DAILY SCHEDULE SHUTDOWN

The DAILY SCHEDULE SHUTDOWN message indicates that the schedule programmed into the “CLOCK” “SET SCHEDULE/HOLIDAY” is keeping the chiller from running.

**SYS # 1 NO RUN PERM
SYS # 2 NO RUN PERM**

Run Permissive is an indicator that an external cycling contact (i.e. flow switch) connected to terminals 13 and 14 is open, or a system switch(es) on the Microprocessor Board is in the OFF position. Whenever the contact is open or a switch is OFF, the NO RUN PERM will be displayed.

**SYS # 3 NO COOL LOAD
SYS # 4 NO COOL LOAD**

This message informs the operator that the chilled liquid temperature is below the point (determined by the setpoint and control range) that the micro will bring the lead system on, or that the micro has not loaded the

system far enough into the loading sequence to be ready to bring the lag system or Slave Module ON. The lag system and/or Slave Module will display this message until the loading sequence is ready for the lag systems to start (TEMPERATURE DEMAND in the OPER DATA displays must be "5" or above before cooling load is established for an additional system to run).

```
SYS # 1   DSCH LIMITING
SYS # 2   DSCH LIMITING
```

Discharge Pressure Limiting takes affect when discharge pressure nears the point at which the high pressure cut-out will shut the system down causing total loss of cooling. When this message appears, discharge pressure has exceeded the user programmable threshold and the micro is unloading the affected system to prevent shutdown on a manual high pressure cut-out. Re-loading will take place when discharge pressure has dropped 60 PSIG below the threshold.

```
SYS # 1   COMP RUNNING
SYS # 2   COMP RUNNING
```

The COMP RUNNING message indicates that the respective compressor is running due to demand.

```
SYS # 1   AR TMR XXX S
SYS # 2   AR TMR XXX S
```

The anti-recycle timer message shows the amount of time left on the respective anti-recycle timer. This message is displayed when demand requires the respective system to start but is being held off due to the timer.

```
MANUAL
OVERRIDE
```

If the MANUAL OVERRIDE key is pressed, the STATUS display will display the message shown above. This will indicate that the Daily Schedule is being ignored and the chiller will start-up when water temperature allows, UNIT Switch permits, and SYSTEM Switches permit.

```
SYS # 3   AR TMR XX S
SYS # 4   AR TMR XX S
```

The anti-coincident timer is a software feature that guards against 2 compressors starting simultaneously. This assures instantaneous starting current does not become excessively high due to simultaneous starts. The micro limits the time between compressor starts to 1 minute regardless of demand of the anti-recycle timer being timed out. The time shown on the anti-coincident timer is the time left on the timer before the respective system will start. Demand must be present for the message to be displayed and will only appear when the anti-recycle timer has timed out.

This is a priority message and cannot be overridden by anti-recycle messages, fault messages, etc. when in the STATUS Display mode. Therefore, do not expect to see any other STATUS messages when in the MANUAL OVERRIDE mode. MANUAL OVERRIDE is to only be used in emergencies or for servicing.

```
LOSS OF COMM LINK
TO SLAVE PANEL
```

This message indicates that the Master Microprocessor Board has lost communications with the Slave Microprocessor Board. This loss of communications is normally a result of disconnecting the RS-485 communications cable between the two control panels.

```
SYS # 3   SUCT LIMITING
SYS # 4   SUCT LIMITING
```

The Suction Pressure Limiting message indicates a system is being unloaded by the micro even though demand requires loading. This safety assures that refrigerant returning to the compressor provides proper motor cooling, assuring that motor life is not compromised. This safety will only activate when the chilled liquid temperature is excessively high. Unloading will take place when suction pressure exceeds the user programmable threshold of 80-105 PSIG. Reloading will take place when suction pressure drops to 10 PSIG below the safety threshold.

FAULT STATUS MESSAGES

Fourteen possible fault messages may appear when the STATUS key is pressed. Whenever a fault message appears, the safety thresholds on the chiller have been exceeded and the entire chiller or a single system will be shut down and locked out. A detailed explanation of the shutdown thresholds and associated information related to each fault is covered in the SYSTEM SAFETIES section (Page 57).

Chiller shutdown faults will shut the entire chiller down and lock it out, while system shutdown faults will only shut down and lock out the affected system (compressor).

A list of the fault messages is shown below:

CHILLER FAULTS

CHILLER FAULT :
LOW AMBIENT TEMP

CHILLER FAULT :
LOW WATER TEMP

CHILLER FAULT :
HIGH AMBIENT TEMP

CHILLER FAULT :
115VAC UNDER VOLTAGE

SYSTEM FAULTS

SYS # 1 HIGH DSCH

SYS # 2 HIGH DSCH

SYS # 1 LOW OIL PRESS

SYS # 2 LOW OIL PRESS

SYS # 1 LOW SUCTION

SYS # 2 LOW SUCTION

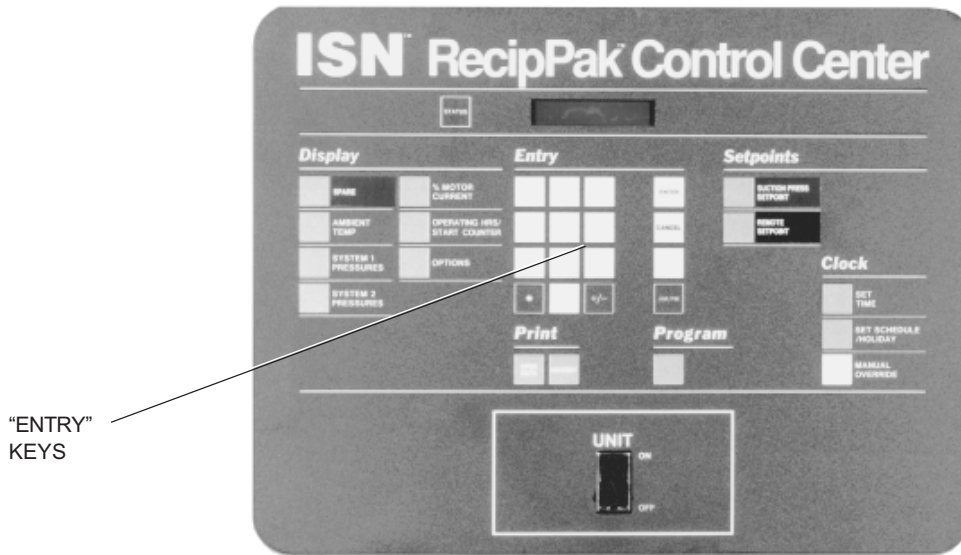
SYS # 1 MOTOR CURRENT

SYS # 2 MOTOR CURRENT

SYS # 1 LLSV NOT ON

SYS # 2 LLSV NOT ON

“ENTRY” KEYS

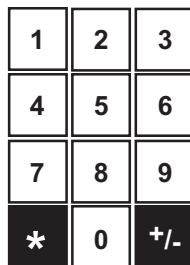


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GENERAL

The ENTRY key allows the user to change programmed numerical values such as chiller setpoints, cut-outs, clock, etc.

Numerical Keypad



The NUMERICAL keypad provides all keys needed to program numerical values as required.

The “*” Key is used to designate holidays when programming special start and stop times for designated holidays in the SET SCHEDULE/HOLIDAY display.

The “+/-” key allows programming -°C setpoints and cut-outs in the metric display mode.

Enter Key

ENTER

The ENTER key must be pushed after any change is made to setpoints, cut-outs or the system clock. Pressing this key tells the micro to accept the new values into memory.

If this is not done, the new numbers entered will be lost and the original values will be returned.

The ENTER key is also used to scroll through available data after any one of the following keys is pressed:

PROGRAM
SET SCHEDULE/HOLIDAY
OPER DATA
HISTORY

Cancel Key

CANCEL

The CANCEL key allows the user to change errors in the data being programmed into memory.

When the CANCEL key is pressed, any data which has been keyed in, but not entered, will be erased. The original values will re-appear on the display and the cursor will return to the first character to be programmed in the display message.

AM/PM Key

AM/PM

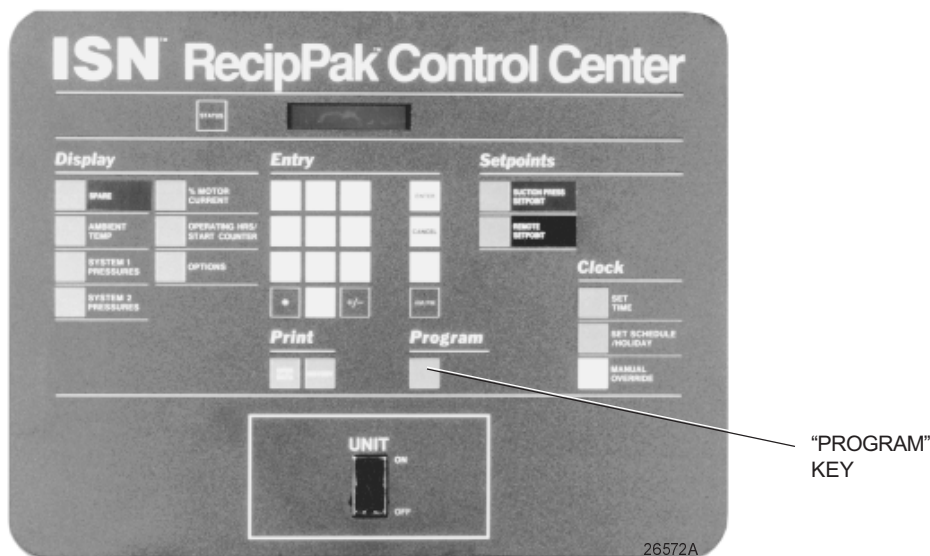
The AM/PM key allows the user to change AM/PM while programming the correct time in the SET TIME display. The same key allows changing the AM/PM schedule while programming daily chiller start and stop times in the SET SCHEDULE/HOLIDAY display.

Advance Day Key

ADVANCE
DAY

The ADVANCE DAY key advances the day when the SET TIME display is being programmed. The day is normally advanced to correspond to the current day of the week. The day will advance a day at a time, each time the key is pressed.

“PROGRAM” KEY PROGRAMMING USER PROGRAMMABLE SAFETIES & LIMITS



GENERAL

Pushing the PROGRAM key allows the user to program “10” system operating limits. These limits include cut-out points for safeties, anti-recycle timer duration, and the reaction time of the microprocessor to abrupt changes in the chilled water temperatures.

After the PROGRAM key is pressed, the micro will first respond by displaying the DISCHARGE CUT-OUT. As the “10” limits are displayed, they may be reprogrammed using the “12” ENTRY keys. New values will be programmed into memory when the ENTER key is pushed. The ENTER key must also be used to advance the display as the operator views the “10” system operating limits. Each time the key is pushed, the display will advance to the next limit.

If the operator attempts to enter an unacceptable value, the micro will respond with a momentary message indicating the value selected has been ignored. This error message is shown:

**OUT OF RANGE
TRY AGAIN!**

The “10” programmable limit displays are shown and described below along with the range of values which the microprocessor will accept for each limit.

THESE VALUES MUST BE CHECKED AND PROPERLY PROGRAMMED WHEN COMMISSIONING THE CHILLER. FAILURE TO PROPERLY PROGRAM THESE VALUES MAY CAUSE DAMAGE TO THE CHILLER OR OPERATION PROBLEMS.

DISCHARGE CUT-OUT

**DISCHARGE CUT OUT
= 395 PSIG**

The DISCHARGE CUT-OUT is a microprocessor back-up for the mechanical high pressure cut-out located in each refrigerant circuit. Typically, chillers with air-cooled condensers should have the cut-out set at 395 PSIG. Chillers with water-cooled condensers normally require the cut-out to be set at 275 PSIG.

NOTE: In some water cooled condenser installations, the possibility exists for the condenser water pump or the cooling tower to not be in operation when the chiller starts. This causes the discharge pressure to rise so rapidly that even though the mechanical high pressure cut-out is shutting down the compressor, the flywheel effect may cause the pressure to continue to rise causing the relief valve to open with a subsequent refrigerant loss. By programming the cut-out at slightly below the typical manual cut-out of 275 PSIG, refrigerant loss due to system operation problems will be eliminated.

To program the DISCHARGE CUT-OUT, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 200-399 PSIG for this cut-out. For this cut-out to be functional, the Discharge Pressure Read-out Option must be installed.

NOTE: It is required to first key in a "0" when programming this cut-out (Example: 0395 PSIG).

More details on this safety are outlined in the SYSTEM SAFETIES section.

OUTSIDE AIR TMP LOW CUT-OUT

OUTSIDE AIR TMP LOW
CUTOUT = 25.0 F

The OUTSIDE AIR TMP LOW CUT-OUT allows the user to select the chiller low ambient temperature cut-out point. If the ambient falls below this point the chiller will shut down. Restart can occur, if demand allows, when temperature rises above the cut-out. This only applies to outdoor air-cooled chillers.

For normal ambient applications, the cut-out is set at 25.0°F and is NOT programmable. However, some users may set the cut-out higher to shut down the chiller and take advantage of other less costly cooling sources. In this case, S1 Dip Switch #2 on the Micro Logic Board must be in the CLOSED position for Low Ambient Control to allow programming the cut-out above 25°F.

Low ambient applications in ambients less than 25.0°F require a low ambient kit to be installed. Otherwise nuisance low pressure and low motor current trips will result. If a low ambient kit is installed, the cut-out may be lowered as needed below 25°F. If operation is occasionally needed below 0°F, the cut-out should be set at 00.0°F. This will allow operation at any temperatures since the micro is only able to recognize temperatures above 1°F, regardless of the display.

NOTE: Operation below 0°F may cause other types of nuisance safety shutdowns, but occasional shutdowns can usually be tolerated since the need for sustained operation at these temperatures is unlikely and temperatures rarely stabilize for any length of time below 0°F.

The micro will accept a range of programmable values between 00.0° - 50.0°F for this cut-out, if S1 Dip Switch #2 on the Micro Logic Board is in the CLOSED position. In the OPEN position, a fixed 25°F cut-out is recognized.

To program the OUTSIDE AIR TMP LOW CUT-OUT, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

OUTSIDE AIR TMP HIGH CUT-OUT

OUTSIDE AIR TMP HIGH
CUTOUT = 130.0 F

The OUTSIDE AIR TMP HIGH CUT-OUT is selectable to establish the high ambient cut-out point. If the ambient rises above this point, the chiller will shut down. Restart can occur when temperature drops below the cut-out. This only applies to outdoor air-cooled chillers.

This cut-out is normally set at 130.0°F to allow operation to the absolute maximum temperature capability of the electro-mechanical components.

To program the OUTSIDE AIR TMP HIGH CUT-OUT, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 100.0° - 130.0°F for this cut-out.

DISCHARGE PRESSURE UNLOAD

DISCHARGE PRESSURE
UNLOAD = 360 PSIG

The DISCHARGE PRESSURE UNLOAD point is a programmable limit to keep the system from faulting on the high discharge pressure cut-out should a system problem or chiller problem occur. A typical problem would be if the cooling tower would become dirty on a water-cooled system. Pressure would rise and eventually cause the chiller to fault causing total loss of cooling. By unloading the compressors at high discharge pressures, the chiller is allowed to continue to run automatically at reduced capacity until the dirty cooling tower can be attended to.

When the unload point is reached, the micro will automatically totally unload the affected compressor. Typical maximum programmed limits would be 375 PSIG for air-cooled chillers with 395 or 405 PSIG high pressure cut-outs and 255 PSIG for water-cooled chillers with 275 PSIG cut-outs.

Reloading will occur when the discharge pressure drops to 60 PSIG below the programmed unload pressure and will increment one stage at a time as dictated by the loading timers.

To program the DISCHARGE PRESSURE UNLOAD, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 200-390 PSIG for the unload point. For this feature to be functional, the Discharge Pressure Read-out Option must be installed.

NOTE: It is required to first key in a "0" when programming this cut-out (Example: 0375 PSIG).

SUCTION PRESSURE UNLOAD

SUCTION PRESSURE
UNLOAD = 090 PSIG

The SUCTION PRESSURE UNLOAD point is a programmable limit designed to assure that suction gas returning to the compressor is cool enough to provide adequate compressor cooling.

If the suction pressure rises to the suction pressure unload pressure, the micro will automatically totally unload the affected compressor which reduces motor heating.

Reloading will occur when the suction pressure drops to 10 PSIG below the programmed unload pressure and will increment one stage at a time as dictated by the loading timers.

This safety will only come into action on a very hot water start with related high system suction pressure. Its sole purpose is to prolong motor life.

To program the SUCTION PRESSURE UNLOAD, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 80-105 PSIG for the unload point.

NOTE: When programming values from 80-99 PSIG, it is required to first key in a "0". Example: 085 PSIG.

RATE CONTROL TEMP

RATE CONTROL TEMP
= 08.0 F

The RATE CONTROL TEMP establishes a temperature range over which the micro may override normal system loading timers and react to the actual rate of change of return and leaving water temperature. This temperature range is slightly above the setpoint with its band width being programmable. This control works in conjunction with the RATE SENSITIVITY which is also programmable.

These controls allow the chiller to adapt to a full range of applications. Depending on how the controls are set up, the chiller can be adapted to provide maximum response, demand limiting/energy saving, or reduced loader and compressor cycling. **Typically, this value should be programmed for 00.1°F. When programming values like 00.1°F, it is first required to key in "00". Example: 00.1°F.** Additional details for programming this control will be discussed on page 54.

ANTI RECYCLE TIME

ANTI RECYCLE TIME
= 600 SECS

The ANTI RECYCLE TIME selection allows the user to select the compressor anti-recycle time to best suit his needs. Motor heating is a result of inrush current when the motor is started. This heat must be dissipated before another start takes place or motor damage may result. The anti-recycle timer assures the motor has sufficient time to cool before it is again restarted.

An adjustable timer allows for the motor cooling required, but gives the user the ability to extend the timer to cut down on cycling. In some applications fast compressor start response is necessary; in others, it is not. These needs should be kept in mind and the timer should be adjusted for the longest period of time tolerable. Although 300 seconds is adequate motor cooling time, longer periods will allow even more heat dissipation, reduce cycling, and possibly increase motor life.

To program the ANTI RECYCLE TIME, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 300-600 seconds for this operating control.

LEAVING WATER TEMP CUT-OUT

LEAVING WATER TEMP
CUTOUT = 36.0 F

The LEAVING WATER TEMP CUT-OUT protects the chiller from an evaporator freeze-up should the chilled liquid temp drop below the freeze point. This situation could occur under low flow conditions or if the micro panel SETPOINT values are improperly programmed. Anytime the leaving chilled liquid temperature (water or glycol) drops to the cut-out point, the chiller will shut down. Restart will occur when temperature rises above the cut-out if the anti-recycle timers are satisfied.

For chilled water applications (comfort cooling, SW1 OPEN), the cut-out is automatically set at 36.0°F. This covers applications where leaving water temperatures are not designed to go below 40.0°F. If chilled liquid (glycol) temperatures are required below 40°F, the cut-out should be programmed for 4°F below the desired leaving chilled liquid temperature.

To program the LEAVING WATER TEMP CUT-OUT the BRINE & PROCESS MODE (SW1, CLOSED) must be selected, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next programmable limit.

The micro will accept a range of programmable values between 08.0° - 36.0°F for this cut-out.

SUCTION PRESSURE CUT-OUT

S U C T I O N P R E S S U R E
C U T O U T = 4 4 P S I G

The SUCTION PRESSURE CUT-OUT protects the chiller from an evaporator freeze-up should the system attempt to run with a low refrigerant charge. Anytime the suction pressure drops below the cut-out point, the system will shut down.

NOTE: There are some exceptions, where suction pressure is permitted to temporarily drop below the cut-out point. Details are outlined in the SYSTEM SAFETIES section.

For chilled water applications, the cut-out should be set at 44 PSIG. If glycol or brine is utilized with leaving water temperature designs below 40°F, the cut-out should be adjusted according to concentration. A rule-of-thumb cut-out design is to drop the cut-out 1 PSIG below 44 PSIG for every degree °F of leaving glycol below 40°F. In other words, 30° glycol requires a 34 PSIG suction pressure cut-out.

To program the SUCTION PRESSURE CUT-OUT, key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next programmable limit.

The micro will accept a range of programmable values between 20-70 PSIG for this cut-out. In the COMFORT COOLING MODE (SW1 OPEN), the cut-out is adjustable from 44-70 PSIG. In the BRINE & PROCESS MODE (SW1 CLOSED), the cut-out is adjustable from 20-70 PSIG.

RATE SENSITIVITY

R A T E S E N S I T I V I T Y
= 5 . 0 F / M I N .

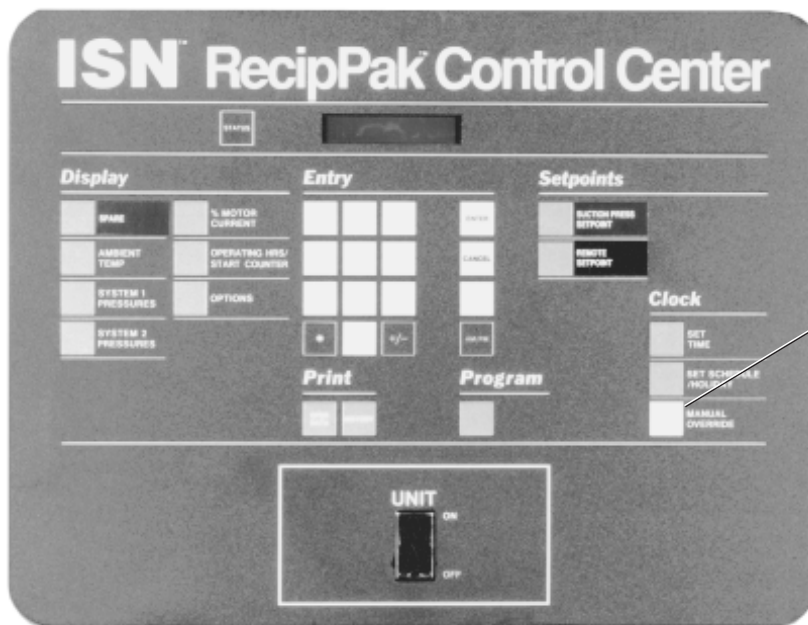
The RATE SENSITIVITY establishes the rate of change of return or leaving water temperature where the micro will over-ride the normal 30-150 seconds per stage loading rate which is based on error between setpoint and actual temperature.

The RATE SENSITIVITY is active when the leaving chilled liquid temperature is in the RATE CONTROL TEMP RANGE. In this range, if water temperature is dropping faster than the RATE SENSITIVITY setting, the micro will not load any more stages because water temperature is dropping quickly. This provides demand limiting and reduces loader/compressor cycling and overshoot. If quick response is needed, RATE SENSITIVITY can be programmed accordingly. When temperatures are in the RATE CONTROL TEMP RANGE, loading will occur in intervals according to both rate of water temperature change and error in water temperature versus setpoint. This will override the typical 30-150 seconds per stage based on error in setpoint versus actual water temperatures. If water temperature is dropping faster than the RATE SENSITIVITY, no further loading will result and in some cases, the chiller will unload to slow temperature drop.

RATE SENSITIVITY is also active in the CONTROL RANGE in RETURN OR LEAVING WATER CONTROL. Further loading will not occur if water temperature is dropping too fast regardless of whether temperature calls for further loading.

Typically, this value should be programmed for 5.0°F. Additional details for programming this control will be discussed on page 54.

“CLOCK” KEYS PROGRAMMING THE SYSTEM CLOCK AND DAILY START/STOP SCHEDULE



26572A

GENERAL

The “CLOCK” is an internal system feature that allows the microprocessor to continuously monitor the time of the day. The micro will display actual time as well as the day of the week and the date when programmed. This feature allows the microprocessor to provide an internal automatic time clock feature for starting and stopping the chiller for each individual day of the week. Also provided is a “HOLIDAY” feature which allows special start/stop programming for designated holidays.

The internal clock and schedule programming eliminates the need for an external time clock. Automatic chiller start and stop will occur according to the programmed schedule.

If the user desires not to utilize the schedule feature, the SET SCHEDULE/HOLIDAY can be programmed to run the chiller on demand as long as the “UNIT” and “SYS” switches are ON.

Typical display messages will be shown which apply to each key.

PROGRAMMING THE DAY, TIME AND DATE

Set Time



A message showing the day, time, and date will be displayed when the SET TIME key is pressed.



To program the day, time, and date, first press the ADVANCE DAY key until the appropriate day of the week is displayed. The day will advance each time the key is pressed.

The cursor will already be below the first digit of the time. Key in the new time, if required. Be sure to key in a “0” before the other digits for times before 10 o’clock., i.e. 08:01.

After the time is keyed in, the cursor will advance to the AM/PM designation. To reprogram, press the AM/PM key. When the key is pressed, the display will change to the opposite time period. If no change is required, begin keying in the required date (the cursor will automatically skip to the first digit of the date [month] when a “number key” is pressed and the number will be placed in the first position).

NOTE: The AM/PM key can only be pressed once. If an error is made, press the CANCEL key and begin again.

The date may be keyed in after AM/PM. The sequence of the message display is month, day, and year. Two digits must be entered for each of these items. Therefore, a leading “0” may be required.

Once the desired information is keyed in, it may be stored in memory by pressing the ENTER key. After the ENTER key is pressed, the cursor will move under the "T" of TODAY.

The micro will accept any valid time or date. If an out of range value is entered, the micro will display the following message for 3 seconds before it reverts back to the SET TIME display message to let the user know that another try at reprogramming is necessary.

```
OUT OF RANGE
TRY AGAIN!
```

PROGRAMMING THE DAILY START/STOP AND HOLIDAY SCHEDULE

Set Schedule/Holiday

```
SET SCHEDULE
/ HOLIDAY
```

Messages showing the start/stop schedule of each day of the week as well as the holiday start/stop schedule can be displayed after the SET SCHEDULE/HOLIDAY key is pressed. The display can be scrolled through day-by-day simply by repetitively pressing the ENTER or ADVANCE DAY key. A typical daily schedule display is shown below:

```
MON START = 06 : 00 AM
STOP = 05 : 30 PM
```

To reprogram any of the daily schedules, key in the new START time. To change the AM/PM associated with the START time, press the "AM/PM" key. This will change the AM/PM message to the opposite time period. The "AM/PM" key can only be pressed once. If an error is made, press CANCEL and begin reprogramming again.

After the START time and the associated AM/PM have been programmed, the cursor will move to the STOP time. Key in the STOP TIME and press the "AM/PM" key if AM/PM requires changing.

When the ENTER key is pressed, the new START/STOP time is entered and the display will scroll to the next day. If an unacceptable time is entered, the following message will be displayed.

```
OUT OF RANGE
TRY AGAIN!
```

For ease of programming, any values "ENTERED" for MONDAY will **automatically** be put in for the other days of the week. Be aware of this anytime the MONDAY SCHEDULE is changed, since it changes times previ-

ously programmed into other days. For scrolling through the days to view times programmed use the ADVANCE DAY KEY, not the ENTER KEY. This will assure that after viewing MONDAY, that the ENTER KEY is not pressed changing times programmed for the rest of the week.

If the chiller is not cycled by the DAILY SCHEDULE, but is required to run whenever the system switches are on, all 00.00's should be programmed into the daily schedule. This can be done manually for each day or by pressing CANCEL and ENTER when the MONDAY START/STOP schedule appears.

NOTE: This will have no effect on the holiday schedule.

Continue to program each day as needed. After MON through SUN has been entered, the HOLIDAY message will be displayed.

```
HOL START = 08 : 00 AM
STOP = 12 : 00 PM
```

The Holiday (HOL) START/STOP allows the user to designate a specific day(s) for special requirements. This is provided so that day(s) needing special start/stop requirements can be programmed without disturbing the normal working schedule.

The start/stop times for the Holiday schedule are programmed just as for any other day.

NOTE: Only one start/stop time can be programmed which will apply to each of the "HOLIDAY" days selected.

After the ENTER key is pressed, a new message will be displayed to designate which days of the week are to be holidays.

```
S M T * W T F S
HOLIDAY NOTED BY *
```

In the above sample display, an * designates Tuesday as a holiday.

When the display appears, the cursor will first stop behind Sunday. To designate a day as a holiday, press the "*" key. If a day is not to be a holiday, press the "0" key. Whenever the "*" or the "0" keys are pressed, the cursor will advance to the next day. After all the holiday days are programmed, press ENTER to store the new data into memory. The display will then advance to the beginning of the Daily Schedule (MON).

The Holiday Schedule is only executed once by the micro before it is erased from memory. This is done

because in most cases a special Holiday Schedule is only necessary once in a several month period. It also eliminates the need for operator intervention to erase the schedule after the holiday passes.

If an error is made while programming, press CANCEL. This will clear all programmed (*) "holiday" days. The schedule can then be reprogrammed.

The "0" key will not cancel out a "*" and cannot be used for correcting a programming error.

Manual Override



When the MANUAL OVERRIDE key is pressed, the Daily Schedule programmed into the chiller will be ig-

nored and the chiller will start-up when water temperature allows, unit switch permits, and system switches permit.

Normally this key is not used unless an emergency forces the chiller to require operation during a period where the programmed Daily Schedule is calling for the chiller to be OFF (Daily Schedule Shutdown).



Once activated, MANUAL OVERRIDE is only active for a period of 30 minutes. It is for servicing only and is designed so that if let on accidentally, the microprocessor will automatically return to the Daily Schedule.

CHILLED LIQUID CONTROL

GENERAL

The YDA chillers are built with two separate evaporators designed to be field piped to discharge into a common supply mixed water line. This requires the chilled liquid control to be from a mixed leaving water temperature sensor. This also **requires** that the Dip Switch S1 on both Microprocessor Boards to be programmed to allow LEAVING WATER CONTROL. If a change is required, position Switch #4 on Dip Switch S1 on **both** Microprocessor Boards (Fig. 25) as indicated:

LWT CONTROL: SW4 CLOSED
(right side pushed down)

Assure that "LEAVING WATER CONTROL" is selected by pressing the OPTION key. The message "THE FOLLOWING ARE PROGRAMMED" will appear on the display for 3 seconds. The display will then scroll through the 8 dip switch selection, each appearing for 3 seconds. The 4th display will tell the user whether "LEAVING WATER CONTROL" is programmed.

The chiller is designed to provide a stable desired **mixed** leaving water temperature as required by the user and is suitable for all types of applications such as comfort cooling and batch / process loads.

The amount of compressor / loader cycling will depend of the RATE SENSITIVITY programmed as well as the programmed length of the anti-recycle timer. Anticipation controls and loading / unloading timers are built into the control algorithms to eliminate cycling. Cycling may be reduced by decreasing the RATE SENSITIVITY and / or increasing the anti-recycle time. However,

this will make the chiller controls less responsive which may cause a larger deviation in the mixed leaving water temperature.

NOTE: Decreasing the RATE SENSITIVITY may be undesirable and may cause the system to prematurely go into rate control due to the micro sensing a transient temperature fluctuation and not allowing the chiller to load. This will cause the mixed leaving water temperature to rise above the desired setpoint.

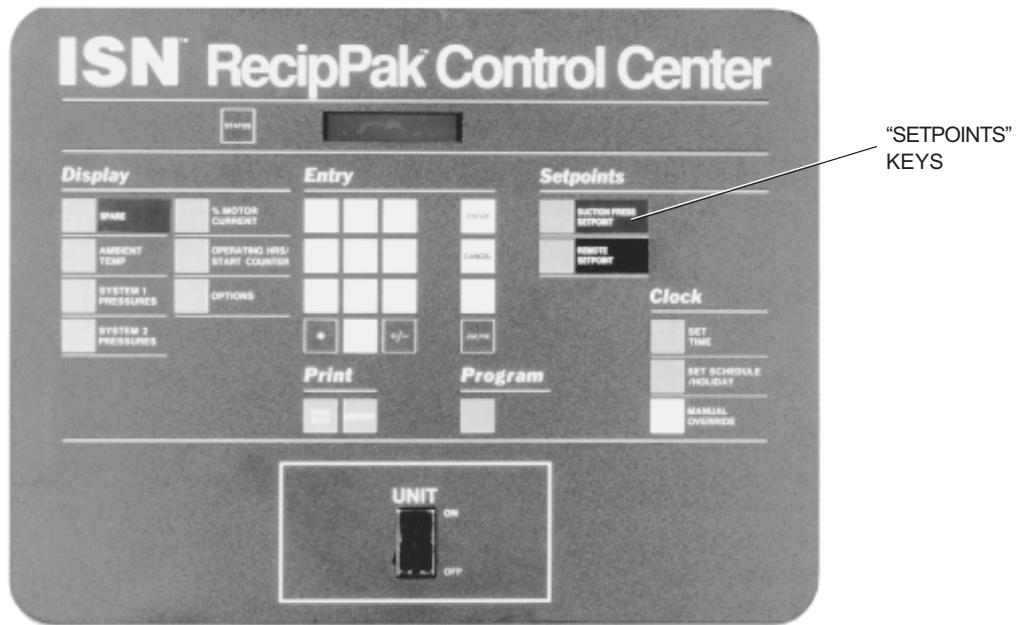
Once the Dip Switch #4 on the Microprocessor Board is properly positioned, the user will be able to view the appropriate display when the CHILLED LIQUID TEMP / RANGE is pressed. This display should allow the following message:



To properly maintain desired leaving water temperature in a system where water mixing is occurring, the micros will, transparent to the user, adjust their individual leaving water temperatures to as low as 40°F (standard water control) or up to -4°F below the programmed setpoint (brine) if the mixed water temperature requires it. The "adjusted" temperatures will be evident from viewing the actual leaving chilled liquid temperatures from SYS 1/2 and SYS 3/4 where individual leaving evaporator water temperatures may fall below the setpoint.

The "lower than setpoint" leaving water temperatures of the individual evaporators will compensate for the water mixing and allow maintaining of mixed water temperatures near the desired setpoint.

“SETPOINTS” KEYS PROGRAMMING CHILLED LIQUID SETPOINTS & REMOTE RESET TEMP RANGE



26572A

GENERAL

After Switch #4 of Dip Switch S1 on both Micro Boards is properly configured to select Leaving Control, the chilled liquid setpoints can then be programmed into the Control Panel. Switch #4 of S1 must be properly programmed or an incorrect display message will appear when the CHILLED LIQUID TEMP/RANGE key is pressed. See “CHILLED LIQUID CONTROL” Page 51 if needed.

If remote temperature setpoint is being utilized, the REMOTE RESET TEMP RANGE must be programmed. Programming the REMOTE RESET TEMP RANGE is discussed later in this manual on page 75.

PROGRAMMING LEAVING WATER CONTROL

Chilled Liquid Temp/Range



When the CHILLED LIQUID TEMP/RANGE key is pressed, the following message will be displayed for 3 seconds indicating Dip Switch S1, Switch #4 on both Microprocessor Boards is programmed properly:



If this message is incorrect, see the “CHILLED LIQUID CONTROL” Section (Page 51) for instructions to reprogram the Microprocessor Dip Switch S1, Switch #4.

The display will then scroll to a second message & hold:



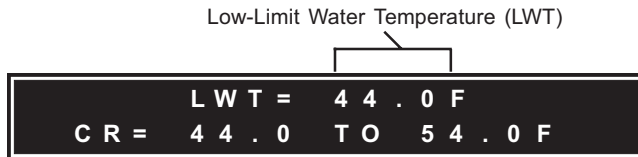
This message will then display the Low-Limit Water Temperature (LWT) and the Control Range (CR). In the sample above, the LWT is 44.0°F and the CR is 44° - 46°F.

The Control Range (CR) is the variation is leaving water temperature which is acceptable in the system application. As long as leaving water temperature stays between the low limit and midpoint of the Control Range (CR), the Microprocessor will consider the temperature acceptable and will not initiate any loading / unloading reaction unless “Rate Control” requires. The Low-Limit Water Temperature (LWT) is the minimum acceptable leaving water temperature in the Control Range (CR), not the actual user desired leaving water temperature.

The desired leaving water temperature is known as the “Target” temperature which is the temperature the micro will attempt to control too. The “Target” temperature is not programmable, but it is always the midpoint of the Control Range (CR). Example: A control range of 44° - 46°F will have a “Target” Temp of 45°F, which

should equal the desired system leaving water temperature. As mentioned before, the micro will be satisfied with a leaving water temperature. As mentioned before, the micro will be satisfied with a leaving temperature between 44° - 45°F unless the rate control is exceeded. The microprocessor's rate control is designed to be less responsive in the upper half of the Control Range (i.e. 45° - 46°F) than in the lower half (i.e. 44° - 45°F). This is to prevent overshoot.

To program the Low-Limit Water Temperature (LWT) and the Control Range (CR), press the CHILLED LIQUID TEMP/RANGE key. This display will first exhibit a message that "LEAVING WATER TEMP CONTROL" is selected and 3 seconds later automatically scroll to the next display of LWT and CR. The cursor will stop at the first digit of LWT. Key in the Low-Limit Water Temperature (LWT) that is acceptable in the system. See below:

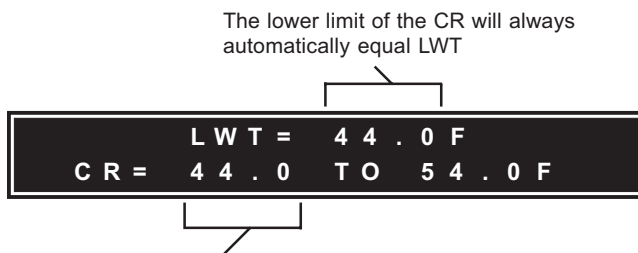


The micro will accept a range of programmable values from 15.0 - 70.0°F (See "SWITCH 1", Page 39). If brine or glycol is used in the system, chilled liquid temperatures below 40°F may be desired.

To program setpoints below 40°F, Dip Switch S1, Switch #1 on the Microprocessor Board must be properly programmed. (See Page 39.) If the switch is incorrect, when setpoints below 40°F are entered as well as when unacceptable values are entered, the following message will be displayed:



After the Low-Limit Water Temperature (LWT) is keyed in, the lower limit of the CR (Control Range) in the display message will automatically change to a value identical to the "LWT". See below:



The cursor will advance to the final entry which is the upper limit of the CR (Control Range). This value is programmed for the highest leaving water temperature

which is acceptable in the system application. Typically 2°F above the Low-Limit Water Temperature is appropriate. The micro will accept a value 1° - 5°F above the LWT for this value. 2°F above the LWT is the default value.

Key in the upper limit of the CR and press the ENTER key. Otherwise the new values will not be entered into memory. After pressing the ENTER key, the display will continue to show the LWT and Control Range message until another key is pressed.

CAUTION: *Too small of a CR selection will cause compressor / loader cycling. If compressor cycling occurs, leaving water temperature may vary considerably as a result of a compressor that cannot restart due to the anti-recycle timer. To eliminate this, increase the DT (temperature differential) of the CR and / or program the anti-recycle timer for a minimum of 300 seconds. If it isn't already programmed for 300 seconds.*

NOTE: *Whenever reprogramming the LWT & CR, keep in mind that the desired leaving water temp. or "target", should be midpoint of the CR.*

Normal pulldown loading is limited by a 30 sec. loading timer between stages with loading occurring whenever leaving water temperature is above the RATE CONTROL RANGE.

However, on start-up, loading will be limited to a maximum of 1 stage per minute for the first 3 minutes. The loading timer will also be increased by the micro to 150 sec. when temperature falls to within the Rate Control Range or the upper half of the Control Range (Between Target and High Limit for the CR).

The Rate Control software may prevent loading and will cause unloading in the Rate Control Range or Control Range if temperature drops faster than 2X the programmed Rate Sensitivity. This is to prevent overshoot.

In the lower half of the Control Range between the Low Limit and the Target, Rate Control will cause unloading if temperature falls faster than 1X the programmed Rate Sensitivity. As before, this is to prevent overshoot.

Below the Control Range, unloading will be done at 20 sec. intervals until temperatures fall back into the Control Zone. Unloading is controlled by a 20 sec. timer below the Control Zone as well as when Rate Control calls for unloading.

Further details loading / unloading and Rate Control will follow:

PROGRAMMING LEAVING WATER RATE CONTROL

Programmable RATE CONTROL is designed to limit compressor/loader cycling thus saving energy and reducing wear on mechanical components. It also reduces the possibility of “overshoot”. RATE CONTROL will allow the micro to react to fast changes in water temperature beyond normal responses dictated by leaving water temperatures, the 150 sec. loading timer, and the 20 sec. unloading temperature when temperatures are in the Rate Control Range or the Control Range.

RATE CONTROL requires programming the temperature range (RATE CONTROL TEMP) above the CONTROL RANGE (CR) where rate control is desired. Additionally, the actual rate of change (RATE SENSITIVITY) of water temperature which the micro uses as a control reference must also be programmed.

Refer to Fig. 26 as you read the following text. A typical low limit water temperature of 44°F is used with a 44° - 46°F CONTROL RANGE (CR). A RATE CONTROL TEMP of 10°F, which is typical (10° above upper limit of the Control Range), is shown.

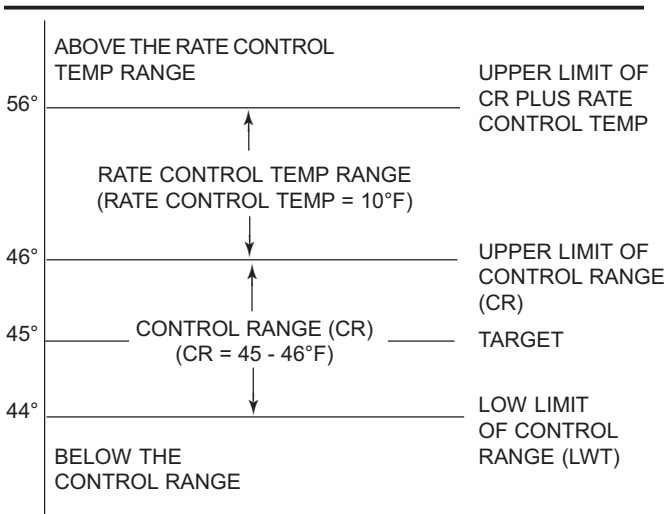


FIG. 26 – LEAVING WATER TEMPERATURE CONTROL

The RATE CONTROL TEMP establishes a temperature range (0.1 - 20°F) above the “Upper Limit of CONTROL RANGE” where the micro will limit loading if the rate of change of water temperature exceeds the RATE SENSITIVITY. In the above example a RATE CONTROL TEMP of 10°F is used. In the Rate Control Range, the micro will prevent loading or may cause unloading if the temperature drop exceeds 2X the Rate Sensitivity regardless of whether the 150 sec. loading timer and the deviation from setpoint is calling for loading.

At temperatures below the CONTROL RANGE, unloading will occur to bring temperatures back to within the CONTROL RANGE. The unloading timer will cause unloading at 20 sec. intervals until temperatures fall back into the CONTROL RANGE.

In the lower half of the Control Range between the Low-Limit Water Setpoint (LWT) and the “Target” Temperature (Desired Leaving Water Temperature), Rate Control software will cause unloading if temperature drops faster than 1X the Rate Sensitivity. Otherwise, no other loading or unloading will result in this temperature range.

In the upper half of the Control Range between the TARGET and the High Limit of the Control Range and in the Rate Control Range, loading will take place in 150 sec. intervals until temperature drops below the TARGET temperature. The Rate Control software may prevent loading or possibly initiate unloading if temperature drops faster than 2X the programmed Rate Sensitivity.

Above the RATE CONTROL TEMP RANGE, the micro will attempt to load the chiller as fast as it can (30 seconds per stage) unless the chiller has not run for 3 minutes during which loading will occur at 1 min. intervals. This allows the chiller to gain control of the water temperature as quickly as possible while still avoiding overshoot and limiting pulldown demand as temperature drops and rate control is implemented.

Since LWT Control does not have the water loop for buffering after a load/unload response and utilizes a narrow control (loading/unloading) range, compressor/loader cycling can be a problem. This makes the selection of RATE CONTROL TEMP and RATE SENSITIVITY values very critical.

Before programming the RATE CONTROL TEMP, the user should first determine if typically the fastest allowable pulldowns are required or weather pulldown demand limiting is desired. Programmable values from 0.1-20°F are possible.

For normal pulldowns, and quick response, a RATE CONTROL TEMP of 0.1°F is appropriate unless overshoot is noted.

For demand limiting, energy efficiency, elimination of overshoot, and minimum cycling, RATE CONTROL TEMPS of 10°-20°F are advisable. This will cause the controls to react to water temperature rate of change well before the water temperature drops into the CONTROL RANGE. This may be required for small water loops. However, if problems arise where the chiller does not load and pull temperature down, select 0.1°F.

To program the RATE CONTROL TEMP, first press the PROGRAM key. Repetitively press the ENTER key until the display below appears.

```

RATE CONTROL TEMP
= 10.0 F
    
```

Key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 0.1-20°F.

NOTE: When programming values between 0.1-9.9°F, it is required to first key in a "0" or "00". Example: 0.5-9°F.

The next item which will require programming is the RATE SENSITIVITY. The RATE SENSITIVITY is a means of "overriding" the leading/unloading timers when water temperatures are in the RATE CONTROL RANGE or the CONTROL RANGE. This allows the micro to react to abrupt downward changes in leaving or return water temperatures. The ability to respond to "rate of change" variations in water temperatures gives the micro "anticipation" capabilities to reduce the possibility of "overshoot" in leaving water temperature.

In demand limiting applications, to avoid cycling, or to avoid overshoot, a low RATE SENSITIVITY may be selected. This allows the micro to go into rate control to prevent loading or cause unloading whenever water temperatures drop faster than the programmed RATE SENSITIVITY. Rate Control can go into effect whenever water temperatures are in RATE CONTROL RANGE or the CONTROL RANGE. For these applications, a 3-5°F/min. RATE SENSITIVITY is recommended. This may be needed for small water loops. However, if problems arise where the chiller does not load and pull temperature down, select 5.0°F/min.

NOTE: Too small of a RATE SENSITIVITY selection may prevent loading due to varying flows or if the water system allows a slug of cold water to enter which falsely fools the micro into thinking the RATE SENSITIVITY has been exceeded, preventing loading and allowing leaving water temperature to rise above the desired temperature.

For normal comfort cooling, or process applications, select a high RATE SENSITIVITY of 5.0°F/min. Before Rate Control can go into effect, the water temperature would have to change at a very high rate to exceed the RATE SENSITIVITY value programmed. This will assure normal loading will occur at the fastest possible speed. In most applications, 5.0°F/min. is suggested. **If unsure of a RATE SENSITIVITY selection, use 5.0°F/min.**

To program the RATE SENSITIVITY, first press the PROGRAM key. Repetitively press the ENTER key until the display below appears.



Key in the desired value and press the ENTER key. The new value will be entered into memory and the display will advance to the next user programmable limit.

The micro will accept a range of programmable values between 0.5°-5.0°F/min.

LOADING AND UNLOADING

In mixed water temperature control, loading and unloading will take place as needed to keep water temperature in the CONTROL RANGE between the TARGET and LOW LIMIT WATER TEMPERATURE. As mentioned earlier in this manual, the CONTROL RANGE is the temperature range of the leaving water temperature that is acceptable to the user and has been previously programmed into memory using the CHILLED LIQUID TEMP RANGE key.

Usually this is a window of water temperatures of about 2° - 3°F. The micro will cause loading and unloading actions to occur as needed to keep leaving water temperatures in the lower half of this range. Refer to Fig. 27 to aid in understanding the loading and unloading scheme performed by the microprocessor.

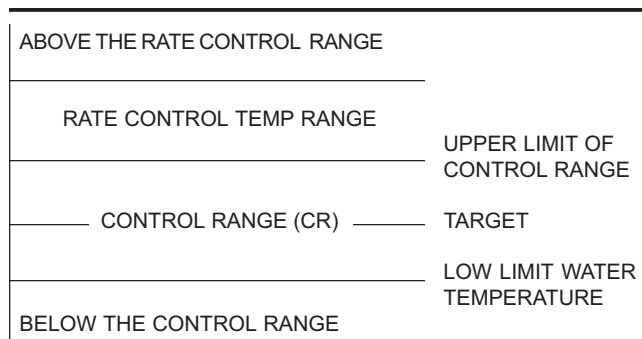


FIG. 27 – LEAVING WATER TEMPERATURE CONTROL

Within the lower half of the CONTROL RANGE, the microprocessor will not call for any further loading or unloading unless the Rate Sensitivity is exceeded. If temperature drop exceeds 1X the Rate Sensitivity, the micro will unload the chiller to prevent overshoot.

If leaving water temperature should fall into the temperature range "BELOW THE CONTROL RANGE" which is below the programmed Low Limit WATER TEMPERATURE, the microprocessor will unload the chiller in 20 sec. intervals until water temperature rises back into the CONTROL RANGE.

If temperature is in the upper half of CONTROL RANGE or in the RATE CONTROL RANGE, the microprocessor will continue loading the chiller as needed in 150 sec. intervals until temperatures pass into the lower half of the CONTROL RANGE. If the rate of drop in water temperature exceeds 2X the programmed Rate Sensitivity, no further loading or unloading will result since

the micro sees the temperature dropping at an excessive rate anticipating temperature will soon fall into the CONTROL RANGE.

When temperatures are in the temperature range ABOVE THE RATE CONTROL RANGE, the micro will load the chiller in intervals of 30 sec. to bring the temperature down as quickly as possible. The micro is capable of providing 20 steps of loading / unloading.

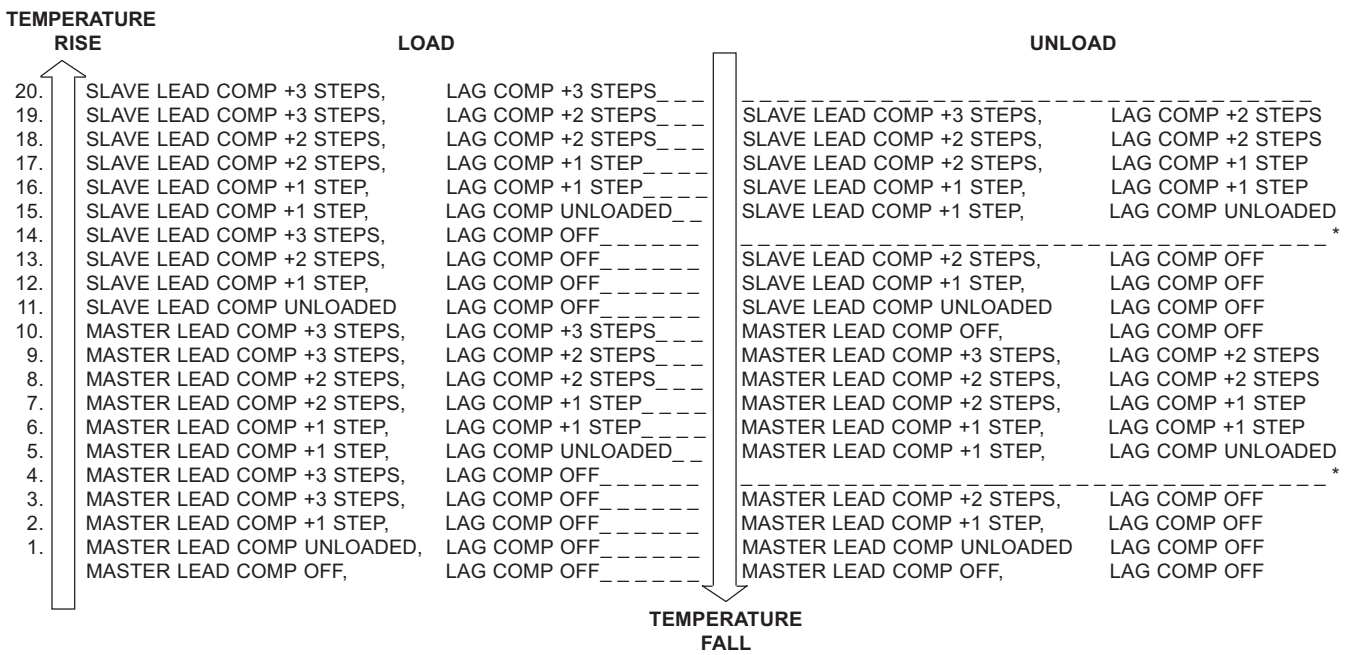
NOTE: The micro's control loading and unloading responses on a 20 step scale regardless of the number of stages present. Therefore, loading and unloading responses on chillers with less than 10 steps per module may appear delayed (time between steps increased) when missing steps are activated or de-activated by the micro.

The sequence of loading will always cause the lead system of the Master Module to start and load first, fol-

lowed by the lag system of the Master Module. As loading continues, the lead system of the Slave Module will start, followed by the lag system of the Slave Module. This sequence will always be followed unless for some reason a refrigerant system safety causes the respective system to shut down or if a system switch is placed in the OFF position.

The Master and Slave Microprocessor Boards will individually control loading and unloading of their associated systems. However, the Master Microprocessor will command the Slave that a correction is necessary and allow the Slave to implement loading / unloading. The Master will continue to ask for correction until mixed leaving water deviation from setpoint is satisfactory. As mentioned before, loading / unloading timers as well as rate control software must be satisfied before loading / unloading will occur. This reduces the possibilities of cycling.

Fig. 28 shows the sequence of loading and unloading.



* This step is skipped on a temperature drop.

FIG. 28 – 20 STEP LEAVING WATER CONTROL LOADING / UNLOADING

“SYSTEM SAFETIES”

There are three types of System Safeties: The Manual Reset type, the Automatic Reset type, and Anticipation Safety Controls. These safeties protect the chiller from damage anytime a safety threshold is exceeded by either shutting the system(s) down or by altering system loading. Continuous monitoring by the microprocessor assures that instantaneous reactions result. A status display message will indicate when a system(s) or the entire chiller is shut down due to a fault or when Anticipation safeties are operating.

An explanation of these safeties will follow.

MANUAL RESET SAFETIES

A Manual Reset Safety will shut the affected system down whenever the safety threshold is exceeded. Automatic restart will occur after the first 2 shutdowns when the anti-recycle timer times out, if temperature demand exists. After any combination of 3 Manual Reset Safety in a 90 minute time period, the affected system will shut down and lock out on a FAULT.

After a system has shut down 3 times and locked out, a fault display indicating the last system fault will appear on the STATUS display message. This is accessible by pressing the STATUS key.

To reset a locked out system, turn the affected system switch on the Microprocessor Board (Page 78) to the OFF position.

CAUTION: *Before returning a locked out system to service, a thorough investigation of the cause of the fault should be made. Failure to repair the cause of the fault while manually allowing repetitive restarts may cause further expensive damage to the system.*

Each of the Manual Reset Safeties will be discussed in detail below.

Motor Current Safety

The Motor Current Safety assures that the motor life is not compromised due to low or high motor current. Low motor current may result from running with low or no refrigerant. The micro looks at motor current to protect against this until the Low pressure bypass is de-activated. High motor current may result from power problems, too much refrigerant, very warm water, or other high pressure situations.

The micro begins monitoring motor current after 3 seconds of operation. If motor current is exceeding 120% FLA at the 3 second point, the compressor will shut

down. After 4 seconds of operation, motor current must be greater than 15% FLA but less than 115% FLA as long as the compressor continues to run.

NOTE: *Do not confuse FLA and RLA. FLA (full load amps) is approximately 1.2 x RLA. RLA (running load amps) specified on the motor nameplate, is typical current demand under rated operating conditions in a fully loaded system. Therefore, do not expect to see 100% FLA when the system is fully loaded. In this condition, currents may run approximately 65-85% FLA.*

An example of a motor current fault display message is shown below:

S	Y	S	#	1	M	O	T	O	R	C	U	R	R	E	N	T
S	Y	S	#	2	M	O	T	O	R	C	U	R	R	E	N	T

NOTE: *The Motor Protector and the mechanical High Pressure Cut-out will also cause the MOTOR CURRENT SAFETY to activate. The reason for this is that both devices cause the motor contractor to de-energize. Details of the operation of these devices are provided on page 58.*

Suction Pressure Safety

The Suction Pressure Safety assures that the system is not run under low refrigerant conditions or due to a problem which will not allow proper refrigerant flow.

For the first 30 seconds of operation, the low suction pressure bypass is in operation. After 30 seconds of operation, the micro begins monitoring suction pressure and continues to do so as long as the compressor runs. For operation periods of 30 seconds to 240 seconds, suction pressure must be greater than 50% of the Suction Pressure Cut-out. After 240 seconds, suction pressure must be greater than the cut-out.

NOTE: *A transient timer is built into software to assure that short term fluctuations in suction pressure due to fan cycling, loading, etc. do not cause nuisance trips on low suction pressure.*

After the system has pumped down and suction pressure reaches cut-out plus 5 PSIG, the transient timer is readied for action. If suction pressure drops below the cut-out point, the 120 second transient timer begins timing. As long as suction pressure doesn't drop below 50% of cut-out during the 120 second period and rises above cut-out before the timer times out, the system will continue to run.

The Suction Pressure Safety Cut-out is programmable by the user (Page 48). An example of a suction pressure fault message is shown below.

S Y S # 1	L O W	S U C T I O N
S Y S # 2	L O W	S U C T I O N

Oil Pressure Safety

The Oil Pressure Safety assures that the compressor's mechanical components receive proper lubrication. The micro begins monitoring compressor oil pressure after 4 seconds of operation. For operating periods of 4 seconds to 30 seconds, oil pressure must be greater than 5 PSID. From 30 seconds to 240 seconds, oil pressure must be greater than 20 PSID. After 240 seconds, oil pressure must be greater than 25 PSID for as long as the compressor continues to run. If the required oil pressure limits are not met, the system will shut down.

The micro computes "differential oil pressure" by measuring oil pump pressure and subtracting suction pressure (Oil - Suction = Oil PSID).

An example of an oil pressure fault display message is shown below:

S Y S # 1	L O W	O I L	P R E S S
S Y S # 2	L O W	O I L	P R E S S

Discharge Pressure Safety

The Discharge Pressure Safety assures that the system pressure does not exceed safe working limits which could open a relief valve or other pressure relief device causing refrigerant loss.

This safety is a back-up for the mechanical safety in the system. Anytime the cut-out point is exceeded, the system will shut down.

The Discharge Pressure Safety Cut-out is programmable by the user (Page 45). An example of a discharge pressure fault display message is shown below:

S Y S # 1	H I G H	D S C H
S Y S # 2	H I G H	D S C H

NOTE: This safety is only operable if optional discharge pressure transducers are installed.

Pumpdown Safety

The Pumpdown Safety assures that a compressor does not run unless it completes a proper pumpdown. This prevents operation of a refrigerant system which has a leaking liquid line solenoid valve.

On start-up, the system must pump down to the suction pressure cut-out within 300 seconds or the system will shut down.

An example of the Pump down fault display message is shown below:

S Y S # 1	L L S V	N O T	O N
S Y S # 2	L L S V	N O T	O N

NOTE: LLSV refers to liquid line solenoid valve.

Motor Protector

Three internal temperature sensors are built into the motor stator. These sensors are wired into the motor protector module located inside the Motor terminal box. As the motor windings heat and cool, the resistance of the motor temperature sensors will change. If the windings overheat, the change in resistance in the sensors will be sensed by the Motor protector module. The module will open its MP contacts breaking the 115VAC fed to the motor contactor. When the motor contactor de-energizes, motor current falls to zero. The low motor current is sensed by the microprocessor and the system is shut down. For more information, see MOTOR CURRENT SAFETY (Page 57).

Auto-restart will be permitted after a shutdown, when the motor sensors cool and the MP contacts close. A fault lock-out will result if safety thresholds are exceeded three times in a 90 minute period.

Mechanical High Pressure Cut-out (HPCO)

A mechanical high pressure cut-out is located on each compressor discharge or in the compressor head. This is the primary high pressure safety in the system. Any microprocessor controls are secondary.

Anytime discharge pressure exceeds 405 PSIG, the contacts in the high pressure cut-out will open which removes 115 VAC from the motor protector module. When 115 VAC control power is lost to the module, the module's MP contacts open breaking the 115 VAC fed to the motor contactor. The motor contactor de-energizes and motor current falls to zero. The low motor current is sensed by the microprocessor and the system is shut down. For more information see MOTOR CURRENT SAFETY (Page 57).

Auto-restart will be permitted after a shutdown when discharge pressure drops to below 330 PSIG which allows the mechanical high pressure cut-out to reset and its contacts to close. This re-applies 115VAC to the motor protector closing the MP contact. A fault lock-out will result if safety thresholds are exceeded three times in a 90 minute period.

AUTOMATIC RESET SAFETIES

An Automatic Reset Safety will shut the entire chiller down on a fault when the safety threshold is exceeded and allows automatic restart after the condition causing the shutdown clears. Restart will occur only after anti-recycle timers are satisfied and demand requires.

A reset hysteresis is built in so repetitive faulting and clearing will not occur in a short time period. An example would be if ambient temperature dropped below the cut-out, temperature would have to rise 5°F above the cut-out before the fault lockout would clear and restart can occur.

When the chiller is shut down on one of these safeties, a message will appear on the STATUS display informing the operator of the problem. This is accessible by pressing the STATUS key.

Details concerning each of the three Automatic Reset Safeties follow.

Low Water Temperature Safety

The Low Water Temperature Safety assures that the evaporator is not damaged from freezing due to improperly set control points. Whenever the chilled liquid temperature drops below the programmable cut-out, the chiller will shut down. Restart will not occur until temperature rises 5°F above the cut-out point, load demand requires, and anti-recycle timers allow.

The Low Water Temperature Safety Cut-out is programmable by the user (Page 47). An example of the Low Water Temperature Fault display message is shown below:

```
CHILLER FAULT :
LOW WATER TEMP
```

Low Ambient Temperature Safety

The Low Ambient Temperature Safety assures that the chiller does not run in low ambients where potential damage could result due to low system pressures.

The Low Ambient Cut-out is programmable by the user (Page 46). An example of the Low Ambient Temperature Fault display message is shown below:

```
CHILLER FAULT :
LOW AMBIENT TEMP
```

High Ambient Temperature Safety

The High Ambient Temperature Safety assures that the chiller does not run in ambients above 130°F where po-

tential malfunction of system mechanical and electrical components may result. Whenever the outdoor ambient exceeds 130°F (non-programmable) the chiller will shut down. Restart will not occur until temperature drops to 2°F below the cut-out point, load demand requires, and anti-recycle timers allow.

The High Ambient Cut-out is programmable (Page 46) for chiller cut-out at temperatures below 130°F (100° - 130°F). An example of the High Ambient Temperature Fault display message is shown below:

```
CHILLER FAULT :
HIGH AMBIENT TEMP
```

Under Voltage Safety

The Under Voltage Safety assures that the system is not operated at voltages where malfunction of the microprocessor could result in system damage. Whenever the microprocessor senses an onboard power supply failure, the chiller is shut down. Restart will occur when power is restored. The microprocessor circuitry is capable of operating at voltages 10% below the nominal 115 VAC supply to the panel.

An example of the Under Voltage Safety display message is shown below:

```
CHILLER FAULT :
115VAC UNDER VOLTAGE
```

Flow Switch

The microprocessor monitors the closure of the flow switch to assure that water flow is present in the evaporator which prevents freeze-ups. A set of flow switch "dry" contacts are connected between terminals 13 & 14 (Fig. 15 & 18). One flow switch **must** be connected to each Control Panel. If a flow switch opens, a chiller module will shut down and the following status message will be displayed.

```
SYS # 1      NO RUN PERM
SYS # 2      NO RUN PERM
```

Closure of the flow switch, when flow is present, will cause the message to disappear and auto-restart will occur.

CAUTION: NEVER BYPASS A FLOW SWITCH. THIS WILL CAUSE DAMAGE TO THE CHILLER AND VOID ANY WARRANTIES.

Power Failure Safety

Whenever power is removed or lost and then reapplied, auto-restart will occur after a 2 minute anti-recycle timer elapses. This is the same anti-recycle timer which is programmable from 5-10 minutes; however, it automatically is set to 2 minutes after a power failure.

This safety assures that the motor has a minimum of 2 minutes to cool under any circumstances allowing much of the internal heating due to starting to be dissipated before another start occurs.

ANTICIPATION SAFETY CONTROLS

Anticipation controls are built into the software to prevent safety shutdowns by automatically overriding temperature controls if system pressures near safety thresholds. This allows the chiller to continue to run under reduced capacity to avoid total loss of cooling resulting from a lockout on a safety.

Anticipation safeties monitor suction and discharge pressure and unload the compressors as needed. The micro will display a message on the STATUS DISPLAY whenever these controls are in operation.

Suction Pressure Unloading

If suction pressure exceeds the value programmed by the user (Page 47), the micro will unload the affected compressor. Automatic reloading will occur when pressure drops 10 PSI below the programmed value. This value assures that the motor will receive proper cooling from the refrigerant which promotes longer motor life.

An example of the message displayed when suction pressure unloading is in effect is shown below:

```
S Y S # 1   S U C T   L I M I T I N G
S Y S # 2   S U C T   L I M I T I N G
```

Discharge Pressure Unloading

If discharge pressure exceeds the value programmed by the user (Page 46), the micro will unload the affected compressor. Automatic reloading will occur when pressure drops 60 PSI below the programmed value. This feature reduces the chance of faulting on the high discharge pressure cut-out.

On water cooled chillers, this safety reduces the chance of tripping the relief valve due to a very high rate of rise in pressure resulting from a controls problem which would cause condenser water flow to be interrupted. In this case, the pressure rise is so fast, refrigerant loss may occur through the relief valve even though the high

pressure cut-out has opened and the compressor is in the midst of stopping.

An example of the message displayed when discharge pressure unloadings in effect is shown below:

```
S Y S # 1   D S C H   L I M I T I N G
S Y S # 2   D S C H   L I M I T I N G
```

INTERNAL TIMERS AND PUMPDOWN CONTROLS

Anti-Recycle Timer

Anytime a compressor shuts down for any reason, restart cannot occur until the programmable Anti-recycle Timer (Page 47) has timed out (timer starts with the compressor start). Even though the Anti-recycle timer has timed out, a minimum of 2 minutes (2-minute start-up timer) must always elapse after a compressor stop before it may again restart.

If a power failure occurs, the anti-recycle timers will reset to 2 minutes after power is re-applied.

If the anti-recycle timer is preventing a start, the timer position in seconds may be viewed by pressing the STATUS key. A sample display is shown below:

```
S Y S # 1   A R   T M R   1 0 2   S
S Y S # 2   A R   T M R   1 0 2   S
```

Anti-Coincidence Timer

The Anti-Coincidence Timer assures that 2 compressors can never start simultaneously. This assures that excessive current demand will never result. A one minute time delay will always separate compressor starts.

The Anti-Coincidence Timer can be viewed, when it is active, by pressing the STATUS key. A sample display is shown below:

```
S Y S # 1   C O M P   R U N N I N G
S Y S # 2   A C   T M R   5 6   S
```

Pumpdown Controls

Each compressor is controlled by a pumpdown on start-up feature which eliminates the need for recycling pumpdown. On start-up, the compressor will pumpdown to the programmed suction pressure cut-out before the liquid line solenoid is energized. This assures that liquid slugging does not occur. Manual pumpdown from the keypad is not possible.

“PRINT” KEYS



26572A

GENERAL

The **Print** keys allow the operator to obtain a remote print-out of real-time system operating data and a print-out of system data at the “instant of the fault” on the last three faults which occurred on the chiller.

If a remote printer is not being used, or the desire is to obtain data locally at the panel, the same keys allow access to identical fault data. Identical and additional real-time information is available by using a combination of the **Print** keys and the other keys on the keypad.

An explanation of the use of the keys for remote printer or local data retrieval will follow. An optional printer (Page 89) will be required for remote print-out.

NOTE: *If a Weigh-Tronix printer is utilized, delays may be experienced during print-outs. This is a result of the Master Microprocessor Board breaking communications with the printer to permit communications with the Slave Microprocessor Board. In some cases, depending upon timing, a delay will be noted before the start of the print-out. These delays should be no cause for concern.*

REMOTE PRINT-OUT

Oper Data

OPER
DATA

The OPER DATA key allows the operator to remotely obtain a print-out of current system operating parameters. When the key is pressed, a snapshot will be taken of system operating conditions and panel programming selections. This data will be temporarily stored in memory and transmission of this data will begin to the remote printer. As the data is transmitted, it will be erased from memory.

The print-out will provide operating temperatures, pressures and status of system components on each of the four refrigerant systems. In addition, chiller operating parameters are provided at the beginning of the print-out as well as daily schedule information at the end.

It should be noted that for troubleshooting purposes, the print-out will only be a snapshot at the time the key is pressed. If a real time up-to-date view of system conditions is required, use the manual keypad to access system data.

A sample print out is shown in Fig. 29.

**YORK INTERNATIONAL CORPORATION
RECIPROCATING WATER CHILLERS**

SYSTEM STATUS
5:24AM 1/02/95

SYS 1 COMPRESSOR RUNNING
SYS 2 COMPRESSOR RUNNING
SYS 3 COMPRESSOR RUNNING
SYS 4 ANTI-RECYCLE TIMER 119 SEC

RETURN WATER TEMP 1 82.8 DEGF
RETURN WATER TEMP 2 83.6 DEGF
LEAVING WATER TEMP 1 60.1 DEGF
LEAVING WATER TEMP 2 73.5 DEGF
MIXED WATER TEMP 49.8 DEGF
LOW WATER CUTOUT 36.0 DEGF
SETPOINT TEMP 44.0 DEGF
OUTSIDE AIR TEMP 66.6 DEGF
LOW AMBIENT CUTOUT 25.0 DEGF
LOW PRESSURE CUTOUT 44 PSIG
LEAD SYSTEM SYS 1
CONTROL TYPE LCHWT
COOLING RANGE 44.0 TO 46.0 DEGF

SYSTEM 1 DATA

COMPRESSOR STATUS ON
MOTOR AMPS 30 %FLA
SUCTION PRESSURE 46 PSIG
DISCHARGE PRESSURE 312 PSIG
OIL PRESSURE 92 PSID
LIQUID LINE SOLENOID ON
RUN PERMISSIVE ON
STAGES OF LOADING 4
FORWARD FANS 2
REVERSE FANS OFF
HOT GAS BYPASS VALVE OFF

SYSTEM 2 DATA

COMPRESSOR STATUS ON
MOTOR AMPS 65 %FLA
SUCTION PRESSURE 68 PSIG
DISCHARGE PRESSURE 334 PSIG
OIL PRESSURE 72 PSID
LIQUID LINE SOLENOID ON
RUN PERMISSIVE ON
STAGES OF LOADING 3
FORWARD FANS 2
REVERSE FANS OFF
HOT GAS BYPASS VALVE OFF

SYSTEM 3 DATA

COMPRESSOR STATUS ON
MOTOR AMPS 22 %FLA
SUCTION PRESSURE 59 PSIG
DISCHARGE PRESSURE 291 PSIG
OIL PRESSURE 95 PSID
LIQUID LINE SOLENOID ON
RUN PERMISSIVE ON
STAGES OF LOADING 4
FORWARD FANS 2
REVERSE FANS OFF

SYSTEM 4 DATA

COMPRESSOR STATUS OFF
MOTOR AMPS 30 %FLA
SUCTION PRESSURE 62 PSIG
DISCHARGE PRESSURE 327 PSIG
OIL PRESSURE 83 PSID
LIQUID LINE SOLENOID OFF
RUN PERMISSIVE ON
STAGES OF LOADING 1
FORWARD FANS OFF
REVERSE FANS OFF

S M T W T F S * = HOLIDAY
SUN START=00:00AM STOP=00:00AM
MON START=00:00AM STOP=00:00AM
TUE START=00:00AM STOP=00:00AM
WED START=00:00AM STOP=00:00AM
THU START=00:00AM STOP=00:00AM
FRI START=00:00AM STOP=00:00AM
SAT START=00:00AM STOP=00:00AM
HOL START=00:00AM STOP=00:00AM

History

HISTORY

The HISTORY key allows the operator to remotely obtain a printout of information relating to the last 3 Safety Shutdowns which occurred. The information is stored at the instant of the fault regardless of whether the fault caused a lockout to occur. The information is also not affected by power failures (long term internal memory battery back-up is built into the circuit board) or manual resetting of a fault lock-out.

When the HISTORY key is pressed, a Print-out is transmitted of all system Operating conditions which were stored at the "instant the fault occurred" for each of the 3 SAFETY SHUTDOWN BUFFERS. There is one buffer (storage area) for data related to each of the last 3 safety shutdowns.

The print out will begin with the most recent fault which occurred. The most recent fault will always be stored as SAFETY SHUTDOWN NO. 1 (See print-out Fig. 30). Identically formatted fault information will then be printed for SAFETY SHUTDOWN NO. 2 and SAFETY SHUTDOWN NO. 3.

Information contained in the SAFETY SHUTDOWN Buffers is very important when attempting to troubleshoot a system problem. This data reflects the system conditions at the instant the fault occurred and often reveals other system conditions which actually caused the safety threshold to be exceeded (See Fig. 30).

NOTE: As mentioned earlier, delays may be experienced due to the Master micro interrupting communications with the printer to communicate with the Slave micro. These interruptions may make the HISTORY print-out time extremely long with a Weigh-Tronix printer.

FIG. 29 – OPERATING DATA PRINT OUT

<p>YORK INTERNATIONAL CORPORATION RECIPROCATING WATER CHILLERS</p> <p>SAFETY SHUTDOWN NUMBER 1 SHUTDOWN @ 5:18AM 1/02/97</p> <p>CHILLER FAULT: LOW AMBIENT TEMPERATURE SHUTDOWN</p> <table border="0"> <tr><td>RETURN WATER TEMP 1</td><td>82.7</td><td>DEGF</td></tr> <tr><td>RETURN WATER TEMP 2</td><td>83.7</td><td>DEGF</td></tr> <tr><td>LEAVING WATER TEMP 1</td><td>60.1</td><td>DEGF</td></tr> <tr><td>LEAVING WATER TEMP 2</td><td>73.5</td><td>DEGF</td></tr> <tr><td>MIXED WATER TEMP</td><td>49.3</td><td>DEGF</td></tr> <tr><td>LOW WATER CUTOUT</td><td>36.0</td><td>DEGF</td></tr> <tr><td>SETPOINT TEMP</td><td>44.0</td><td>DEGF</td></tr> <tr><td>OUTSIDE AIR TEMP</td><td>24.8</td><td>DEGF</td></tr> <tr><td>LOW AMBIENT CUTOUT</td><td>25.0</td><td>DEGF</td></tr> <tr><td>LOW PRESSURE CUTOUT</td><td>44</td><td>PSIG</td></tr> <tr><td>LEAD SYSTEM</td><td></td><td>SYS 1</td></tr> <tr><td>CONTROL TYPE</td><td></td><td>LCHWT</td></tr> <tr><td>COOLING RANGE</td><td>44.0 TO 46.0</td><td>DEGF</td></tr> </table> <p>SYSTEM 1 DATA</p> <table border="0"> <tr><td>COMPRESSOR STATUS</td><td></td><td>ON</td></tr> <tr><td>MOTOR AMPS</td><td>30</td><td>%FLA</td></tr> <tr><td>SUCTION PRESSURE</td><td>46</td><td>PSIG</td></tr> <tr><td>DISCHARGE PRESSURE</td><td>312</td><td>PSIG</td></tr> <tr><td>OIL PRESSURE</td><td>92</td><td>PSID</td></tr> <tr><td>LIQUID LINE SOLENOID</td><td></td><td>ON</td></tr> <tr><td>RUN PERMISSIVE</td><td></td><td>ON</td></tr> <tr><td>STAGES OF LOADING</td><td>4</td><td></td></tr> <tr><td>FORWARD FANS</td><td>1</td><td></td></tr> <tr><td>REVERSE FANS</td><td></td><td>OFF</td></tr> <tr><td>HOT GAS BYPASS VALVE</td><td></td><td>OFF</td></tr> </table> <p>SYSTEM 2 DATA</p> <table border="0"> <tr><td>COMPRESSOR STATUS</td><td></td><td>ON</td></tr> <tr><td>MOTOR AMPS</td><td>65</td><td>%FLA</td></tr> <tr><td>SUCTION PRESSURE</td><td>68</td><td>PSIG</td></tr> <tr><td>DISCHARGE PRESSURE</td><td>334</td><td>PSIG</td></tr> <tr><td>OIL PRESSURE</td><td>72</td><td>PSID</td></tr> <tr><td>LIQUID LINE SOLENOID</td><td></td><td>ON</td></tr> <tr><td>RUN PERMISSIVE</td><td></td><td>ON</td></tr> <tr><td>STAGES OF LOADING</td><td>4</td><td></td></tr> <tr><td>FORWARD FANS</td><td>1</td><td></td></tr> <tr><td>REVERSE FANS</td><td></td><td>OFF</td></tr> <tr><td>HOT GAS BYPASS VALVE</td><td></td><td>OFF</td></tr> </table> <p>SYSTEM 3 DATA</p> <table border="0"> <tr><td>COMPRESSOR STATUS</td><td></td><td>ON</td></tr> <tr><td>MOTOR AMPS</td><td>22</td><td>%FLA</td></tr> <tr><td>SUCTION PRESSURE</td><td>59</td><td>PSIG</td></tr> <tr><td>DISCHARGE PRESSURE</td><td>291</td><td>PSIG</td></tr> <tr><td>OIL PRESSURE</td><td>95</td><td>PSID</td></tr> <tr><td>LIQUID LINE SOLENOID</td><td></td><td>OFF</td></tr> <tr><td>RUN PERMISSIVE</td><td></td><td>ON</td></tr> <tr><td>STAGES OF LOADING</td><td>1</td><td></td></tr> <tr><td>FORWARD FANS</td><td></td><td>OFF</td></tr> <tr><td>REVERSE FANS</td><td></td><td>OFF</td></tr> </table> <p>SYSTEM 4 DATA</p> <table border="0"> <tr><td>COMPRESSOR STATUS</td><td></td><td>ON</td></tr> <tr><td>MOTOR AMPS</td><td>30</td><td>%FLA</td></tr> <tr><td>SUCTION PRESSURE</td><td>623</td><td>PSIG</td></tr> <tr><td>DISCHARGE PRESSURE</td><td>327</td><td>PSIG</td></tr> <tr><td>OIL PRESSURE</td><td>83</td><td>PSID</td></tr> <tr><td>LIQUID LINE SOLENOID</td><td></td><td>ON</td></tr> <tr><td>RUN PERMISSIVE</td><td></td><td>ON</td></tr> <tr><td>STAGES OF LOADING</td><td>4</td><td></td></tr> <tr><td>FORWARD FANS</td><td>2</td><td></td></tr> <tr><td>REVERSE FANS</td><td></td><td>OFF</td></tr> </table>	RETURN WATER TEMP 1	82.7	DEGF	RETURN WATER TEMP 2	83.7	DEGF	LEAVING WATER TEMP 1	60.1	DEGF	LEAVING WATER TEMP 2	73.5	DEGF	MIXED WATER TEMP	49.3	DEGF	LOW WATER CUTOUT	36.0	DEGF	SETPOINT TEMP	44.0	DEGF	OUTSIDE AIR TEMP	24.8	DEGF	LOW AMBIENT CUTOUT	25.0	DEGF	LOW PRESSURE CUTOUT	44	PSIG	LEAD SYSTEM		SYS 1	CONTROL TYPE		LCHWT	COOLING RANGE	44.0 TO 46.0	DEGF	COMPRESSOR STATUS		ON	MOTOR AMPS	30	%FLA	SUCTION PRESSURE	46	PSIG	DISCHARGE PRESSURE	312	PSIG	OIL PRESSURE	92	PSID	LIQUID LINE SOLENOID		ON	RUN PERMISSIVE		ON	STAGES OF LOADING	4		FORWARD FANS	1		REVERSE FANS		OFF	HOT GAS BYPASS VALVE		OFF	COMPRESSOR STATUS		ON	MOTOR AMPS	65	%FLA	SUCTION PRESSURE	68	PSIG	DISCHARGE PRESSURE	334	PSIG	OIL PRESSURE	72	PSID	LIQUID LINE SOLENOID		ON	RUN PERMISSIVE		ON	STAGES OF LOADING	4		FORWARD FANS	1		REVERSE FANS		OFF	HOT GAS BYPASS VALVE		OFF	COMPRESSOR STATUS		ON	MOTOR AMPS	22	%FLA	SUCTION PRESSURE	59	PSIG	DISCHARGE PRESSURE	291	PSIG	OIL PRESSURE	95	PSID	LIQUID LINE SOLENOID		OFF	RUN PERMISSIVE		ON	STAGES OF LOADING	1		FORWARD FANS		OFF	REVERSE FANS		OFF	COMPRESSOR STATUS		ON	MOTOR AMPS	30	%FLA	SUCTION PRESSURE	623	PSIG	DISCHARGE PRESSURE	327	PSIG	OIL PRESSURE	83	PSID	LIQUID LINE SOLENOID		ON	RUN PERMISSIVE		ON	STAGES OF LOADING	4		FORWARD FANS	2		REVERSE FANS		OFF	<p>YORK INTERNATIONAL CORPORATION RECIPROCATING WATER CHILLERS</p> <p>SAFETY SHUTDOWN NUMBER 2 SHUTDOWN @ 5:03AM 1/02/97</p> <p>CHILLER FAULT: 115VAC UNDER VOLTAGE SHUTDOWN</p> <table border="0"> <tr><td>RETURN WATER TEMP 1</td><td>82.8</td><td>DEGF</td></tr> <tr><td>RETURN WATER TEMP 2</td><td>83.6</td><td>DEGF</td></tr> <tr><td>LEAVING WATER TEMP 1</td><td>60.1</td><td>DEGF</td></tr> <tr><td>LEAVING WATER TEMP 2</td><td>73.5</td><td>DEGF</td></tr> <tr><td>MIXED WATER TEMP</td><td>49.5</td><td>DEGF</td></tr> <tr><td>LOW WATER CUTOUT</td><td>36.0</td><td>DEGF</td></tr> <tr><td>SETPOINT TEMP</td><td>44.0</td><td>DEGF</td></tr> <tr><td>OUTSIDE AIR TEMP</td><td>60.4</td><td>DEGF</td></tr> <tr><td>LOW AMBIENT CUTOUT</td><td>25.0</td><td>DEGF</td></tr> <tr><td>LOW PRESSURE CUTOUT</td><td>44</td><td>PSIG</td></tr> <tr><td>LEAD SYSTEM</td><td></td><td>SYS 1</td></tr> <tr><td>CONTROL TYPE</td><td></td><td>LCHWT</td></tr> <tr><td>COOLING RANGE</td><td>44.0 TO 46.0</td><td>DEGF</td></tr> </table> <p>SYSTEM 1 DATA</p> <table border="0"> <tr><td>COMPRESSOR STATUS</td><td></td><td>ON</td></tr> <tr><td>MOTOR AMPS</td><td>30</td><td>%FLA</td></tr> 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FANS		OFF	HOT GAS BYPASS VALVE		OFF	COMPRESSOR STATUS		ON	MOTOR AMPS	65	%FLA	SUCTION PRESSURE	68	PSIG	DISCHARGE PRESSURE	334	PSIG	OIL PRESSURE	72	PSID	LIQUID LINE SOLENOID		ON	RUN PERMISSIVE		ON	STAGES OF LOADING	4		FORWARD FANS	2		REVERSE FANS		OFF	HOT GAS BYPASS VALVE		OFF	COMPRESSOR STATUS		ON	MOTOR AMPS	21	%FLA	SUCTION PRESSURE	59	PSIG	DISCHARGE PRESSURE	291	PSIG	OIL PRESSURE	95	PSID	LIQUID LINE SOLENOID		ON	RUN PERMISSIVE		ON	STAGES OF LOADING	4		FORWARD FANS	2		REVERSE FANS		OFF	COMPRESSOR STATUS		ON	MOTOR AMPS	30	%FLA	SUCTION PRESSURE	62	PSIG	DISCHARGE PRESSURE	353	PSIG	OIL PRESSURE	83	PSID	LIQUID LINE SOLENOID		ON	RUN PERMISSIVE		ON	STAGES OF LOADING	4		FORWARD FANS	2		REVERSE FANS		OFF	<p>YORK INTERNATIONAL CORPORATION RECIPROCATING WATER CHILLERS</p> <p>SAFETY SHUTDOWN NUMBER 2 SHUTDOWN @ 4:58AM 1/02/97</p> <p>SYS 1 LOW SUCTION PRESS SHUTDOWN SYS 2 NO FAULTS SYS 3 NO FAULTS SYS 4 NO FAULTS</p> <table border="0"> <tr><td>RETURN WATER TEMP 1</td><td>82.8</td><td>DEGF</td></tr> 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NOTE: In actual print-outs, this would be one continuous print-out.

FIG. 30 – HISTORY PRINT OUT

LOCAL DISPLAY READ-OUT

Oper Data

The OPER DATA key also allows the user to scroll through additional real time display information about the chiller system which is not available from the DISPLAY keys. This information covers a wide range of data which includes fan status, loading status, liquid line solenoid status, run time, etc. A total of 31 different displays are offered.

When the OPER DATA key is pressed, the following message will appear:

**P R E S S E N T E R T O
D I S P L A Y D A T A**

Repetitively pressing the ENTER key allows the operator to scroll through the 20 available displays.

In the information that follows, a sample message along with an explanation of its meaning is provided for all 20 messages.

**L O A D T I M E R
1 4 0 S E C S**

This message provides a real time display of the time left on the Load Timer. The Load Timer is a constantly recycling timer that the micro utilizes in conjunction with "rate control" and "temperature deviation from setpoint" to determine when loading should occur. The timer will always start at 150 sec.; however, it may count to "0" at a rate of up to 5 secs per actual second of time.

**U N L O A D T I M E R
1 2 2 S E C S**

This message provides a real timer display of the time left on the Unload Timer. The Unload Timer is a constantly recycling timer that the micro utilizes in conjunction with "rate control" and "temperature deviation from setpoint" to determine when unloading should occur. The timer will always start at 150 sec.; however, it may count to "0" at a rate of up to 5 secs per actual second of time.

**M A S T E R M A X L O A D = 6
S L A V E M A X L O A D = 0**

This message informs the operator what stage of maximum stage of loading the MASTER (SYS 1 & 2) and SLAVE (SYS 3 & 4) Module should presently be on as a result of commands from the MASTER Microprocessor. This is a coded number and the steps must be decoded to be meaningful. This indication of loading may be different from the actual loading due to loading / unloading timers that are not satisfied and preventing any action or actual mixed leaving water temperature is satisfied.

A table for decoding the display message is shown below:

STEP:

- 0: Both Compressors OFF
- 1: Lead Compr Unloaded, Lag Compr OFF
- 2: Lead Compr 1 Stage Loading, Lag Compr OFF
- 3: Lead Compr 2 Stages Loading, Lag Compr OFF
- 4: Lead Compr 3 Stages Loading, Lag Compr OFF
- 5: Lead Compr 2 Stages Loading, Lag Compr Unloaded
- 6: Lead Compr 1 Stage Loading, Lag Compr 1 Stage Loading
- 7: Lead Compr 2 Stages Loading, Lag Compr 1 Stage Loading
- 8: Lead Compr 2 Stages Loading, Lag Compr 2 Stages Loading
- 9: Lead Compr 3 Stages Loading Lag Compr 2 Stages Loading
- 10: Lead Compr 3 Stages Loading, Lag Compr 3 Stages Loading

**M A S T E R A C T L O A D = 5
S L A V E A C T L O A D = 0**

This message informs the operator what stage of loading the MASTER (SYS 1 & 2) and SLAVE (SYS 3 & 4) Module is actually on at any given time. This is a coded number and the steps must be decoded to be meaningful. A table for decoding the display follows:

STEP:

- 0: Both Compressors OFF
- 1: Lead Compr Unloaded, Lag Compr OFF
- 2: Lead Compr 1 Stage Loading, Lag Compr OFF
- 3: Lead Compr 2 Stages Loading, Lag Compr OFF
- 4: Lead Compr 3 Stages Loading, Lag Compr OFF
- 5: Lead Compr 2 Stages Loading, Lag Compr Unloaded
- 6: Lead Compr 1 Stage Loading, Lag Compr 1 Stage Loading
- 7: Lead Compr 2 Stages Loading, Lag Compr 1 Stage Loading
- 8: Lead Compr 2 Stages Loading, Lag Compr 2 Stages Loading
- 9: Lead Compr 3 Stages Loading Lag Compr 2 Stages Loading
- 10: Lead Compr 3 Stages Loading, Lag Compr 3 Stages Loading

* On some "STEPS" actual loading will NOT change due to the steps not being present on the compressor.


```
TEMP RATE : MIXED
- 1.5 DEGF / MIN
```

This message provides a real time display of the average rate of change of leaving chilled water as seen by the micro. A (-) or (+) sign is also shown to indicate a temperature fall or a temperature rise.

```
LEAD SYSTEM IS
SYSTEM NUMBER 1
```

This message informs the operator which system of the Master Module is in the lead.

```
EVAPORATOR WATER
PUMP STATUS ON
```

This message informs the operator that the micro has commanded the Master auxiliary contacts (optional) for the chilled water pump to close. No Slave contacts are available.

```
EVAPORATOR HEATER
STATUS OFF
```

This message informs the operator that the micro senses the outdoor ambient temperature is below 40°F and is commanding the Evaporator Heater to turn on. Once turned on the heater will turn off at 45°F.

```
CONDENSER WATER
PUMP STATUS OFF
```

This message informs the operator that the micro has commanded the Master auxiliary contacts (optional) for the condenser water pump to close. No Slave contacts are available.

```
SYS 1 LIQUID LINE
SOLENOID STATUS OFF
```

“OFF”: SYS 1 Liquid Line Solenoid De-energized (Closed).

“ON”: SYS 1 Liquid Line Solenoid Energized (Open).

```
SYS 1 STAGES OF
LOADING 2
```

This message informs the operator of the number of stages of loading which are active on SYS 1.

```
SYS 1 FORWARD FANS
STATUS 1
```

This message informs the operator of the number of forward running fans which are active on SYS 1.

```
SYS 1 REVERSE FANS
STATUS OFF
```

This message informs the operator whether the reversing fan is active on SYS 1.

```
SYS 1 RUN TIME
200 SECS
```

The Run Time for SYS 1 since the last start is displayed.

```
SYS 1 HOT GAS BYPASS
VALVE STATUS OFF
```

This message informs the operator whether the Hot Gas Solenoid is ON or OFF. The micro will activate the Hot Gas signal regardless of whether or not this option is installed.

```
SYS 2 LIQUID LINE
SOLENOID STATUS ON
```

“OFF”: SYS 2 Liquid Line Solenoid De-energized (Closed).

“ON”: SYS 2 Liquid Line Solenoid Energized (Open).

```
SYS 2 STAGES OF
LOADING 1
```

This message informs the operator of the number of stages of loading which are active on SYS 2.

```
SYS 2 FORWARD FANS
STATUS OFF
```

This message informs the operator of the number of forward running fans which are active on SYS 2.

```
SYS 2 REVERSE FANS
STATUS OFF
```

This message informs the operator whether the reversing fan is active on SYS 2.

```
SYS 2 RUN TIME
0 SECS
```

The Run Time for SYS 2 since the last start is displayed.

```
SYS 2 HOT GAS BYPASS
VALVE STATUS ON
```

This message informs the operator whether the Hot Gas Solenoid is ON or OFF. The Micro will activate the Hot Gas signal regardless of whether or not this option is installed.

```
SYS 3 LIQUID LINE
SOLENOID STATUS OFF
```

“OFF”: SYS 3 Liquid Line Solenoid De-energized (Closed).

“ON”: SYS 3 Liquid Line Solenoid Energized (Open).

```
SYS 3 STAGES OF
LOADING 2
```

This message informs the operator of the number of stages of loading which are active on SYS 3.

```
SYS 3 FORWARD FANS
STATUS
```

This message informs the operator of the number of forward running fans which are active on SYS 3.

```
SYS 3 REVERSE FANS
STATUS OFF
```

This message informs the operator whether the reversing fan is active on SYS 3.

```
SYS 3 RUN TIME
200 SECS
```

The Run Time for SYS 3 since the last start is displayed.

```
SYS 4 LIQUID LINE
SOLENOID STATUS ON
```

“OFF”: SYS 4 Liquid Line Solenoid De-energized (Closed).

“ON”: SYS 4 Liquid Line Solenoid Energized (Open).

```
SYS 4 STAGES OF
LOADING 1
```

This message informs the operator of the number of stages of loading which are active on SYS 4.

```
SYS 4 FORWARD FANS
STATUS OFF
```

This message informs the operator of the number of forward running fans which are active on SYS 4.

```
SYS 4 REVERSE FANS
STATUS OFF
```

This message informs the operator whether the reversing fan is active on SYS 4.

```
SYS 4 RUN TIME
0 SECS
```

The Run Time for SYS 4 since the last start is displayed.

History

The HISTORY key also allows the user to scroll through the SAFETY SHUTDOWN buffers to display information relating to the last 3 Safety Shutdowns which occurred. Information contained in the SAFETY SHUTDOWN Buffers is very important when attempting to troubleshoot a system problem. This data reflects system conditions at the **instant** the fault occurred.

Information is stored in the SAFETY SHUTDOWN Buffers on every fault regardless of whether the fault caused a Lockout to occur. The information is also not affected by power failures (long term internal memory battery back-up is built into the circuit board) or manual resetting of a fault lock-out.

When the HISTORY key is passed, the following message will appear.

```
DISPLAY SAFETY SHUT-
DOWN NO. 1 (1 TO 3)
```

The operator must then select which SAFETY SHUTDOWN Buffer is desired. When deciding this, keep in mind that Buffer No. 1 is always the most recent fault. As new fault information is stored, it is always placed in Buffer No. 1, No. 1 is loaded to No. 2, No. 2 is loaded to No. 3, and information previously in No. 3 is discarded.

To select a buffer, simply press the “1”, “2”, or “3” ENTRY key and press ENTER. Repetitively pressing the ENTER key will allow the operator to scroll through the information available in the SAFETY SHUTDOWN Buffer.

In the information that follows, a sample message along with an explanation is provided for all available messages.

```
SHUTDOWN OCCURRED
3 : 24 PM 3 / 12 / 95
```

This message informs the operator of the time and date of the fault.

```
SYS # 1 LOW OIL PRESS
SYS # 2 NO FAULTS
```

This message informs the operator of the nature of the fault which occurred if it is on the MASTER Module.

```

SYS # 3      NO FAULTS
SYS # 4      NO FAULTS

```

This message informs the operator of the nature of the fault which occurred, if it is on the SLAVE Module.

```

RETURN WATER TEMP 1
52.7 DEGF

```

This message indicates the Return Water Temperature to the MASTER Module at the time of the fault.

```

RETURN WATER TEMP 2
52.7 DEGF

```

This message indicates the Return Water Temperature to the SLAVE Module at the time of the fault.

```

LEAVING WATER TEMP 1
44.3 DEGF

```

This message indicates the Leaving Water Temperature from the MASTER Module at the time of the fault.

```

LEAVING WATER TEMP 2
44.3 DEGF

```

This message indicates the Leaving Water Temperature from the SLAVE Module at the time of the fault.

```

MIXED WATER TEMP
44.2 DEGF

```

This message indicates the Mixed Leaving Water Temperature at the time of the fault.

```

LOW WATER CUTOUT
36.0 DEGF

```

This display shows the Low Water Cut-out (Leaving) which was programmed at the time of the fault.

```

SETPOINT TEMP
44.0 DEGF

```

This display shows the Setpoint Temp which was programmed at the time of the fault.

```

OUTSIDE AIR TEMP
77.6 DEGF

```

This message indicates the Outdoor Ambient Temperature at the time of the fault.

```

LOW AMBIENT CUTOUT
35.0 DEGF

```

This display shows the Low Ambient Cut-out programmed at the time of the fault.

```

LOW PRESSURE CUTOUT
44 PSIG

```

This display shows the Low Pressure Cut-out programmed at the time of the fault.

```

LEAD SYSTEM
SYS 1

```

This message indicates which system of the Master Module was in the lead at the time of the fault.

```

LOCAL REMOTE SETTING
REMOTE

```

This MUST always be in the Remote Mode. See page 39.

```

CONTROL TYPE
LCHWT

```

This message indicates the type of chilled water control selected at the time of the fault. LCHWT = Leaving Water Control. ECHWT = Entering or Return Water Control. LCHWT MUST always be selected. See page 51.

```

COOLING RANGE
45.0 TO 47.0 DEGF

```

This display shows the Cooling Range (CONTROL RANGE, CR) which was selected at the time of the fault.

```

SYS 1 COMPRESSOR
ON

```

This message indicates whether Compressor 1 was ON or OFF at the time of the fault.

```

SYS 1 MOTOR AMPS
74 %FLA

```

This message indicates SYS 1 motor current at the time of the fault.

SYS 1 SUCTION PRESS
59 PSIG

This display shows the suction pressure of SYS 1 at the time of the fault.

SYS 1 DSCH PRESS
220 PSIG

This message indicates SYS 1 discharge pressure at the time of the fault. This display will be a fixed value unless the Discharge Pressure Read-out is installed.

SYS 1 OIL PRESSURE
70 PSID

This display shows the oil pressure of SYS 1 at the time of the fault.

SYS 1 LIQ LINE
ON

This display informs the operator whether SYS 1 liquid line solenoid was energized (ON) or de-energized (OFF) at the time of the fault.

SYS 1 RUN PERMISSIVE
ON

This message informs the operator if SYS 1 Run Permissive (flow switch, remote START/STOP) was in the RUN mode (ON) or (STOP) mode (OFF).

SYS 1 LOADING STAGES
1

This message indicates the number of stages which were loaded on SYS 1 at the time of the fault.

SYS 1 FORWARD FANS
2

This display indicates the number of fans on SYS 1 which were running forward at the time of the fault.

SYS 1 REVERSE FANS
OFF

This message indicates the number of fans on SYS 1 which were running in the reverse direction at the time of the fault.

SYS 1 HOT GAS VALVE
OFF

This display indicates whether the Hot Gas Solenoid Valve was energized on SYS 1 at the time of the fault.

NOTE: The micro will attempt to control the Hot Gas, Solenoid Valve regardless of whether the option is installed.

SYS 2 COMPRESSOR
OFF

This message indicates whether Compressor 2 was ON or OFF at the time of the fault.

SYS 2 MOTOR AMPS
60 % FLA

This message indicates SYS 2 motor current at the time of the fault.

SYS 2 SUCTION PRESS
62 PSIG

This display shows the suction pressure of SYS 2 at the time of the fault.

SYS 2 DSCH PRESS
240 PSIG

This message indicates SYS 2 discharge pressure at the time of the fault. This display will be a fixed value unless the Discharge Pressure Read-out is installed.

SYS 2 OIL PRESSURE
74 PSID

This display shows the oil pressure of SYS 2 at the time of the fault.

SYS 2 LIQ LINE
ON

This display informs the operator whether SYS 2 liquid line solenoid was energized (ON) or de-energized (OFF) at the time of the fault.

SYS 2 RUN PERMISSIVE
ON

This message informs the operator if SYS 2 Run Permissive (flow switch, remote START/STOP) was in the RUN mode (ON) or STOP mode (OFF).

SYS 2 LOADING STAGES
1

This message indicates the number of stages which were loaded on SYS 2 at the time of the fault.

SYS 2 FORWARD FANS
OFF

This display indicates the number of fans on SYS 2 which were running forward at the time of the fault.

SYS 2 REVERSE FANS
OFF

This message indicates the number of fans on SYS 2 which were running in the reverse direction at the time of the fault.

SYS 2 HOT GAS VALVE
OFF

This display indicates whether the Hot Gas Solenoid Valve was energized on SYS 2 at the time of the fault.

NOTE: The micro will attempt to control the Hot Gas Solenoid Valve regardless of whether the option is installed.

SYS 3 COMPRESSOR
ON

This message indicates whether Compressor 3 was ON or OFF at the time of the fault.

SYS 3 MOTOR AMPS
74 % FLA

This message indicates SYS 3 motor current at the time of the fault.

SYS 3 SUCTION PRESS
59 PSIG

This display shows the suction pressure of SYS 3 at the time of the fault.

SYS 3 DSCH PRESS
220 PSIG

This message indicates SYS 3 discharge pressure at the time of the fault. This display will be a fixed value unless the Discharge Pressure Read-out is installed.

SYS 3 OIL PRESSURE
70 PSID

This display shows the oil pressure of SYS 3 at the time of the fault.

SYS 3 LIQ LINE
ON

This display informs the operator whether SYS 3 liquid line solenoid was energized (ON) or de-energized (OFF) at the time of the fault.

SYS 3 RUN PERMISSIVE
ON

This message informs the operator if SYS 3 Run Permissive (flow switch, remote START/STOP) was in the RUN mode (ON) or (STOP) mode (OFF).

SYS 3 LOADING STAGES
1

This message indicates the number of stages which were loaded on SYS 3 at the time of the fault.

SYS 3 FORWARD FANS
OFF

This display indicates the number of fans on SYS 3 which were running at the time of the fault.

SYS 3 REVERSE FANS
OFF

This message indicates the number of fans on SYS 3 which were running in the reverse direction at the time of the fault.

SYS 4 COMPRESSOR
OFF

This message indicates whether Compressor 4 was ON or OFF at the time of the fault.

SYS 4 MOTOR AMPS
60%FLA

This message indicates SYS 4 motor current at the time of the fault.

SYS 4 SUCTION PRESS
62 PSIG

This display shows the suction pressure of SYS 4 at the time of the fault.

SYS 4 DSCH PRESS
240 PSIG

This message indicated SYS 4 discharge pressure at the time of the fault. This display will be a fixed value unless the Discharge Pressure Readout is installed.

SYS 4 OIL PRESSURE
74 PSID

This display shows the oil pressure of SYS 4 at the time of the fault.

SYS 4 LIQ LINE
ON

This display informs the operator whether SYS 4 liquid line solenoid was energized (ON) or de-energized (OFF) at the time of the fault.

SYS 4 RUN PERMISSIVE
ON

This message informs the operator if SYS 4 Run Permissive (flow switch, remote START/STOP) was in the RUN mode (ON) or STOP mode (OFF).

SYS 4 LOADING STAGES
1

This message indicates the number of stages which were loaded on SYS 4 at the time of the fault.

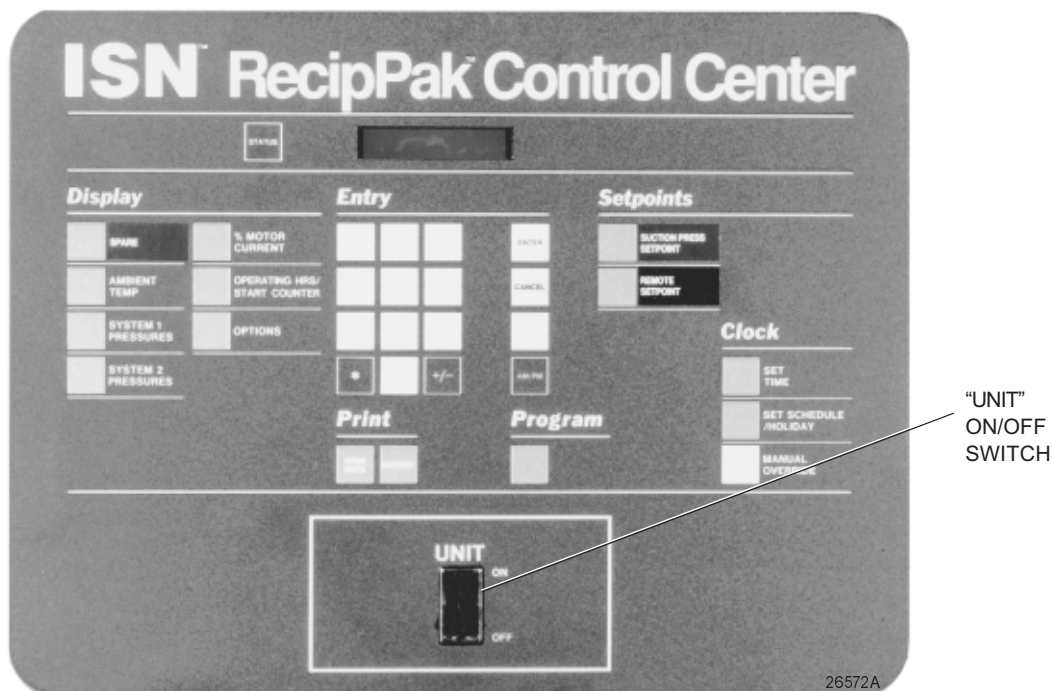
SYS 4 FORWARD FANS
OFF

This display indicates the number of fans on SYS 4 which were running forward at the time of the fault.

SYS 4 REVERSE FANS
OFF

This message indicates the number of fans on SYS 4 which were running in the reverse direction at the time of the fault.

“UNIT” ON/OFF SWITCH



UNIT ON/OFF SWITCH

A master UNIT ON/OFF switch is located on the keypad. This rocker switch allows the operator to turn the entire chiller OFF if desired. The switch must be placed in the ON position for the chiller to operate.

Whenever the switch is placed in the OFF position, a STATUS display indicating the condition will be displayed. This message is shown below.

UNIT SWITCH IS IN
THE OFF POSITION

SYSTEM SWITCHES

SYSTEM SWITCHES 1-4 are located on each Micro-processor Board (See Fig. 31). These allow the operator to selectively turn a given system on or off as desired. On a 4 system chiller, switches 1, 2, 3 & 4 of the Master Microprocessor Board MUST be ON to allow operation of all 4 compressors. This allows operator control of all 4 systems from the Master Microprocessor Board. Switches 1 & 2 on the Slave Microprocessor Board MUST also be ON to enable operation of compressors 3 & 4 which is controlled by the Slave Microprocessor. If these two switches are not ON, the Slave Micro will not respond to commands from the Master to operate compressors 3 & 4. Additionally, switches 3 & 4 of the Slave Microprocessor Board should be in the OFF position.

Whenever a switch is placed in the OFF position, a STATUS display indicating the condition will be displayed

indicating that the system does not have a Run Permissive signal. A sample of this message follows:

SYS # 1 NO RUN PERM
SYS # 2 NO RUN PERM

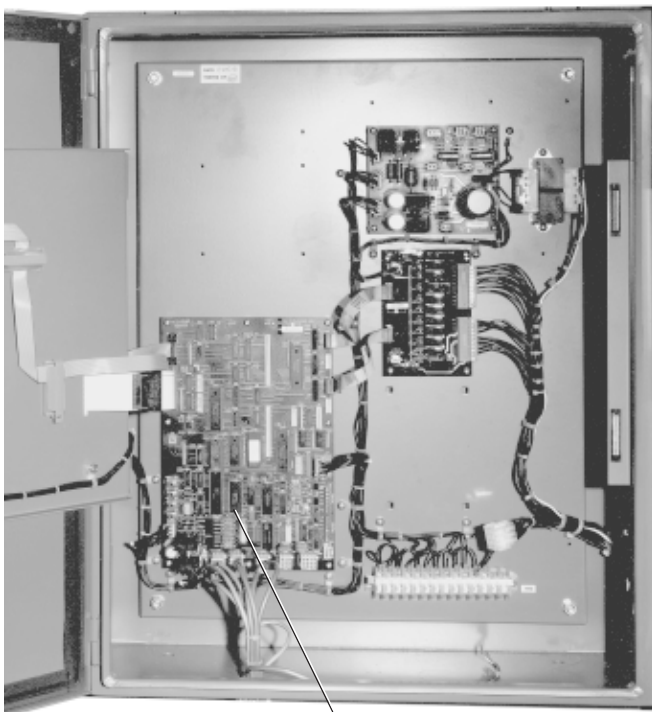
NOTE: This message will not appear if Anti-recycle or Anti-coincident timers are in effect and are being displayed.

ALARM CONTACTS (ANNUNCIATION ALARM)

“Dry” contacts connected to terminals 23 and 24 (Fig. 32) are supplied on the Master Control Panel, which will transition to function as a warning whenever a fault shutdown occurs on any system or if power is lost to the control panel. The dry contacts are normally open (N.O.) and will close when control power is applied to the panel, if no fault conditions are present. If power is lost or a fault lockout occurs, the contact will open.

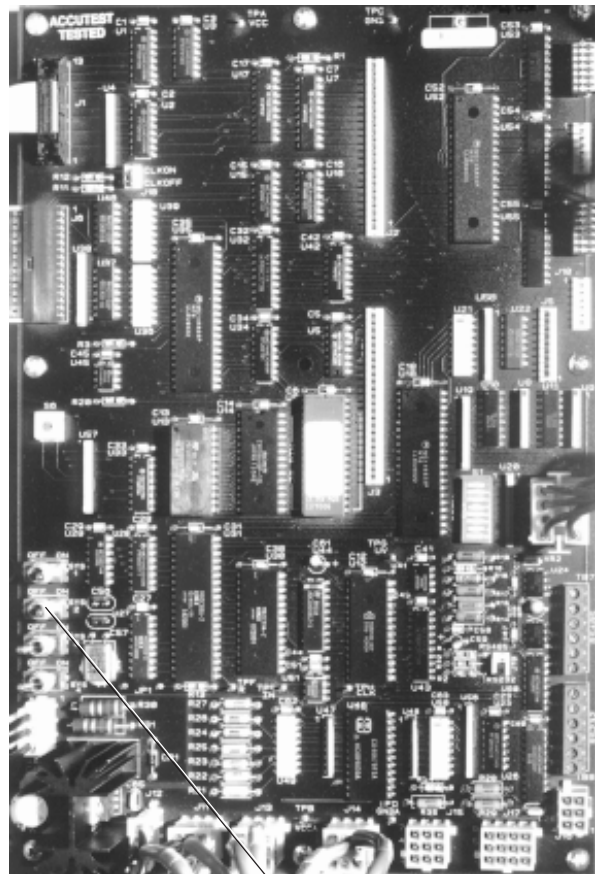
A 28VDC or 120VAC external alarm circuit (by others) may be wired into the YORK supplied alarm contacts. Any inductive load devices (relay, contactor), supplied by the user which are connected to the dry contacts, MUST be suppressed at the load. Use YORK P/N 031-00808-000 suppressor (not supplied). Failure to do this will result in nuisance faults and possible damage to the chiller.

CAUTION: If the alarm circuit is applied in an application used for critical duty (such as process duty or cooling other critical equipment) and



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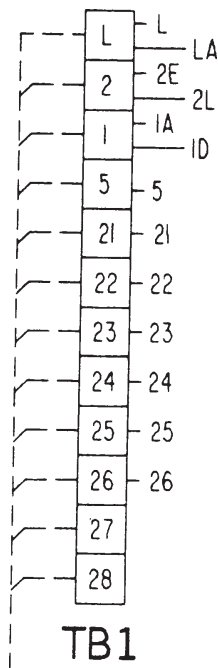
MICROPROCESSOR BOARD



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SYSTEM SWITCHES 1 - 4

FIG. 31 – LOCATION OF THE MICROPROCESSOR BOARD



LD01945

the alarm circuit should fail to function, YORK will not be liable for damages.

LEAD/LAG COMPRESSOR SELECTION

The chiller can be set up for AUTO or MANUAL Lead/Lag. This is accomplished by configuring the S1 Dip Switches properly on both Microprocessor Boards. Details for doing this are discussed in the OPTIONS key section.

When AUTO Lead/Lag is utilized, the micro determines which compressor is assigned to the lead and the lag. A new lead/lag assignment is made whenever both compressors shut down. The respective micro will assign the "lead" to one of the two compressors it directly controls with the shortest anti-recycle time. This will tend to balance run time between each pair compressors.

AUTO Lead/Lag will cause the lag compressor on the Master or Slave Module to automatically become the lead, anytime the compressor currently in the lead shuts down due to a safety threshold being exceeded. This is done to maintain water temperature as close to setpoint

FIG. 32 – ALARM CONTACT CONNECTION LOCATION

as possible. Additionally, the lag system will automatically become the lead anytime the system switch on the Microprocessor Board of the compressor currently in the lead is placed in the OFF position. This is also done to maintain water temperature as close to setpoint as possible.

If MANUAL Lead/Lag is selected, an external “dry” contact (switch) must be wired into each Control Panel. This contact is supplied by others. When the contact is closed, SYS 2 will be the lead system. With the contact open, SYS 1 is the lead.

Manual Lead/Lag selection can be automatically overridden by the micro to allow the lag compressor to automatically become the lead, anytime the selected lead compressor shuts down due to a safety threshold being exceeded. This is done to try to maintain water temperature as close to setpoint as possible. No lead/lag switchover will take place if the system switch of the Microprocessor of the lead compressor is placed in the OFF position.

The “dry” contact for manual lead/lag selection is wired into terminals 13 and 19. The location of these contacts is shown below in Fig. 33.

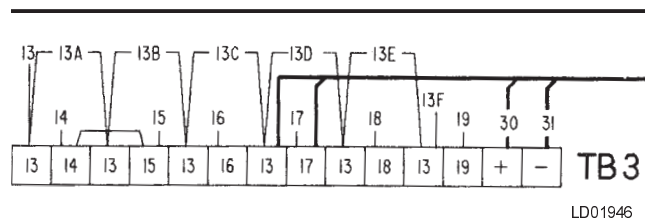


FIG. 33 – LEAD/LAG CONTACT CONNECTION LOCATION

NOTE: It is advisable to select the same type of LEAD/LAG control on both the Master and Slave Microprocessor Boards.

MEMORY BATTERY BACK-UP

Each Microprocessor Board contains a Real Time Clock (RTC) I.C. Chip with an internal battery back-up. The battery back-up assures that any programmed values, clock, all fault information, accumulated information such as starts/run time, etc. stored in the RTC memory is not lost when a power failure occurs regardless of the time period.

The battery is a 10-year lithium type. The life of the battery with power removed will depend upon whether the Real Time Clock’s internal clock circuit is energized. With the clock OFF, approximately 10 years can be expected, with the clock ON, approximately 5 years.

The clock is turned ON and OFF by a jumper on the Microprocessor Board. While a chiller is operating, the

clock must be ON. Otherwise the internal clock on the microprocessor will not be active and the micro cannot keep track of time, although all other functions will operate normally. This could result in the chiller not starting due to the time frozen on the clock falling outside the START/STOP time window that is programmed in the DAILY SCHEDULE.

If the chiller is shut-down for extended periods of months, it may be desirable to disable the clock to save battery life. The clock can then be reactivated and reprogrammed when the chiller is returned to service.

NOTE: ALL PROGRAMMED VALUES AND STORED DATA, OTHER THAN THE INTERNAL CLOCK TIME-KEEPING, WILL BE MAINTAINED IN MEMORY REGARDLESS OF WHETHER THE CLOCK IS ON OR OFF AND REGARDLESS OF THE LENGTH OF THE POWER FAILURE.

To disable the clock, place the jumper (Fig. 43, Page 74) in the OFF position. To activate it, place the jumper in the ON position.

On power-up, the microprocessor will check the Real Time Clock (RTC Chip) battery to assure that the internal battery is still operational. This is accomplished by performing an RTC RAM location check. As long as the battery checks out, the microprocessor will continue on with business without interruption.

If a check is made and the battery has failed, the microprocessor will not allow the chiller to run and the following STATUS message will appear:

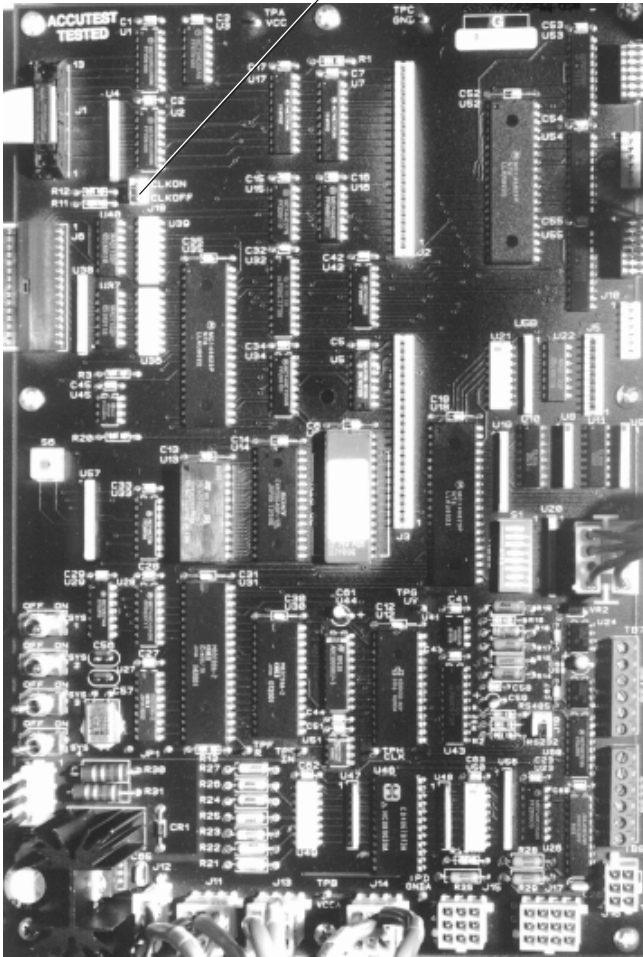


The only way to run the chiller is to press the MANUAL OVERRIDE key. Under low battery conditions, the manual override key will function differently than it normally does in service situations where it overrides the daily schedule for only 30 min. In a low battery condition, the MANUAL OVERRIDE key will zero out the daily schedule to allow unlimited operation regardless of the time on the internal clock. Default values will also be loaded into memory for all setpoints and cut-outs. These may require reprogramming to assure they meet chiller operating requirements. In addition, the low battery message which is displayed for this condition will disappear.

NOTE: If a power failure should again occur, the above process will again need to be repeated to bring the chiller back on line.

In the unlikely event the low battery message should ever appear, it will require the RTC Chip U13 on the Microprocessor Board (Fig. 25) to be replaced. Care should be taken to assure that the chip is properly in-

CLOCK JUMPER



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FIG. 34 – CLOCK JUMPER

stalled. Pin 1 (dimple in the top of the chip) must be oriented as shown (Fig. 25). The part number for the RTC Chip is 031-00955-000.

CRANKCASE HEATER

The crankcase heater for a compressor will be ON whenever the compressor is not running. The heater is interlocked into the compressor motor contactor and is not controlled by the microprocessor.

The purpose of the crankcase heater is to prevent the migration of refrigerant to the crankcase during shut-down, assuring proper lubrication of the compressor on start-up.

Anytime power is removed from the chiller for more than an hour, the crankcase heater should be left on for 24 hours prior to start. This can be accomplished by applying 115VAC to the control panel.

EVAPORATOR HEATER

The evaporator heater prevents water standing in the evaporator from freezing. Whenever outdoor ambient temperature drops below 40°F, the microprocessors will turn the evaporator heaters ON. If temperature rises above 45°F, the heater will be turned off.

METRIC DISPLAY

The control panel is capable of providing displays of pressure and temperature in metric values. Temperatures will be displayed in °C and pressures in kPa.

A Metric to English temperature conversion table is provided on the rear cover of this manual. Pressure can be converted from PSI to kPa using the formula $PSI \times 6.89 = kPa$.

To obtain panel displays in metric, Switch 5 of Dip Switch S1 on BOTH Microprocessor Boards must be placed in the OPEN position (Page 39). The positioning of this switch can then be verified by pushing the OPTIONS key and verifying that “METRIC UNITS READ-OUT” is programmed (Page 36).

NOTE: This verifies the positioning on the Master Microprocessor Board only. The Slave Microprocessor Board must be checked visually.

EMS/BAS CONTROLS

The microprocessor is capable of REMOTE START/STOP, REMOTE UNLOADING (Pull-down demand limiting), and REMOTE SETPOINT RESET. These functions can be easily utilized by connecting user supplied “dry” contacts to the Microprocessor Board.

REMOTE START/STOP BY A CYCLING DEVICE OR TIME CLOCK

Remote START/STOP is accomplished by connecting a time clock or other “dry” contact in series with the flow switch on terminals 13 & 14 of both microprocessor boards. See Fig. 24 for the location of the terminals. The contact must be closed to allow the respective module (Master or Slave) to run. Any time the contact opens, the module will shut down and the following status message relating to the Master or Slave Module will be displayed. Terminals 13 & 14 of the Slave Micro Panel MUST also be jumpered to allow system 3 to operate.

SYS # 1	NO	RUN	PERM
SYS # 2	NO	RUN	PERM

Wiring from these contacts should not exceed 25 ft. and should be run in grounded conduit that does not carry any wiring other than control wiring. Additionally,

if an inductive device (relay, contactor) is supplying these contacts, the coil of the device must be suppressed with a user supplied YORK P/N 031-00808 suppresser.

REMOTE SETPOINT RESET (REMOTE RESET TEMP RANGE)

Remote Setpoint Reset allows resetting the setpoint upward from the programmed value in memory. This is accomplished by connecting a “dry” contact between terminals 13 & 17 of the Master Microprocessor Control Panel. See Fig. 24 for the location of these terminals. Closing the contact for a defined period of time allows reset of the setpoint upward by up to 40°F above the setpoint programmed in memory.

The maximum desired reset must be programmed into memory and can be a value of 02 to 40°F. This value will vary according to the user’s requirements. To program the reset, press the REMOTE SETPOINT TEMP RANGE key. The following message will appear.

<p>REM SETPOINT = 40.0 REM RANGE = 20 DEGF</p>
--

The display will indicate the REM SETPOINT which is always equal to the chilled liquid setpoint plus the offset from the reset signal. The display will also show the REM RANGE which is the same as the maximum reset required. Key in the maximum reset for the REM RANGE and press the ENTER Key to store the new value in memory.

Once the maximum reset is programmed, it will require a contact closure of 21 seconds to achieve the maximum reset. Closure for less than 21 seconds will provide a smaller reset. For noise immunity, the micro will ignore closures of less than 1 second.

To compute the offset for a given timer closed, use the formula below:

1. $\frac{\text{Programmed max. reset}}{20 \text{ seconds}} = \text{Reset per sec.}$
2. $(\text{Time Closed} - 1) \text{ Reset per sec.} = \text{Reset}$

Example:

Programmed max reset = 30°; Time Closed = 9 sec.

1. $\frac{30^\circ}{20 \text{ sec.}} = 1.5^\circ \text{ per sec.}$
2. $(9 \text{ sec.} - 1 \text{ sec.}) 1.5^\circ \text{ per sec.} = 12^\circ = \text{Reset}$

To determine the new setpoints, add the reset to the setpoint programmed into memory. In the example

above, if the programmed setpoint = 44°F, the new setpoint after the 9 second contact closure would be 44°F + 12°F = 56°F. This new setpoint can be viewed on the display by pressing the REMOTE RESET TEMP/RANGE key.

To maintain a given offset, the micro must be refreshed every 30 seconds - 30 minutes with a contact closure of the required time period. It will not accept a refresh sooner than 30 seconds after the end of the last PWM signal, but must be refreshed before a period of 30 minutes expires from the end of the last PWM signal.

After 30 minutes, if no refresh is provided, the setpoint will change back to its original value. A refresh is nothing more than a contact closure for the period required for the desired offset.

NOTE: After an offset signal, the new setpoint may be viewed on the REMOTE RESET TEMP RANGE DISPLAY. However, if this display is being viewed when the reset pulse occurs, the setpoint will not change on the display. To view the new offset, first press any other display key on the keypad and then press the REMOTE RESET TEMP RANGE key. The new setpoint will then appear.

Wiring from these contacts should not exceed 25 ft. and should be run in grounded conduit that does not carry any wiring other than control wiring. Additionally, if an inductive device (relay, contactor is supplying these contacts), the coil of the device must be suppressed with a user supplied YORK P/N 031-00808 suppressor.

NOTE: Remote Setpoint Reset will not operate when a Remote Control Center Option Kit is connected to the Micropanel. The remote Control center will always determine the setpoint.

REMOTE UNLOADING

The Master Microprocessor is capable of remote unloading or pulldown demand limiting in two steps. The first step shuts down the Slave Module. The second step unloads the Master Module to its 3rd step of capacity which places the entire system at approximately 15% of its total capacity. % capacity will vary according to the number of steps that are present on the lead compressor. The 3rd step of capacity will operate the lead compressor unloaders de-energized (loaded), of two are present on the compressor.

To shut down the Slave Module, a “dry” contact should be connected between terminals 13 & 16. See Fig. 24 for the location of these terminals. When the contact is closed, the Slave Module will shut down.

Before the lead system can be unloaded to its 3rd step of capacity, the Slave Module must already be disabled with a “dry” contact closure between terminal 13 & 16 as described in the preceding paragraph.

With contacts on terminals 13 & 16 closed, the lead system can be unloaded to its 3rd step of capacity by closing a “dry” contact connected between terminals 13 & 17. See Fig. 24 for location of this terminal. The lead system will remain totally unloaded as long as the contacts remain closed on both 13 & 16 and 13 & 17. It should be noted that terminals 13 & 17 are normally used for Remote Setpoint Reset. However, it is assumed that if the lag system is purposely being shut down, Remote Setpoint Reset and temperature control is of no importance. This is generally true since capacity control of the load is lost when a large portion of the capacity is disabled.

CAUTION: Two cautions should be observed when using these functions. Observing these cautions will assure that undesirable operation does not result.

1. Terminals 13 & 17 contact should always be closed after or simultaneous with those on 13 & 16, when unloading of the lead system is desired. Otherwise, the microprocessor may mistake the closed contacts on 13 & 17 as a signal for a setpoint reset.
2. Terminal 13 & 17 contact should always be opened before or simultaneous with those on 13 & 16 when loading is desired. Otherwise, the microprocessor may mistake the closed contacts on 13 & 17 as a signal for a setpoint reset.

FAN CONTROL STRATEGY ABOVE 25°F AMBIENT

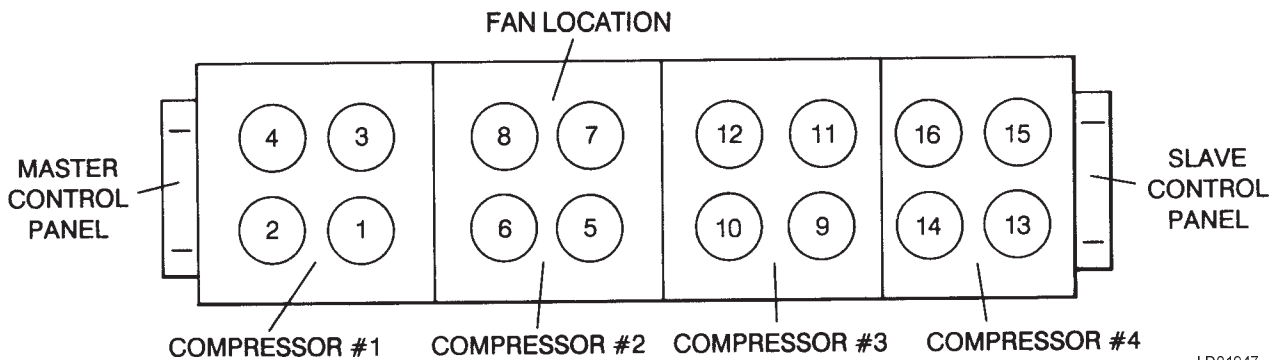
The chiller is equipped with 8 condenser fans; 4 per system. The standard fan control strategy is fan cycling by outdoor ambient temperature, with the low ambient cut-out (chiller shut down) set at 25°F.

Above 25°F ambient, 2 fans on a respective system will turn on 4 seconds after the compressor starts. These fans will continue to run until the compressor shuts down. These fans are designated as Fans 2 & 4 on SYS 1, Fans 6 & 8 on SYS 2, Fans 10 & 12 on SYS 3 and Fans 14 & 16 on SYS 4.

If the ambient temperature is above 45°F, 2 more fans on a respective system will start after the compressor has run for 30 seconds. These two fans will continue to run until the compressor shuts down or until the ambient temperature drops to 40°F. These fans are designated as Fans 1 & 3 on SYS 1, Fans 5 & 7 on SYS 2, Fans 9 & 11 on SYS 3 and Fans 13 & 15 on SYS 4.

Locations of the fans and a chart showing the operation outlined above is shown in Fig. 35.

For operation below 25°F, a Low Ambient Kit MUST be installed. See page 84.



LD01947

SYS 1 FANS	SYS 2 FANS	AMBIENT ON	AMBIENT OFF
2 & 4	6 & 8	25°F	24°F
1 & 3	5 & 7	45°F	40°F

SYS 3 FANS	SYS 4 FANS	AMBIENT ON	AMBIENT OFF
10 & 12	14 & 16	25°F	24°F
9 & 11	13 & 15	45°F	40°F

FAN 35 – FAN LOCATIONS

COMPRESSOR CAPACITY CONTROL

The function of the compressor capacity control system is to automatically adjust the compressor pumping capacity to balance with the cooling load at a pre-determined return water temperature and to permit the compressor to start under partial load. The compressor capacity control system is actuated by means of gas pressure from the discharge side of the compressor. Gas pressure to the power element loads the associated cylinders and release of this pressure unloads them. Control of the gas pressure to the unloader elements is the function of the compressor capacity control solenoids located on the front handhole cover.

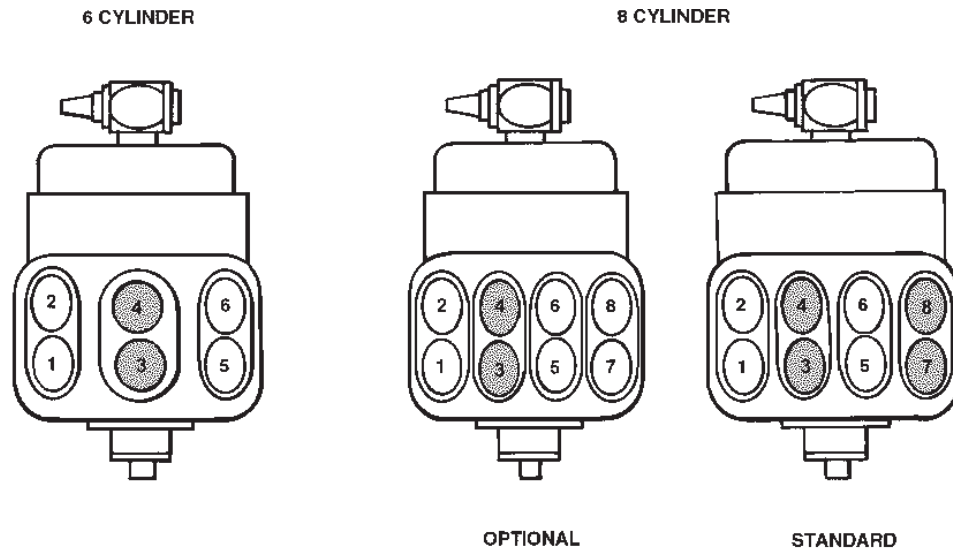
UNLOADING

When the solenoid valve is energized, discharge gas pressure is applied to the top of the unloader piston, forcing it down against spring pressure. The bottom end of the piston seats against the recessed opening to the suction plenum, effectively blocking the flow of suction gas into the cylinders (blocked suction unloading). The cylinders are now unloaded.

LOADING

When the solenoid valve is de-energized, gas pressure on top of the unloader piston is relieved to the suction plenum. The coil spring forces the piston up, uncovering the recessed opening which allows the suction gas to flow through the port and into the cylinders. The cylinders are now loaded.

CHILLER MODEL	SYS	NO. OF CYLINDER	NO. OF STEPS OF UNLOADING	
			STD.	OPT.
YDAJ87HU7	1 & 3	8	10	16
YDAJ87KU6 YDAJ97KU7	2 & 4	6		
YDAJ88MU6 YDAJ98MU7 YDAJ99MW6 YDAJ99MU7 YDAJ99MW9	1, 2, 3, & 4	8	10	20



UNLOADING CYLINDERS
 PERMANENTLY LOADED CYLINDERS

LD01948

NOTES:

- 6 cylinder compressors do not connect the loading solenoid wiring on cylinders 1 & 2, effectively making them permanently loaded in the "standard" unloading scheme. The loading solenoid on these cylinders is connected to additional electronics for optional extra steps of unloading. Cylinders 3 & 4 have no loading solenoids and are truly permanently loaded cylinders.
 - 8 cylinder compressors do not connect the loading solenoids on cylinders 5 & 6, effectively making them permanently loaded in the "standard" unloading scheme. The loading solenoids on cylinders 3 & 4 and 7 & 8 are jumpered together and connected to the Relay Output Board to function together as a single step of unloading in the "standard" unloading scheme. Loading solenoids on 5 & 6, 3 & 4 and 7 & 8 are connected to additional electronics for extra steps of unloading. Cylinders 3 & 4 have no unloading solenoids and are truly permanently loaded cylinders.
- Optional unloading connects all loading solenoids to individual Relay Output Board outputs to provide extra steps.

FIG. 36 – COMPRESSOR UNLOADING SEQUENCE

SYSTEM START-UP CHECKLIST / REPORT

JOB NAME: _____ SALES _____ ORDER#: _____
LOCATION _____
SOLD BY: _____
INSTALLING _____ CONTRACTOR _____
START-UP: _____ TECHNICIAN/ COMPANY: _____
DATE: _____
CHILLER MODEL #: _____ SERIAL #: _____
COMPRESSOR #1 MODEL #: _____ SERIAL #: _____ COMPRESSOR #2 MODEL #: _____ SERIAL #: _____

CHECKING THE SYSTEM 24 HOURS PRIOR TO INITIAL START-UP (NO POWER)

Unit Checks

- 1. Inspect the unit for shipping or installation damage.
- 2. Assure that all piping has been completed.
- 3. Assure that the Splicing Kit is properly installed.
- 4. Assure that the Communications Cable between the two control panels is properly installed.
- 5. Assure that the Mixed Water Temp. Sensor is installed properly.
- 6. Check that the unit is properly charged and that there are no piping leaks.
- 7. Suction and discharge stop valves and the refrigerant liquid stop valves are open (ccw).

CAUTION: *Compressor lubrication circuit must be primed with YORK "C" oil prior to start-up. Priming should be done through the Schrader fitting at the compressor oil pump. Stroke oil pump 10 times to prime the lubrication circuit.*

- 8. The compressor oil level must be maintained in the sight glass at all operating conditions. At part load operating conditions, it is not abnormal for the oil level to be in the lower sight glass. If it is necessary to add oil, connect a YORK oil pump to the oil charging valve, but do not tighten the flare nut on the delivery tubing. With the bottom (suction end) of the pump submerged in oil to avoid the entrance of air, operate the pump until oil drips from the flare nut joint, allowing the air to be expelled, and tighten the flare nut. Open the compressor oil charging valve and pump in oil until the oil reaches the proper level as described above. Close the compressor oil charging valve.
- 9. Assure water pumps are on. Check and adjust water pump flow rate and pressure drop across cooler.
- 10. Check both panels to see that they are free of foreign material (wires, metal chips, etc.).
- 11. Visually inspect wiring (power & control). Must meet NEC and all local codes. (See Figs. 22 and 24)
- 12. Check for proper size fuses in main and control power circuits.
- 13. Verify that field wiring matches the 3-phase power requirements of the compressor. See nameplate. (See Fig. 22)
- 14. Assure 115VAC Control Power to each TB1 has 30A minimum capacity. (See Fig. 22)
- 15. Be certain all control bulbs are inserted completely in their respective wells and are coated with heat conductive compound.

PANEL CHECKS

(POWER ON-BOTH SYSTEM SWITCHES "OFF")

- 1. Apply 3 phase power and verify its value at each pair of compressor contacts. (See Fig. 22)
 Record the voltage: fA _____ VAC
 fB _____ VAC
 fC _____ VAC
- 2. Apply 115VAC and verify its value on the terminal block in the lower left of each Power Panel. Make the measurement between terminals 5 and 2. Should be 115VAC ±10%. (See Fig. 22)
 Record the voltage: _____ VAC
- 3. Assure crankcase heaters are on. Allow crankcase heaters to remain on a minimum of 24 hours before start-up. This is important to assure no refrigerant is in the oil at start-up!

- 4. Program the Dip Switches on the Microprocessor Board (Page 38) and verify the selection by pressing the OPTIONS key.

Switch 3 should always be open.

Switch 4 should always be closed.

Switch 6 should always be open.

NOTE: It is IMPORTANT that all switches are properly programmed. Otherwise, undesirable operation will result.

- 5. Press the PROGRAM key and program each of the 10 limits and record them.

They are as follows:

- Discharge Cut-out _____ PSIG
- Outside Air Temp Low Cut-out _____ °F
- Outside Air Temp High Cut-out _____ °F
- Discharge Pressure Unload Pressure _____ PSIG
- Suction Pressure Unload Pressure _____ PSIG
- Leaving Water Temp Cut-out _____ °F
- Suction Pressure Cut-out _____ PSIG
- Rate Control Temperature _____ °F
- Anti Recycle Time _____ SEC.
- Rate Sensitivity _____ °F/MIN.

See page 45 for assistance in programming these values.

- 6. Program the date and time by first assuring that the CLK jumper J18 on both Microprocessor Boards (Fig. 34) is in the ON position (Top 2 pins).

Press the SET TIME key and set the date and time (Page 49).

- 7. Program the Daily and Holiday Start/Stop Schedule by pressing the SET SCHEDULE/HOLIDAY key (Page 50).

- 8. Program the Chilled Liquid Setpoint and Control Range by pressing the CHILLED LIQUID TEMP/RANGE key (Page 52). Record the setpoint and control range: Setpoint: _____ °F
Control Range: _____ °F

- 9. If the Remote Reset is to be used, the maximum reset must be programmed. This can be programmed by pressing the REMOTE RESET TEMP RANGE key (Page 75).

INITIAL START-UP

After the operator has become thoroughly familiar with the control panel and has performed the preceding checks 24 hours prior to start-up, the unit can be put into operation.

- Place the System Switches to the ON position. See the OPERATING SEQUENCE for unit operation.
- The compressor will start and a flow of liquid should be noted in the liquid indicator. After several min-

utes of operation, the bubbles will disappear and there will be a solid column of liquid when the unit is operating normally. On start-up, foaming of the oil may be evident in the compressor oil sight glass. After the water temperature has been pulled down to operating conditions, the oil should be clear. Normal operation of the unit is evidenced by a hot discharge line (discharge superheat should not drop below 50°F) clear oil in the compressor crankcase, solid liquid refrigerant in the liquid indicator and usually no more than 2 PSIG variation in suction pressure for any given set of operating conditions.

- Allow the compressor to run for a short time, being ready to stop it immediately if any unusual noise or other adverse condition should develop. When starting the compressor, always make sure the oil pump is functioning properly. Compressor oil pressure must be as described in the SYSTEM SAFETY'S Section, page 57.
- Check the system operating parameters. Do this by selecting various read-outs such as pressures and temperatures. Compare these to test gauge readings. Record read-outs below:

CHILLED LIQUID TEMPERATURES

Mixed Leaving: _____ °F
Ambient Temperature: _____ °F

SYSTEM 1 PRESSURES

Suction: _____ PSIG
Oil: _____ PSIG
Discharge: _____ PSIG

SYSTEM 2 PRESSURES

Suction: _____ PSIG
Oil: _____ PSIG
Discharge: _____ PSIG

SYSTEM 3 PRESSURES

Suction: _____ PSIG
Oil: _____ PSIG
Discharge: _____ PSIG

SYSTEM 4 PRESSURES

Suction: _____ PSIG
Oil: _____ PSIG
Discharge: _____ PSIG

MOTOR CURRENT:

SYS 1: _____ % FLA
SYS 2: _____ % FLA
SYS 3: _____ % FLA
SYS 4: _____ % FLA

OPTIONS:

CHECKING SUPERHEAT AND SUBCOOLING

The subcooling should always be checked when charging the system with refrigerant and/or before setting the superheat.

When the refrigerant charge is correct, there will be no bubbles in the liquid sightglass with the system operating under full load conditions, and there will be 10°F to 15°F subcooled liquid refrigerant leaving the condenser.

An overcharged system should be guarded against. Evidences of overcharge are as follows:

- a. If a system is overcharged, the discharge pressure will be higher than normal. (Normal discharge/condensing pressure can be found in refrigerant temperature/pressure chart; use entering air temperature +30°F for normal condensing temperatures).
- b. The temperature of the liquid refrigerant out of the condenser should not be more than 15°F less than the condensing temperature. (The temperature corresponding to the condensing pressure from refrigerant temperature/pressure chart).

The subcooling temperature should be taken by recording the temperature of the liquid line at the outlet of the condenser and recording the liquid line pressure at the liquid stop valve and converting it to a temperature from the temperature/pressure chart.

Example:

LIQUID LINE PRESSURE		
202 PSIG converted to		102°F
Minus Liquid Line Temperature		-90°F
Subcooling =		12°F

Record:

	SYS 1	SYS 2	SYS 3	SYS 4	
Liquid Line Press:	_____	_____	_____	_____	PSIG
Liquid Line Temp:	_____	_____	_____	_____	°F
Subcooling:	_____	_____	_____	_____	°F

After the subcooling is set at 10°-15°F the superheat should be checked.

The superheat should be checked only after steady operation of the chiller has been established, the leaving chilled liquid has been pulled down to the required temperature, and the unit is running fully loaded. Correct superheat setting is 12°-15°F.

The superheat is the difference between the actual temperature of the returned refrigerant gas entering the compressor and the temperature corresponding to the suction pressure as shown in a standard pressure/temperature chart.

Example:

Suction Temperature	46°F
Minus Suction Pressure 60 PSIG	
Converted to Temperature	- 34°F
Superheat	12°F

The suction temperature should be taken 6" before the compressor service valve, and the suction pressure is taken at the compressor suction service valve.

Record:

	SYS 1	SYS 2	SYS 3	SYS 4	
Suction Temperature:	_____	_____	_____	_____	°F
Suction Pressure:	_____	_____	_____	_____	PSIG
Superheat:	_____	_____	_____	_____	°F

Normally, the thermal expansion valve need not be adjusted in the field. If, however, an adjustment is to be made, the expansion valve adjusting screw should be turned not more than one turn at a time, allowing sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and return to settled operation.

If the unit has been functioning satisfactorily during the initial operating period, it is ready for continuous operation.

- Leak check compressors, fittings, and piping to assure no leaks are present from improper handling.

NOTES: _____

- Start-Up Complete

OPERATING SEQUENCE

NOTE: The operating sequence described below relates to operation after power has been applied on a hot water start (such as start-up commissioning). Under these circumstances, loading will deviate from normal sequence and timing previously described. When a compressor starts, internal timers limit minimum time before another compressor can start to 1 minute. Time between stages of loading is also limited by internal timers to a minimum of 1 min., although the micro would like to load at 30 sec. intervals which may cause the lag compressor to start before the lead system fully loads optional steps. This also deviates from the normal sequence of loading. If rate control dictates, time between stages of loading may be up to 150 sec. or may not occur at all. This will be determined by rate control programming and actual water temperature rate of change.

1. For the system compressor to run, all Manual Reset Cut-outs must be reset, the Flow Switch must be closed, any remote cycling contacts must be closed, the System Switches must be ON, the Daily Schedule must be scheduling the chiller to run, and temperature demand must be present.
2. As long as power is applied, the Crankcase Heaters will be on and stay on as long as the compressors are not running.
3. When power is applied to the system, the microprocessor will start a two minute timer. This is the same timer that prevents an instantaneous start after a power failure.
4. At the end of the two minute timer, the microprocessor will check for cooling demand as well as check to see if any system safeties are exceeded. If all conditions allow for start, the lead compressor will start unloaded. Coincident with the start, the programmable anti-recycle timer will be set and begin counting downward to "0". The liquid line solenoid valve will open when the system is pumped down to the suction pressure cut-out (Pumpdown on start-up.)
5. **After 4 seconds of run time**, the motor current of the lead compressor must be >14% FLA and <115% FLA. Oil pressure must be 5 PSID or greater. If these conditions are not met, the lead compressor will shut down.
6. **After 30 seconds of run time**, the oil pressure of the lead compressor must be a minimum of 20 PSID and the suction pressure must be a minimum of 50% of cut-out.
7. **After 60 sec. of run time**, if cooling demand requires and no safeties have been exceeded, the lead compressor will load, if cooling demand (temperature and rate control) requires.
8. **After 90 seconds of run time**, if cooling demand requires and no safeties have been exceeded the lag compressor will start unloaded. Coincident with the start, the programmable anti-recycle counter will be set and begin counting downward to "0". The liquid line solenoid will open when the system is pumped down to the suction pressure cut-out.
9. **After 94 seconds of run time**, the oil pressure of the lag compressor must be a minimum of 5 PSID and suction pressure must be greater than 50% of cut-out.
10. **After 2 minutes of run time**, the lead compressor will continue to load, if cooling demand (temperature and rate control) requires and extra steps of capacity are present. The oil pressure of the lag compressor must be a minimum of 20 PSID and the suction pressure must be a minimum of 50% cut-out.
11. **After 2 minutes and 30 seconds of run time**, the lag compressor will load, if cooling demand (temperature and rate control) requires.
12. **After 3 minutes of run time**, the lead compressor will load, if cooling demand (temperature and rate control) requires, and extra steps of capacity are present.
13. **After 3 minutes and 30 seconds of run time**, the lag compressor will load, if optional stages of loading are present and cooling demand requires.
14. **After 4 minutes of run time**, the lead compressor's suction pressure must be greater than the programmed cut-out. In addition, the oil pressure of the lead compressor must be greater than 25 PSID.
15. **After 4 minutes and 30 seconds of run time**, the lag compressor will load, if optional stages of loading are present and cooling demand requires.
16. **After 5 minutes and 30 seconds of run time**, the lag compressor's suction pressure must be greater than the programmed cut-out. In addition, the oil pressure of the lead compressor must be greater than 25 PSID.
17. Operation beyond 6 minutes will be dictated by cooling demand. Anti-recycle timers will time out and system safety thresholds will continue to be monitored.

PREVENTATIVE MAINTENANCE

It is the responsibility of the owner to provide the necessary daily, monthly and yearly maintenance requirements of the system.

IMPORTANT

If a system failure occurs due to improper maintenance during the warranty period, YORK will not be liable for costs incurred to return the system to satisfactory operation. The following is intended only as a guide and covers only the chiller unit components. It does not cover other related system components which may or may not be furnished by YORK. System components should be maintained according to the individual manufacturers' recommendations as their operation will affect the operation and life of the chiller.

DAILY MAINTENANCE

It is recommended that the following items be checked daily.

1. Oil Level – Correct oil level is when oil appears in either of the compressor oil sight glasses after the unit has been in operation for about two hours. If it is necessary to add oil after this operating period, see item #3 under the ANNUAL MAINTENANCE section.
2. Oil Pressure – Oil pressure should be a minimum of 50 psi above suction pressure. Typical pressure is 65-70 psi.
3. Compressor Superheat – Correct superheat is 10-15°F measured at the compressor.
4. Operating Pressures and Temperatures – Check to see that operating pressures and temperatures are within the OPERATIONAL LIMITATIONS shown in this book.

WEEKLY MAINTENANCE

It is recommended that the following items be checked weekly.

1. All items listed under DAILY MAINTENANCE.
2. Color of Compressor Oil – New oil is clear, and if the system is not contaminated with moisture and/or foreign material, should retain its new appearance for a reasonable length of operating time. Discoloration of the oil, either turning darker brown or in some cases lighter, is an indication of contamination, basically due to moisture. If it is necessary to charge oil refer to item #3 under the ANNUAL MAINTENANCE section.

3. Check the refrigerant circuit for leaks.
4. Operating Pressures and Temperatures – Check to see that operating pressures and temperatures are within the OPERATIONAL LIMITATIONS shown in this book.

ANNUAL MAINTENANCE

It is recommended that the following items be checked annually.

1. All items under WEEKLY MAINTENANCE.
2. Operating Controls – Check to see if controls are set and operating within the proper limits. See UNIT CONTROLS and OPERATION section of this book.
3. Compressor Oil – Drain, inspect and refill with new oil. This requires pumping out the compressor. If possible, this should be done after the unit has been in operation for some time, when the oil in the crankcase will contain the least amount of refrigerant. To pump out the compressor, proceed as follows:
 - A. Close the suction stop valve.
 - B. Open the discharge stop valve two turns of the stem.
 - C. Operate the compressor until 15 to 20 inches of vacuum is obtained. Do this by disconnecting the wiring to LLSV and repeatedly starting the compressor. Recycle 115VAC power to the Logic Panel to reduce anti-recycle time to 2 min. if needed. The compressor should in no case be operated under vacuum conditions for longer than 10 to 15 seconds.
 - D. Stop the compressor and immediately close the discharge stop valve. The procedures outlined in steps (b) and (c) above should be repeated if the suction pressure rises rapidly to 15 PSIG or more which would indicate considerable refrigerant remaining in the crankcase oil. Do not expect to retain 0 PSIG since some refrigerant will continually be released from the oil in the crankcase.
 - E. After pumping down the compressor, wait until the pressure builds up to 2 or 3 PSIG before opening up any part of the hermetic compressor.
 - F. Open the coil drain valve slowly and drain as much oil from the compressor as possible.
 - G. Examine the oil for any metal particles which would indicate wear on the bearings, crankshaft or connecting rods. If metal particles are found, the need

for closer examination by factory service personnel is indicated.

H. If the oil is clean and free of metal particles, refill the compressor with YORK oil "C". To add oil or to fill the compressor crankcase, connect the delivery tube of the YORK Hand Oil Pump. YORK Part No. 470-10654 or equal to the compressor oil charging and drain valve. Expel all air from the delivery tube by pumping it full of oil, allowing a few drips to drip out before tightening the flare nut to the oil charging valve. Then open the oil charging valve and pump oil into the crankcase to the proper level. It is necessary that the suction end of the hand oil pump be kept submerged under the oil level in the container at all times, to avoid entrance of air into the compressor.

I. Before opening the suction or discharge stop valves, connect a vacuum pump to the pump-out

port in the discharge stop valve. (Pump-out port is port on valve stem side of valve). With the vacuum line shutoff valve open, run the vacuum pump until a vacuum of at least 1000 microns is reached. Stop the vacuum pump, close the shut-off valve and open the discharge valve fully before disconnecting the line from the vacuum pump. Disconnect the vacuum pump and replace the plug in the pump-out port.

NOTE: If suction or discharge valves are not seated properly, a 1000 micron vacuum can not be obtained. Do not evacuate for long periods of time.

J. Be sure both discharge and suction stop valves are open before operating the unit.

4. Suction and Discharge Valves – The condition of the suction and discharge valves should be checked by YORK service personnel.

OPTIONS

This section is devoted to options which may be ordered or retrofitted to the unit. Listed below are the options which are covered in this section.

- | | | |
|--|--|---|
| <ol style="list-style-type: none"> 1. CONDENSER WATER PUMP/RUN STATUS CONTACT OPTION 2. EVAPORATOR WATER PUMP CONTACT OPTION 3. LOW AMBIENT ACCESSORY 4. HOT GAS BYPASS (LOADMINDER) OPTION 5. DISCHARGE PRESSURE READOUT OPTION 6. HIGH AMBIENT OPTION 7. LOCAL PRINTER OPTION 8. OPTIONAL TAMPERPROOF ENCLOSURE (WIRE GRILLE) 9. OPTIONAL DECORATIVE TAMPERPROOF ENCLOSURE (LOUVERED & WIRE GRILLE) 10. OPTIONAL DECORATIVE TAMPERPROOF ENCLOSURE (LOUVERED) 11. BAS INTERFACE OPTION (REMOTE RESET OPTION) | | <p>Both controls are included as part of the PUMP CONTROL KIT</p> |
|--|--|---|

CONDENSER WATER PUMP CONTACT OPTION

This option provides a "dry" contact in the Master Panel which can be used to turn on the condenser water pump, other device or indicate run status. The contact closes whenever one of the compressors start.

Connections to this contact can be made on Terminals 21 and 22 of TB1 in the power panel. The location of these terminals is shown in Fig. 37.

This option utilizes a second Relay Output Board and associated wiring. The part number for the Field Mounted Pump Control Kit is 471-01232-101. This kit is not required if a second Relay Output Board is already installed in the Master Panel.

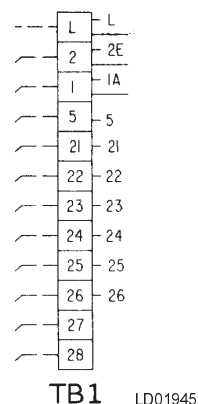


FIG. 37 – CONDENSER WATER PUMP CONTACT CONNECTION POINT (MASTER PANEL ONLY)

NOTE: Any inductive devices (contactor/relay coil) connected to these contacts must be suppressed with YORK P/N 031-00808 supplied by others. Otherwise, nuisance faults may occur.

EVAPORATOR WATER PUMP CONTACT OPTION

This option provides a “dry” contact in the Master Panel which can be used to turn on the evaporator water pump. The contact will be closed by the micro before the micro brings a compressor on. The micro will not bring a compressor on until a “RUN PERMISSIVE” signal is established by a flow switch contact closure. If no daily schedule is set (all times = 00.00), the evaporator water pump contact will transition as soon as a System Switch on the Microprocessor Board is placed in the ON position.

If a daily schedule is programmed, the evaporator water pump contacts will transition when the daily schedule dictates.

If MANUAL OVERRIDE is selected, the evaporator water pump contacts will immediately transition.

Connections to this contact can be made on Terminals 25 and 26 of TB1 in the power panel. The location of these terminals is shown in Fig. 38.

If a power failure occurs which shuts the entire chiller down, the contacts will not be allowed to close again until 30 seconds after power is restored. This prevents rapid cycling of the chilled water pump.

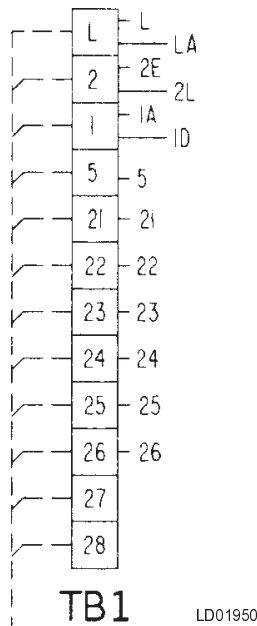


FIG. 47 – EVAPORATOR WATER PUMP CONTACT CONNECTION POINT (MASTER PANEL ONLY)

This option utilizes a second Relay Output Board and associated wiring. The part number for the Field Mounted Pump Control Kit is 471-01232-101. This kit is not required if a second Relay Output Board is already installed in the Master Panel.

NOTE: Any inductive devices (contactor/relay coil) connected to these contacts must be suppressed with YORK P/N 031-00808 supplied by others. Otherwise, nuisance faults may occur.

0°F LOW AMBIENT OPTION

The standard chiller is designed to operate in an ambient of 25°F or higher. If it is necessary to operate the chiller in an ambient between 0° and 25°F, the chiller should be purchased with the factory installed Low Ambient Option.

NOTE: Occasional operation below 0°F is normally possible. In these cases a low suction pressure shutdown may sometimes occur, but can usually be tolerated.

Two kits, one for both the Master and Slave Control Panel, are required.

Operation

The fundamental purpose of the Low Ambient Option is to reduce the capacity of the condenser when the ambient temperature is in the 0° to 25°F range. This assures that adequate discharge pressures can be maintained at low temperatures which will eliminate low suction pressure faults.

Operation at low ambients is accomplished by cycling fans according to discharge pressure. This requires the addition of discharge pressure transducers which allows the microprocessor to add two additional steps of control to the standard fan control scheme. Fans are now allowed to cycle completely off and two fans on each system are permitted to run in the reverse direction. This reduces the capacity of the condenser as required. Reverse rotation of the fans is accomplished by the addition of reversing contactors.

Components

The Low Ambient Option consists of 6 kits; (2) 371-01232-161 Low Ambient Kits, a 471-01232-131 Discharge Pressure Readout Kit for the Master Module, a 471-01232-136 Discharge Pressure Readout Kit for the Slave Module, and also (2) 471-01232-101 Relay Board Kits. The Relay Board Kit(s) is not required if two Relay Boards are already present in a panel.

When the Low Ambient Option is installed, the following physical changes are made to the standard chiller:

1. Discharge pressure transducers and wiring are added to both modules.
2. Reversing contactors 9M, 10M, 15M and 16M with supporting wiring are added to both the Master and Slave Control Panels.
3. A second Relay Output Board and wiring is installed in both Control Panels.

Programming

The control panel may be programmed for “AMBIENT & DISCH PR FAN CONTROL” (Ambient & discharge pressure fan control) or by “DISCHARGE PRESSURE FAN CONTROL” (fan control by discharge pressure only). This is selected by placing SW8 on both the Master and Slave Microprocessor Boards to the appropriate position. See page 40.

SW2 on each microprocessor board must also be programmed for “LOW AMBIENT CONTROL” to allow operation at temperatures below 25°F. To accomplish this, place SW2 in the CLOSED position. See page 39. After the switch is properly positioned, the OUTSIDE AIR TMP LOW CUT-OUT in the PROGRAM mode can then be programmed between 0° - 25°F. See page 46.

NOTE: For operation below 0°F, program the cut-out for 0°F. This will cause the microprocessor to ignore the low ambient cut-out regardless of temperature.

Operation of the fans will be discussed in both “Ambient and Pressure Control” as well as “Pressure Only” control in the following text.

Ambient and Pressure Fan Control 0°F - 25°F

Fan operation on each system below 25°F is controlled only by the discharge pressure of the respective system. Each system will operate 4 steps of fan control as follows:

1. Until discharge pressure reaches 320 PSIG, the fans will be completely off.
2. The second stage of fan control will energize fans 1 & 3 (SYS 1, 9M and 10M), fans 5 & 7 (SYS 2, 15M & 16M), fans 9 & 11 (SYS 3, 9M and 10M) or fans 13 & 15 (SYS 4, 15M & 16M) in the reverse direction when the discharge pressure exceeds 320 PSIG. Once the reversing contactors are energized, they will stay on until the discharge pressure of the system falls below 120 PSIG, the ambient temperature

exceeds 35°F, or discharge pressure of the system rises above 340 PSIG.

NOTE: The corresponding compressor must be on for a minimum of 4 sec. before the reversing fans are permitted to start.

3. The third stage of fan control will energize fans 2 & 4 (SYS 1, 6M & 8M), fans 6 & 8 (SYS 2, 12M & 14M), fans 10 & 12 (SYS 3, 6M and 8M) or fans 14 & 16 (SYS 4, 12M & 14M) as well as turn off the reversing fans on the respective system whenever discharge pressure exceeds 340 PSIG. These fans will stay on until discharge pressure drops below 120 PSIG.

NOTE: The corresponding compressor must be on for 4 sec. before these fans are permitted to start.

4. The fourth stage of fan control will energize fans 1 & 3 (SYS 1, 5M & 7M) or fans 5 & 7 (SYS 2, 11M & 13M), fans 9 & 11 (SYS 3, 5M & 7M) and fans 13 & 15 (SYS 4, 11M & 13M) and will operate the corresponding fans in the forward direction whenever discharge pressure exceeds 360 PSIG. These fans will stay on until discharge pressure drops below 140 PSIG.

NOTE: The corresponding compressor must be on for 4 sec. before these fans are permitted to start.

Ambient and Pressure Fan Control 25° - 45°F

Fan control between 25° and 35°F is controlled by discharge pressure. If the reversing fans are on, the reversing fan will continue to operate until the temperature reaches 35°F or discharge pressure reaches 340 PSIG. At 35°F or 340 PSIG, fans 2 & 4 (SYS 1, 6M & 8M), fans 6 & 8 (SYS 2, 12M & 14M), or fans 10 & 12 (SYS 3, 6M & 8M) or fans 14 & 16 (SYS 4, 12M & 14M) will energize. Between 25°F and 45°F if the reversing fan is not operating, after 4 seconds of compressor operation, fans 2 & 4 (SYS 1), fans 6 & 8 (SYS 2), fans 10 & 12 (SYS 3) or fans 14 & 16 (SYS 4) will energize. This is identical to standard fan control by temperature (Page 82). No pressure override exists. If temperature drops below 25°F, these fans will remain on until cycled off by pressure.

Ambient and Pressure Fan Control 45°F and Higher

Fan control above 45°F is strictly controlled by temperature with no pressure override.

After 4 seconds of operation, fans 2 & 4 (SYS 1, 6M & 8M), fans 6 & 8 (SYS 2, 12M & 14M), fans 10 & 12 (SYS 3, 6M & 8M) or fans 14 & 16 (SYS 4, 12M & 14M) will energize turning the fans in the forward direction.

After 30 seconds of operation, fans 1 & 3 (SYS 1, 5M & 7M), fans 5 & 7 (SYS 2, 11M & 13M), or fans 9 & 11 (SYS 3, 5M & 7M) or fans 13 & 15 (SYS 4, 11M & 13M) will energize turning two additional fans on in the forward direction. This is identical to standard fan control by temperature (Page 76). These fans will de-energize if ambient temperature drops below 40°F.

**Pressure Control Only,
Fan Control by Discharge Pressure**

Fan control by pressure will operate 4 stages of fan cycling according to the discharge pressure of the corresponding system. Ambient temperature will have no effect.

1. Until discharge pressure reaches 320 PSIG, no system fans will operate.
2. When discharge pressure reaches 320 PSIG, fans 1 & 3 (SYS 1, 9M & 10M), fans 5 & 7 (SYS 2, 15M & 16M), fans 9 & 11 (SYS 3, 9M & 10M) or fans 13 &

15 (SYS 4, 15M & 16M) will be energized in the reverse direction. These fans will remain energized until discharge pressure drops below 120 PSIG.

3. If discharge pressure reaches 340 PSIG, the reversing fans on the respective system will be turned off. At the same time, fans 2 & 4 (SYS 1, 6M & 8M), fans 6 & 8 (SYS 2, 12M & 14M), fans 10 & 12 (SYS 3, 6M & 8M) or fans 14 & 16 (SYS 4, 12M & 14M) will energize. These fans will remain on until discharge pressure drops below 120 PSIG.
4. If discharge pressure reaches 360 PSIG and compressor run time has exceeded 30 seconds, fans 1 & 3 (SYS 1, 5M & 7M), fans 5 & 7 (SYS 2, 11M & 13M), fans 9 & 11 (SYS 3, 5M & 7M) or fans 13 & 15 (SYS 4, 11M & 13M) will energize turning the fans in the forward direction. These fans will remain on until discharge pressure drops to 140 PSIG.

Table 2 shows the operation of both modes of fan control previously discussed.

TABLE 2 – LOW AMBIENT FAN CYCLING

SYS.	FAN	CONTACTOR	CONTROL BY TEMPERATURE & PRESSURE				CONTROL BY PRESSURE ONLY	
			BELOW 25°F PRESSURE CONTROL ONLY		ABOVE 25°F TEMPERATURE CONTROL ONLY		TEMPERATURE HAS NO EFFECT	
			ON	OFF	ON	OFF	ON	OFF
1 3	1 & 3 REV 9 & 11 REV	9M & 10M 9M & 10M	320 PSIG	120 PSIG	Will Not Start Above 25°F	35°F or 340 PSIG	320 PSIG	120 PSIG
1 3	2 & 4 10 & 12	6M & 8M 6M & 8M	340 PSIG	120 PSIG	25°F	Turns OFF by Pressure Only at 120 PSIG	340 PSIG	120 PSIG
1 3	1 & 3 FWD 9 & 11 FWD	5M & 7M 5M & 7M	360 PSIG	140 PSIG	45°F	40°F	360 PSIG	140 PSIG
2 4	5 & 7 REV 13 & 15 REV	15M & 16M 15M & 16M	320 PSIG	120 PSIG	Will Not Start Above 25°F	35°F or 340 PSIG	320 PSIG	120 PSIG
2 4	6 & 8 14 & 16	12M & 14M 12M & 14M	340 PSIG	120 PSIG	25°F	Turns OFF by Pressure Only at 120 PSIG	320 PSIG	120 PSIG
2 4	5 & 7 FWD 13 & 15 FWD	11M & 13M 11M & 13M	360 PSIG	140 PSIG	45°F	40°F	340 PSIG	140 PSIG

NOTE: Fans with reversing contactors will have the reversing contactors mechanically and electrically locked out when the fans are running forward. The forward contactor will also be locked out when the fans are running in reverse.

HOT GAS BYPASS (LOADMINDER) OPTION

General

A factory Hot Gas Bypass Option is available as a factory installed option to prevent compressor cycling and water temperature fluctuation at low load. This is accomplished by providing further capacity reduction below the last step of compressor cylinder unloading by introducing an artificial load to the cooler, which keeps the compressor on the line. The option will provide hot gas bypass on both compressors of the Master Module enabling hot gas to be active regardless of which compressor is in the lead.

NOTE: The microprocessor will only activate the hot gas on the lead compressor. Hot Gas Bypass will not operate and is not available on the Slave Module.

The hot gas bypass consists of a pilot operated regulating valve with an integral solenoid. The pilot operated solenoid is controlled by the microprocessor according to water temperature. The regulating valve which becomes activated when the solenoid is energized, is controlled by suction pressure to modulate the flow of gas in a bypass connected from the compressor discharge to the cooler inlet. The following text will explain how the hot gas solenoid is activated by the microprocessor in both return and in leaving water control.

LWT Control Hot Gas Operation

The hot gas solenoid is energized when the leaving water temperature falls below the "Target" water temperature, if the compressor is on its minimum stage of loading. Hot gas may then be fed according to the suction pressure and the pressure regulating valve setting. Once activated, the micro will keep the solenoid energized until the leaving water temperature rises above the high limit of the Control Range or until the load becomes so low that the hot gas can no longer keep temperature within the control range and the micro turns the compressor off. Details for setting the pressure regulator follow.

RWT Control Hot Gas Operation

The hot gas solenoid is energized if the compressor is on its minimum stage of loading and the return water temperature falls below the following point:

$$\text{ULCR} - \text{CR} + \text{CR}/20$$

Where: ULCR = Upper Limit of Control Range
CR = Control Range Differential

Example:

In a typical system that requires a 45°F leaving water temperature, we will have a 10° Control Range (CR)

differential which gives us an Upper Limit of Control Range (ULCR) of 55°F. Therefore, plugging the numbers into the formula:

$$55 - 10 + (10/20) = 45\frac{1}{2}^{\circ}\text{F}$$

The hot gas solenoid will be activated at 45½°F in the example above and hot gas may then be fed according to the suction pressure and the pressure regulated valve setting. Once activated, the micro will keep the solenoid energized until the return water temperature rises above the temperature designated by the formula:

$$\text{ULCR} - \text{CR} + \text{CR}/10$$

Where: ULCR = Upper Limit of Control Range
CR = Control Range Differential

$$\text{Example: } 55 - 10 + 10/10 = 46^{\circ}\text{F}$$

If temperature continues to drop while the Hot Gas is energized, the Hot Gas will be de-energized when the compressor cycles off on temperature.

Procedure For Setting The Hot Gas Regulators (Ref. Fig. 39)

1. If desired, set the control panel data to show suction pressure.
2. Adjust the pilot power assembly adjustment screw ② to approximately the middle of the adjustment range.
3. The chiller must be running and stabilized on the minimum stage capacity. In establishing this condition it may be necessary to deactivate the regulator by de-energizing the solenoid ①.
4. Adjust the adjustment screw ② in the clockwise direction to open the valve at a higher pressure (sooner) or in the counterclockwise direction to open the valve at a lower pressure (slower response). The valve is feeding when the valve outlet feels warm to the touch.

The adjustment is correct when system suction pressure rises to a point nearly equal to normal running pressure at the midpoint in the "Control Zone".

5. Further minor adjustment may be necessary to be certain that the valve opens fully before the temperature point at which the compressor stops due to a fall in Return or Leaving Water Temp.
6. Repeat this procedure on the other system.

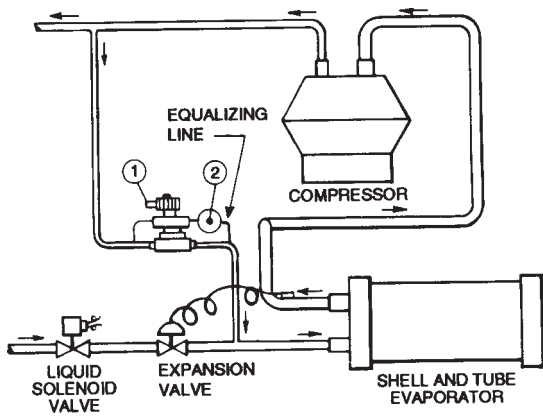


FIG. 48 – PIPING DIAGRAM

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FIELD INSTALLATION

If it becomes necessary to field install the Hot Gas (Loadminder) Option, two kits are required. The part numbers of the kits are 375-04249-000 and 471-01232-101. The 471-01232-101 kit consists of a second Relay Output Board. It is not required if two Relay Boards are already installed in the control panel. If the 375-04249-001 kit is not available, the following parts should be ordered separately.

ITEM	QTY	PART #	DESCRIPTION
1	1	375-00431-025	SOL. VALVE
2	1	375-00431-026	SOL. VALVE
3	2	075-03742-000	SUPPORT
4	1	075-04281-000	PIPE CONN.
5	4	066-83964-000	CLAMP
6	2	075-04286-000	PIPE CONN.
7	4	066-88928-000	CLAMP
8	4	023-00200-000	REDUCER
9	1	075-04200-000	PIPE CONN.
10	1	075-04283-000	PIPE CONN.
11	1	075-04202-000	PIPE CONN.
12	1	075-03781-000	PIPE CONN.
13	1	075-04284-000	PIPE CONN.
14	4	021-16161-000	SCREW
15	20	021-16136-000	SCREW
16	4	021-16210-000	LOCKWASHER
17	2	023-08576-000	TEE
18	4	021-16151-000	HEX NUT
19	2	023-09743-000	E11
20	1	075-04285-000	TUBING
22	1	075-04282-000	PIPE CONN.
23	2	031-01117-000	SUPPRESSOR
24	2	023-05299-000	CLAMP
25	2	021-08381-000	SCREW
26	2	021-00451-000	HEX NUT
27	2	021-01148-000	LOCKWASHER
30	1	075-04201-000	PIPE CONN.
32	5	023-00061-000	COUPLING
33	4	075-04519-000	BRACKET
XX	1	075-04249-000	DRAWING

DISCHARGE PRESSURE READ-OUT OPTION

The Discharge Pressure Read-out Option P/N 471-01232-131 (Master Module) and 471-01232-136 (Slave Module) allows the user to obtain control panel displays of discharge pressure. Additionally, other displays such as fault information will then hold relevant discharge pressure information useful in diagnosing problems.

The Discharge Pressure Unloading feature also becomes usable when this option is installed (Page 46) as well as fan cycling by discharge pressure.

Fan cycling by discharge pressure sometimes becomes necessary, if ambient temperature cycling of fans causes low suction pressure faults due to unusual operating conditions or chiller location problems. Fan cycling by discharge pressure only, allows higher discharge pressures which in turn raises suction pressure by permitting better operation of the thermal expansion valve. To convert to discharge pressure cycling, the micro panel must be programmed for DISCHARGE PRESSURE FAN CONTROL (See Page 40). Fan cycling will operate as indicated in Table 3.

TABLE 3 – FAN CYCLING

SYS.	FAN	CONTACTORS	ON	OFF
1	1 & 3 REV	9M & 10M	320 PSIG	120 PSIG
3	9 & 11 REV*	9M & 10M	320 PSIG	120 PSIG
1	2 & 4	6M & 8M	340 PSIG	120 PSIG
3	10 & 12	6M & 8M	340 PSIG	120 PSIG
1	1 & 3 FWD	5M & 7M	360 PSIG	140 PSIG
3	9 & 11 FWD	5M & 7M	360 PSIG	140 PSIG
2	5 & 7 REV*	15M & 16M	320 PSIG	120 PSIG
4	13 & 15 REV*	15M & 16M	320 PSIG	120 PSIG
2	6 & 8	12M & 14M	340 PSIG	120 PSIG
4	14 & 16	12M & 14M	340 PSIG	120 PSIG
2	5 & 7 FWD	11M & 13M	360 PSIG	140 PSIG
4	13 & 15 FWD	11M & 13M	360 PSIG	140 PSIG

* Optional Low Ambient

The kit consists of discharge pressure transducers for each system, wire harnesses, and associated mounting hardware.

HIGH AMBIENT OPTION

The High Ambient Option consists of four kits, P/N's 471-01232-131 for the Master Module, 471-01232-136 for the Slave Module, and (2) 475-04250-000 Sunshield kits. The option allows operation of the chiller in ambients up to 115°F. Typically, standard operation is limited to 105°F. High ambient operation is accomplished by discharge pressure unloading to assure that the chiller does not fault due to the high pressure cut-out opening during high temperature operation. A sun shield is also installed on the both control panels to prevent direct sunlight from overheating the control panel causing subsequent malfunction of the electro-mechanical

and electronic components in the control panel. Additionally, actual discharge pressure read-outs can now be obtained from the micro panel.

Discharge Pressure unloading allows the microprocessor to unload a compressor when the discharge pressure approaches a point nearing the discharge pressure cut-out. This assures that the system does not shut down completely if the cut-out were to open. See page 49 for programming the unloading pressure.

Fan cycling by discharge pressure is also available when this option is installed (See DISCHARGE PRESSURE READ-OUT OPTION, page 88), however it is of little use in areas where ambients are generally high and standard temperature control of the fans provides good control and maximum efficiency.

NOTE: The two Discharge Pressure Read-out Options 471-01232-131 and 471-01232-136 are not required if already installed.

LOCAL PRINTER OPTION

The Micro Panel is capable of supplying a print-out of chiller conditions or fault shutdown information at any given time. This allows operator and service personnel to obtain data and system status with the touch of the keypad. In addition to manual print selection, the micro panel will provide an automatic print out whenever a fault occurs. An explanation of the keypad use to obtain a print out is discussed in the "PRINT" KEY Section on page 61.

YORK recommends the field tested WEIGH-TRONIX IMP-24, Model 2600 printer. This is a compact low cost printer that is ideal for service work and data logging. Paper is in the form of a compact roll and is easily handled compared to other printers using wider business form style paper. The paper is 2.25" wide desktop calculator paper that can be easily and inexpensively purchased at most stationery stores. Shown in Fig. 40 and 33 is the WEIGH-TRONIX printer and a typical sample print out.



FIG. 49 – WEIGH-TRONIX IMP-24 MODEL 2600 PRINTER

YORK INTERNATIONAL CORPORATION RECIPROCATING WATER CHILLERS	
SYSTEM STATUS 5:24AM 1/02/95	
SYS 1	COMPRESSOR RUNNING
SYS 2	COMPRESSOR RUNNING
SYS 3	COMPRESSOR RUNNING
SYS 4	ANTI-RECYCLE TIMER 119 SEC
RETURN WATER TEMP 1	82.8 DEGF
RETURN WATER TEMP 2	83.7 DEGF
LEAVING WATER TEMP 1	60.1 DEGF
LEAVING WATER TEMP 2	73.5 DEGF
MIXED WATER TEMP	49.3 DEGF
LOW WATER CUTOUT	36.0 DEGF
SETPOINT TEMP	44.0 DEGF
OUTSIDE AIR TEMP	66.6 DEGF
LOW AMBIENT CUTOUT	25.0 DEGF
LOW PRESSURE CUTOUT	44 PSIG
LEAD SYSTEM	SYS 1
CONTROL TYPE	LCHWT
COOLING RANGE	44.0 TO 46.0 DEGF
SYSTEM 1 DATA	
COMPRESSOR STATUS	ON
MOTOR AMPS	30 %FLA
SUCTION PRESSURE	46 PSIG
DISCHARGE PRESSURE	312 PSIG
OIL PRESSURE	92 PSID
LIQUID LINE SOLENOID	ON
RUN PERMISSIVE	ON
STAGES OF LOADING	4
FORWARD FANS	2
REVERSE FANS	OFF
HOT GAS BYPASS VALVE	OFF
SYSTEM 2 DATA	
COMPRESSOR STATUS	ON
MOTOR AMPS	65 %FLA
SUCTION PRESSURE	68 PSIG
DISCHARGE PRESSURE	334 PSIG
OIL PRESSURE	72 PSID
LIQUID LINE SOLENOID	ON
RUN PERMISSIVE	ON
STAGES OF LOADING	3
FORWARD FANS	2
REVERSE FANS	OFF
HOT GAS BYPASS VALVE	OFF
SYSTEM 3 DATA	
COMPRESSOR STATUS	ON
MOTOR AMPS	22 %FLA
SUCTION PRESSURE	59 PSIG
DISCHARGE PRESSURE	291 PSIG
OIL PRESSURE	95 PSID
LIQUID LINE SOLENOID	ON
RUN PERMISSIVE	ON
STAGES OF LOADING	4
FORWARD FANS	2
REVERSE FANS	OFF
SYSTEM 4 DATA	
COMPRESSOR STATUS	ON
MOTOR AMPS	30 %FLA
SUCTION PRESSURE	62 PSIG
DISCHARGE PRESSURE	327 PSIG
OIL PRESSURE	83 PSID
LIQUID LINE SOLENOID	OFF
RUN PERMISSIVE	ON
STAGES OF LOADING	1
FORWARD FANS	OFF
REVERSE FANS	OFF
S M T W T F S	* = HOLIDAY
SUN	START=00:00AM STOP=00:00AM
MON	START=00:00AM STOP=00:00AM
TUE	START=00:00AM STOP=00:00AM
WED	START=00:00AM STOP=00:00AM
THU	START=00:00AM STOP=00:00AM
FRI	START=00:00AM STOP=00:00AM
SAT	START=00:00AM STOP=00:00AM
HOL	START=00:00AM STOP=00:00AM

FIG. 41 – SAMPLE PRINT-OUT

The WEIGH-TRONIX IMP-24 Model 2600 printer can be purchased for approximately \$150.00. Contact Weigh-Tronix for purchase information:

Weigh-Tronix
2320 Airport Blvd.
Santa Rosa, CA 95402

Phone: 1-800-358-9110 or 1-707-527-5555
(International Orders Only)

NOTE: The print-out is made to be universal to all types of chillers, both air and water cooled with or without options. Items may be indicated on the print-out which may not be present on the chiller.

Installation Limitations

The following limitations must be adhered to. Failure to do so may result in improper printer and/or chiller operation.

1. The printer option is adaptable to all versions and revisions of microprocessor boards and EPROM's. No modifications are necessary to the panel.
2. Maximum cable length between the printer and the microprocessor board is 25 feet. Twisted pair shielded cable is required.

3. The printer must be supplied a 115 VAC source.
4. The printer may be left connected to the micro panel.

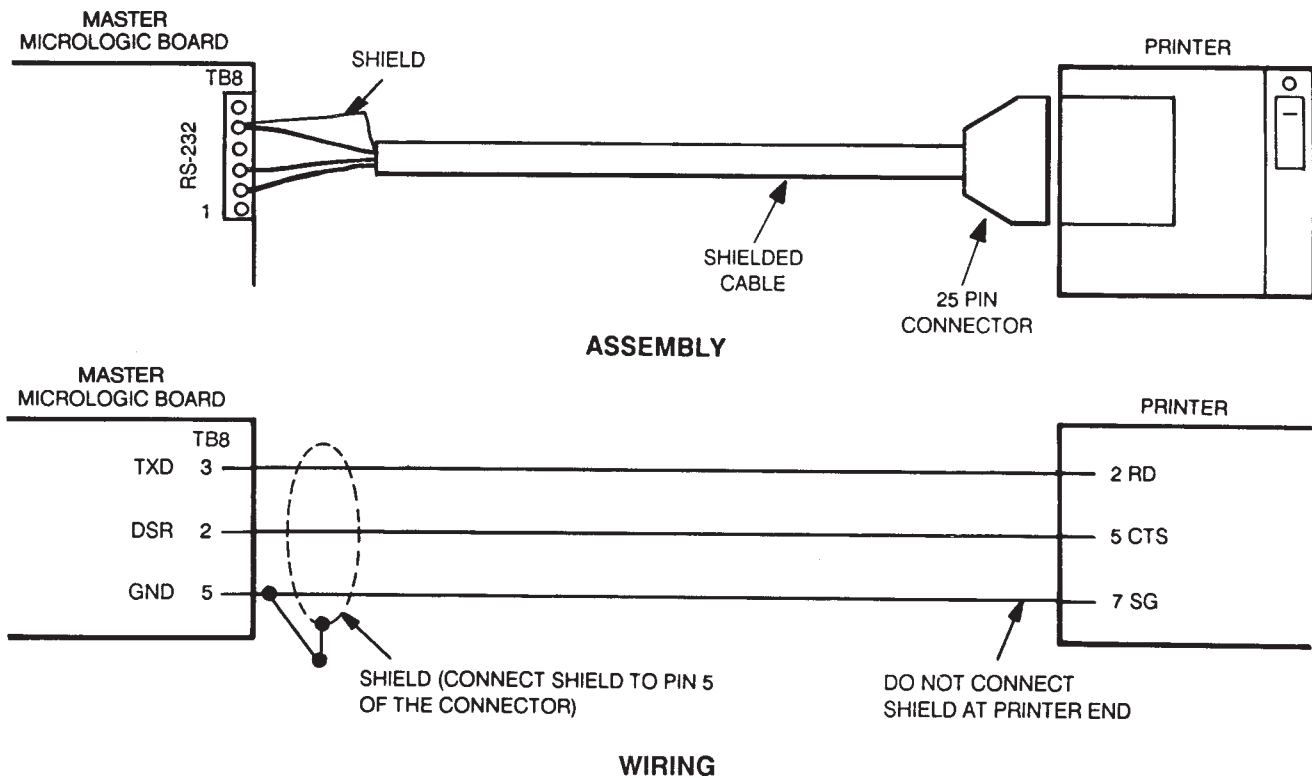
Parts

The following parts are required:

1. Weigh-Tronix IMP-24, Model 2600 printer.
2. 2.25" wide desk top calculator paper.
3. 25 ft. Twisted Pair Shielded Cable (minimum 3 conductor), #18 AWG Stranded, 300V min. insulation.
4. (1 ea.) 25-pin Cannon connector and shell. Connector: Cannon P/N DB-25P or equivalent. Shell: Cannon P/N DB-C2-J9.

Assembly and Wiring

All components should be assembled and wired as follows in Fig. 42. Strip the outside insulation back several inches and individual wires about 3/8" to connect the cable at the **MASTER Micro Logic Board**. Connect the shield of the cable as shown on the **MASTER Micro Logic Board**. Do not connect the shield at the printer end of the cable. The printer should never be connected to the Slave Control Panel.



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FIG. 42 – ASSEMBLY AND WIRING

Printer Configuration

2 Switches on the printer must be properly configured. Remove the paper roll to access these switches. Place the switches in the following position:

SW. 1 OFF

SW. 2 ON

Obtaining a Print Out

A print-out of current operating data may be obtained by pressing the OPER DATA key. A snap-shot will be taken by the micro of current operating conditions. These conditions will be stored in memory until they can be transmitted to the printer and printed. A sample print-out is shown in Fig. 29 on page 62.

A print-out of the fault shut-down history may be obtained by pressing the HISTORY key. A print out showing the last 3 faults with all system conditions at the time of the fault will be transmitted. A sample print-out is shown in Fig. 30 on page 63.

An automatic print-out will be sent to the printer whenever the chiller shuts down on a fault, regardless of whether the fault causes a system or the entire chiller to lockout or whether restart is permitted. This is the same print-out that is obtained when the OPER DATA Key is pressed; however, it will be a snap-shot of system operating conditions at the instant that the fault oc-

curred. Additionally, the Status indication that is noted in the print-out will note the specific fault that occurred.

Delays may be experienced during print-outs resulting from the Master microprocessor board breaking communications with the printer to enable communications with the Slave microprocessor board. The delays in printing will be experienced not only during print outs, but at the beginning of the print-out as well.

This action is necessary and normal. Print-out time may seem very long, especially during HISTORY print-outs where quite a few communication breaks will be noted.

Using Other Printers

Control codes vary from printer to printer. This will result in unusual formatting of printed data from many printers. In addition, "handshaking" lines and "handshaking" sequence will differ between printers. This makes the equipment susceptible to operation problems or mis-wiring which may cause damage to the printer or the microprocessor board. YORK assumes no responsibility for assistance or damage in the use of non-specified printers.

Warranty

YORK assumes no warranty responsibility in the use of the printer. This includes damages to the printer and the microprocessor board or chiller operation problems which may result.

OPTIONAL TAMPERPROOF ENCLOSURE (WIRE GRILLE)

General

A wire grille tamperproof enclosure is available for the chiller for the prime purpose of deterring unauthorized access to components on the chiller.

Kits 475-04251-002 is the tamperproof enclosure which consists of weather resistant steel grilles as well as the necessary mounting hardware. Two kits must be installed to complete the installation.

Installation For Master Section

1. Refer to Fig. 43 and the associated parts list. Before starting installation, all of the items in the kit should be identified by comparing with Fig. 44.
2. All holes for mounting kit parts are provided in both the chiller frame and the added supports; therefore, it should be unnecessary to drill holes.
3. Install grilles using the proper hardware and supports. Refer to Fig. 44 and the Parts List for placement of the grilles and the proper hardware required.
4. Notch grilles to suit water connection and wiring harnesses as needed.

5. If the High Ambient Sunshield Kit or Disconnect Option is installed, field adaption will be required where parts of the kits interfere. Touch up exposed metal parts to prevent rust.

Parts List for Each Kit

PART #	ITEM	QTY	DESCRIPTION
075-02501-000	1	6	BRACKET
075-02502-000	2	24	CLIP (SINGLE)
075-02503-000	3	4	CLIP (DOUBLE)
025-32206-000	4	1	GRILLE
026-31834-000	5	8	GRILLE
026-31633-000	6	8	GRILLE
026-32207-000	7	1	GRILLE
021-16203-000	8	145	SCR. TAP TYPE "F" 1/4 x 3/4 LG.
021-16165-000	9	145	WASH FLAT 1/4
021-16205-000	10	60	SCR. HEX HD. 3/8 x 1-1/2 LG.
021-16158-000	11	60	LOCKWASHER, SPG. 3/8
021-16139-000	12	60	NUT, HEX. 3/8



FIG. 43 – COMPLETED INSTALLATION

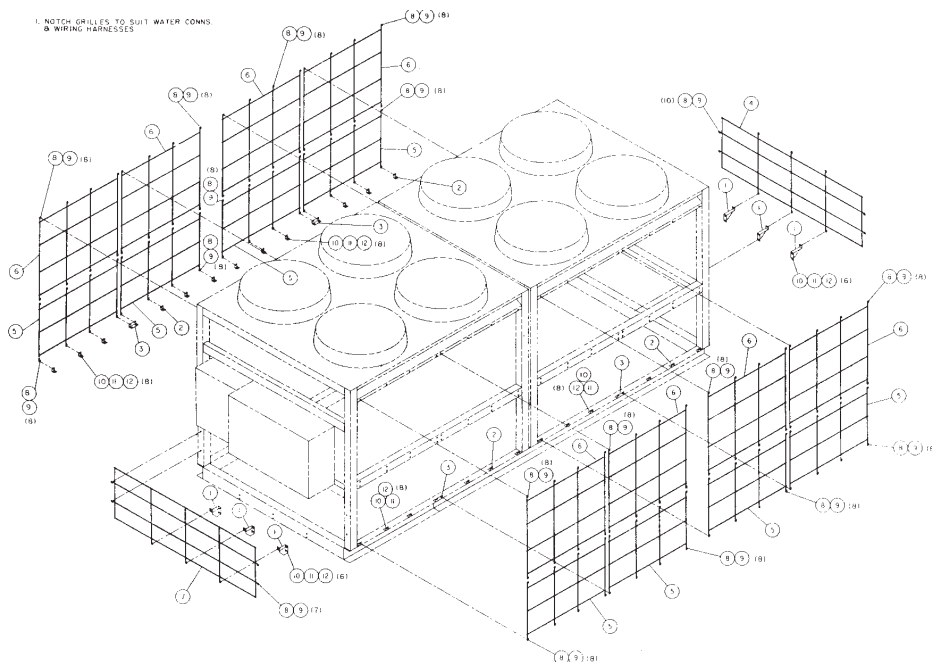


FIG. 53 – WIRE GRILLE INSTALLATION FOR EACH KIT

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OPTIONAL DECORATIVE TAMPERPROOF ENLCOSURE (LOUVERED & WIRE GRILLE)

General

A combination louvered and wire gridded enclosure is available for the chiller for the prime purpose of deterring unauthorized access to components of the chiller.

Kit 475-04518-002 is the decorative / tamperproof enclosure which consists of a combination of louvered sheet metal panels and weather resistant wire grilles along with mounting hardware. This kit has a further purpose of presenting a pleasing appearance to the chiller when it is located in a highly visible area. Two kits must be installed to complete the installation.

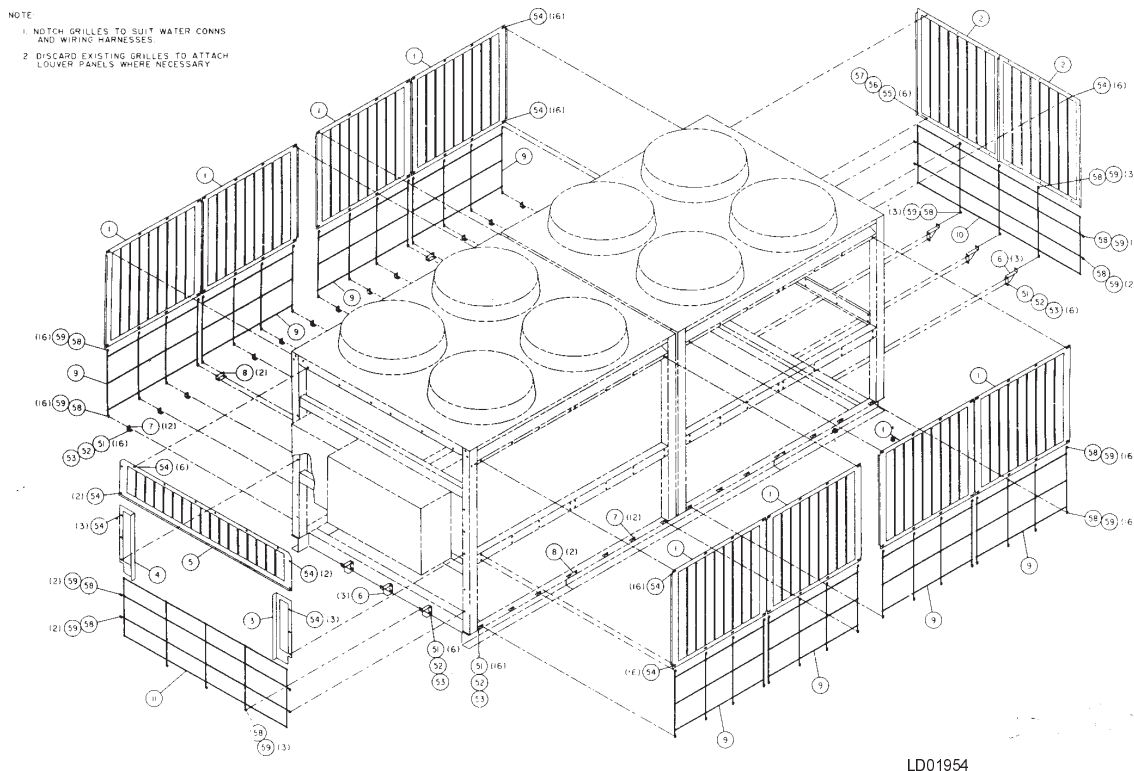
Installation

1. Before starting installation, all of the items in the kit should be identified by comparing with Fig. 45.
2. All holes for mounting kit parts are provided in both the chiller frame and the added supports; therefore, it should be unnecessary to drill holes.
3. Installed the louvered panels and wire grilles using the proper hardware and supports. Refer to Fig. 45 and the Parts List for placement of the grilles / panels and the proper hardware required. Discard existing grilles to attach the louvered panels where necessary.

4. Notch grilles to suit water connection and wiring harnesses as needed.
5. If the High Ambient Sunshield Kit or Disconnect Option is installed, field adaption will be required where parts of the kits interfere. Touch up exposed metal parts to prevent rust.

Parts List For Each Kit

PART #	ITEM	QTY	DESCRIPTION
075-02563-002	1	8	PANEL, LOUVERS Side Top
075-02563-005	2	2	PANEL, LOUVERS Rear Top
075-02563-015	3	1	PANEL, LOUVERS Front Top R.H.
075-02563-016	4	1	PANEL, LOUVERS Front Top L.H.
075-02563-017	5	1	PANEL, LOUVERS Front Top
075-02501-000	6	5	BRACKET
075-02502-000	7	24	CLIP, Retainer
075-02503-000	8	4	CLIP, Retainer
026-31634-000	9	8	GRILLE, SIDE BTM.
026-32206-000	10	1	GRILLE, REAR BTM.
026-32207-000	11	1	GRILLE, FRONT BTM.
021-16205-000	51	44	SCREW, HEX 3/8-16 x 1-1/2
021-16158-000	52	44	LKWASHER SPG. 3/8
021-16139-000	53	44	NUT, HEX 3/8
021-16136-000	54	86	SCREW, TAP CUT 1/4 x 1/2
021-16161-000	55	6	SCREW, CAP HEX 1/4-20 x 3/4
021-16210-000	56	6	LKWASHER SPG. 1/4
021-16151-000	57	6	NUT, HEX 1/4
021-16203-000	58	81	SCREW, Tap Type "F" 1/4 x 3/4 LG.
021-16165-000	59	81	WASHER, FLAT 1.4



LD01954

FIG. 45 – LOUVER AND GRILLE INSTALLATION FOR EACH KIT

OPTIONAL DECORATIVE TAMPERPROOF ENCLOSURE (LOUVERED & WIRE GRILLE)

General

A louvered tamperproof enclosure is available for chiller for the prime purpose of deterring unauthorized access to components of the chiller.

Kits 475-04262-002 is the decorative/tamperproof enclosure which consists of louvered sheet metal panels along with mounting hardware. This kit has a further purpose of presenting a pleasing appearance to the chiller when it is located in a highly visible area. Two kits must be installed to complete the installation.

Installation

1. Refer to Fig. 46 and the associated parts list. Before starting installation, all of the items should be identified by comparing with Fig. 47.
2. All holes for mounting kit parts are provided in both the chiller frame and the added supports; therefore, it should be unnecessary to drill holes.
3. Install the louvered panels using the proper hardware and supports. Refer to Fig. 47 and the Parts List for placement of the panels and the proper hardware required. Discard existing grilles to attach the louvered panels where necessary.
4. Notch grilles to suit water connection and wiring harnesses as needed.
5. If the High Ambient Sunshield Kit or Disconnect Option is installed, field adaption will be required where parts of the kits interfere. Touch up exposed metal parts to prevent rust.

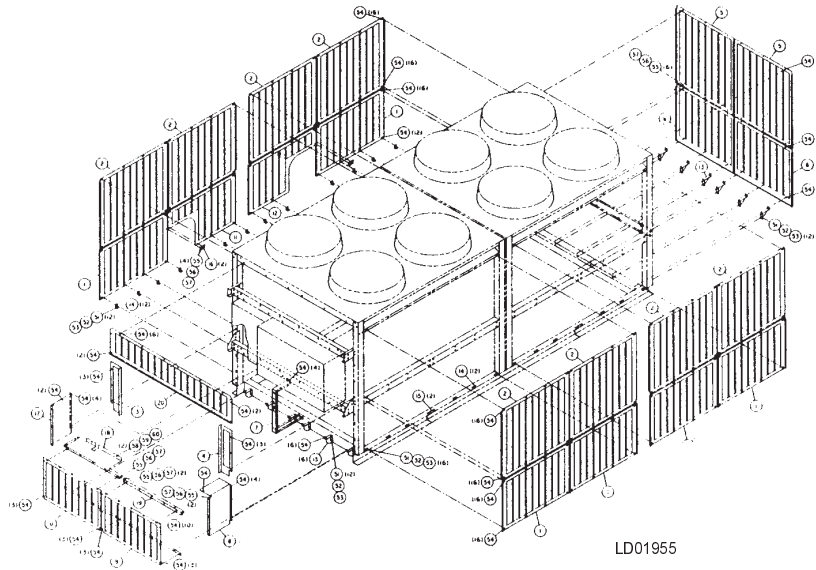
Parts List For Each Kit

PART #	ITEM	QTY	DESCRIPTION
075-02563-001	1	6	PANEL, LOUVERS SIDE BTM.
075-02563-002	2	8	PANEL, LOUVERS SIDE TOP
075-02563-016	3	1	PANEL, LOUVERS Front Top L.H.
075-02563-015	4	1	PANEL, LOUVERS Front Top R.H.
075-02563-005	5	2	PANEL, LOUVERS REAR TOP
075-02563-006	6	2	PANEL, LOUVERS REAR BTM.
075-02563-018	7	1	SUPPORT, FRONT CTR.
075-02563-021	8	1	SUPPORT, FRONT R.H.
075-02563-019	9	1	PANEL, Louvers Front BTM. R.H.
075-02563-020	10	1	PANEL, Louvers Front BTM. L.H.
075-02563-014	11	1	PANEL, Louvers Side BTM. L.H. FR.
075-02563-013	12	1	PANEL, Louvers Side BTM. L.H. RR.
075-02501-000	13	12	BRACKET
075-02502-000	14	22	CLIP, RETAINER
075-02503-000	15	4	CLIP, RETAINER
075-04287-000	16	2	CLIP, TIE
075-02563-022	17	1	SUPPORT, FRONT L.H.
075-02563-023	18	1	SUPPORT, TOP L.H.
075-02563-024	19	1	SUPPORT, TOP R.H.
075-02563-017	20	1	PANEL, LOUVERS FRONT TOP
021-16205-000	51	52	SCREW, CAP HEX 3/8-16 x 1-1/2
021-16158-000	52	52	LKWASHER SPG. 3/8
021-16139-000	53	52	NUT, HEX 3/8
021-16136-000	54	213	SCREW, TAP CUT 1/4 x 1/2
021-16161-000	55	15	SCREW, CAP HEX 1/4-20 x 3/4
021-16210-000	56	15	LKWASHER SPG. 1/4
021-16151-000	57	15	NUT, HEX 1/4
021-17223-000	58	2	SCREW, CAP HEX 1/2-13 x 1
021-16157-000	59	2	LKWASHER SPG. 1/2
021-16155-000	60	2	NUT, HEX 1/2
021-17055-000	62	10	SCREW, CAP HEX 1/4-20 x 1/2
021-16999-000	63	10	NUT, HEX 1/4
021-01248-000	64	10	WASHER, PLAIN 5/16 ID
021-01148-000	65	10	LKWASHER 1.4



00028TG

FIG. 46 – COMPLETED INSTALLATION



LD01955

FIG. 47 – LOUVER INSTALLATION FOR EACH KIT

**BAS INTERFACE
(REMOTE RESET OPTION)**

The Remote Reset Option allows resetting of the water temperature setpoint using a 0-10 VDC input, a 4-20 mA input, or a dry contact. The electronic circuitry in the option converts the signals mentioned, above into pulse width modulated (PWM) signals which the microprocessor can understand. Whenever an offset is called for, the change may be noted by the user by pressing the REMOTE RESET TEMP/RANGE key on the keypad. All refresh requirements normally associated with PWM inputs will be automatically taken care of by the electronics in the option.

It is important to note that the maximum offset, when this option is installed, is 20°F. This is due to the electronics' limitation of maximum 11 sec. pulse. If a greater than 20°F offset is required, a user supplied PWM signal of up to 21 sec. is needed and the Remote Reset Option cannot be installed.

The Remote Reset Option P/N 471-01232-181 consists of a Remote Reset printed circuit board, a mounting bracket and associated wiring. Each of the 3 signal types will require individual jumpering of the printed circuit board. This will be discussed in the following text. A single kit is required. The Remote Reset Board must be installed in the Master Module Control Panel.

0-10 VDC

Jumpers JU2 and JU4 must be IN. All other jumpers should be OUT. Program the REMOTE RESET TEMP RANGE (page 75) for 40°F which will allow a 20°F offset with an input of 10 VDC. The temperature will be offset linearly according to the voltage (0-10 VDC) applied.

The 0-10 VDC signal should be connected to the + and – terminals on the TB3 Terminal Block at the right of the microprocessor board. Be sure polarity is correct.

CAUTION: THE 0-10 VDC INPUT SIGNAL WIRING MUST NOT BE EARTH GROUNDED!

4-20mA

Jumpers JU3 and JU5 must be IN. All other jumpers should be OUT. Program the REMOTE RESET TEMP RANGE (page 75) for 40°F which will allow a 20°F offset with an input of 20mA. The temperature will be offset linearly according to the current (4-20mA) applied.

The 4-20mA input signal should be connected to the + and – terminals on the TB3 Terminal Block at the right of the Microprocessor Board. Be sure polarity is correct.

CAUTION: THE 4-20mA INPUT SIGNAL WIRING MUST NOT BE EARTH GROUNDED!

Dry Contact

A dry contact may also be used to offset temperature. This allows a single offset whenever the contact is closed. The offset is determined by the adjustment of the R11 potentiometer on the Remote Reset Board. Adjust the potentiometer as needed to obtain the desired offset.

Jumper JU1 must be IN. All other jumpers must be OUT. Program the REMOTE RESET TEMP RANGE (page 75) for 40°F which will allow the R11 pot to be adjusted for an offset of as much as 20°F when the contact is closed.

The dry contact should be connected directly to the P1-1 and P1-2 terminals on the Remote Reset Board (Fig. 48).

NOTE: *The coil of the controls used for reset must be suppressed. Use YORK P/N 031-00808-000 suppressor.*

The Remote Setpoint Reset will not operate when a Remote Control Center Option is connected to the micro panel. The Remote Control Center will always determine the setpoint.

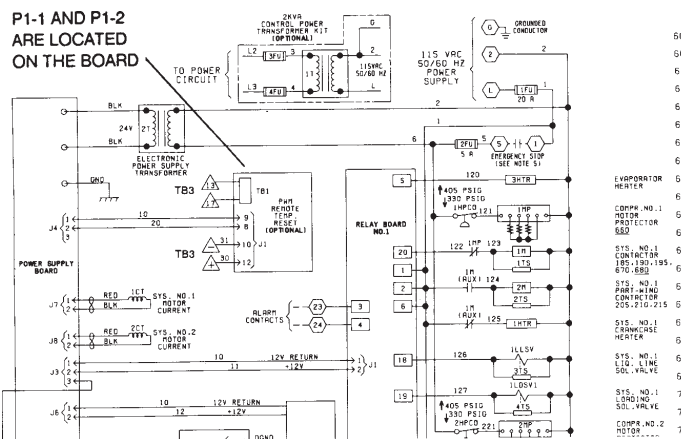




FIG. 48 – REMOTE RESET BOARD

LD01956

TROUBLESHOOTING CHART

PROBLEM	CAUSE	SOLUTION
No display on panel Unit will not operate	1. No 115VAC to 2T. 2. No 24VAC to Power Supply Board. 3. 2T defective,, no 24VAC output. 4. No +12V output from Power Supply Board	1. Checking wiring and fuses (1 FU and 2 FU). Check emergency stop contacts  to  . 2. Check wiring 2T to Power Supply Board. 3. Replace 2T. 4. Replace Power Supply Board or isolate excessive load on the board.
	<i>Contact YORK Service Before Replacing Circuit Boards!</i>	
“NO RUN PERM”	1. No flow. 2. Flow switch installed improperly. 3. Defective flow switch. 4. Remote cycling device open. 5. System switch in the OFF position	1. Check chilled liquid flow. 2. Check that flow switch is installed according to manufacturer's Instructions. 3. Replace flow switch. 4. Check cycling devices coonected to terminals 13 & 14 of the TB3 Terminal Block. 5. Place switches to the ON position.
“MOTOR CURRENT” Fault Motor Contactor may or may not Energize	CONTACTOR DOES NOT ENERGIZE 1. External high pressure switch tripped. 2. External motor protector tripped. 3. Defective relay output board.	1. Check external high pressure switch, fan operation, and discharge pressure stored in memory. Air flow from fans must be up. 2. Check for defective External motor protector, wiring and motor problems. Assure that motor protector is not tripped due to external high pressure switch. 3. Replace relay output board.
	CONTACTOR ENERGIZES 1. Improper system high voltage. 2. Defective contactor contacts and contactor. 3. Faulty high voltage wiring. 4. High motor current stored in memory. 5. Defective current transformer (CT).	1. Check system high voltage supply. 2. Check contacts and contactor. 3. Check wiring. 4. Loose calibration resistors in J9 (SYS 1 & 3) or J10 (SYS 2 & 4) of power supply board. 5. CT resistance 42-44 ohms.
<i>Contact YORK Service Before Replacing Circuit Boards!</i>		
“LOW OIL PRESS” Fault	1. Low oil charge. 2. Too much refrigerant-in oil, particularly on start-up. 3. Liquid Line Solenoid Valve (LLSV) not operating. 4. Suction Press. Transducer or wiring defective. 5. Oil Press. Transducer or wiring defective.	1. Oil level should be visable in either sight glass at all times. Add YORK “C” oil if necessary. 2. Check crankcase oil heater operation. (350 Watt heater should be “ON” when unit is “OFF”. Measure heater current. (Should be min. 2 amps.) 3. Check wiring and LLSV. 4. Compare display to a gauge (SYS OFF). Replace defective component. 5. Compare suction and oil gauges to display. Replace defective component.
LOW SUCTION Fault	1. Improper Suction Pressure Cut-out adjustment. 2. Low refrig. charge. 3. Fouled filter drier. 4. Thermal expansion valve adjustment/failure. 5. Reduced flow of chilled liquid through cooler. 6. Defective suction press. transducer. 7. Fouled compressor suction strainer. 8. Faulty wiring to transducer.	1. Adjust per recommended settings and restart unit. 2. Repair leak/add refrigerant. 3. Change drier core. 4. Adjust compressor suction superheat to 11°F (6.1°C) or replace power element (or valve). 5. Check GPM (See OPERATING LIMITATIONS) Check operation of pump. Clean pump strainer, purge chilled liquid system of air. 6. Replace transducer. 7. Remove and clean strainer. 8. Check wiring.

PROBLEM	CAUSE	SOLUTION																																																																					
<p>“HIGH DSCH” Fault Cuts out on High Discharge Pressure as sensed by Microprocessor via high discharge pressure transducer.</p> <p><i>NOTE: If external H.P. Cut-out Switch opens, a “Motor Current” Fault will result.</i></p>	<ol style="list-style-type: none"> 1. Condenser fans not operating or rotating backwards. 2. Too much refrigerant. 3. Air in Refrigerant System. 4. Defective discharge pressure transducer. 5. Assure Programmable H.P. Cut-out is correctly set. 6. Assure OAT sensor is reading properly. 	<ol style="list-style-type: none"> 1. Check fans, fuses, and contactors. 2. Remove refrigerant. 3. Evacuate and recharge. 4. Replace discharge pressure transducer. 5. Adjust per recommended settings and restart unit. 6. Place a thermometer next to the sensor and compare reading to the display. Operation should not suffer if thermometer is +/- 10°F. 																																																																					
<p>“CHILLER FAULT: HIGH AMBIENT TEMP” Cuts out on high ambient temperature. (Max. = 130°F will re-start automatically if temperature drops below 128°F)</p>	<ol style="list-style-type: none"> 1. Temperature sensed incorrectly by thermistor. 2. Fans rotating backwards. 3. Air flow to unit restricted (or being re-circulated). 4. High ambient cut-out set too low. 	<ol style="list-style-type: none"> 1. Verify actual ambient temperature at probe +/-10°F with a thermometer placed next to the OAT sensor. 2. Air flow must be up. Correct fan rotation. 3. Check installation clearances. (See Page 9). 4. Reprogram cut-out. 																																																																					
<p>“CHILLER FAULT: LOW AMBIENT TEMP” Cuts out on low ambient temperature. (25°F min. for std. adjustable for low ambient unit)</p> <p><i>NOTE: Operation below 25°F requires low ambient accessory.</i></p>	<ol style="list-style-type: none"> 1. Temperature of outside air is below cut-out setting. 2. Temperature sensed incorrectly by thermistor. 3. Check low ambient temperature 	<ol style="list-style-type: none"> 1. No problem exists. 2. Verify actual ambient temperature immediately at probe with thermometer. 3. Adjust if necessary. <p><i>NOTE: For occasional operation below 0°F set the cut-out at 0°F. The chiller is then allowed to operate regardless of temperature. A low ambient kit must be installed.</i></p>																																																																					
<p>CHILLER FAULT: LOW WATER TEMP Low water temperature shutdown</p>	<ol style="list-style-type: none"> 1. RWT Control ONLY: Control range is too small and does not match actual ΔT across evaporator under full load conditions. 2. Check LWT cut-out point on panel. 3. Defective LWT or RWT sensor. (Assure the sensor is properly installed in the bottom of the well with a generous amount of heat conductive compound.) <p><i>NOTE: It is not unusual to find up to a +/- 2°F difference between the display and a thermometer located in water piping.</i></p>	<ol style="list-style-type: none"> 1. Flow is lower than design. Increase flow or increase the control range to match actual evaporator ΔT. 2. Adjust if necessary and restart unit.(See Page 46). 3. Check according to following table (use digital volt meter)* Replace if necessary. <table border="0"> <thead> <tr> <th>TEMP.</th> <th>VOLTAGE (DC)</th> <th></th> </tr> </thead> <tbody> <tr><td>20.0°F</td><td>1.65</td><td></td></tr> <tr><td>22.0°F</td><td>1.71</td><td></td></tr> <tr><td>25.0°F</td><td>1.82</td><td></td></tr> <tr><td>27.0°F</td><td>1.88</td><td></td></tr> <tr><td>30.0°F</td><td>1.99</td><td></td></tr> <tr><td>33.0°F</td><td>2.09</td><td></td></tr> <tr><td>36.0°F</td><td>2.22</td><td></td></tr> <tr><td>38.0°F</td><td>2.28</td><td></td></tr> <tr><td>41.0°F</td><td>2.37</td><td></td></tr> <tr><td>43.0°F</td><td>2.43</td><td></td></tr> <tr><td>46.0°F</td><td>2.54</td><td></td></tr> <tr><td>48.0°F</td><td>2.60</td><td></td></tr> <tr><td>50.0°F</td><td>2.67</td><td>* Check voltage on</td></tr> <tr><td>53.0°F</td><td>2.77</td><td>Microprocessor Board.</td></tr> <tr><td>55.0°F</td><td>2.83</td><td></td></tr> <tr><td>57.0°F</td><td>2.89</td><td>LWT: J11-7 to J11-1</td></tr> <tr><td>59.0°F</td><td>2.95</td><td>RWT: J11-8 to J11-1</td></tr> <tr><td>61.0°F</td><td>3.02</td><td></td></tr> <tr><td>63.0°F</td><td>3.08</td><td></td></tr> <tr><td>65.0°F</td><td>3.14</td><td></td></tr> <tr><td>67.0°F</td><td>3.20</td><td></td></tr> <tr><td>70.0°F</td><td>3.28</td><td></td></tr> </tbody> </table>	TEMP.	VOLTAGE (DC)		20.0°F	1.65		22.0°F	1.71		25.0°F	1.82		27.0°F	1.88		30.0°F	1.99		33.0°F	2.09		36.0°F	2.22		38.0°F	2.28		41.0°F	2.37		43.0°F	2.43		46.0°F	2.54		48.0°F	2.60		50.0°F	2.67	* Check voltage on	53.0°F	2.77	Microprocessor Board.	55.0°F	2.83		57.0°F	2.89	LWT: J11-7 to J11-1	59.0°F	2.95	RWT: J11-8 to J11-1	61.0°F	3.02		63.0°F	3.08		65.0°F	3.14		67.0°F	3.20		70.0°F	3.28	
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PROBLEM	CAUSE	SOLUTION
Low Compressor Oil Level (Particularly on start-up)	1. Low oil charge. 2. Excessive flood back of liquid refrigerant.	1. Oil level should be visible in either sight glass at all times. Add YORK "C" oil if necessary. 2. Adjust Thermal Expansion Valve (TXV) or replace power element. Check TXV bulb location. Should be located on suction line at least 8"-10" from nearest elbow. Bulb should be at 4 o'clock or 8 o'clock position, have good contact with suction line and be well insulated.
Crankcase Heater won't Energize (Should energize anytime unit is "OFF") (Min. current draw = 2 amps)	1. Open in 115 VAC wiring to heater. 2. Defective heater. 3. Auxiliary contacts of compressor contactor defective.	1. Check wiring. 2. Replace heater. 3. Replace contactor.
Compressor won't load (Solenoid valve de-energizes to load compressor)	1. Suction pressure > programmed unload point or operating limitations have been exceeded. 2. Discharge pressure > programmed unload point or operating limitations have been exceeded. 3. Demand not great enough. 4. Defective loading solenoid. 5. Faulty wiring to loading solenoid. 6. Defective water temperature sensor. 7. Defective evaporator or optional discharge transducer.	1. Excessive load. Check OPERATING LIMITATIONS. Check programmed unloading point. 2. Check OPERATING LIMITATIONS. Check programmed unloading point. 3. OK. Become familiar with control operation. 4. Replace compressor loading solenoid. 5. Check wiring. 6. Compare sensor with a thermometer. Variation of sensor vs thermometer of +/- 2°F is not unusual. Replace if necessary. 7. Replace transducer after verifying with a gauge.
Lack of Cooling Effect	1. Fouled evaporator surface. 2. Faulty compressor suction and/or discharge valves.	1. Contact the local YORK service representative. 2. Contact the local YORK service representative.

TEMPERATURE CONVERSION TABLES

The numbers in bold-face type in the center column refer to the temperature, either in Centigrade or Fahrenheit, which is to be converted to the other scale. Converting Fahrenheit to Centigrade the equivalent temperature will be found in the left column. If converting Centigrade to Fahrenheit, the equivalent temperature will be found in the column on the right.

TEMPERATURE			TEMPERATURE			TEMPERATURE			TEMPERATURE		
°C	°C or °F	°F	°C	°C or °F	°F	°C	°C or °F	°F	°C	°C or °F	°F
-40.0	-40	-40.0	-6.7	+20	+68.0	+26.7	+80	+176.0	+60.0	+140	+284.0
-39.4	-39	-38.2	-6.1	+21	+69.8	+27.2	+81	+177.8	+60.6	+141	+285.8
-38.9	-38	-36.4	-5.5	+22	+71.6	+27.8	+82	+179.6	+61.1	+142	+287.6
-38.3	-37	-34.6	-5.0	+23	+73.4	+28.3	+83	+181.4	+61.7	+143	+289.4
-37.8	-36	-32.8	-4.4	+24	+75.2	+28.9	+84	+183.2	+62.2	+144	+291.2
-37.2	-35	-31.0	-3.9	+25	+77.0	+29.4	+85	+185.0	+62.8	+145	+293.0
-36.7	-34	-29.2	-3.3	+26	+78.8	+30.0	+86	+186.8	+63.3	+146	+294.8
-36.1	-33	-27.4	-2.8	+27	+80.6	+30.6	+87	+188.6	+63.9	+147	+296.6
-35.6	-32	-25.6	-2.2	+28	+82.4	+31.1	+88	+190.4	+64.4	+148	+298.4
-35.0	-31	-23.8	-1.7	+29	+84.2	+31.7	+89	+192.2	+65.0	+149	+300.2
-34.4	-30	-22.0	-1.1	+30	+86.0	+32.2	+90	+194.0	+65.6	+150	+302.0
-33.9	-29	-20.2	-0.6	+31	+87.8	+32.8	+91	+195.8	+66.1	+151	+303.8
-33.3	-28	-18.4	0.0	+32	+89.6	+33.3	+92	+197.6	+66.7	+152	+305.6
-32.8	-27	-16.6	+0.6	+33	+91.4	+33.9	+93	+199.4	+67.2	+153	+307.4
-32.2	-26	-14.8	+1.1	+34	+93.2	+34.4	+94	+201.2	+67.8	+154	+309.2
-31.7	-25	-13.0	+1.7	+35	+95.0	+35.0	+95	+203.0	+68.3	+155	+311.0
-31.1	-24	-11.2	+2.2	+36	+96.8	+35.6	+96	+204.8	+68.9	+156	+312.8
-30.6	-23	-9.4	+2.8	+37	+98.6	+36.1	+97	+206.6	+69.4	+157	+314.6
-30.0	-22	-7.6	+3.3	+38	+100.4	+36.7	+98	+208.4	+70.0	+158	+316.4
-29.4	-21	-5.8	+3.9	+39	+102.2	+37.2	+99	+210.2	+70.6	+159	+318.2
-28.9	-20	-4.0	+4.4	+40	+104.0	+37.8	+100	+212.0	+71.1	+160	+320.0
-28.3	-19	-2.2	+5.0	+41	+105.8	+38.3	+101	+213.8	+71.7	+161	+321.8
-27.8	-18	-0.4	+5.5	+42	+107.6	+38.9	+102	+215.6	+72.2	+162	+323.6
-27.2	-17	+1.4	+6.1	+43	+109.4	+39.4	+103	+217.4	+72.8	+163	+325.4
-26.7	-16	+3.2	+6.7	+44	+111.2	+40.0	+104	+219.2	+73.3	+164	+327.2
-26.1	-15	+5.0	+7.2	+45	+113.0	+40.6	+105	+221.0	+73.9	+165	+329.0
-25.6	-14	+6.8	+7.8	+46	+114.8	+41.1	+106	+222.8	+74.4	+166	+330.8
-25.0	-13	+8.6	+8.3	+47	+116.6	+41.7	+107	+224.6	+75.0	+167	+332.6
-24.4	-12	+10.4	+8.9	+48	+118.4	+42.2	+108	+226.4	+75.6	+168	+334.4
-23.9	-11	+12.2	+9.4	+49	+120.2	+42.8	+109	+228.2	+76.1	+169	+336.2
-23.3	-10	+14.0	+10.0	+50	+122.0	+43.3	+110	+230.0	+76.7	+170	+338.0
-22.8	-9	+15.8	+10.6	+51	+123.8	+43.9	+111	+231.8	+77.2	+171	+339.8
-22.2	-8	+17.6	+11.1	+52	+125.6	+44.4	+112	+233.6	+77.8	+172	+341.6
-21.7	-7	+19.4	+11.7	+53	+127.4	+45.0	+113	+235.4	+78.3	+173	+343.4
-21.1	-6	+21.2	+12.2	+54	+129.2	+45.6	+114	+237.2	+78.9	+174	+345.2
-20.6	-5	+23.0	+12.8	+55	+131.0	+46.1	+115	+239.0	+79.4	+175	+347.0
-20.0	-4	+24.8	+13.3	+56	+132.8	+46.7	+116	+240.8	+80.0	+176	+348.8
-19.4	-3	+26.6	+13.9	+57	+134.6	+47.2	+117	+242.6	+80.6	+177	+350.6
-18.9	-2	+28.4	+14.4	+58	+136.4	+47.8	+118	+244.4	+81.1	+178	+352.4
-18.3	-1	+30.2	+15.0	+59	+138.2	+48.3	+119	+246.2	+81.7	+179	+354.2
-17.8	0	+32.0	+15.6	+60	+140.0	+48.9	+120	+248.0	+82.2	+180	+356.0
-17.2	+1	+33.8	+16.1	+61	+141.8	+49.4	+121	+249.8	+82.8	+181	+357.8
-16.7	+2	+35.6	+16.7	+62	+143.6	+50.0	+122	+251.6	+83.3	+182	+359.6
-16.1	+3	+37.4	+17.2	+63	+145.4	+50.6	+123	+253.4	+83.9	+183	+361.4
-15.6	+4	+39.2	+17.8	+64	+147.2	+51.1	+124	+255.2	+84.4	+184	+363.2
-15.0	+5	+41.0	+18.3	+65	+149.0	+51.7	+125	+257.0	+85.0	+185	+365.0
-14.4	+6	+42.8	+18.9	+66	+150.8	+52.2	+126	+258.8	+85.6	+186	+366.8
-13.9	+7	+44.6	+19.4	+67	+152.6	+52.8	+127	+260.6	+86.1	+187	+368.6
-13.3	+8	+46.4	+20.0	+68	+154.4	+53.3	+128	+262.4	+86.7	+188	+370.4
-12.8	+9	+48.2	+20.6	+69	+156.2	+53.9	+129	+264.2	+87.2	+189	+372.2
-12.2	+10	+50.0	+21.1	+70	+158.0	+54.4	+130	+266.0	+87.8	+190	+374.0
-11.7	+11	+51.8	+21.7	+71	+159.8	+55.0	+131	+267.8	+88.3	+191	+375.8
-11.1	+12	+53.6	+22.2	+72	+161.6	+55.6	+132	+269.6	+88.9	+192	+377.6
-10.6	+13	+55.4	+22.8	+73	+163.4	+56.1	+133	+271.4	+89.4	+193	+379.4
-10.0	+14	+57.2	+23.3	+74	+165.2	+56.7	+134	+273.2	+90.0	+194	+381.2
-9.4	+15	+59.0	+23.9	+75	+167.0	+57.2	+135	+275.0	+90.6	+195	+383.0
-8.9	+16	+60.8	+24.4	+76	+168.8	+57.8	+136	+276.8	+91.1	+196	+384.8
-8.3	+17	+62.6	+25.0	+77	+170.6	+58.3	+137	+278.6	+91.7	+197	+386.6
-7.8	+18	+64.4	+25.6	+78	+172.4	+58.9	+138	+280.4	+92.2	+198	+388.4
-7.2	+19	+66.2	+26.1	+79	+174.2	+59.4	+139	+282.2	+92.8	+199	+390.2



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