FORM NUMBER: D • 3
DATE: 10/14/80
REVISED:

WARREN//SHERER

INSTALLATION & OPERATION MANUAL

MODEL:

D5, D6, D6R
DAIRY DELI

THIS REFRIGERATOR CONFORMS TO THE COMMERCIAL REFRIGERATOR MANUFACTURERS ASSOCIATION HEALTH AND SANITATION STANDARD.
CRS-SI-78

WARREN//SHERER
DIVISION OF KYSOR INDUSTRIAL CORPORATION

1600 ROCKDALE INDUSTRIAL BLVD., CONYERS, GEORGIA 30207/404•483•5600

INSTALLATION AND OPERATING INSTRUCTIONS

FOR

D5, D6 and D6R MODELS

SELF SERVICE DAIRY CASES

APPLICATION:

The Warren/Sherer multi-shelf self service dairy cases are designed to merchandise packaged dairy products. These cases should be installed and operated according to the instructions contained in the manual to insure proper performance. They are designed for display of products in an air-conditioned store where temperature and humidity are maintained at a maximum of 75°F dry bulb temperature, 55% relative humidity.

MODEL	DESCRIPTION	SERIAL CODE DESIGNATION
*D5	Front Load Dairy - Low Front Height Usually (3) adjustable shelves - 18",20",22"	745
*D6	Front Load Dairy - High Front Height Usually (4) adjustable shelves - 18",20",22"	735-A
D6R	Rear Load Dairy (sliding door) High Front Height. Must be backed up and sealed to a walk-in cooler - usually (4) adjustable shelves 20",22"	759
D6L	Front Load Dairy - Low Front Height Usually (4) adjustable shelves - 18",20",22"	762
D6RL	Rear Load Dairy (sliding door) Low Front Height. Must be backed up to a walk-in cooler Usually (4) adjustable shelves - 20", 22"	760

*These models may be used for deli (processed meats) with proper BTU capacity and Warren/Sherer special hook-a-pak systems are used or a 18" and 20" shelves are used above a hook-a-pak system supplied by others.

GENERAL

These display refrigerators may be installed individually or in a continuous line-up consisting of several 8-foot and 12-foot sections by using a joint trim kit. A plexiglass divider kit must be used between cases operating on different refrigeration systems. Divider will be factory installed if specified on order.

SHIPPING DAMAGE

All equipment should be examined for shipping damage before and during unloading. If there is any damage, the carrier should be notified immediately and an inspection requested. The delivery receipt "must" be noted that the equipment was received damaged. If damage is of a concealed nature you must contact the carrier immediately or no later than three (3) days following delivery. A claim must be filed with the carrier by the consignee for all damages.

Note: Your equipment, when delivered, will have a sticker attached advising what must be done to report any damage.

LOCATION

This refrigerator must be located on a firmly based floor and leveled within plus or minum 1/16". Use shims provided to level your refrigerator.

JOINING

Two or more fixtures of like models can be joined together to form a continuous line-up. Instructions for joining fixtures are included in the joint kit. Before lining up refrigerator, inspect refrigeration lines, electrical connections and controls to insure refrigerators are in proper line-up and are in the proper sequence.

Note: THESE REFRIGERATORS ARE LINED UP AT THE FACTORY AND ARE NUMBERED. INSURE THEY ARE LINED UP IN THE FIELD IN THE SAME SEQUENCE NUMBER.

WASTE OUTLET

The D6 & D6R cases are equipped with a 1-1/2" M-NPT waste outlet connection which terminates in the center of the refrigerator below the insulated bottom. The water seal is installed on the cases. The D5 cases are equipped with a 1" F-NPT waste outlet. The water seal is shipped loose.

INSTALLING DRIP PIPE

Improperly installed drip pipes can seriously effect the operation of this equipment and result in maintenance cost and improper installation.

1. Never use a double water seal.

2. Never use a pipe smaller than the size pipe or water seal supplied with the equipment.

3. Always provide as much as fall as possible in drip pipe. (1" fall for each 4' of drip pipe).

4. Avoid long runs in drip pipe which make it impossible to provide maximum fall in pipe.

5. Provide a drip space between drip pipe and floor drain or sewer connection.

6. Do not allow drip pipe to come in contact with uninsulated suction lines, which will cause the condensation from your refrigerator to freeze.

CLEANING

To insure minimum maintenance cost, cabinet should be thoroughly emptied and washed out every three (3) months. The exterior should be washed weekly. A mild soap and water solution is recommended for painted surfaces of the cabinet. Do not use cleaners containing abrasive materials which will scratch or dull finish. The waste outlet should be flushed with a bucket of water following each cleaning.

Caution: Never introduce water into the fixture faster than the waste outlet can carry it away.

When cleaning lighted shelves, wipe down with a wet sponge or cloth so that water does not enter the light rails. DO NOT USE A HOSE OR SUBMERGE SHELVES IN WATER. BE SURE REFRIGERATION IS SHUT-OFF AND ALL ELECTRICAL IS OFF BEFORE WASHING YOUR REFRIGERATION.

LOADING

Merchandise should not be placed in the fixture until all controls have been adjusted and the refrigerator is at proper temperature.

At no time should the fixture be stocked beyond the load line or over the front edge of adjustable shelves. In doing so, you will seriously affect the performance which will result in higher product temperatures and increase operating costs.

ELECTRICAL

All field installed wiring must comply with the NATIONAL ELECTRICAL CODE AND LOCAL CODES.

ELECTRICAL RACEWAY

An electrical raceway is provided with each refrigerator for running your fan, anti-sweat heaters, and defrost circuits from case to case without using conduit. This applies, of course, when the front panel is properly secured into position. This is an approved method by the Underwriters' Laboratories; however, wiring must be run in accordance with local and national electrical codes.

ELECTRICAL CONNECTIONS

All field connections are made in the electrical raceway.

Make sure that proper voltage is supplied to your refrigerator. Check refrigerator nameplate for fan and anti-sweat volts and defrost volts. If a canopy is furnished, use a separate fused circuit. ALL REFRIGERATORS MUST BE GROUNDED.

Fan motors must operate continuously and panel must be marked sufficiently to prevent the fan motors and anti-sweat heaters from being turned off accidentally. When refrigerators are multiplexed, add the total of these amperage values to determine wire size and circuit protection. Anti-condensate controllers can be used to control the anti-condensate heater.

On electric defrost models, the defrost heater amperages of all cases on defrost circuit should be added together, and if their rating exceeds the defrost time clock or condensing unit breaker capacity, a defrost relay and circuit breaker must be employed and furnished by others. Make sure that proper wire size and branch circuit protection are employed for safe operation.

Chart #1 shows the electrical ratings for your refrigerator. This is the same information that appears on your refrigeration nameplate.

REFRIGERATION FAN MOTORS
The fan motors employed are permanently oiled for the life of the motor and requires no periodic maintenance. They are wired according to the enclosed wiring diagram and MUST RUN CONTINUOUSLY.

ANTI-SWEAT HEATERS
These heaters are placed in the fixture to eliminate sweat forming on certain areas of fixture.

EXPANSION VALVE
The expansion valve furnished with your refrigerator has been sized for maximum coil efficiency. To adjust superheat, place a thermocouple under the expansion valve bulb. Read the suction line pressure as near coil as possible. (If at the condensing unit, estimate suction line loss at 2PSIG). Convert coil suction pressure to temperature. The difference between coil temperature and the thermocouple temperature is superheat. (Use average superheat when expansion valve is hunting). Do not set superheat until cases have pulled down to operating temperature and never open or close valve over 1/2 turn between adjustments and allow 10 minutes or more between adjustments. Superheat should be set to 6-8°F.

REFRIGERATION LINES
The refrigeration lines are located under the deck pans on the 8' and 12' cases. A refrigeration outlet is provided in the front RH end of the D5 & D6 cases and rear LH end of D6R. Make sure all refrigeration lines lie as close to the refrigerator bottom so as not to obstruct the air pattern or block the deck pans. See the section on "Recommended Piping Practices" for additional details on piping practices.

These 8' and 12' refrigerators have polyurethane foamed-in-place insulation. In opening a ferrule hole, simply heat a piece of copper tubing of the same size as the tubing to be employed and force it through the ferrule hole.

IMPORTANT - SEAL AROUND LINES AFTER CONNECTIONS ARE MADE. KEEP DIRECT FLAME FROM BOTTOM OF REFRIGERATOR, AS HEAT WILL DISINTEGRATE THE BOTTOM AND INSULATION. USE A HEAT SHIELD WHEN WELDING NEAR THE BOTTOM OF THE CASES.

REFRIGERANT
R-12 expansion valves are standard. If other refrigerant is used, the order must specify the expansion valve to be supplied.

HEAT EXCHANGER
Heat exchangers are standard in these refrigerators. They aid to increase operating efficiency and reduce frosting and flood-back to compressor.

OPERATION
On single condensing unit systems a thermostat should be used to control temperatures. The thermostat bulb should be mounted in the discharge air. On parallel units, temperature control can be provided by EPR valve, thermostat and liquid line solenoid or solid state low pressure controls on compressor unit. Chart #2 shows approximate settings for merchandisers. Since many variables are present in each installation, such as store temperature, length of tubing runs, temperature desired in refrigerator, etc., Chart #2 is only a guide for the installer.

DEHYDRATION OF REFRIGERATION SYSTEMS

Please read carefully before placing system into operation. After laying refrigerant lines, they should be blown out before making final connection at fixture or condensing unit. Use dry nitrogen to prevent any foreign matter being left in the lines. Keep pressure below 250 pounds. To prevent scaling due to brazing, dry nitrogen should be allowed to flow through lines while brazing operations are taking place.

After the refrigeration system has been pressure-tested and proven leak-free, it is recommended that the system be dehydrated with a vacuum pump to 1000 microns for the first two evacuations and 500 microns on the third. The triple evacuation method requires evacuating the system three successive times and breaking each vacuum with dry refrigerant. Allow the pressure to rise above atmospheric pressure.

DEFROST CYCLE

Off-time defrost is standard on these models. The fans run continuously and defrost termination is by pressure or time (fail safe). See Chart #2 for defrost settings.

HOT GAS DEFROST MODELS

On hot gas defrost models, (optional for parallel compressors operation only) hot gas is routed through the suction line and evaporator coil. It exits the coil through a by-pass around the expansion valve and heat exchanger to return to the liquid line where the "condensed" liquid is used to feed the other cases on the same parallel unit. The case fans continue to operate during defrost to warm up the drain pan and air ducts.

SPECIAL REQUIREMENTS FOR REAR LOAD MODELS - Rear load models must be installed and sealed to a walk-in cooler. The cooler BTU load should be sized as a free standing cooler and for approximately 36° temperature.

The base rail below the case must be insulated and sealed to prevent any air leakage out of the cooler. Make sure refrigeration access holes are sealed The rear sliding doors must be closed at all times except when stocking from the rear for proper case operation.

Chart #1

Model	Evaporator Fans (Amps)	Anti-Cond Heater (Amps)	Lights (Amps) (See note 1&2)
D5 8	1.2	---	1.2
D5 12	1.8	---	1.6
D6 8	1.0	---	1.6
D6 12	1.5	---	2.1
D6R 8	1.5	1.0	1.6
D6R 12	2.0	1.5	2.1

Notes
1. For each lighted shelf, add 0.7 amps per shelf

2. Values shown are for one row canopy lights

Chart #2

Recommended Control Settings

Model	Refrigerant & Applicant	LP Control Cut-out	LP Control Cut-in	EPR Valve	Thermostat (Disc. Air Temp) Cut-out	Thermostat (Disc. Air Temp) Cut-in
D5,D6,D6L	R-12 - Dairy	15 PSIG	28 PSIG	17#	24	30
D5,D6,D6L	502 - Dairy	46 PSIG	60 PSIG	47#	24	30
D5,D6	R-12 - Deli	12 PSIG	28 PSIG	14#	22	26
D5,D6	R-502 - Deli	40 PSIG	60 PSIG	40#	22	26
D6R	R-12 - Dairy	12 PSIG	28 PSIG	14#	24	30
D6R	R-502 - Dairy	40 PSIG	60 PSIG	40#	24	30

Models	*Defrost Periods Frequency	Pressure Termination R-12	Pressure Termination R-502	Fail Safe Setting Time off	Fail Safe Setting Hot Gas
D5,D6,D6L	4	45#	90#	36 min.	14 min.
D6R	6	45#	90#	36 min.	14 min.

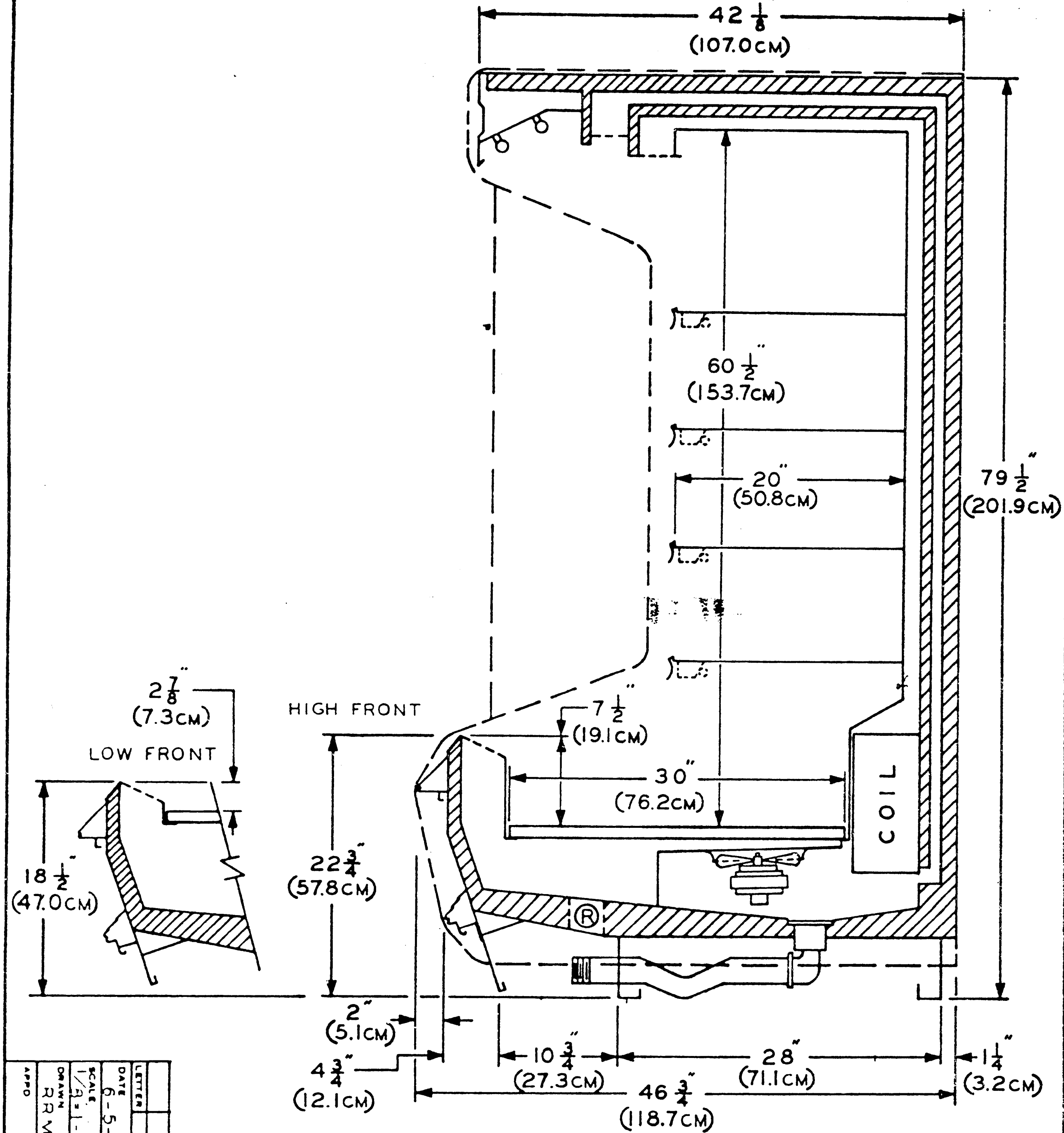
*Defrost frequency is at design conditions. Higher temperature or humidity may require more frequent defrost setting.

D5
Parts List

Description	D5 8'	D5 12'	Part Number
Evap Fan Mtr	2	3	3-015-01-2505
Evap Fan Blade	2	3	3-015-01-1053
Exp Valve	1		3A11-23
		1	3A12-21
Hcomb Ref Jet	2	3	3-019-05-0206
Return Air Grille	1		2-240-00-1939
		1	2-240-00-1947
Fan Wiring Harness	1		2-368-00-0119
		1	2-368-00-0127
Deck Pan	4	6	2-295-00-0364
Wire Rack	4	6	28G19-164
Lamp (canopy)	1		10A10-58
		2	10A10-57
Ballast (canopy)	1		10D10-27
		1	10D10-36
Lampholders (cnpy)	1	2	10B11-19,20
Lamp (shelf)	1	1	10A10-55
Ballast (shelf)	1	1	10D10-12
Lampholders (shelf)	1	1	10B11-17,18
Cband Bumper Trim	2		15J11-49
		2	15J11-50
Cband (ptd)	1		2-270-00-0751
		1	2-270-00-0769
Cband (vinyl)	1		2-270-xx-5370
		1	2-270-xx-5390
Cband (gold)	1		2-270-00-0694
		1	2-270-00-0702
Canopy Panel (ptd)	1		2-270-00-3573
		1	2-270-00-3581
Canopy Panel (vinyl)	1		2-270-xx-5530
		1	2-270-xx-5550
Front Panel (ptd)	1		2-270-00-4449
		1	2-270-00-4456
Front Panel (vinyl)	1		2-270-xx-5570
		1	2-270-xx-5590
Kplate (ptd)	1		2-155-00-0041
		1	2-155-00-0033
Kplate (stainless steel)	1		2-155-00-1106
		1	2-155-00-1098

D6(L) D6R(L)
Parts List

Description	D6(L) 8'	D6R(L) 8'	D6(L) 12'	D6R(L) 12'	Part No.
Evap Fan Motor	2	3	3	4	9A10-17
Evap Fan Blade	2		3		9B10-21
		3		4	9B10-27
Expansion Valve	1	1			3A11-23
			1	1	3A12-21
Hcomb Ref Jet	2	2	3	3	62G15-30
Hcomb Guard Jet	2		3		62G15-31
Return Air Grille	1	1			54P16-218
			1	1	54P16-219
Htr Rail Assy		1			81C10-79
				1	81C11-79
Fan Wiring Harness	1				10M10-100
			1		10M10-101
		1			10M10-81
				1	10M10-82
Deck Pan	2		3		54N18-143
Deck Pan Center				1	54N18-155
Deck Pan RH		1		1	54N18-154
Deck Pan LH		1		1	54N18-153
Wire Rack	4		6		28G19-130
Wire Rack Center		2		4	28G19-160
Wire Rack RH	1		1		28G19-158
Lamp (canopy)	2	2			10A10-58
			4	4	10A10-57
Ballast (canopy)	1	1	2	2	10D10-36
Lampholders (cnpy)	2	2	4	4	10B11-19,20
Lamp (shelf)	1	1	1	1	10A10-55
Ballast (shelf)	1	1	1	1	10D10-12
Lampholders (shlf)	1	1	1	1	10B11-17,18
Raceway Bumper Trim	1	1			15J11-53
			1	1	15J11-54
Cband Bumper Trim	1	1			15J11-49
			1	1	15J11-50
Cband (ptd)	1	1			51A17-33
			1	1	51A19-33
Cband (vinyl)	1	1			53A10-41
			1	1	53A10-42
Cband (gold)	1	1			62J20-31
			1	1	62J20-33
Canopy Panel (ptd)	1	1			51C12-51
			1	1	51C14-47
Canopy Panel (vinyl)	1	1			53E14-71
			1	1	53E14-72
Front Panel (ptd)	1	1			51A12-85
			1	1	51A14-75
Front Panel (vinyl)	1	1			53E11-133
			1	1	53E11-132
Kplate (ptd)	1	1			54D12-138
			1	1	54D14-137
Kplate (SS)	1	1			55A32-129
			1	1	55A32-130
Frnt Panel Low (ptd)	1	1			51A12-106
			1	1	51A14-87
Frnt Pnl Low (vinyl)	1	1			53E11-143
			1	1	53E11-144



D6–HIGH FRONT
D6L–LOW FRONT

6-5-79

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KYSOR WARREN/SHERER	
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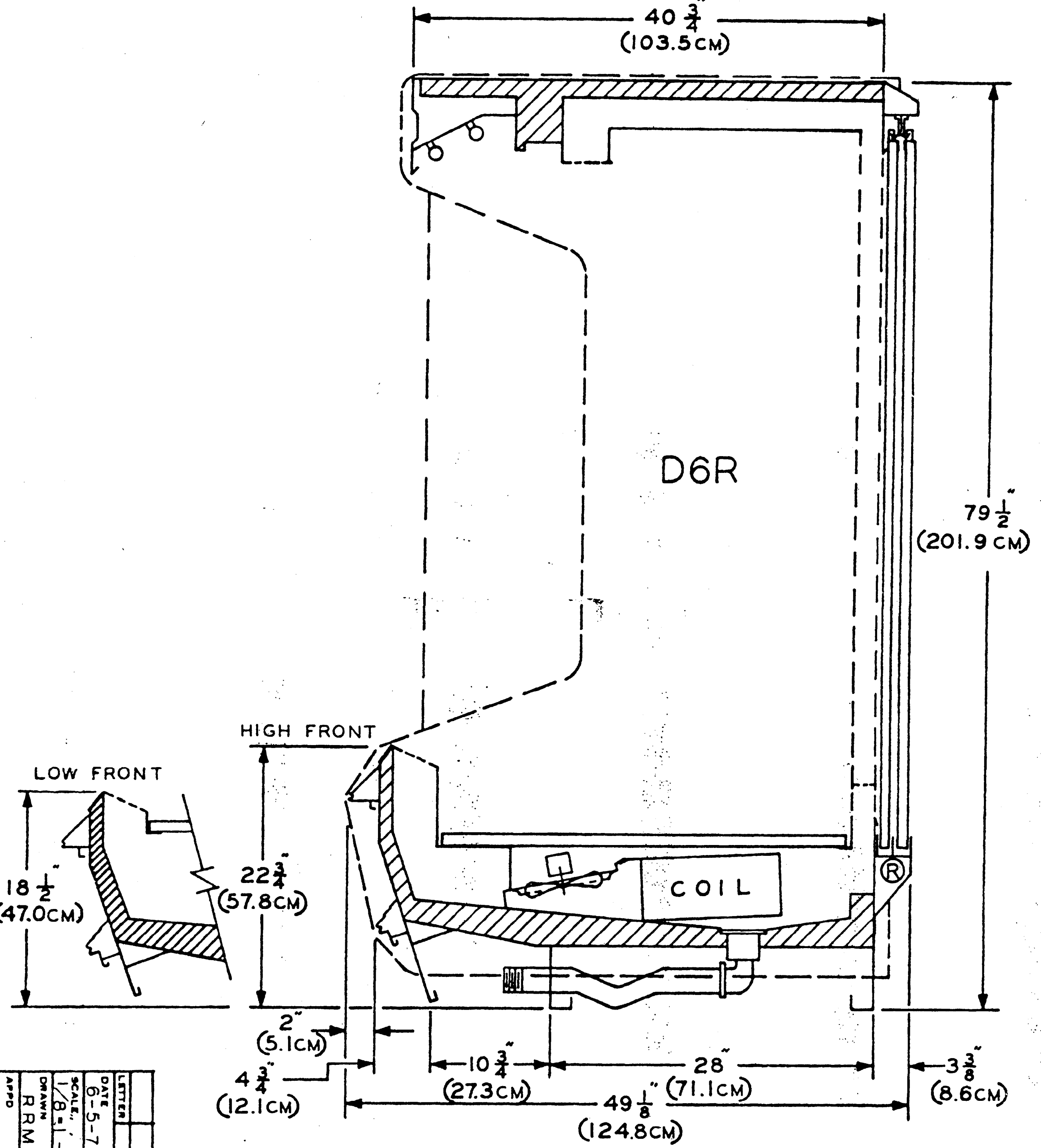

D6R-HIGH FRONT-REAR LOAD
D6RL- LOW FRONT-REAR LOAD

6-5-79

TITLE CROSS SECTION
MODEL D6R-D6RL

DATE 6-5-79
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LETTER
REVISED
DATE
KYSOR
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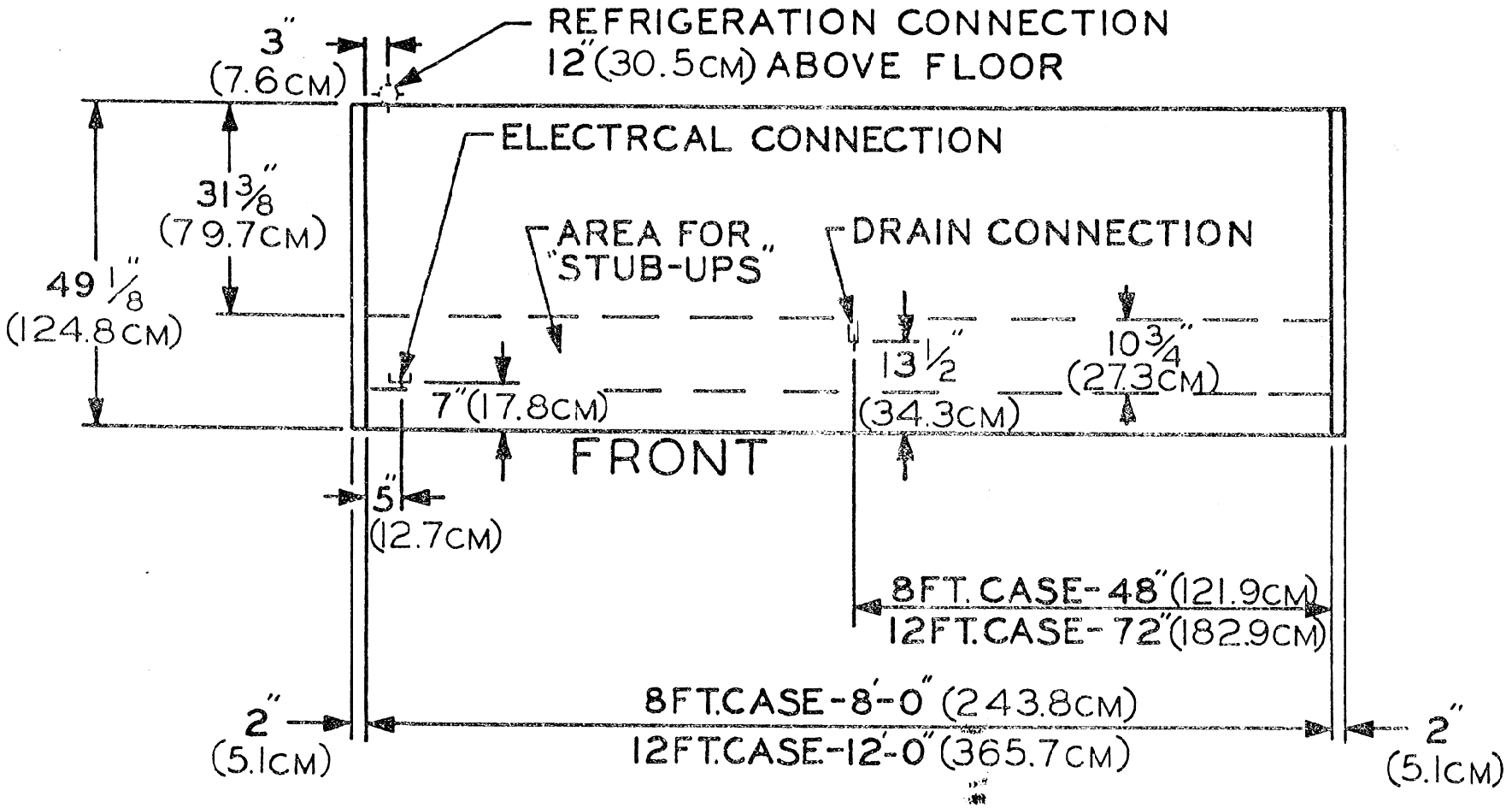

-12-

LETTER	REVISED	DATE	BY

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APPD.

TITLE

PLAN VIEW
MODEL D6R(L)

KYSOR | WARREN / SHEMER
DIVISION OF KYSOR INDUSTRIAL CORPORATION

DRAWING NUMBER
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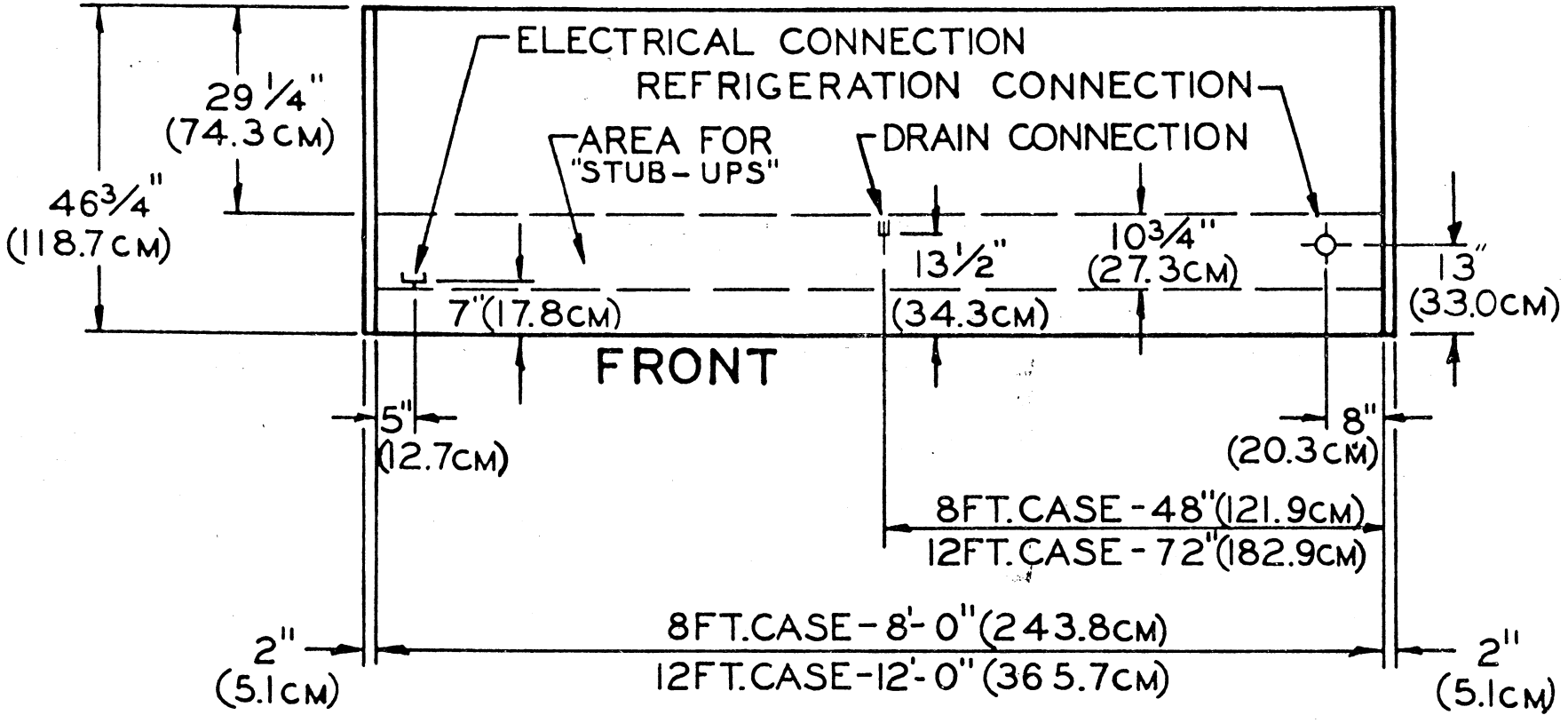

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DATE 12-19-77

SCALE 1/2" = 1'-0"

DRAWN

APPD.

TITLE

PLAN VIEW
MODEL D6-D6L

KYSOR | WARREN / SHERER
DIVISION OF KYSOR INDUSTRIAL CORPORATION

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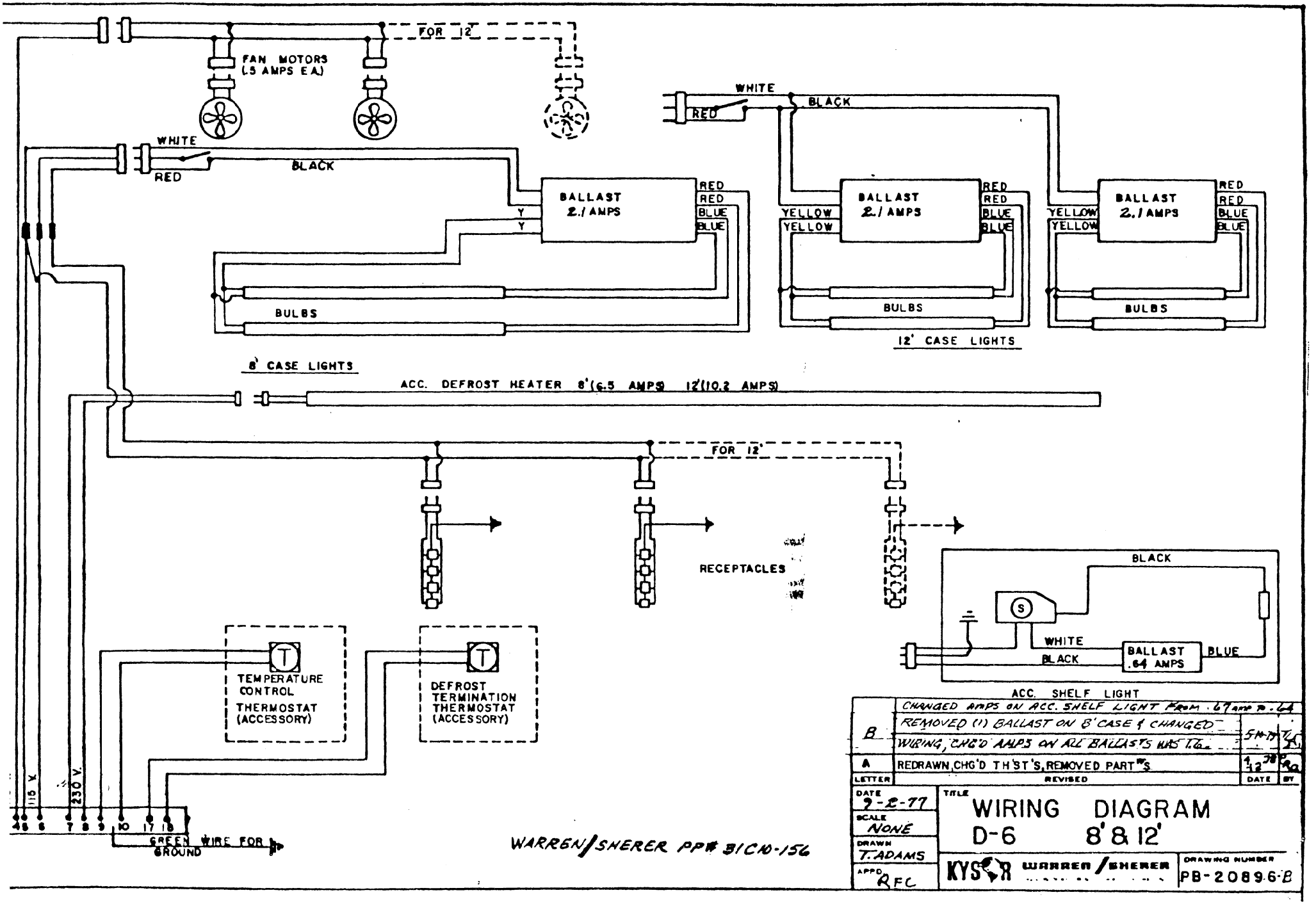

WARREN/SHERER PP# 31C10-156

LETTER	REVISED	DATE	BY
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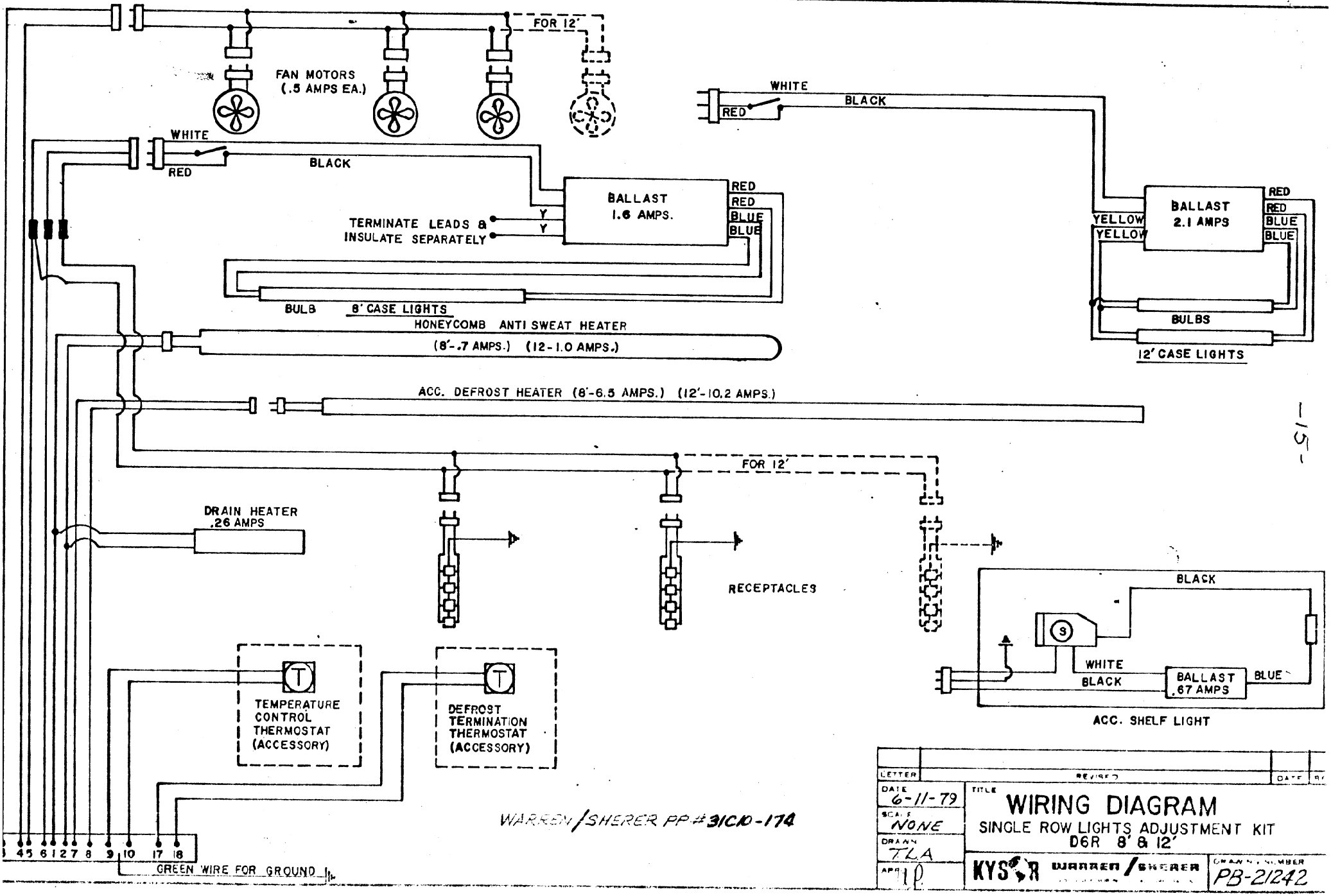
A	REDRAWN, CHG'D TH'ST'S, REMOVED PART#'S	1-12-78	RC

DATE 2-2-77
SCALE NONE
DRAWN T. ADAMS
APPD. RFC

TITLE
WIRING DIAGRAM
D-6 8' & 12'

KYSOR WARREN/SHERER

DRAWING NUMBER PB-20896-B



WARREN/SHERER PP#31C10-174

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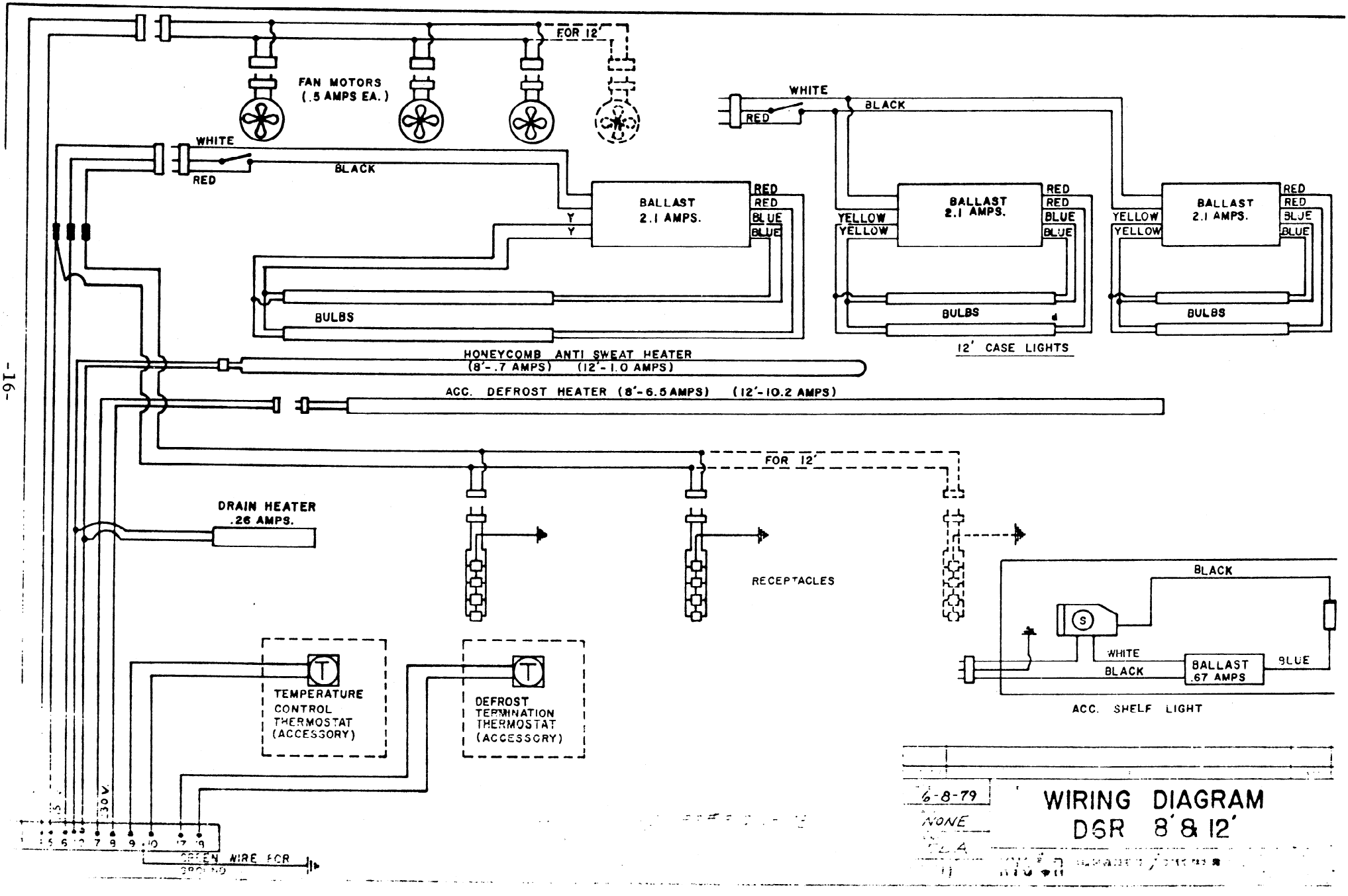
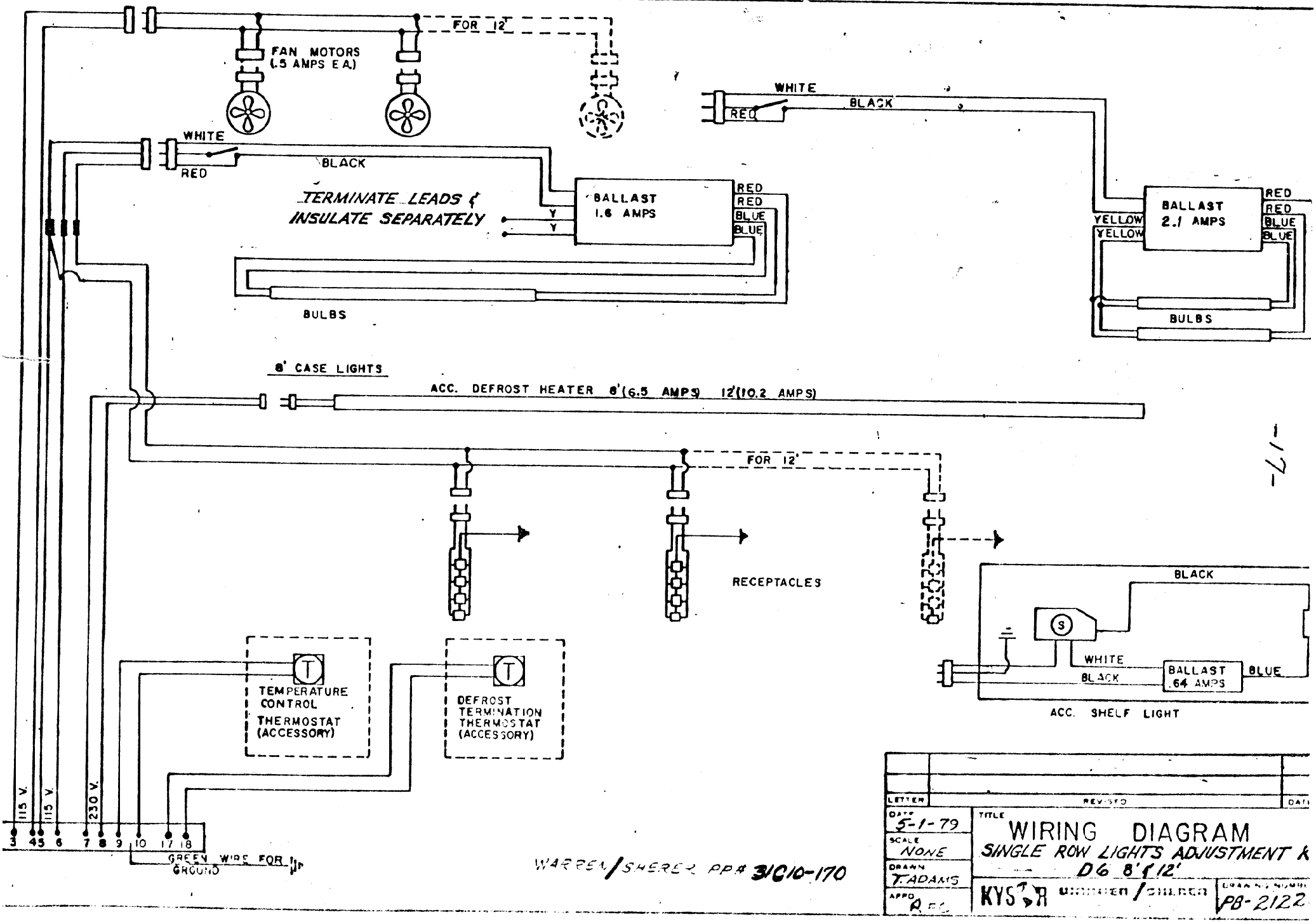
APP'D	KYSOR WARREN/SHERER	DRAWING NUMBER PB-21242	


FOR 12'
FAN MOTORS
(.5 AMPS EA.)
WHITE
RED
BLACK
BALLAST
2.1 AMPS.
RED
RED
BLUE
BLUE
Y
Y
BULBS
WHITE
RED
BLACK
YELLOW
YELLOW
BALLAST
2.1 AMPS.
RED
RED
BLUE
BLUE
BULBS
12' CASE LIGHTS
YELLOW
YELLOW
BALLAST
2.1 AMPS.
RED
RED
BLUE
BLUE
BULBS
HONEYCOMB ANTI SWEAT HEATER
(8'-.7 AMPS) (12'-1.0 AMPS)
ACC. DEFROST HEATER (8'-6.5 AMPS) (12'-10.2 AMPS)
FOR 12'
DRAIN HEATER
.26 AMPS.
RECEPTACLES
BLACK
S
WHITE
BLACK
BALLAST
.67 AMPS
BLUE
ACC. SHELF LIGHT
T
TEMPERATURE
CONTROL
THERMOSTAT
(ACCESSORY)
T
DEFROST
TERMINATION
THERMOSTAT
(ACCESSORY)
GREEN WIRE FOR
6-8-79
NONE
WIRING DIAGRAM
DSR 8'&12'


FOR 12'
FAN MOTORS (.5 AMPS EA.)
WHITE
RED
BLACK
TERMINATE LEADS & INSULATE SEPARATELY
BALLAST 1.6 AMPS
RED
RED
BLUE
BLUE
BULBS
WHITE
RED
BLACK
BALLAST 2.1 AMPS
YELLOW
YELLOW
RED
RED
BLUE
BLUE
BULBS
8' CASE LIGHTS
ACC. DEFROST HEATER 8'(6.5 AMPS) 12'(10.2 AMPS)
FOR 12'
RECEPTACLES
BLACK
WHITE
BLACK
BALLAST .64 AMPS
BLUE
ACC. SHELF LIGHT
TEMPERATURE CONTROL THERMOSTAT (ACCESSORY)
DEFROST TERMINATION THERMOSTAT (ACCESSORY)
115 V.
115 V.
230 V.
3 4 5 6 7 8 9 10 17 18
GREEN WIRE FOR GROUND
WARREN / SHERER PP# 31010-170
LETTER
REVISED
DATE
DATE 5-1-79
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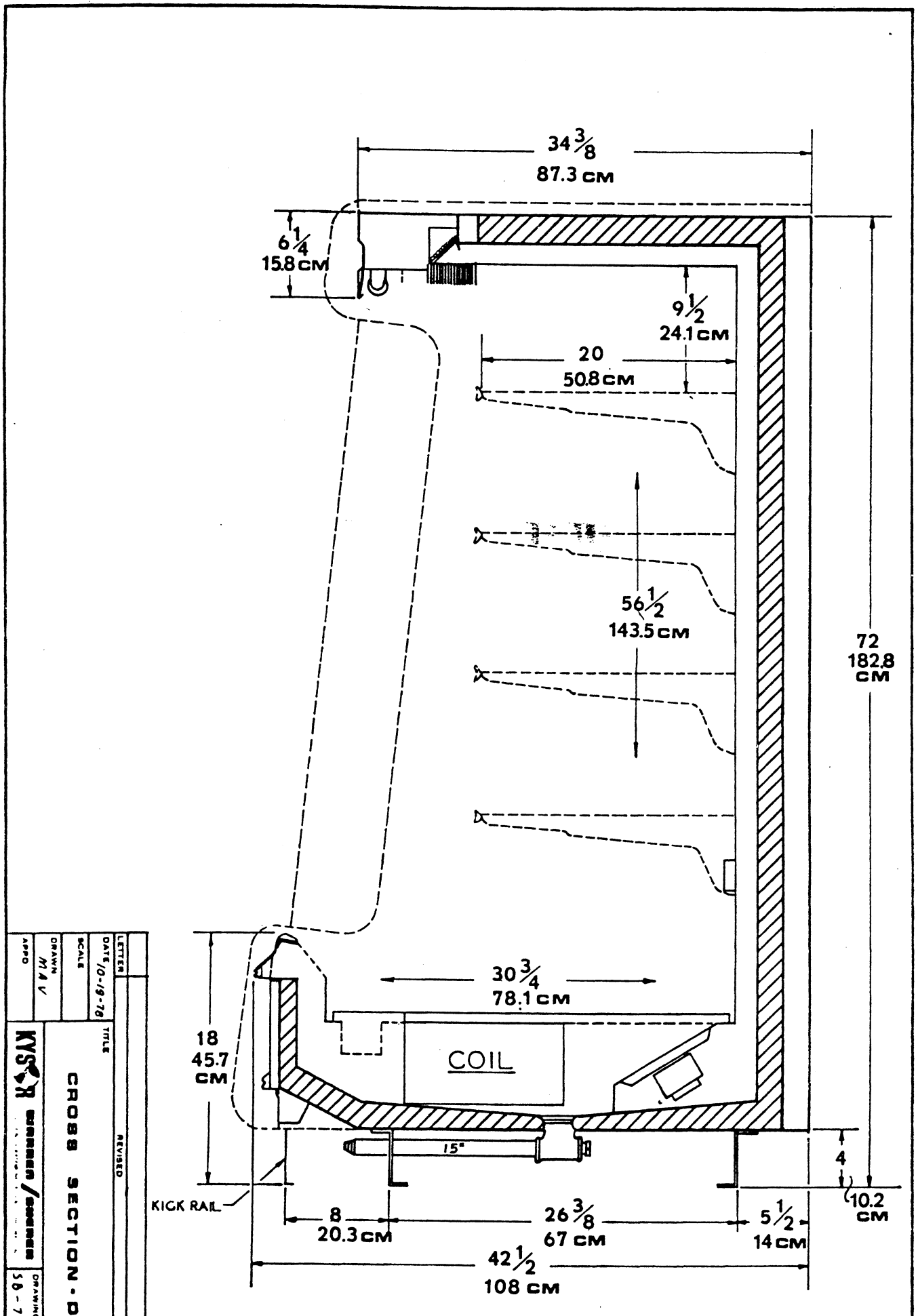
DRAWN T. ADAMS
APPD
TITLE WIRING DIAGRAM
SINGLE ROW LIGHTS ADJUSTMENT K
D6 8' & 12'
KYSOR
DRAWING NUMBER PB-2122

-17-


34 3/8
87.3 CM
6 1/4
15.8 CM
9 1/2
24.1 CM
20
50.8 CM
56 1/2
143.5 CM
72
182.8
CM
30 3/4
78.1 CM
18
45.7
CM
COIL
15°
4
10.2
CM
KICK RAIL
8
20.3 CM
26 3/8
67 CM
5 1/2
14 CM
42 1/2
108 CM
LETTER
DATE 10-19-78
SCALE
DRAWN M A V
APPD
TITLE
CROSS SECTION - DS
REVISED
DATE
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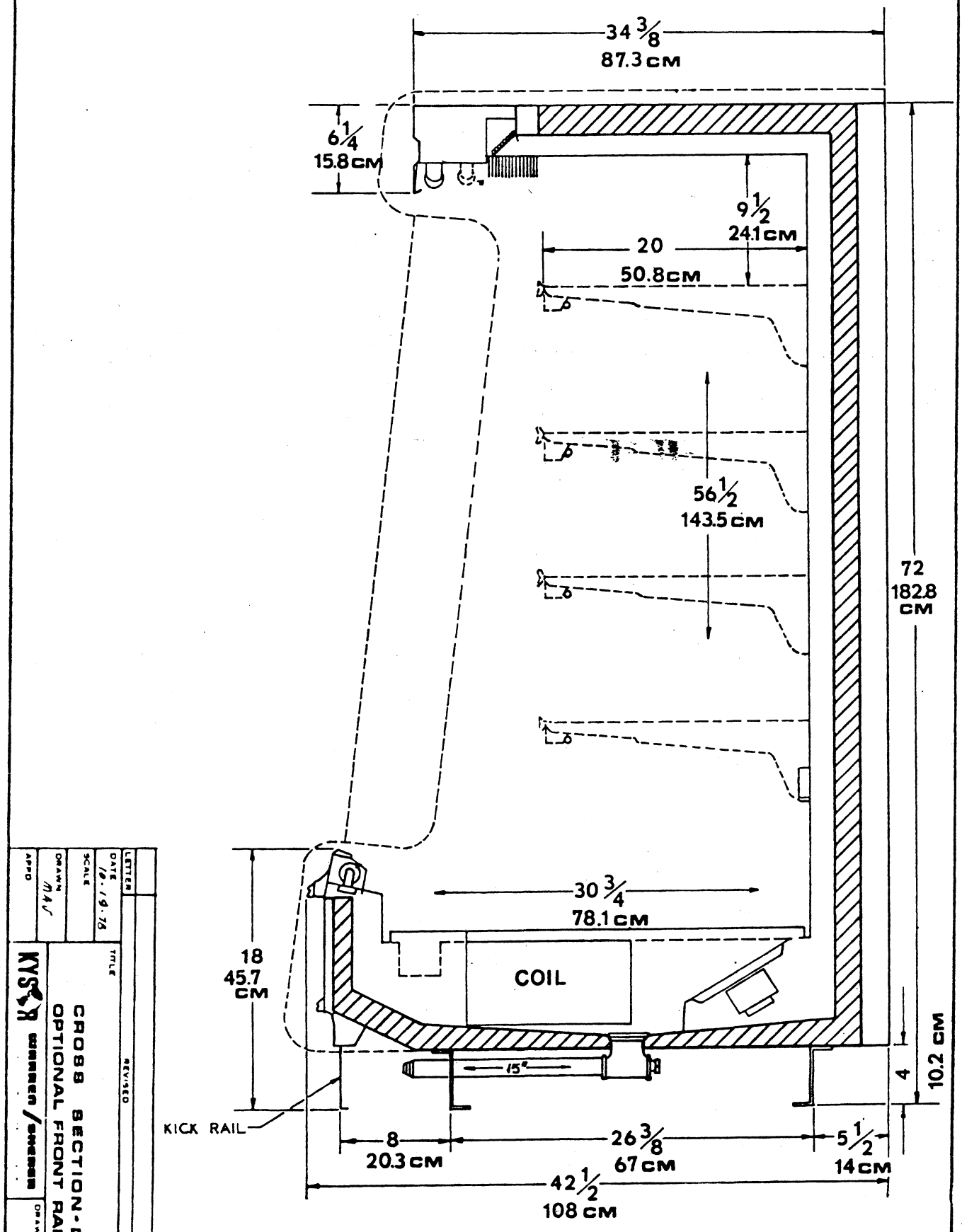
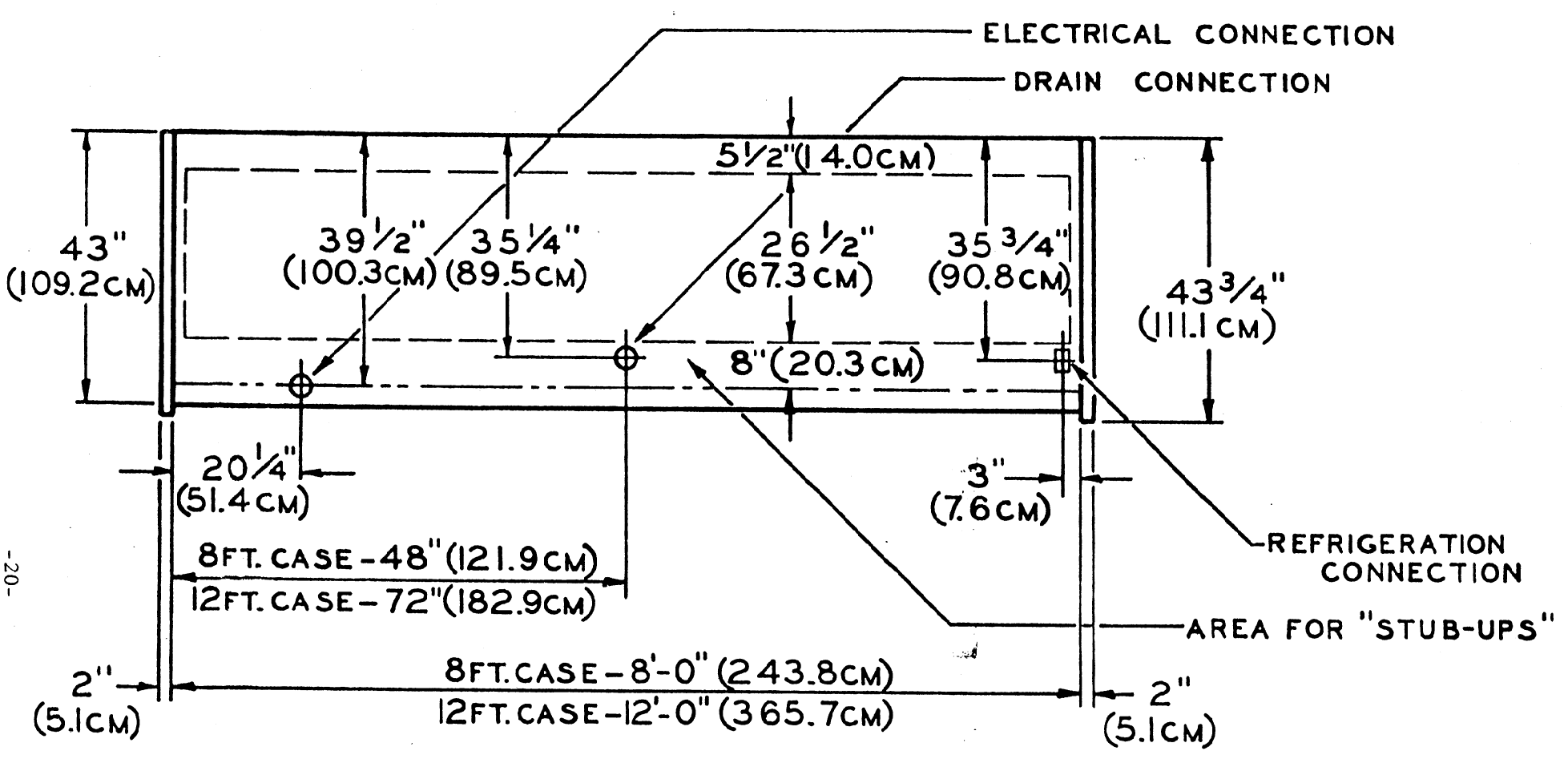
58-78536


34 3/8
87.3 CM
6 1/4
15.8 CM
9 1/2
24.1 CM
20
50.8 CM
56 1/2
143.5 CM
72
182.8
CM
30 3/4
78.1 CM
COIL
18
45.7
CM
15°
4
10.2 CM
KICK RAIL
8
20.3 CM
26 3/8
67 CM
5 1/2
14 CM
42 1/2
108 CM
LETTER
DATE
10-19-78
SCALE
DRAWN
APPD
TITLE
CROSS SECTION-DS WIT
OPTIONAL FRONT RAIL LIGH
REVISED
DATE
DRAWING NUMBER



LETTER	REVISED	DATE	BY

DATE 10-2-80

SCALE 1/2" = 1'-0"

DRAWN RRM

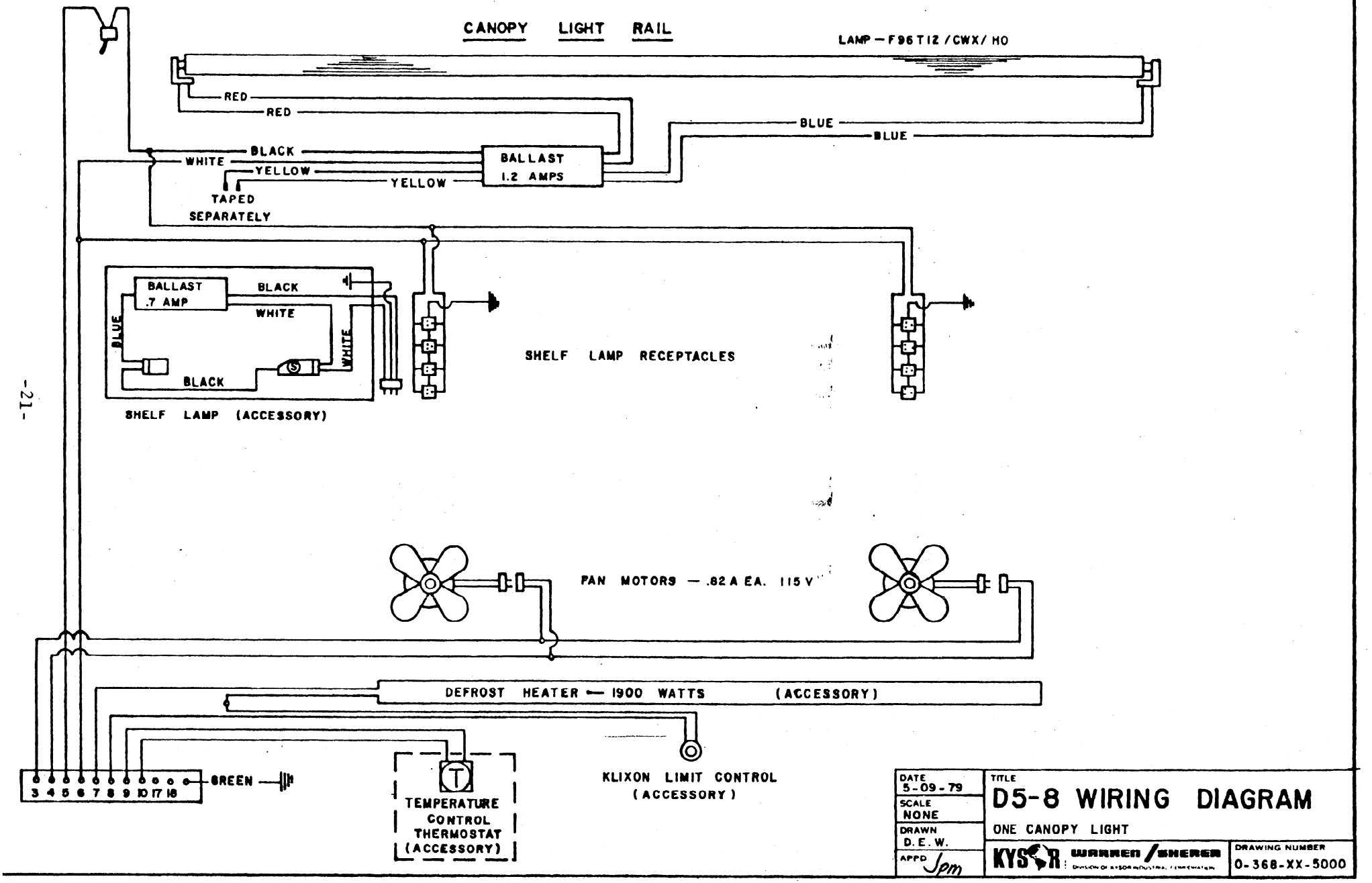
APPD.

TITLE

PLAN VIEW
MODEL D5

KYSOR | WARREN / SHERER
DIVISION OF KYSOR INDUSTRIAL CORPORATION

DRAWING NUMBER
SA-80508



DATE	5-09-79
SCALE	NONE
DRAWN	D. E. W.
APPD	Jpm

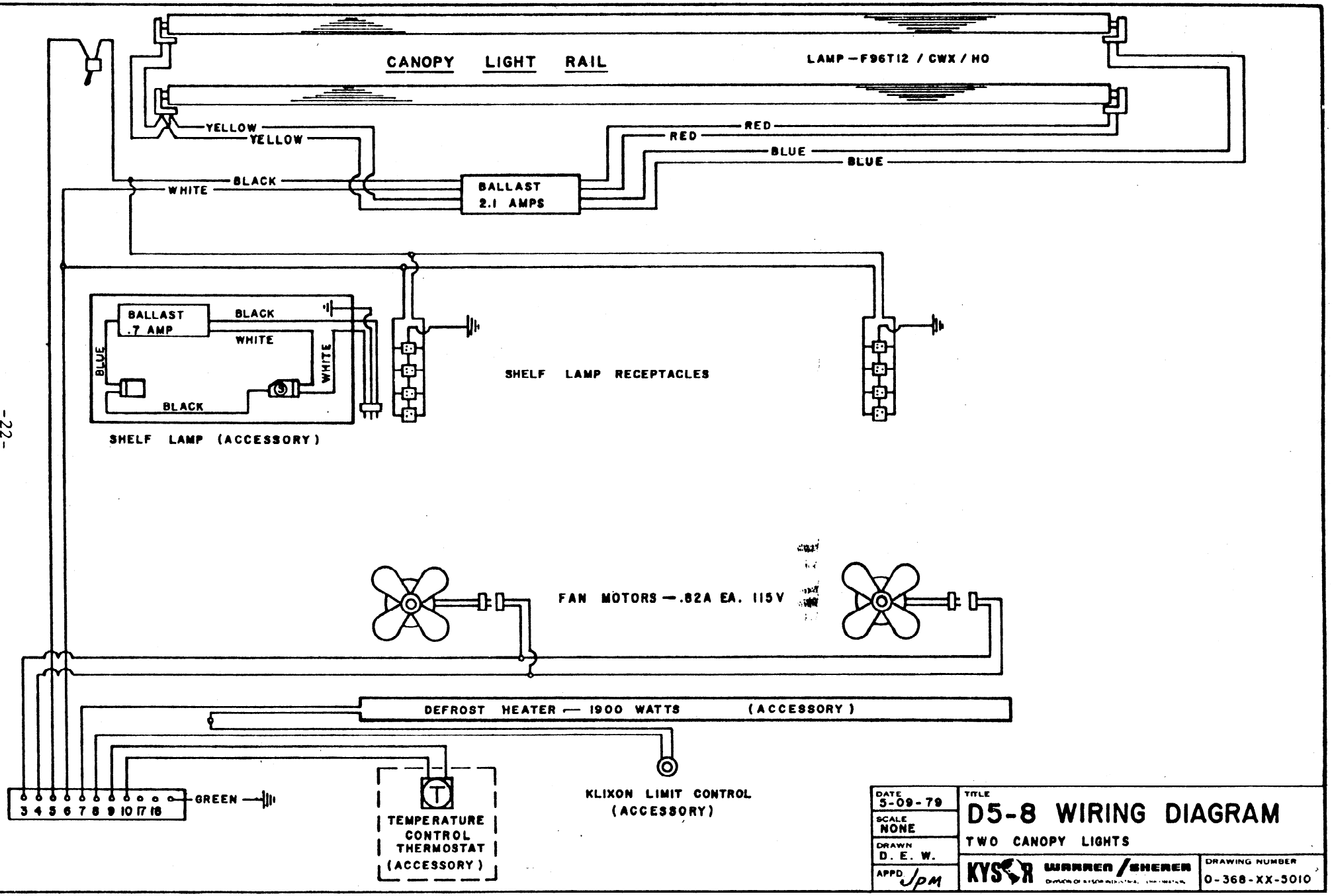
TITLE

D5-8 WIRING DIAGRAM

ONE CANOPY LIGHT

KYSOR WARREN / SHEREN

DRAWING NUMBER 0-368-XX-5000

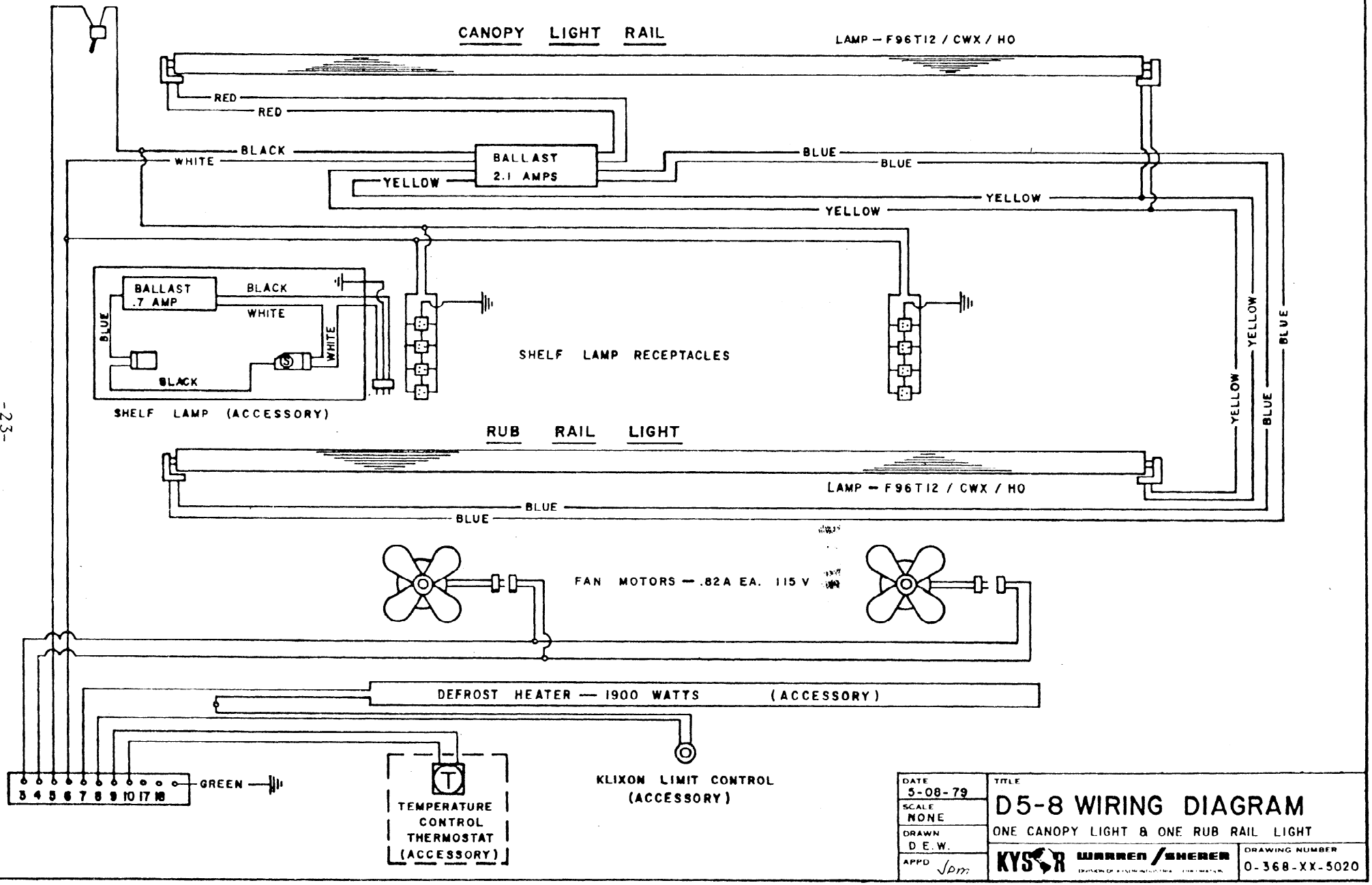


DATE	5-09-79
SCALE	NONE
DRAWN	D. E. W.
APPD	JPM

TITLE
D5-8 WIRING DIAGRAM
TWO CANOPY LIGHTS

KYSOR WARREN / SHERER

DRAWING NUMBER
0-368-XX-3010



DATE	5-08-79
SCALE	NONE
DRAWN	D.E.W.
APPD	JPM

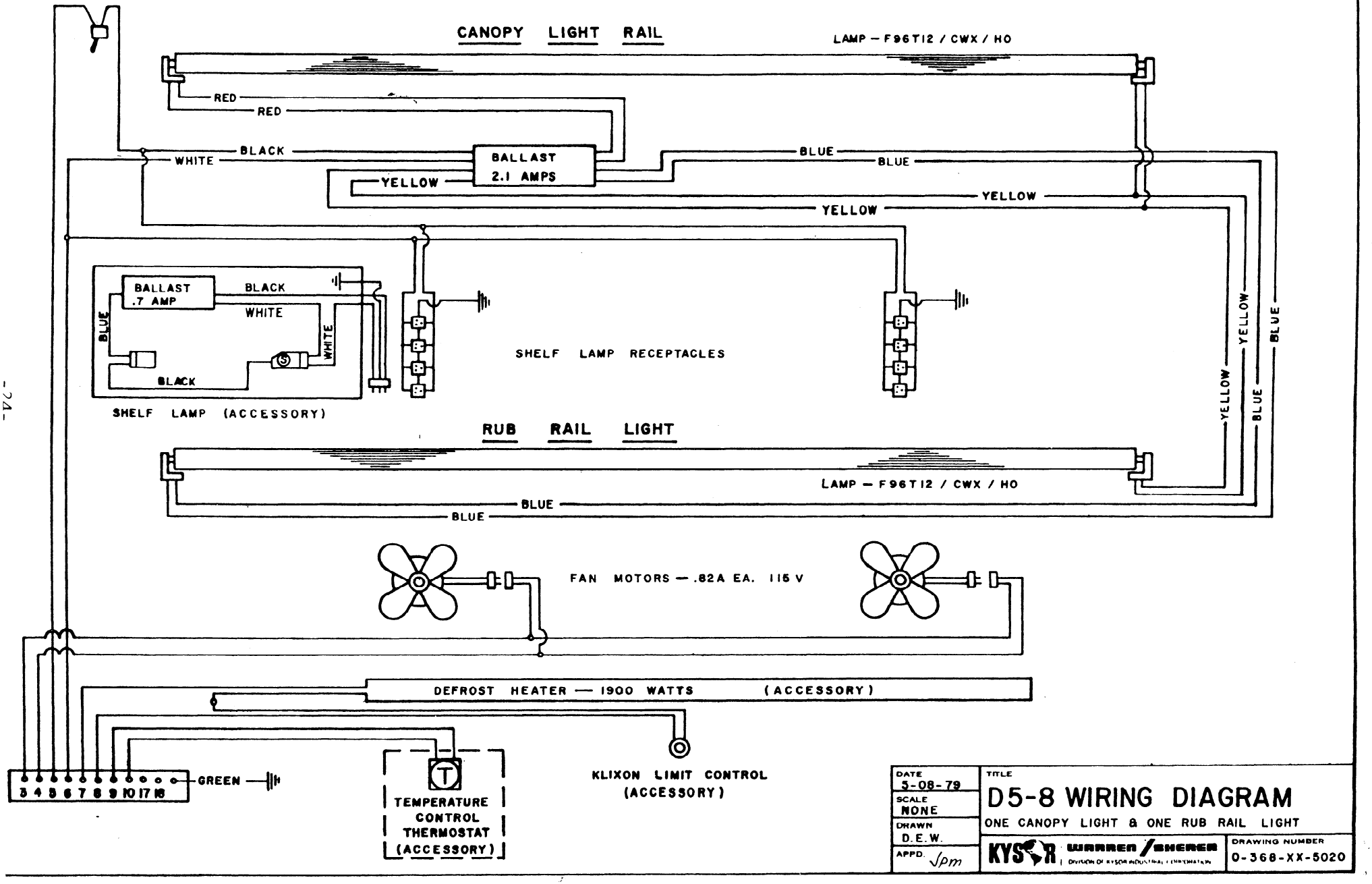
TITLE

D5-8 WIRING DIAGRAM

ONE CANOPY LIGHT & ONE RUB RAIL LIGHT

KYSOR WARREN / SHERER

DRAWING NUMBER 0-368-XX-5020



DATE	5-08-79
SCALE	NONE
DRAWN	D.E.W.
APPD.	jpm

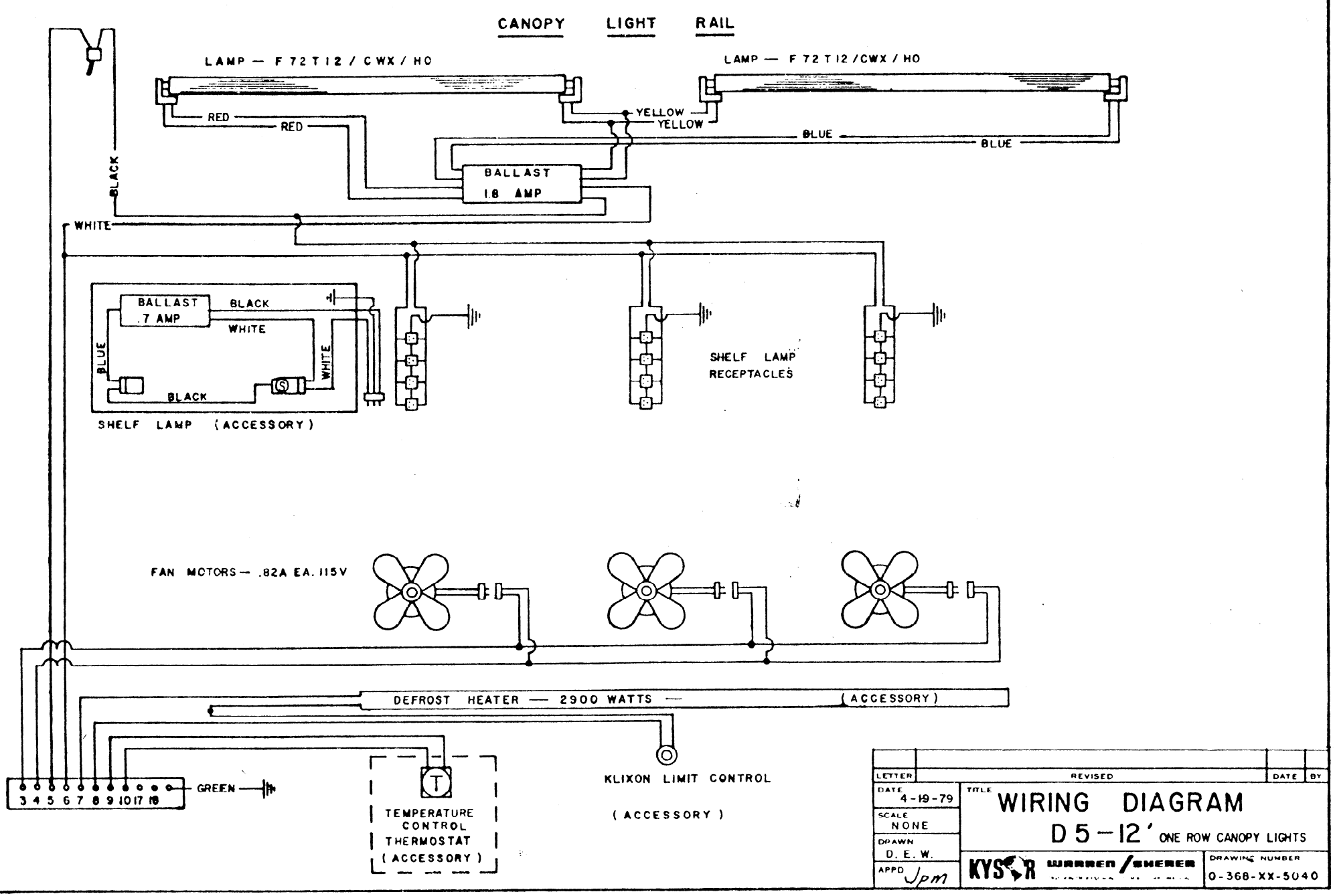
TITLE

D5-8 WIRING DIAGRAM

ONE CANOPY LIGHT & ONE RUB RAIL LIGHT

KYSOR | WARREN / SHERER | DIVISION OF KYSOR INDUSTRIAL CORPORATION

DRAWING NUMBER 0-368-XX-5020



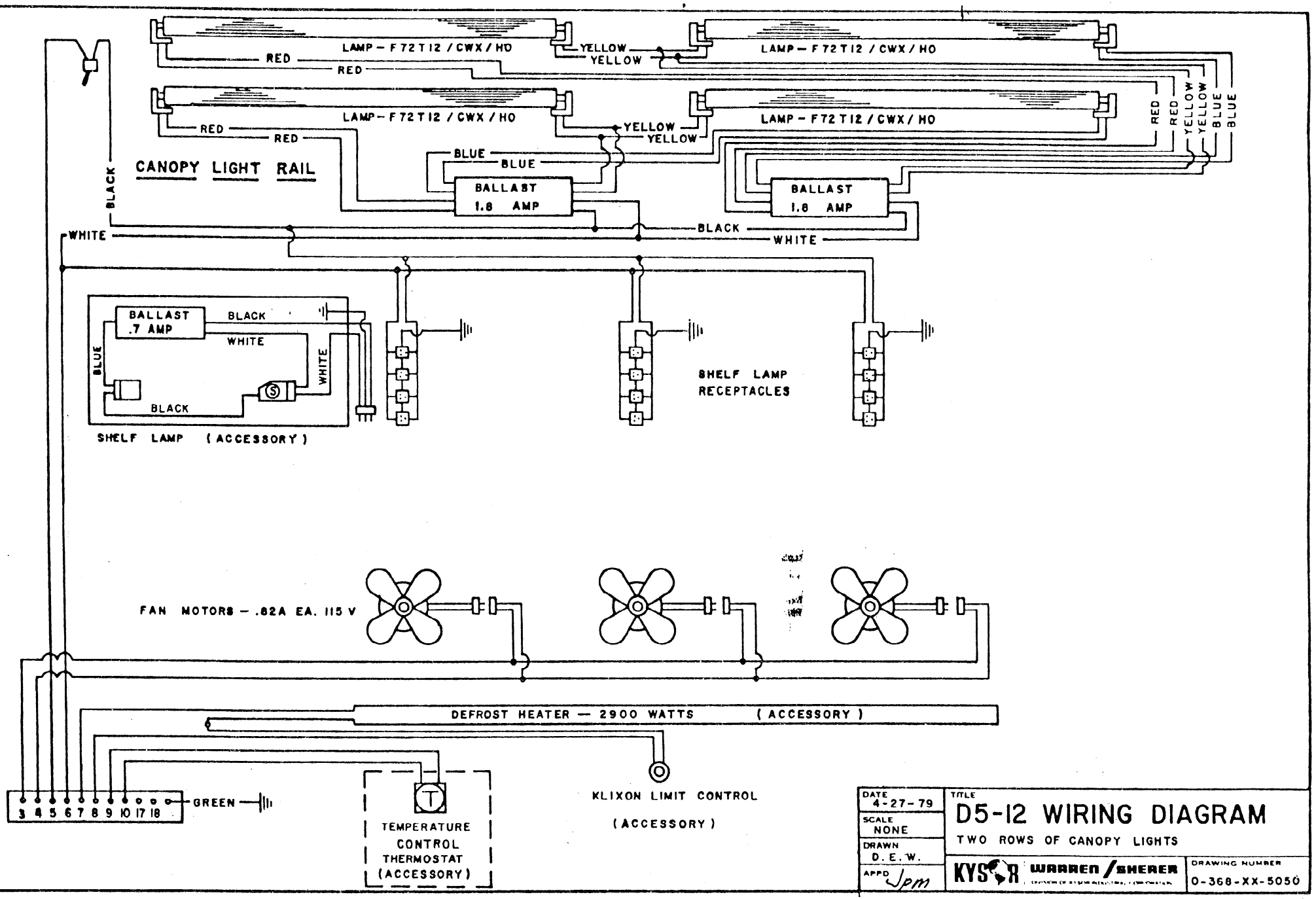
LETTER	REVISED	DATE	BY

DATE 4-19-79
SCALE NONE
DRAWN D. E. W.
APPD Jpm

TITLE
WIRING DIAGRAM
D5-12' ONE ROW CANOPY LIGHTS

KYSOR WARREN / SHERER

DRAWING NUMBER
0-368-XX-5040



DATE	4-27-79
SCALE	NONE
DRAWN	D. E. W.
APPD	JPM

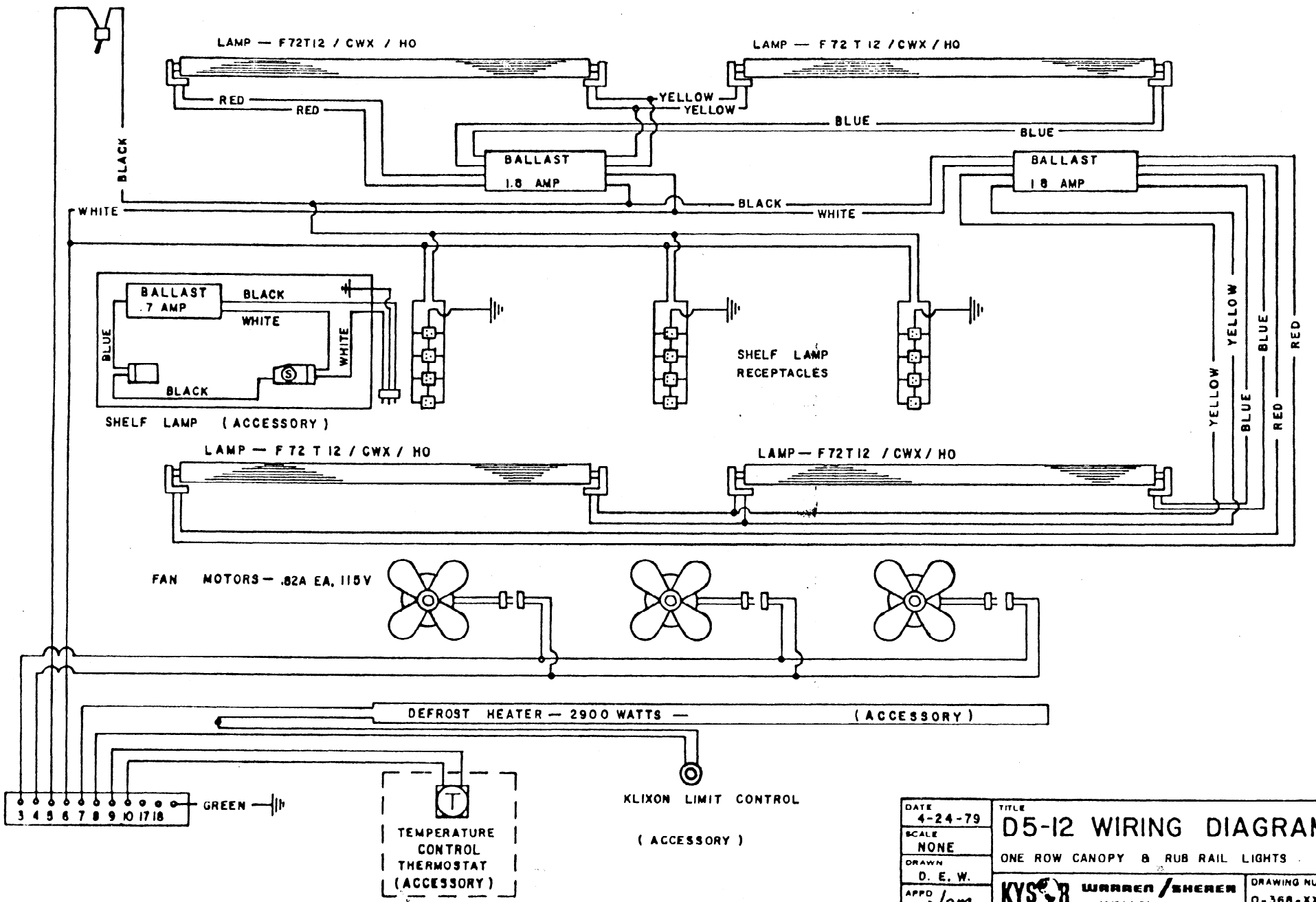
TITLE

D5-12 WIRING DIAGRAM

TWO ROWS OF CANOPY LIGHTS

KYSOR WARREN / SHERER

DRAWING NUMBER 0-368-XX-5050



DATE	4-24-79
SCALE	NONE
DRAWN	D. E. W.
APPD.	Jpm

TITLE

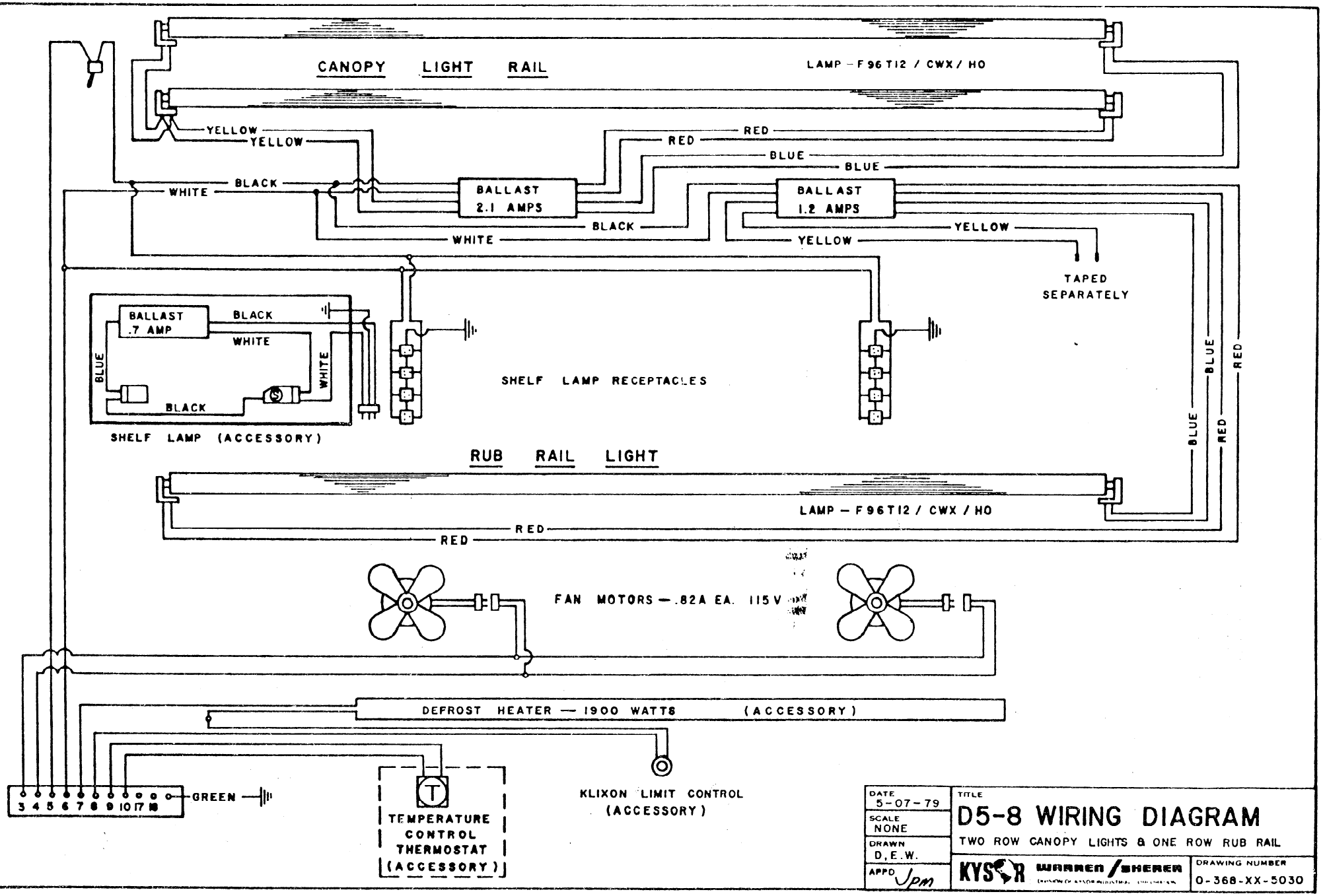
D5-12 WIRING DIAGRAM

ONE ROW CANOPY & RUB RAIL LIGHTS

KYSOR WARREN / SHERER

DRAWING NUMBER

0-368-XX-5060



DATE	5-07-79
SCALE	NONE
DRAWN	D.E.W.
APPD	JPM

TITLE

D5-8 WIRING DIAGRAM

TWO ROW CANOPY LIGHTS & ONE ROW RUB RAIL

KYSOR WARREN / SHERER

DRAWING NUMBER 0-368-XX-5030

1. Proper size refrigeration lines are essential to good refrigeration performance. Suction lines are more critical than liquid or discharge lines. Oversized suction lines may prevent good oil return to the compressor. Undersized lines can rob refrigeration capacity and increase operating cost. Consult the technical manual or legend sheet for proper line sizes.

2. Refrigeration lines in cases in line-ups can be reduced. However, the lines should be no smaller than the main trunk lines in at least 1/3 of the cases and no smaller than one size above the case lines to the last case. Reductions should not exceed one line size per case. It is preferred to bring the main trunk lines in at the center of line-up. Liquid lines on systems on hot gas defrost must be increased one line size above the main trunk line for the entire line-up. Individual feed lines should be at the bottom of the liquid header.

3. Do not run refrigeration lines from one system through cases on another system.

4. Use dry nitrogen in lines during the brazing to prevent scaling and oxidation.

5. Insulate suction lines from the cases to the compressor with 3/4" wall thickness Armaflex or equal on low temp cases to provide maximum of 65° sub-cooled gas back to the compressor and prevent condensation in exposed areas. Insulate suction lines on medium temp cases with 1/2" thick insulation in exposed areas to prevent condensate drippage.

6. Suction and liquid lines should never be taped or soldered together. Adequate heat exchanger is provided in the case.

7. Refrigeration lines should never be placed in the ground unless they are protected against moisture and electrolysis attack.

8. Always slope suction lines down toward the compressor, 1/2" each 10'. Do not leave dips in the line that would trap oil.

9. Provide "P" traps at the bottom of suction line risors, 4' or longer. Use a double "P" trap for each 20' of risors. "P" traps should be the same size as the horizontal line. Consult the technical manual or legend sheet for proper size risors.

10. Use long radius ells and avoid 45° ells.

11. Provide expansion loops in suction lines on systems on hot gas defrost. An expansion loop is required for each 100' of straight run.

12. Strap and support tubing to prevent excessive line vibration and noise.

13. Brazing of copper to copper should be with a minimum of 10% silver. Copper to brass or copper to steel should be with 45% silver.

14. Avoid the use of "bull head" tees in suction lines. An example is where suction gas enters both ends of the tee and exits the center. This can cause a substantial increase in pressure drop in the suction lines.

15. When connecting more than one suction line to a main trunk line, connect each branch line with an inverted trap.