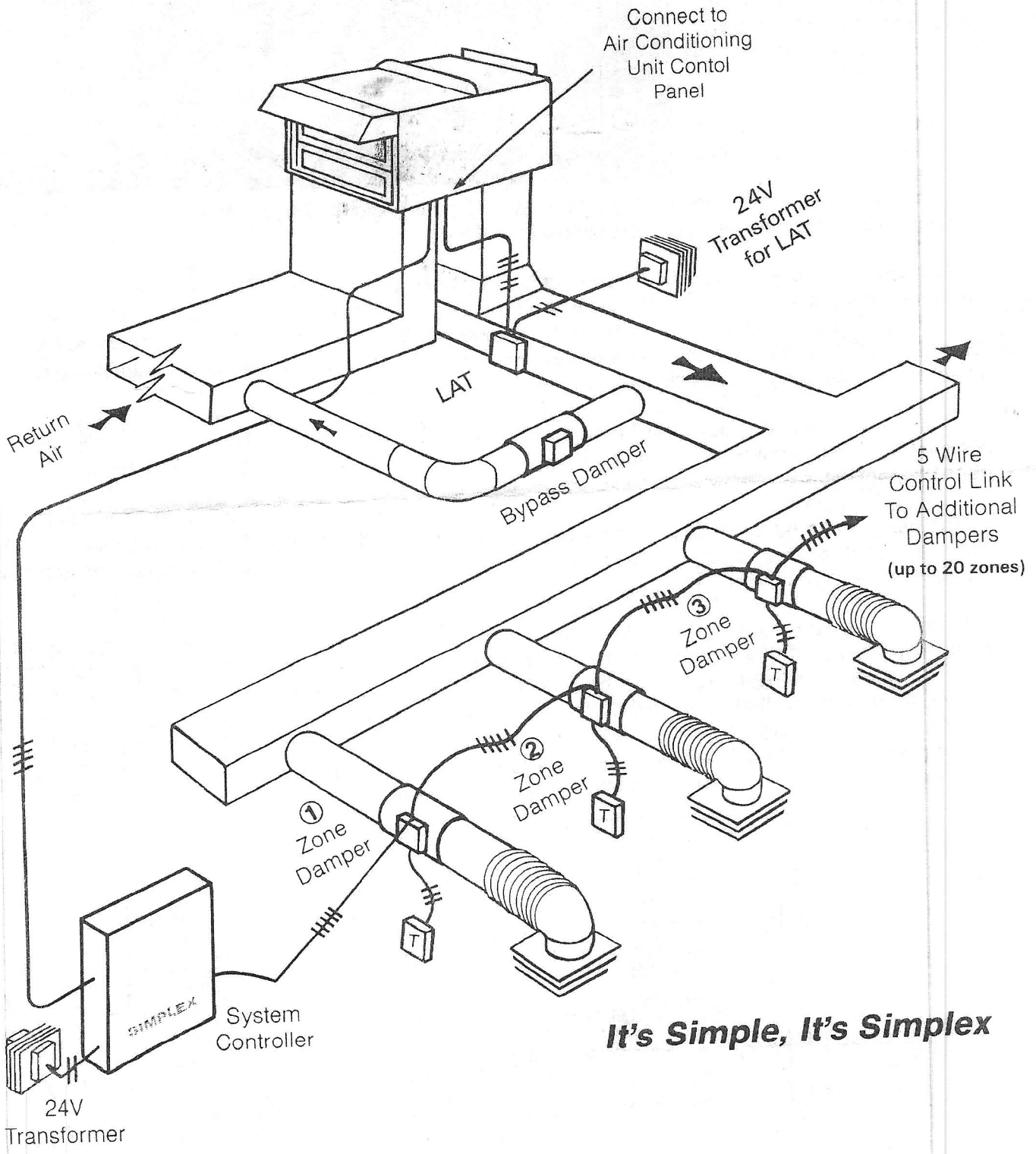
SIMPLEX

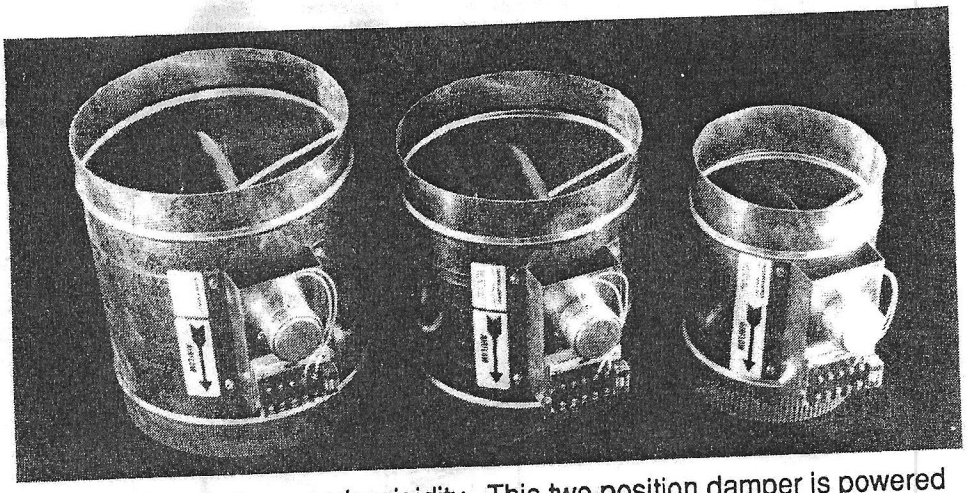
DAMPER SYSTEM - 2000

SCHEMATIC



It's Simple, It's Simplex

SIMPLEX DAMPERS



Simplex dampers are used in cooling/heating systems to provide individual zone control. Simplex dampers can solve heating/cooling problems in an entire building, home, or any other specific problem area where room by room comfort control is required.

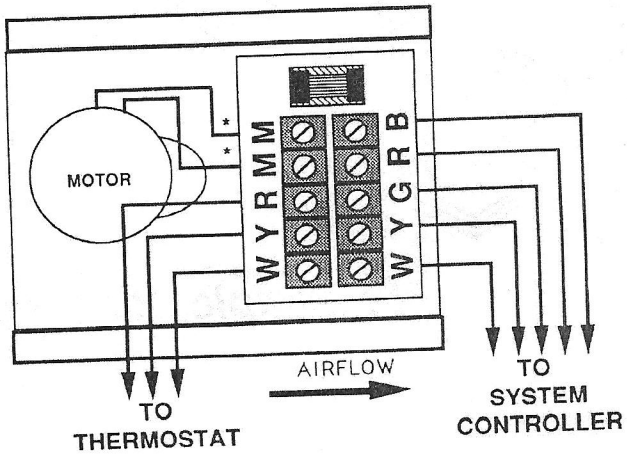
The Simplex damper is manufactured from 24 gauge galvanized steel (22 ga. in 10", 12", and 14" sizes), with rolled-in stiffening beads for superior rigidity. This two-position damper is powered closed and spring returns open for very simple operation.

The damper pipe is furnished with one crimped end and one straight end for easy installation. A hat section supports a synchronous 24V Ac 60Hz 11VA motor. The motor is designed for continuous full stall operation. Special windings and heavy duty gearing provide for long motor life and easy spring open operation. Crosspin drive on the shaft provides positive direct drive to the damper blade without a coupling or set screws, allowing for a quick and easy motor change if required.

The damper mounted relay board provides terminal connections for the five wire control link from the Simplex System Controller. Additionally, each damper has a three wire connection to it's room thermostat, (See diagram below).

The damper can be controlled by a Honeywell T-87 stat with the manual Simplex Controller. Use any other set back or programmable stat with the Simplex Auto changeover Controller for enhanced performance and energy savings.

All dampers spring return to the full open position to allow for ventilation (fan operation), when no cooling or heating is required. If a room stat has a call for heating or cooling, the damper will remain open and all other dampers will drive closed. The Simplex Bypass Damper described on page 10 is designed to relieve static pressure that may build up in the system. The Bypass allows excess air to flow from the supply to the return side of the A/C unit. To protect the compressor or heat exchanger, the Simplex Leaving Air Temperature Controller (LAT) is used to control the capacity of the system. The LAT is described on page 7. In the event of damper power failure, all dampers fail safe to the open position.



* FACTORY WIRED

SELECTING A SIMPLEX DAMPER

1. For new systems, retrofit jobs or where required load is known: Determine CFM from heat gain or loss calculations. Then select a Simplex damper to fit the duct size required for that zone from the chart below. A second method is to select the damper based on CFM and velocity. CFM is determined from load calculations. Recommended velocities are: Main duct 1000 - 1500 FPM Branch ducts 700 FPM.

2. For Simplex dampers within three feet of outlet (grille or register), velocities above 700 FPM are not recommended.

3. Flexible sound attenuating ducts are recommended where Simplex dampers operate at velocities above 1000 FPM and are installed within 3' of an outlet.

4. Zone dampers should be preceded by 2'-4' of straight pipe where possible.

5. In attic installations and high humidity areas, the Simplex damper should be insulated along with the duct work. The Simplex hat section on the damper is delivered with insulation between the hat section and pipe. Therefore, insulation should be applied to the round pipe and be butted against the hat section, (do not insulate the motor or relay board). Both motor and the relay board generate enough heat so no condensation will develop on the hat section.

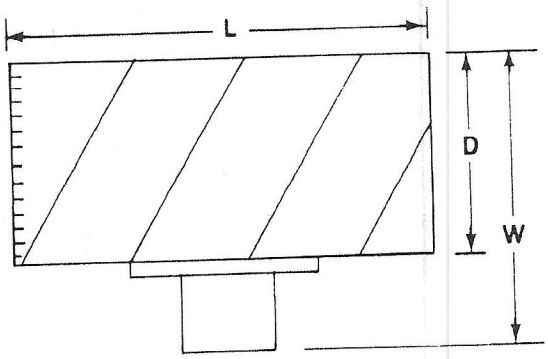
6. Two or more dampers may be used for a single zone and be controlled by a single zone thermostat. See slaving a Simplex Damper on page 5.

7. Every register or diffuser in the system must be controlled by a Simplex damper.

8. Review wiring and power requirements on page 22 and 23 of this manual before proceeding.

▼ SIMPLEX DAMPER DIMENSIONAL DATA

SIZE	DIAMETER(D)	LENGTH(L)	WIDTH(W)
6"	6"	10"	9"
7"	7"	10"	10"
8"	8"	10"	11"
9"	9"	11"	12"
10"	10"	12"	13"
12"	12"	14"	15"
14"	14"	16"	17"



▼ CAPACITIES

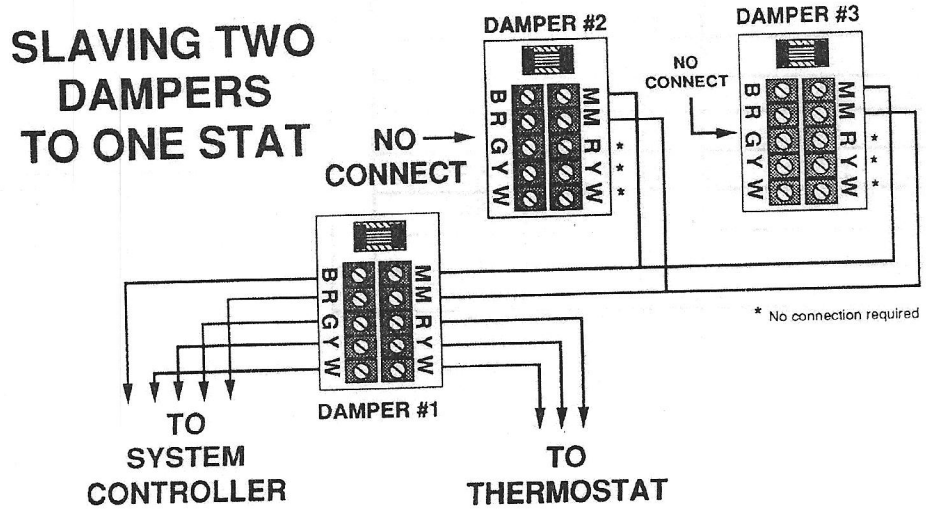
Note: *Simplex dampers are not designed to work with static pressure over .3" W.C. at the damper. *If static exceeds .3" request Simplex high pressure* damper. HIgh pressure damper is designed to work up to 2" W.C.

		RECOMMEND	
PRESSURE DROP	.015	.035	.07
VELOCITY FPM	700	1000	1500
SIZE	CFM	CFM	CFM
6"	125	175	250
7"	170	240	360
8"	220	315	470
9"	280	400	600
10"	380	550	820
12"	500	700	1060
14"	675	960	1440

SLAVING A SIMPLEX DAMPER

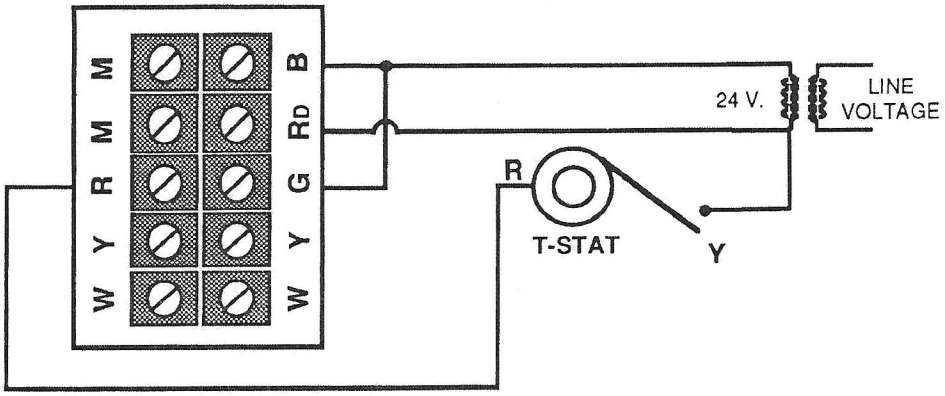
If you would like to operate two or more dampers with one thermostat, follow the wiring diagram detailed below.

NOTE: As you add Dampers to a Simplex System each damper motor draws approximately 11VA. Therefore, your 24V field supplied system transformer must be sized to meet the total load of all damper motors in the system. As an example; If you have installed five zone dampers with a total load of 55VA, a 60VA transformer must be supplied to power the system. If you have installed the same five zones as discussed above, but slaved two zones with two additional dampers, we have now increased the total number of dampers in our system to seven. The total load is 77VA. In this example, a 100VA transformer will be required to provide power to the system.

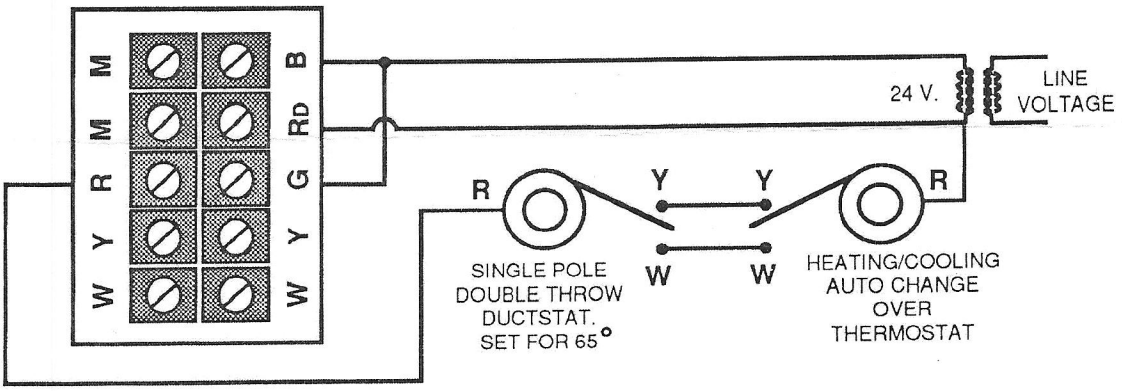


WIRING A SINGLE DAMPER
WHEN NO SYSTEM CONTROLLER IS USED

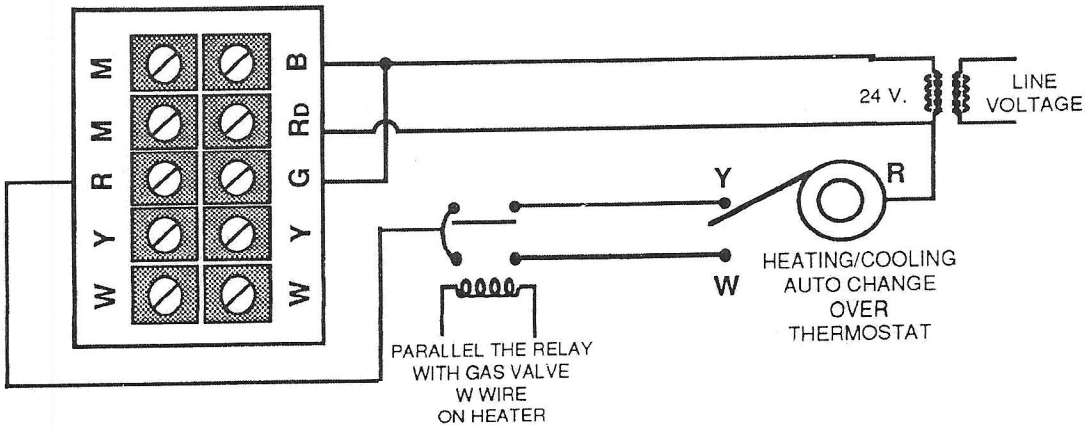
COOLING ONLY DAMPER



HEATING/COOLING AUTO CHANGE OVER OPTION #1



HEATING/COOLING AUTO CHANGE OVER OPTION #2

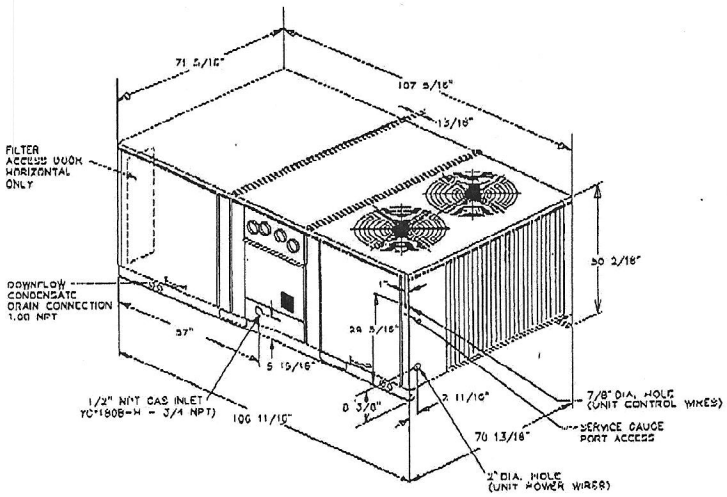


YCD180SQ207.15

Tag: [redacted] FIREHOUSE / GEORGE

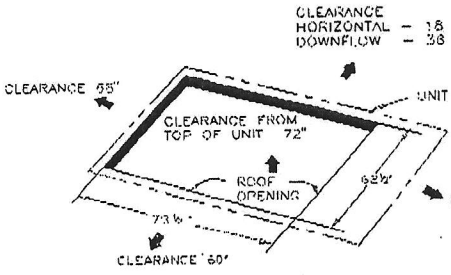
SUBMITTAL

All dimensions are in inches.



Standard Efficiency
15Ton
Packaged
Gas/Electric
Downflow
YCD180B

Note:
Duct flanges mount 7-7/16" down inside the curb on the 1½" curb flanges. See recommended duct dimensions on page 3.
Roofcurb is intended for downflow use only.



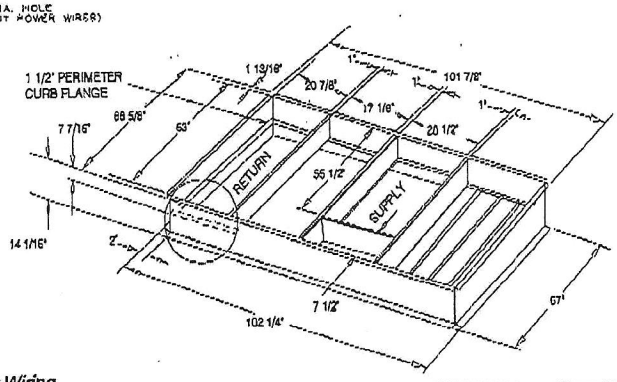


Table 1 — Unit Wiring

Unit Model No.	Unit Operating Voltage Range	Minimum Circuit Ampacity[2] (Standard/Oversize)	Maximum Fuse Size or Maximum Circuit Breaker[1] (Standard/Oversize)
YCD180B3	187-253	78/94	90/100
YCD180B4	414-506	39/42	50/50
YCD180BW	517-633	31/30	40/40

Notes:
1. HACR type circuit breakers per NEC. 2. Values do not include power exhaust accessory.

Table 2 — Electrical Characteristics — Power Exhaust Accessory

Accessory Operating Voltage	Phase	HP	RPM	Amps FLA	Amps LRA
208-230	1	3/4	1040	6.6	13.6
460	1	3/4	1040	3.2	8.4
575	1	3/4	1040	2.1	5.2

Table 3 — Accessory Net Weights (lbs)[1,2]

Economizer	Outside Air Damper		Power Exhaust	Roof Curb	Oversized Motor Adder	High Static Drive	All Zone Sensors	LPG Conversion Kit
Net	Manual	Motorized						
65	60	82	95	205	5	2	1	5

Notes:
1. Net weight should be added to unit weight when ordering factory installed accessories.
2. Factory installed options for economizers, multiply net capacity x .99, EER x .97. For oversize motors, multiply net capacity x .98, EER x .93. This is provided in compliance with ARI certification program.

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Table 6— Gross Cooling Capacities (MBH)

CFM Airflow	Enter. Dry Bulb (F)	Ambient Temperature 85 Entering Wet Bulb 61 MBH	61 SHC	67 MBH	67 SHC	73 MBH	73 SHC	95 61 MBH	61 SHC	67 MBH	67 SHC	73 MBH	73 SHC	105 61 MBH	61 SHC	67 MBH	67 SHC	73 MBH	73 SHC	115 61 MBH	61 SHC	67 MBH	67 SHC	73 MBH	73 SHC
5400	75	168.0	133.0	188.0	106.0	198.0	73.0	157.0	128.0	181.0	101.0	194.0	70.4	147.0	122.0	172.0	97.0	187.0	67.3	137.0	117.0	162.0	92.1	179.0	63.2
	80	188.0	158.0	188.0	128.0	199.0	97.3	155.0	155.0	181.0	125.0	195.0	94.3	148.0	143.0	172.0	120.0	188.0	90.8	140.0	137.0	162.0	115.0	179.0	88.7
	85	174.0	174.0	189.0	150.0	200.0	117.0	188.0	188.0	182.0	147.0	196.0	115.0	158.0	158.0	172.0	143.0	189.0	113.0	150.0	150.0	162.0	138.0	180.0	110.0
	90	184.0	184.0	190.0	172.0	202.0	136.0	177.0	177.0	183.0	170.0	197.0	135.0	170.0	170.0	170.0	170.0	190.0	133.0	162.0	162.0	165.0	157.0	181.0	131.0
6000	75	172.0	140.0	190.0	110.0	199.0	74.3	161.0	134.0	184.0	106.0	195.0	71.7	151.0	129.0	175.0	101.0	189.0	68.7	140.0	124.0	165.0	96.1	181.0	64.9
	80	189.0	169.0	191.0	133.0	200.0	99.4	164.0	157.0	184.0	130.0	196.0	97.2	155.0	151.0	176.0	126.0	190.0	93.8	145.0	145.0	165.0	121.0	182.0	89.9
	85	181.0	181.0	192.0	156.0	202.0	119.0	173.0	173.0	185.0	154.0	198.0	118.0	165.0	165.0	176.0	151.0	191.0	116.0	157.0	157.0	166.0	148.0	183.0	113.0
	90	189.0	189.0	193.0	179.0	204.0	140.0	183.0	183.0	183.0	183.0	199.0	139.0	176.0	176.0	178.0	171.0	193.0	138.0	168.0	168.0	170.0	168.0	184.0	136.0
6600	75	176.0	147.0	192.0	112.0	200.0	75.5	165.0	141.0	186.0	110.0	196.0	73.0	154.0	136.0	178.0	105.0	190.0	69.8	144.0	130.0	168.0	99.8	182.0	66.1
	80	178.0	171.0	193.0	135.0	201.0	101.0	169.0	165.0	187.0	125.0	197.0	98.8	160.0	159.0	178.0	131.0	191.0	96.1	150.0	150.0	168.0	127.0	183.0	92.6
	85	185.0	185.0	194.0	161.0	203.0	122.0	179.0	179.0	189.0	160.0	199.0	121.0	171.0	171.0	179.0	158.0	193.0	119.0	163.0	163.0	169.0	153.0	185.0	116.0
	90	193.0	193.0	193.0	193.0	205.0	143.0	188.0	188.0	189.0	188.0	201.0	143.0	181.0	181.0	182.0	178.0	195.0	142.0	173.0	173.0	174.0	174.0	186.0	140.0
7200	75	179.0	152.0	194.0	114.0	201.0	76.7	168.0	147.0	188.0	112.0	197.0	74.2	158.0	142.0	180.0	109.0	191.0	71.0	142.0	142.0	170.0	103.0	183.0	67.3
	80	182.0	177.0	195.0	140.0	202.0	103.0	173.0	172.0	188.0	139.0	198.0	100.0	164.0	164.0	181.0	136.0	192.0	97.6	155.0	155.0	171.0	132.0	184.0	94.4
	85	189.0	189.0	196.0	166.0	204.0	125.0	183.0	183.0	190.0	166.0	200.0	123.0	176.0	176.0	182.0	164.0	194.0	121.0	167.0	167.0	167.0	167.0	186.0	119.0
	90	197.0	197.0	197.0	197.0	206.0	146.0	192.0	192.0	193.0	197.0	202.0	148.0	185.0	185.0	186.0	184.0	196.0	146.0	172.0	172.0	172.0	172.0	188.0	144.0

Notes:
1. All capacities shown are gross and have not considered indoor fan heat. To obtain net cooling subtract indoor fan heat.
2. MBH = Total Gross Capacity
3. SHC = Sensible Heat Capacity

Table 7 — Electrical Characteristics — Evaporator Fan Motor — 60 Cycle

Unit Model No.	Standard Evaporator Fan Motor No.	Volts	Phase	HP	Amps[1] FLA	LRA	Oversized Evaporator Fan Motor No.	Volts	Phase	HP	Amps[1] FLA	LRA
YCD180B3	1	208-230	3	3.00	10.6	81.0	1	208-230	3	5.00	16.7	109.8
YCD180B4	1	460	3	3.00	4.8	40.5	1	460	3	5.00	7.6	54.9
YCD180CW	1	575	3	3.00	3.9	31.0	1	575	3	5.00	6.1	41.6

Table 8 — Electrical Characteristics — Compressor Motor and Condenser Motor — 60 Cycle

Unit Model No.	Compressor Motors No.	Volts	Phase	HP[2]	RPM	Amps[1] RLA	LRA	Condenser Fan Motors No.	Phase	HP	Amps[1] FLA	LRA
YCD180B3	2	208-230	3	9.3/5.1	3450	31.9/20.7	253/128	2	1	.50	3.2	8.8
YCD180B4	2	460	3	9.3/5.1	3450	16.3/10.0	113/63	2	1	.50	1.6	3.8
YCD180BW	2	575	3	9.3/5.1	3450	13.1/7.4	85/49	2	1	.50	1.3	3.2

Notes:
1. Amp draw for each motor; multiply value by numbers of motors to determine total amps.
2. HP for each compressor.

Table 9 Combustion Blower Motor Data

Heat	Heating Stages	HP	RPM	Volts	Phase	Amps FLA	LRA
Low	2	1/10	3500/2800[1]	208-230	1	0.8	2.00
High	2	1/10	3500/2800[1]	208-230	1	0.8	2.00

1. High/Low Speed

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Table 4 — General Data

	15 Ton Downflow Units	
	YCD180B3,B4,BWL	YCD180B3,B4,BWH
Cooling Performance[1]		
Gross Cooling Capacity	182,000	
EER[2]	9.7	
Nominal CFM/ARI Rated CFM	6,000/5,300	
ARI Net Cooling Capacity	174,000	
Integrated Part Load Value[3]	10.0	
System Power (kW)	17.94	
Heating Performance[4]	Low	High
Heating Models	250,000	350,000
Heating Input (Btuh)	175,000	250,000
1st Stage (2 Stage Only)	203,000	294,000
Heating Output (Btuh)	142,000	203,000
1st Stage (2 Stage Only)	80.7/79.9	80.1/79.1
AFUE%[5]/Steady State Efficiency (%)	1	1
No. Burners	2	2
No. Stages		
Gas Supply Pressure (In w.c.)	2.5/14.0	2.5/14.0
Natural or LP (minimum/maximum)	1/2	3/4
Gas Connection Pipe Size (in.)		
Compressor		
No./Type	2/Scroll	
Sound Rating (BELS)[6]	9.2	
Outdoor Coil — Type	Hi-Performance	
Tube Size (in.) O.D.	.375	
Face Area (sq ft)	27.12	
Rows/FPI	3/16	
Indoor Coil — Type	Hi-Performance	
Tube Size (in.)	.375	
Face Area (sq ft)	17.50	
Rows/FPI	2/15	
Refrigerant Control	Short Orifice	
Drain Connection No./Size (in.)	1/1.00 NPT	
Outdoor Fan — Type	Propeller	
No. Used/Diameter (in.)	2/26	
Drive Type/No. Speeds	Direct/1	
CFM[4]	10,200	
No. Motors/HP	2/.50	
Motor RPM	1,100	
Indoor Fan — Type	FC Centrifugal	
No. Used	1	
Diameter x Width (in.)	15 x 15	
Drive Type/No. Speeds	Belt/1	
No. Motors	1	
Motor HP (Standard/Oversized)	3.0/5.0	
Motor RPM (Standard/Oversized)	1,740/3,450	
Motor Frame Size (Standard/Oversized)	145T/145T	
Filters — Type Furnished[8]	Throwaway	
(No.) Size Recommended (In.)	(2) 20 x 20 x 2 / (4) 20 x 25 x 2	
Refrigerant Charge (Lbs of R-22)[7]	17.5/9.5/Circuit	

Notes:
1. Cooling Performance is rated at 95°F ambient, 80°F entering dry bulb, 67°F entering wet bulb. Gross capacity does not include the effect of fan motor heat. ARI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ± 20% of nominal cfm. Certified in accordance with the Unitary Large Equipment certification program, which is based on ARI Standard 340/360-93.
2. EER is rated at ARI conditions and in accordance with DOE test procedures.
3. Integrated Part Load Value is based on ARI Standard 360. Units are rated at 80°F ambient, 80°F entering dry bulb, and 67°F entering wet bulb at ARI rated cfm.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 2,000 feet. For elevations above 2,000 feet, ratings should be reduced at the rate of 4% for each 1,000 feet above sea level.
5. AFUE and Steady State Efficiency are rated in accordance with DOE test procedures.
6. Sound rating shown is tested in accordance with ARI Standard 270 or 370.
7. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
8. Optional 2" pleated media filters are also available.

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Table 10 — Evaporator Fan Performance

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
CFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3-HP Standard Motor & Field Supplied Low Static Drive (1)												5-HP Standard Motor & Drive							
4800	—	—	584	1.22	613	1.33	647	1.49	676	1.59	704	1.71	732	1.84	759	1.96	485	2.13	911	2.28
5200	591	1.41	623	1.53	649	1.61	679	1.78	709	1.93	736	2.04	762	2.17	788	2.31	831	2.46	837	2.62
5600	633	1.76	661	1.89	688	1.96	713	2.09	742	2.29	769	2.43	793	2.55	817	2.69	542	2.84	865	3.00
6000	674	2.10	699	2.28	727	2.37	749	2.48	775	2.66	802	2.98	825	3.00	849	3.13	872	3.28	894	3.44
6400	716	2.52	739	2.73	766	2.95	788	2.94	809	3.08	835	3.30	860	3.50	882	3.65	903	3.79	925	3.94
6800	758	3.00	779	3.22	804	3.38	827	3.47	847	3.58	868	3.77	892	4.01	915	4.21	936	4.37	957	4.52
7200	800	3.54	820	3.76	842	3.96	866	4.07	885	4.17	904	4.32	925	4.54	946	4.81	970	5.01	990	5.17
	5-HP Oversized Motor & Drive																			

For Standard Evaporator Fan Speed (RPM), reference Performance Data Tables.
For Standard Motor and High Static Drive Accessory Fan Speed (RPM), Performance Data Tables.
For Oversize Evaporator Fan Speed (RPM), Performance Data Tables.
Notes:
Fan motor heat (MBH) = 3.16 x Fan Bhp.
Data includes pressure Drop Due to Wet Coils and Filters.

1. Field Supplied Fan Sheave BK105 Required. Field Supplied Belt may be necessary.
2. 5 HP Oversize Motor with Field Supplied Motor Sheave 1VP50 Required. Field Supplied Belt may be necessary.

Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all catalogued conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Table 10 — (Continued)

	External Static Pressure (Inches of Water)																			
	1.10		1.20		1.30		1.40		1.50		1.60		1.70		1.80		1.90		2.00	
CFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3-HP Standard Motor & Drive						3-HP Standard Motor & High Static Drive Accessory													
4800	836	2.36	862	2.51	887	2.64	912	2.77	937	2.90	962	3.04	987	3.19	1011	3.34	1034	3.49	1057	3.65
5200	861	2.76	885	2.90	908	3.04	932	3.18	955	3.31	978	3.46	1002	3.60	1025	3.75	1047	3.90	1070	4.06
5600	886	3.17	910	3.33	932	3.49	954	3.64	976	3.79	998	3.93	1020	4.08	1042	4.23	1063	4.38	1085	4.54
6000	916	3.61	938	3.78	959	3.96	980	4.13	1001	4.31	1021	4.45	1042	4.62	1062	4.78	1082	4.93	1103	5.09
6400	946	4.10	967	4.28	987	4.47	1007	4.66	1027	4.85	1047	5.03	1066	5.21	1085	5.38	1104	5.55	—	—
6800	977	4.67	997	4.84	1017	5.03	1038	5.22	1055	5.42	1074	5.62	—	—	—	—	—	—	—	—
7200	1009	5.33	1028	5.49	1047	5.67	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	5-HP Oversized Motor & Drive						5-HP Oversized Motor & Field Supplied High Static Drive (2)													

Table 11 — Standard Motor and High Static Drive Accessory Fan Speed (RPM)

6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
679	721	764	806	849	891	N/A

Table 12 — Standard Motor and High Static Drive Accessory Fan Speed (RPM)

6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
806	849	891	934	976	1019	N/A

Table 13 — Oversize Motor and Sheave/Fan Speed (RPM)

6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
806	856	907	957	1008	1058	N/A

Table 14 — Static Pressure Drops Through Accessories (Inches Water Column)

CFM	Standard 2" Filters[2]	Pleated 2" Filters[2]	Economizer With OA/RA Dampers[1] 100% OA	100% RA
4800	0.07	0.10	0.25	0.03
6000	0.10	0.15	0.33	0.04
7200	0.15	0.19	0.40	0.05

Notes
1. OA = Outside Air and RA = Return Air.
2. Difference in pressure drop should be considered when utilizing optional 2" pleated filters.

Table 15 — Gas Fired Heating Capacities

Unit Model No.	Heating Input MBH	Heating Output MBH	Air Temperature Rise Range
YCD180B-L[1]	250/175	203/142	25-55
YCD180B-H[1]	350/250	284/203	35-65

Note:
1. Second stage is total heating capacity. Second Stage / First Stage.

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FROM :WESTERN AIR CREDIT DEPT FAX NO. :916 929 2519 May. 05 2005 12:45PM P5

SUBMITTAL | MICROMETL

SPECIAL CURB ADAPTOR FROM A R160 (ON AACRB 0820 CURB) TO A WCD 180B

PRODUCT NUMBER: WS9802-06CA

FORM NO. DATE: 2/98

SUBMITTED TO:

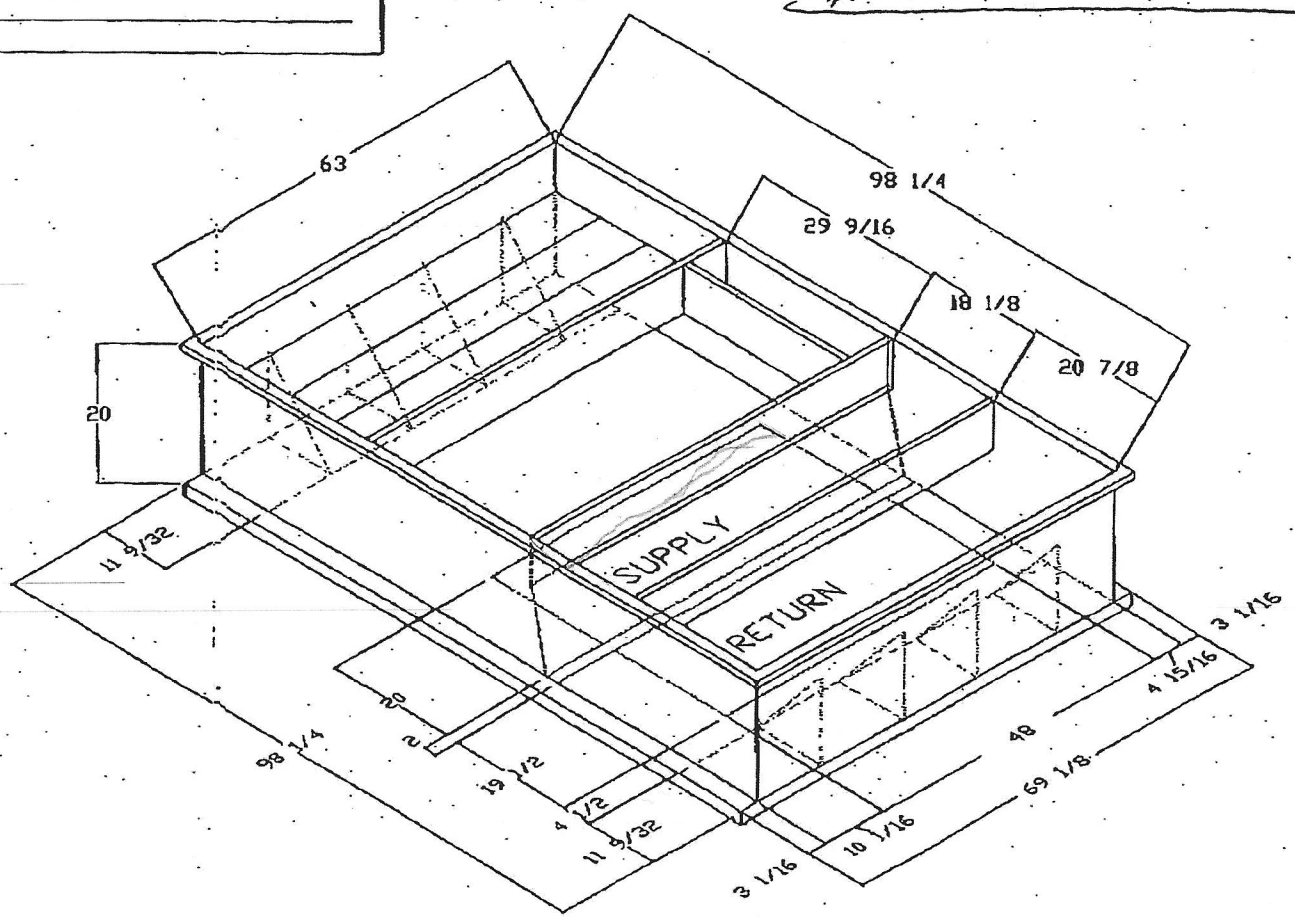
COMPANY:

DRAWN BY: MRM

JOB NAME:

EQUIPMENT:

NOTES:



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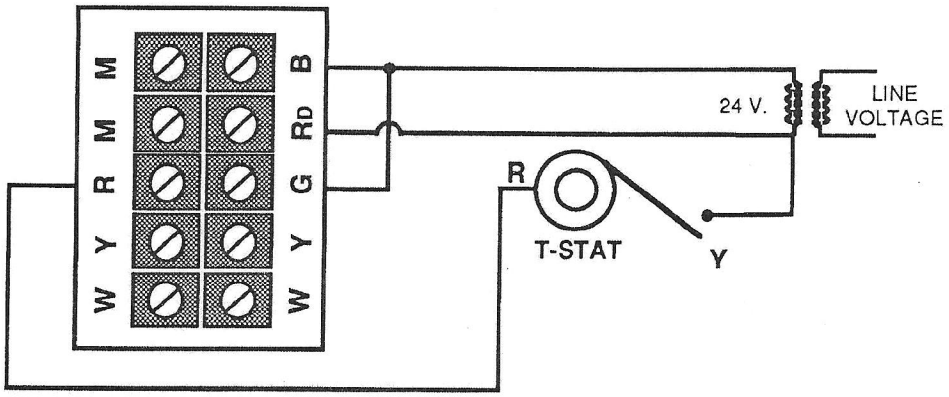
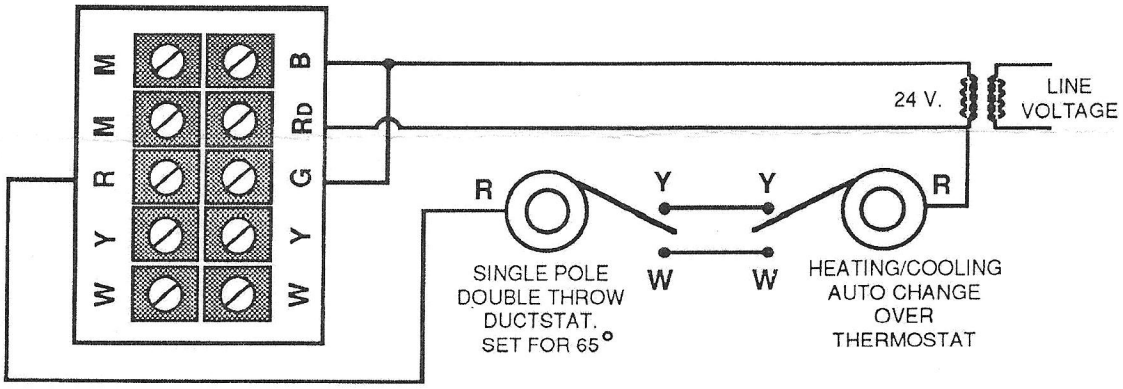
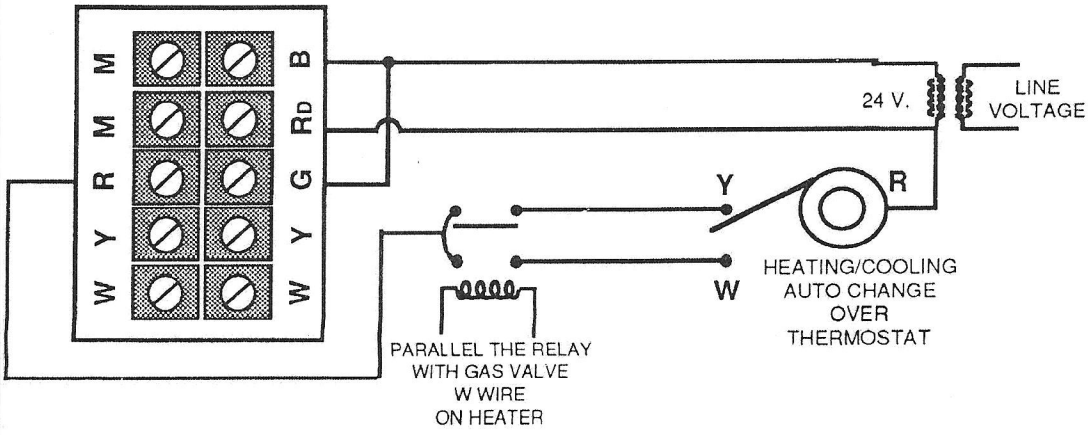
WIRING A SINGLE DAMPER
WHEN NO SYSTEM CONTROLLER IS USED

COOLING ONLY DAMPER



HEATING/COOLING AUTO CHANGE OVER OPTION #1



HEATING/COOLING AUTO CHANGE OVER OPTION #2