



** TECH WEST INC.**

Manufacturers of Dental Vacuum  
and Air Systems

2625 N. Argyle Ave. • Fresno, CA 93727  
(559) 291-1650 • (800) 428-7139 • FAX (559) 348-9677

# WHIRLWIND VACUUM PUMP



## **INSTALLATION AND SERVICE MANUAL**

Revised 4-15

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# WHIRLWIND PUMP

## INSTALLATION AND SERVICE MANUAL

This manual is for the installation and service of Tech West’s WhirlWind Pumps.

### CONTENTS

Installation	2
Figure 1: Plumbing Schematic	4
Figure 2: Water Connection	4
Figure 3: Typical Dual WhirlWind Installation	5
Figure 4: Sink Cabinet Installation	5
Figure 5: Vacuum Connection - Single WhirlWind	6
Figure 6: Vacuum Connection - Dual WhirlWind	6
Figure 7: Wiring Diagram	7
Figure 8: Remote Control Wiring	7
Figure 9: Line Voltage Connection	8
Weekly Servicing	9
Parts List	10-16

### TROUBLESHOOTING

Single Vacuum Pump Troubleshooting	18-19
Dual Vacuum Pump Troubleshooting	20-21
Triple Vacuum Pump Troubleshooting	22-23
Installation Diagrams and Information	24-26
Maintenance & Service and Notes Sheet	27-29

# WHIRLWIND PUMP INSTALLATION

## 1. WHIRLWIND LOCATION REQUIREMENTS

The WhirlWind location should be level, accessible and well ventilated.

If the WhirlWind will be located in a confined space, provide cross ventilation and install an exhaust fan.

The following utilities are required:

- (a) Cold Water Supply Install a separate 1/2" cold water branch for the WhirlWind water intake(s). This will cool and lubricate the shaft seal. Water pressure should be between 25 and 55 psi (water must remain on during operation) or shaft seal damage will occur.
- (b) Waste Disposal The WhirlWind will exhaust both vapor and liquid waste. Provide exhaust vent sized to 2" in diameter and a waste drain which complies with local code.
- (c) Vacuum Line The main vacuum line from the operatories must connect to the WhirlWind vacuum pump intake manifold.
- (d) Electrical
  - (1) Line voltage must be within the limits of Table 1 below. (Install a "buck-boost transformer" if line voltage is not between these values.) Provide a separate line for each pump motor. Circuit breaker switches must be 20 amp.

TABLE 1

<u>PUMP VOLTAGE RATING</u>	<u>MIN VOLTAGE RATING</u>	<u>MAX VOLTAGE RATING</u>
230 v	208 v constant	240 v constant
115 v	110 v constant	130 v constant

- (2) Local code may require you to provide one quick disconnect (safety switch) for each pump motor.
- (3) The WhirlWind is controlled by a 24 volt circuit. For remote control, provide one 18/3 jacketed cable for each pump motor.

# WHIRLWIND PUMP INSTALLATION

## 2. INSTALLATION STEPS

- (a) Check the shipping carton for damage. This could detect damage to the unit which might otherwise be overlooked.
- (b) Remove the WhirlWind from its shipping carton. Inspect the unit for damage. (Single WhirlWind's are shipped bolted to a pallet. This pallet is intended for shipping use only and should be discarded).
- (c) Inventory your Hook-Up Kit. Check its contents against the inventory sheet included. These items will be used in the remaining steps.
- (d) Mount the WhirlWind. To dampen vibration, ensure rubber isolators are installed on each WhirlWind Pump.

**Refer to the schematic diagram of Figure 1 for steps (e) (f) and (g).**

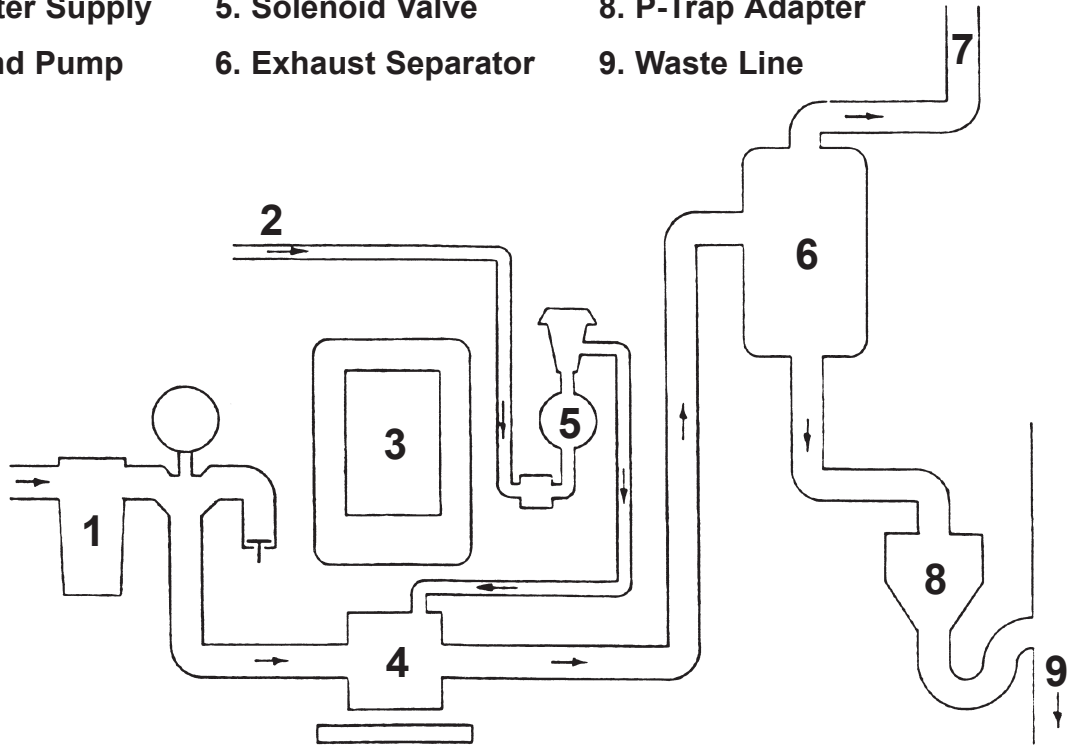
- (e) Connect the cold water supply. See Figure 2. Turn the water on and check for leaks in the water control assembly.
- (f) Make the necessary waste connections. Figures 3 and 4 show typical installations. To install a Tech West Exhaust Separator or Water Recycler see the applicable installation sheet.
- (g) Connect the main vacuum line. For Single WhirlWind's, connect flexible hose to the pump intake manifold (Figure 5). For Dual and Triple WhirlWind's, connect to the vacuum intake manifold (Figure 6).

**Refer to the wiring diagram of Figure 7 for steps (h) and (i). Detailed wiring diagrams are on the inside of each pump relay panel cover plate.**

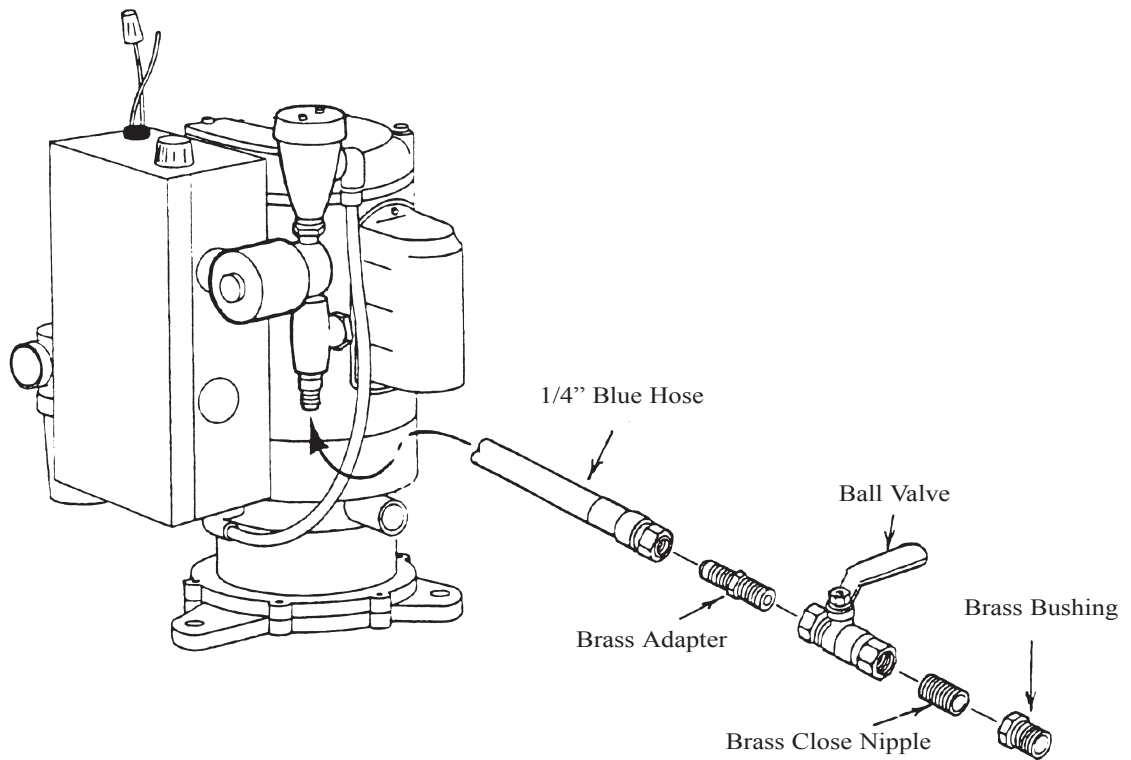
- (h) Connect remote control 18/3 jacketed cable to each pump relay panel. Use wire connectors which provide secure mechanical connections. See Figure 8.
- (i) Connect to line voltage (via safety switch(es) if required by local code). Use 12 gauge THHN grade wire and approved conduit for permanent wiring. See Figure 9. (Single WhirlWind pumps may operate on either 115 volt or 230 volt lines. For terminal changing instructions see inside of relay panel cover plate.
- (j) Turn on the WhirlWind. Check the pump(s) for leaks and the vacuum level following the instruction in "Weekly Servicing" page 8.

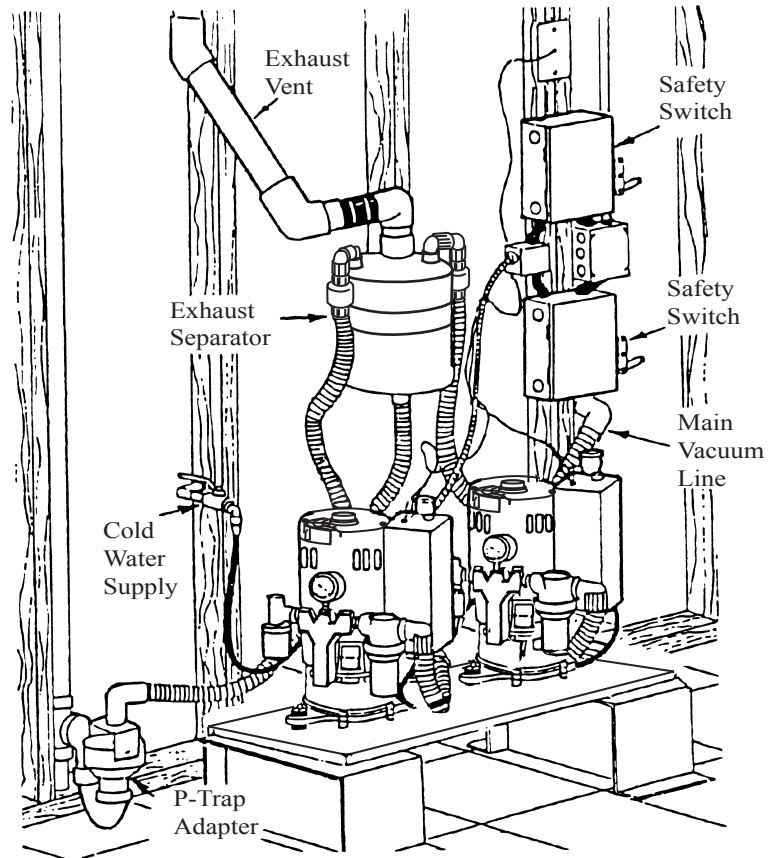
**Figure 1: Plumbing Schematic**

- |                      |                      |                   |
|----------------------|----------------------|-------------------|
| 1. Line Filter       | 4. Impeller          | 7. Exhaust Vent   |
| 2. Cold Water Supply | 5. Solenoid Valve    | 8. P-Trap Adapter |
| 3. WhirlWind Pump    | 6. Exhaust Separator | 9. Waste Line     |

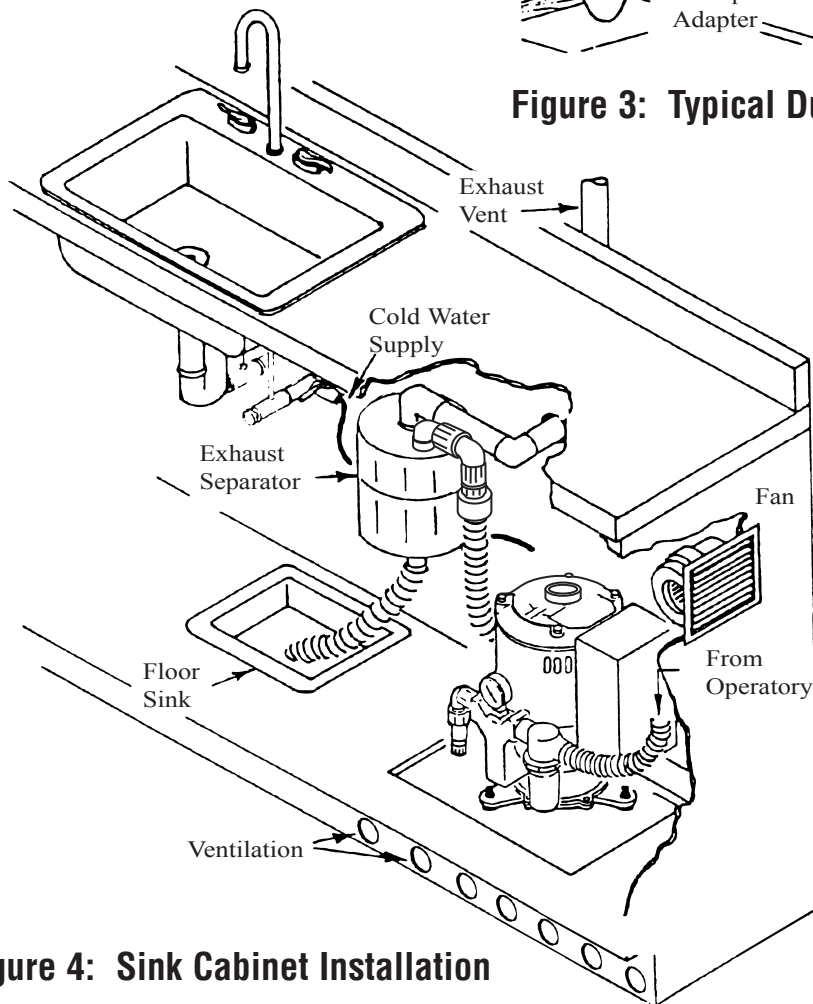


**Figure 2: Water Connection**



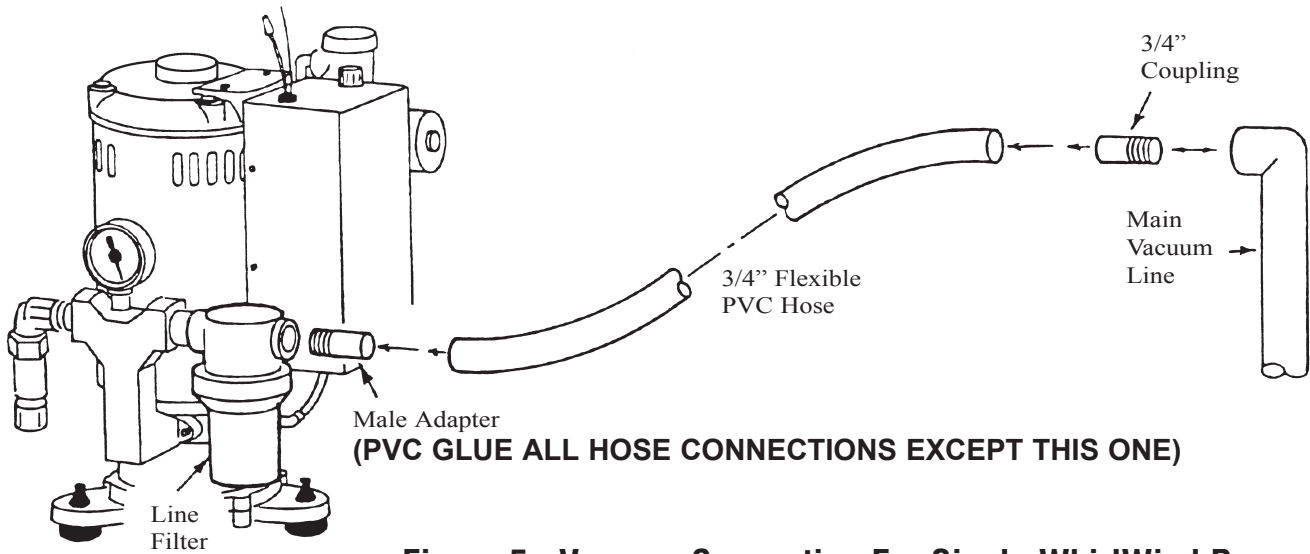


**Figure 3: Typical Dual WhirlWind Vacuum Installation**

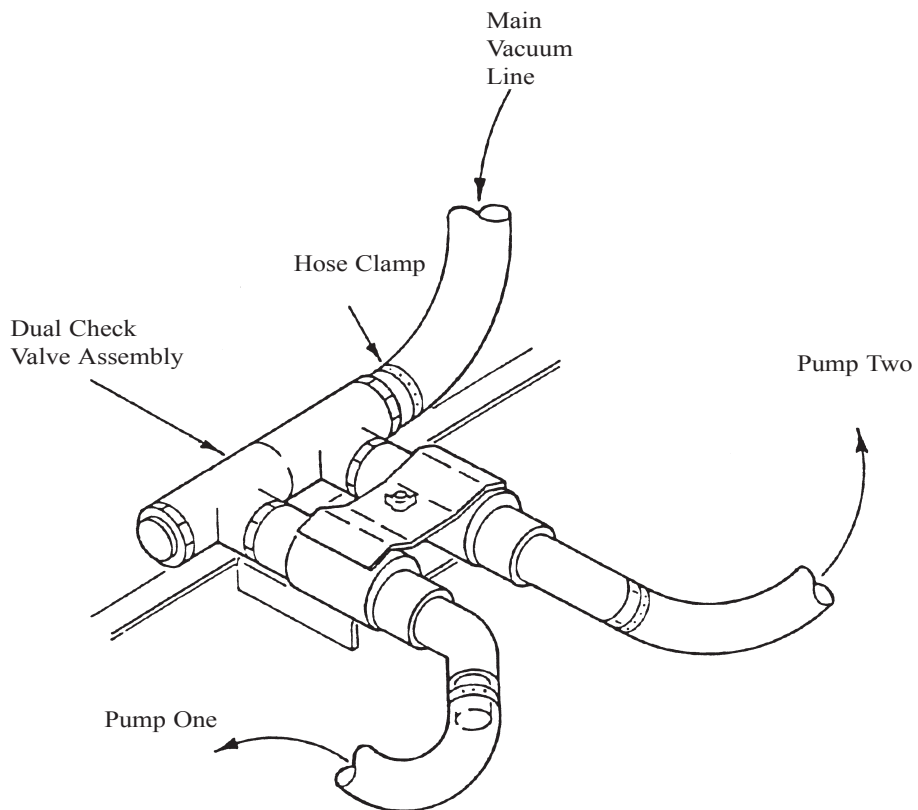


**Figure 4: Sink Cabinet Installation**





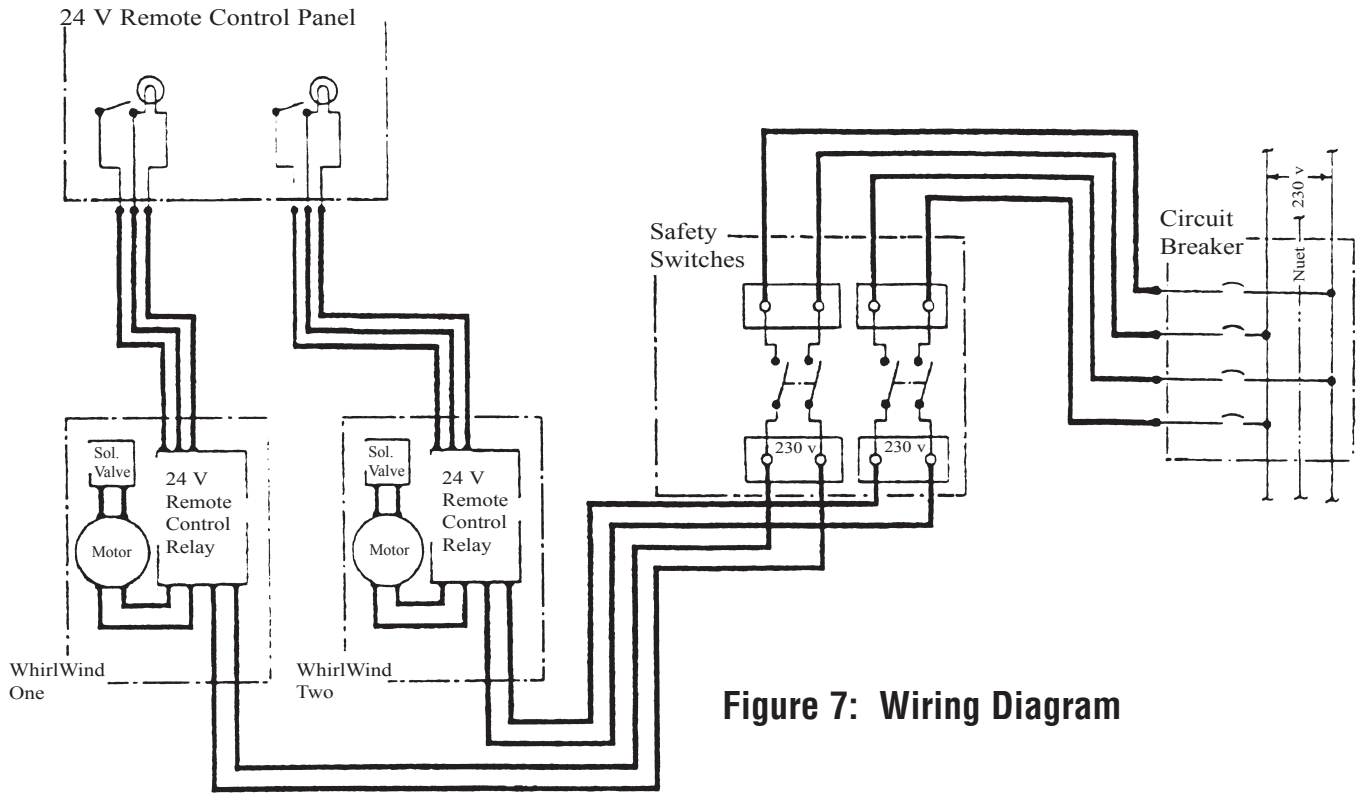
**Figure 5: Vacuum Connection For Single WhirlWind Pump**



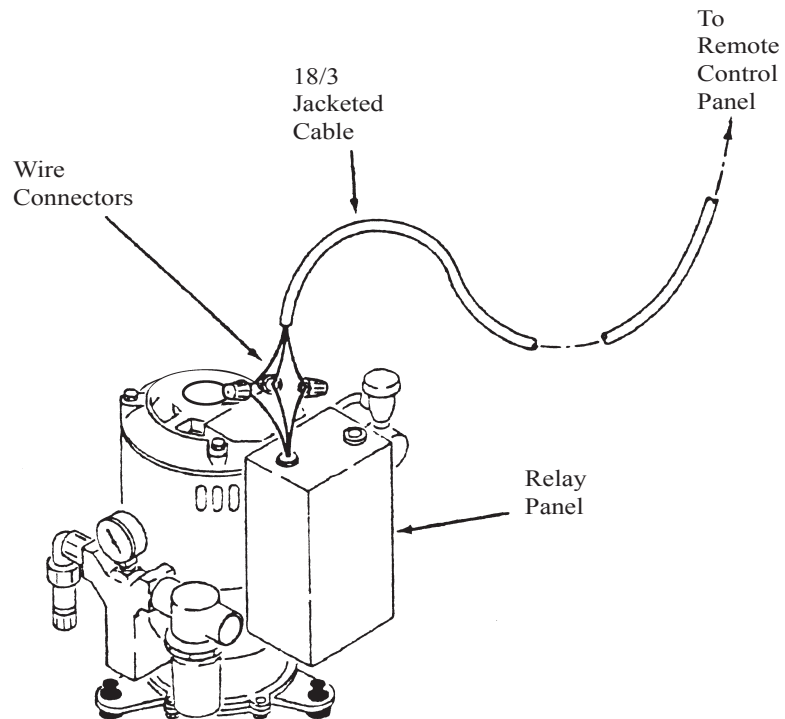
**GLUE ALL EXHAUST HOSE CONNECTIONS SECURELY WITH PVC GLUE**

**Figure 6: Vacuum Connection For Dual WhirlWind Pump**

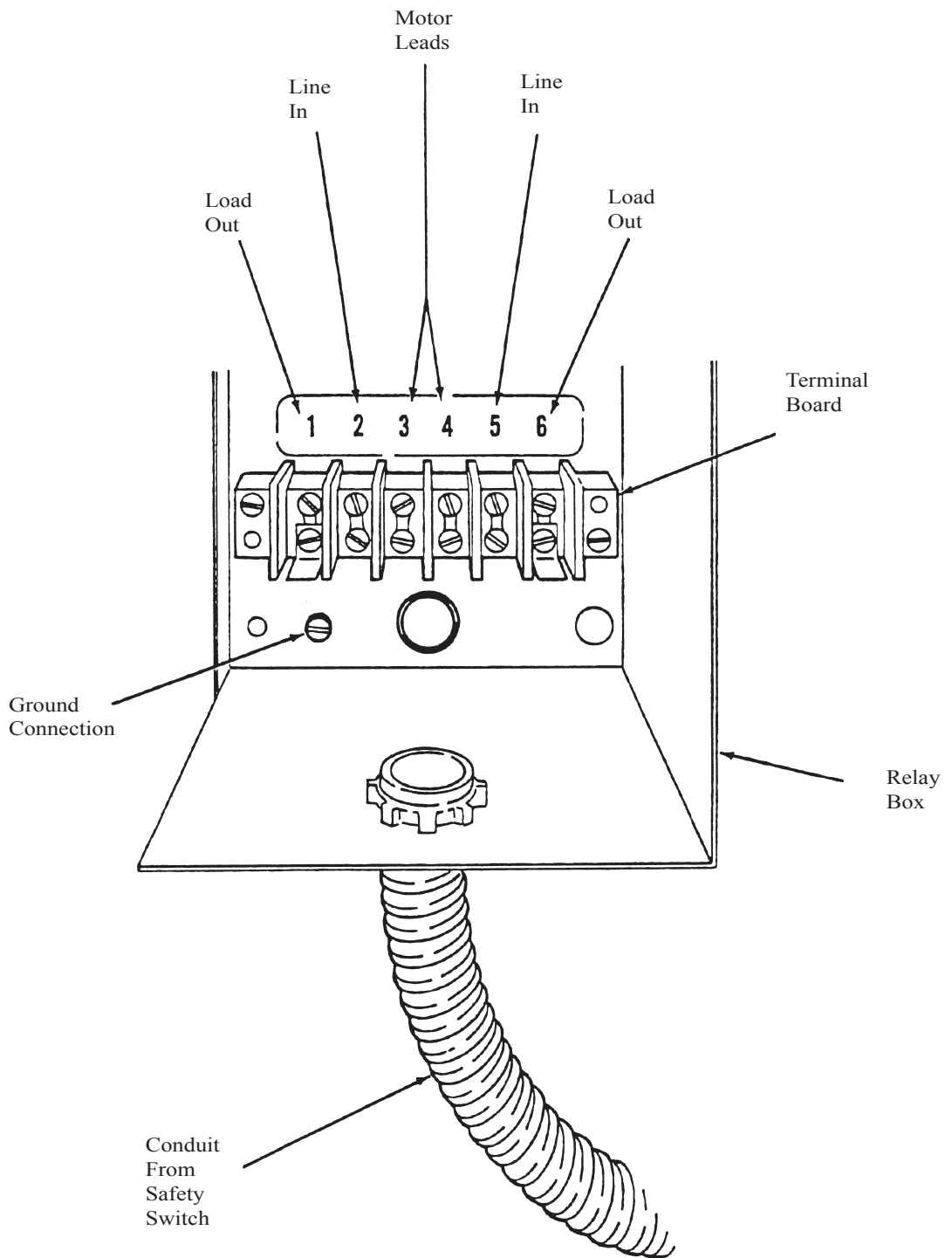
# Wiring Diagram Illustrates The Connections For a Dual WhirlWind Pump



**Figure 7: Wiring Diagram**



**Figure 8: Remote Control Wiring**



**Figure 9: Line Voltage Connections**

# WHIRLWIND PUMP WEEKLY SERVICING

## 3. WEEKLY SERVICING

Refer to Figure 10 for the following steps.

- (a) Clean vacuum filter bowl and screen. Turn the pump off and unscrew the vacuum filter bowl, rinse bowl and screen under cold water. Replace bowl or screen if damaged. Ensure gasket is in place in the filter bowl before reassembly.
- (b) Flush the WhirlWind pump(s) and main vacuum lines with a non-foaming dental vacuum cleanser. Follow the cleanser manufacturer’s instructions.
- (c) Visually inspect WhirlWind pump(s) for water leakage. Ensure that all hose clamps and water connections are tight.
- (d) Check vacuum gauge level. Vacuum settings are adjusted at the factory according to table 3 below. To check the vacuum level, ensure that the pump is aspirating air only. If the vacuum level is out of adjustment, turn off the pump and remove the vacuum relief valve. Holding the phillips head screw in place, turn the “tension nut”.

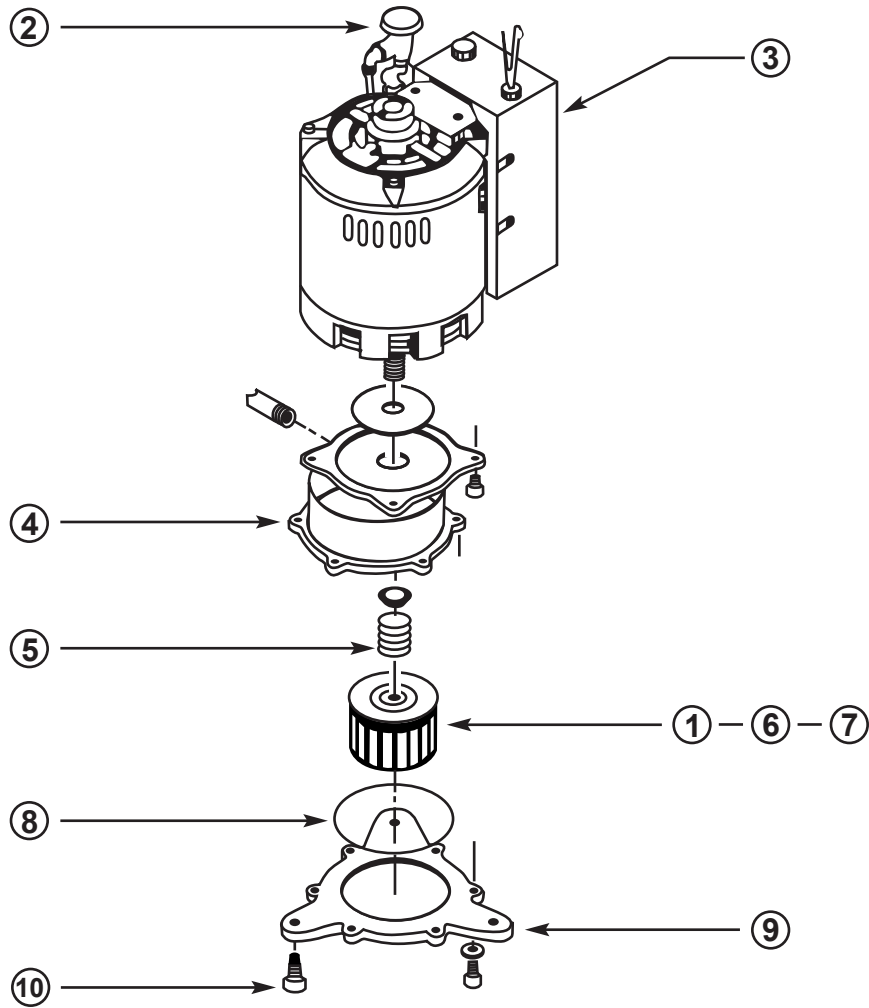
One complete clock-wise turn of the tension nut will add 2 in. hg. to the vacuum level; one complete counter-clock-wise turn will subtract 2 in. hg. from the vacuum level.

TABLE 3

<b>WHIRLWIND (HORSEPOWER)</b>	<b>1</b>	<b>1 1/2</b>	<b>2</b>
<b>AIR ASPIRATION VACUUM LEVEL (INCHES OF MERCURY)</b>	<b>10</b>	<b>12</b>	<b>12</b>

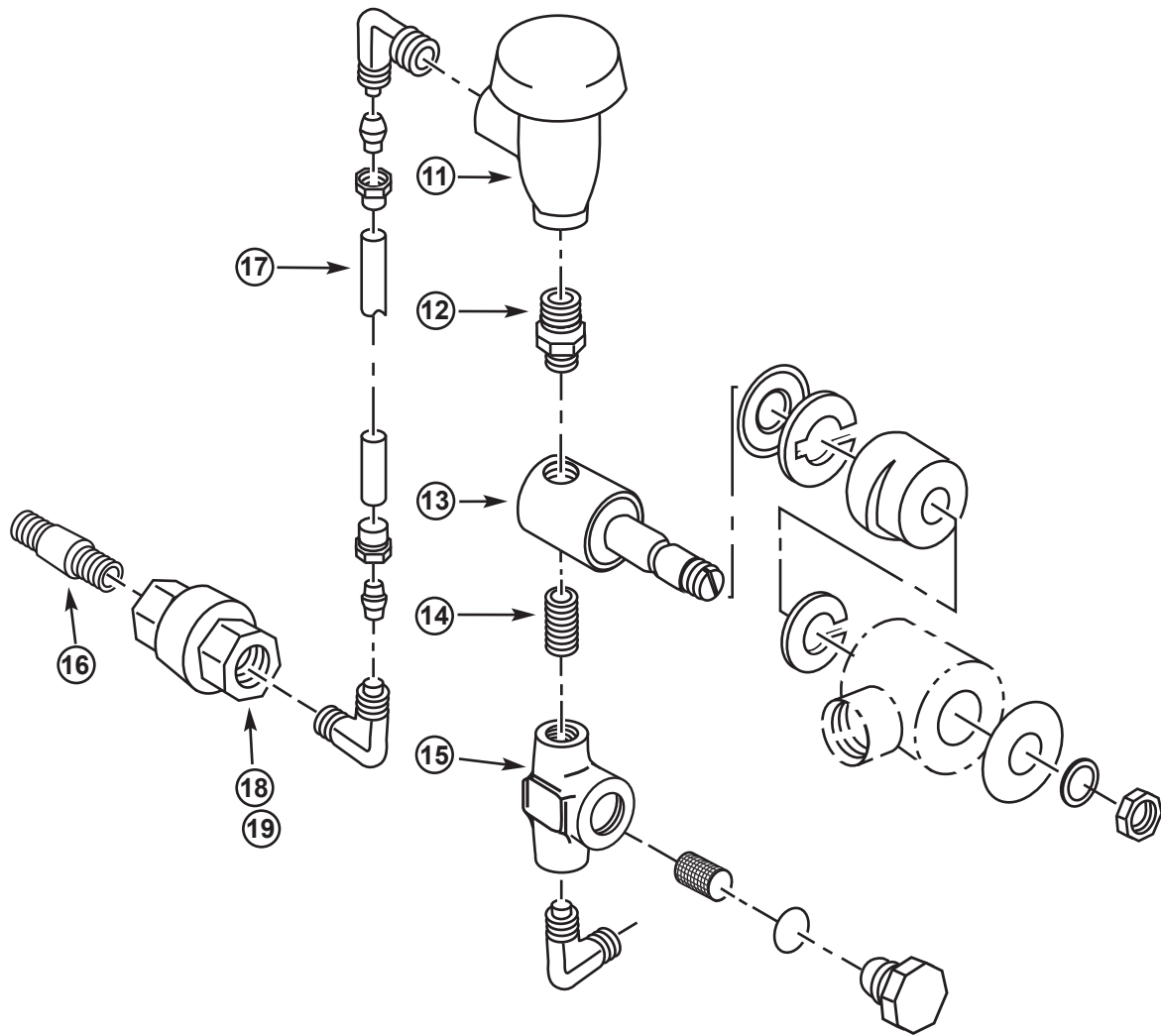
**WARNING: NEVER SET VACUUM LEVEL HIGHER THAN INDICATED IN TABLE 3**

Flush the entire vacuum piping system (all operatories) weekly. Use a non-foaming cleanser. If the WhirlWind cannot induce adequate air flow because of a blockage in the vacuum piping system, liquids and solids will not evacuate. Contact Tech West’s Customer Service for further details on maintaining your vacuum piping system.



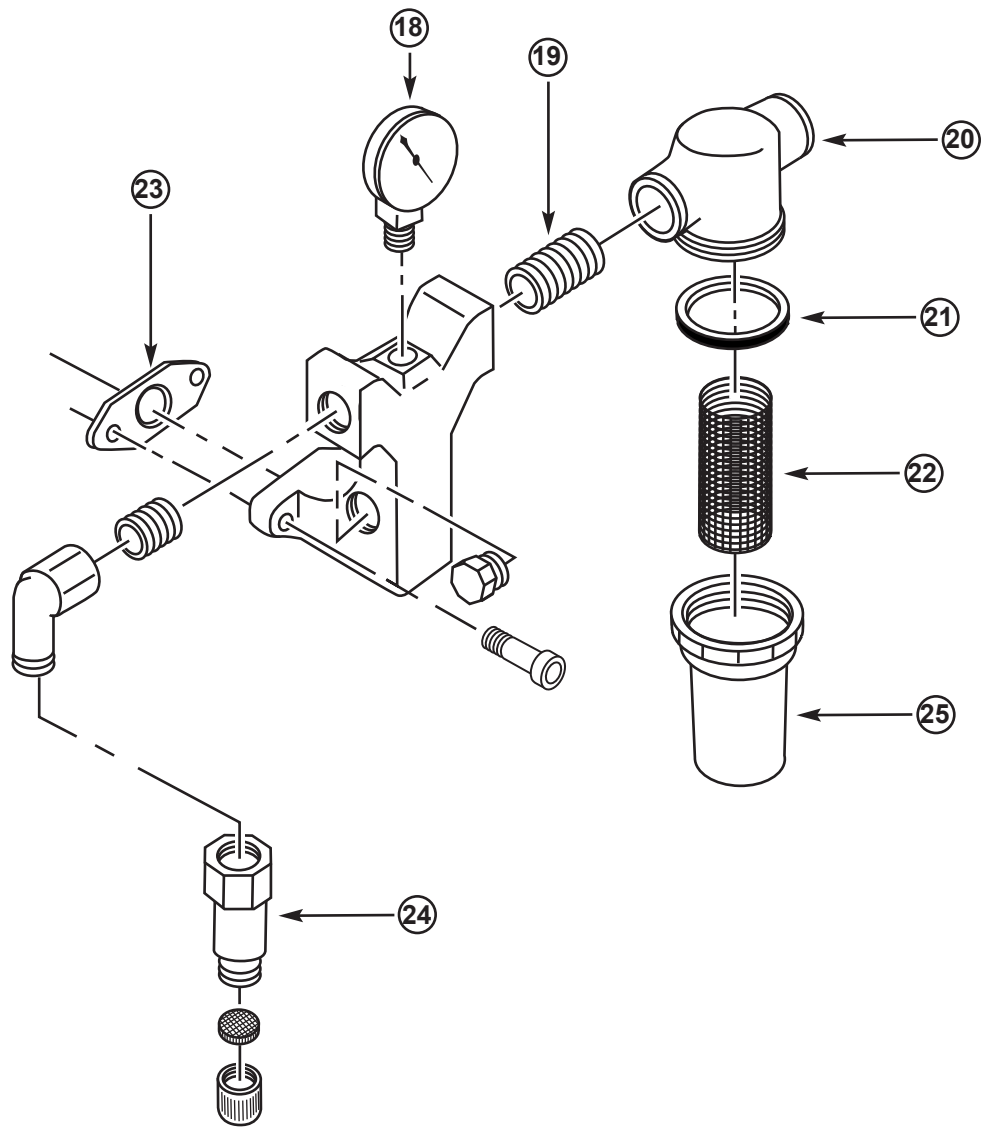
### WHIRLWIND PUMP \* 1 HP - 1 1/2 HP - 2 HP

KEY	PART NO.	DESCRIPTION	UNIT
1	BIM	BRASS PUMP IMPELLER 1 1/2 HP PUMP	1
2	WIA-100	WATER INJECTION ASSEMBLY, COMPLETE	1
3	PRC-100	115V/230V RELAY CONTROL BOX, COMPLETE	1
4	BPH	BRASS PUMP HOUSING	1
5	PSS-100	SHAFT SEAL	1
6	BIS	BRASS PUMP IMPELLER 1 HP PUMP	1
7	BIL	BRASS PUMP IMPELLER 2 HP PUMP	1
8	OR-5	5" RUBBER BASE PLATE 'O' RING SEAL	1
9	BBP	BRASS BASE PLATE	1
10	RFV-100	RUBBER FEET FOR VACUUM PUMP	3



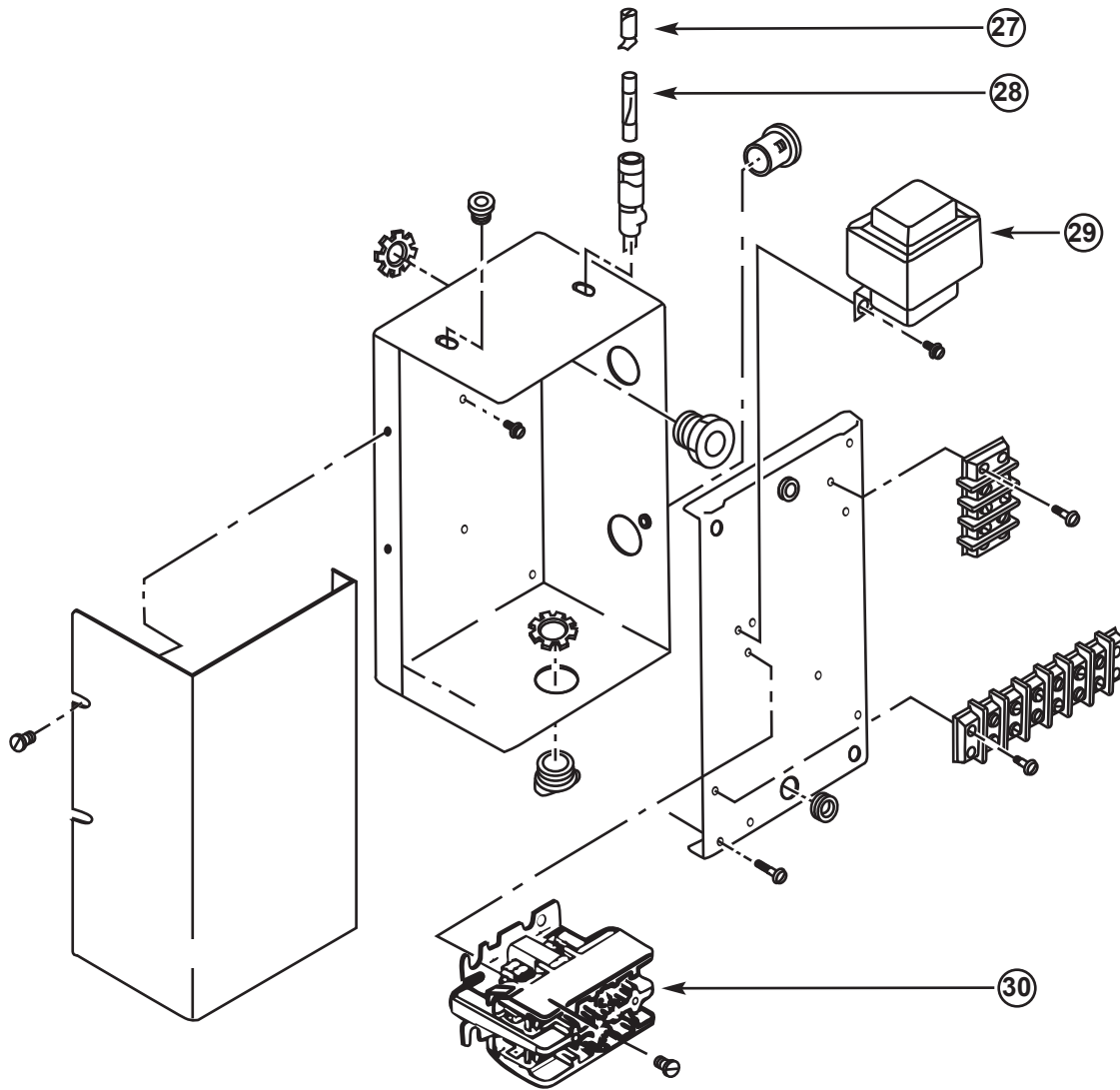
## WATER INJECTION ASSEMBLY

KEY	PART NO.	DESCRIPTION	UNIT
11	PVB-100	1/4" VACUUM BREAKER	1
12	BRN-4-2	1/4" MPT x 1/8" MPT NIPPLE	1
13	PSV-115GC	115V 1/8" SOLENOID VALVE/COIL	1
14	BN-125-CL	1/8" BRASS CLOSE NIPPLE	1
15	VPS-125	1/8" WATER STRAINER	1
16	BN-250-1.50	1/4" X 1 1/2" BRASS NIPPLE	1
17	PRT-250	1/4" BLUE POLY TUBE	PER. FT
18	WIN-RP	1/4" MPT INJECTION NOZZLE (FOR RECYCLERS ONLY)	1
19	WIN-2P	1/4" INJECTION NOZZLE	1



## WHIRLWIND MANIFOLD AND FILTER

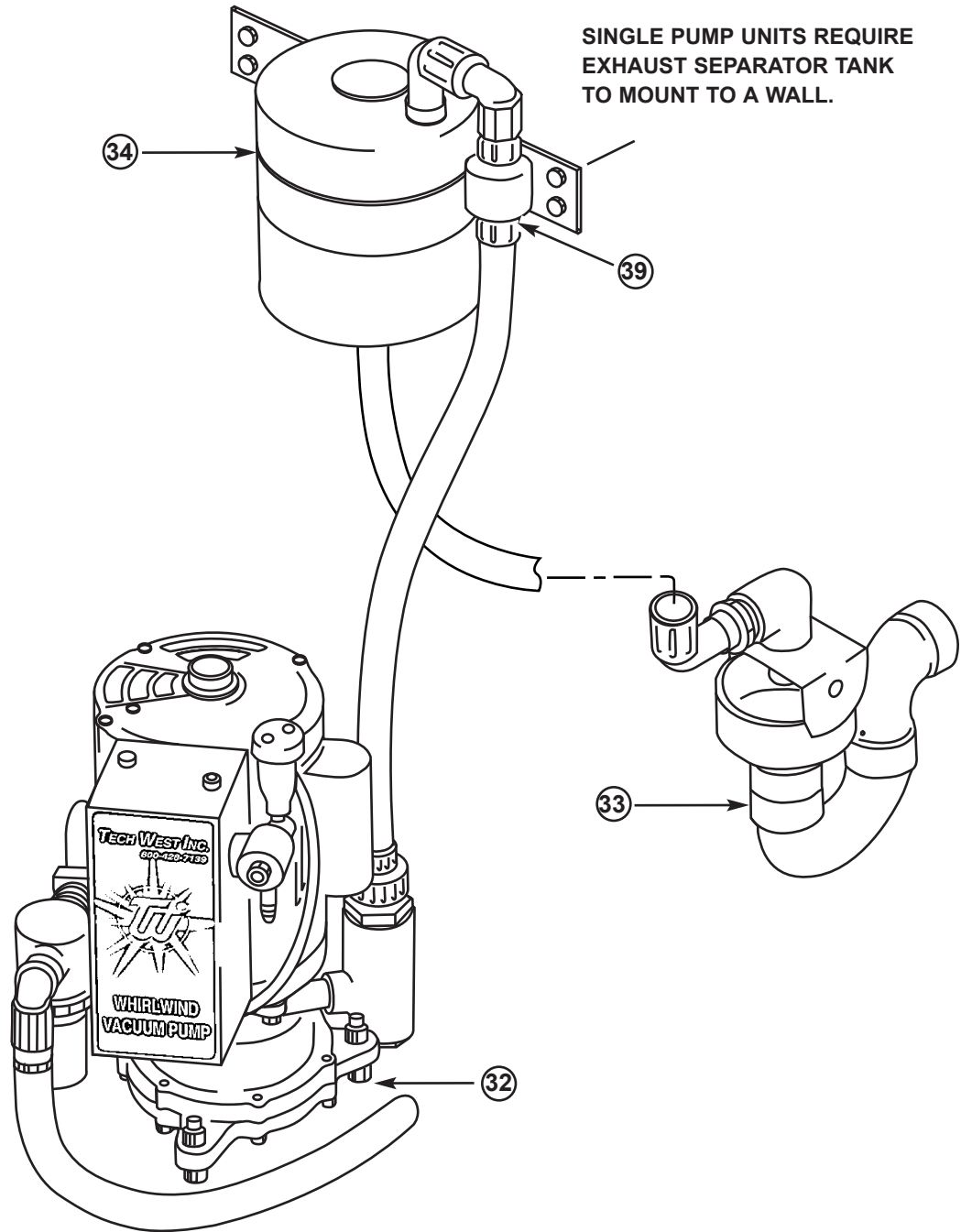
KEY	PART NO.	DESCRIPTION	UNIT
18	VPG-100	30" HG GAUGE	1
19	BN-750-CL	3/4" BRASS CLOSE NIPPLE	1
20	VFA-40	3/4" FILTER UNIT, COMPLETE	1
21	VFG-100	3/4" RUBBER GASKET FOR BOWL	3
22	VFS-40	40 MESH SCREEN FOR 3/4" FILTER	3
23	MG-100	MANIFOLD GASKET	1
24	VRV-100	VACUUM RELIEF VALVE W/ FITTING	1
25	VFB-100	3/4" VACUUM FILTER BOWL	1
26	VPMA-100	MANIFOLD ASSEMBLY, COMPLETE	1



## LOW VOLTAGE RELAY CONTROL BOX

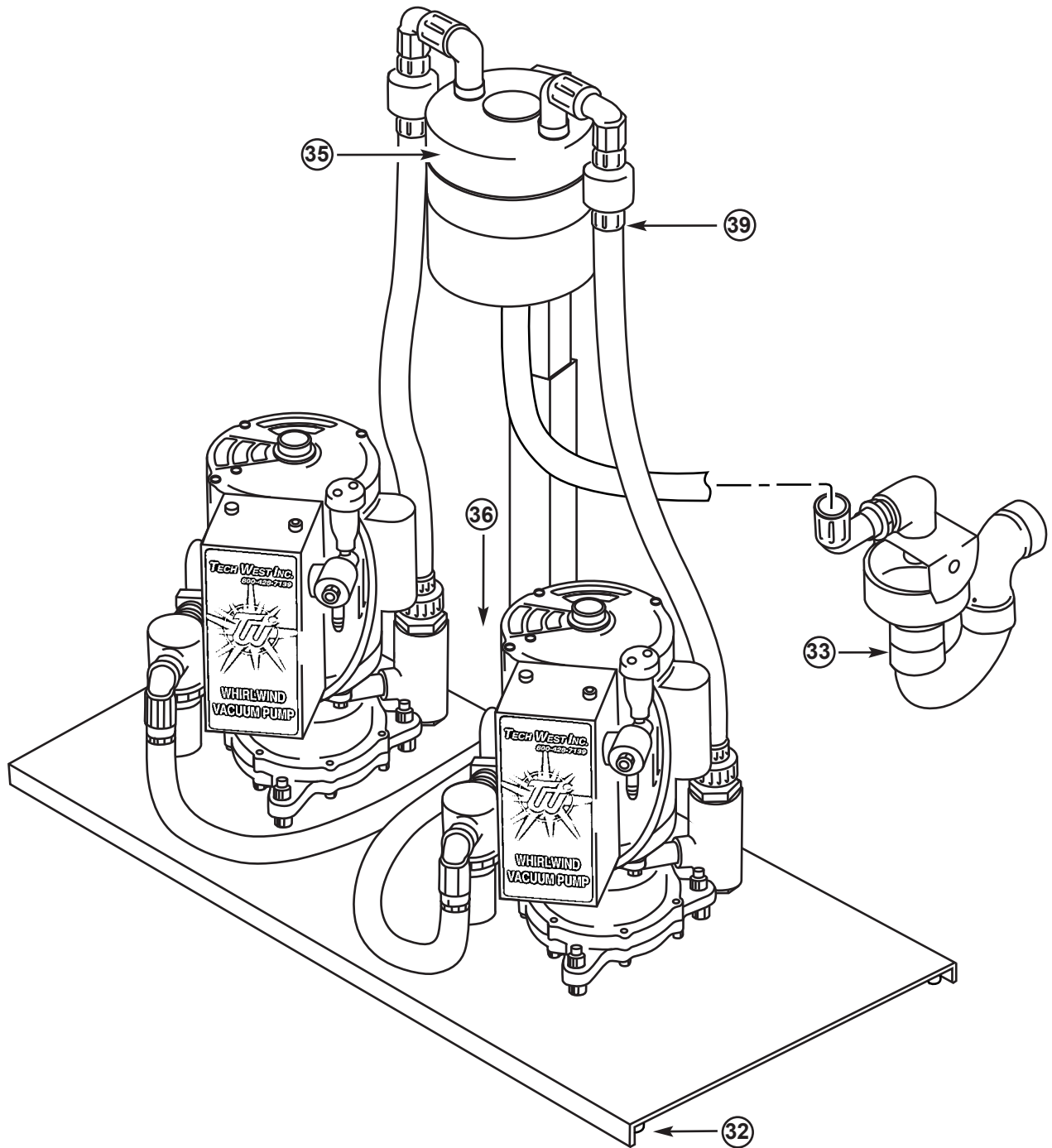
KEY	PART NO.	DESCRIPTION	UNIT
27	FH-100	FUSE HOLDER, PUMP	1
28	SBF-250	1/4 AMP SLOW BLOW FUSE	5
29	PT-100	24V TRANSFORMER, 30A	1
30	PR-100	24V RELAY CONTACTOR	1
-	RC-115	115V RELAY CONTROL, COMPLETE	1
-	RC-230	230V RELAY CONTROL, COMPLETE	1





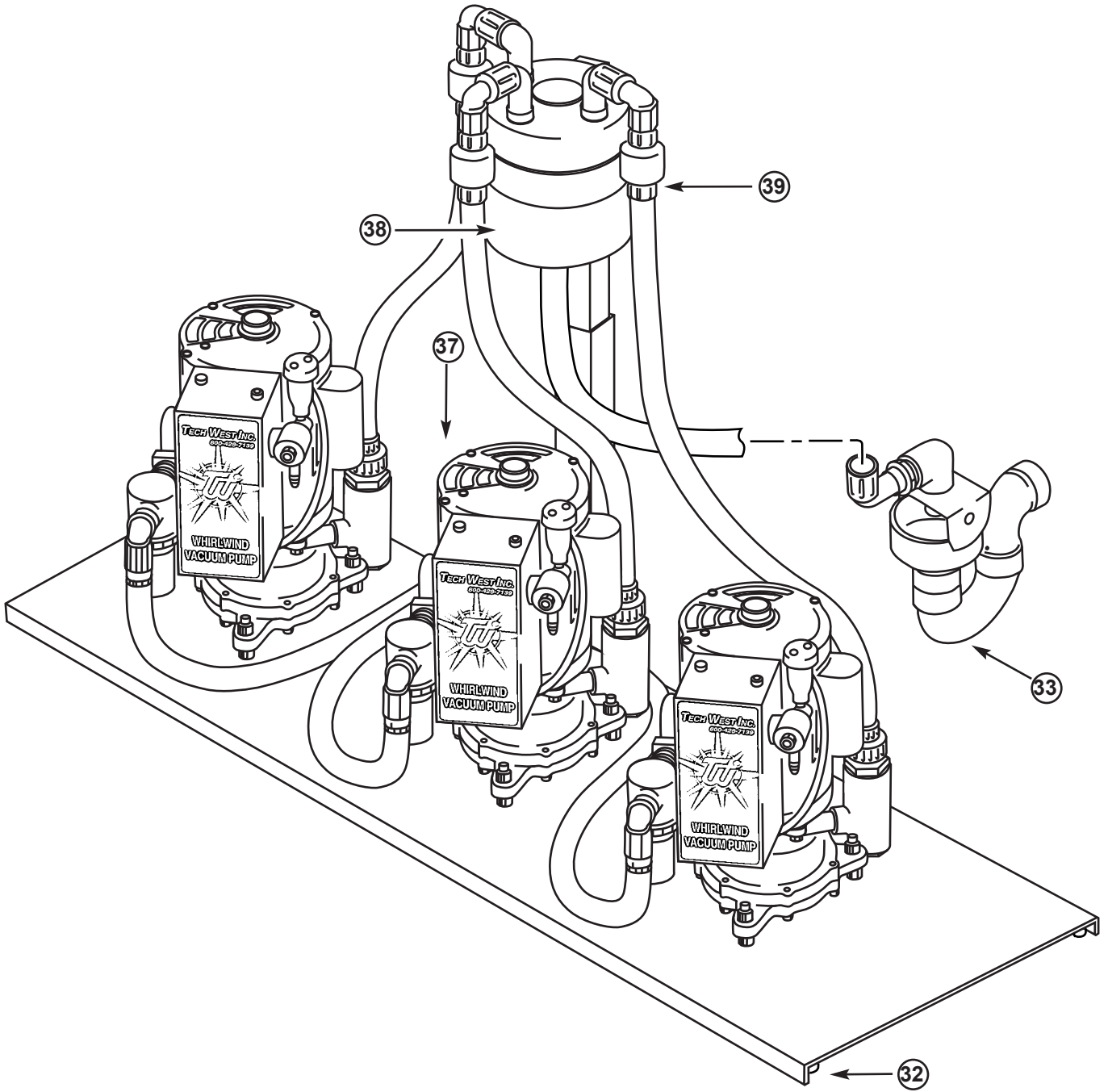
### SINGLE WHIRLWIND

KEY	PART NO.	DESCRIPTION	UNIT
32	RFV-100	RUBBER FEET FOR VACUUM PUMP	3
33	PTA-100	P-TRAP ASSEMBLY	1
34	ES-1	EXHAUST SEPARATOR TANK	1
39	CVF-750	3/4" CHECK VALVE	1



## DUAL WHIRLWIND PLATFORM

KEY	PART NO.	DESCRIPTION	UNIT
31	BV-250	1/4" BALL VALVE / FRESH WATER SUPPLY	2
32	RFV-100	RUBBER FEET FOR VACUUM PUMP	4
36	DCV-100	DUAL CHECK VALVE ASSEMBLY	1
33	PTA-100	P-TRAP ASSEMBLY	1
35	ES-2	EXHAUST SEPARATOR TANK	1
39	CVF-750	3/4" CHECK VALVE	2

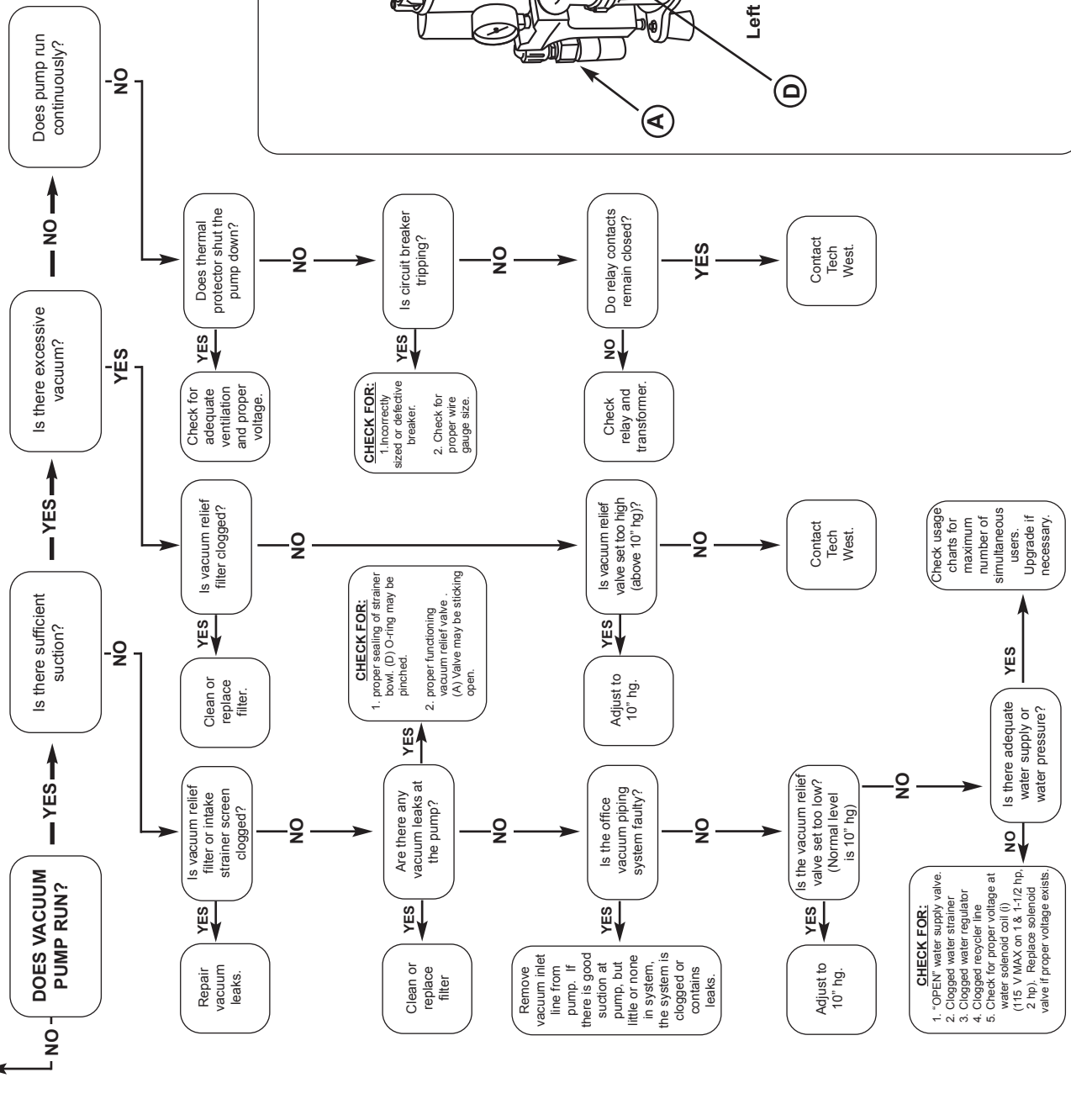


## TRIPLE WHIRLWIND PLATFORM

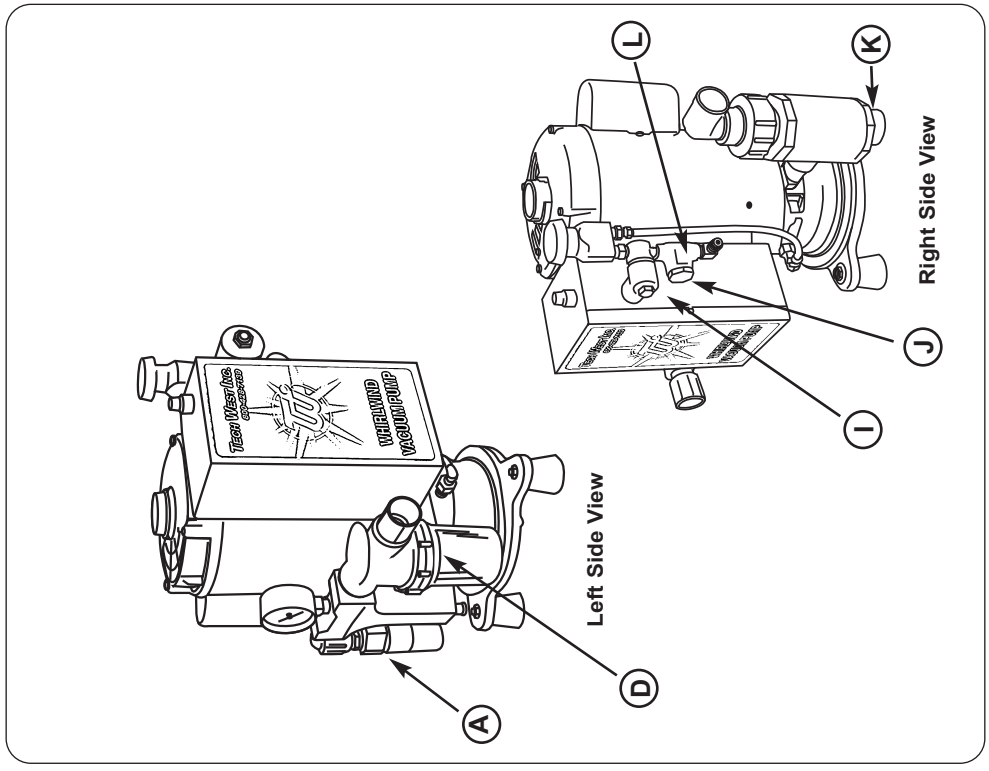
KEY	PART NO.	DESCRIPTION	UNIT
31	BV-250	1/4" BALL VALVE / FRESH WATER SUPPLY	3
32	RFV-100	RUBBER FEET FOR VACUUM PUMP	6
37	TCV-100	TRIPLE CHECK VALVE ASSEMBLY	1
33	PTA-100	P-TRAP ASSEMBLY	1
38	ES-3	EXHAUST SEPARATOR TANK	1
39	CVF-750	3/4" CHECK VALVE	3



# Troubleshooting Chart Single Vacuum

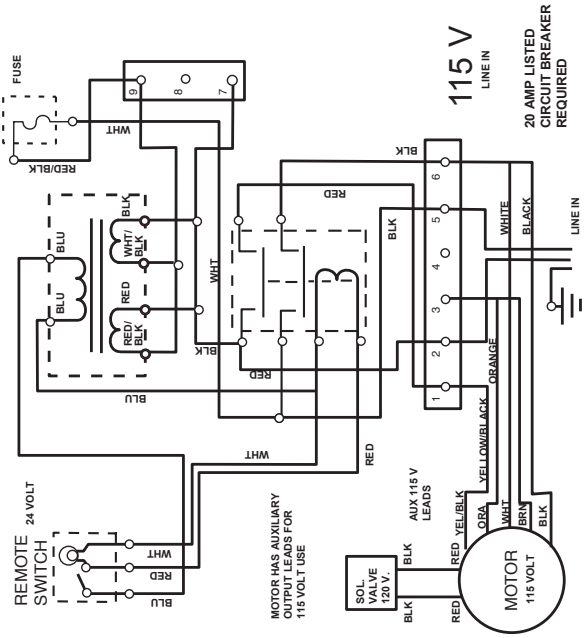
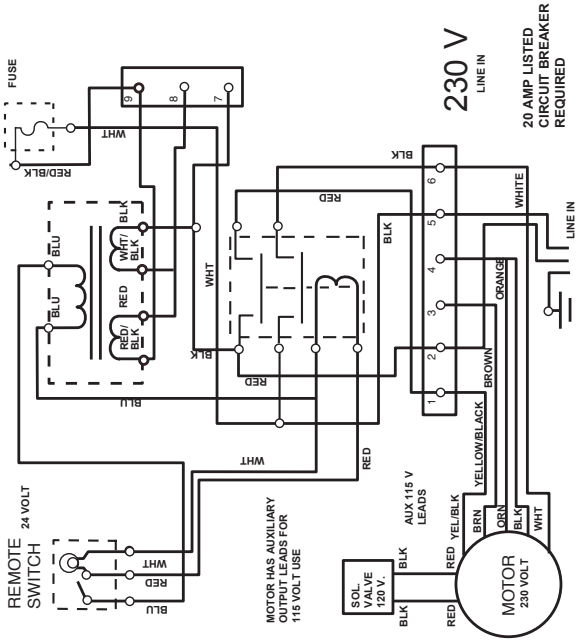


Vacuum Component Diagram



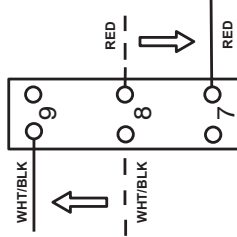
# Vacuum Wiring Diagram

## Dual Voltage Single Vacuum



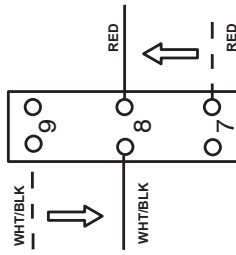
### TRANSFORMER LEADS

STEPS TO CHANGE VOLTAGE FROM 230 TO 115 V

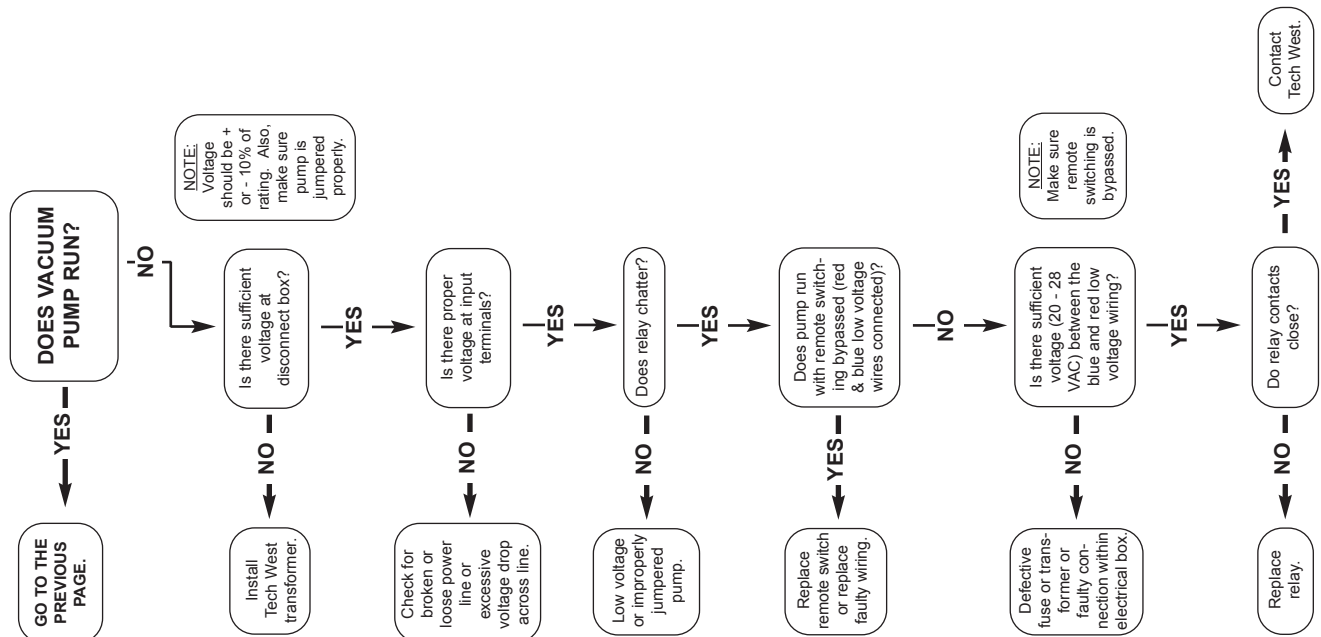


MOVE RED WIRE FROM TERMINAL #8 TO TERMINAL #7 AND THE WHITE/BLACK FROM TERMINAL #8 TO #9. THEN MOVE ORANGE FROM #4 TO #3 THEN BLACK FROM #4 TO #6

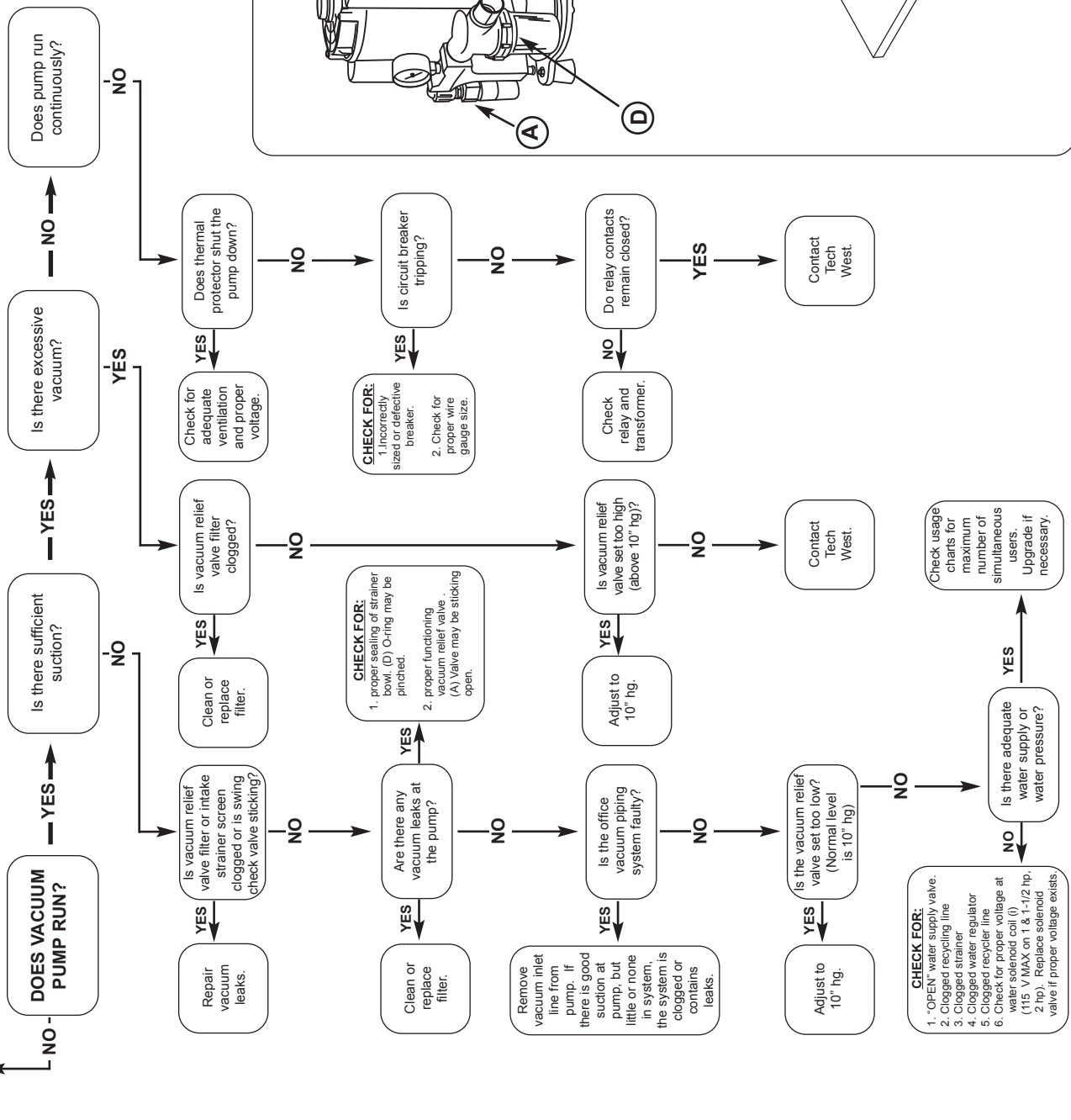
STEPS TO CHANGE VOLTAGE FROM 115 TO 230 V



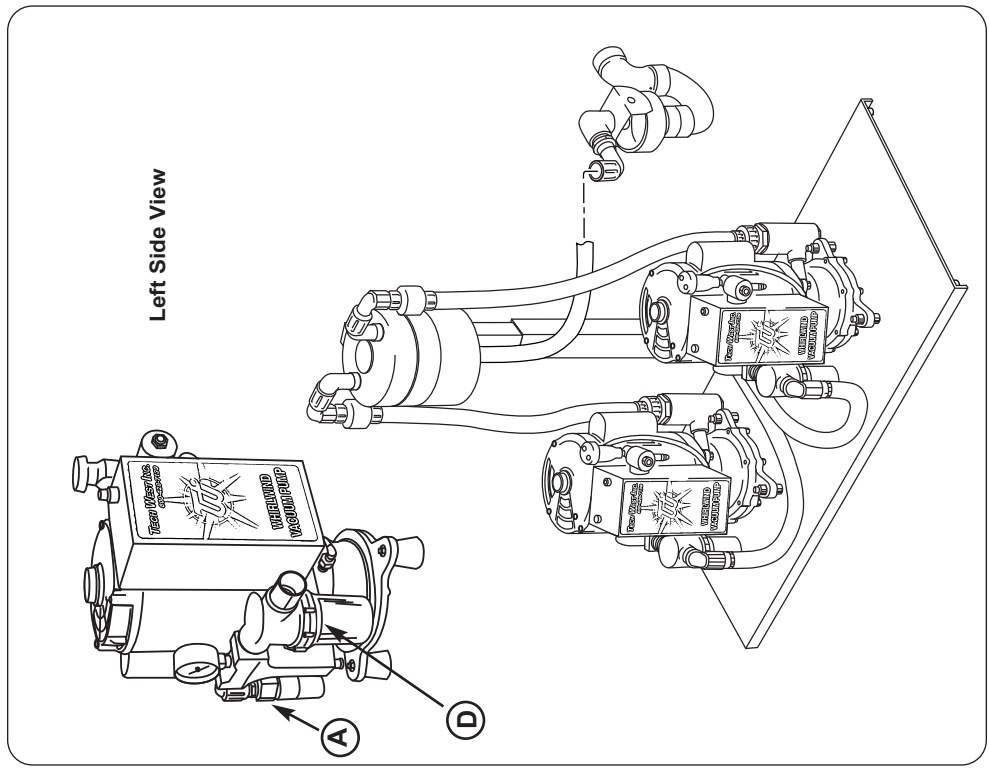
MOVE RED WIRE FROM TERMINAL #7 TO TERMINAL #8 AND THE WHITE/BLACK FROM TERMINAL #9 TO #8 THEN MOVE BLACK FROM #6 TO #4 THEN MOVE THE ORANGE FROM #3 TO #4



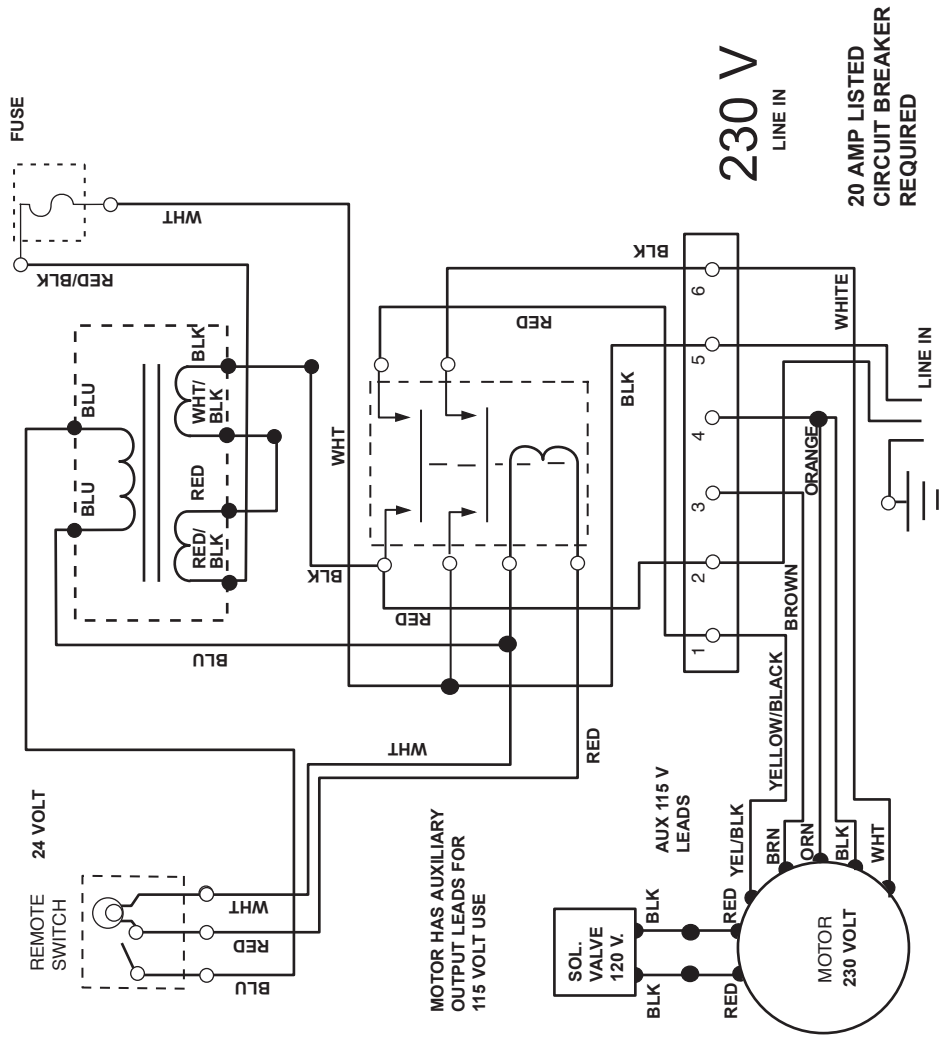
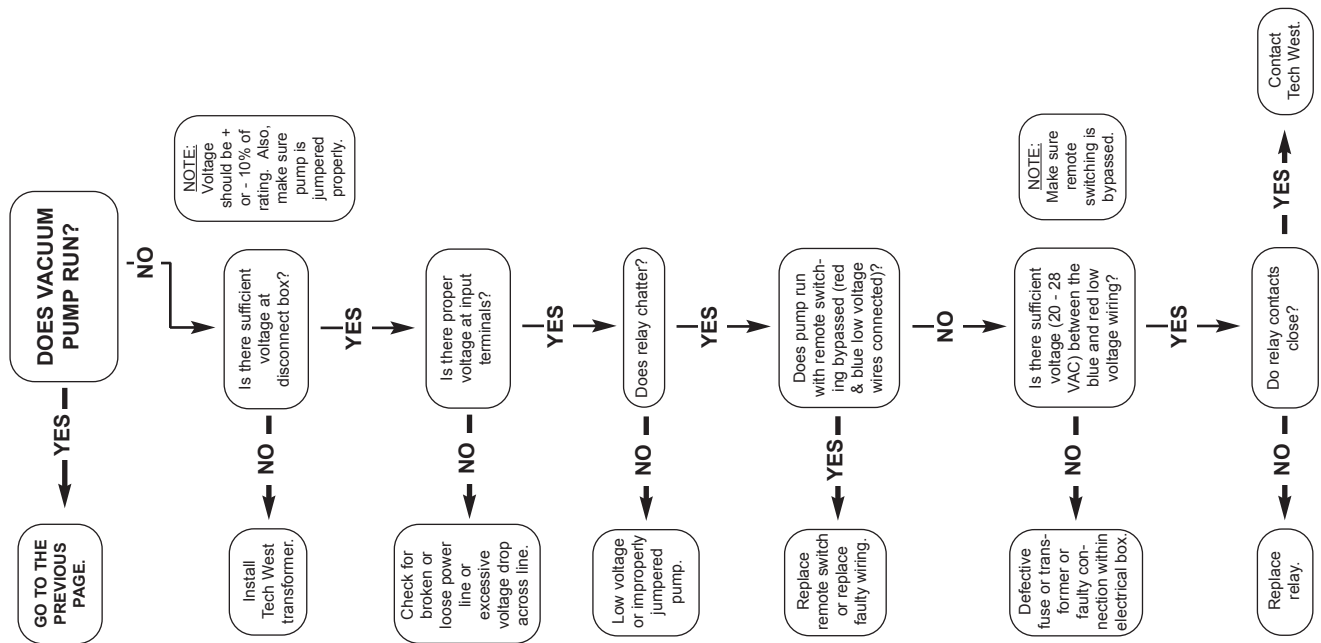
# Troubleshooting Chart Dual Vacuum



Vacuum Component Diagram

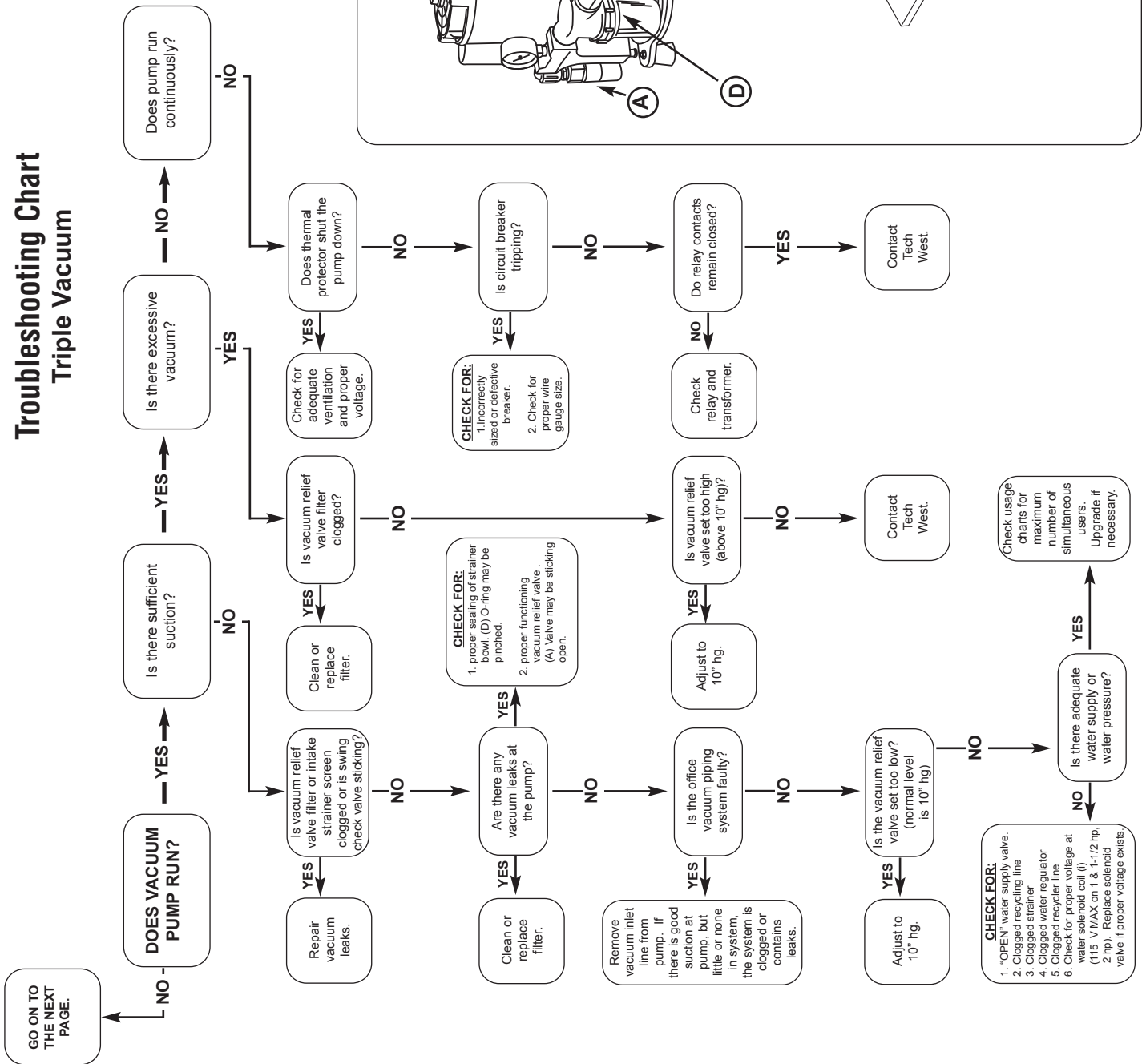


# Vacuum Wiring Diagram Dual Vacuum

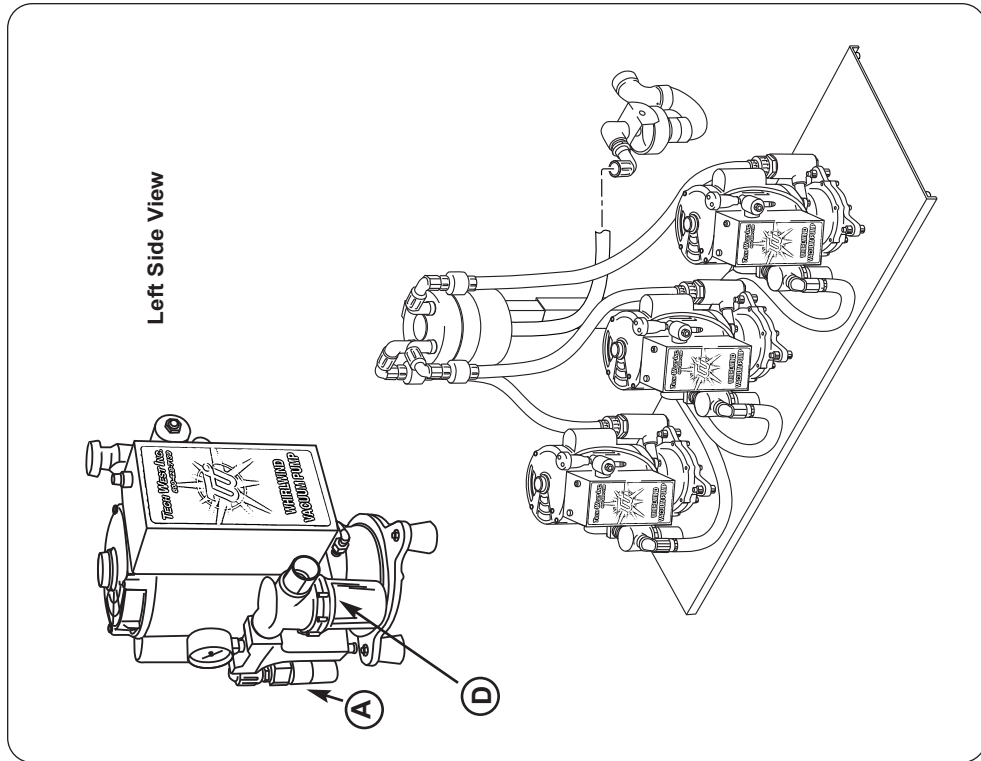




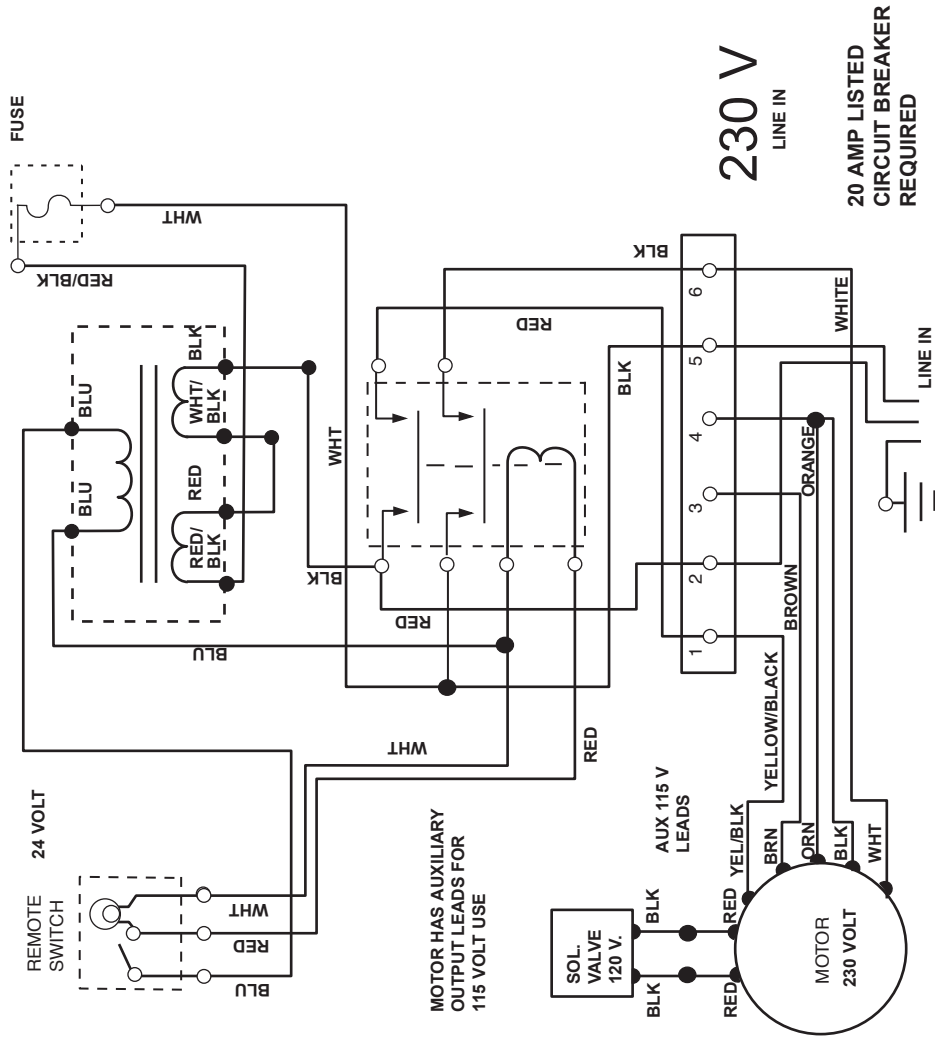
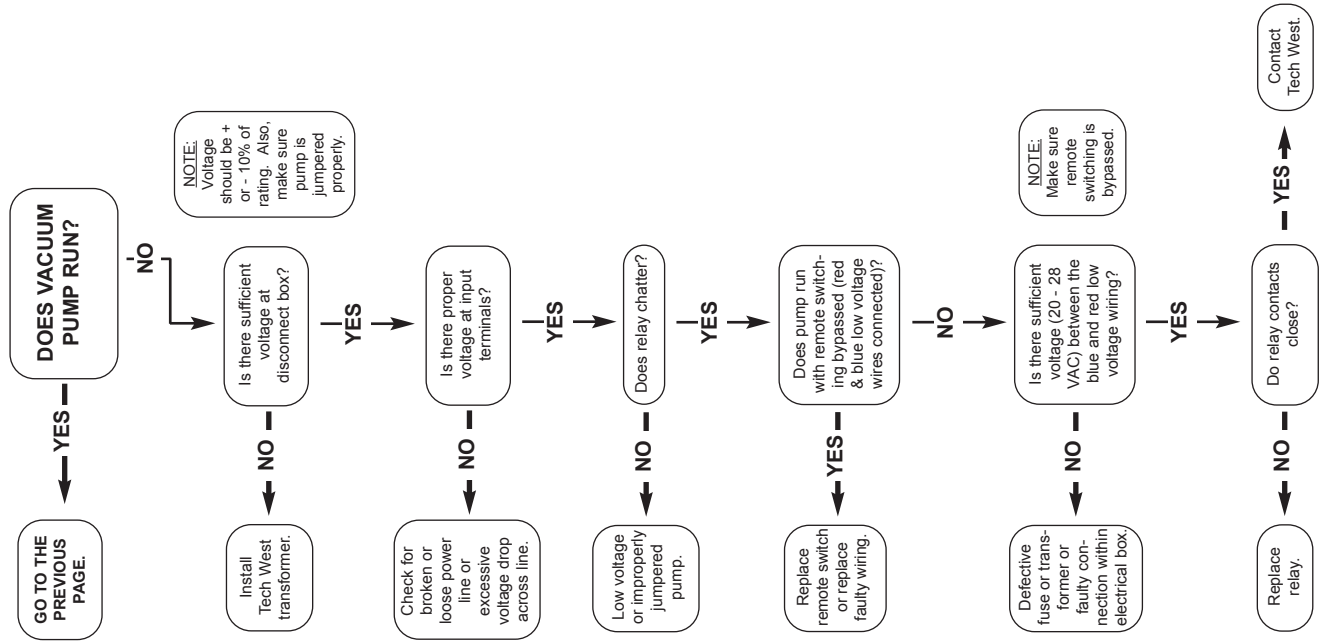
# Troubleshooting Chart Triple Vacuum



Vacuum Component Diagram



# Vacuum Wiring Diagram Triple Vacuum



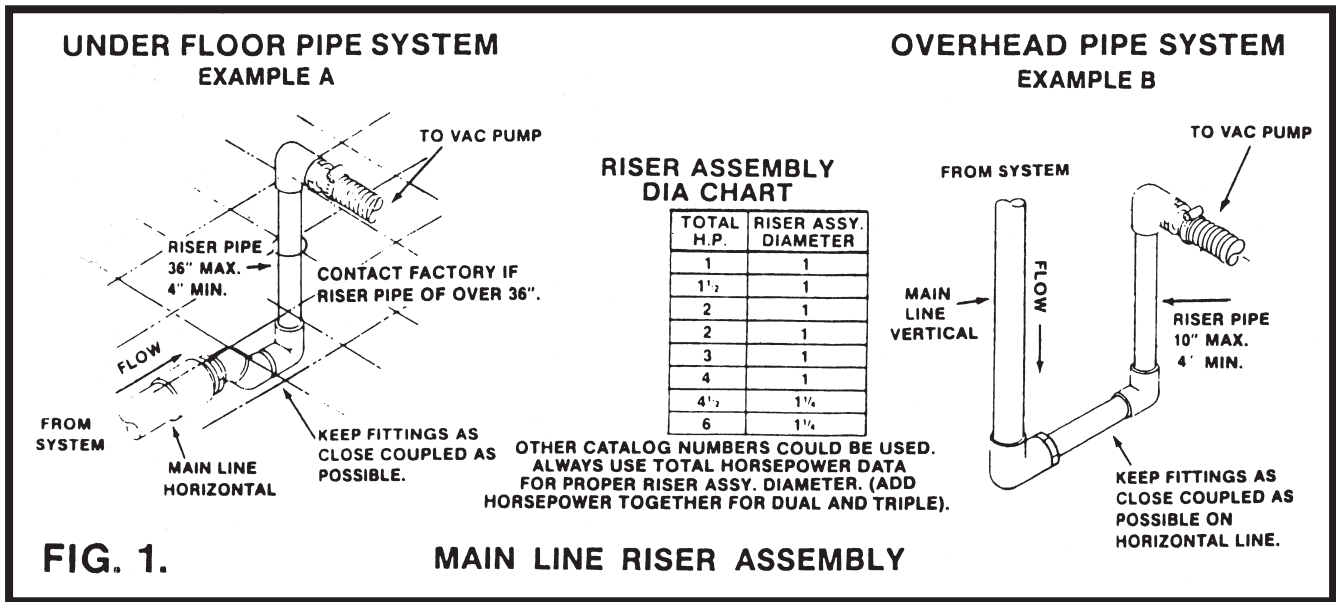
# FIGURE 9. HOW TO SIZE A VACUUM AND AIR SYSTEM

BOTH THE DRAWING AND THE SIZE CHART ARE SIZED TO ACCOMMODATE AN AIR AND VACUUM SYSTEM FOR 100% USE. THIS IS DONE TO PRODUCE GOOD AIR AND VACUUM PRESSURES AND FLOWS AT ALL TIMES, FROM ALL OPERATORIES. YOU ALWAYS USE THIS DESIGN FOR A PROPER SYSTEM IN THE EVENT ALL SIX OPERATORIES ARE USED SIMULTANEOUSLY; YOU WOULD NOT HAVE ANY SUCTION LOSS DUE TO IMPROPERLY SIZED MAIN OR BRANCH LINES.

**IMPORTANT: DO NOT FIGURE OR DRAW ANY NITROUS OR SINK EVACUATION TERMINATIONS UNTIL YOU HAVE A COMPLETE SYSTEM SHOWING TERMINATION TO HIGH VOLUME EVACUATION CONNECTIONS NORMALLY FOUND IN DENTAL UNIT JUNCTION BOX.**

ADDITIONAL 3/4" VACUUM LINES FOR NITROUS OXIDE SCAVENGE AND EVACUATOR SINKS CAN BE ADDED WITHOUT AFFECTING MAIN OR BRANCH LINE SIZES. SEE FIG. 8. EXCEPT IN AN OVERHEAD SYSTEM SEE FIG. 5.

- STEP 1. COUNT THE TOTAL NUMBER OF OPERATORIES TO BE PLUMBED AND SELECT THE VACUUM LINE SIZE FOR EITHER PVC OR COPPER PIPE. SEE THE LINE SIZING CHART IN FIGURE 2.
- STEP 2. THIS PIPE SIZE YOU HAVE SELECTED WILL BE THE STARTING LINE OR MAIN LINE AND BEGINS AT THE EQUIPMENT LOCATION. THE VACUUM LINE WILL USE A MAIN LINE RISER ASSEMBLY AS SHOWN IN FIGURES 1 AND 3.
- STEP 3. AFTER FIGURING YOUR MAIN LINE SIZE, YOU MAY SELECT THE BEST LOCATION TO SPLIT YOUR PIPING LINES TO BEST ACCOMMODATE THE OPERATORIES. IN FIGURE 3 WE HAVE SELECTED TO SPLIT THE SYSTEM INTO TWO ZONES; "A" AND "B". EACH ZONE BECOMES ITS OWN SYSTEM FOR PURPOSES ON SIZING THE LINES PROPERLY. IF OPERATORIES ARE IN A STRAIGHT LINE, ZONE SPLITTING WILL NOT BE REQUIRED; SEE NOTE FIG. 2.
- STEP 4. STARTING FROM ZONE SPLIT LOCATION, COUNT REMAINING OPERATORIES AND LOOK AT THE SIZING CHART IN FIGURE 2. SELECT CORRECT BRANCH ZONE LINE DIAMETER. IN FIGURE 3, ZONE "B" HAS 3 OPERATORIES REMAINING WHICH CORRESPONDS WITH 1" VACUUM LINE AND 1/2" AIR LINE IN FIGURE 2 LINE SIZING CHART. THIS SIZING LOGIC WILL CONTINUE TO THE LAST INLET ON ALL ZONES.

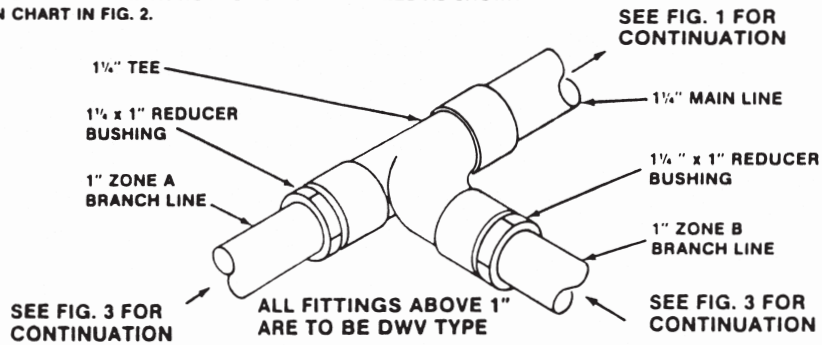


**FIG. 1. MAIN LINE RISER ASSEMBLY**

**FIG. 2. VACUUM AND AIR LINE SIZING CHART**  
ONE TO TWELVE OPERATORIES FOR OVERHEAD SYSTEM SEE FIG. 5.

NUMBER OF OPERATORIES SEE NOTE	VACUUM LINE PIPE DIAMETER	
	PVC sch 40	COPPER TYPE "M"
1	3/4"	3/4"
2	1"	1"
3	1"	1"
4	1 1/4" - FIG. 3 (10)	1 1/4"
5	1 1/4" - FIG. 3 (10)	1 1/2"
6	1 1/4" - FIG. 3 (10)	1 1/2"
7	1 1/2"	1 1/2"
8	1 1/2"	1 1/2"
9	1 1/2"	2"
10	2"	2"
11	2"	2"
12	2"	2"

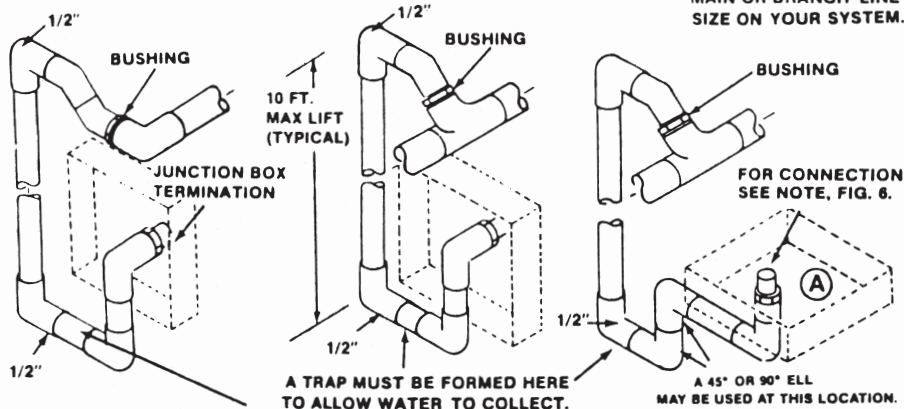
THE TEE WILL ALWAYS MATCH MAIN LINE SIZE. USE REDUCER BUSHINGS TO MATCH BRANCH (OPERATORY) LINE. LINE SIZES WILL DECREASE WITH NUMBER OF OPERATORIES AS SHOWN ON CHART IN FIG. 2.



**FIG. 4** BRANCH LINE OR OPERATORY TEE  
EXAMPLE SHOWN IS ZONE SPLIT TEE

**IMPORTANT:** ALL FITTINGS AND PIPING FROM THIS BUSHING TO JUNCTION BOX TERMINATION MUST BE 1/2".

SEE FIGURE 2 FOR CORRECT MAIN OR BRANCH LINE SIZE ON YOUR SYSTEM.

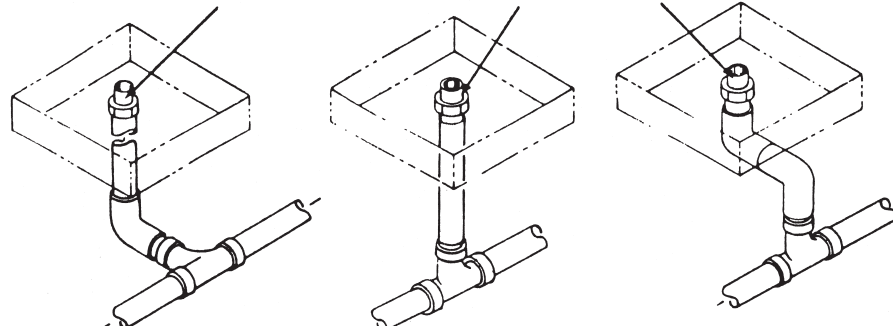


**IMPORTANT** ALWAYS CLOSE COUPLE FITTINGS AT TRAP LOCATION.

WHEN INSTALLING OVERHEAD PIPING SYSTEM USE THESE BRANCH LINE TAKE OFF EXAMPLES: YOU MUST NOT DEVIATE FROM THESE EXAMPLES ON OVERHEAD SYSTEMS. SEE FIG. 2 FOR CORRECT MAIN OR BRANCH LINE SIZE ON YOUR SYSTEM.

**FIG. 5** OVERHEAD SYSTEM

CONNECT OPERATORY SOLIDS COLLECTOR HERE VIA FLEXIBLE HOOK-UP HOSE



NOTE: FOR INFORMATION ON CORRECT TERMINATION SIZE AT JUNCTION BOX SEE FIG. 3 NOTE 2.

**FIG. 6** TYPICAL BRANCH LINE TAKE OFF

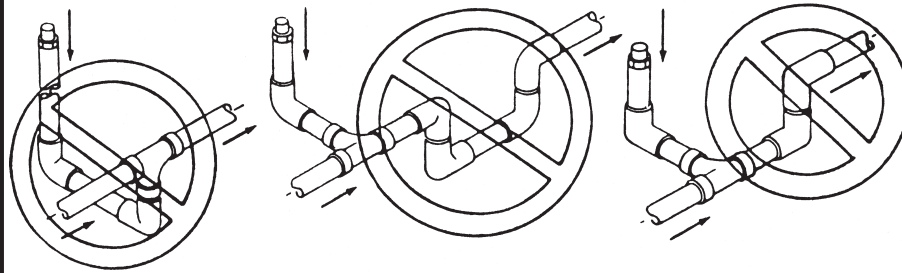
# NOTES

1. HANGER SUPPORTS REQUIRED EVERY EIGHT FEET OR TO SUPPORT PIPING WITHOUT SAGS.
2. ALWAYS STUD VACUUM AND AIR LINE INTO WALL OR FLOOR JUNCTION BOX PER MANUFACTURER'S TEMPLATE. IF 1/2" IS REQUIRED, YOU MAY REDUCE PIPE SIZE AS CLOSE AS POSSIBLE TO TERMINATION POINT. IF A LARGER SIZE IS REQUIRED, THIS CHANGE MUST BE MADE WITHIN JUNCTION BOX.
3. ALL VACUUM PIPING ILLUSTRATIONS AND DRAWINGS ARE SHOWN WITH PVC PIPE SCH 40 AND DWV TYPE FITTINGS. ALWAYS USE SWV FITTINGS. NOT AVAILABLE BELOW 1 1/4".
4. ALL VACUUM PIPING SHOULD GRADE TOWARD EQUIPMENT LOCATION 1/4" IN TEN FEET.
5. WHEN INSTALLING AN OVERHEAD SYSTEM, USE THE NEXT LARGER VACUUM PUMP MODEL FOR BEST RESULTS.
6. IF OVERHEAD SUCTION LINE TERMINATES IN A FLOOR JUNCTION BOX, USE THIS EXAMPLE. TRAP MUST BE INSTALLED BEFORE LINE RISES AS SHOWN. SEE FIG. 5(A).
7. INSTALL TRAP IN MAIN LINE JUST BEFORE HOOKING THE FLEXIBLE INTAKE HOSE CONNECTION TO PUMPS. SEE FIG. 1, EXAMPLE B.
8. IN AN OVERHEAD SYSTEM, THE MAIN VACUUM LINE WILL DROP DOWN TO THE SWIRL-VAC LOCATION USING REQUIRED PIPE SIZE. ALL OVERHEAD SYSTEMS ARE SIZED IN THE SAME MANNER AS THE SYSTEM SHOWN HERE.
9. DO NOT RUN POLY FLO TUBING BELOW SLAB. ALWAYS RUN PIPE ABOVE SLAB, THEN MAKE POLY FLO CONNECTION.
10. FIG. 2 LINE SIZING CHART SHOWS MAIN VACUUM LINE SIZE DIAMETER FOR 4, 5 AND 6 OPERATORIES AS 1 1/4" DIAMETER. IF 1 1/4" DIAMETER IS NOT AVAILABLE, YOU MAY USE 1 1/2" DIAMETER.
11. RISER ASSEMBLY MUST ALWAYS BE USED. SEE FIG. 1 EXAMPLE A FOR RISER ASSEMBLY SPECIFICATIONS.
12. CONTROL PANEL SUPPLY LINES SHOULD BE CONNECTED CLOSE TO EQUIPMENT ROOM AND MUST ALWAYS CONNECT VERTICALLY TO MAIN LINE AS SHOWN.
13. ALTERNATE CLEAN AIR INTAKE SOURCE SHOULD BE EITHER PVC OR COPPER PIPE, CONNECTED TO HVC. RETURN AIR DUCT. SEE AIR COMPRESSOR DIAGRAM FIG. 4.

DO NOT ALLOW ANY PIPE TO BRANCH OFF ANOTHER PIPE BELOW THE CENTERLINE OF THE MAIN OR BRANCH LINE PIPE. SEE FIG. 6 FOR CORRECT BRANCH LINE TAKE OFF.

### IMPORTANT

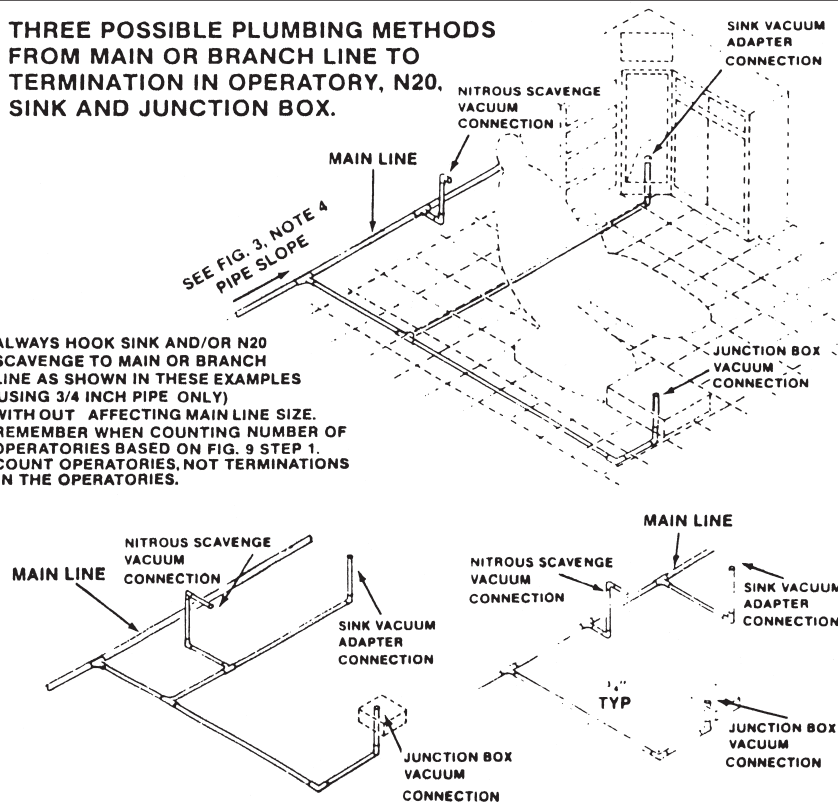
TO PREVENT SUCTION LOSS, DO NOT ALLOW A TRAP TO BE PLUMBED AT ANY LOCATION IN THE SYSTEM EXCEPT MAIN LINE RISER ASSEMBLY (FIG. 1) AND OVERHEAD VERTICAL RISER (FIG. 5).



**FIG. 7 MOST COMMON VACUUM PLUMBING ERRORS**

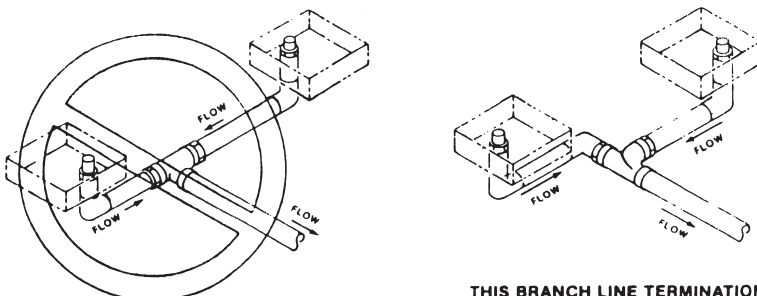
### THREE POSSIBLE PLUMBING METHODS FROM MAIN OR BRANCH LINE TO TERMINATION IN OPERATORY, N20, SINK AND JUNCTION BOX.

ALWAYS HOOK SINK AND/OR N20 SCAVENGE TO MAIN OR BRANCH LINE AS SHOWN IN THESE EXAMPLES (USING 3/4 INCH PIPE ONLY) WITHOUT AFFECTING MAIN LINE SIZE. REMEMBER WHEN COUNTING NUMBER OF OPERATORIES BASED ON FIG. 9 STEP 1. COUNT OPERATORIES, NOT TERMINATIONS IN THE OPERATORIES.



**FIG. 8 N20 AND SINK VACUUM CONNECTIONS**

### BRANCH LINE TERMINATION TO TWO OPERATORIES



THIS BRANCH LINE TERMINATION IS SHOWN CORRECTLY. NEVER USE THE INCORRECT EXAMPLE SHOWN AT LEFT FOR VACUUM SYSTEMS.

**FIG. 10**





