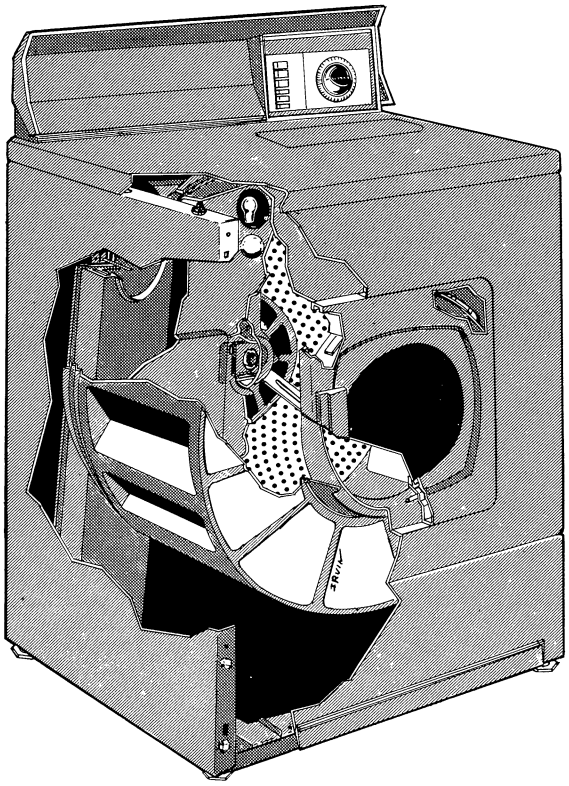
REPAIR-MASTER® *for*

WHIRLPOOL - KENMORE

GAS & ELECTRIC DRYERS



- DIAGNOSIS CHARTS
- CHECKING PROCEDURE
- SERVICE PROCEDURE
- COMPONENT DATA
- PARTS LISTS

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REPAIR-MASTER for..

WHIRLPOOL-KENMORE

AUTOMATIC

DRYERS

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FOREWORD

This Repair Master contains information and service procedures to assist the service technician in correcting conditions that are not always obvious.

A thorough knowledge of the functional operation of the many component parts used on appliances is important to the serviceman, if he is to make a proper diagnosis when a malfunction of any part occurs.

We have used many representative illustrations, diagrams and photographs to portray more clearly these various components for a better over-all understanding of their use and operation.

IMPORTANT SAFETY NOTICE

You should be aware that all major appliances are complex electromechanical devices. Master Publication's REPAIR MASTER® Service Publications are intended for use by individuals possessing adequate backgrounds of electronic, electrical and mechanical experience. Any attempt to repair a major appliance may result in personal injury and property damage. Master Publications cannot be responsible for the interpretation of its service publications, nor can it assume any libility in connection with their use.

SAFE SERVICING PRACTICES

To preclude the possibility of resultant personal injury in the form of electrical shock, cuts, abrasions or burns, etc., that can occur spontaneously to the individual while attempting to repair or service the appliance; or may occur at a later time to any individual in the household who may come in contact with the appliance, Safe Servicing Practices must be observed. Also property damage, resulting from fire, flood, etc., can occur immediately or at a later time as a result of attempting to repair or service – unless safe service practices are observed.

The following are examples, but without limitation, of such safe practices:

1. Before servicing, always disconnect the source of electrical power to the appliance by removing the product's electrical plug from the wall receptacle, or by removing the fuse or tripping the circuit breaker to OFF in the branch circuit servicing the product.

NOTE: If a specific diagnostic check requires electrical power to be applied such as for a voltage or amperage measurements, reconnect electrical power only for time required for specific check, and disconnect power immediately thereafter. During any such check, ensure no other conductive parts, panels or yourself come into contact with any exposed current carrying metal parts.

2. Never bypass or interfere with the proper operation of any feature, part, or device engineered into the appliance.

3. If a replacement part is required, use the specified manufacturers part, or an equivalent which will provide comparable performance.

4. Before reconnecting the electrical power service to the appliance – be sure that:

   a. All electrical connections within the appliance are correctly and securely connected.
   b. All electrical harness leads are properly dressed and secured away from sharp edges, high-temperature components such as resistors, heaters, etc., and moving parts.
   c. Any uninsulated current-carrying metal parts are secured and spaced adequately from all non-current carrying metal parts.
   d. All electrical ground, both external and internal to the product are correctly and securely connected.
   e. All water connections are properly tightened.
   f. All panels and covers are properly and securely reassembled.

5. Do not attempt an appliance repair if you have any doubts as to your ability to complete it in a safe and satisfactory manner.

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SECTION 1

SERVICE CHECK LIST

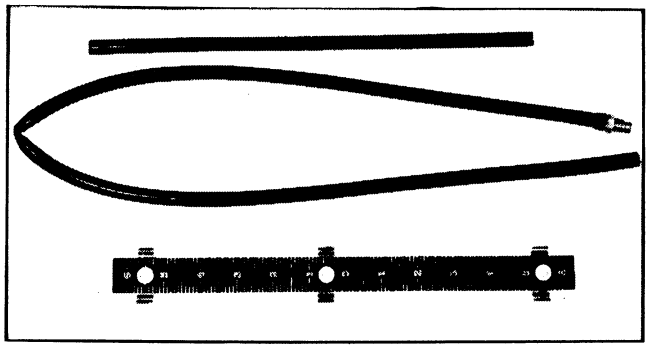
The following diagnosis chart is intended to be only a starting point in proceeding with the servicing of automatic dryers. The diagnosis chart can only deal in generalities; to effectively service any appliance, the serviceman must thoroughly understand the mechanical functions and electrical circuitry of the appliance.

A considerable amount of time and money can be saved if a serviceman will take time to analyze the probable cause of a malfunction of a machine before proceeding to remove any parts. Always be sure first that the machine i s properly installed and its power cord is plugged into a live receptacle that is properly fused. When checking electric dryers connected to 220 volts, be sure BOTH fuses are good. Be sure the gas is turned on and air is bled from the line when checking gas dryers. Check for proper air flow and make sure the operator has properly set the controls.

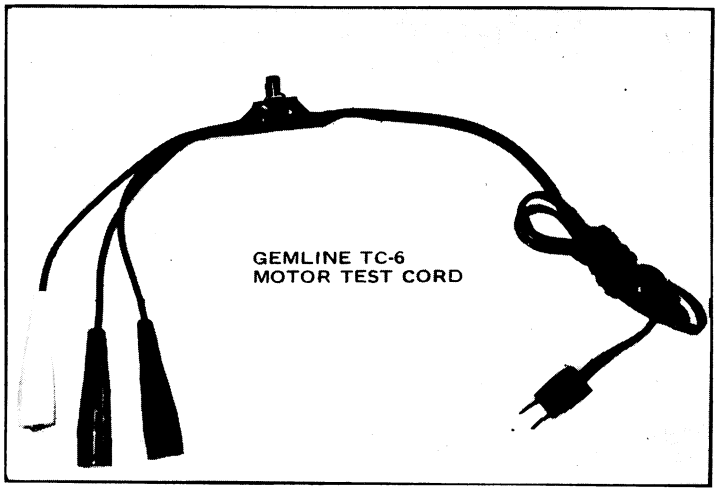
Always make a visual check first before using any testing equipment such as test lamps, voltmeters or ohmmeters. Before attempting to remove any electrical part from the machine, disconnect the power cord from the live receptacle. If a voltmeter or test lamp is being used for testing, the power cord must be plugged into a live receptacle, however.

MANOMETER

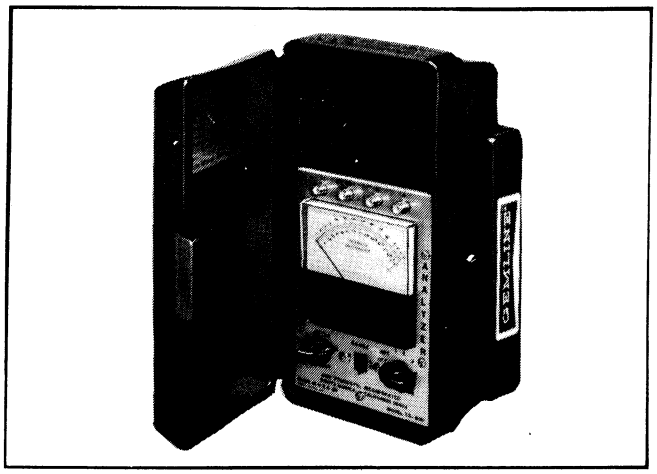
Use for checking gas pressure.



TEST CORD

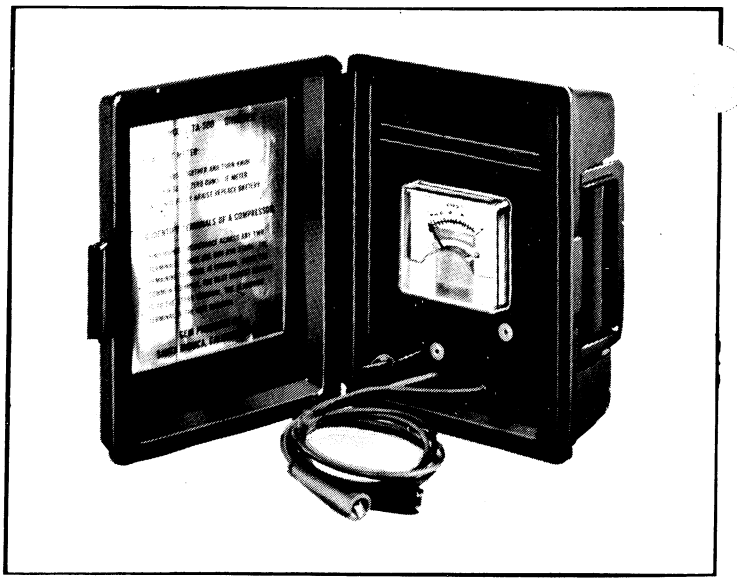


TA–800 TEMPERATURE ANALYZER

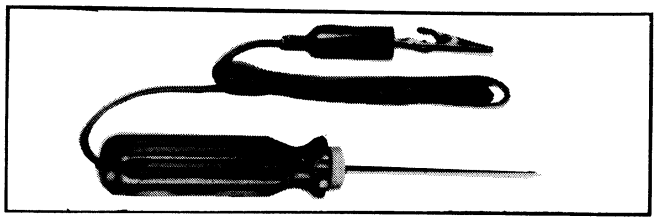


TA-500 OHMMETER

Use for checking Electrical Resistance



TB-500 CONTINUITY TESTER



SERVICE TOOLS

CONDITION	POSSIBLE CAUSE	REMEDY
WILL NOT RUN	Power supply	Check line fuses and line switches.
	Main Wiring Harness	Check for loose or broken terminal and for broken wire.
	Door switch	Make continuity check on switch contacts.
	Main motor	Test motor direct using live test cord.
	Timer	Make continuity check on timer contacts Y to BG.
	Push-to-start switch	Check start switch for continuity.
WILL NOT HEAT	Power supply	Check line fuses and switches. Be sure 220 Volts are being delivered (Electric Dryers).
	Wiring harness	Check heater element and relay harness leads for broken or loose terminals (Electric Dryers). Check harness at burner terminals for voltage (Gas Dryers).
	Operating and Safety Thermostats	Install jumper across terminals and test dryer, or make continuity test on switch contacts.
	Main motor	Check motor centrifugal switch M1 to M2 for continuity. Motor must be operating for this test.(Electric dryers). Check motor centrifugal switch 2M to 3M for continuity. Motor must be operating for this test.(Gas dryers).
	Timer	Check continuity of timer contacts Y to R. Also Y to BR if used on timer.
	Heat element	Check for broken element wire.
	Heat element relay	Check for open relay coil and test switch contacts for continuity.
	Gas burner	Disconnect burner wiring and test burner direct.
	Air-heat switch	Be sure switch is set on heat and check contacts for continuity.

CONDITION	POSSIBLE CAUSE	REMEDY
CLOTHES NOT DRYING	Operating thermostat	Check for open switch contacts.
	Main motor	Remove wires M1 and M2 from motor terminal board and connect together. Operate dryer, if heat comes on, replacement of centrifugal switch in motor is indicated. On Gas dryers use same test using 2M and 3M wires
	Timer	Check timer switch contacts Y to R for continuity. Also Y to BR if used on timer.
	Heat element	Check for broken element wire.
	Heat element relay	Check for open relay coil and test switch contacts for continuity.
	Gas burner	Disconnect burner wiring and test burner direct.
	Air-heat switch	Be sure switch is set on heat and check contacts for continuity.
	Belt	Check belt; may be worn, broken or u pulleys.
	Drum seals	Check front and rear drum seals. Must be properly positioned on the drum and flange surface.
	Exhaust fan	Check fan for proper R.P.M., lint or frozen bearings.
	Lint screen	Check lint screen for lint and clean.
	Exhaust duct	Check exhaust duct for lint blockage.
BLOWING FUSES	Electrical ground	Check motor, heat element, electrical components and wiring harness for ground.
MOISTURE RETENTION UNSATISFACTORY	Exhaust duct	Check exhaust duct for lint blockage.
	Inlet sensor thermostat	Check mounting adjustment of inlet sensor thermostat. Add or delet spacers as required.
	Timer	Check for loose or broken terminal and for broken wire.

CONDITION	POSSIBLE CAUSE	REMEDY
DRYING TEMPERATURE TOO HIGH	Operating thermostat	Check for lint that may insulate thermo bulb from exhaust air. Check thermostat for function.
	Heat element relay	Check lint screen for lint and clean. Check relay coil and switch contacts for proper function.
MOTOR RUNS WITH DOOR OPEN	Door switch	Check door switch for function and switch clip actuating arm for proper switch plunger operation.
GERMICIDAL BULB DOES NOT LIGHT	Drum bulb	Bulb must be good. It serves as a ballast for germicidal lamp. Note both filaments.
	Door switch	Check door switch for continuity and function.
	Wiring Harness	Check for loose terminals.
DRUM BULB DOES NOT LIGHT	Germicidal bulb	Check for broken filament--both bulbs.
	Door switch	Check door switch for continuity and function.
	Wiring Harness	Check for loose terminals.
DRUM WILL NOT ROTATE	Drum belt	Check for broken belt. Be sure it is properly positioned on motor pulley.
	Exhaust fan	Check for frozen bearings.
	Drum bearing	Drum bearing dry. Relubricate or replace bearing.
WILL NOT SHUT OFF	Timer	Check timer motor for function and timer for welded contacts.
	Operating thermostat (Automatic cycle)	Check for correct thermostat in dryer. Check thermostat contacts for continuity.
	Sensor thermostats	Check sensor thermostats for function.

CONDITION	POSSIBLE CAUSE	REMEDY
TIMER DOES NOT ADVANCE	Timer motor	Test motor direct with 120 Volt test cord.
	Operating thermostat (Automatic cycle)	Check function of operating thermostat.
GLOW COIL DOES NOT LIGHT	Glow coil defective	Disconnect glow coil leads and test with ohmmeter or 2½ Volts only. Visually inspect for broken filament or filament loose at one end.
	Transformer defective	Check across pilot terminals using flashlight bulb.
	Warp switch defective	Jumper across terminals W and O.
	Pilot switch	Test for continuity between 3 & 4 and 1 & 4.
NO PILOT FLAME – GLOW COIL IGNITES	Pilot valve solenoid	Check for continuity. Replace if defective.
	Gas supply	Bleed air from gas line at union in front of machine.
	Pilot burner	Check for clogged orifice.
PILOT LIGHT GOES OUT	Q.S.O. Switch	Check contacts for function. Check for proper adjustment. Check mercury switch adjustment.
	Pilot solenoid (Dole burners)	Check for continuity. Replace if defective.
	Thermocouple (Manual Ignition)	Check and replace if defective.
	Magnetic head (Manual ignition)	Replace if defective.
MAIN BURNER WILL NOT IGNITE – PILOT BURNING.	Main burner solenoid	Test for continuity. Replace if defective.
	Pilot switch	Test for continuity between termin 3 and 4 with thermo bulb hot.
	See Causes under Will Not Heat	

BURNERS - STANDING PILOT MODELS

CONDITION	POSSIBLE CAUSE	REMEDY
1. Pilot and/or Zip-Tube will not light	1a. Inadequate gas for ignition	1a. Check main gas valve and manual valve on burner for being open. Check installation for inadequate supply line and utility for gas supply main.
	1b. Kinked pilot tube	1b. Repair or replace tube.
	1c. Improper regulator function	1c. Check regulator for gas passage.
	1d. Pilot filter clogged	1d. Clean or replace.
	1e. Zip-tube orifice plugged	1e. Clean or replace.
	1f. Air in supply line	1f. Bleed main supply line.
2. Pilot will not continue to burn	2a. Excessive backdraft	2a. Install backdraft damper. (Hood)
	2b. Partially clogged or defective pilot orifice	2b. Clean or replace orifice.
	2c. Improperly adjusted latch pin	2c. Check and adjust pin.
	2d. Defective pilot sensing element	2d. Repair or replace pilot and unlatch assembly.
	2e. Insufficient gas supply	2e. See 1a, 1b, 1c and 1f.
	2f. Defective heat duct safety thermostat (unlatch coil model only)	2f. (Use same part number thermostat only)
	2g. Improper orificed for type of gas used	2g. See orifice chart.
3. Main burner will not ignite	3a. Insufficient gas supply.	3a. See 1a and 1f.
	3b. Main burner valve solenoid inoperative	3b. Replace same.
	3c. Defective operating thermostat or safety thermostat	3c. Replace defective thermostats.
	3d. Defective wiring or loose connection.	3d. Repair or replace same.
	3e. Defective or clogged main orifice	3e. Replace with same number orifice.
	3f. Improper regulator function	3f. Repair or replace regulator.
	3g. Faulty timer	3g. Replace timer.
	3h. Incorrectly wired thermostats	3h. Check terminal identification.
	3i. Faulty or misaligned door switch	3i. Adjust clip or replace door switch.
4. Improper burner flame	4a. Air shutter adjustment	4a. Adjust shutter so that flame is deep blue slightly yellow tipped. Note: Atmosphere should be relatively dust free when observing flame.
	4b. Partially clogged orifice	4b. Replace orifice.
	4c. Improper alignment of orifice to venturi throat	4c. Align orifice perpendicular to venturi.
	4d. Bent flame spreader (scoop) or venturi	4d. Repair or replace entire venturi assembly.
	4e. Burner not on rate	4e. See orifice chart
	4f. Leaking gas entering burner funnel with atmosphere air	4f. Check for leaks in manifold assembly or a supply line connector.

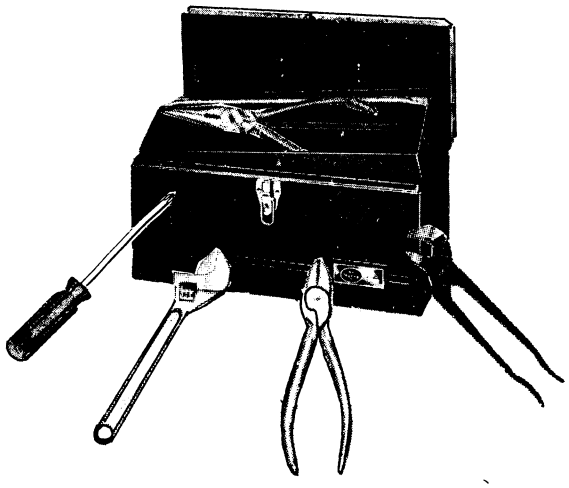
CONDITION	POSSIBLE CAUSE	REMEDY
4. Improper burner flame (cont'd.)	4g. Venting not to specifications and/or air system clogged (lint screen)	4g. Check for venting to specification and accumulation of lint in air system.
5. Improper two level operation	5a. Defective two level pin and spring	5a. Remove, check, and replace if necessary.
	5b. Defective two level solenoid	5b. Replace solenoid.
	5c. Defective wiring or connectors	5c. Repair or replace same.
	5d. Defective two level selector switch	5d. Replace switch.
6. Burner fails to shut off after thermostats are satisfied	6a. Dirt on seal of main burner gas valve	6a. Disassemble and clean.
	6b. Wiring	6b. Check dryer for being properly wired.

3. BURNERS ELECTRIC (DIRECT IGNITION) MODELS

1. Ignitor fails to ignite burner (gas supply normal)	1a. Ignitor out on warp switch	1a. Disconnect power supply and wait 5 to 10 minutes for warp switch remake.
	1b. No power to ignitor and/or burner	1b. Check harness and burner external wiring for defects or loose connections. Check door switch. Check thermostats and check timer.
	1c. Corroded or insulated contacts	1c. Remove foreign matter between contacts and clean.
	1d. Defective contacts	1d. Check contacts return spring. Check for contacts fused or stuck together. Check for binding contact rotor.
	1e. Defective ignitor and master control	1e. Replace ignitor and master control assembly.
2. Burner ignites but does not continue to burn. Note: This condition could cause warp out of the warp switch	2a. Defective resistors	2a. Check and/or replace.
	2b. Defective solenoid	2b. Replace solenoid.
	2c. Defective master control	2c. Replace master control.
	2d. Defective timer	2d. Replace timer.
	2e. Defective thermostat	2e. Replace thermostat.
	2f. Erratic door switch	2f. Replace door switch.
	2g. Loose harness connection	2g. Repair connection.
3. Main burner will not ignite (ignitor normal)	3a. Inadequate gas supply for ignition	3a. Check main gas valve and manual valve for being open. Check installation for inadequate to supply line and utility for gas supply main.
	3b. Improper regulator function	3b. Unlock regulator poppit by tapping regulator or relieving valve gas pressure.
	3c. Air in supply line. This could occur if utility has had line opened.	3c. Bleed air out of supply line.
	3d. Main burner valve solenoid inoperative	3d. Replace same.
	3e. Faulty or misaligned door switch	3e. Adjust clip or replace door switch.

CONDITION	POSSIBLE CAUSE	REMEDY
3. Main burner will not ignite (ignitor normal) (cont'd.)	3f. Defective operating thermostat or safety thermostat	3f. Check thermostat. Replace if necessary.
	3g. Defective wiring or loose connection	3g. Repair or replace same.
	3h. Defective or clogged main orifice	3h. Replace with same number orifice.
	3i. Faulty timer	3i. Replace timer.
	3j. Incorrectly wired thermostats	3j. Check terminal identification.
4. Improper burner flame	4a. Air shutter adjustment	4a. Adjust shutter so that flame is deep blue slightly yellow tipped. Note: Atmosphere should be relatively dust free when observing flame.
	4b. Partially clogged orifice	4b. Replace orifice.
	4c. Improper alignment of orifice to venturi throat	4c. Align orifice perpendicular to venturi.
	4d. Bent flame spreader (scoop) or venturi	4d. Repair or replace entire venturi assembly.
	4e. Burner not on rate	4e. See orifice chart
	4f. Leaking gas entering burner funnel with atmosphere air	4f. Check for leaks in manifold assembly or a supply line connector.
	4g. Venting not to specifications and/or air system clogged (lint screen)	4g. Check for venting to specification and accumulation of lint in air system.
5. Improper two level operation	5a. Defective two level pin and spring	5a. Remove check and replace if necessary.
	5b. Defective two level solenoid	5b. Replace solenoid.
	5c. Defective wiring or connectors	5c. Repair or replace same.
	5d. Defective two level selector switch	5d. Replace switch.
6. Burner fails to shut off after thermostats are satisfied	6a. Dirt on seat of main burner gas valve	6a. Disassemble and clean.
	6b. Wiring	6b. Check dryer for being properly wired.

SERVICE PROCEDURE



COMPONENT DESCRIPTION

Before attempting to service an automatic dryer of any make, the serviceman should be equipped with the proper tools. Many of these tools are designed to test the electrical system and components quickly and accurately. Special tools of this type include a test lamp or voltmeter, a continuity tester or ohmmeter and a wattmeter. Proper use of these tools will help make fast, efficient diagnosis and service much easier.

Always use caution when checking any part of the electrical system. Never use an ohmmeter with the machine plugged in. Also, as a safety precaution, always disconnect the electrical power from the dryer before attempting to remove any parts from the machine. For testing purposes, the power cord can again be plugged into a live receptacle after the necessary parts are removed.

All dryers have a wiring diagram attached usually to the back of the cabinet. Study this diagram carefully before proceeding with any electrical checks.

POWER SUPPLY

Electric dryers require a three-wire, single phase, nominal 120/240 volt 60 cycle circuit. This circuit should be fused equal to, or to the next larger size than the ampere rating specified on the nomenclature plate (located on the back or in the door well of the dryer). Wire sizes must also correspond to these ratings. Normally, the wire size for this circuit is No. 10 AWG and is fused at 30 amperes. Other appliances should not be connected to this circuit.

The 240 volt circuit is necessary to supply enough power to energize the heating element so that it will furnish sufficient heat for *normal* or *hot* temperature settings. One leg of the power supply, which is nominally rated at 120 volts, is used to operate the control circuits.

If the local code permits the use of an approved flexible cordset (pigtail), run a three-wire line from the fuse disconnect box to a polarized 30 ampere receptacle within three feet of the dryer.

Where local codes permit, it is also possible to connect directly to the fuse disconnect box using either rigid conduit, flexible conduit, or non-metallic sheathe cable. Two or three feet of slack in the line should be allowed behind the dryer so that it can be moved for servicing.

On some models it is possible to connect to a 120 volt, 60 cycle circuit capable of carrying 1600 watts and separately fused at not more than 20 amperes. For this type of installation, a receptacle must be provided to accommodate a parallel-blade plug within five feet from the terminal block on the dryer. This method of installation requires some changes on the dryer terminal block which are explained in later paragraphs.

Gas dryers do not have an electric heat element as a heat source and, therefore, they do not use a 240 volt circuit. All gas dryers are equipped with a power cord incorporating a common parallel-blade plug which will fit into a standard household receptacle. This receptacle must supply a nominal 120 volt, 60 cycle current, and should be located within five feet of the rear of the machine. A separately fused (15 ampere) circuit to this receptacle is preferred. The use of an extension cord or an existing heavily loaded circuit is not recommended.

IMPORTANT: *All electrical connections must conform to local codes or ordinances. Check the local electrical code for the approved size and type of wire required for the particular dryer installation.*

THREE-WIRE HOOK-UP (120/240 VOLTS)

To connect the electric dryer to a 120/240 volt, 60 cycle, three-wire circuit, remove the plate covering the terminal block and attach the three wire cable or pigtail as shown in *Figure 1*. The white or neutral wire is always connected to the silver (N) terminal of the terminal block. The other two wires can be interchanged on the remaining two terminals. Be sure all electrical connections are secure, and that they conform to local electrical codes or ordinances. These codes or ordinances will also govern how the dryer is to be grounded. In many instances, neutral terminal grounding is recommended. In some areas, however, it will be necessary to use a separate ground wire. These two methods of grounding are described in this section under "Grounding".

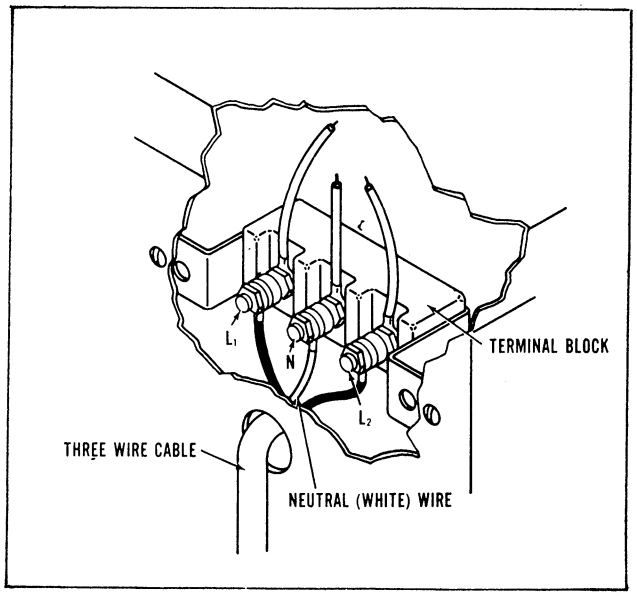


Figure 1

TWO-WIRE HOOK-UP (120 VOLTS)

Electric dryers with an element of 5200 watts or less and a three hour timer may be connected to a 120 volt, 60 cycle, two-wire circuit. Generally, this will increase the drying time to approximately three times that required on a 240 volt circuit.

"Two-wire" is general terminology for a 120 volt system. However, in some areas, it will be necessary to use a three-wire power cord even for the 120 volt installation. (All current production of gas dryers, washers, etc., are equipped with this three-wire power cord.) This cord has a green wire which is used as an *equipment ground* and a plug with a ground prong. Use of the two or three-wire power cord for 120 volt installation depends on the local electrical codes which govern the installation.

Regardless of which type cord is to be used, it is necessary to move wiring harness lead "L2" from terminal "L2" to "N" on the terminal block, *Figure 2*.

For the two-wire system, connect one of the wires (white) to terminal "N" and the other (Black) to terminal "L1".

IMPORTANT: *Do not use neutral ground strap with a 120 volt hook-up; use separate ground wire only. See Separate Wire Grounding under "Grounding" section.*

For the three-wire system, connect the wires in the same manner described in the preceding paragraph, but leave the green wire free for ground purposes. This green wire should be taken through the terminal block opening and attached to the cabinet itself at the nearest blank hole below the terminal block with a star lock washer and self-tapping screw, *Figure 2*.

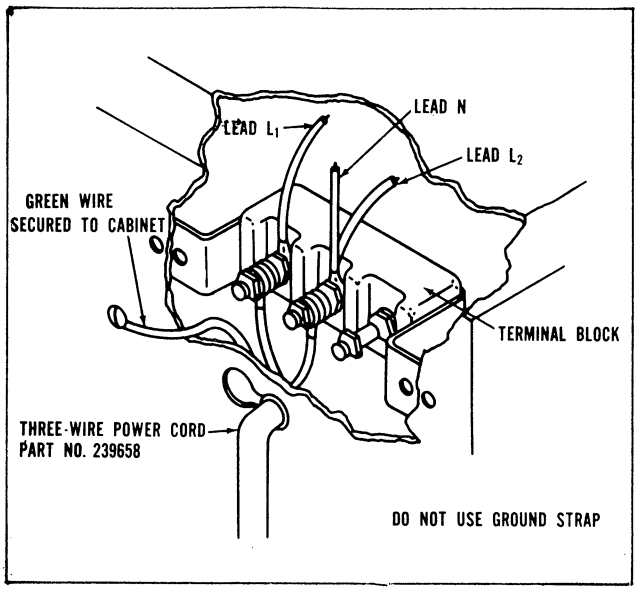


Figure 2

If the wall receptacle does not have provision for the three wire plug, it may be necessary to replace the receptacle. If changing and properly grounding the wall receptacle is impossible, a temporary adapter may be plugged into the wall receptacle to mate with the three-pronged electric supply cord, *Figure 3*. If this is done, the green wire on the adapter must be connected to the wall receptacle cover plate screw. Also where the adapter is used, a separate ground wire must be connected to the dryer, back panel screw and a *cold* water pipe. (See Separate Wire Grounding.) Use of these adapters is not recommended.

NOTE: *Do not under any circumstances remove the ground prong from the power supply cord plug.*

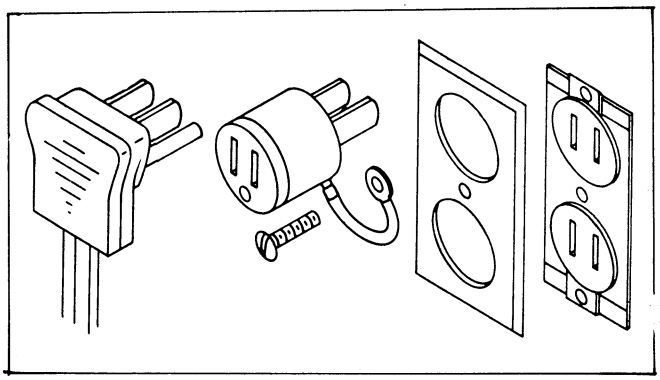


Figure 3

GROUNDING

The dryer must be grounded as a precaution against an electrical shock to the user. These shocks can occur whenever electrical current can travel to the frame or cabinet of the machine from such causes as the motor insulation leaking, insulation rubbing off a wire against any part of the cabinet or the heat element sagging to the point it touches any metal part. When these conditions occur, the user can get a severe shock when touching the machine, particularly when standing on a damp cement floor.

Two methods of grounding an appliance are used: Neutral Terminal Grounding and Separate Wire Grounding.

Neutral Terminal Grounding

A neutral terminal ground is an *electrical* or *system* ground. The *system* ground normally carries current at ground potential. This type ground is only used on electric dryers connected to a 230 volt system. Do not use it on any 120 volt installation.

Neutral terminal grounding is accomplished by fastening one end of the ground strap (furnished with electric dryers only) to the silver colored (N) terminal on the terminal block. The opposite end of this ground strap is attached to the cabinet by using the screw immediately above the terminal block opening, *Figure 4*.

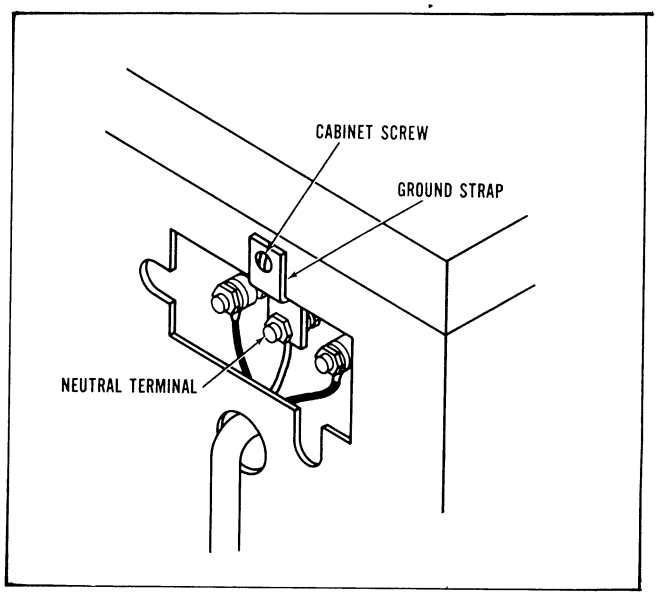


Figure 4

Separate Wire Grounding

A separate wire ground is a ***mechanical*** or ***equipment*** ground and carries current only during a short circuit condition. This type of ground may be used on either a 120 volt or a 230 volt installation.

Figure 5

Separate wire grounding is accomplished by attaching a separate ground wire to the ground lug on the rear of the machine, *Figure 5*. Connect the opposite end of this wire to a special ground clamp and fasten the ground clamp securely to a COLD WATER PIPE. Never fasten this wire to a gas pipe.

The green wire used in the three wire 120 volt cord described under Two Wire Hook-Up is another type of ***equipment*** or ***separate wire*** ground.

ELECTRICAL TESTING

To check the continuity of a circuit in a wiring harness or any component part, it is best to use an externally powered continuity tester, such as the one shown in *Figure 6*.

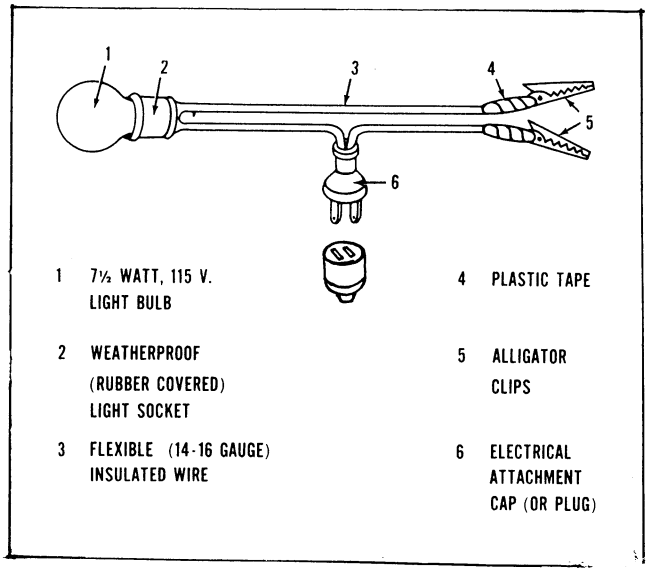


Figure 6

The continuity test cord can be a homemade arrangement that is used to test electrical current carrying components. It may also be modified to serve as a live test cord or as a test lamp. As a live test cord, the lamp, Item 1, is replaced with a low amp fuse. This permits energizing the motors or solenoids with direct power, bypassing the machine wiring. As a test lamp, the male plug, Item 6, is shorted across its prongs. A female connector that has been shorted works well as an adaptor. With the continuity tester shunted to convert it to a test lamp, the power supplied to the dryer is used to check and see if a circuit exists at a component that should be energized. When testing a 240 volt circuit, the lamp, Item 1, should be replaced with a 240 volt lamp.

CAUTION: *Always remove the service cord from the power supply or disconnect the circuit in some manner before using an externally powered continuity tester.*

Before any tests are made, it will be to your advantage to study the wiring diagram to determine which harness leads to check for continuity. Both ends of the wire or the component part being checked should be disconnected to insure against any possibility of current feed-back through the machine circuit. For example, let's say we are checking the heating element on an electric dryer. First, disconnect the wires supplying current to the heating element. Next, plug in the continuity tester and apply the test clips of the tester to the heating element terminals. If the test lamp lights, a good element is indicated. Now, let's say the current supply to the element is NOT disconnected and we apply the test clips to the element terminals. Again, the test lamp will light, but we haven't determined whether or not the element is good, because of the possible existence of current feed-back through the machine wiring.

NOTE: *Unless otherwise stated, all electrical tests are made with the timer turned to "ON" past the ten minute position or cool down period. Be sure the power is disconnected before disassembling the machine.*

HEATING ELEMENT

The heating element is a length of resistance coiled wire through which electric current is passed to give off heat. It becomes hot because of the resistance it offers to the current.

All heat elements on RCA Whirlpool electric dryers are the coiled nichrome wire type, *Figure 7*. On 29 inch models, a 5600 watt element is used; 24 inch models use either a 4200 or 4400 watt element, depending on the model.

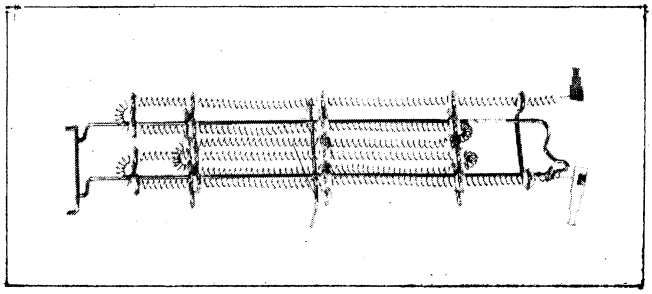


Figure 7

The element is mounted vertically in the heater box on the rear bulkhead of the dryer. All of the air used in clothes drying is heated by flowing over the heat element before entering the tumbler.

The heat element is supported by a heavy wire bracket, which is designed to prevent the element from warping out of shape when it expands and contracts due to heat changes. Ceramic rings are used to insulate the heat element from the supporting bracket.

Two section heat elements are used on dryers featuring a continuous modulated heat input or dryers having the 2 speed feature. A 2,000 watt section operates continuously during the heat-on phase of the modulating drying cycle. The 3,600 watt section cycles on and off during the operation of the exhaust sensor thermostat as exhaust temperatures reach 145° during the modulated heat cycle. Maximum heat input is utilized as long as the clothes are damp during the modulated heat cycle.

Both sections of the 2 section heat element are utilized on 2 speed dryers when high speed is selected. The 3,600 watt section alone is utilized with the selection of normal speed. A 2 section heat element is shown in *Figure 8*.

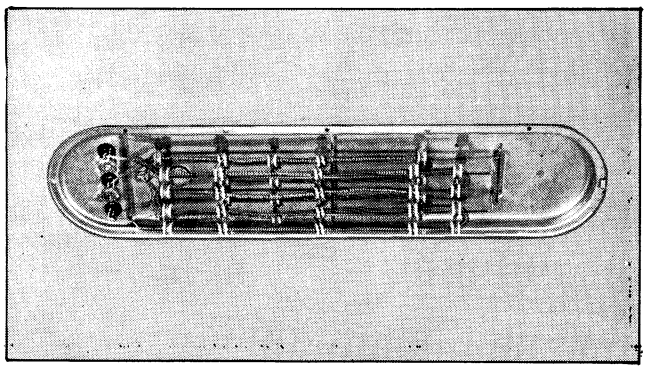


Figure 8

A new element is also used on some 2 speed dryers giving heat inputs of 5600 and 4600 watts. This new element gives 1000 watts additional heat on the *Normal* setting. This element is one of two sections; 5600 watts and a resistance section. On *Super Speed*, the 5600 watt section is energized and on the *Normal* speed setting, both the 5600 watt and the resistance section are energized in series providing a 4600 watt input.

The round type, two level input heat element,

Figure 9, was introduced in 1965. It fits inside the duct and a retaining screw secures it in position. The screw hole in the duct is located just below the safety thermostat.

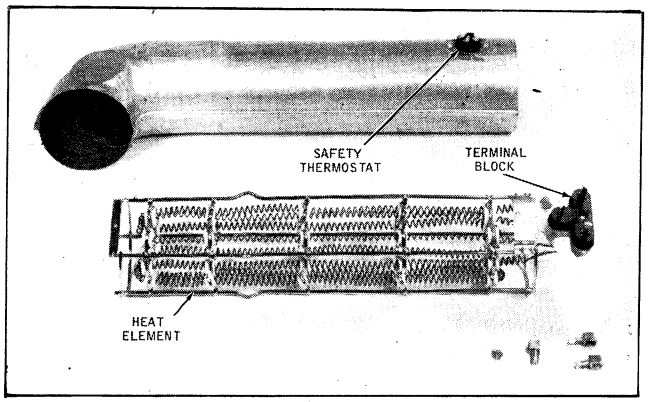


Figure 9

The two major causes for element failure are high voltage and inadequate air circulation over the element. If the necessary air is not passing over the element, it overheats, reducing the life of the element. An indication of this trouble is usually noticed by the increase in drying time. To check the air flow, set the temperature selector to HOT and the timer past the 20 minute mark. Within 7 to 10 minutes, the exhaust temperature should be between 195° – 215° Fahrenheit. This is with the drum empty and at normal room temperature. A longer time can indicate worn drum seals or a restricted air flow.

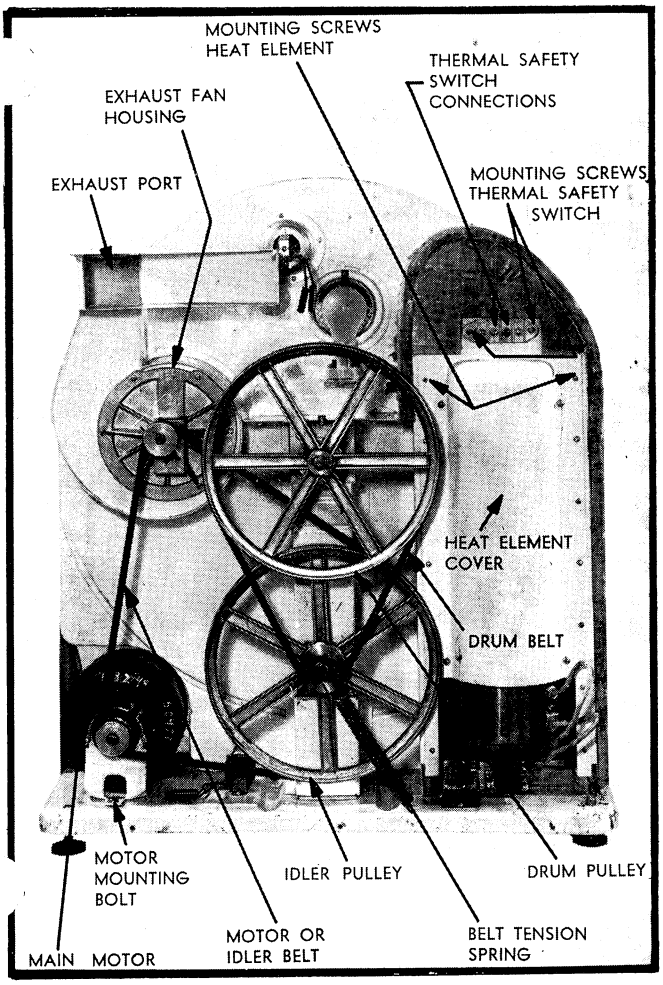


Figure 10

Before removing or condemning the heater element, test to see if there is a 230 volt power supply to the dryer. A fuse or circuit breaker opening one leg of the 230 volt power supply to the dryer will permit the motor to run, but will not allow the heater element to heat. If full power is present at the dryer, check with a 230 volt test lamp at the heater terminal. If continuity is present, disconnect the power supply and remove the heater assembly. The lack of current at the heater terminal will require checking other components. If there is current to the heater element, remove the wires from the element terminals and check with a continuity tester.

NOTE: ***The pulleys do not need to be removed on the later model dryers.***

To replace the heater element, remove the back panel from the dryer and remove the relay assembly, disconnecting the element wiring from the switch (models where applicable). Remove the belts and the large drive pulley.

Remove the screw attaching the cover and remove the back reflector and heater assembly, *Figure 10*, and the element cover, *Figure 10*. The heat element is fastened to the inside of the heater box and is easily removed for restringing or replacing, *Figure 11*.

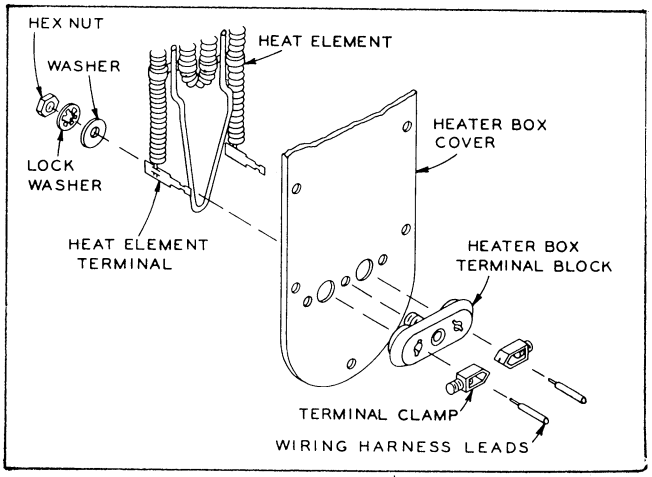


Figure 11

"Push on" heater element connectors for 240-volt electric dryers will soon replace the conventional bolt on or lug connectors. The "push on" terminals are illustrated in *Figure 11.* This type of connection will help prevent wire burn-off due to poor or loose connections.

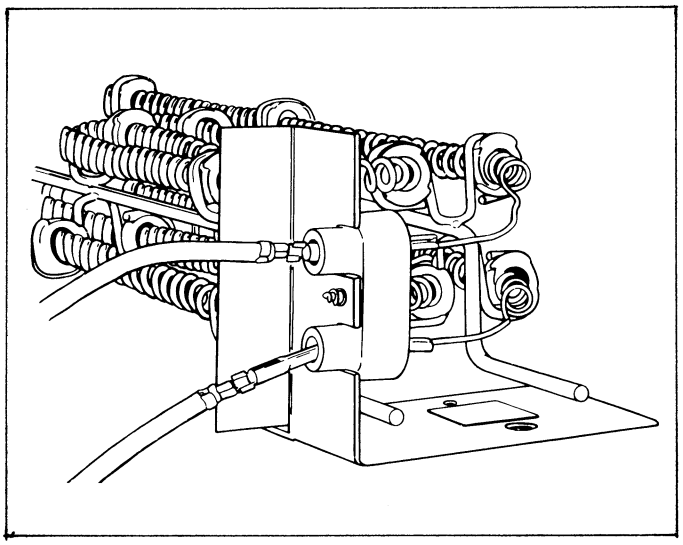


Figure 12

TIMERS

CYCLE OF OPERATION

The various timers used on the electric and gas dryers are basically the same in design, with the exception of the number of cycles of different models. The three cycle timer operation is typical of all the timers used.

Dryers using three cycle timers are equipped with *Regular, Delicate* and *Wash-and-Wear* cycles. Two types of operating cycles are available: (1) Three timed cycles with continuous timer motor operation. (2) An Automatic Regular and Delicate cycle plus a Timed Wash-and-Wear cycle.

In the Regular Automatic Cycle, the drying temperature is controlled by a 165° fixed operating thermostat located in the fan scroll and the timer motor operates only during the time the operating thermostat is satisfied. A 5 minute cool down period is used at the end of the cycle.

In the Delicate Automatic Cycle, the drying temperature is controlled by a 135° fixed operating thermostat. As in the Regular Automatic Cycle, the timer motor operates only when the operating thermostat is satisfied.

In the Wash-and-Wear cycle, the cycle is always timed through continuous timer motor operation. The drying temperature is controlled by a 165° fixed operating thermostat. A 10 minute cool-down is used at the end of the cycle, as required by these fabrics.

The type of material and the size of the clothes load will be the controlling factor in setting the timer dial in any of the cycles.

> NOTE: *On electric dryers, when the timer is turned on, the timer motor will run only until the main motor reaches sufficient speed to switch from the start to the running windings at which time a 240 volt heat element relay switch opens, deenergizing the timer motor. When the operating thermostat reaches 165°, the contacts of the thermostat open. This removes the voltage from the relay contacts and completes a circuit to the timer motor.*

The various timers used on electric and gas dryers are similar in design and operation. The number of circuits controlled by the timer depends on the complexity and number of functions of the different models.

Each timer consists of two basic components assembled into one unit, *Figure 13*. The components are; the motor with speed reduction gear enclosure and the switch box.

Timer Motors

Timer motors, *Figure 13*, may vary slightly due to different sources of manufacture, but all function in the same manner. The speed reduction gears reduce the timer motor speed from several hundred revolutions per minute to about one revolution per hour for most dryers. Some dryers feature a drying time up to three hours. In these dryers the timer

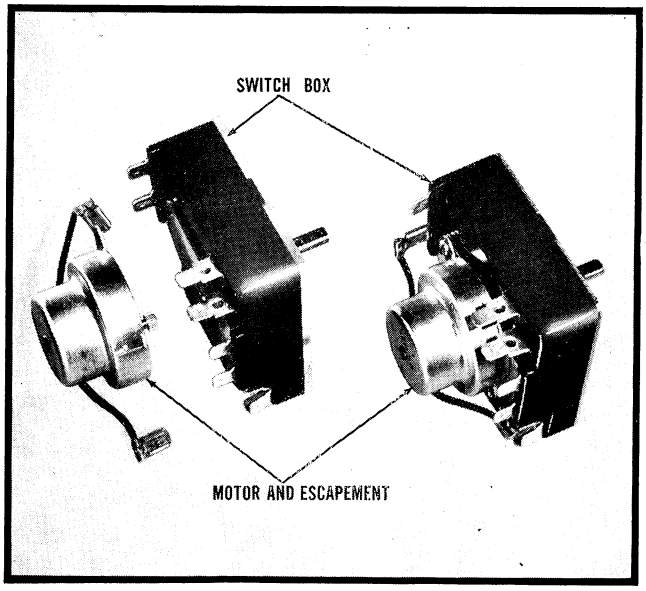


Figure 13

motor speed is reduced to one revolution in ove three hours. The speed reduction gears transfer power from the timer motor to a pinion gear which turns the cam shaft.

When replacing a timer motor and speed reduction assembly, be careful not to damage the small pinion gear that fits into the switch box. Also, be sure to get the correct replacement motor, both for timing and for gear size.

Switch Box

The switch box contains one or two cams, each of which is a circular piece of composition material fixed on a revolving shaft. The cam is shaped so that a cam follower, which rides on the outer contour of the cam, is forced up or down, making or breaking contacts as the cam revolves, *Figure 14*.

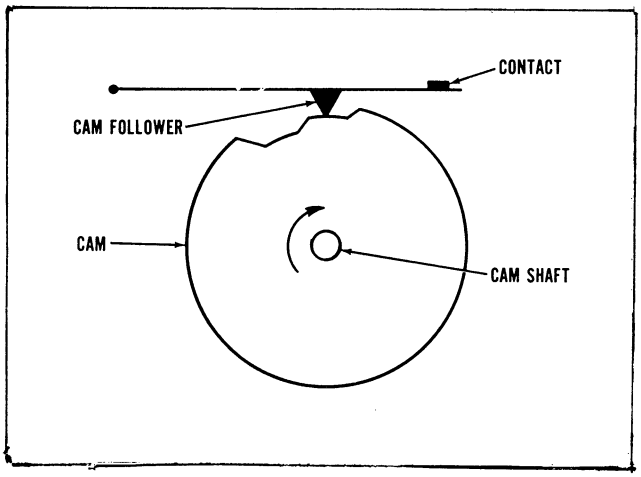


Figure 14

The contact points are secured to spring brass arms with tension applied toward the cams. This tension permits rapid disconnection of the contacts as the cam follower enters the low point of the cam.

SINGLE CYCLE AND DUAL CYCLE TIMERS

In both the single and dual cycle timers, all switch contacts are operated by only one cam. To permit two separate drying cycles, ***Normal Drying*** and ***Wash-and-Wear Drying***, on machines equipped with dual cycle timers, an additional set of notches has been cut out of the cam approximately 180° from those on the single cycle timer cam as shown in *Figure 14*. The switch contacts are operated in the same manner for both cycles. In *Figure 15*, the cam has forced the cam follower up so that the circuits to the heat element or gas burner and the main motor are energized, (A).

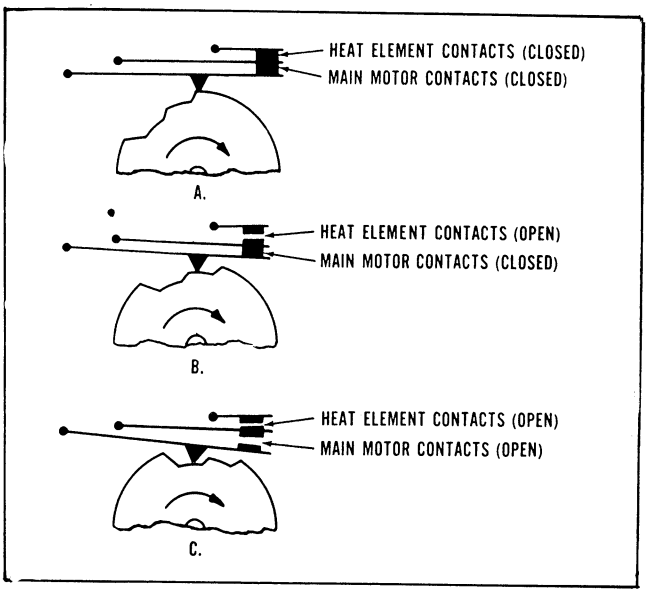


Figure 15

In B, the cam follower is permitted to drop slightly, breaking the circuit to the heat element, but still permitting current to flow to the main motor. This happens during the last few minutes of the cycle, permitting the clothes to tumble in unheated air so that they will be comfortable to handle at the end of the cycle.

C shows the timer cam and contacts when the dryer has completed its cycle, and both the heat element and main motor circuits are deenergized. On some timers, as many as four contacts are made or broken by the action of one cam, *Figure 16*. The third and fourth contacts control the panel lights and cycle end signal on some models.

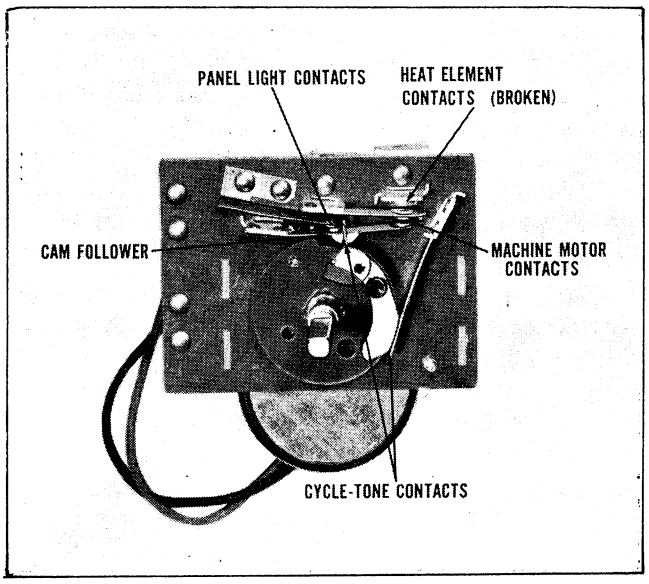


Figure 16

THREE CYCLE TIMERS

This timer is basically the same as the single and dual cycle timers. The major differences are the three separate and distinct cycle cuts of the primary cam and the addition of a secondary cam. *Figure 17* shows the cut of both cams, as well as the contact arrangement.

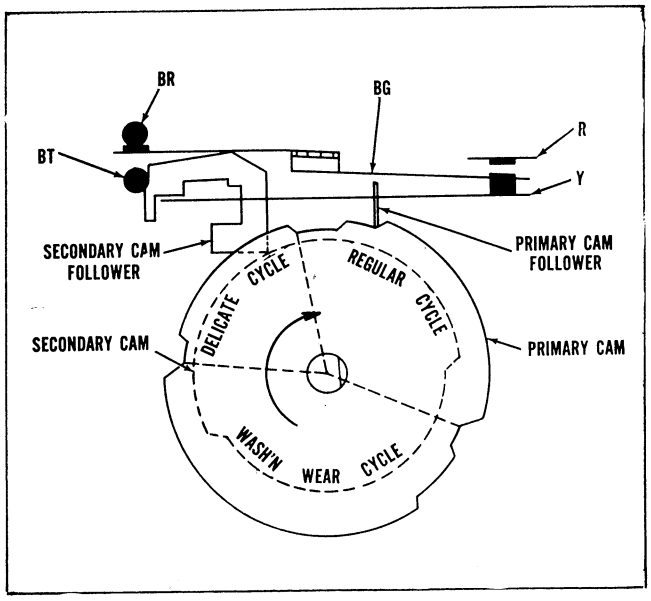


Figure 17

The timer for the modulating dryer is similar to past dryer timers in basic construction, using a single cycle cam. A total of 10 minutes timer motor operating time is used in the cycle. The timer cycle is the same for each of the three dryer cycles (Dry, Damp-Dry, and Air). Pushbutton control provides the desired cycle selection and circuits to the correct control thermostat and air-heat switch as required for the chosen cycle, *Figure 18*.

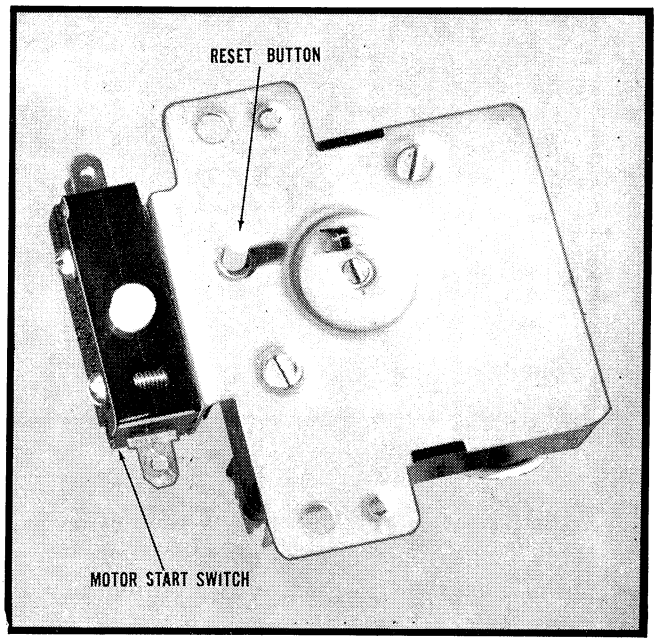


Figure 18

A timer shaft is not used on the Mark XII dryer a. it is fully operated by cycle pushbuttons and the "Master Touch" (start) button. A screwdriver slot is located in the end of the cam shaft for service convenience and timer checking.

To start the dryer, first push the desired cycle button and then depress the "Master Touch" button. This action performs two simultaneous functions. The "Master Touch" button depresses the timer reset plunger and the start switch plunger which starts the dryer motor.

As the timer reset button is depressed, the cam is returned to start position by the cam return spring. To accomplish this, the mechanical action of the reset button causes movement of the reset cam. The reset cam action performs two functions:

1. Disengages the timer motor drive gear from the cam driven gear.
2. Closes timer contacts by raising the cam follower from the cam.

These two functions permit the cam reset spring to return the timer cam to the start position. A cam stop is utilized to assure the correct reset position. The timer motor drive is direct without the use of a clutch.

As the timer is reset to the start position a set of contacts to provide three minutes of timer motor function, then open. During this three minute period, contacts in the inlet sensor thermostat open, cooling the heater box. It will remain open until the exhaust thermostat stops cycling. At that time, the clothes load is nearly dry, the heat in the clothes load and from the 2000 watt heat element will keep the exhaust thermostat open for some time. This is sufficient time to allow the inlet sensor to cool and reset.

A timer motor circuit is established to run the timer motor to the off position. Two minutes of Y to R contact and seven minutes of Y to BG time is provided. The last five minutes is a cool-down period without heat. In the last two minutes of timer operating time, contacts Y to BG close, providing a circuit to the intermittent operating end-of-cycle signal, in the *Wash and Wear* cycle.

Each minute provides 5° of cam movement. Hence, the cam moves only 50° during a cycle of operation, which consists of ten minutes total timer motor time. Dryer operation will vary due to size of clothes load, type of fabric, and moisture retention.

TIMER – ELECTRONIC CONTROL

The timer motor on the electronic timer operates on 80 Volts, as compared to the conventional timer motor that is designed to operate on 120 Volts. A 720 ohm resistor is in series with the timer motor, reducing the line voltage to the motor.

Figure 21 illustrates the Finish Guard Pulser Timer, this timer is used on many models of the *"Top"* of the line series dryers. This secondary timer is mounted on the console control panel close to the main timer assembly. The Finish Guard control takes over in the *PERMANENT PRESS* cycle, on completion of the tumble action, and allows the drum to rotate for ten seconds of each five minute periods as a preventive measurer to prevent wrinkles in permanent press items after the dryer has stopped. If the end of cycle signal is used, the buzzer will sound after each short tumble action, as a reminder to the user that contents of the dryer should be removed.

TO SERVICE TIMER

a. Remove control knobs on front of control console.
b. Remove the two screws at each end of console bezel.
c. After pulling the control panel forward, remove the two-speed speed control switch and cable, if used, to allow the panel to lie face down on top of the washer.
d. Remove the control panel light and light sockets, held by one screw at each end.
e. Remove ten nuts. Remove panel from bezel.
f. Disconnect wires from timer and remove two screws securing the timer to the control panel.
g. To reassemble, reverse above procedure.

REVISED FINISH GUARD CONTROL

Previously the Finish Guard Control employed single-pole, double throw cycling and safety thermostats to control the heating element or the timer motor, depending upon the air temperature surrounding the thermostats.

The new Finish Guard System uses single-pole, single throw thermostats to replace the single-pole, double throw thermostats. A 4500-ohm resistor has been added in series between one side of the heat element and one side of the timer motor, *Figure 21A.* When the automatic cycle is selected and the start switch activated the dryer will heat and the drum rotate, at this time the timer contacts TM-CS is open and Y-R and Y-BG contacts are closed. Because the current is shunted around it, through the Y-R and thermostat contacts, the timer motor will not run.

When the thermostat is satisfied the thermostat contacts will open. When this takes place the shunt is removed and allows current to flow from L1 through timer contacts Y-BG, the timer motor, power resistor and the heat element. Current also flows through the motor switch, 1M-2M and L2. This circuit is a 240 volt circuit and the power resistor reduces the voltage at the timer motor to its operating voltage of 120 Volts.

The power resistor is mounted in a bracket which is attached to the timer. The bracket also acts as a heat sink to disipate the heat generated when the resistor is in operation.

If a "No timer run" condition exists, first check the timer in the timed cycle setting. If the timer motor runs in this setting then check the power resistor. It should read 4500 ohms, plus or minus five percent.

PUSH TO START SWITCH

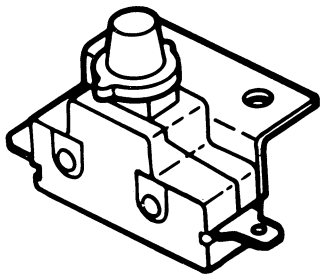


Figure WC18A

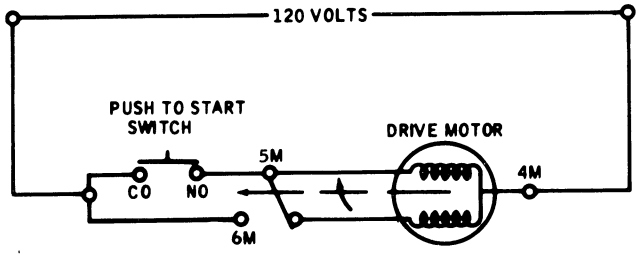


Figure WC18B

PUSH TO START RELAY

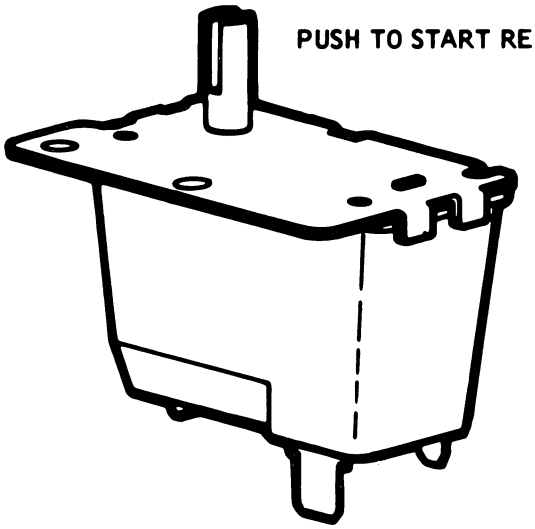


Figure WC18C

PUSH-TO-START SWITCH, *refer to Figure WC18A*
The push-to-start switch is a safety device which will not permit the dryer to start after the initial cycle is completed or if the cycle is interrupted until the button is depressed. On the gas dryers the push-to-start switch function is illustrated in *Figure WC18B.*

TESTING THE PUSH-TO-START SWITCH
Check across terminals CO and NO in both open and closed positions. If test fails continuity test, it must be replaced.

PUSH-TO-START SWITCH, Removal
Remove two screws at each end of console bez and pull control panel forward and rest face of panel on padded machine top. Next remove two leads from the switch and the two screws holding switch to control panel.

PUSH-TO-START RELAY, *refer to Figure WC18C*
Models using the push-to-start switch also use the relay. On gas models the relay function is illustrated in *Figure WC18D.*

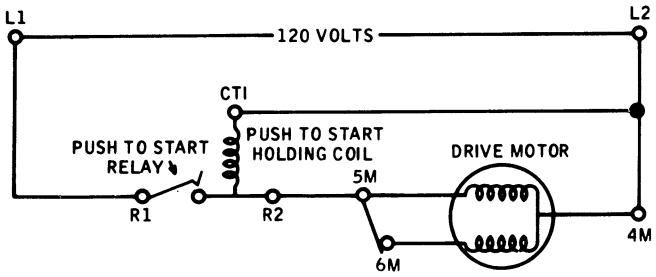


Figure WC18D

TESTING THE PUSH-TO-START RELAY
Check for continuity across R and CTI while relay is in the open and closed position. If test fails, relay should be replaced.

RELAY, Removal
1. Remove two screws at each end of control bezel.
2. Place panel on padded surface on machine top.
3. Remove the leads from the relay.
4. Remove two screws holding relay to control panel.
5. Replace in reverse manner.

Tests for the relay and push-to-start switch on electric models are the same as on gas models.

SPEED SELECTOR SWITCH
The speed selector switch is a two-position switch which will change the heat input from 4600W to 5600W on the electric models. It will also activate the two-speed air damper at the same time, with the use of linkage and cable.

TESTING THE TWO-SPEED SWITCH
Remove wires from switch and check continuity across terminals SWI and SW. If test fails switch should be replaced. Removal of switch is the same as removing the push-to-start switch.

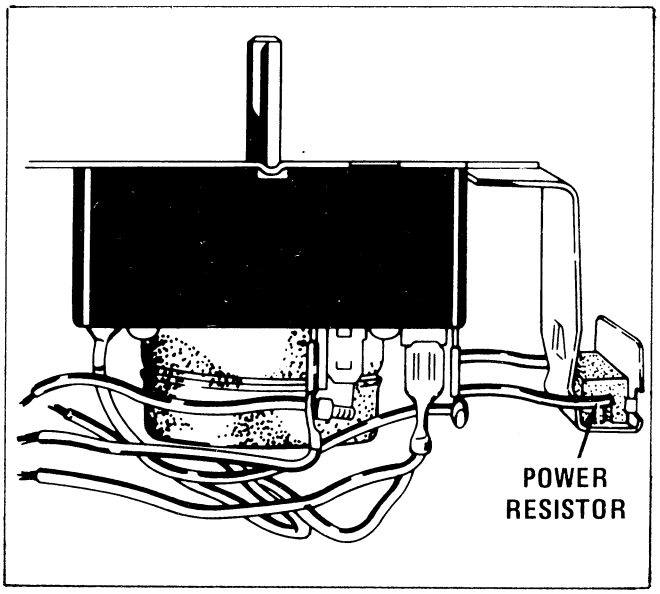


Figure 21A

THE ELECTRONIC DRY CONTROL SYSTEM

Four basic components compromise the electronic custom dry control feature. Shown in *Figure 19* are the components as illustrated. The power resistor No. 1, the electronic dry control No. 2, the timer assembly with the 85 Volt motor No. 3, and the sensor No. 4. With this system the user may select the amount of moisture retention desired.

The 720 ohm resistor is mounted to the dryer bulkhead, *Figure 20,* above the heater box. In the event of servicing, the resistor should be dealt with carefully, as it operates at a normal temperature of 250°. The primary function of the power resistor is to eliminate a short circuit when the silicon controlled rectifier, in the electronic dry control, is conducting D.C. current through the control. It is as stated before wired-in series with the timer motor to reduce the voltage to 85 Volts, in the timer motor operation.

ELECTRONIC CONTROL, *Solid State.*

Late model dryers have a solid state electronic control. Five components make up the electronic control system. These are described as follows:

1. The pushbutton temperature selector switch, which is mounted in the machine console, *refer to Figure 19A.*
2. The CUTSOM or TIMED cycle switch, *refer to Figure 19B.*

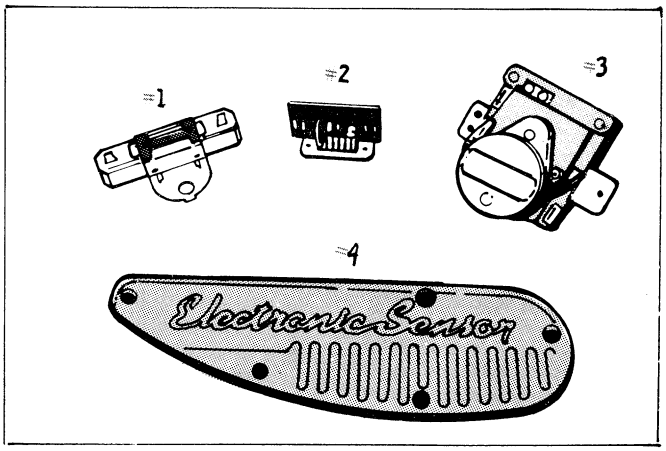


Figure 19

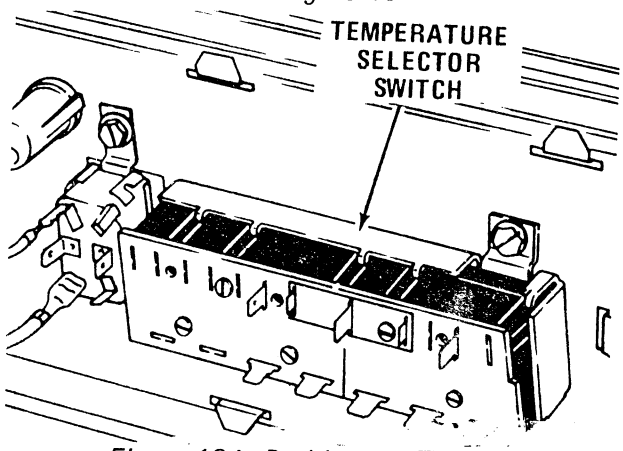


Figure 19A, Pushbutton Temperature Selector Switch.

3. The pushbutton group and printed circuit board (PCB) mounted together and connected by a wiring harness using quick-disconnect blocks, all comprise the Electronic Control, *Figure 19C and 19E.*
4. A "Push-to-Start" relay made up of three coils functions as the Push-to-Start feature. Two other coils and contacts are responsible for the drive motor and heater functions, *Figure 19D.*
5. The bulkhead mounted dryness sensor is the fifth component. The sensor is the same as on previous models.

To help in diagnosing problems of the electronics control a Tech Sheet is provided with each dryer. The Tech Sheet is stowed under a clip in the console as shown in *Figure 19F.* Always replace the Tech Sheet when service is completed.

Pushbutton Switch, Checking.

The pushbutton switch can be checked with an ohmmeter using the chart shown in *Figure 19G,* and *Figure 35.*

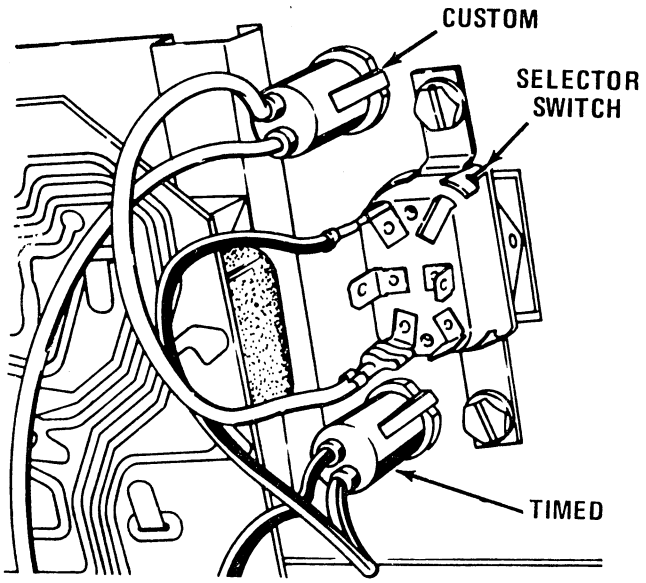


Figure 19B, Custom or Timed Selector Switch

Relay Contacts, Checking.

To check the contacts of the relay, disconnect the wiring harness, *Figure 19E.* Using an ohmmeter, check the contacts for continuity.

Relay Coils, Checking.

The relay coils can be checked for continuity at the connector using an ohmmeter.

ELECTRONIC CONTROL MODEL (LFE9800)

The LFE9800 model dryer has a solid state electronic control. Five components make up the electronic control system. They are:

1. The pushbutton temperature selector switch.
2. "Custom" or "Timed" cycle selector switch.
3. Electronic control which includes the pushbutton pack and printed circuit board assembly, mounted together and connected by a wiring harness with quick-disconnect blocks.

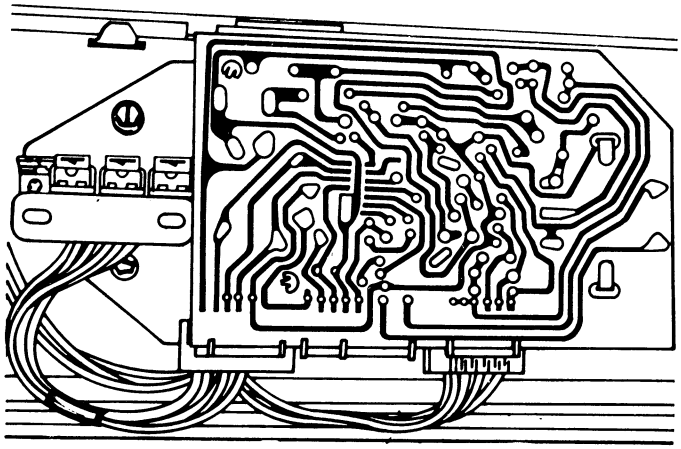


Figure 19C, Pushbutton Selector, Printed Circuit Board, and Harness Disconnect.

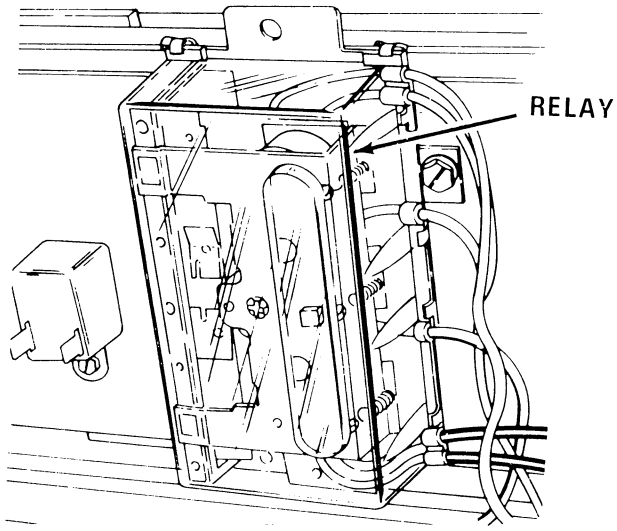


Figure 19D, Relay

4. The "Push-to-Start" relay which is a 3-coil relay that has the "Push-to-Start" function. The other two coils and contacts are drive motor and heater functions.
5. The fifth component is the bulkhead-mounted dryness sensor, which is the same as on previous dryer models.

SERVICING THE ELECTRONIC CONTROL DRYERS

All diagnosis of this dryer must begin with normal checks of line voltage, blown fuses, defective components, and loose or miswiring.

1. "Custom" or "Timed" Selector Switch

The CUSTOM or TIMED selector switch is a double-pole, double-throw switch. It is mounted to the control bracket in the console with two screws, *refer to Figure 19B.* The CUSTOM and TIMED indicator lamps are controlled by this switch.

This switch can be checked by using the following chart and an ohmmeter.

CYCLE SWITCH	AUTO	TIME
SW-SW1		
SW-SW2		
LS-LS		

Figure 19H. and *Figure 35.*

2. Pushbuttom Temperature Selector Switch

This switch is mounted to the console as shown in *Figure 19A.* The switch can be checked by using the following chart and an ohmmeter.

3. Relay

The relay is mounted to the control bracket as shown in *Figure 19D.* It is connected to the electronic control by a wiring harness with a quick-disconnect block, see *Figure 19E.* The coils of the relay can be checked at the connector, using an ohmmeter.

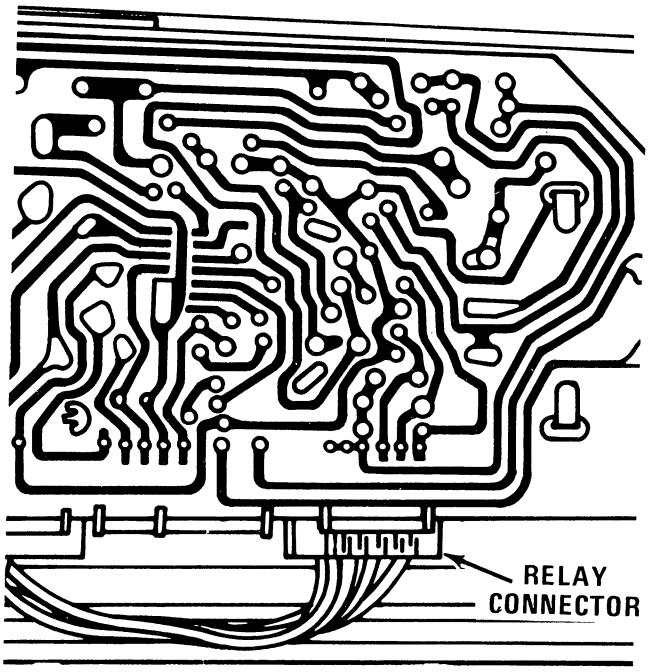


Figure 19E, Relay Disconnect

4. **Contacts**
   To check the contacts of the relay, the wiring harness leads can be removed and an ohmmeter used to check the contacts.

PUSHBUTTON SELECTOR AND ELECTRONIC CONTROL

The electronic control and pushbutton cycle selector are mounted on a common control bracket. This assembly is mounted to the console control bracket as shown in *Figure 19C.*

In most cases (unless a pushbutton pack button is missing or there is an obvious mechanical defect in the pushbutton assembly), the electronic control and pushbutton pack will be replaced as an assembly.

To help in diagnosis of the electronic control, a "Tech Sheet" is provided with each dryer. It is located under a clip in the console. After using the Tech Sheet always replace the sheet under the clip. See *19F.*

Information from the Tech Sheet for diagnosis of the electronic control is as follows:

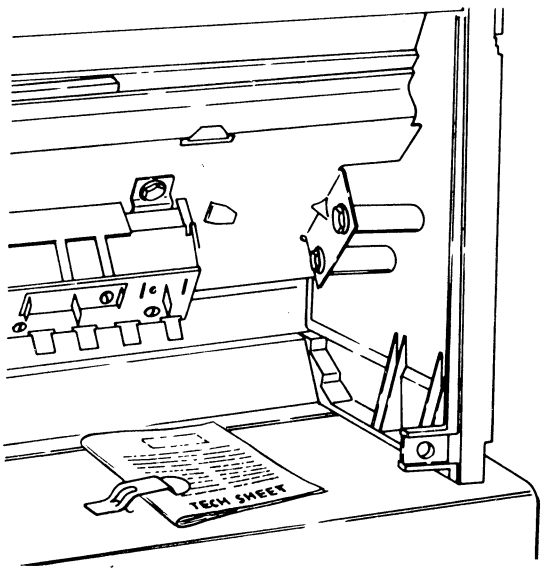


Figure 19F, Location of Tech Sheets.

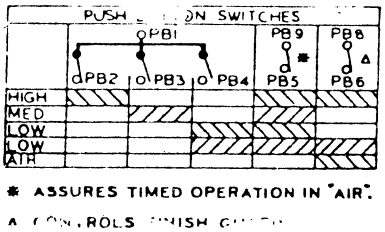


Figure 19G.

LHI ELECTRONIC CONTROL MODEL

The LHI9801 Model Dryer has solid state electronic controls. The components that make up the control system are:

1. Microcomputer Assembly
2. LED Display Assembly
3. Touch Module
4. 3 Coil Relay
5. Transformer
6. Speaker
7. Low-Voltage Operating Thermostats

SERVICING THE SOLID STATE ELECTRONIC CONTROL DRYER

When servicing this dryer:

1. A diagnosis of this dryer must begin with normal checks of line voltage, blown fuses and defective components.
2. All checks should be made with a meter having a sensitivity of 20,000 ohms per volt or greater.
3. Dryer door must be closed before making any tests on the electronic control system.

Microcomputer Assembly

The microcomputer assembly is mounted to the touch module with six screws, *refer to Figure 19J.* There are five wiring harness connectors attached to the microcomputer assembly. The connectors are:

1. Relay Edge Connector
2. Control Harness Edge Connector
   NOTE: *In Figure 19K both the relay connector and control harness connectors have holes in the connector for use as test points.*
3. Flexible Circuit Connector (latching)
   NOTE: *When replacing the flexible circuit connector into the latching mechanism, make sure to slide the flexible connector into the latching mechanism until the probes on the latch fit into the notches in the flexible connector. Refer to Figure 19L.*
4. Ribbon Cable Connector
   The ribbon cable connector has a barb that mates onto the pin connector. Use care when disconnecting the ribbon cable.
5. Speaker Pin Connector
   This connector is a two-pin quick-disconnect block that connects the speaker to the microcomputer assembly.

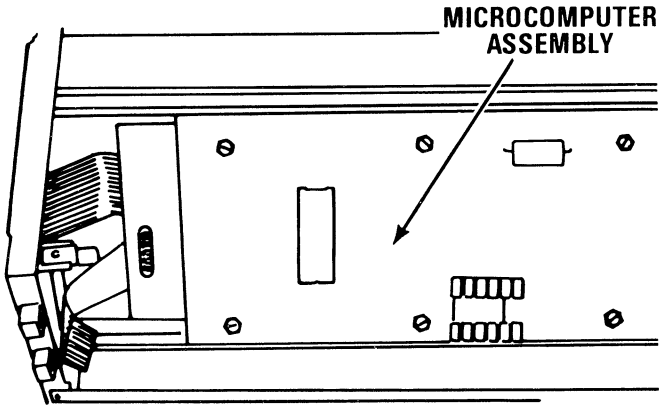


Figure 19J

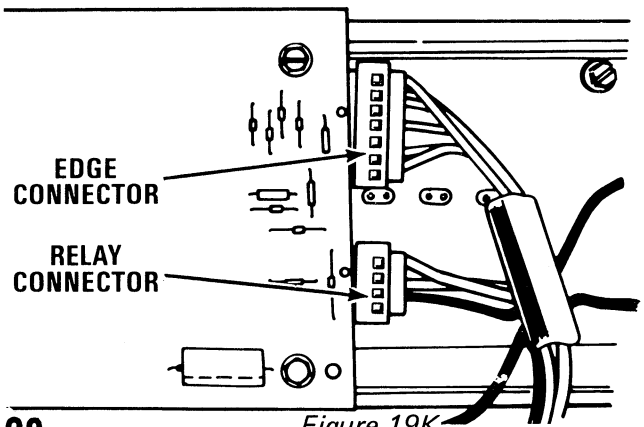


Figure 19K

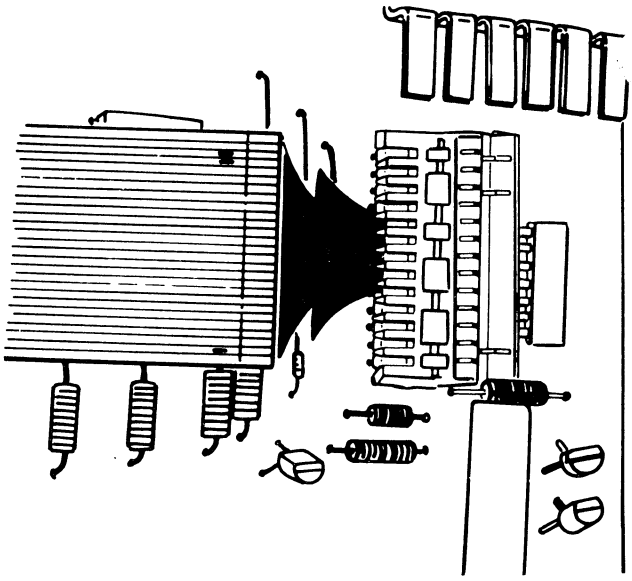


Figure 19L

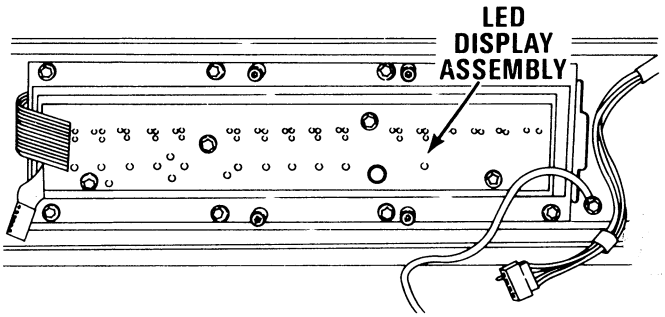


Figure 19M

LED Display Assembly

The LED Display assembly is mounted to the Touch Module with four screws, *refer to Figure 19M.* The ribbon cable with pin connector is attached to the end of the LED Display Assembly.

Touch Module

Eight screws mount the Touch Module to the controls mounting bracket. The following continuity diagram is in the tech sheet and can be used to trouble shoot problems in the Touch Module area.

3-Coil Relay

The relay is mounted to the control bracket with two mounting screws. The coils of the relay can be checked using an ohmmeter.

Transformer

The transformer is mounted to the console with two screws. The secondary voltage of the transformer is as follows:

TR3 to TR4 – 17 VAC
TR3 to TR2 – 17 VAC
TR1 to TR4 – 112 VAC

Speaker

The speaker and housing are mounted to the back panel of the console, *refer to Figure 19N.* To remove the speaker from the housing, use a thin-blade screwdriver to release the tabs that hold the speaker in place.

Low-Voltage Operating Thermostats

The medium- and low-temperature thermostats are in the low-voltage DC circuits. DO NOT apply 120 volts to these two thermostats, as failure will result.

NOTE: *Refer to the tech sheet information on the following pages for diagnosis of the 1980 Electronic Dryer.*

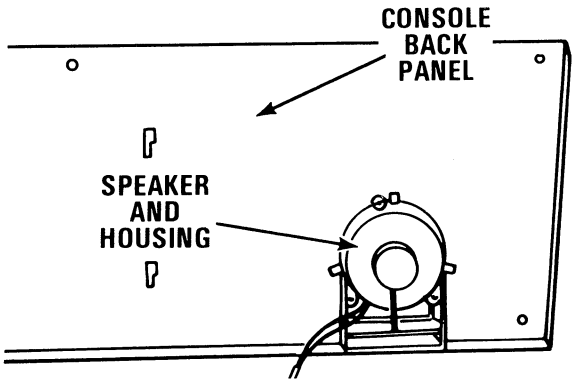


Figure 19N

POWER RESISTOR, ELECTRONIC CONTROL, TIMER MOTOR

Checking:

1. Disconnect the electric supply from the dryer.
2. Remove the electronic control board from its disconnect block.
3. Disconnect the leads from the timer motor and using a direct line test cord, apply 120 volts to the timer motor terminals.
4. The timer motor should run. If it does not operate, replace the timer motor. If the motor does operate, replace the electronic control.
5. Reassemble and rewire the components.

CYCLE SIGNAL

Some models feature a cycle signal. The device is located under the lint lid on top of the dryer. The sound level is adjustable by simply moving the lever. The signal is activated at the end of the cycle through the M6 terminal of the motor centrifugal switch. The signal continues for approximately three seconds while the motor is coming to a stop. The Cycle Signal can be checked with a continuity meter. Check the continuity of the signal coil. To place the Cycle Signal proceed as follows:

1. Remove two mounting screws.
2. Remove two screws securing top to air duct.
3. Raise top, disconnect signal wires and pull signal lever out of top.

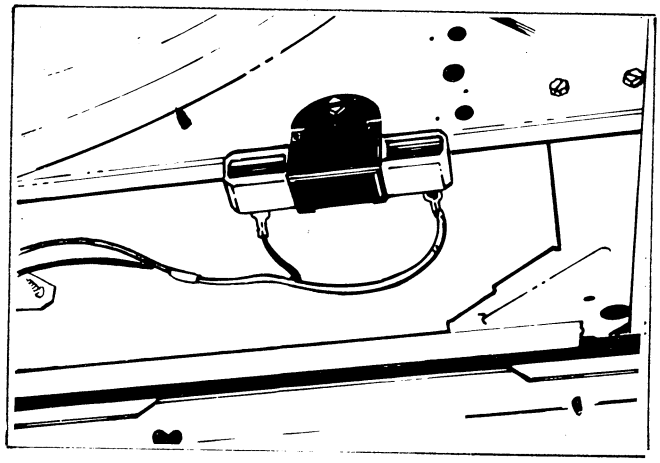


Figure 20

The timer assembly is attached to the control panel with two screws, *Figure 21.* Some dryers feature a two-cycle selection, the electronic cycle and the timed dry cycle.

The range of moisture retention, runs from a ten percent moisture retention, to bone dry, or a very dry setting.

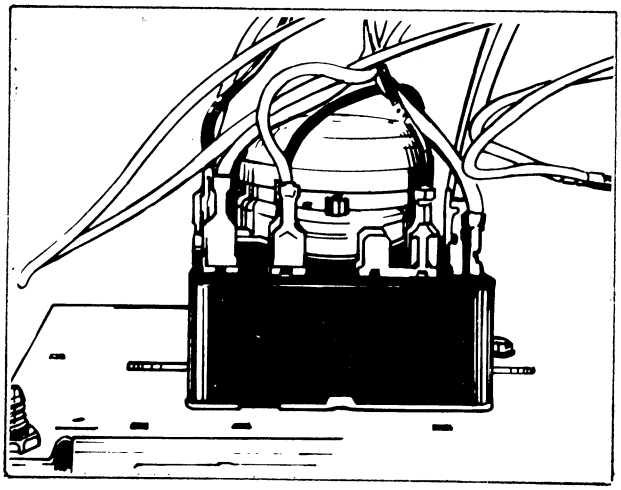


Figure 21

Figure 22 shows the electronic dry control as its wired paralled with the timer motor. It is fitted with a quick disconnect plug which mounts to the control panel. It cannot be installed incorrectly as it fits into the disconnect plug only one way.

The following makes up the internal components: Five resistors, a compacitor, a diode, a silicon controlled rectifier and a neon bulb.

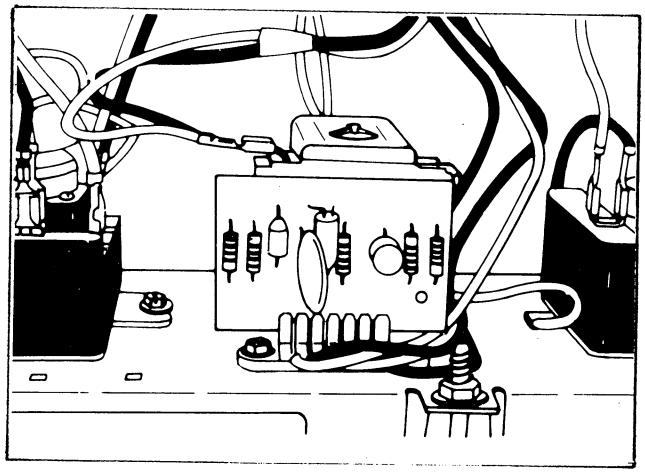


Figure 22

When moisture is detected by the bulkhead sensor, the control components are activated and help to create a D.C. bypass circuit, which stalls the timer motor. If replacement is necessary, the complete master control should be replaced as a single unit.

Timer Testing

The average dryer timer is easily tested with a continuity test cord. Disconnect the power supply to the dryer and set the timer for the regular cycle. Using a continuity test lamp shown in *Figure 6*, a circuit should exist between terminals Y and BG, main motor and timer motor circuit, terminal Y and R, the heating circuit.

The timer motor can be tested direct by attaching the clip of the continuity cord to the motor leads and replacing the lamp with a fuse. If the timer motor runs with this test, other components such as operating thermostats could be causing the malfunction.

The timers on all gas and electric dryers are easily reached for servicing. In many instances, the timer is removed by removing the knob and loosening the mounted screws and turning the timer body in the direction that will permit the screw heads to slip through the timer support. Other timers are easily removed from the machine by removing the complete timer and bracket as an assembly.

Chain Drive

Rotate the timer sprocket wheel to expose the timer mounting screws in the holes of the sprocket wheel, *Figure 23.* Remove the screw which retains

wheel, *Figure 23*. Remove the screw which retains the sprocket to the timer shaft and then loosen the two timer retaining screws. Hold the timer sprocket and drive chain, top and bottom, with one hand and pull forward to clear the timer shaft while rotating the timer slightly to disengage the retaining screws from the keyhole slots of the control panel. With the timer free of the control panel, it can be completely removed.

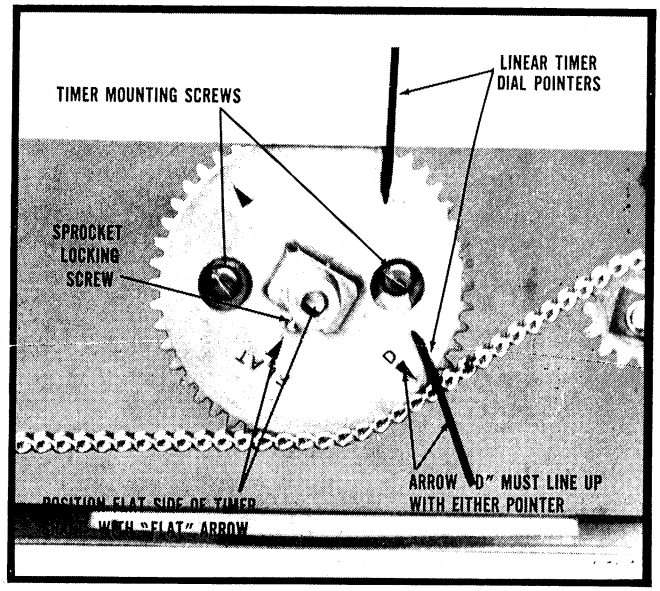


Figure 23

The timer sprocket has two markings to assist in proper re-installation and synchronization of the Linear Dial Indicator Chain, *Figure 23*. The sprocket must be assembled to the timer shaft with the reference arrow related to the flat of the shaft as shown. Next, install the sprocket locking screw. The arrow marked "D", near the outer periphery of the sprocket, is the alignment point used for proper positioning of the drive chain.

IMPORTANT: ***The chain must be installed with any one dial pointer in line with the arrow marked "D", in order to obtain synchronization of the dial pointer with the timer.***

SWITCHES

DOOR SWITCH

The door switch, located inside the front of the cabinet, *Figure 24*, is actuated by the door hinge. The door switch controls all the circuits to the motor and the motor controls the heat circuit. Therefore, when the door is opened, everything is shut off with the exception of the pilot burner and the drum lights.

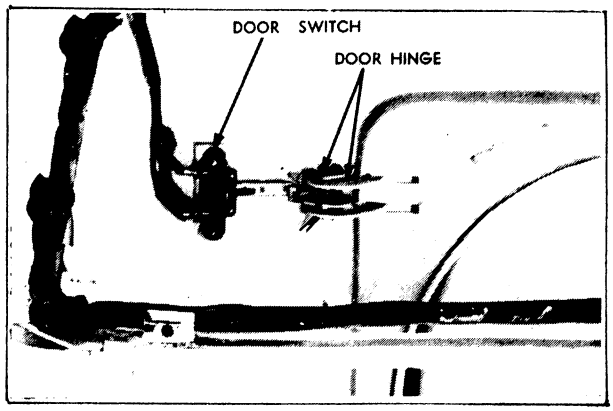


Figure 24

The door switch stops the timer motor and machine motor when the dryer door is opened. This safety feature allows the user to open the door for inspection during the drying cycle without risk of personal injury or clothes damage. On dryers that have a combination drum and ozone lamp, the door switch closes a second circuit to these lamps as the motor circuit is opened, permitting the drum lamp to remain on whenever the door is opened.

If the motor runs when the door is open, check to be sure the door switch is not jammed and that the lever actuating the switch is adjusted properly. Refer to the wiring diagram for correct hookup when replacing the door switch.

To replace the door switch on the early models, remove the cabinet top and the screws around the base of the cabinet to permit shifting the cabinet to gain access to the switch assembly. The switch mounting bracket and wire can now be disconnected to allow switch removal.

On the later model dryers, the switch has been relocated, and only the top need be removed or raised to gain access to the door switch.

To check door switch:

NOTE: Do not attempt to repair defective door switch, replace when necessary.

a. Use wiring diagram on machine.
b. Remove wires from switch, test for continuity.
c. Note that button is not binding on cabinet keeping switch depressed.
d. Adjust switch lever if necessary.

CENTRIFUGAL MOTOR SWITCH

The centrifugal switch on a gas and electric dryer is a safety devise that will stop the heat when the motor is stopped by operating the door or if the motor should fail. This switch is part of the main motor and will complete a circuit to the heat only when the motor is running at full speed.

On gas dryers equipped with a push-to-start switch, the centrifugal switch functions in the following manner, *Figure 25.*

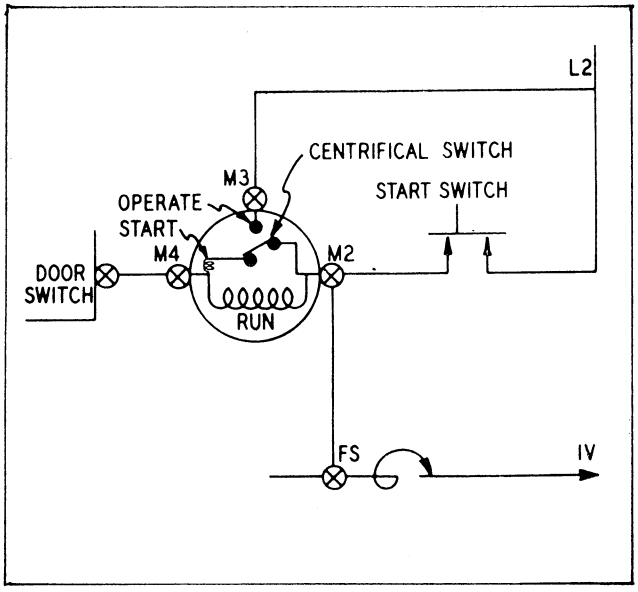


Figure 25

When the motor is stopped, the centrifugal switch connects the start winding to M2. When the start switch is closed, the motor starts. When the motor attains running speed, the centrifugal switch moves from start to operate, connecting M2 to M3. This circuit is paralled to the starting switch circuit. (Circuit holds until the motor stops.) Then, the centrifugal switch returns to its original position to connect the start winding to M2.

When the motor running, power should be present between terminals 3 and 4 of the centrifugal motor switch. This is checked with the use of a test lamp.

Figure 26 shows the centrifugal motor switch in the electric dryer circuit. When checking this switch, continuity should be present between terminals 1 and 2 with the motor running. It is best to remove the heater wires to prevent a feed-back through the circuit, when checking the switch. Use the continuity test cord shown in *Figure 6.*

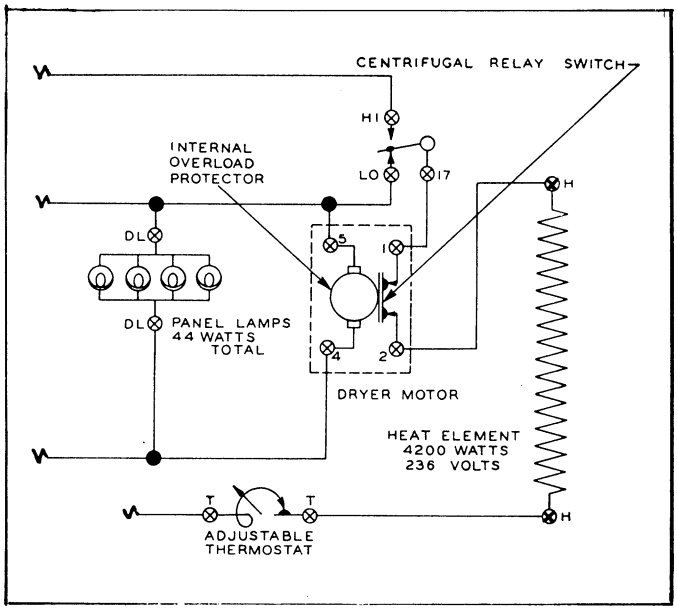


Figure 26

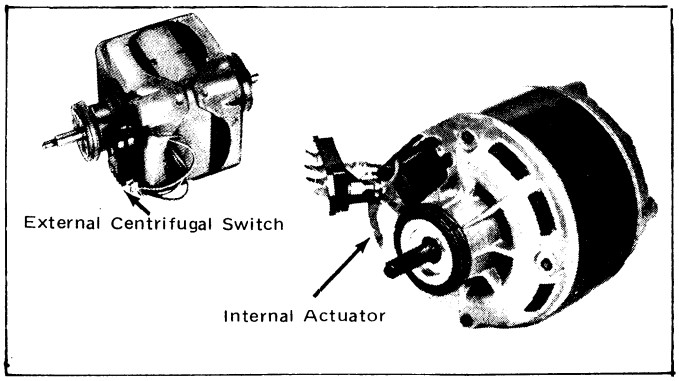


Figure 27

The centrifugal switch is mounted on the inside of the motor on the early models, the motor must be disassembled to install or repair a new switch. This is generally a shop repair and is not practical to attempt in a home. Quite often the motor bearings will have to be replaced also, so it is best that the motor be taken to the shop for repairs.

Later models have the switch mounted on the motor with two screws, *Figure 27.* The isolated or auxiliary switch for the heat is part of this switch assembly. The switch can be replaced in the field, and it is a good item to have handy on the service truck. The heater contacts in the switch will burn out as often as the phasing contacts.

To check the heating contacts, remove wires at terminals 1 and 2 at the motor terminal board (back part of the centrifugal switch) and connect these wires together. If the heater goes on because of the wire bypass, the switch should be replaced.

Designs will vary slightly due to the number of methods of switch actuation used by various motor suppliers. An installation sheet is supplied with each replacement switch. All switches are enclosed in a plastic case to keep foreign matter out of the switch contacts and to prolong the life of the switch. Motors using this switch no longer need to be replaced because of a defective switch.

CENTRIFUGAL FAN SWITCH

The centrifugal relay switch is a device which delays closing the heat element circuit until the motor is running at full speed rather than in its starting windings. If the heat element and the motor were started at the same time, the increased amperage load would be too great, resulting in fuse failures.

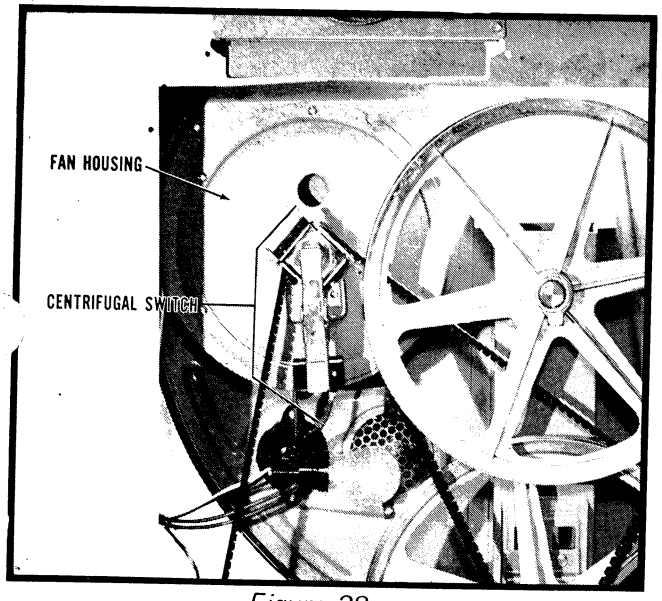


Figure 28

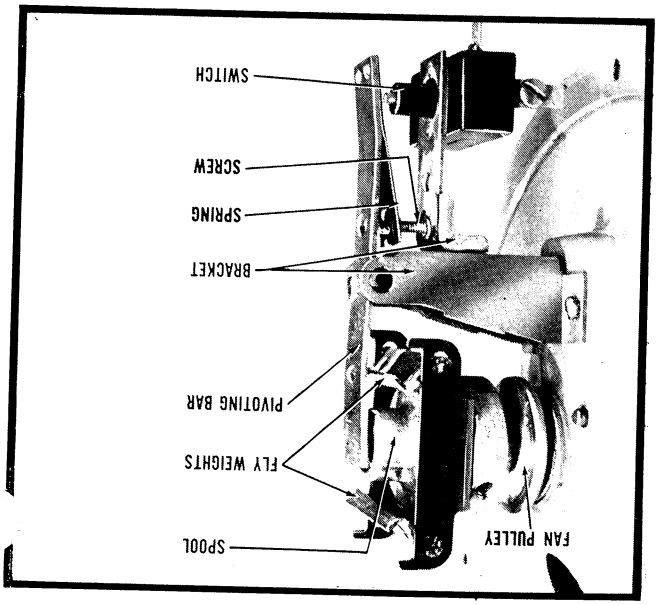


Figure 29

The centrifugal fan assembly is shown in *Figure 28*. *Figure 29* shows a more detailed view of this mechanism.

The spool and the bracket holding the fly weights are mounted on the end of the fan shaft and revolve with it. As the fan begins to turn, centrifugal force moves the fly weights away from the shaft, sliding the spool against the pivoting bar which, at its opposite end, actuates the switch.

Movement of this bar is also controlled by an adjustment screw and spring which has been set at the factory to allow the switch to close when the fan is turning about 2100 RPM. When the fan reaches this speed, the machine motor has stopped drawing high starting current and is almost up to full speed. This centrifugal switch will not open until the fan speed has decreased to about 1950 RPM. Consequently, normal changes in fan speed caused by overloads will not affect the action of this switch.

The centrifugal switch mechanism can be adjusted as outlined below.

The clearance between the switch button and the actuating arm, dimension "A", should be approximately 3/32 inches when the dryer is not running. The other end of the actuating arm should be touching the spool, *Figure 30*. To adjust this clearance, remove the switch and bracket from the blower housing and bend as shown by the dotted lines on the drawing.

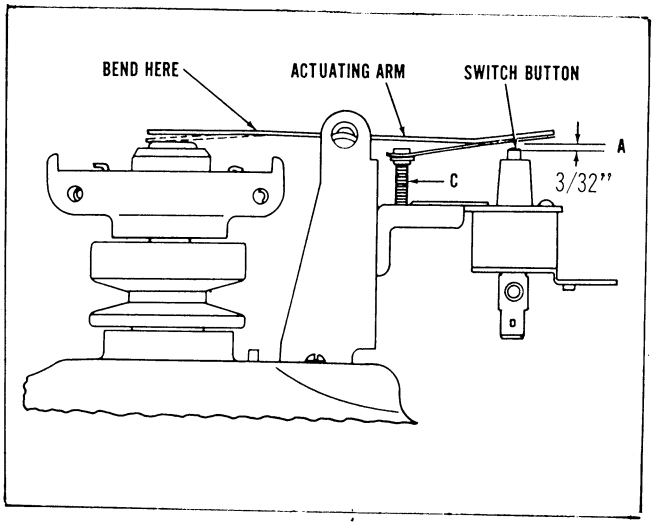


Figure 30

The adjustment screw "C" controls the amount of pressure required from the spool to force the arm to actuate the switch button. This adjustment screw should be changed only if the switch is completing the circuit to the heat element before the motor gets out of its starting windings, or if the switch fails to close this circuit when the dryer is running at full speed, adjust this screw by turning it either clockwise or counterclockwise to the exact point where the actuating arm closes the switch. Then, turn the screw 1/4 turn clockwise.

If the switch portion of this assembly is defective, the entire assembly should be replaced.

SOLENOID RELAY SWITCH

On the early model electric dryers, a solenoid switch assembly is used to close the circuit to the heater element, *Figure 31*. The solenoid circuit is controlled by the centrifugal switch of the motor. The solenoid portion of this switch can be checked with a 120 volt test cord. The continuity of the switch section of this assembly can be read with the solenoid closed.

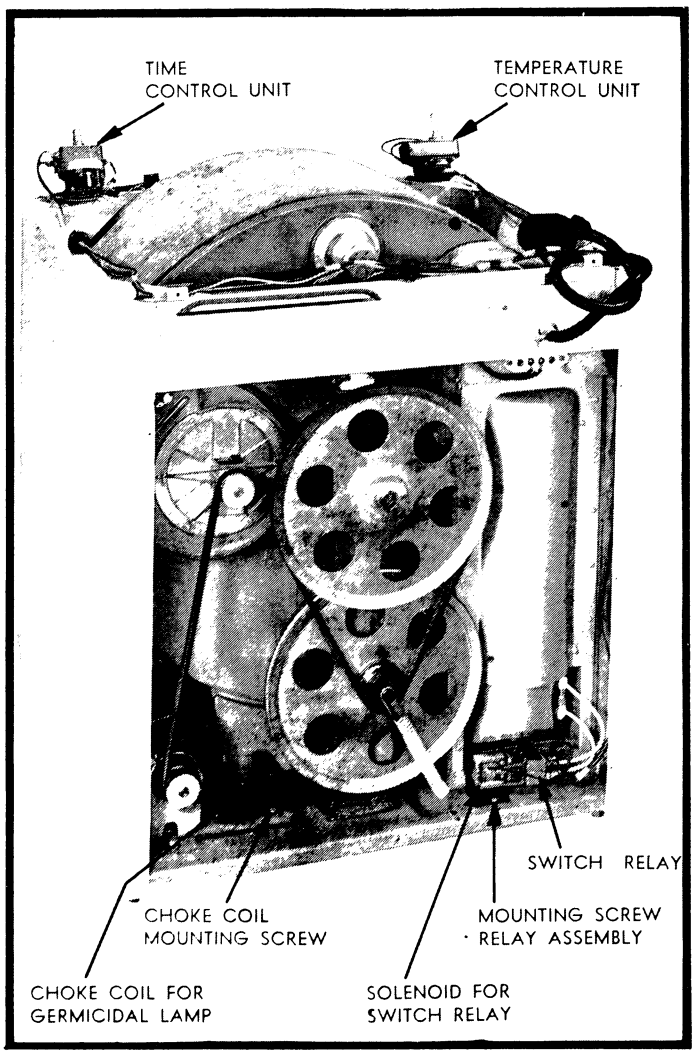


Figure 31

HEAT RELAY SWITCH

There are several types of heat relay switches used on various models of the electric dryers. On the single and dual cycle dryers where the timer runs throughout the cycle, the relay is a 230 volt switch, controlling one set of contacts (BL1 and BL2) which are normally open. These contacts are closed by a circuit from the timer through a thermostat and the motor centrifugal switch to the relay coil terminals A1 and A2.

Three Cycle Relay Switch

On the three cycle dryer, the relay switch is a double-pole, single-throw relay switch that provides a circuit to both the heat element and the timer motor, but not at the same time. The heat element circuit BL1 and BL2 is a normally open circuit which is closed by a 230 volt relay coil when it is energized. This action simultaneously opens a normally closed set of contacts, TX1 and TX2, thus opening the circuit to the timer motor. On the regular cycle, the timer motor operates only when the thermostat is satisfied.

Heat Element Relay

Due to the fact that the relay coil and heat element switch contacts of the heat element relay are in the 240 volt circuit, the proper operation of this component should be visually observed. Contacts BL1 and BL2 should be closed, completing the heat element circuit, when the relay coil is energized. The timer motor contacts TX1 and TX2 should be open. When there is no voltage applied to the relay coil, contacts BL1 and BL2 should be in a normally open position and contacts TX1 and TX2 should be in a normally closed position. If either set of contacts or the coil is faulty, the relay assembly should be replaced.

Modulating Relay Switch

A modulating relay switch is used only on the electric dryer models which have one or more automatic drying cycles. It is equipped with a double-pole, single-throw switch, with one set o contacts in a normally open position and the other set normally closed. It is mounted to the lower left hand side of the bulkhead assembly.

The function of this relay is to open the heat element circuit when the proper drying temperature is reached. The heat element contacts RO and RO1 are opened when the relay coil circuit is opened by the action of the operating thermostat.

Simultaneously, the timer motor contacts NC and NC1 of the relay switch are closed (automatic cycle dryers), completing the timer motor circuit. The timer motor will run until the air flow temperature passing over the operating thermostat drops sufficiently to allow the thermostat contacts to close.

When this occurs, the relay coil becomes energized and closes the heat element contacts of the relay switch, thus energizing the element. By the same switch action the timer motor contacts of the relay switch are opened and the timer motor is deenergized, stopping advancement of the timer.

The modulating dryers use a hot wire relay. The hot wire element is operated by the 11 volt output from a step-down transformer. Contacts open and close by expansion and contraction of the element wire. The element circuit A and A1 is controlled by the exhaust sensor thermostat, *Figure 32*.

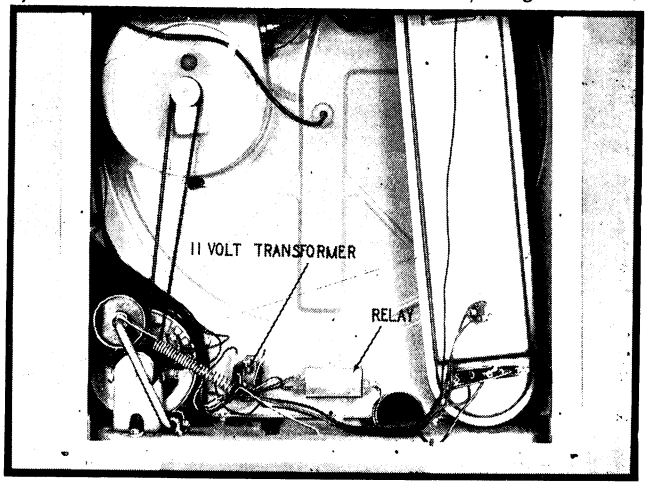


Figure 32

A step-down transformer (230 to 11 volts) is used to provide the 11 volts to the relay element coil terminals A and A1.

NOTE: ***ALWAYS USE A STEP-DOWN TRANSFORMER ATTACHED TO THE RELAY ELEMENT 'A' AND 'A1' WHEN TESTING THIS RELAY SWITCH. The element of the relay will not handle large voltage without burning out.***

The switch contacts can be tested for continuity at terminals NC and NC1 or normally closed, and terminals RO and RO1 or normally open. Energizing the relay element with 11 volts reverses the contacts of this switch.

Main Burner and Timer Motor Relay Switch

This relay is used only on the gas dryers which have one or more automatic drying cycles. It is equipped with a single-pole, single-throw switch, the contacts of which are in a normally closed position. It is mounted to the lower left side of the drum support post of the base and bulkhead assembly, *Figure 33*.

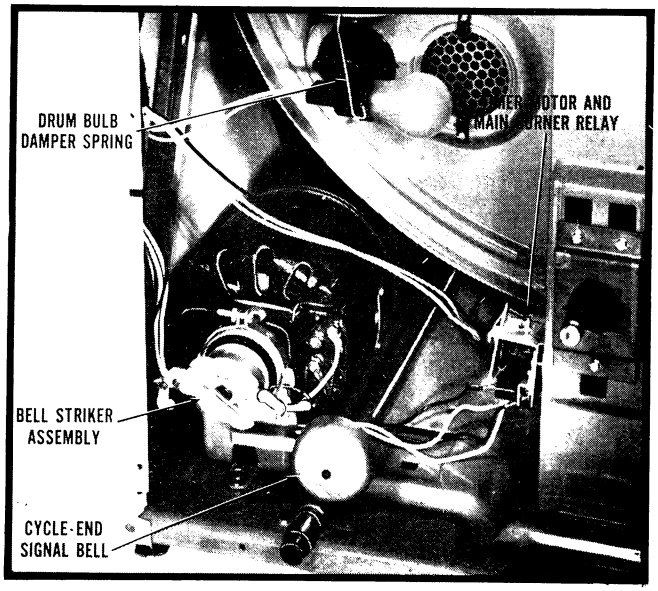


Figure 33

The function of this relay is to complete the timer motor circuit when the operating thermostat reaches its calibrated temperature and opens the circuit to the relay coil and the main burner solenoid coil, also referred to as the cycling valve. When this happens, the timer motor will start and the timer dial pointer will advance along the timer schedule. The main burner solenoid coil and relay coil will remain deenergized until the air temperature, flowing over the operating thermostat, drops sufficiently to allow the thermostat contacts to reset.

When the thermostat contacts reset, the main burner solenoid coil and relay coil become energized. Simultaneously, when the relay coil is energized, the timer motor is deenergized by the opening of the relay switch contacts by the action of the relay armature.

These electrical controls and wiring are easily accessible for service or inspection by removing the back panels. The rest of the controls can be serviced by either removing the console back panel or removing the top.

NOTE: *Be sure to study the wiring diagram for the particular dryer you are servicing.*

AIR HEAT SWITCH

Some dryers feature an air-heat switch. It may be a pushbutton or rotary type switch. This switch must be set on HEAT when a drying cycle has been selected. Setting the switch on AIR provides a cycle without heat, used for fluffing or air dry garments only. The air heat switch is located in the heat circuit and controls either the heating element, relay coil, or burner assembly. Check this switch with a continuity test lamp.

SELECTOR SWITCH

The selector switch, also known as the Fabric Switch, when set on High closes the 230 volt circuit to the heating element terminals HI and 17. When set on Low, terminals LO and 17, a 120 volt circuit is closed to the element. If this switch has an air setting, neither of the above circuits will be completed if the air setting is selected. If the leads HI and LO are reversed, the dryer will perform exactly opposite. Some of the gas dryers feature this same type of switch, using a circuit containing a low setting fixed thermostat. This thermostat cycles the burner on and off so that a temperature of around 115° F. is maintained, *Figure 34*.

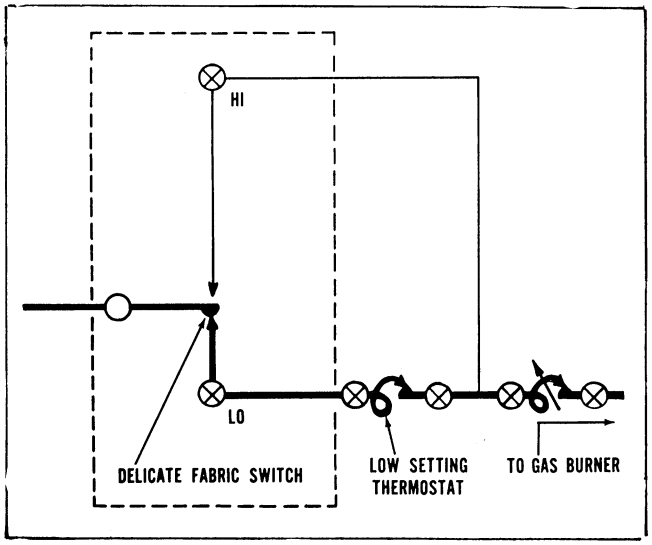


Figure 34

On some of the later model dryers, a pushbutton selector switch is used. These switches give 3, 4, or 5 different selections such as in *Figure 35*, and incorporate a push-to-start switch. When a button is depressed, it makes the circuit selected and also closes the contacts PB and PB7 on the push-to-start switch. When the button is released,

	SELECTOR SW.			
	SW4		SW	SW2
	SW5	SW6	SW1	SW3
SUPER		X	X	X
GENTLE	X			

	SWITCHES					
	PB1					PB
	PB2	PB3	PB4	PB5	PB6	PB7
HEAVY	X				X	CO
REG		X			X	CO
W'N W		X				CO
DEL			X		X	CO
AIR				X		CO

X- CLOSED

CO - CLOSED MOMENTARY ON OVERTRAVEL

Figure 35

the contact of the push-to-start switch opens, but the dryer continues to run through the circuit selected by the pushbutton. If the dryer is stopped before the end of its cycle, the selected button must be again pressed to energize a circuit to the motor through the push-to-start switch.

Q.S.O. SWITCH

Quick shut-off is featured on gas dryers equipped with automatic ignition gas-burner assemblies. Quick shut-off operation varies with the type burner used.

The quick shut-off feature prevents the flow of raw gas through the main burner, when the dryer cycle is interrupted by opening and then closing the door before the pilot switch returns to the cold

position. With QSO, when the door is closed, the pilot valve remains closed until the pilot switch returns to the *cold* contact. Then the burner will cycle normally, first igniting the pilot, then the main burner.

Gas dryers equipped with quick shut-off can readily be identified by examining the pilot switch

assembly. The quick shut-off pilot switch has a ceramic-type resistor mounted to the bottom of the switch box, as shown in *Figure 36*. This resistor is connected to contacts 1 and 4 on the interior of the pilot switch assembly.

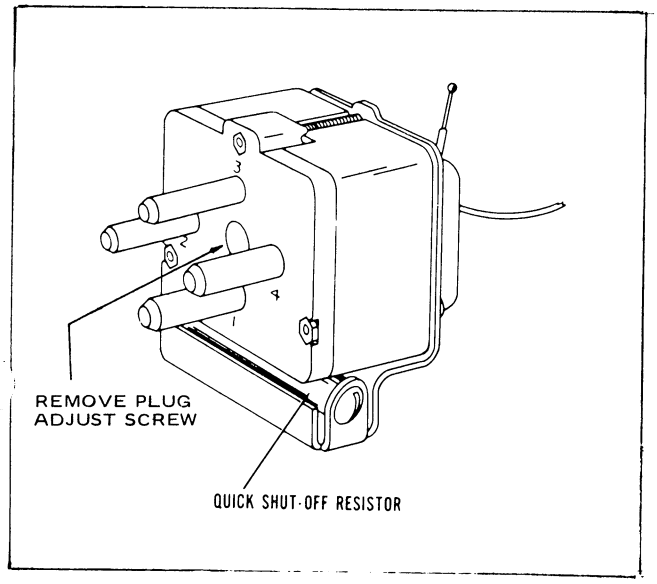


Figure 36

With the pilot switch arm in the COLD position, the resistor is in series with the pilot solenoid coil but is also in parallel with the switch arm, and is ***shunted*** by the switch arm. This allows full voltage, or approximately 115 volts, to be impressed on the pilot solenoid coil in order that the pilot solenoid coil can produce sufficient magnetism to raise the pilot plunger assembly, thereby permitting gas to flow to the pilot burner.

Due to the fact that the resistor is ***shunted*** by the switch arm, it has no effect on the operation of the pilot solenoid coil as electricity will always follow the path of least resistance.

When the mercury in the capillary tube reaches the proper temperature to vaporize and cause the switch arm to move from the COLD to the HOT position, the pilot coil resistor then causes the voltage impressed on the pilot coil to drop to approximately 90 volts. This is sufficient to allow the coil to hold the pilot plunger assembly in the raised position, thereby permitting a continued flow of gas to the pilot burner.

The mercury switch can be adjusted in many cases by removing round plug as indicated in *Figure 36*. The brass adjusting screw is visible through this hole after plug has been removed. If mercury tube is broken it is beyond adjustment and assembly should be replaced.

Should the clothes door of the dryer be opened during the cycle, the circuit to the pilot solenoid and main burner solenoid coil will be opened by action of the door switch, shutting off the pilot and main burners. If the door is closed before the mercury in the capillary tube of the pilot switch assembly has cooled sufficiently to allow the switch arm to return to the COLD position, there will be no flow of gas to the pilot burner. This is because the resistor is in series with the pilot solenoid coil and with the switch arm still in the HOT position, the drop in voltage, to approximately 90 volts, is not sufficient to permit the pilot solenoid coil to lift the pilot plunger assembly. This action eliminates the flow of raw gas through the pilot and main burner for the length of time it takes the pilot switch arm to return to the COLD position and reignite the pilot burner.

The quick shut-off on the White Rogers Assembly is accomplished by switch function responding to the pilot coil magnetism. A frame type bracket is mounted over the dual coil assembly and supports the mechanical quick shut-off switch as in *Figure 37*. Below the QSO Switch is an armature that

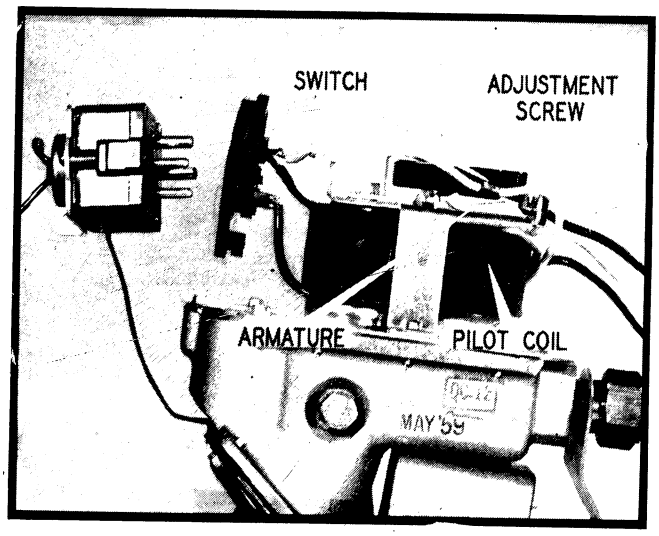


Figure 37

pivots on a fulcrum point. Pilot coil magnetism attracts the armature causing it to pivot and actuate the switch. The switch and solenoid coils are readily replaceable, however, readjustment of the mounting bracket is required when reassembling.

An adjusting screw and locknut are used to regulate the armature stroke to properly activate the switch. This switch assembly should be calibrated to close as soon as the pilot coil is energized. The pilot coil now remains energized through the QSO switch until the circuit to the burner is broken, either by opening the door, power failure, or the timer completing the cycle. If the pilot fails to ignite, the resistor in the warp switch opens the circuit to the pilot coil. Since it requires the magnetism of the pilot coil to close the QSO switch, the burner assembly does not function. The timer continues to run to the off position if not manually turned off.

Another style of QSO switch is shown in *Figure 38*. It is a single-pole, double-throw, relay type switch, which is also actuated by the magnetic pull of the pilot solenoid. The quick shut-off circuitry will function if the burner operation circuit is momentarily interrupted for any reason; this action deenergizes the pilot and the main burner flame goes out.

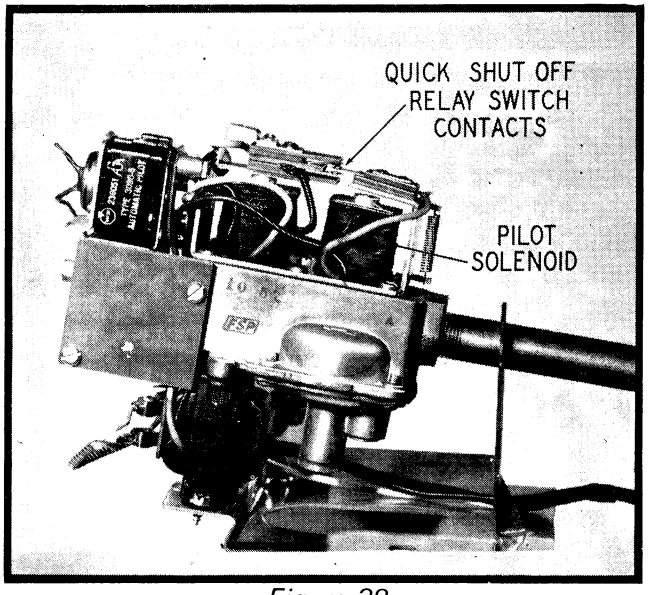


Figure 38

The Dole burner assembly, *Figure 39*, has a different method of pilot solenoid control which acts as a QSO feature. This solenoid is actually two solenoids built into one core. Both are energized at the start of the cycle until voltage is removed from the pull segment by the pilot switch moving to the Hot position. This leaves only the holding coil in the circuit. Any interruption of the electrical circuit to the burner assembly allows the plunger of the pilot valve to drop, closing off the gas supply. Gas must flow through the pilot valve first before the main burner can be supplied. Failure of any component mounted on the panel assembly should not be repaired or adjusted, but replaced as an assembly.

NOTE: A "Quick shut off" (QSO) resistor is used in the valve circuit of all spark ignited Whirlpool gas dryers. This prevents gas spillage under certain operating conditions. The resistor is usually found under the switch box as shown in Figure 36, or mounted over the dual coils as shown in Figure 37. A defective QSO resistor will cause intermittent flame action. For example: Let's assume that the ignitor has established a flame. The ignitor will then cut off after the sensor has sensed the intensity of the flame. If the flame goes out at the same time the ignitor goes off it would indicate that the QSO resistor is defective.

TO TEST: The QSO resistor jump the resistor with a insulated wire then start the dryer in operation. The flame should stay on when the ignitor goes off. The flame should only go off when the thermostat is satisfied.

THE QSO RESISTOR MUST BE REPLACED IN ORDER TO HAVE A PROPERLY FUNCTIONING AND SAFE DRYER.

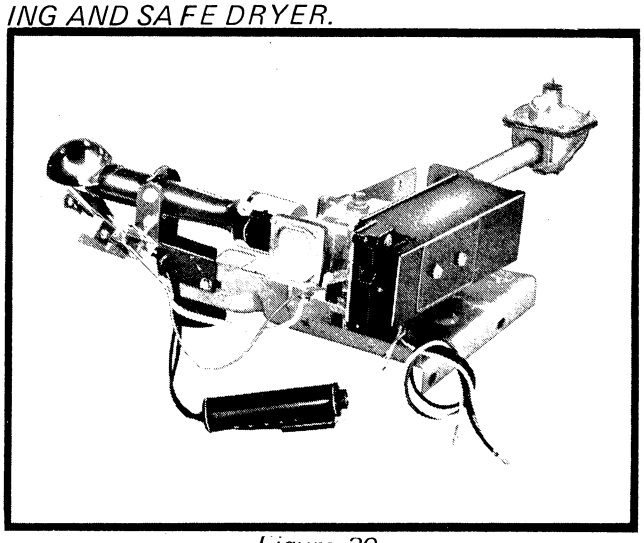
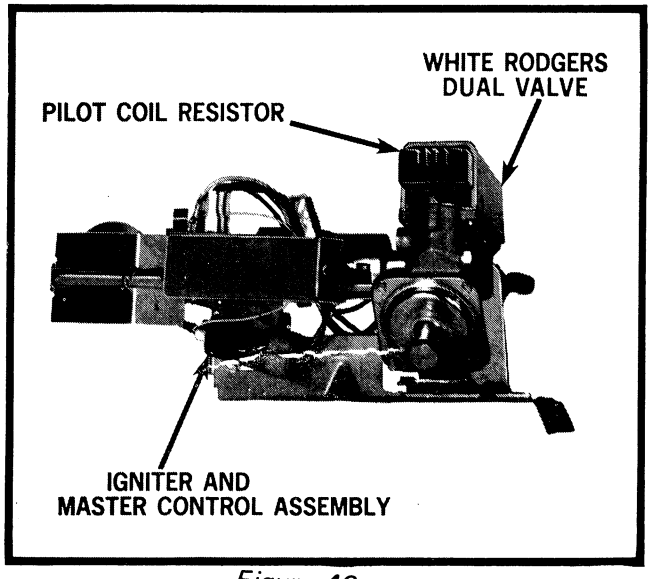


Figure 39



The new type Direct Ignition Assembly, *Figure 40*, is very similar to the two coil solenoid just mentioned, except instead of a two coil solenoid, a 900 ohm resistor is used in series with the pilot solenoid. This resistor reduces the voltage to the pilot coil but it is sufficient to maintain the pilot valve in the open position until power is interrupted.

THERMOSTATS

FIXED THERMOSTATS

A fixed thermostat, *Figure 41*, is composed of a bi-metallic disc that ***snaps*** from a normal position to an opposite position when sufficiently heated. This bi-metallic disc operates a single-pole, single-throw or double-throw switch which, in its normal closed position is wired in series with the gas burner or heating element circuit.

Fixed thermostats are used as operating thermostats on some models as well as safety devices. They are located in either the heat-exchange cover, bulkhead, or fan-scroll housing, *Figure 42*, depending on the requirements of different dryer models. When a thermostat is used as a hi-limit or safety device, its purpose is to break the circuit to the heat source if the adjustable or fixed operating thermostat fails, or if other mechanical failure causes abnormal temperature rises not detected by the operating thermostat.

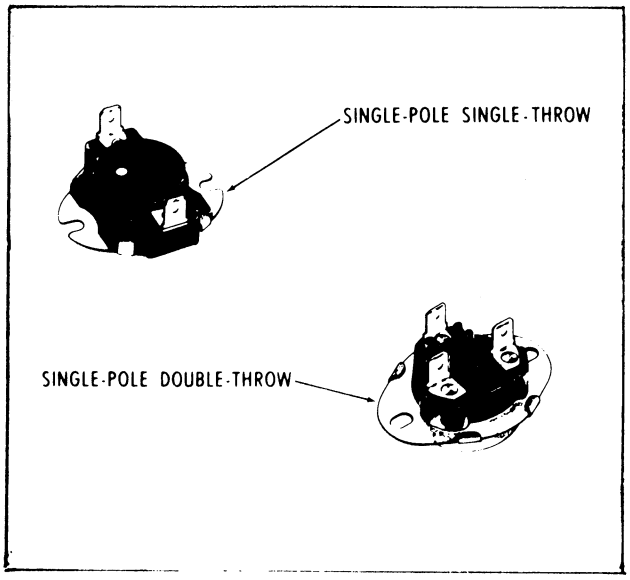


Figure 41

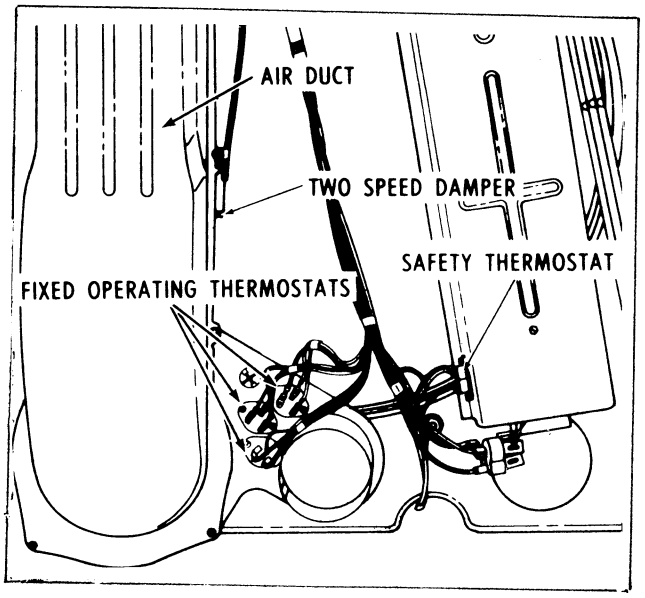


Figure 42

Dryers featuring a three-cycle timer having Regular, Delicate and Wash'n Wear cycles are equipped with two operating thermostats. One temperature thermostat provides a high degree drying temperature for Regular and Wash 'n Wear cycles. The other temperature thermostat provides a lower degree drying temperature in the Delicate cycle. Both thermostats, through normally closed contacts, provide circuits to the gas burner or heating element assembly. When the drying cycle reaches the designated cut-out temperature, the thermostat switch throws to the other contact providing a circuit to the timer motor in the automatic cycles.

These fixed thermostats are calibrated in different degrees for the open or closing temperature as to their use. The correct thermostat range of degrees should be used when replacing a thermostat. The calibration of these fixed thermostats range from 115° F. to 245° F. opening temperature. With this wide range of calibration it can easily be seen the substitution is hazardous. The open disc fixed thermostat increases the sensitivity of the control and permits a narrower temperature differential.

NOTE: ***Fixed thermostats are accurately adjusted and permanently sealed at the factory. No adjustments or repairs can be made in the field.***

To Check Fixed Thermostats:

Note: *Fixed thermostats are accurately adjusted and sealed at the factory. No adjustments can be made or are required if the thermostat proves defective. A defective thermostat should be replaced. See Figure 44A.*

thermostat when dryer is cool. Normal contact position "closed".

2. If safety or fixed thermostat functions, assume the operating temperatures to be correct.
3. When removed, fixed thermostats can be checked by placing them face down in an electric fry pan with an adjustable thermostat. Use a test light for functional check.

To Remove Fixed Thermostats:

1. Remove rear service panel — six screws.
2. Disconnect wires from thermostat.
3. Remove two screws securing thermostat to heater box or fan housing.

High Limit Thermostat

When a fixed thermostat is used as a hi-limit or safety device, its purpose is to break the circuit to the heat source should the adjustable or fixed operating thermostat fail, or in the case of some other mechanical failure not detected by the operating thermostat.

When testing the hi-limit or safety thermostat, it is necessary to by-pass the other thermostats in the circuit in order to make the safety thermostat cycle.

ADJUSTABLE THERMOSTAT

An adjustable thermostat, *Figure 43,* is a device for converting heat into mechanical motion which in turn opens or closes the circuits supply current to the heat element on the electric dryer or to the gas burner on a gas dryer. Its components are a thermal bulb and capillary tube, an expanding wafer, a switch and a control screw.

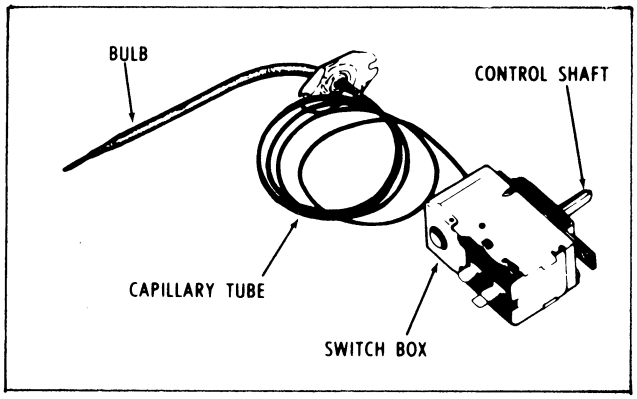


Figure 43

This control is located on the console. The control screw gives varying pressures to the wafer disc. Thus the term adjustable.

The bulb is inserted into the air stream (in the exhaust fan housing). As the exhaust temperature rises, the liquid in the bulb vaporizes causing a pressure which is transmitted back to the control through the capillary tube. This pressure causes the wafer to expand which in turn opens the contacts in the switch and breaking the electrical circuit to the heat source, *Figure 44.*

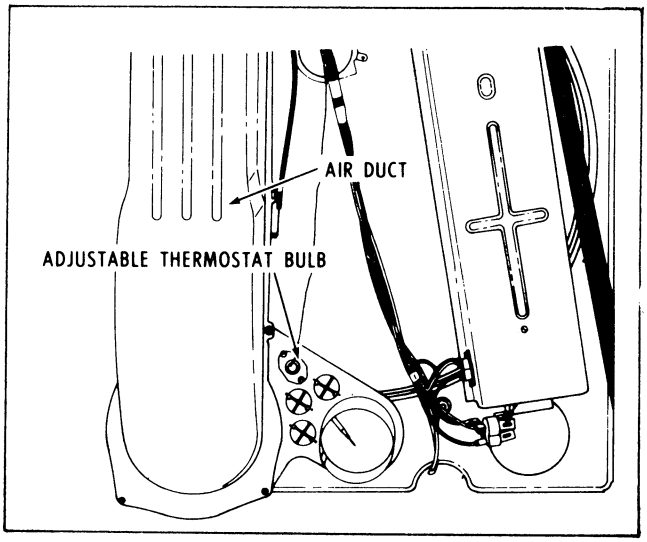


Figure 44

To Check Adjustable Thermostats:

1. By-pass the thermostat by connecting both wire leads to one terminal. If the heat element operates, replace the thermostat.
   Caution: *Never operate the dryer for more than a few moments when any thermostat is by-passed.*
2. If slow drying, i.e. low drying temperature, is caused by the operating thermostat, it should be replaced. Be sure the bulb end of the capillary tube fits closely on the inside of the fan housing. Improper placement can cause a lint build-up around the bulb, which can hinder its proper action.

If the thermostat does not open the heating circuit at the proper temperature, it should be replaced. If slow drying or low drying temperature is caused by the operating thermostat, it should be replaced.

To Check A Heater Box Thermostat:

1. No clothes load in dryer.
2. Remove exhaust duct from dryer.
3. Completely block dryer exhaust outlet with tape or by other means.
4. Shunt all fan housing thermostats.
5. Use a suitable means to determine if heater box thermostat is open or closed. A test light across the thermostat terminals is a good method, or a voltmeter across the gas valve coil is another good method.
6. Turn dryer on and allow thermostat to cycle once.
7. On subsequent cycles, a good thermostat will trip between 21 and 38 seconds.

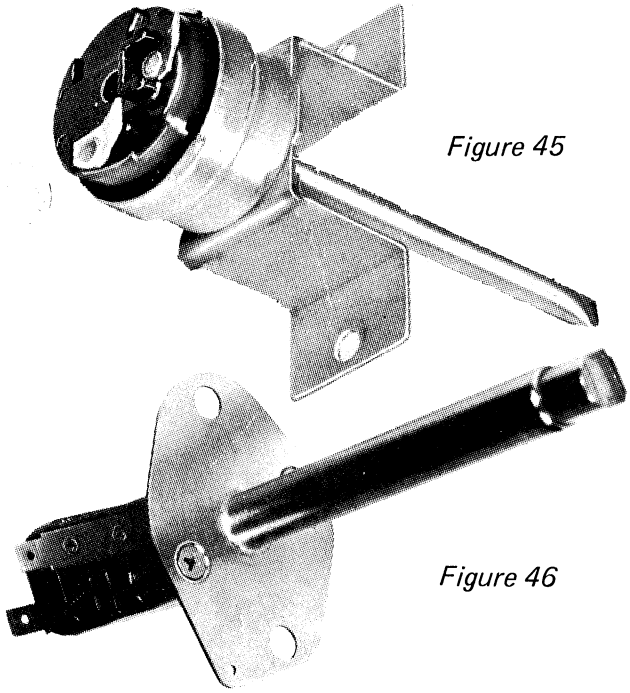


Figure 45

Figure 46

SENSOR THERMOSTAT

Sensor type thermostats, *Figure 45 and 46,* have protruding rods that extend into the air stream. They are used as inlet and exhaust air temperature sensors and are of a single-pole, single-throw type with contacts normally closed. Inlet sensors protrude into the inlet air stream. One function is to provide a circuit to the timer motor during the cool down period. Sensor contacts also return to the normal closed position when minimum modulated heat input will maintain maximum exhaust temperature.

A 1/8" thick metal washer is used under each side of the thermostat mounting, as a spacer, to properly position the sensing rod in the inlet air stream. Adding a 1/16" metal washer will increase moisture retention of the load at the end of the cycle.

Installing a 1/16" metal washer in place of the original 1/8" metal washer will decrease moisture retention. This 1/16" plus or minus adjustment will vary moisture retention about two percent.

On later models, the inlet sensor is mounted to an adjustable bracket that is cable linked to an adjustment lever on the console, *Figure 46A.* The lever will adjust the sensor in or out to provide the degree of dryness desired. Once the satisfactory position

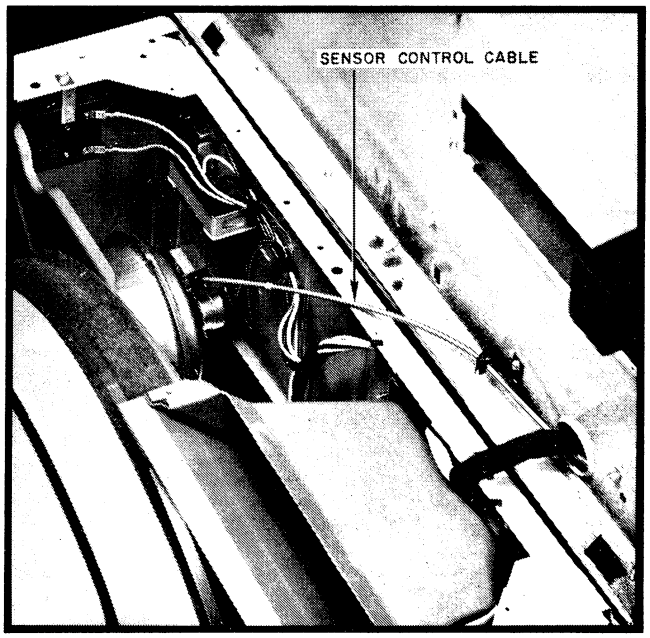


Figure 46A.

is found, it requires no further adjustment. The sensor mounted in this fashion also serves as an operating thermostat in the drying cycle.

LIGHTS

DRUM LIGHT

The drum light is a 40 watt bulb that serves a dual purpose; it furnishes light for the drum inter-

ior and also acts as a ballast to cut down the voltage for the ozone lamp. Both lamps wired ir series must be good for either lamps to light. These lamps remain on during the entire drying cycle or when the clothes door is opened.

OZONE LIGHT

The ozone or germicidal lamp which operates throughout the entire cycles creates a faint blue glow. This lamp generates ozone, ultra violet and infra-red which helps to purify and sterilize the clothes. It is a 4 watt, 12 volt lamp that needs either a choke coil or 40 watt lamp in series with it to test or operate. It will not take 120 volts live test. Its average life is approximately 2500 hours, and should be replaced if it loses its blue glow.

MOTORS

The earlier motors have an internal centrifugal switch. It was necessary to disassemble the motor for repairs or replacement. Newer type motors have an external switch, which also has the isolated or auxiliary switch in the same unit, *Figure 47.* This centrifugal switch can be replaced in the field

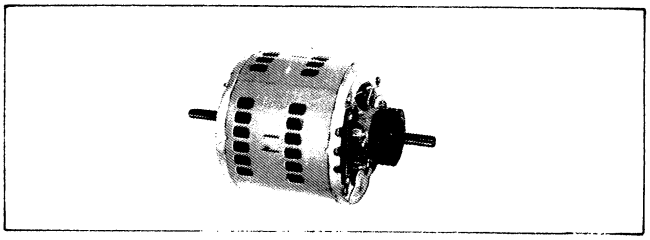


Figure 47

without removing the motor. In current model dryers the "T" frame motor is used, see *Figure 48.* The "T" frame motor is a throw-away motor. When it has been determined that the motor and

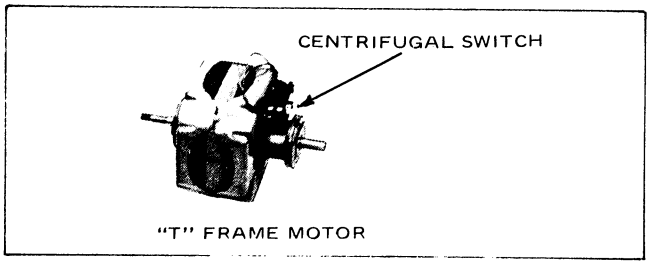


Figure 48

not the centrifugal switch is at fault, the "T" motor must be discarded and replaced. If a condition exists where there is no heat to the dryer and the isolated or auxiliary switch is suspected, remove wires from terminals 1 and 2 and connect these wires together. If the heat, comes on a defective switch is indicated and must be replaced.

If motor fails to start, remove switch from the motor by removing the switch mounting screws, located at the sides of the switch (two screws). Remove the wires from the inside of switch, take note of terminals the wires are removed from.

With an ohmmeter, test across *orange* or *blue* to *yellow*, it should read out to approximately 2 ohms. Test across *orange* or *blue* to *black,* this should read from 4 to 5 ohms. Test from motor case to any or all of the wires for grounded winding. If read out is incorrect, motor will have to be replaced.

Figure 49 shows the internal wiring hook-up, refer to this schematic in testing procedures

Symbols

E = Emerson motor
GE = General Electric motor

Note the color code difference.

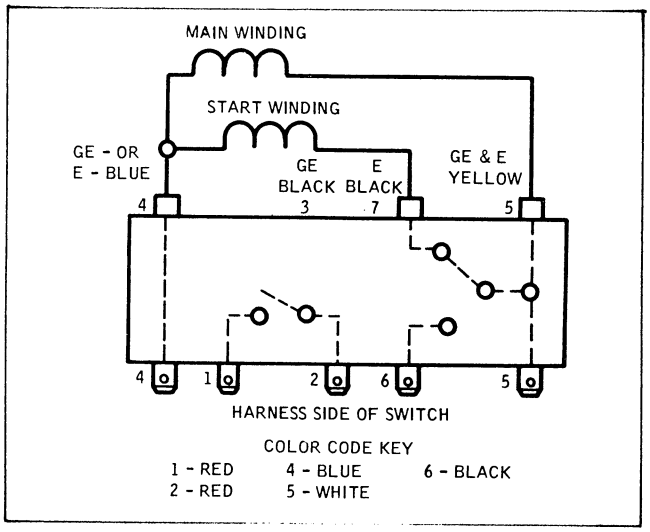


Figure 49

TO TEST MOTOR WITHOUT AN OHMMETER

If an ohmmeter is not readily available, a simple method of testing the motor with an easily constructed test cord is outlined in the following test. A similar cord the,Gemline TC-6, is available through your local appliance parts distributor, *Figure 50.*

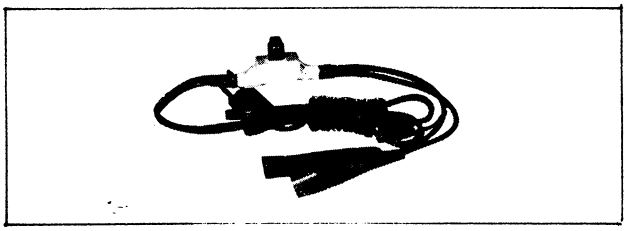


Figure 50

Constructing a test cord for split-phase motors, *Figure 51.*

1. Any two wire cord of at least 16 gauge wire can be used. Be sure it is long enough to reach from the wall outlet to the area test is to be made.

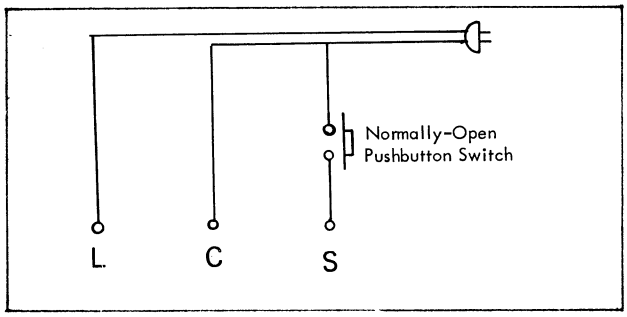


Figure 51

2. Attach a conventional male plug to one end, connect insulated alligator clips to the other end.
3. Secure a single-wire of like gauge about 12 inches long to one side of a normally open, momentary contact, pushbutton switch.
4. Connect an alligator clip to the other end of the short wire.
5. Measure up about twelve inches from the alligator clip end of the cord, (it is best to seperate the two wires up to this point and connect the other side of the switch to one of these wires). Wrap the switch terminals with insulated tape, see *Figure 52.*

For purpose of identification wires should be marked.

S = Start (connects to start winding only)

C = Common (connects to both *start* and *run)*

L = Line (connects to run windings)

All the motors used on RCA Whirlpool dryers are either 1/6 or 1/3 H.P and operates on 115 volts, 60 cycle current. They may be either single or

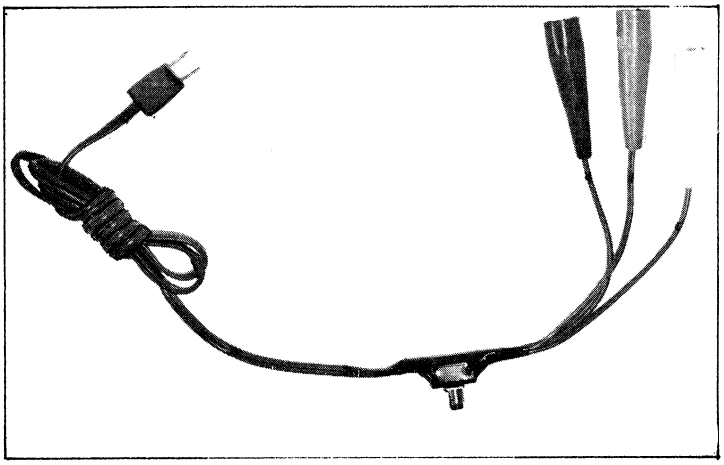


Figure 52

double shafted motors, depending on the model dryer they are used on. The main motor is protected with an internal overload protector that operates on the thermal principle. A malfunction of the motor or an overheated cabinet will cause the overload to open shutting off the motor. This safety device is self-resetting and the motor will restart after cooling.

Most of the machine motors have a built-in centrifugal switch to control the heating element or burner assembly (see *Centrifugal Switch).* The motor must run to close the circuit to the heat source. If it does not, check for voltage at terminals 4 and 5. If voltage is present, the motor should run or be replaced. If no voltage is present at terminals 4 and 5, check other components for a defect.

To remove the motor, first remove the rear panel and run the belt off from the motor pulley. Remove the bolt holding the motor saddle to the base of the dryer, *Figure 10*. Slide the motor out and disconnect the wiring. Take note of the wiring to facilitate reinstalling the wiring correctly and to insure properly safety control. It is possible for the motor to be miswired so it will run, without safety control, or to miswire to short out the overload protector.

To cord test the motor, (make sure cord is unplugged from wall receptacle, and switch is re moved from motor.

Connect wire *S* to *black* wire in motor
Connect *L* wire to *orange* on GE or *blue* on Emerson motor.
Connect *C* to *yellow* wire.

With switch depressed, plug test cord into wall outlet.

When motor starts, immediately release button. If motor fails to start, or stops when button is released, the motor will have to be replaced.

If motor starts and continues to run when button is released, take note if it sounds noisy, such as bearing wear may cause.

If everything seems normal, the centrifugal switch could be defective and should be replaced.

Removing "T" Frame Motors

1. Remove the screws under lint lid and raise top.
2. Remove six screws holding front panel, remove panel.
3. Remove drive belt from motor pulley.
4. With a lifting motion slide drum out.
5. Disconnect wiring harness from motor.
6. Remove two motor mount clips.
7. Remove fan assembly, *Figure 53,* using a wrench on flat of the motor shaft (pulley end) and another wrench on hex nut of fan hub. Note: Left hand thread.
8. Upon installation of replacement motor the raised notch on the motor mounting ring (pulley end) fits into the cutout in the front mounting bracket to prevent motor torque on start of motor. Reverse above procedure for installation of replacement motor.

WHIRLPOOL CONVERTABLE DRYER

MOTORS

The motor that is used on the convertable dryers is a throw away type, *Figure WC53A*. Many of these motors have the end belts welded to the frame while others are cemented or epoxied. There is no provision for bolts through the frame as in the conventional motor. The motor is cube shaped and have shafts extending from both ends. It is a 1/3 H.P. motor and one end drives the drum through the use of a pulley and belt, while the fan is mounted on the other shaft.

The rotation of the motor is in a counterclockwise direction looking from the end that mounts the centrifugal switch. The protector device is built into the motor. The motor has an externally mounted centrifugal switch and its internal make-up is illustrated in *Figure WC53B.* The switch, besides separating the starting phase after operating speed of the motor, is attained and has a switch device built into it that

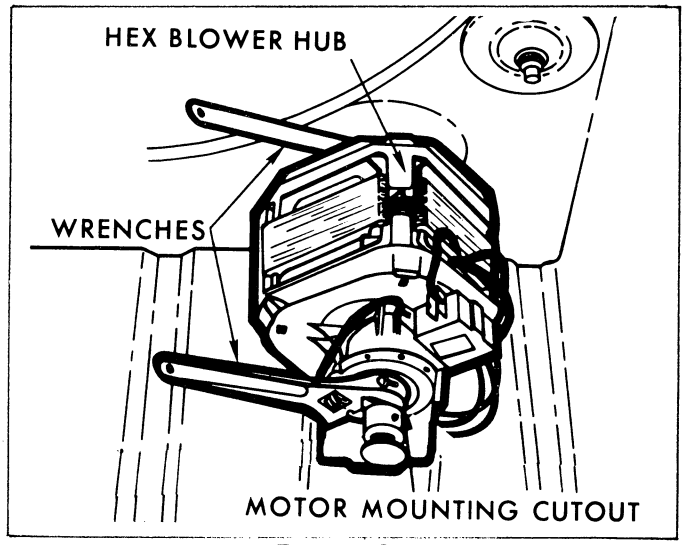


Figure 53

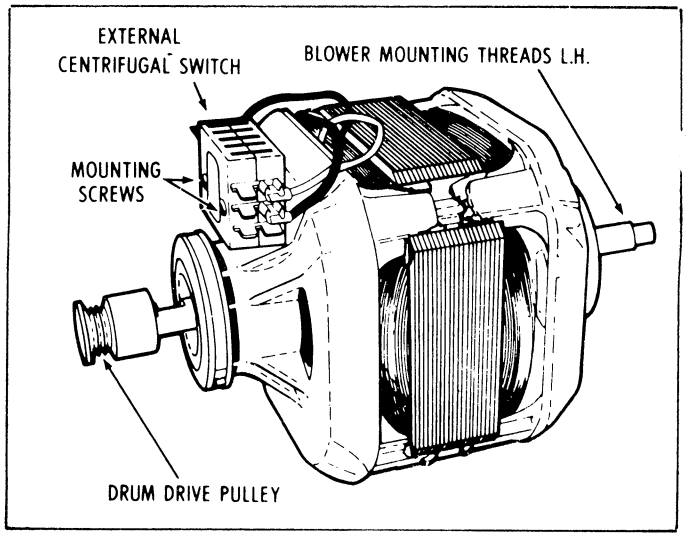


Figure WC53A

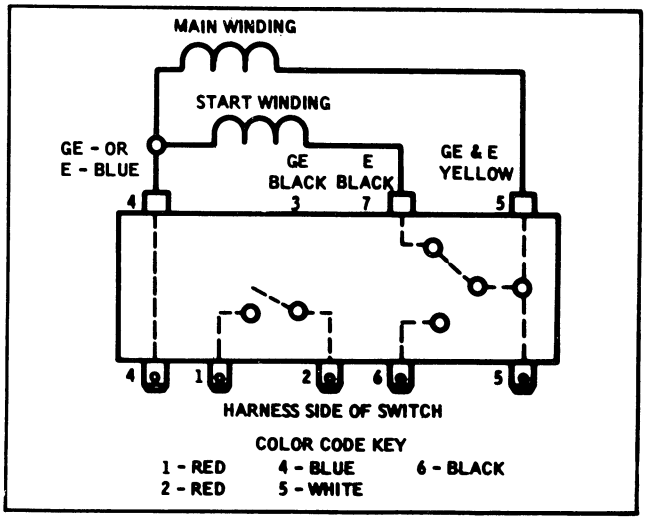


Figure WC53B

controls the current to the heating element or the gas coil in the case of a gas dryer. Before condemning a motor, check the centrifugal switch.

CHECKING THE SWITCH

1. Using *Figure WC53B* as a guide, check across the various terminals for continuity. The centrifugal switch should be removed from the motor for this test.
2. Check across terminals 4 and 5 on the outside of the switch with a continuity light or an ohmmeter. Test should show continuity, the starting winding circuit connects to these two terminals.
3. Place one of the probes on terminals 4 on the outside and the other one on terminal 7 on the inside of switch, there should be no continuity. Press the switch extension toward the switch, there should be continuity. In pressing the switch extension, the switch is closed and current flows to the starting winding. In releasing the switch, the starting phase is disconnected.
4. Now place the probes on 1 and 2 on the outside switch. Continuity should exist. Depress the switch extension, continuity should no longer exist.
5. If any of these tests fail, the centrifugal switch should be replaced. If the tests prove the switch servicable, test the motor.

MOTOR TEST

With switch still removed, proceed as follows:

1. Using a direct line or test cord, connect one of the probes to the orange wires as used on the G.E. motor or the blue on the Emerson motor.
2. Connect the other probe of the direct line cord to the yellow wire.
3. Connect or plug test cord into receptacle and immediately touch the black wire to the yellow wire. (Use caution to avert shock or injury). Motor should start immediately. After motor starts, remove the black wire from the yellow wire, motor should continue to operate. If motor fails to start, or fails to continue running after the black wire is separated, the motor should be discarded and replaced with a new motor.

Also see "To Cord Test the Motor" on page *35*, the same text can be used for testing this motor. Also note *Figures 51 and 52,* these same test cords can be used.

CABINETS

CABINET TOP

Dryer tops have changed over the years due to styling, control location and venting improvements.

On the early model dryers, the tops are formed from one piece. They are mounted to the cabinet by speed clips in the front and brackets and screws in the rear. These tops have the same outside dimensions as the cabinets. To remove these tops, the control knobs and two rear retaining screws at the rear have to be removed. The top is then lifted and moved toward the front to unlatch the speed clips.

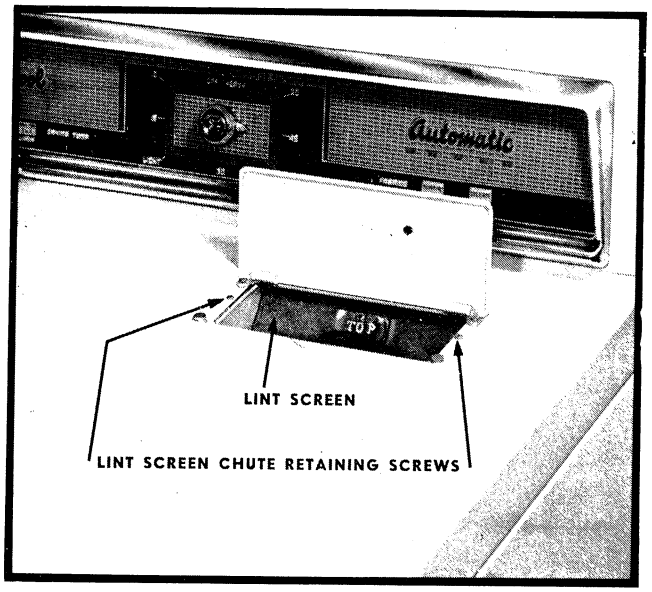


Figure 54

The later dryer tops have the lint screen located in the cabinet top, *Figure 54 and 55*. The two screws securing the lint filter chute to the top have to be removed before attempting to raise the top. Then remove the two screws, *Figure 56*, and slide top forward to release the top from the mounting clip.

NOTE: ***Take precautions not to bend or twist the capillary tube of the adjustable thermostat when raising the top.***

The latest top, *Figure 55*, is hinged to facilitate servicing. With the chute screws removed, grasp the top panel at one rear corner, pulling it toward

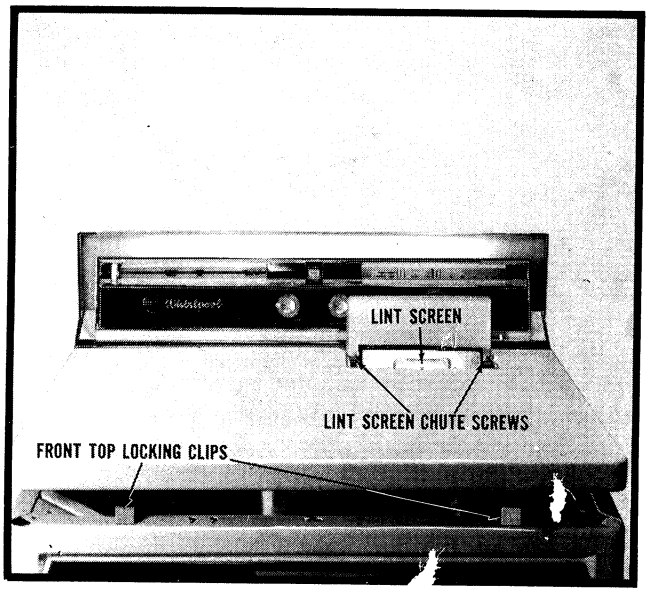


Figure 55

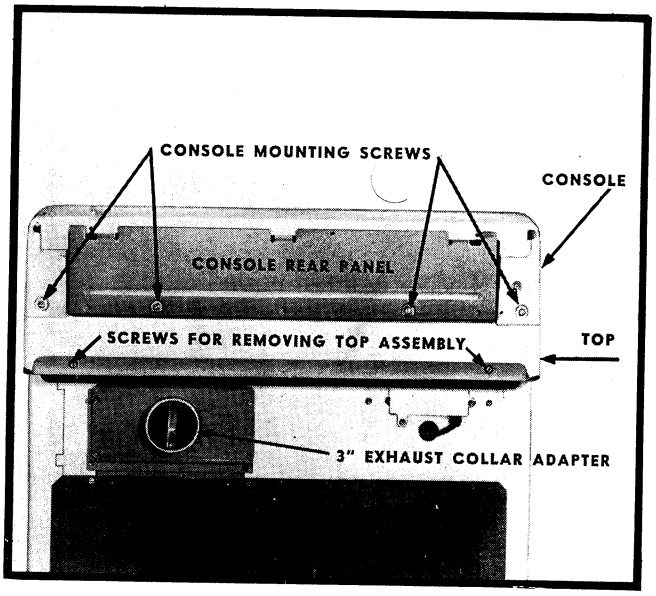


Figure 56

the front. This forces the top panel forward enough to allow one side of the top panel to be unlatched by upward pressure. Release only one side at a time. The top is hinged and can be raised easily. To reset the top panel, merely rest the panel on the front clips and apply pressure downward. The panel will then snap into a locked position.

CONSOLE

The console houses the timer, heat selector, panel light switch and other components. To gain access to these components, it is sometimes necessary to remove the wrap-around console. The first step is to remove the timer and other control knobs.

With the control knobs removed, remove the rear control panel and mounting screw in *Figure 56*, and the two retaining springs, *Figure 57*, and pivot the console forward as in *Figure 58*. Other consoles require removing a retaining screw, *Figure 59*, and carefully lifting the console free from the top.

CONSOLES, Later Models.

The consoles on later models can be serviced from the front. Remove the screws at the lower front corners of the console as shown in *Figure 58A*. Pull

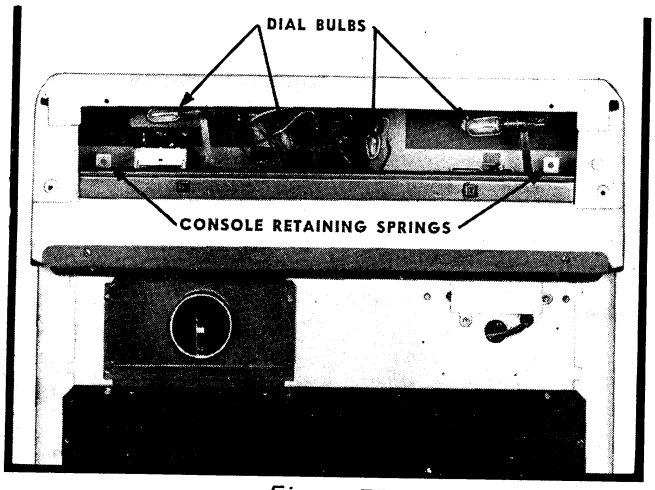


Figure 57

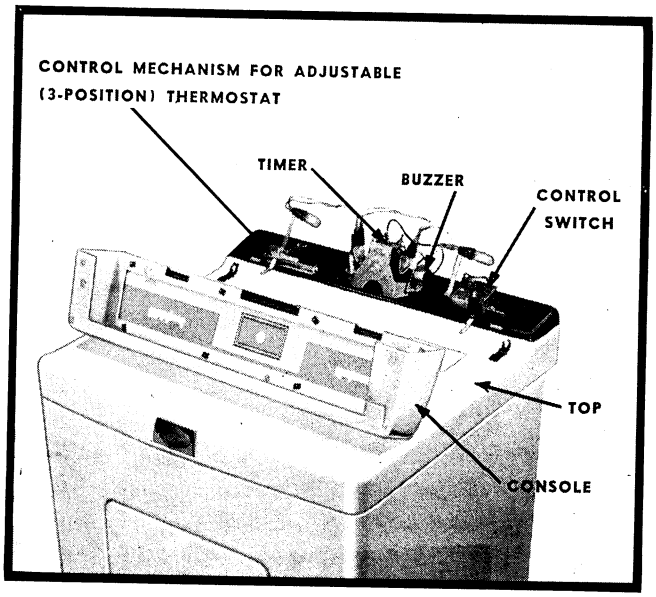


Figure 58

the console about 1/2 inch forward to disengage the the locking tabs as illustrated in *Figure 58B.*

REAR PANEL

The rear panels are secured to the cabinet by a series of screws. This panel must be removed to gain access to many of the components such as motors, relay switch, blower assembly, belts, and pulleys.

FRONT PANEL

The early model cabinets are a one-piece construction, forming the front and both sides, with only the bottom front section of the gas dryers removable as a service panel. The latest models, however, are quite different and vary between the gas and electric dryers. On the gas models, two panels make up the front. The top section is secured to the cabinet flanges with clips and screws and is removable to service the door hinges or door switch. The lower panel is held in place by snap-on clips and is easily removed to service the gas burner assembly. On the electric dryer, the front is a single panel secured by clips to the bottom flange and screws at the top.

CLOTHES DOOR

Doors are fabricated from two sections, a front and a rear. The front section is a decorative covering, matching the dryer contour and serves as a mounting piece for the hinges, rear section and handle. The rear section fits inside the front section flanges. It has a round protruding section which fits the cabinet drum opening. (Commonly known as the *plug* type door.) A soft rubber seal encircles the plug. Glued in place, it seals the drum opening whenever the dryer door is closed. The plug type glass port door is similar construction, however, it has an additional seal between the glass port and the outer and inner metal sections.

A pushbutton mechanical linkage was incorporated in some models for latching the door. However, the majority of doors have been latched by a bayonet type plunger mounted on the door which enters a specially designed clip located in the cabinet door-well.

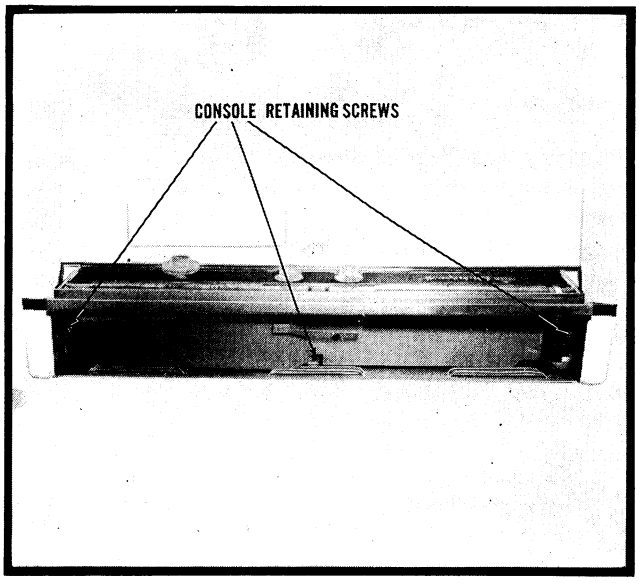


Figure 59

The doors are adjustable in the cabinet door-well by loosening, repositioning and then retightening the hinge mounting screws.

In 1967 models, two door and front panel designs were used on the dryers. The original swinging plug type door and the full width door with the large drum opening, *Figure 59.1 and 59.2.* The machines with full width door design features a removable toe plate.

The toe plate is held in place at the top with a compression clip on each end of the panel and a spring latch midway at the top of the panel. The latch must be released with a tool such as a small screwdriver before panel will open.

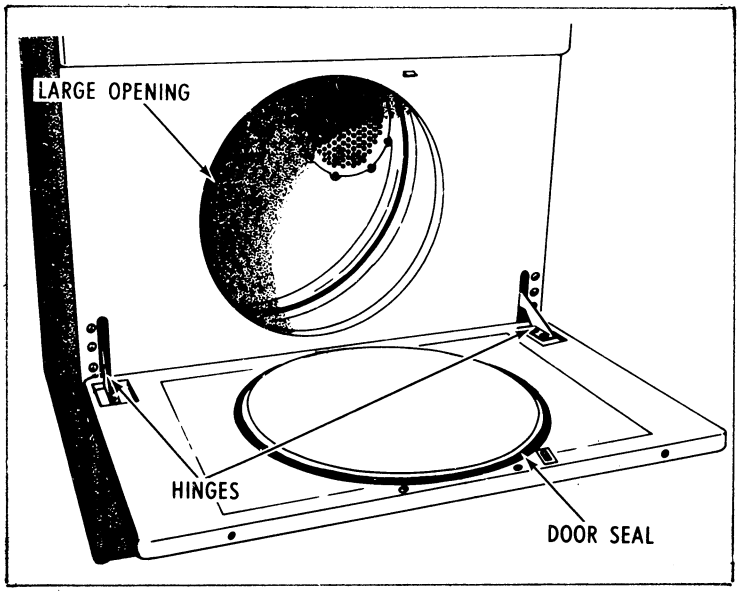


Figure 59-1

All plug type doors on the 1974 model line will open 180 degrees as illustrated in *Figure 59.3.* The door hinges are mounted to the door and front panel by 2 screws. The door and hinges can be replaced without removing the front panel.

A snap in plastic door handle is used on all 1976 models built with the plug doors. Follow these instructions to replace this handle:

1. Remove the outer door panel.
2. Resting the door on a protective cloth upside down, press down as illustrated in *Figure 59.4.* Remove handle.

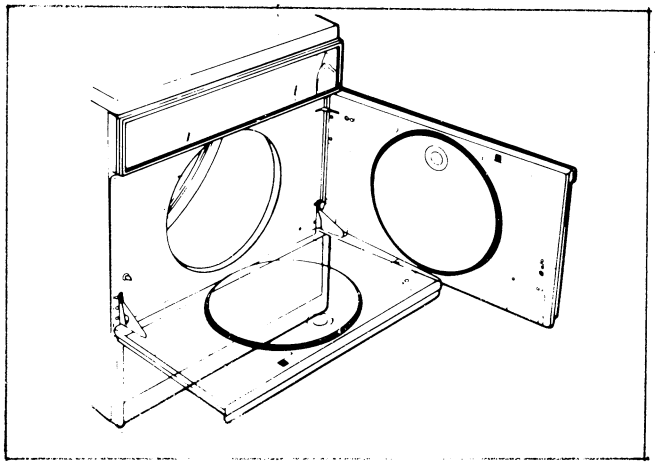


Figure 59-2

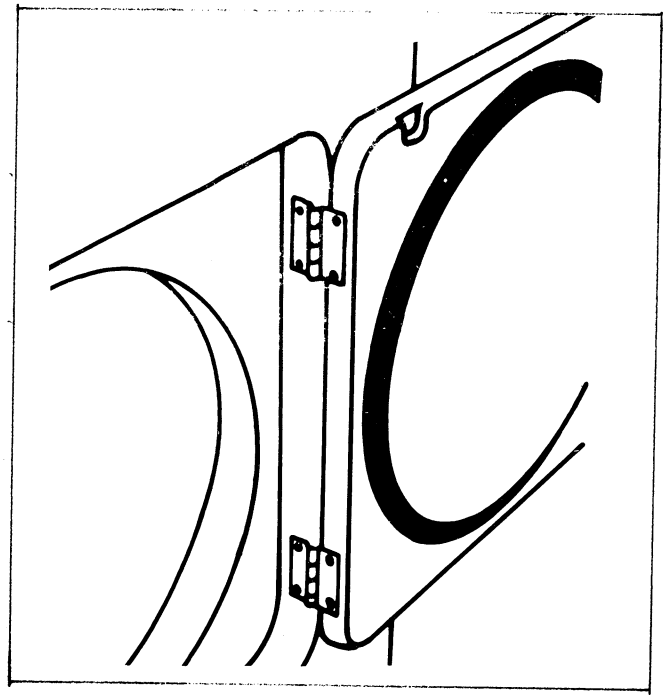


Figure 59-3

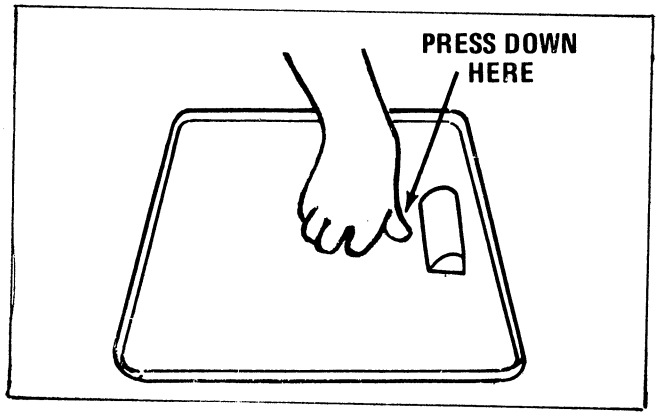


Figure 59-4

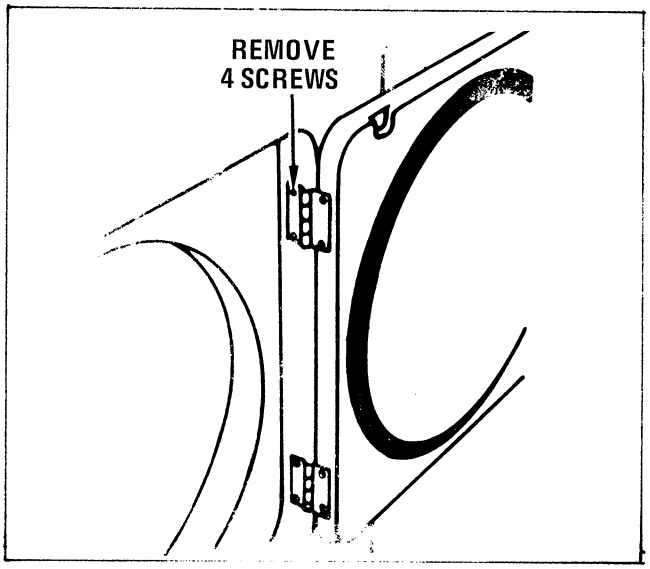


Figure 59-5

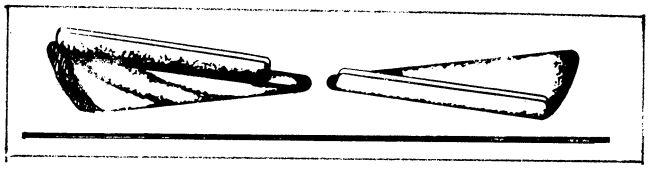


Figure 59-6

3. Fit outer door panel over new handle and press down. Handle will snap in place.

REMOVING DOOR PANEL, Models with Plug doors

1. Open door and remove four screws securing hinges to the inner door panel, *Figure 59.5.*
2. Remove door off hinges
3. Remove screws joining panels together, two at the top, two at the bottom. Separate the panels.

DOUBLE SWING DOORS

The Imperial Models Mark XII dryers are equipped with the new two-way door feature. A door positioning lever is located under the panel. By pressing up on this lever, the door position can be changed from pull down, to a side swing movement. Removal of the door handle will expose the door position actuating lever. Pressing the lever up on the left side puts the door in the swing position, pressing the lever up on the right side upts the door in the down position, *Figure 59.6.*

An indented nylon guide has been added to the guide assembly. If it is necessary to service the door, the guide may be removed with a thin blade or a common screwdriver. Loosen the guide and replace by snapping a new one in place, *Figure 59.7.*

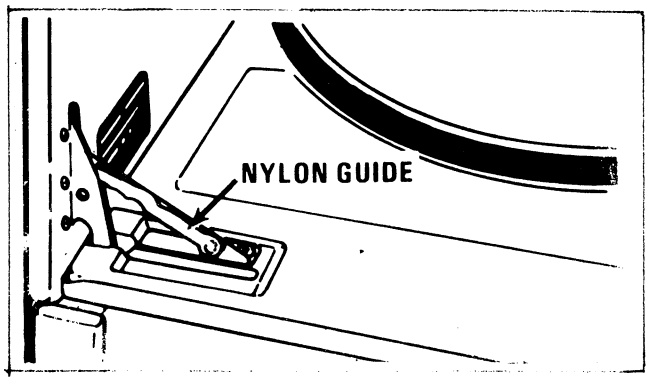


Figure 59-7

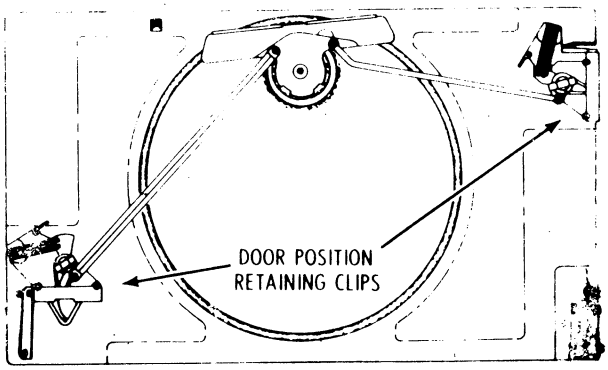


Figure 59-8

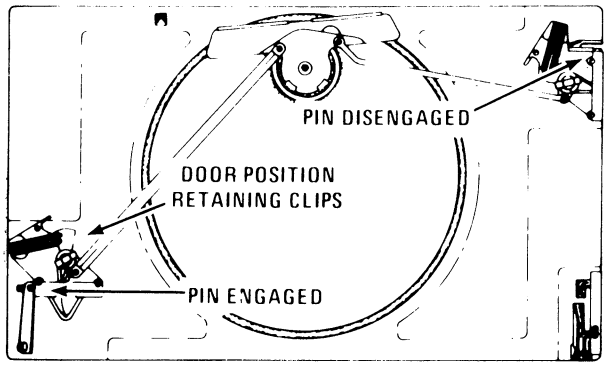


Figure 59-9

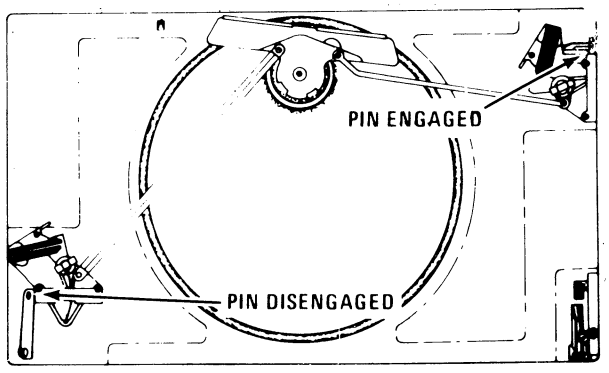


Figure 59-10

The entire dryer door linkage can be viewed when removing the front door panel, *Figure 49.8.* Separate the panels as previously described. The door position linkage is illustrated in *Figure 59.8* in the swing position. Note the extended hinge pin in the swing position, and the retracted hinge pin at the down position, *Figure 59.9* and *59.10.*

The door position retaining clips are pointed out here. These clips help hold the proper door position setting, once the door has been opened. Do not attempt to change the door positioning lever when the door position, damage to the linkage will result.

Models LTE 8900 and LTI 8900 Imperial 90 dryers feature a two position hamper door. This full width dryer door may be opened all the way down, or halfway down. The hamper door chute position makes it easier for the user to remove clothes from the washer directly into the dryer.

TWO SPEED DAMPER, *Removal.*

1. Remove two screws securing top to air duct.
2. Lift top and secure in position.
3. Remove front panel, swing panel to one side of dryer.
4. Disengage idler pulley and remove belt.
5. Remove dryer drum.
6. Remove two screws securing the bulkhead to the cabinet on the right side.
7. Remove the back panel.
8. Remove four screws securing the air duct to the fan housing.
9. Remove one screw and disconnect damper cable from damper lever, ***Figure 42***
10. Pull air duct out of top of dryer.
11. Holding damper, remove shaft and bearings from inside of duct.
12. Turn and lift out bearings.
13. Replace air seals when reassembling air duct to bulkhead.

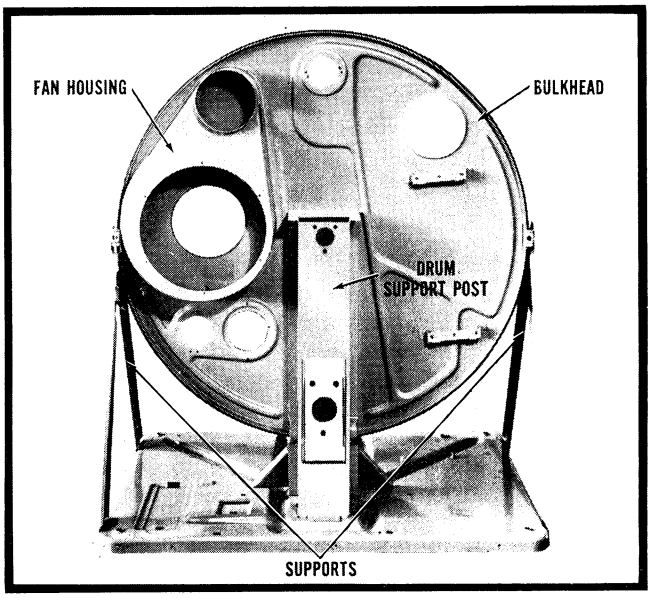


Figure 60

BULKHEAD AND BEARING SUPPORT

The bulkhead assembly is welded or bolted together to form a rigid support for the bearing, drum shaft, fan scroll, and also acts as a sealing surface for the drum felt. The basic bulkhead assembly on the early models, *Figure 60 and 61*, incorporates a support post to retain or adjust the bearing assembly. These support posts use either three or four bolts, depending on the model and year of the dryer. On these models, the bulkhead and bearing support assembly carries the full weight of the drum by proper adjustment. (See Drum Assembly.)

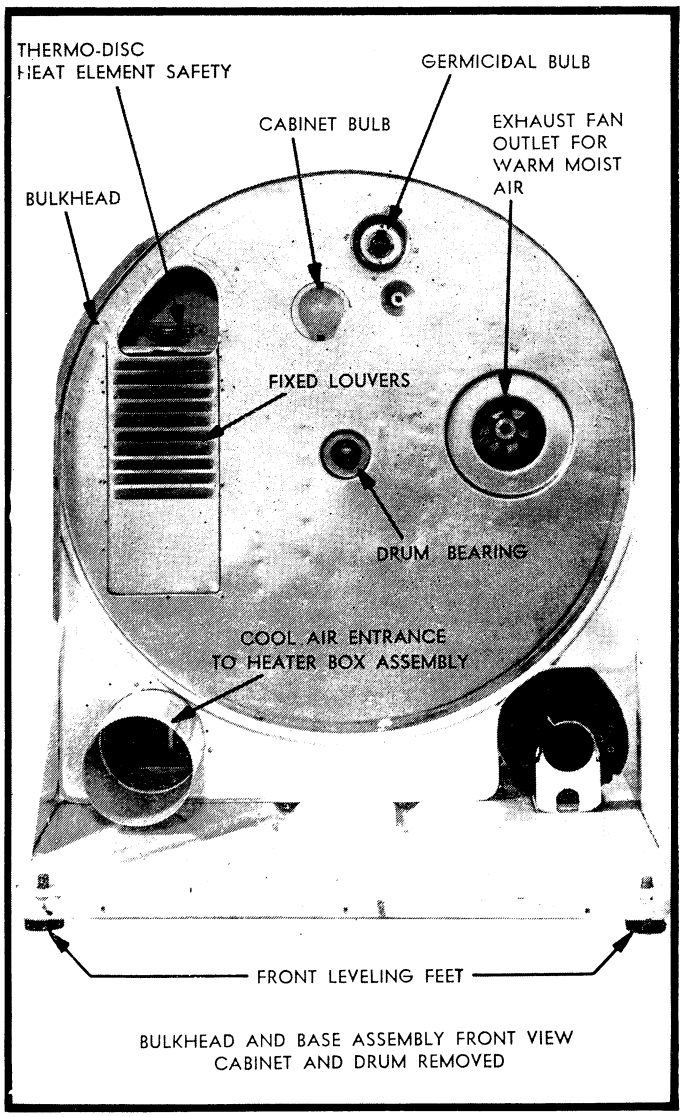


Figure 61

The bearing assembly, *Figure 62*, for these bulkheads can be removed without removing the drum. Merely remove the back panel, the drum pulley and the key from the drum shaft. Then, remove the securing and adjusting bolts, *Figure 63*, and slide the bearing assembly off of the drum shaft. When installing the new bearing assembly, be sure that the end of the drum shaft is free from metal burrs that might score the new bearing. The bearing assembly should be installed with the oil hole to the top since periodic oiling is important. Be sure to align the drum before tightening the mounting bolts, *Figure 63*.

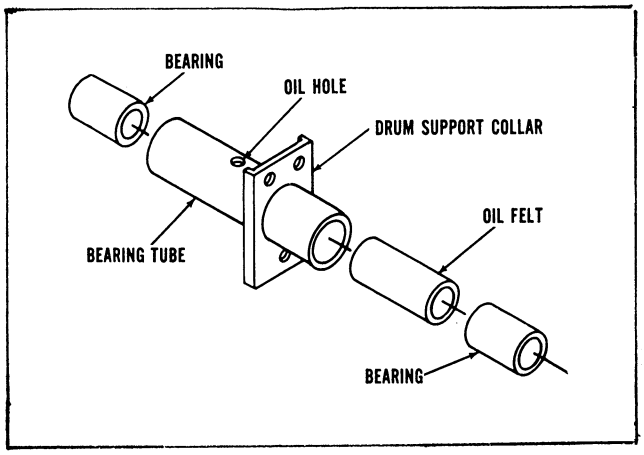


Figure 62

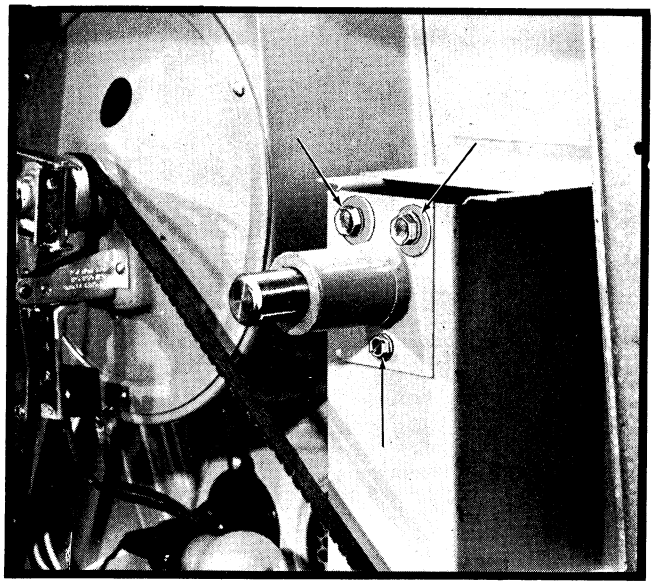


Figure 63

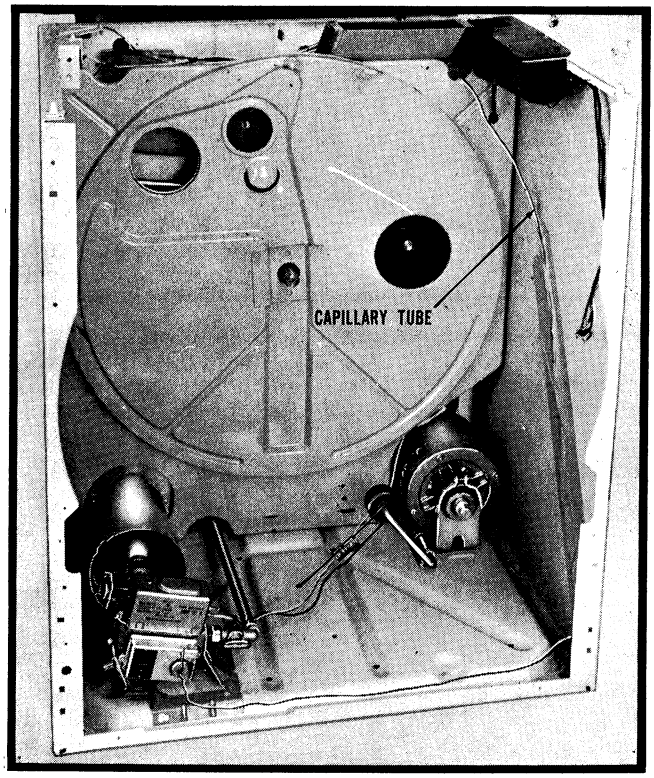


Figure 64

On the latest bulkhead construction, the drum shaft is secured to the bulkhead, *Figure 64*. The bearing assemblies for these dryers are self-aligning and are attached to the rear of the drum. These bearings are permanently lubricated and should never require additional lubrication. On these dryers, the drum is supported at both the front and the rear. The drum must be removed to service the bearing. This is done by removing the front panel, the left hand threaded cap screw, flat washer and sliding the drum out of the dryer.

DRUM ASSEMBLY

The drum assemblies, *Figure 65* and *66*, are constructed of steel with the backs perforated to allow a free movement of air through the drum. Three baffels are formed in the body of the drum which creates a gentle tumble action to the clothes through the air stream, as the drum revolves. These drums also have attached to them a rear and front sealing felt. The rear seal rides on the flange on the outer circumference of the bulkhead, *Figure 67*, to prevent air from entering the drum at this point rather than through the heater box. The smaller front seal rides against the cabinet front sealing the front opening of the drum.

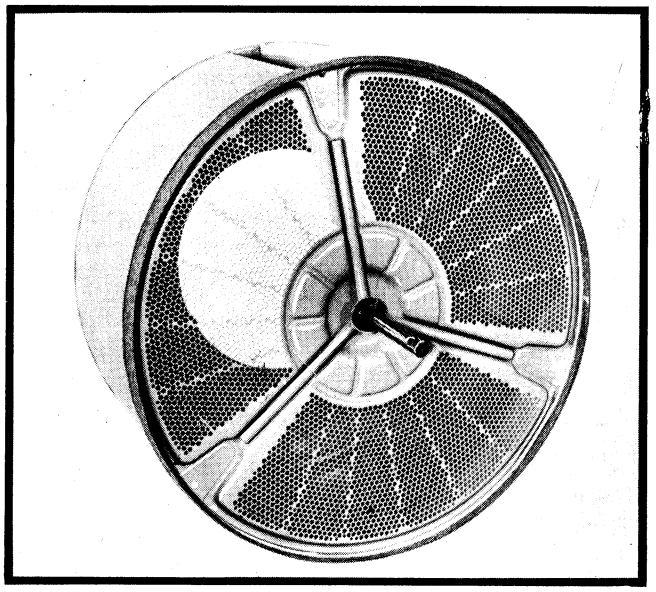


Figure 65

Drum Adjustment

The drum assembly, *Figure 65*, must be aligned properly to the cabinet front. To adjust the alignment of the drum, loosen the bolts, *Figure 63*, holding the bearing tube assembly to the drum support post. Align the drum so that the clearance on each side of the door opening is equal, and about fifty percent greater clearance at the top than at the bottom. Sometimes it is necessary to install or remove shims to get solid alignment. With the alignment corrected, check the dryer with a full load of clothes to insure against excessive rubbing. To remove the drum, the cabinet, drive pulley and key must be removed first.

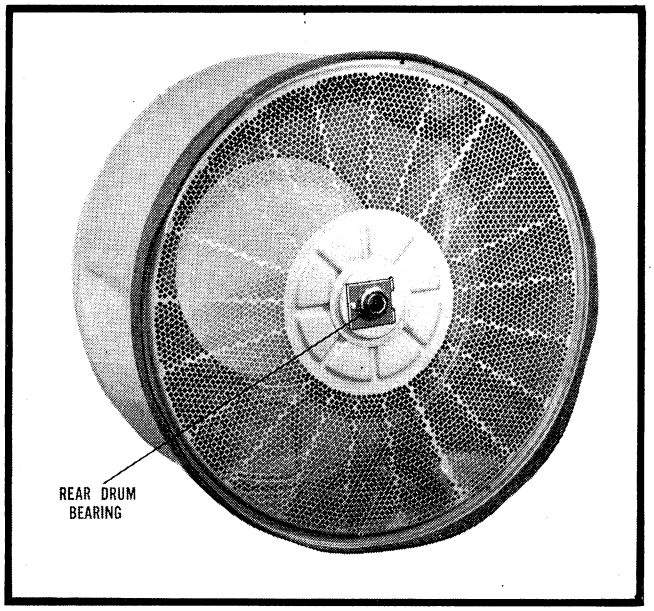


Figure 66

On the latest dryers using the drum illustrated in *Figure 66*, the drum bearing is self-centering and is attached to the rear of the drum with a clamp. The drum and bearing assembly is held on the bulkhead drum shaft by a flat washer and cap screw (left hand thread). A plug button is used to cover this drum retaining screw on models without a sprinkler system. Dryers with a sprinkler system have a rubber cover button with a center hole as a sprinkler orifice outlet. The brass cap screw (left hand thread) is drilled for the sprinkler orifice.

These drums also use a Delrin ring with locking tabs that fit into retaining notches in the drum front opening. This ring is removed by tapping the ring out of the drum notches, *Figure 68*. The front of the drum and ring assembly is supported by front bearings attached to the cabinet flange at the clothes door opening, *Figure 69*. The front bearing supports the drum and provides the correct alignment of the drum. These front bearings are lubricated by a lubricating felt that permanently lubricates the bearing for the normal life of the dryer.

To remove the drum for servicing, raise the top panel, remove the top screws holding the front panel. Hold the drum in position and angle the front panel away from the drum enough to free the front bearing and release the drum. The front panel is then lifted free from the lower clips. Disconnect the wiring from the door switch and set the front

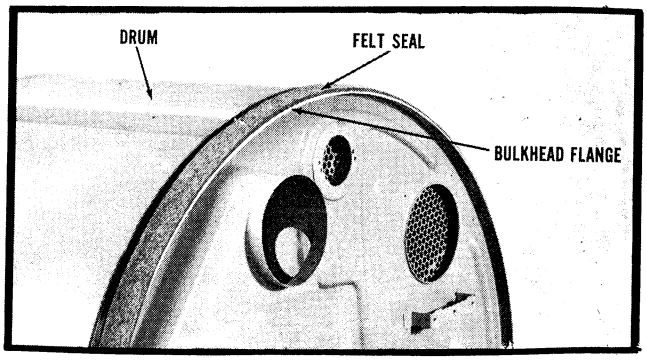


Figure 67

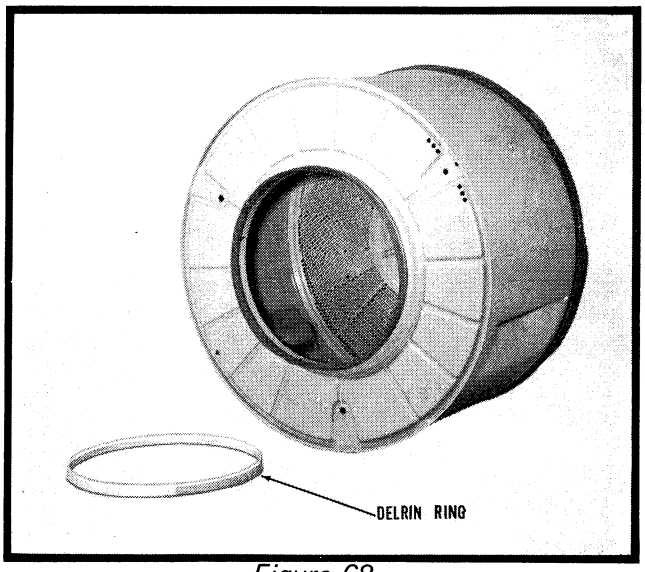


Figure 68

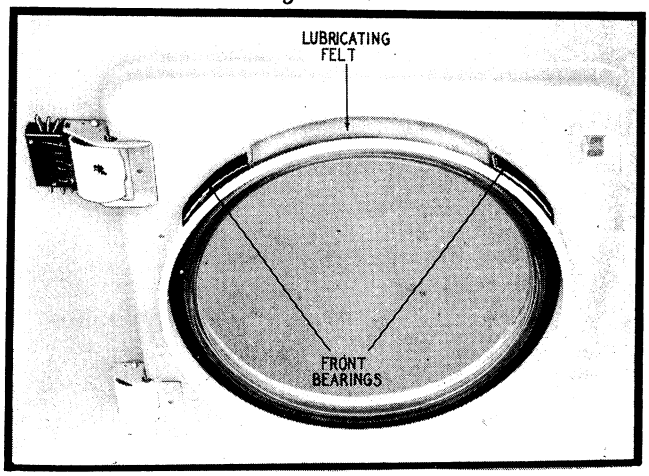
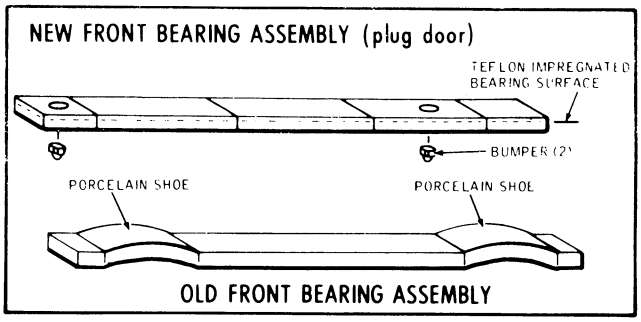


Figure 69



panel aside. Remove the cap screw cover and the left hand threaded cap screw and remove the drum.

DRUM SEAL

The drum seal is probably the most overlooked part in a dryer. It is responsible not only for the proper sealing of the drum, but also the least suspected reason for slow drying. If there is an air leak around the drum seals, then the air is not all passing through the heater box, causing a rise in temperature in the heater box. This causes the safety thermostat to cycle before the operating thermostat is satisfied or the correct drum temperature is reached. An inadequate drum seal can also be one of the major causes for the heating element in the electric dryer to fail. Sufficient air must pass over the element and into the drum to properly cool the element to prevent it from overheating.

A leaking drum seal also causes a lint build up in the outer cabinet as well as causing unwanted air to enter the drum. It is also important that the door seal is tight, since cold air can be drawn into the drum at this point, causing unsatisfactory operation.

AIR CIRCULATION SYSTEM

The air circulation system is a method of heat transfer used on both the gas and electric dryers. Air is drawn in over the heat source into the drum containing damp clothes. The heated air acts somewhat like a sponge soaking up the moisture from the clothes it touches. The moisture laden air is then exhausted out of the dryer by the exhaust fan that operates throughout the cycle.

There are two types of systems used on the various dryers. The air is circulated through the dryer by a single eight inch exhaust fan on the 29 inch models, *Figure 70*. The early electric models on the 24 inch dryer used two fans (an exhaust and intake fan), *Figure 71*. These figures show the flow pattern of the air passing over the heat source; no other source of air supply should enter the dryer if the drying cycle is to be satisfactory.

Venting and Lint Screen

After the heated air has absorbed the moisture from the damp clothes, the humid air is filtered

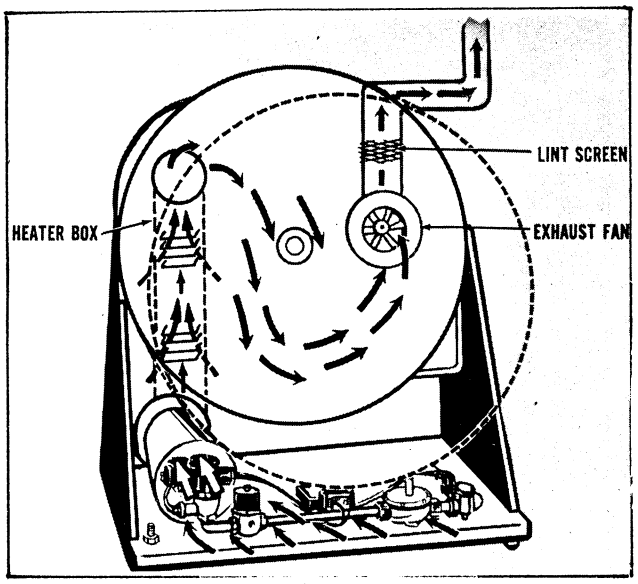


Figure 70

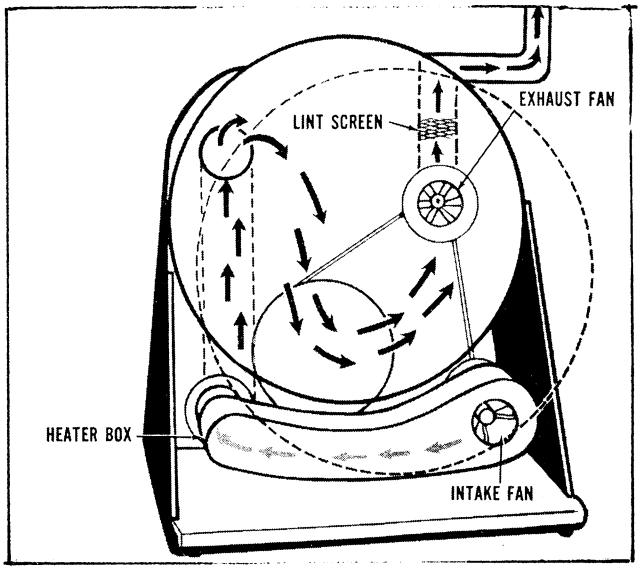


Figure 71

through a lint screen before leaving the dryer, therefore, it can readily be seen that it is extremely important to clean the lint screen after each load. Even a slight build-up of lint in this screen will reduce the flow of air through the dryer. The humid air should be exhausted out of doors. *Figure 72* shows some methods of doing this using either rigid pipe or non-combustible flexible tube for the ducting. If the dryer is not externally vented, a window should be left open to supply air to the dryer, and help rid the room of moisture laden air. Drying efficiency is decreased when exhausting a dryer directly into a laundry room.

WHIRLPOOL CONVERTABLE DRYER

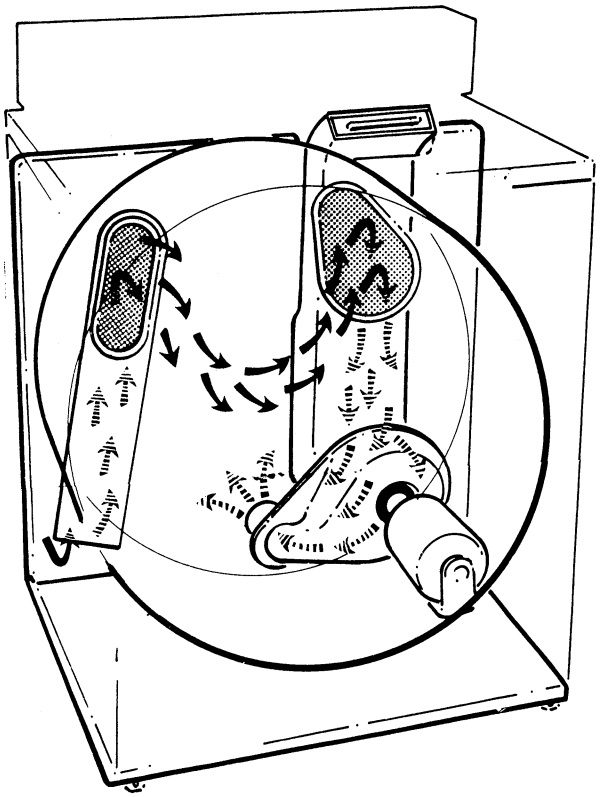


Figure 72

AIR CIRCULATION

The air is circulated through the dryer by an 8-5/8" exhaust fan, *Figure 40.* This fan is directly driven off the machine motor at 1750 RPM, *Figure 72A.*

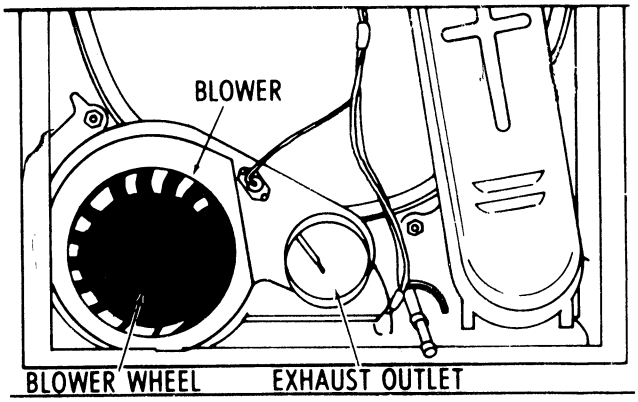


Figure 72A

NO-RESET THERMAL FUSE

A no-reset thermal fuse is being used to replace tl blower housing safety thermostat, as shown in *Figure 72B.*

The thermal fuse is wired in series with the operating thermostat. If the operating thermostat fails in the closed position, the thermal fuse opens and shuts off all power to the dryer to prevent overheating.

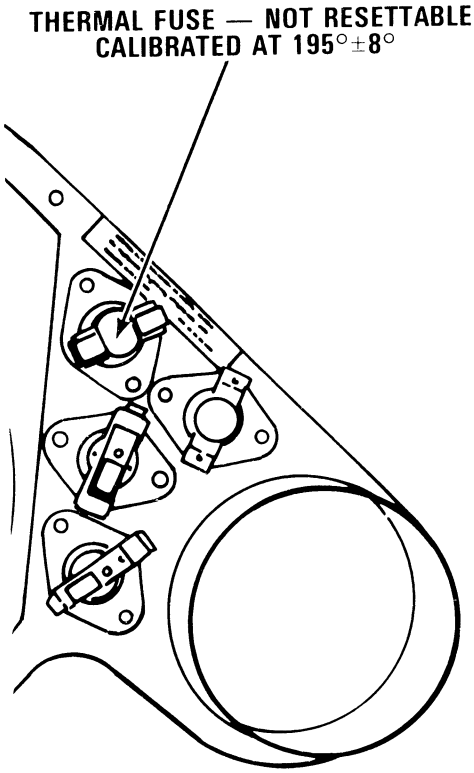


Figure 72B

Once the thermal fuse has opened, it must be replaced along with the failed operating thermostat.

DRIVE MECHANISM

The drive mechanism on the early dryer consists of 2 cogged V-belts. One V-belt links the main motor to a pulley on the exhaust fan shaft and also drives the larger portion of the idler pulley. A second V-belt connects the small portion of the idler pulley to another pulley fastened to the drum shaft. The two idler pulleys, which are cast together to form one part, serve to reduce the drum speed. *Figure 73* shows the arrangement of the pulleys and belts as they appear from the back of the dryer.

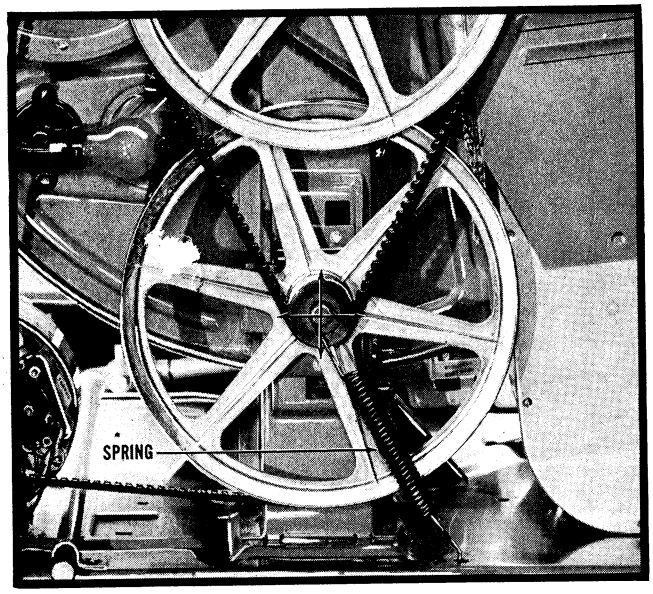


Figure 73

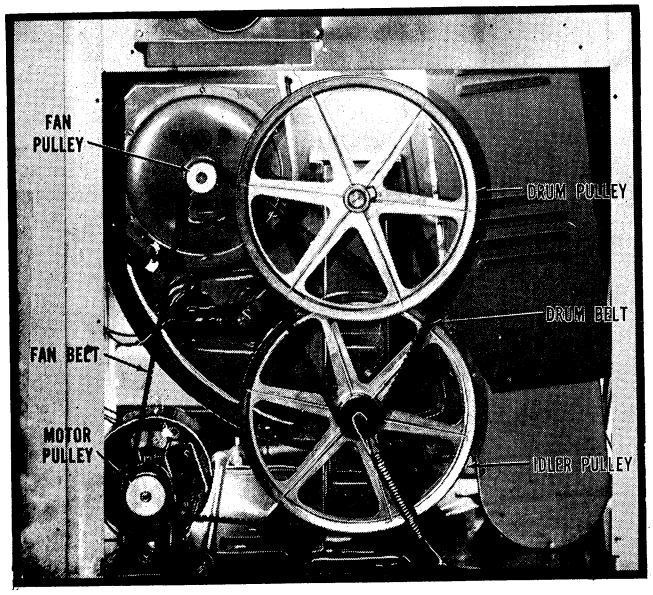


Figure 74

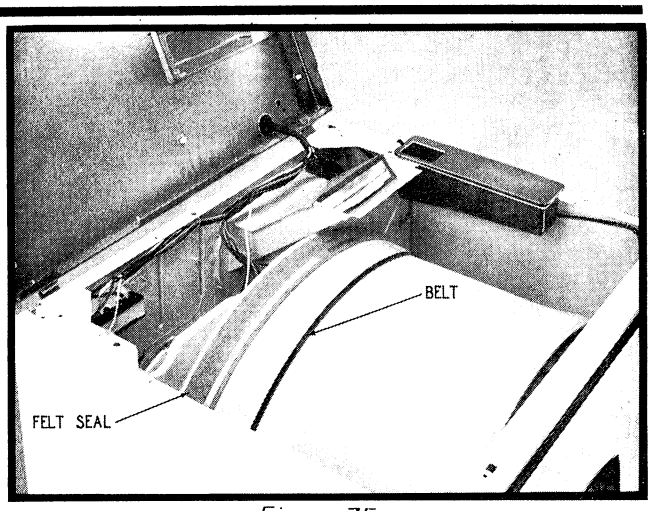


Figure 75

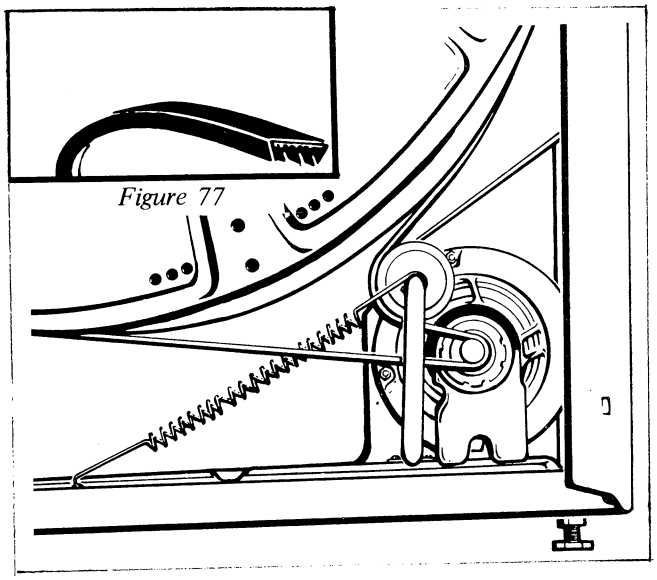


Figure 77

Figure 76

The idler pulley is mounted on the center support post in such a way that it has a floating action both horizontally and vertically. A coil spring, running from the base plate to the idler pulley shaft, maintains proper tension on both belts, *Figure 74*.

On the later model dryers, a double shaft motor with two drive pulleys directly drives the drum and the blower pulley. There is no pulley to drive the drum since the drum shell itself serves as a pulley, *Figure 75*. An idler pulley mounted on a spring loaded arm provides automatic belt tension. A flat poly-V type belt is used to drive the drum, *Figure 76 and 77*. The drum idler bracket is positioned in a rectangular hole in the dryer base. A tension spring is attached to a formed tab on the bracket and anchors in a hole in the base. This hole is now to the rear and to the left of the hole used on early production of this style dryer

DRIVE BELT, Removal and Replacement

1. Start the dryer and set cycle selector to "Delicate".

2. Stop the dryer and open the toe panel.

3. Push the idler assembly to the right as shown. in *Figure B1* . Holding the idler assembly remove the belt from the pulley on the motor.

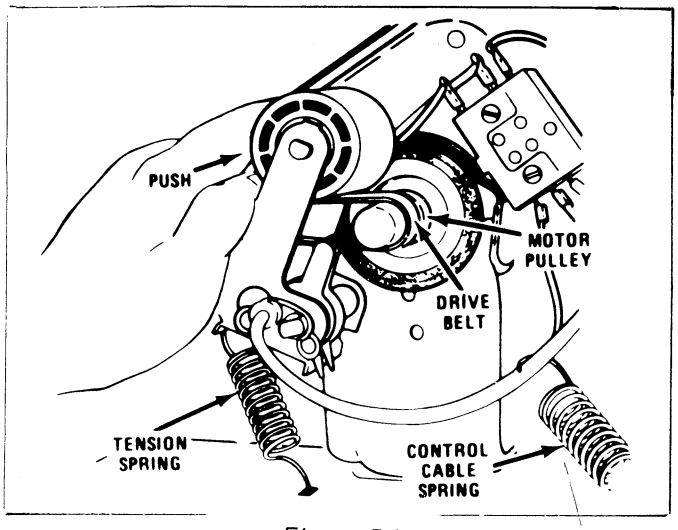


Figure B1

When installing the belt to the motor pulley, form a small loop on the belt, then pass the loop between the idler pulley and the base of the idler assembly. Move the idler assembly to the right and place the belt loop over the end of the motor pulley, *Figure B1*.

IDLER AND SHIFTER ASSEMBLY, Removal and Replacement.

1. Remove the drive belt.

2. Remove the tension spring.
The following is the procedure for removing and replacing the tension spring.

   a. Remove the end of the spring from the hole in the idler assembly base.

   b. Rotate the spring 90° so the spring can be removed from the slot in the dryer base.

3. With the aid of pliers remove the retainer spring, *Figure B2*.

4. The idler and shifter can now be removed from the shifter shaft, *Figure B3*.

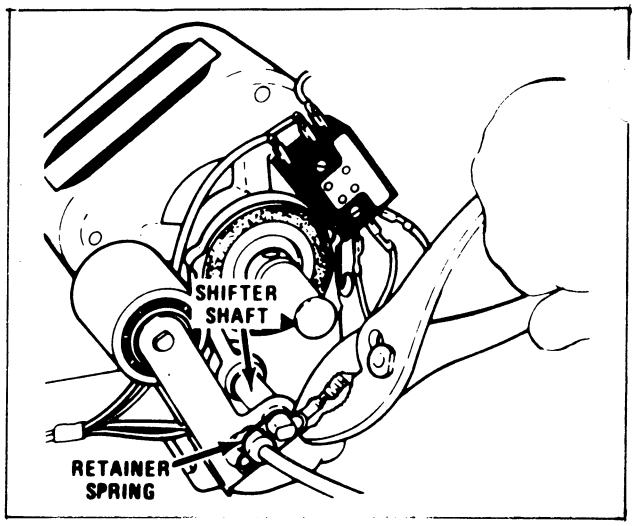


Figure B2

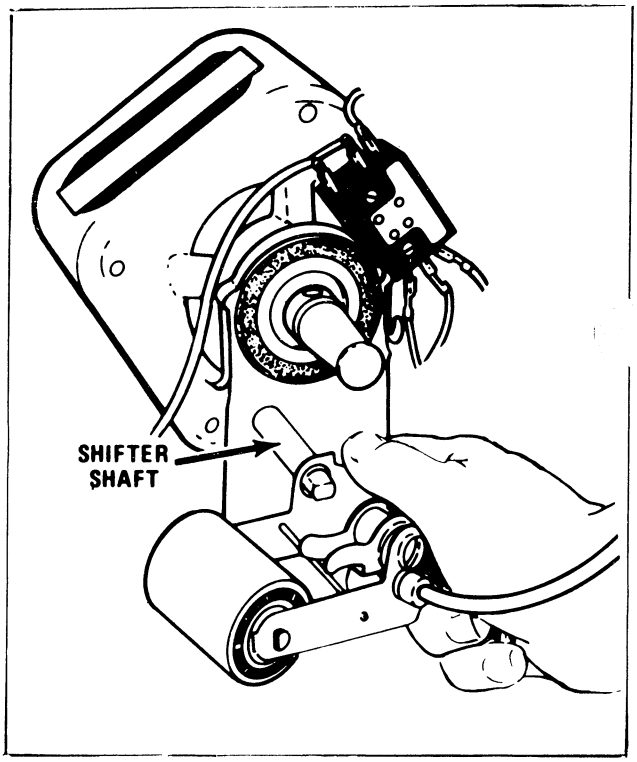


Figure B3

5. Slip the nylon retainer end of the control cable from the idler housing, *Figure B4.*

6. Slide the control cable through the idler housing until the shifter is clear of the housing, *Figure B5* .
Remove the shifter from the control cable.

NOTE: The offset linkage is the same as on the console end of the control cable. Shown in Figure B6 are the call outs of the components. The assembly can be further disassembled for replacement c the idler pulley or other components.

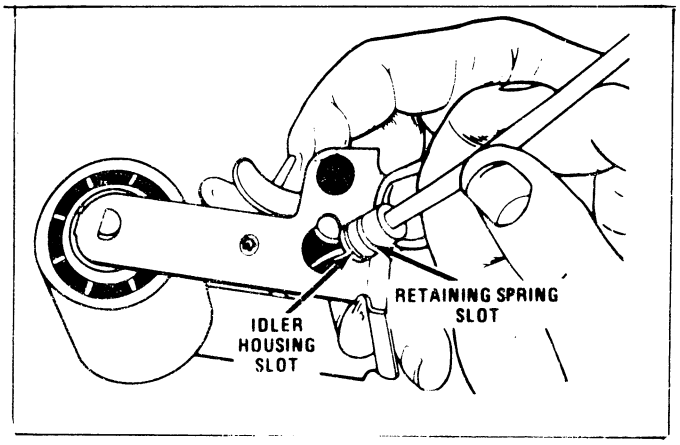


Figure B4

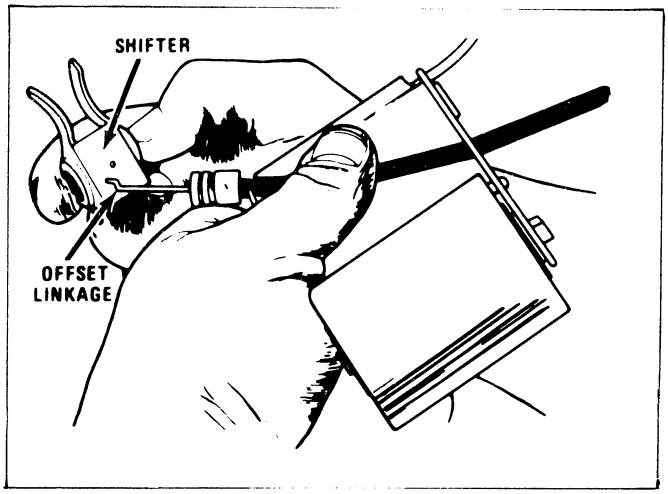


Figure B5

DISASSEMBLING THE IDLER

1. Remove the belt guide rod. Using a punch, drive the rod out of the locking retainer, *Figure B7* .

2. Spread the side of the idler housing and remove the idler pulley and shaft.

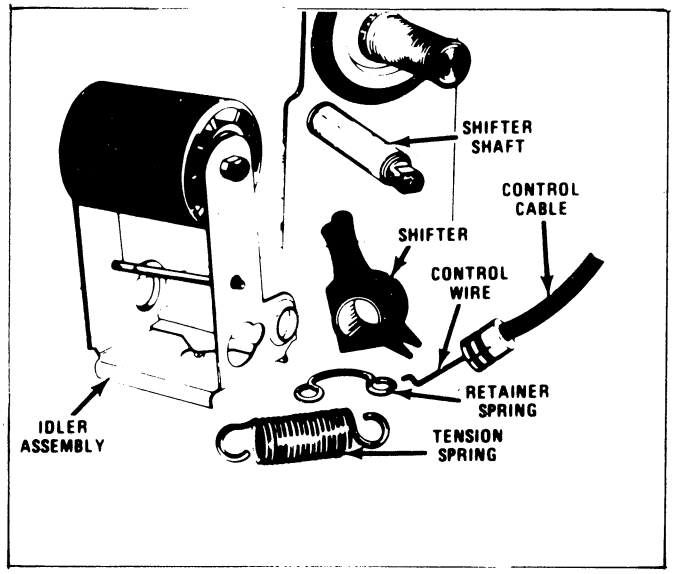


Figure B6

NOTE: The dampening pad at the base of the idler housing can also be replaced. It can be removed by pushing up on the tab at the center of the idler housing base. This will release the pad. By rotating the pad, it then can be removed from the idler housing.

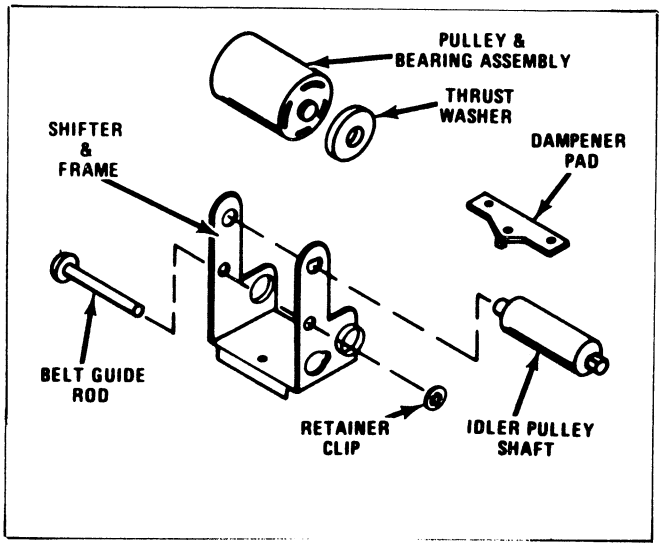


Figure B7

BELTS

To change or install a new belt on the above type drive mechanism, the front panel of the dryer must be removed. Then the belt is placed over the drum in the driving position and mated properly to the V's on the motor pulley. If the belt is not properly set in the V's on the pulley, the drum will revolve too fast and cause excessive drying time.

NOTE: *The idler pulley rides against the back of the belt to apply proper belt tension. The latest dryer eliminates the idler pulley by using an "O" ring belt.*

On the early dryers, release the tension spring in *Figure 74* and the cogged belts are readily replaceable. The cogged belts are primarily used on dryers due to the small radius of the pulley on the motor and blower assembly. These belts bend more easily around a small radius without excessive wear. A belt with a bad spot in it can cause the dryer to thump and knock as if it had bad bearings.

Blower Belts

Some of the dryers utilize a two speed exhaust fan, such as *Figure 78*, with a cable attached to a belt shift mechanism and mounted on the blower flange.

A double sheave blower pulley provides the two speed blower operation. The belt is pictured in

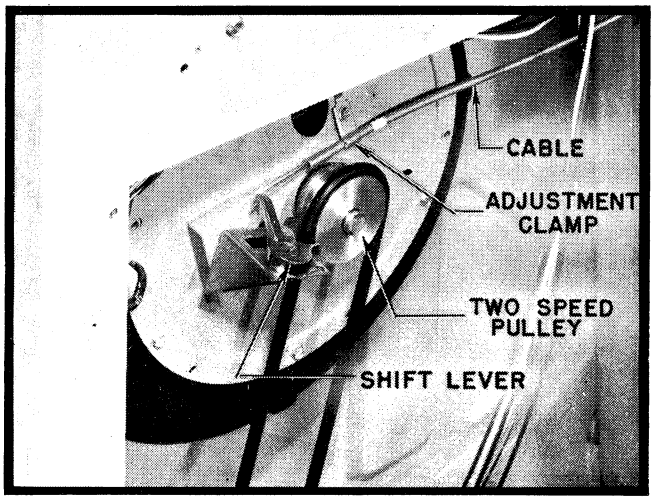


Figure 78

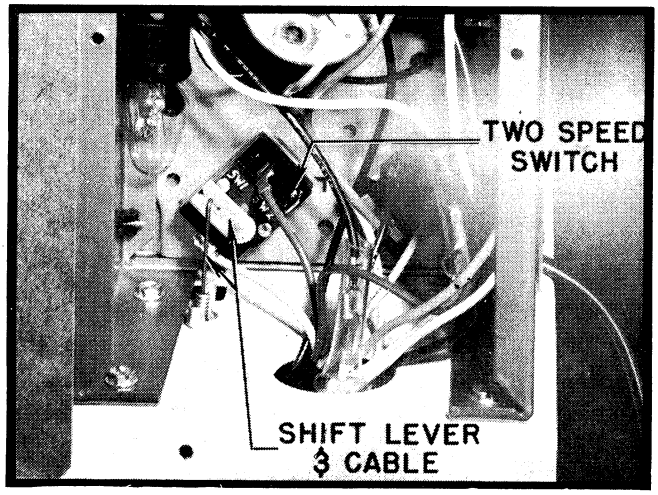


Figure 79

the slow speed or the large diameter sheave. The belt shift mechanism has a two fingered fork which straddles the belt when in this position. This position selects normal speed producing reduced heat input and a blower speed of approximately 1700 RPM. The selection of the blower speed is done by the actuation of a console mounted switch, *Figure 79*.

When super speed is selected, the belt is shifted to the small sheave increasing the blower speed to approximately 2000 RPM. The contacts SW1 and SW of the switch in *Figure 79* closes, bypassing the series heating element on the electric dryer and increasing the heat input to 5600 watts. On the gas models, the full burner input of 37,000 BTU's is supplied on super setting.

The adjustment of the belt shift mechanism is accomplished by loosening the cable sheathing clamp and repositioning the cable sheathing. Adjustment is always made when the belt is in the large diameter sheave and the dryer is not operating. Adjustment objective is to set the belt shift mechanism forks that straddle the belt with equal fork spacing from the belt, then tighten the clamp mounting screw. The fan flanges must also be positioned properly on the blower housing to obtain correct position of the shift mechanism in relation to the belt. A properly positioned fan will have the half moon cut-outs on the edge of the fan flanges positioned at the 25" high locating boss on the fan housing. The shift fork should always be clear of the belt in operation.

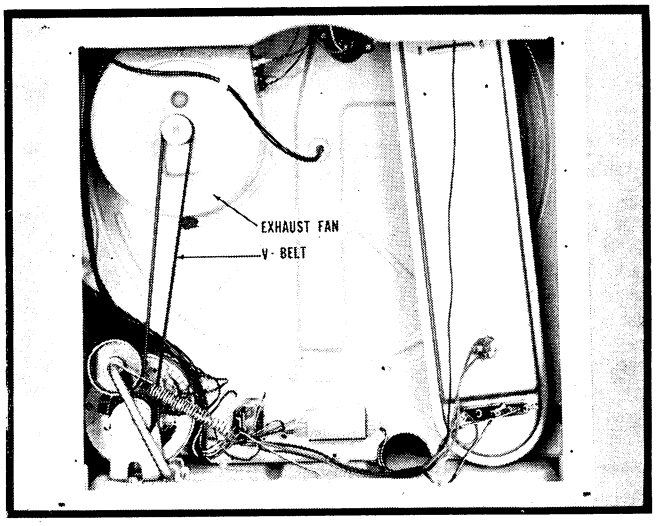


Figure 80

There is also a poly-V belt used on a single speed blower that is direct driven by the motor, *Figure 80*. An idler pulley mounted on a spring loaded pulley arm maintains the proper belt tension.

BLOWER ASSEMBLIES

Earlier models have two fans: an air intake fan and an exhaust fan. The air intake fan is mounted on one end of the motor shaft and forces air through a duct into the heater box, *Figure 81*. This fan requires little servicing, except for an occasional cleaning. It is removed from the motor by turning it counterclockwise while holding the opposite end of the motor shaft.

The exhaust fan assembly, *Figure 82*, is mounted in its housing on the rear of the bulkhead. *Figure 83* shows the component parts of this assembly.

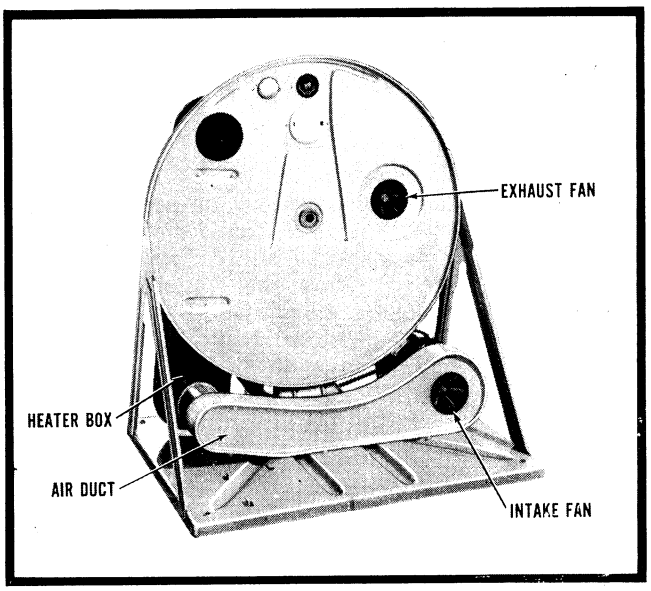


Figure 81

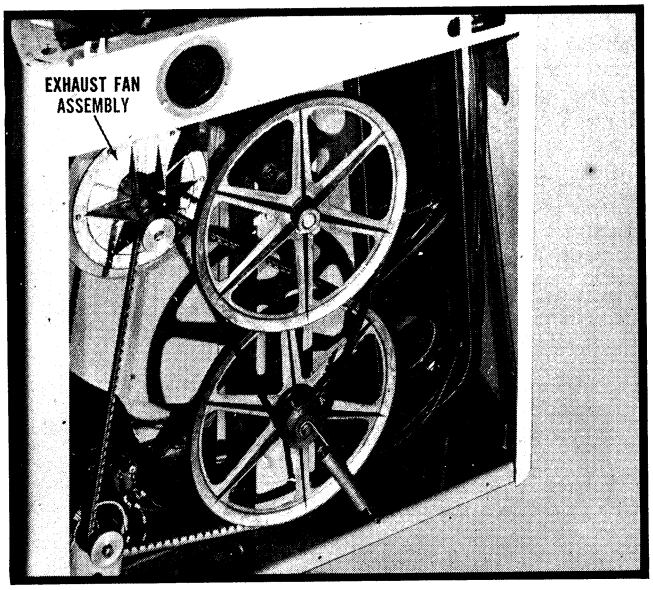


Figure 82

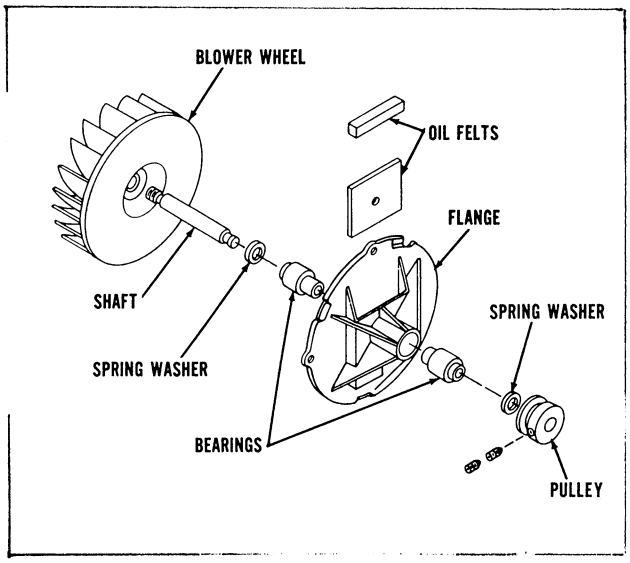


Figure 83

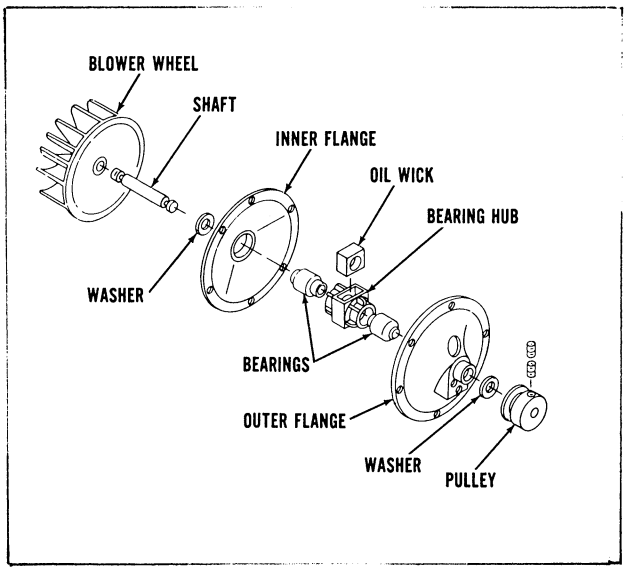


Figure 84

Be very careful when servicing the exhaust fan assembly; it is so exactly balanced that even a small amount of damage will produce an unbalanced condition which can create excessive vibration and noise, causing bearing failure.

This assembly should be kept clean and well oiled at all times. Use only enough turbine oil to saturate the oil felts. Do not use any oil except turbine oil.

When reassembling the exhaust fan assembly, do not compress the spring washers which separate the fan and pulley from the bearings. Allow only the weight of the pulley to determine the proper tension on these washers.

Some Whirlpool Dryers have one fan which operates on the same principle as the exhaust fan on the 24 inch models. *Figure 84* shows the component parts of this fan assembly. Note that the bearings are not pressed into the supporting flange, but into a hub which fits between two supporting flanges. (Early model dryers have two rubber mounted bushings pressed into the fan scroll. These bushings are replaceable.)

On models that have the centrifugal relay switch in conjunction with the exhaust fan assembly, it should be noted that the fly weight assembly is pressed onto the shaft and should not be separated from it. It is necessary to remove the blower wheel before it is possible to remove the shaft from the bearing housing or to remove the pulley from the shaft. If it is necessary to replace the blower wheel shaft, the complete shaft and fly weight assembly should be used, *Figure 85*.

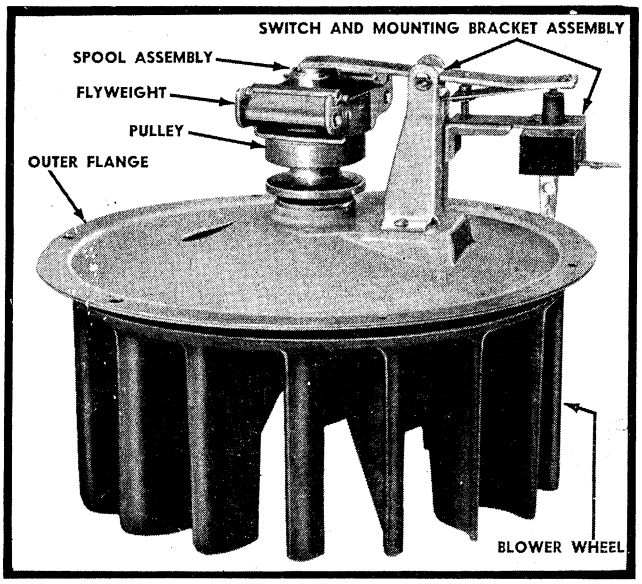


Figure 85

The fans used on the dryers are made from a high grade heat-resistant plastic material. They are precision manufactured so that they are correctly balanced and will not cause excessive vibration when revolving at high speeds.

On later models, to further insure quiet operation, the exhaust fan bearings are completely encased in neoprene sleeves which absorb much of the noise created by the fan. A fan bearing hub, containing two bearings and an oil felt, are mounted in an inner and an outer flange to support the blower wheel and shaft. Thrust washers are used on the blower shaft on each side of the two flanges. The pulley should be positioned on the blower shaft so that excessive end play is removed. Do not overtighten and create a bind in the assembly. Check to make certain it turns freely when assembled. *Figure 86* shows the assembly sequence of this blower assembly.

Some late model dryers have a revised blower hub assembly that uses a recirculating oiling system.

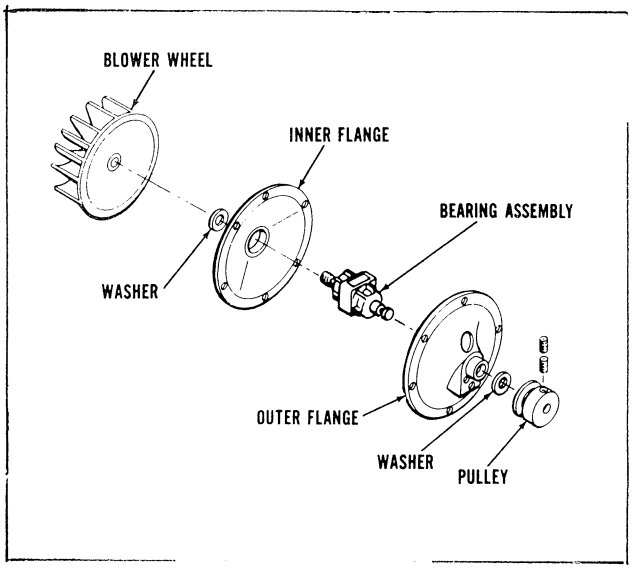


Figure 86

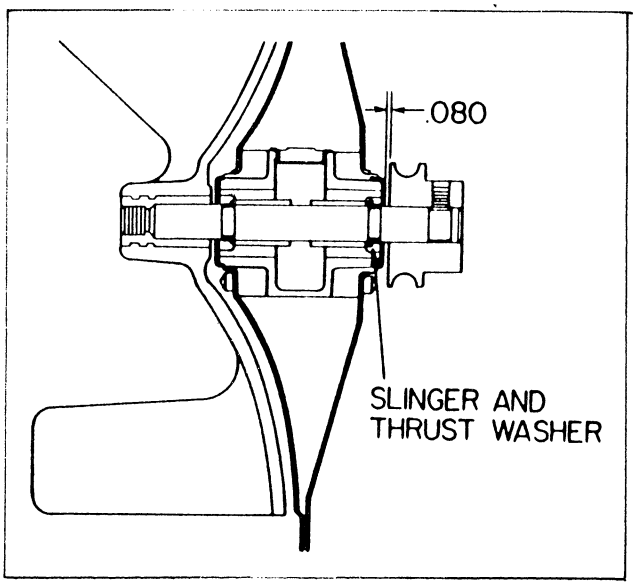


Figure 87

The shaft is lubricated by the oil wicking and the oil slingers return the circulating oil to the hub oil wicking for reuse. Cushion blocks are used to isolate the hub from the mounting flanges and reduce operating noise.

Further revisions to the blower and hub assembly are shown in *Figure 87*. These revisions were the deepening of the slinger groove in the shaft .020" and the reduction of the slinger I.D. by .020". At the same time, the thrust washers were removed from the shaft at the front and rear flanges. Pulleys are now spaced with a .080" clearance from the hub, with the exception of 2 speed pulleys,

which still use a thrust washer and minimum clearance. This allows the slingers to serve as thrust washers and assures proper operational clearance from the hub.

Two speed dryers utilize a fan assembly and pulley which enables the fan to operate at two different speeds.

The late model dryer may use either the poly-V belt, *Figure 80*, or the "O" ring type belt shown in *Figure 78*.

To remove the blower, slip the belt off of the blower pulley and remove the retaining screws securing the fan housing to the bulkhead. Slide the fan assembly out, being careful not to damage the fan blades. Remove the Allen screws holding the pulley to the shaft and disassemble the blower assembly. The shaft may be removed from the fan by holding the fan and turning the shaft counter-clockwise. Replace the necessary parts in the right order and saturate the oil wick with a special turbine oil. Do not over-saturate the wick.

PREVENTIVE MAINTENANCE HINTS

Dryers are designed and built to rigid engineering and quality standards. Hence, a minimum of service attention is anticipated, with normal home use, during the lifetime of the dryer. Maximum dryer performance requires a clean lint screen and observance of loading capacity on the part of the user.

Machines installed for other than home use, with continuous, or nearly continuous, daily usage will operate with less service attention required, providing preventative maintenance is practiced. The following maintenance steps are recommended after each 1,000 hours of operation:

1. Check blower hub and bearing assembly. If wick is dry, add oil from No. 10943 oil capsule--just enough to saturate oil wick without overfilling.

2. Check drum bearing blocks and lubrication felts. If dry, add 89318 lubricant grease to felt. Fill V groove and remove surplus grease.

3. Remove drum from drum shaft. When lubrication is exhausted from drum bearing, replace bearing. On older models, an oil hole is provided, *Figure 62*.

4. Check belts for cracked or frayed spots, replace if questionable.

5. Check drum felts for position and sealing ability.

6. Remove any lint accumulation when found in the dryer. If excessive, correct lint leak at seals or lint screen housing gasket.

7. Check exhaust duct attached to the dryer--be sure it is free of lint.

8. After extended usage--2,500 to 3,000 hours--have the main motor inspected, cleaned and lubricated at a motor repair station. Always keep motor free of lint when making a check.

CONVERTABLE DRYER, Mechanical System

The blower and blower housing is somewhat different in the convertable dryer.

Air is circulated through the dryer by an 8 5/8" exhaust fan, *Figure WC87A*. The fan is driven directly from the motor shaft and rotates at the motor speed of 1759 rpm. The air flow pattern is illustrated in *Figure 72*. Air is moved through the heater box, then passes through the inlet manifold into the drum area. In the drum it absorbs the moisture from the laundry and then passes through the lint filter and is finally exhausted.

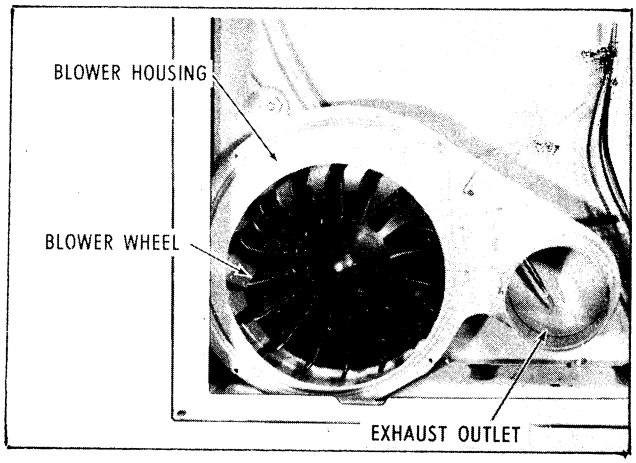


Figure WC87A

AIR DUCT AND BLOWER WHEEL REMOVAL

1. Remove the two screws securing top to the air duct.

2. Lift the top and prop it up out of the way.

3. Remove the harness wires from the door switch.

4. Remove the front panel.
5. Ride belt off idler pulley and remove the belt.
6. Remove the drum from the dryer cabinet.
7. Remove the two screws that secure the bulkhead to the cabinet on the right side.
8. Remove the back panel from the dryer.
9. Remove the four screws that fasten the air duct to the fan scroll
10. Using a wrench, hold the motor shaft and unscrew the blower wheel from motor shaft , this is a left hand thread.
11. To replace fan or component parts, reassemble in reverse order.

ORIFICE

Two level input gas burners require special main burner orifices. An angular seat is required for proper needle function and input control. These orifices have right hand threads and are identified by the letter "T", which follows the drill size.

An orifice coded 30–T would indicate a Number 30 drill size and the letter "T" indicates it is for a two level input gas burner.

Maximum flow rate is calculated with some needle displacement, hence in some cases they have a larger drill size than required to provide standard gas flow. Standard main burner orifices cannot be used as two level orifices. However, two level orifices can be used as a standard orifice with proper drill size selection.

THERMOCOUPLES

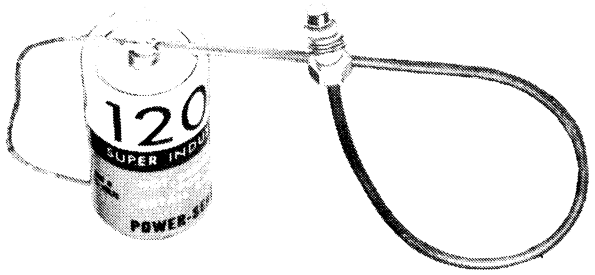
A thermocouple is a device which generates a small amount of electrical current when its element is heated by the pilot flame. This current is measured in millivolts. Before condemning a thermocouple, the pilot flame should be checked for proper size and flame characteristics. The flame must be hot enough to heat the thermo element enough to continue its millivolt output. A thermocouple on a direct reading of millivolt output should be a minimum of 17 millivolts or higher with only the pilot burning. The average reading will vary between 24 to 28 millivolts.

NOTE: ***The thermo-element should be clean and not loaded with carbon and all connections should be clean and tight.***

ELECTROMAGNET

The electromagnet is energized by the current produced by the thermocouple and is designed to hold the pilot valve open. The electromagnet will hold the pilot valve open so long as the pilot burner and thermocouple is operating correctly. If for any reason the pilot flame is extinguished, the thermocouple will cool and stop generating current, and the electromagnet will be deenergized, releasing the pilot valve and stopping the flow of gas to the burner.

A simple tester for the Electromagnet can be made by cutting off the *"hot side"* of an old thermocouple and separating both wires (tube acts as one wire) carefully cut tube back without damaging the wire inside, and expose enough of the wire to connect to a flashlight cell 1.5 Volts, connect to Electromagnet and test, if button or reset stays down and machine is turned on while tester is in the circuit, then mag head is not at fault, look for other problems, check with a new thermocouple, see illustration below



Since the electromagnet receives its current supply from the thermocouple only and not from the dryer electrical circuitry, it can be tested individually from the dryer circuit. The electromagnet is installed in the body of the valve assembly and acts as a safety device on pilot failure.

MANUAL IGNITION BURNERS

Gas burners employing manual pilot ignition use a gas control valve such as pictured in *Figure 88* The cut-away view in *Figure 89* shows the internal parts of this valve.

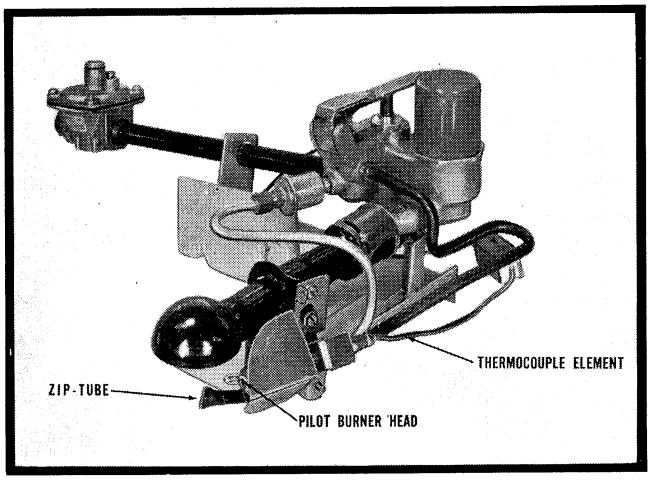


Figure 88

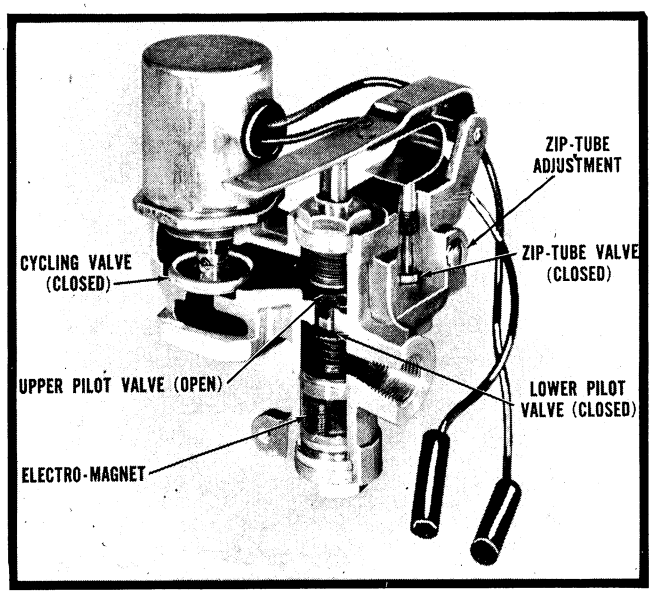


Figure 89

When the lever is manually depressed, *Figure 90*, the lower pilot valve is held open, permitting gas to flow to the pilot burner and zip-tube valve. Manually depressing the lever also closes the upper pilot valve which stops gas from flowing out at this point, and also opens the zip-tube valve, permitting gas to flow to the zip-tube.

The cabinet toe plate must be removed to light

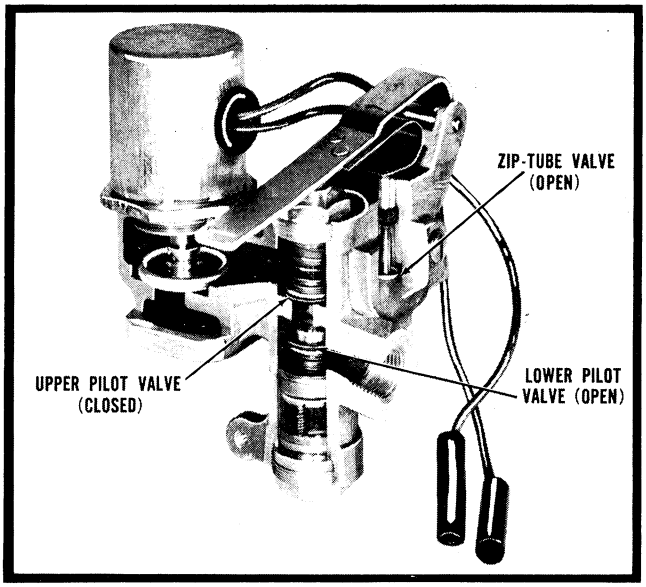


Figure 90

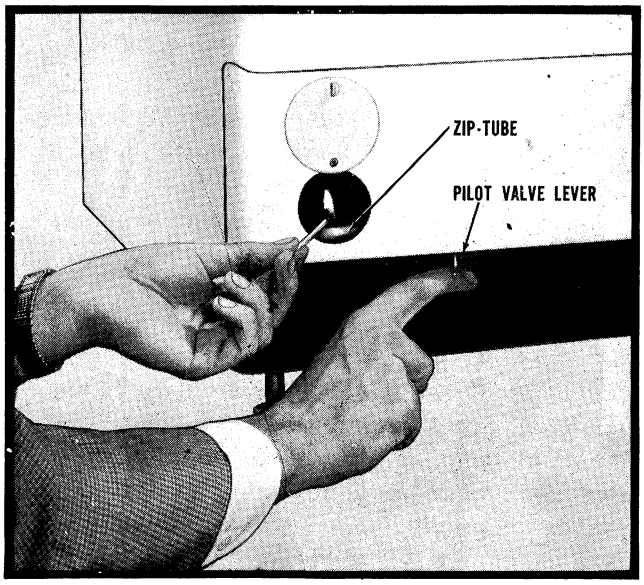


Figure 91

the pilot burner. The toe plate is fastened to the cabinet by retaining clips. To remove, grasp the bottom edge of each side and pull out. Locate ignition lever and zip tube. To light the pilot, simultaneously depress ignition lever and place a lighted match to the front port of the zip-tube. The zip-tube will ignite the pilot burner. Keep the ignition lever depressed for at least 30 seconds to allow the pilot flame to heat the thermocouple.

On the early models, the pilot may be lit by inserting a lighted match through the toeplate opening as shown in *Figure 91.*

When the lever is released after pilot ignition, the zip-tube valve closes and the upper pilot valve opens, allowing gas to flow to the cycling or main burner valve. Gas is now available to the pilot burner and the main burner valve, but not to the zip-tube.

It should be noted that the pilot burner and its control valve are not connected to the dryer electrical circuit in any way. The pilot burner can be ignited when the timer is in its OFF position; in fact, it is recommended that the dryer not be turned on until after the pilot burner is lighted. The pilot can be extinguished by turning off the gas supply at the petcock in the supply pipe.

The cycling or main burner valve on a manual pilot ignition gas burner is a solenoid operated valve which is connected to the 120 volt circuit on the dryer, but does not depend electrically on the action of the pilot burner or its control valve. That is, this burner control valve can be opened or closed by making or breaking an electrical circuit through the solenoid regardless of whether or not the pilot is burning. The pilot valve must be open, however, before the gas will flow through the cycling valve to the main burner. After the pilot is ignited, the timer is set to the desired drying time and the dryer begins to operate.

On the later dryers, the burner assembly was changed as in *Figure 92*. The valve body is the unitized type, incorporating the pressure regulator and the pilot filter within its construction. The pilot burner is mounted beneath the main burner and shutter assembly, *Figure 93*. This location places it in an area of minimum air turbulence. The pilot burner is enclosed in a perforated metal shield to assure proper burner performance. It is of the non-aerated type, requiring no primary air screen-thus eliminates lint problems at the pilot burner assembly.

The pilot orifice is designed for a pilot burner input of approximately 300 BTU's of gas per hour. A flame scoop is used to direct the flame against the bulb of the mercury element, thus utilizing the full flame for heating the bulb and igniting the main burner during operation of the dryer.

The pilot safety valve is maintained in an open or operating position by a latching pin that is actuated by the mercury filled thermal bulb and diaphragm reacting to pilot flame heat.

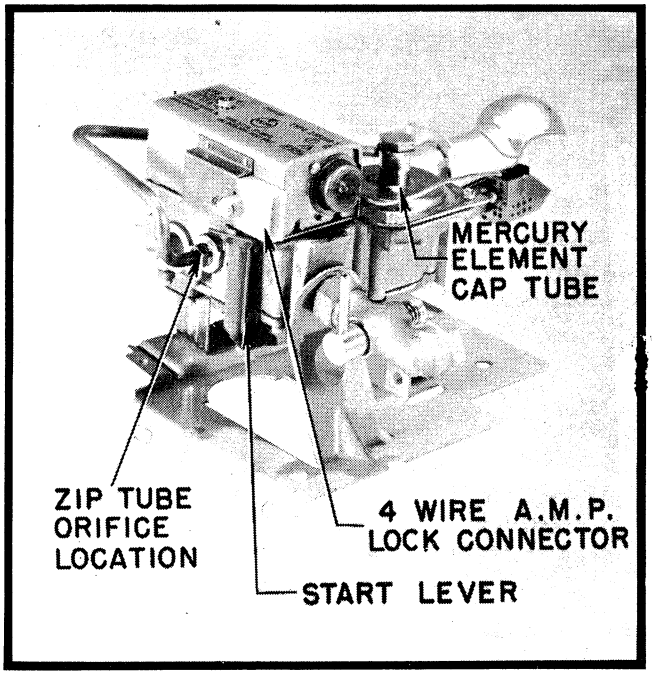


Figure 92

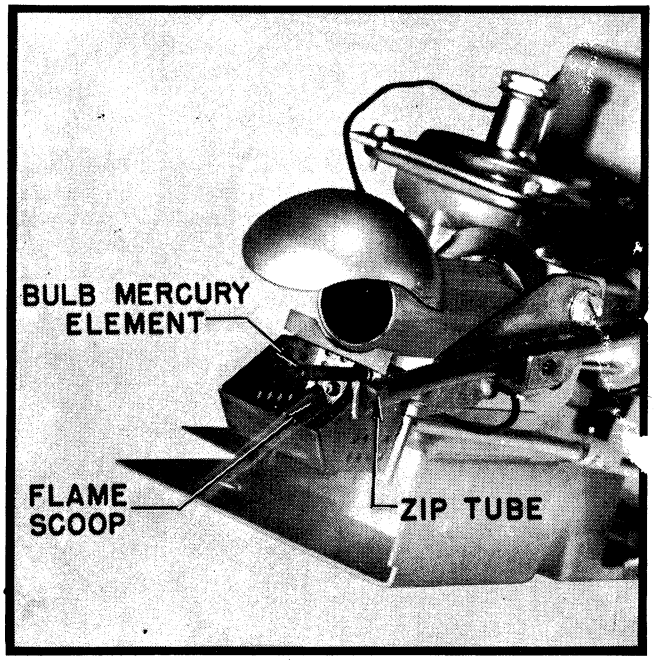


Figure 93

The pilot burner and flame scoop are welded to the thermal bulb. These components are a part of pilot and unlatch coil assembly which is a serviceable assembly. The pilot orifice threads into the end of the pilot burner and the pilot tube connects to the orifice.

Four screws secure the unlatch coil assembly to the valve body; the front two screws are pictured, *Figure 94*.

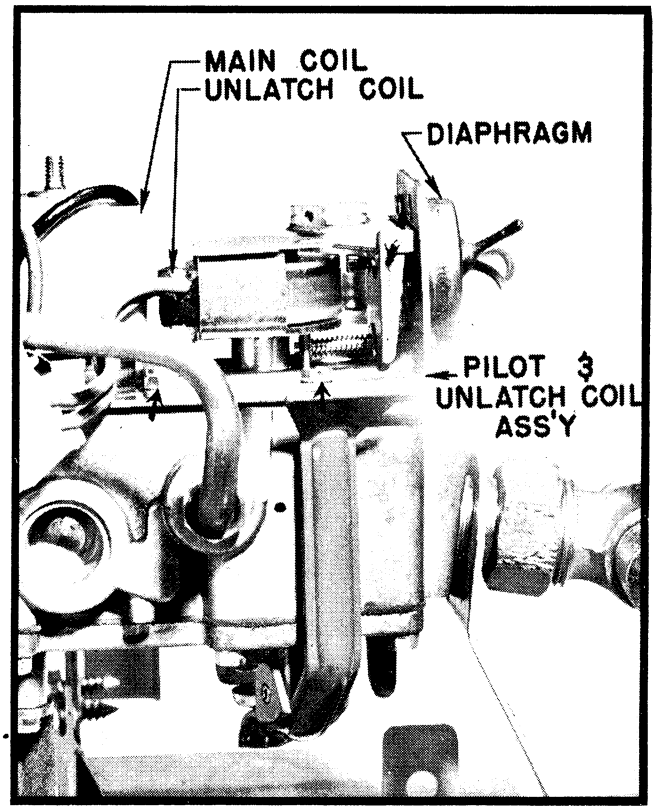


Figure 94

The unlatch mechanism is shown in the closed or cold position with the safety pilot valve also closed. This burner assembly functions fully on 115 volt circuitry, whereas previous Match Lite burners use millivolt circuitry for function of the safety pilot valve. Two solenoids and the mercury element provides for burner function. At the left is the main burner coil; the unlatch coil is an integral part of the pilot and unlatch coil assembly. The unlatch coil is in a circuit always potentially energized by voltage from terminals L–1 and L–2 with a normally open heater box safety thermostat in series with the unlatch coil. When air movement is reduced through the heater box sufficiently to cause the normally open safety thermostat to close, the unlatch coil is energized and allows the safety pilot valve to close. The two purple colored harness leads at the 4 wire AMP lock connector provides circuitry to the unlatch coil.

The main burner coil will lift the main valve with the solenoid cover removed. This enables the serviceman to fully observe functional operation of the pilot and unlatch coil assembly when checking burner assembly performance. The latch pin is adjusted to provide .023/.027 clearance from the pilot position safety valve plunger in the unlatched position. This factory adjustment is made at the diaphragm actuating pin and should not require field adjustment.

Depressing the start lever fully lifts the pilot valve plunger. This action causes the lower seat of the safety valve to close the passageway to the main burner. At the same time over-travel action opens the zip tube valve and the valve to the pilot orifice. Gas is now present at the zip tube and the pilot burner. Igniting the zip tube gas causes the ports on the zip tube to light and in turn ignite the pilot burner.

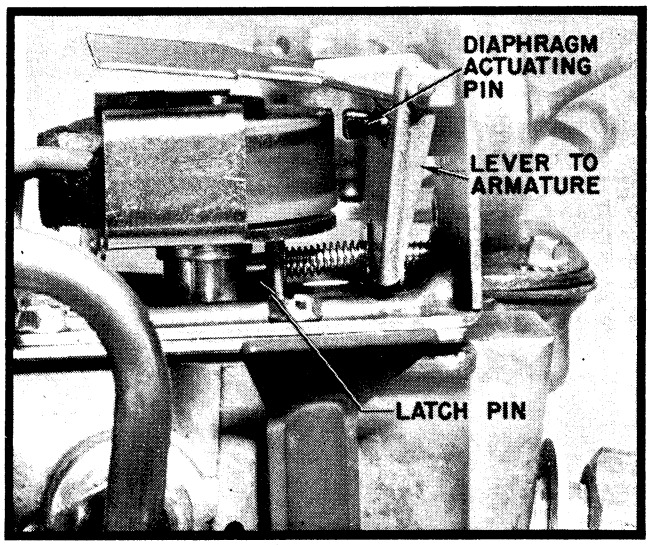


Figure 95

After about one minute, the pilot flame heat will cause the mercury in the thermal unit to expand or move the diaphragm. The diaphragm actuating pin moves the lever forward allowing the latching pin to move into the latched position, *Figure 95*. Releasing the start lever allows the zip tube valve to close and reopens the passageway to the main burner valve seat. The pilot burner should remain ignited until the manual gas shut-off valve is closed or the safety thermostat action energizes the unlatch coil to close the pilot position safety valve. During the time the safety thermostat is closed, (7 or 8 minutes), the unlatch coil remains energized. This will cause the clapper or armature to buzz, alerting the customer to the action taking place. A burner lighting instruction label is located in the door well of the machine.

Two level input, White Rodgers Match Lite gas burner assemblies are basically identical to the single level input burner except for the two level feature. The two level input provides 20,000 BTU at the low level and 37,000 BTU input at the high

level. A solenoid operated needle assembly that is actuated in and out of the main burner orifice provides two levels of gas input, *Figure 96*. The two brown colored leads at the six wire AMP lock connector provide for circuitry to the two level solenoid coil. Spring action causes the needle to seat in the orifice, reducing input. Energizing the two level solenoid will lift the needle out of the orifice for high level input. Burner input and blower speed selection is provided by a console mounted switch and control knob.

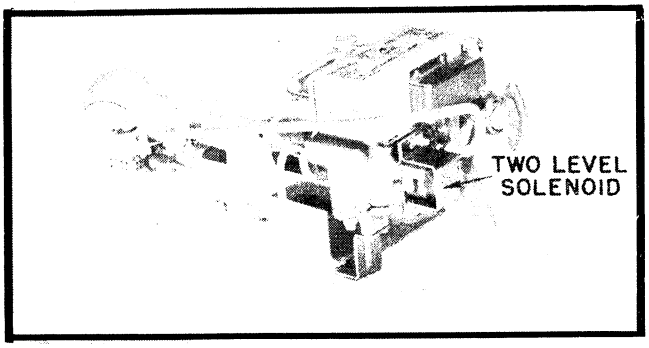


Figure 96

Match lite burner assemblies will be slightly revised starting with the 1965 models. The unlatch coil and the unlatch armature will not be specified on the dual gas valve. This means that the heater box safety thermostat will be wired to cycle the main burner in the future when it functions. This will eliminate the need to relight the pilot burner when the safety thermostat functions.

NOTE: The unlatch mechanism can be adjusted by turning adjusting screw indicated, Figure 97. The thickness of an ordinary business card should exist between the heavy part of plunger and latch pin when mercury tube is in a cold state.

The latch pin will function as heretofore. It will hold the safety valve open in operation by latching force created by pilot heat on the mercury filled pilot bulb and capillary tube, *Figure 97*. In the event of pilot outage, for any reason, the latch pin will retract allowing the safety pilot valve to close. This action stops all gas flow through the dual valve.

Two level input gas burners require special main burner orifices. An angular seat is required for proper needle function and input control. These orifices have right hand threads and are identified by the letter "T", which follows the drill si

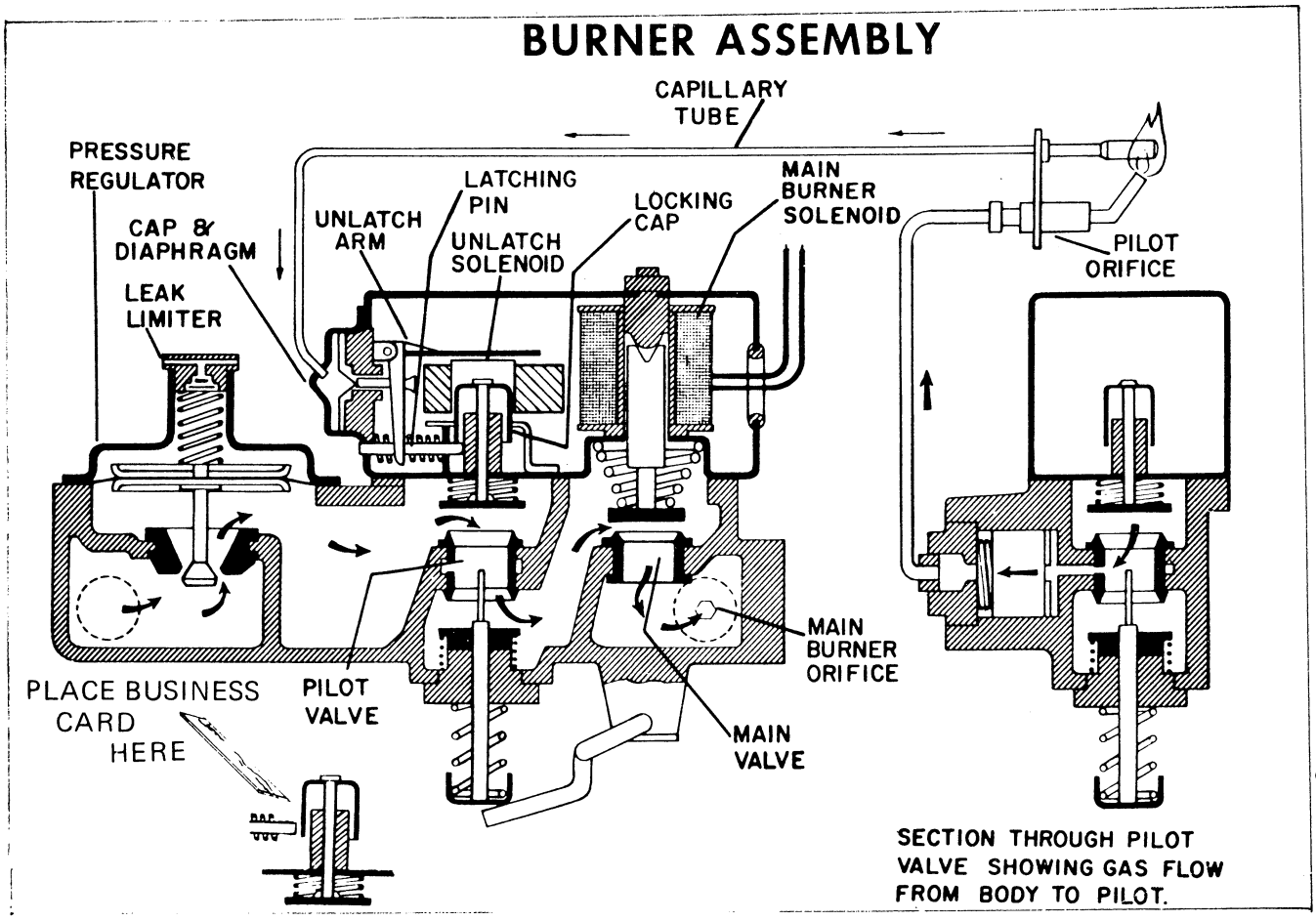


Figure 97

THERMOCOUPLESTAT

The thermocouplestat is another safety device that is mounted to the burner assembly and wired in series with one leg of the thermocouple. Its purpose is to protect the dryer against any possible blowback of flame from the main burner. It is set to open at 285 degrees and when opened it breaks the circuit to the pilot holding magnet, letting the pilot valve close and no longer permitting the gas to flow. The dryer should be checked for proper air flow and the pilot relit before resuming use of the dryer.

UNLATCH MECHANISM

The latest manual ignition burners no longer use a thermocouple or magnetic coil to hold the pilot valve open. A diaphragm assembly with a mercury filled bulb is used to hold a latching pin in the latch position, *Figure 97*. If the pilot should fail for any reason, the mercury in the bulb contracts, allowing the diaphragm to recede, thus permitting the unlatch pin to retract. The plunger held by the latch pin falls, thereby closing off the gas supply. The early model of this version has an electrical unlatch coil also in the circuit, *Figure 95*. When the pilot safety thermostat which is normally open, closes, a circuit is completed to the relay coil causing not only the pilot valve to close, but also acts as an alarm by buzzing continuously for several minutes, thus notifying the user of a malfunction.

ZIP TUBE

The zip tube is a device used to light the pilot burner. It is a small diameter tube with a series of small holes drilled along its length with the end welded closed. The tube is attached to the valve body as in *Figure 88*, and is controlled by a valve, *Figure 89*, which when depressed by a lever feeds gas to the tube. A match held to the tube ignites the raw gas, causing it to follow the drill holes of the tube and igniting the pilot. When the lever is released, the zip tube valve closes, shutting off the supply of gas to the zip tube. Regardless of which manual ignition burner is used, the principle of ignition is the same.

ELECTRIC IGNITION BURNERS

Several types and many variations of the electric pilot ignition assemblies have been used. However, the basic principle of operation remains the same. To understand how these burners operate, various components and their functions must be discussed.

The basic burner assembly, *Figure 98*, consists of warp switch and step-down transformer, ignitor coil, dual solenoid controlled valve, main burner and pilot assembly, and the mercury vapor or pilot switch.

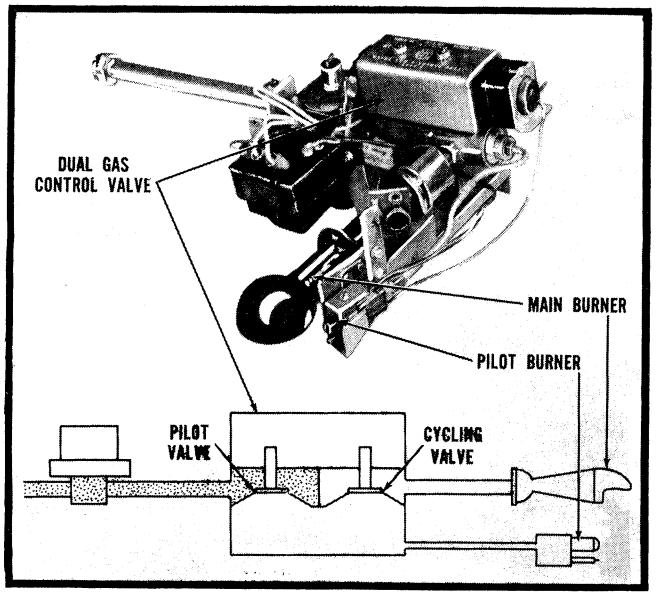


Figure 98

As soon as the timer is turned to the desired drying time, several actions occur simultaneously. Circuits are completed to the machine motor, timer motor, warp switch resistor, transformer and glow coil, and the pilot valve solenoid. During this period, gas flows past the open pilot valve to the pilot burner where it is ignited by the glow coil which is being energized by the transformer.

The pilot flame begins to heat the mercury bulb and the resulting pressure causes the pilot switch to move from its COLD to its HOT position, *Figure 99*. This action removes the voltage from the transformer, glow coil and warp switch resistor and closes a circuit to the cycling valve solenoid.

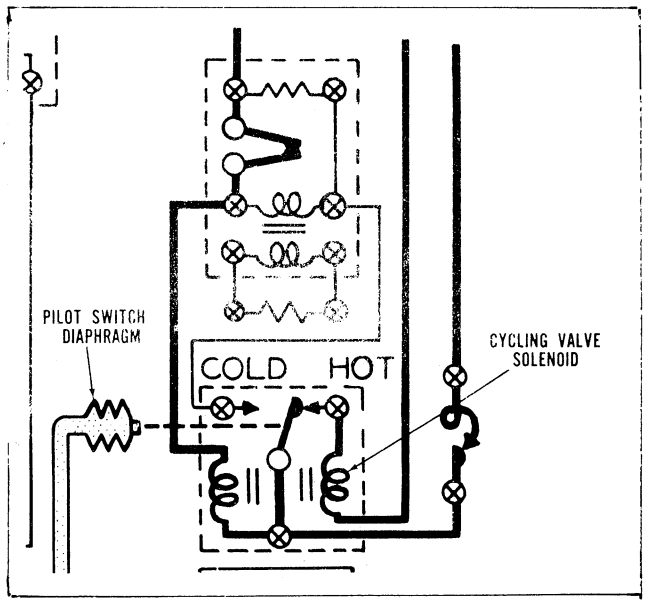


Figure 99

If the pilot gas is not ignited or if the pilot switch does not move from its COLD position, the warp switch resistor will open the warp switch after a period of from 3 to 5 minutes. This action opens the circuit to the pilot valve, transformer and glow coil. Note, however, that when the warp switch opens, the resistor is still energized and will continue to heat the warp switch to keep it open. In order to attempt ignition again, it will be necessary to turn the timer off for about 7 minutes to allow the warp switch to cool sufficiently so that its contacts will close.

With normal pilot ignition, however, it takes only a few seconds for the pilot flame to cause the pilot switch to move to its HOT position. As explained before, this action removes voltage from the ignition components and completes a circuit to the cycling valve solenoid. In this phase, both the pilot valve and the cycling valve are open, permitting gas to flow to the pilot burner and the main burner.

The main burner is now cycled on and off by the operating thermostat to maintain the proper drying temperature.

If some mechanical failure causes abnormal temperature rises that are not detected by the operating thermostat, a safety thermostat will open and deenergize all gas burner circuits.

On gas burners equipped with automatic pilot ignition, a dual gas control valve is used. This unit is actually two solenoid-operated valves contained in the same body, *Figure 98*. The valve nearest the inlet end is referred to as the pilot valve, which the second valve is termed the cycling or main burner valve.

When the pilot valve solenoid is energized, the pilot valve opens, allowing gas to flow inside the valve body and out through a port to the pilot burner, *Figure 100* When the cycling valve is opened, gas can flow from the same chamber to the main

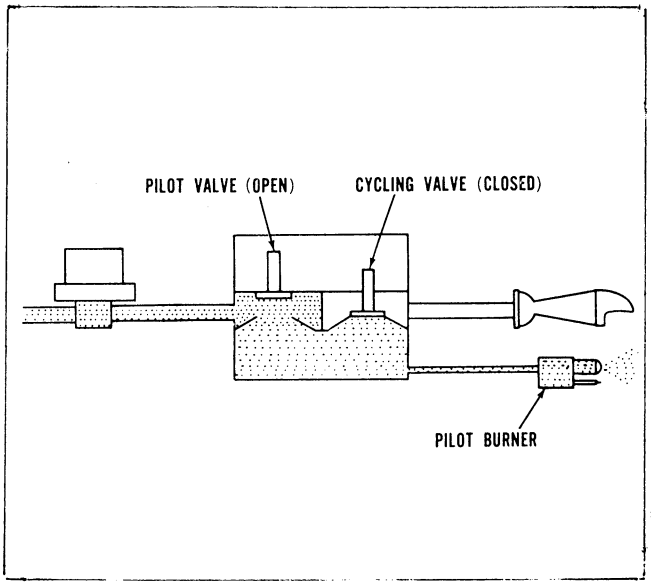


Figure 100

burner, *Figure 101*. Consequently, the pilot valve must always be open while the dryer is running normally, while the cycling valve opens and closes to satisfy the need for more or less heat for proper clothes drying temperatures. Due to the action of the pilot switch, the pilot burner must be ignited before a circuit can be completed to the cycling valve.

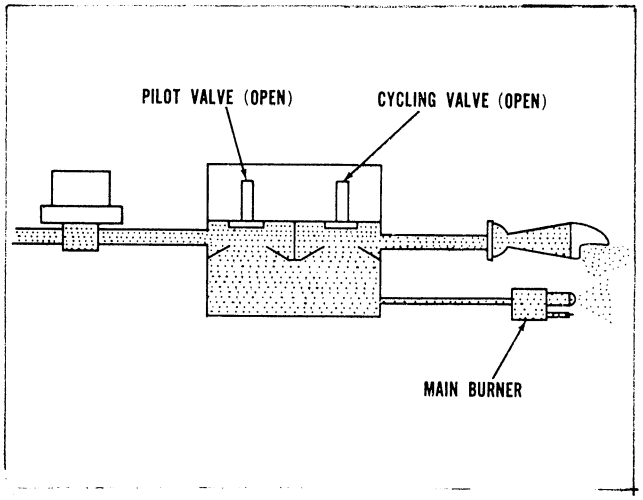


Figure 101

The pilot switch consists of a bulb, capillary tube, flexible diaphragm and a switch. Note that this switch plugs into the solenoid housing on the dual gas control valve much in the same way as you would plug in a radio tube *Figure 102*.

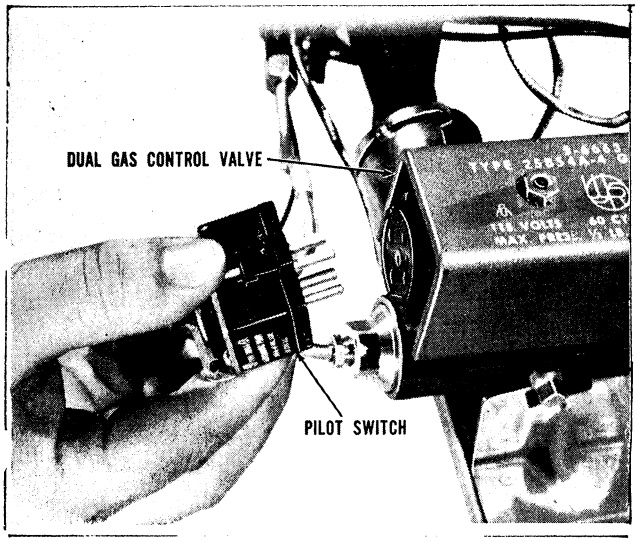


Figure 102

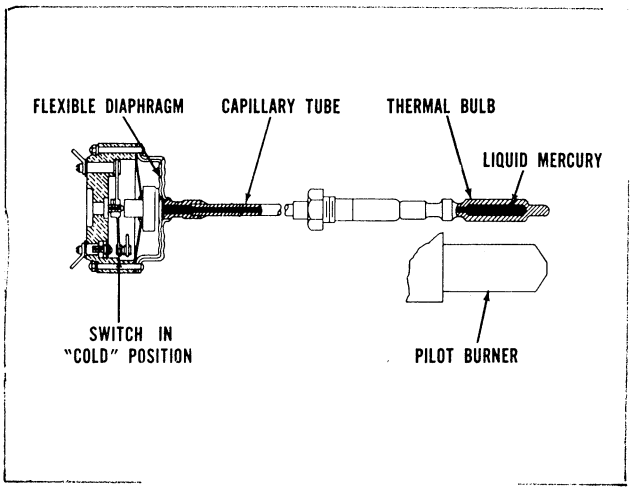


Figure 103

The mercury filled tube is placed so that a flame from the pilot burner will play directly on it, *Figure 103* When the bulb is heated sufficiently, the mercury vaporizes and builds up pressure which is transmitted through the capillary tube to the flexible diaphragm. Under sufficient pressure, the flexible diaphragm will cause the switch to move from its COLD position to its HOT position, *Figure 104* This action does three things:

1. Opens the circuit to the ignitor transformer and allows the ignitor coil to cool.

2. Opens the circuit to the warp switch resistor, allowing the warp switch to remain closed.

3. Closes the circuit to the cycling valve solenoid which opens the valve that supplies gas to the main burner.

The pilot switch will stay in its HOT position so long as the pilot flame is burning correctly. If the pilot flame fails, however, this switch will return to its COLD position and automatic ignition will again be attempted. If the pilot fails to reignite, the circuit to the pilot valve solenoid will be broken by the action of the warp switch.

The warp switch is a safety device used on electrically ignited gas burners. It is wired into the gas burner circuit to remove voltage from the pilot

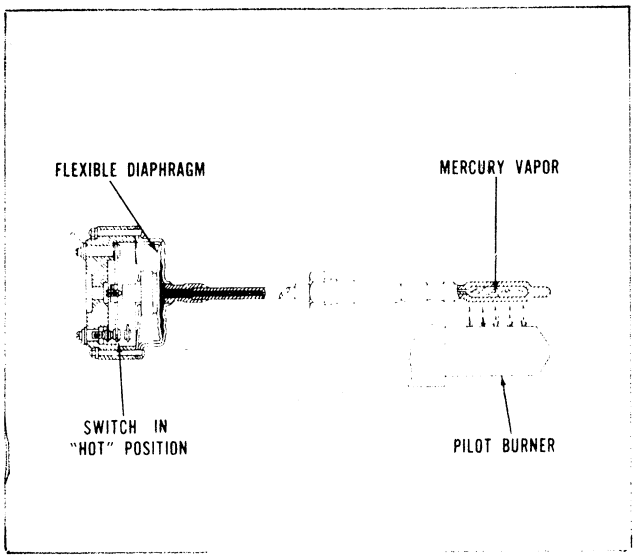


Figure 104

valve solenoid and glow coil if any of the following conditions should arise:

a) Gas supply to the dryer is interrupted.

b) Pilot fails to light.

c) Pilot flame is faulty and not heating sufficiently to cause the pilot switch to operate.

This switch is composed of two bi-metal arms and a resistor, ***Figure 105***. The resistor is placed close to one of the bi-metal arms, and acts as a miniature heat element which is designed to produce enough heat in 2 to 4 minutes to cause the arm to warp out of shape. (Ambient temperature and applied voltage will affect the warp time. Low temperatures and low voltage will take longer to actuate the switch.) This warping causes the switch contacts to break, ***Figure 106*** thus removing voltage from the pilot valve solenoid and shutting off the gas supply. This action also removes voltage from the transformer which is the source of power for the glow coil.

Normally, however, the pilot ignites and the pilot switch moves from its COLD to its HOT position before the heat from the resistor opens the warp switch contacts. Since the warp switch resistor is energized only when the pilot switch is in its COLD position, it does not generate sufficient heat to open the switch contacts.

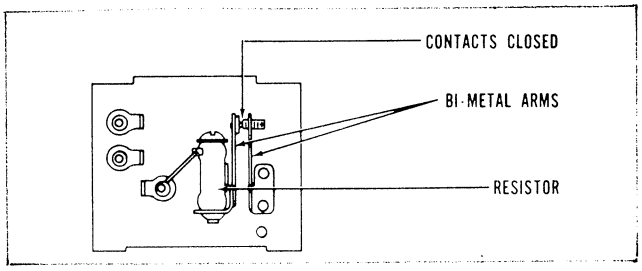


Figure 105

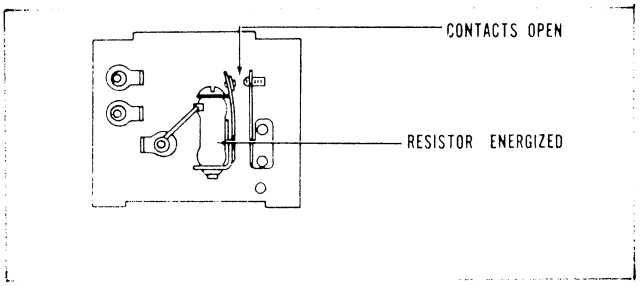


Figure 106

If the pilot fails to ignite or burn properly, thus opening the warp switch, the resistor will remain energized until the timer is turned off. After the timer is turned off, several minutes must elapse before the warp switch will cool sufficiently to allow the bi-metal arms to return to their normal closed position.

Trip time on the warp switch must be tested when assembly is at room ambient temperature. A 25 minute cool-down period is necessary for the warp switch to reach ambient temperature once the burner has been cycled. Normal trip time varies from two to four minutes depending on the temperature and the burner type. Warp switches are carefully calibrated being temperature compensated for normal variations in room ambient. Replacement is seldom required if checks are made according to following instructions.

The transformer is the source of voltage for the glow coil on the automatic pilot assembly. Although the warp switch and the transformer perform separate functions, they are combined into one unit to simplify the wiring, ***Figure 107***. When 120 volts is impressed on its primary winding, this transformer will furnish about 2 1/4 volts from its secondary winding which supplies voltage to the glow coil.

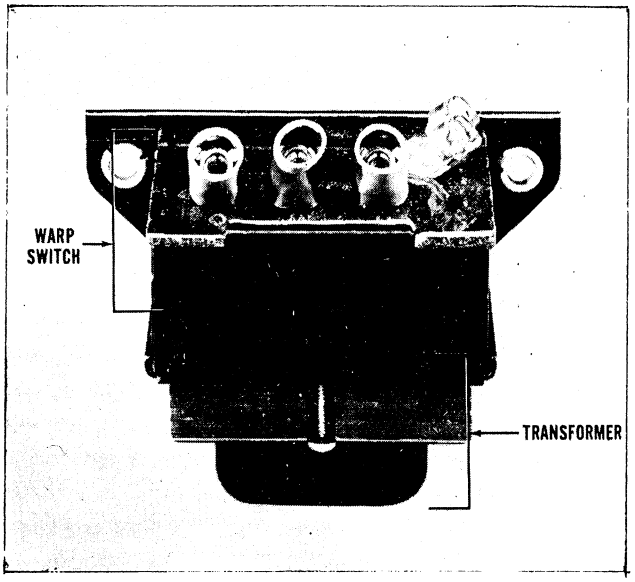


Figure 107

Voltage to the transformer can be interrupted by two actions: (1) when the pilot switch moves from its COLD to its HOT position, or (2) when the pilot burner fails to ignite and the warp switch contacts open as explained before.

The warp switch has 3 basic connection terminals: W, O, and Y that are used to check this assembly. Disconnect the three wires from these terminals and check for continuity between terminals W and O. This checks the internal switch. Apply live power to terminals W and Y and the glow coil should light. If it does not light, move the test lead on W to terminal O. This bypasses the internal switch. This switch is normally closed and should operate the glow coil between terminals W and Y. Disconnect the two leads to the glow coil and check the voltage at these terminals. It should be about 2 1/2 volts. A globe out of a two cell flashlight can be used to check this circuit. If the globe lights, but the glow coil doesn't, replace the glow coil. DO NOT CHECK THE GLOW COIL WITH MORE THAN 2 1/2 VOLTS.

MERCURY VAPOR SWITCH

The mercury vapor switch also known as the pilot switch, consists of a mercury filled bulb, capillary tube, flexible diaphragm and a single-pole, double throw switch. This switch assembly attaches to the valve body either by plug in or screw attachment. The mercury filled tube is mounted to the pilot burner assembly so that the pilot flame impinges on it. When the bulb is heated sufficiently, the mercury vaporizes and builds up pressure against the flexible diaphragm. When the pressure is sufficient, the diaphragm will cause the snap action switch to change from the normal cold position to the hot position. This action opens the circuit to the glow coil and warp switch resistor and closes a circuit to the main burner cycling solenoid, which opens the valve that supplies the main burner.

A continuity check of this pilot switch when in the cold position will be between terminals 4 and 3. When heated, there should be no continuity between 4 and 3 and a circuit is completed between 4 and 2.

Servicing the Gas Burner

By examining the machine being checked, you will be able to determine the best disassembly method for the part to be repaired or replaced. A few specific instructions, however, are listed below to help you avoid unnecessary trouble in servicing a gas burner.

To remove the burner assembly from the dryer, first remove the power cord from the wall receptacle and remove the toe plate. Turn off the petcock in the burner feed pipe and disconnect the burner control leads from the junction box. By disconnecting the union next to the petcock and removing the screw holding the burner base to the dryer base plate, the gas burner can be pulled out.

Handling the gas burner assembly should be done very carefully. Be careful not to kink the pilot tube and pilot switch capillary tube or to misalign any of the adjustable parts. Always disassemble threaded joints by using appropriate wrenches and, when reassembling pipe fittings, be sure to use a suitable thread sealer.

Replace wiring very carefully. Always use a wiring diagram to insure proper hook-up. To clean the gas passages and valves, use a solvent such as white gasoline or naphtha. Swab the valve seats with a lint-free cloth dipped in this solvent--do not scrape.

When replacing solenoid coils on a dual gas control valve, be sure that the leads to one coil point downward and the leads to the other point upward. This arrangement is necessary so that the magnetic fields around the coils will counteract each other, and not generate excessive heat.

Bench Testing

With the burner assembly removed from the dryer and connected to a separate gas supply, bench testing can be accomplished by connecting a live test cord to the three wires formerly attached to the wiring harness of the dryer. Attach one clip of the test cord to the No. 1 Black terminal and attach the other clip to the No. 2 White and No. 3 Blue terminals. There are three basic units using glow coil ignition. The wiring diagrams for these units are illustrated in *Figure 108*

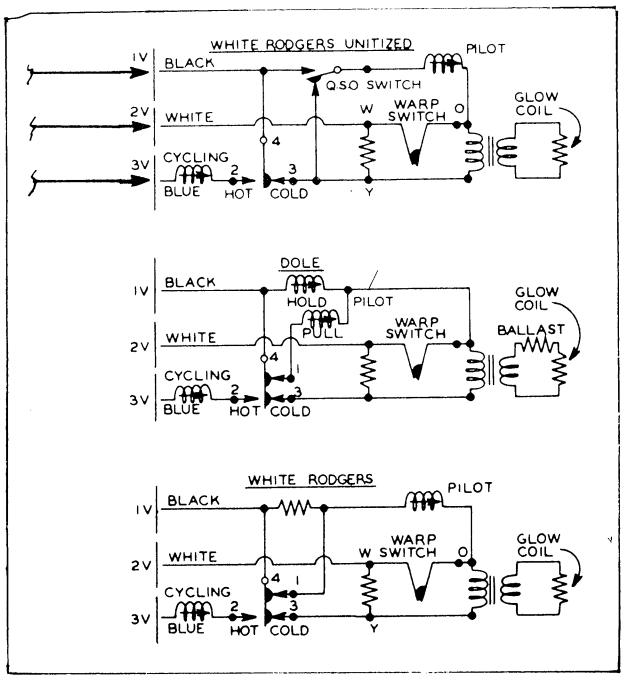


Figure 108

Black No. 1 is the common lead on all the early burner assemblies and supplies one leg of a circuit to the pilot coil, transformer, warp switch resistor, and the mercury vapor switch while the mercury vapor switch is in the cold position. On the White Rogers Unitized burner assembly, as soon as the pilot coil is energized, the Q.S.O. switch closes a holding circuit to the pilot coil. As the pilot heats the mercury bulb of the pilot switch, the diaphragm of the switch causes the contacts of the switch to move from the COLD to HOT position. This action breaks the circuit to the warp switch resistor and the transformer and completes a circuit to the cycling coil.

If the mercury or pilot switch fails to move from the COLD to the HOT position, the warp switch resistor is left in the circuit and the heat generated by it causes the bi-metal arms of the warp switch to open. The circuits to the glow coil, transformer, and the pilot coil are opened, and the Q.S.O. switch returns to its open position. All circuits are now removed from the burner assembly except for the resistor, which continues to hold the warp switch open until power is removed from the burner assembly.

The Dole Burner Assembly, ***Figure 39***, operates very similar to the previous burner, with the exception of the pilot coil which is a dual coil incorporating a *pull* and a *hold* winding. When a circuit is completed to the pilot coil, both windings are energized to give sufficient lift to open the pilot valve. When the pilot switch changes from the COLD to the HOT position, the *pull* winding of the pilot coil, the warp switch, resistor and transformer are opened and the *hold* winding of the coil is left in. This is sufficient to hold the pilot valve open, maintaining pilot flame. With this unit, if the door is opened or the power is disrupted, all the valve circuits are opened. The circuits must be left opened long enough for the pilot switch to return to the cold position in order to again supply the necessary voltage to the *pull* section of the pilot coil to again ignite the pilot burner. This is a safety feature designed into this unit.

The White Rogers Assembly using the Quick Shut Off resistor shown in ***Figure 36*** acts similar to the above unit. When the circuitry is completed to the cycling solenoid, full voltage is removed from the pilot coil. The pilot valve is now held open by a circuit through the resistor. If power to the burner assembly is interrupted for any reason, the pilot armature drops, cutting off all gas flow. It is necessary for the power supply to now remain off long enough for the pilot switch to again return to the cold position before the pilot burner will light again.

Refer to *Figure 108* to check the various components of these assemblies. Attach a live test cord to the black and white leads and the glow coil should light and the pilot valve should open. As the pilot switch moves to the hot position, the glow coil should go out and the pilot remain on.

If this portion of the cycle functions okay, then the blue wire can be touched to the white wire to check the main burner cycling valve for proper ignition. If the burner assembly functions correctly on the bench test, but does not do so in the dryer, then the malfunction is in the dryer and not in the burner assembly.

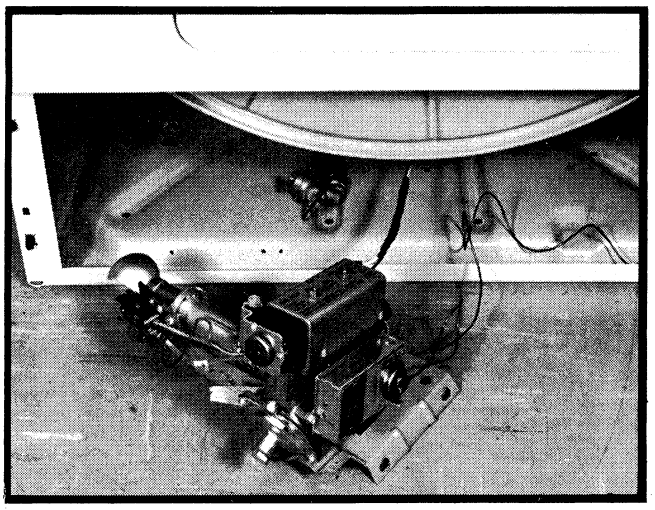


Figure 109

MODULATING BURNERS

Modulating gas burners installed in gas dryers have circuits and functions similar to standard burner assemblies.

A removable gas modulating unit is attached to the valve body. This unit has a fluid filled capillary tube and bulb that extends to the fan scroll, *Figure 109* The bulb and bracket are positioned in a thermostat mounting hole, *Figure 110*. The bulb senses exhaust air temperature. The hydraulic capillary tube with an internal diaphragm is attached to the modulator body. The diaphragm actuates a lever which regulates the movement of a needle in the main burner orifice. This needle meters gas input to the main burner to provide a modulating heat input to the dryer drum. Needle movement starts when the capillary bulb registers exhaust air temperature of 155°. Minimum heat input is reached at 170° exhaust air temperature.

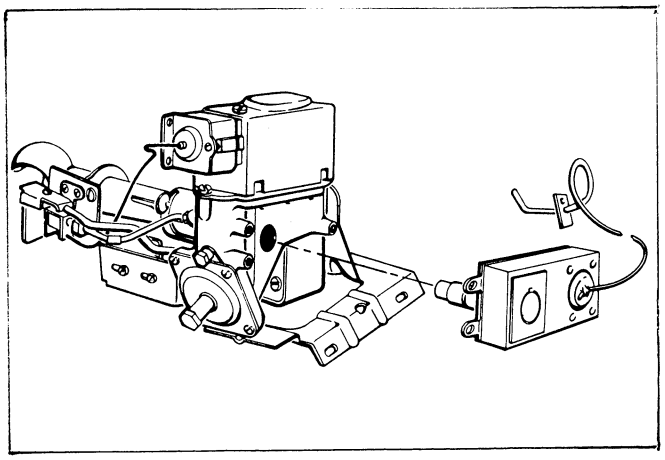


Figure 110

On initial production of gas modulating units, a ***quad*** ring was used as a needle seal at the rear of the gas chamber. The quality improvement utilizing a diaphragm to seal the modulating needle went into later production. This diaphragm provides a smoother action of the modulating needle, *Figure 111* At the same time, the modulation main burner orifices for Types No. 1, No. 2 and No. 4 gases were revised. Orifices with a No. 54 through No. 19 drill size have a tubular type extension to serve as a guide to center the modulation needle. Orifices for Type No. 3 gas remain unchanged.

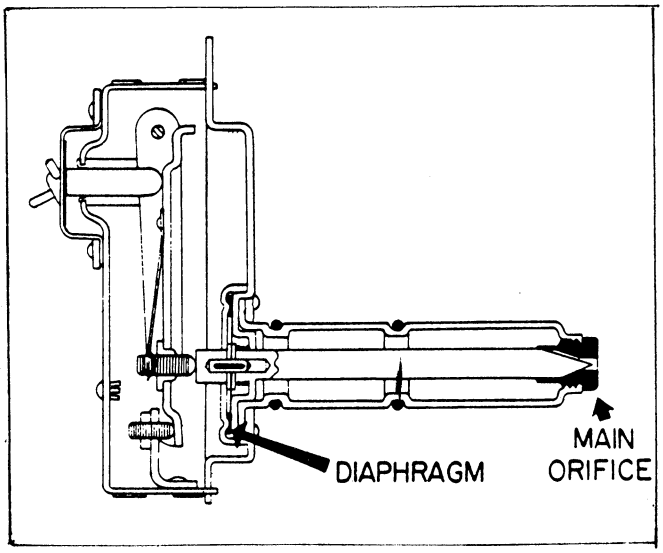


Figure 111

The main burner orifice is located in the orifice spud or tube which carries gas from the dual valve. (NOTE: Left hand threads are used on the main burner orifice.)

Modulating gas burner assemblies provide a continuous modulated heat input into the dryer rather than an interrupted or cycling heat input. As long as dampness remains in the clothes load, maximum heat input is utilized. When the moisture content lowers, less heat input is required to maintain a constant exhaust temperature. The heat input gradually reduces as the modulator pin restricts the gas input at the main burner orifice. All fabrics can be safely dried without danger of damage from excessive heat.

The basic burner function remains the same as with the electric ignition burners. Voltage to the burner is supplied by two coded harness leads instead of three.

TWO LEVEL INPUT BURNERS

Two level input White Rodgers burners equipped with electric ignited pilots, *Figure 112*, are basically identical with single level burners except for the two level feature. The gas input at low level is 20,000 BTU and 37,000 BTU at the high level. A solenoid actuated needle when seated by spring action in the main burner orifice controls the low level input. Solenoid action lifts it from the orifice seat for high level input. A console mounted switch and control knob provides for selection of burner input and blower speed.

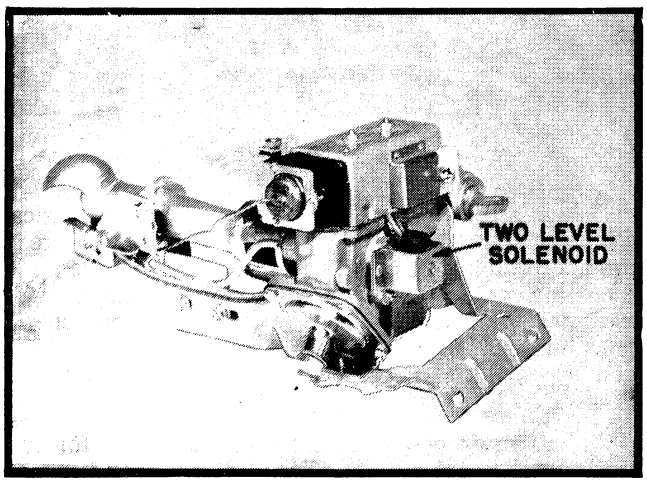


Figure 112

The pilot burner assembly is now located below the pilot head, *Figure 113*. The pilot shield is revised as shown. This places the pilot burner in an area of minimum air flow and provides improved pilot burner ignition and pilot switch transfer.

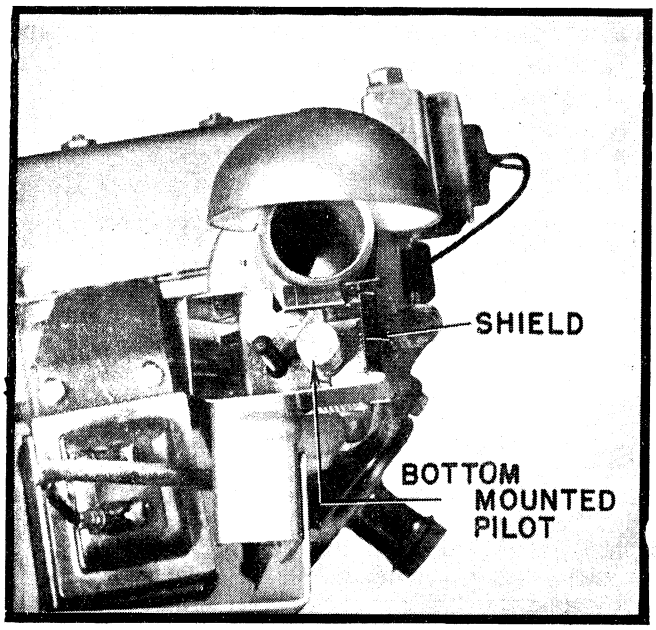


Figure 113

DIRECT IGNITION BURNERS

The two level direct ignition burner, *Figure 114*, and the single level burners, *Figure 115 and 116*, eliminate the pilot flame for burner ignition. The pilot solenoid and valve are retained and must be opened before gas can flow through the main cycling valve. These burners, like the earlier ones, use a dual gas valve with a double seat shut off and electrical quick shut off system.

These assemblies are removed the same as the previous ones and are electrically connected with a quick disconnect terminal block. The terminal blocks will fit together in only one position. This is to assure the proper terminal polarity, *Figure 117*. In the instant igniter burner assemblies are several components not used on previous burner

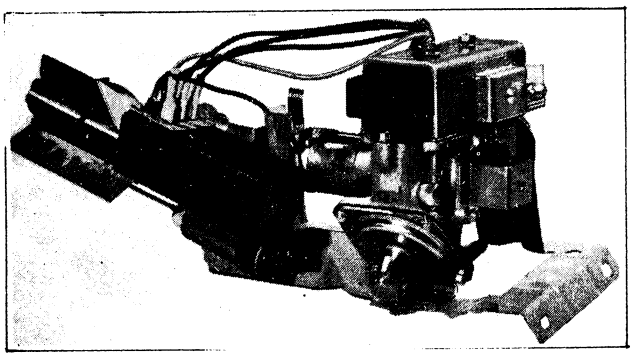


Figure 114

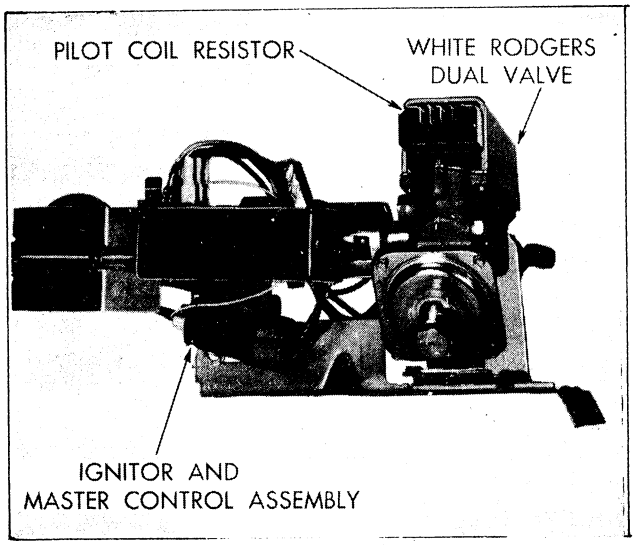


Figure 115

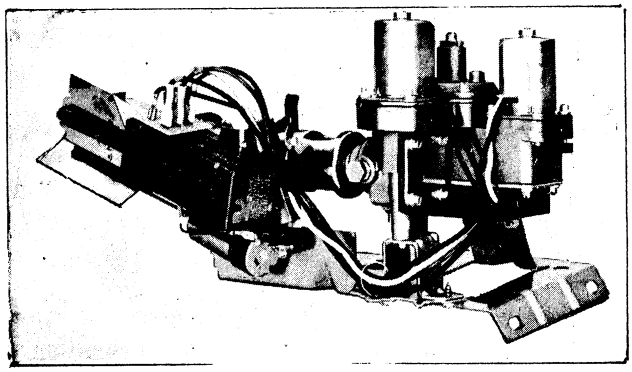


Figure 116

assemblies. These components are the flame switch relay, relay coil, ignitor, ignitor coil, diode and resistor.

Figure 118 shows a close up view of the functional and safety components contained within the master control assembly. Starting at the right hand side we see the relay coil, the relay armature and pivot arm which actuates the normally open relay contacts. Energizing the relay allows the relay contacts to close and provides circuitry to the pilot valve solenoid.

Next, we see the normally closed flame switch contacts. Directly above this is the 1000 ohm warp switch heater mounted on the warp switch contact arm. Warp switch contact arms are made of temperature compensated bi-metal. The warp switch is calibrated to open between 15 to 40 seconds at 115 volts and 70° ambient temperature.

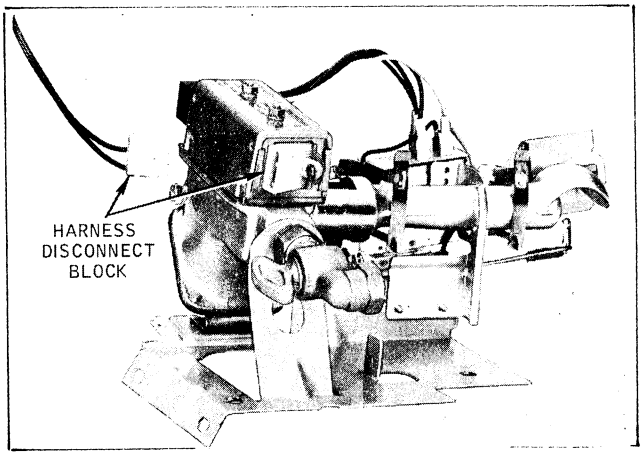


Figure 117

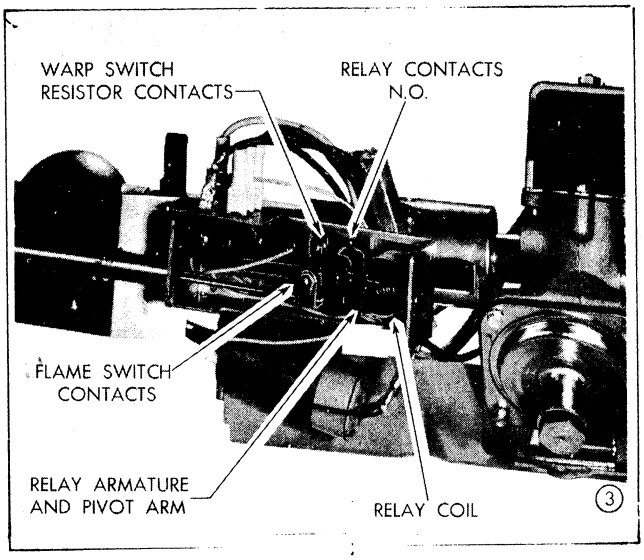


Figure 118

Shown in *Figure 119* are the ignitor contacts located at the burner head. The moveable contact arm is motor actuated by circuitry through the contact points. The arm oscilates each 1/6th of a second. A spring returns the contact arm to its normally closed position. Heat generated by arcing of the actuating tungsten ignitor contacts ignites the gas discharged from the burner head. The arcing takes place each time the contacts break to provide the ignition (or igniting) spark.

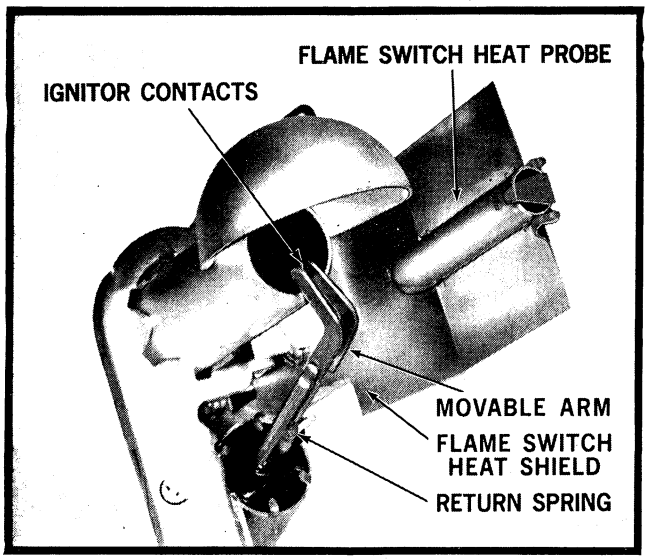


Figure 119

The main burner is ignited instantly (1 second or less). The burner flame then impinges on the heat probe of the flame switch on the burner side of the flame switch shield. The opposite side of the heat probe is shielded by the flame switch shield and is only exposed to the surrounding ambient air.

This difference in temperatures on the heat probe causes a warping action of the heat probe. The internal switch arm motion causes opening of the flame switch contacts, breaking the electrical circuit to the ignitor assembly. This action is specified to take place 3 to 5 seconds after the main burner ignites and completes the ignition cycle.

Figure 120 is a view of the General Electric Ignitor Assembly. Note that all components are mounted on a sturdy bracket. Mounting cut-outs allow it to be mounted on the tube of the main burner and shutter assembly.

The locating stud shown fits into the lower hole of the burner bracket and properly positions the assembly to provide the required operational location. Two mounting straps secure the assembly to the burner tube as seen in the previous picture.

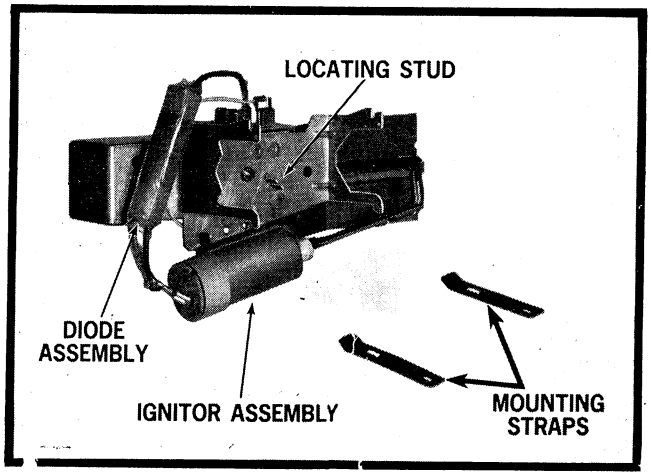


Figure 120

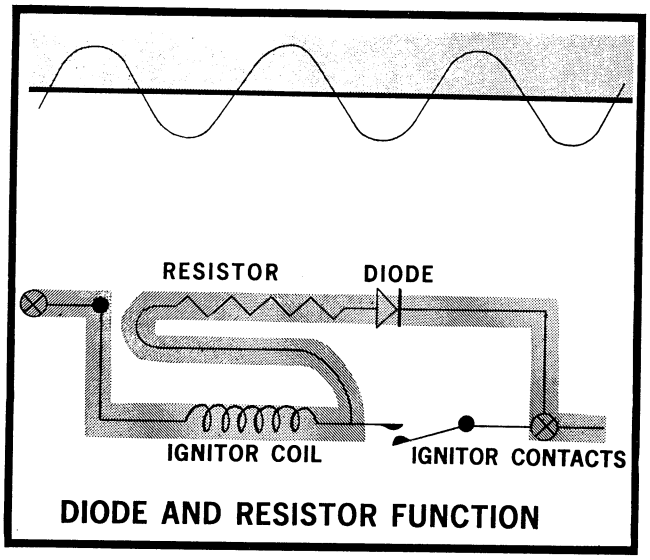


Figure 121

The diode and resistor assembly provides a parallel electrical circuit that by-passes the ignitor contacts. This circuit functions only when the ignitor contacts become insulated with lint. *Figure 121* illustrates the parallel circuitry function of the Diode and Resistor Assembly when ignitor contacts are insulated by lint. In this instance, the resistor controls current through the diode and the diode is a rectifier on AC current as shown above. This pulsating current will actuate the ignitor motor and contacts. As the contacts open and close, the lint is removed, restoring normal circuitry and function.

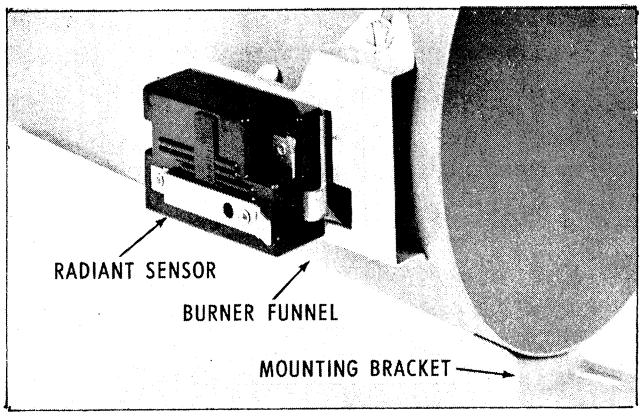


Figure 122

Burner ignition is instantaneous when operated at normal line voltage. Main burner gas ignites when both valves open.

The ignitor coil reaches 1800° in approximately ten seconds, the radiant sensor limits the ignitor temperature to 2800° and is mounted to the left side of the funnel assembly. The radiant sensor is calibrated to open within 12 to 20 seconds after the ignitor starts to heat. *Figure 122* is a close-up view indicating location of the radiant sensor. *Figure 123* is the gas burner circuitry on the machine wiring diagram label. Switches shown are in the deenergized position. The number one coil is so named because in sequence it is operational first, and is in series with the latching switch. Future Q.S.O. switches used on the Glo-Sil gas valve will be replaced with a more reliable split coil design, see *Figures 124* and *125*. *Figure 126* illustrates the White-Rogers split coil design and its components.

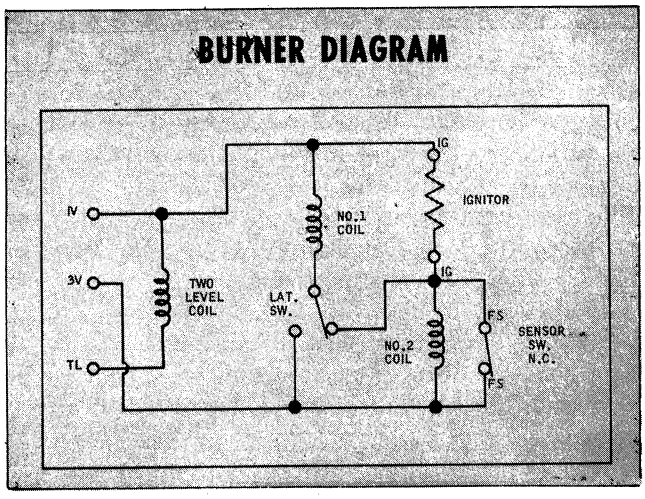


Figure 123

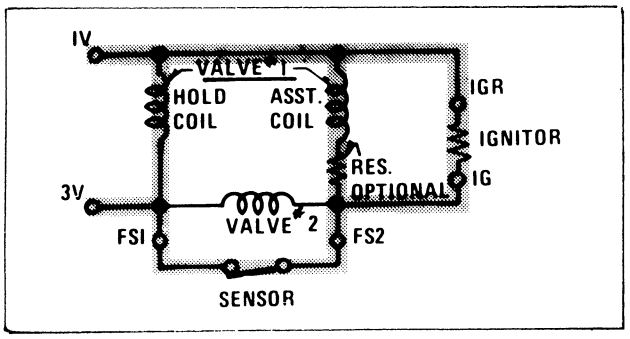


Figure 124

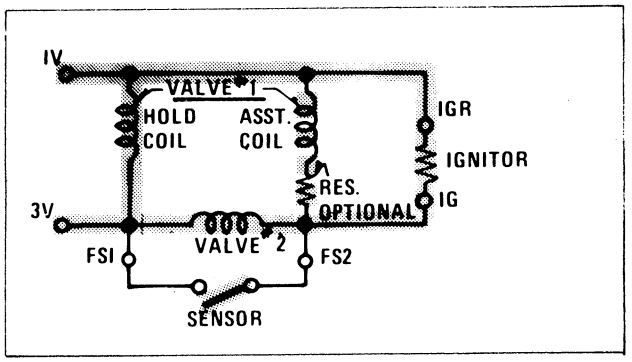


Figure 125

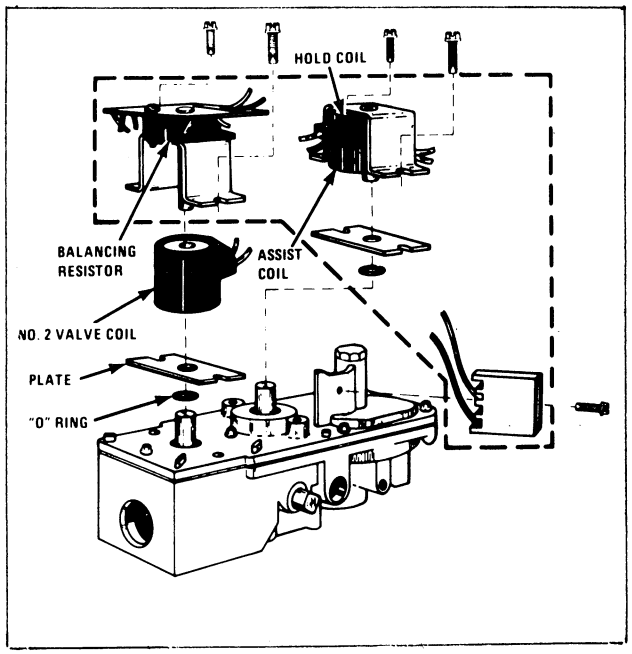


Figure 126

GAS CONTROL VALVE

Two types of control valves were used on all the 1967 gas dryers and on some current models. One is a valve used with a manually ignited standing pilot. The other is used on models that feature an automatic electric pilot (ignition type). Standing pilots are used on some single level models as well as two level valve assemblies.

The valve body incorporates two valves and two encapsulated coils. A quick shut-down resistor, and a pressure regulator completes the unit, *Figure 127*

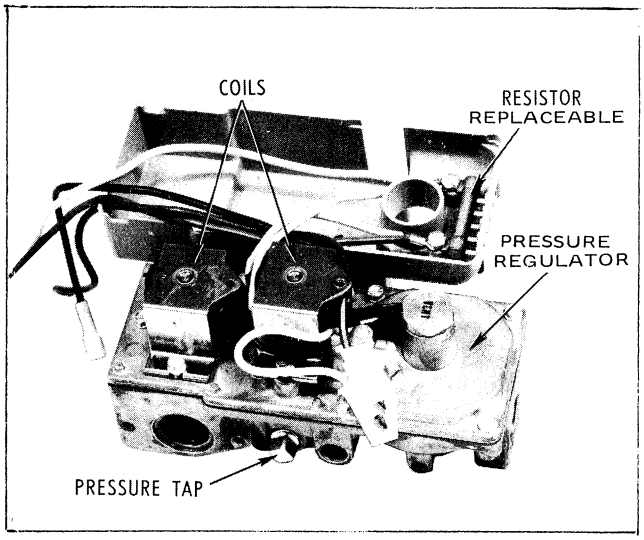


Figure 127

Gas flows through the regulator and then through both valves. The regulator is always gas loaded, which results in a faster response. The quick shut-off is a preventive measure in case of momentary power interruption during an ignition sequence. The quick shut-off resistor is located inside the plastic cover, and is a replaceable part.

To replace a valve coil the following procedure should be adhere to on the 25K valve assembly, *Figure 128*

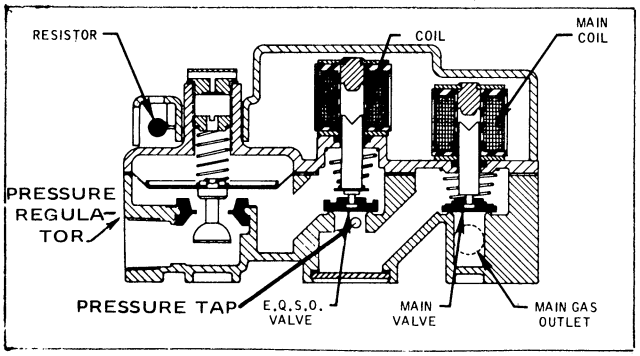


Figure 128

1. Place coil on tube and basket assembly.
2. Arrange plate on bottom of bracket assembly so tube extends through the plate.
3. Position o-ring properly on extended tube, *Figure 129*
4. Position coil and bracket on armature.
5. Tighten all screws.

NOTE: A complete repair kit is available through your local part distributor.

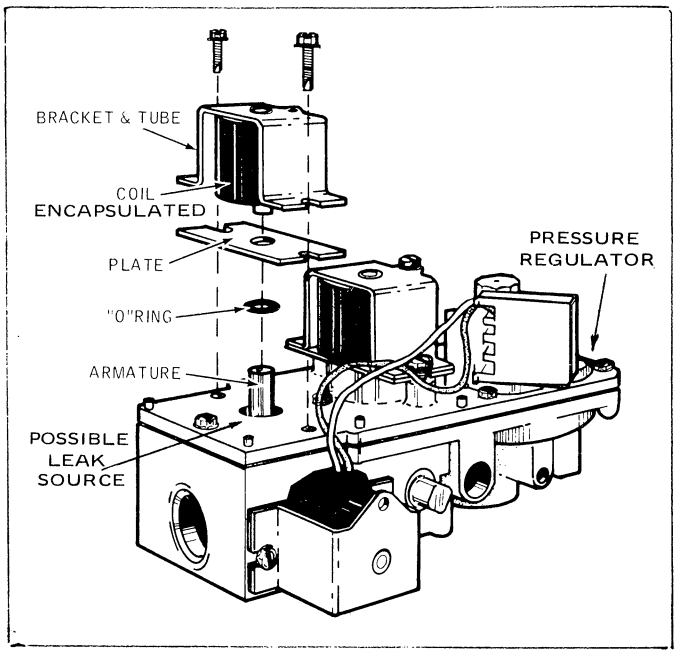


Figure 129

GLO-SIL IGNITOR

The Glo-Sil ignitor was inovated to bring a hotter ignitor and a much faster response to combustion in the firing up of the dryer burner. This ignitor has fewer parts and no mechanical action such as can be found in the earlier ignition type assemblies. Since it has been introduced, many modifications have been made. The following paragraphs are to acquaint you with this type of ignition system. The same method of testing can be applied in part to the Glo-Sil valve assembly as in other types of electric ignition valve assemblies.

Figure 130 shows the Glo-Sil type burner assembly. The gas valve is a single level input, using a dual seat valve. The entire assembly mounted on a base, conveniently fits into the gas dryer base mounting slot. A steel bracket with ceramic and mica insulators supports the Glo-Sil ignitor. In the ignition sequence the ignitor becomes white hot and directly ignites the main burner gas without depen-

dence on a second pilot system. Spade type harness leads are used to the ignitor. The other unattached harness leads are attached to the radiant sensor that mounts on the burner funnel assembly.

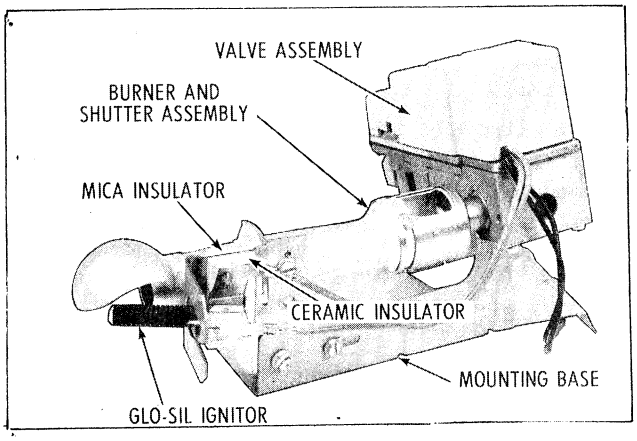


Figure 130

The burner shutter assembly is shown, *Figure 130* in full open position. To improve flame characteristics the shutter may need adjusting. The two level coil, when energized, provides maximum BTU input. The gas burner operates on three wire circuitry and has an Amplock harness connector.

A latching switch is placed above the number 1 valve coil, it is a single-pole – double-throw switch and is actuated by a plunger located in the center of the number 1 coil, *Figure 131*

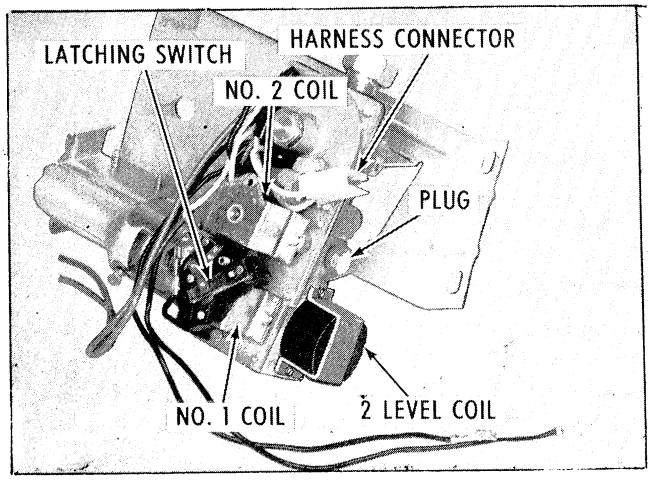


Figure 131

Figure 132 is a close-up view of the Glo-Sil ignitor assembly in its operating position, to service remove mounting screws and disconnect two harness leads.

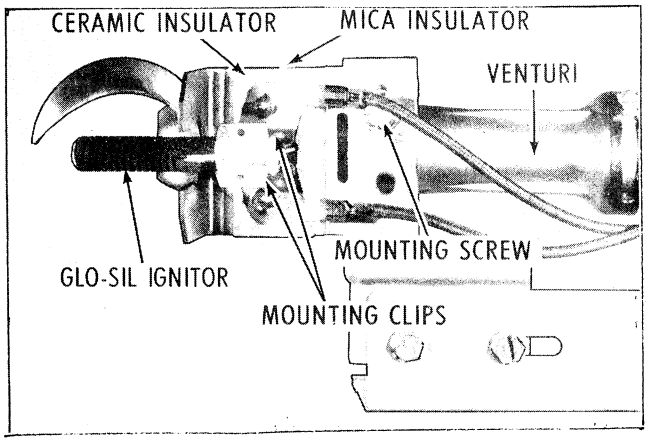


Figure 132

Because of its construction, the Glo-Sil ignitor requires extra care in handling when being replaced, be sure it is properly located before assembly in mounting clips.

Figure 133 shows the Glo-Sil ignitor removed from bracket assembly. The body and coil are made from recrystalized silicone carbide.

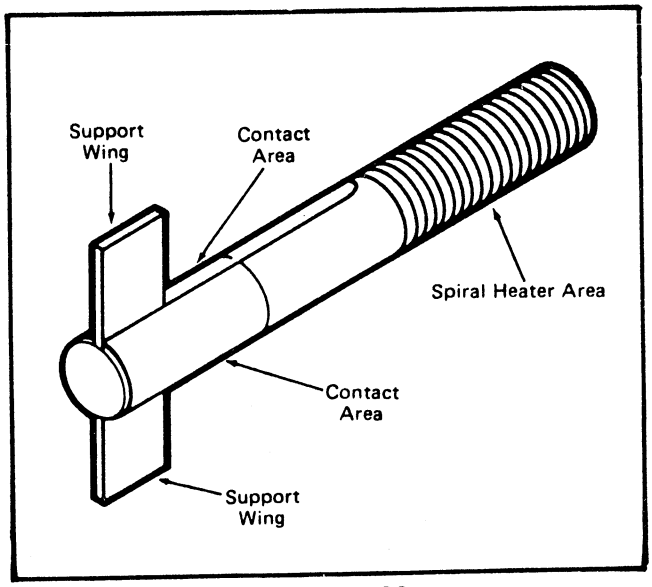
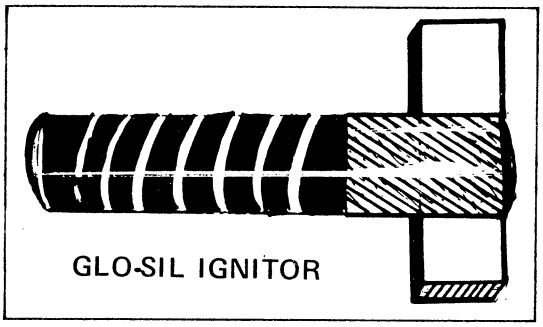


Figure 133

GLO-SIL IGNITION SYSTEM

A silicon carbide Glo-Sil ignitor , burner tube, flame sensor and a two-stage gas valve make up the four main components of the system. The two-stage gas valve contains a split-coil valve and secondary coil valve.

When the dryer thermostat calls for heat the split-coil valve opens. The secondary coil valve is closed until the glow coil ignitor has reached ignition temperature.



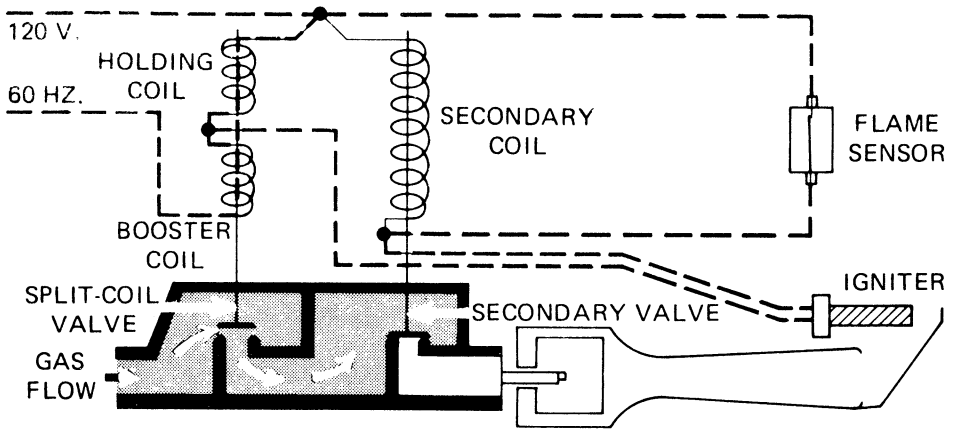
PRE-IGNITION CIRCUIT *Figure 133A*

With a demand for heat from the dryer thermostat the circuits are completed through the holding coil, booster coil, flame sensor and ignitor. To open the split-coil valve, both coils (holding and booster) must be energized. However, once opened the holding coil can hold the valve open without help from the booster coil. The current shunted around the secondary coil by the flame sensor completes circuit to ignitor causing it to heat.

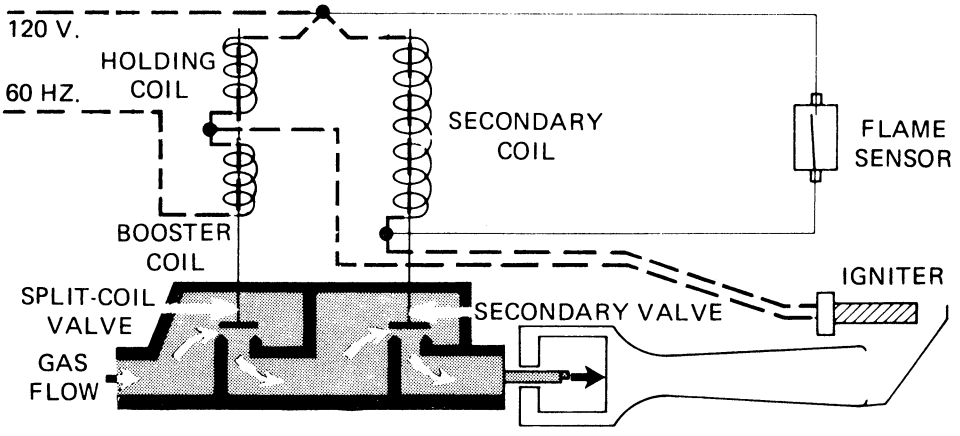
BURNER HEAT CIRCUIT *Figure 133A*

When the ignitor attains ignition temperature in

WHITE-RODGERS BURNER SYSTEM



PRE-IGNITION CIRCUIT



BURN CIRCUIT

Figure 133A

approximately 30-40 seconds, the contacts in flame sensor located directly above ignitor open. The circuit previously shunted around the secondary coil is now completed through booster coil and ignitor to secondary valve coil opening the valve and allowing gas to flow. Ignition is accomplished and the heat from the burner flame keeps the flame sensor circuits open. *Figure 133B.*

IGNITION FAILURE

If burner flame is not accomplished as the flame sensor contact opens, the secondary valve will remain open until flame sensor contacts reclose. The flame sensor will continue to recycle the ignitor and secondary valve about once per minute until ignition is accomplished or dryer is turned off.

FLAME FAILURE

If burner flame fails, the flame sensor contacts will reclose in approximately 45 seconds. The secondary valve will then close and the system will be in the normal pre-ignition circuit.

WARNING: For safety reasons, close valve in gas supply line and disconnect electrical power source before servicing.

GAS VALVE ASSEMBLY REMOVAL *Figure 133C*

1. Open access door and close gas shutoff valve.
2. Disconnect flare nut from shutoff valve.
3. Disconnect wires from ignitor and gas valve wire harness at connector.
4. Remove two screws holding gas valve bracket to burner shield and carefully lift assembly out of dryer.

   NOTE: The split-coil, secondary coil and wire harness are replaced as a kit.

BURNER TUBE AND IGNITOR REMOVAL, *Figure 133C*

CAUTION: Use extreme care when handling ignitor as it is quite fragile. Always handle ignitor by ceramic end keeping fingers out of the silicone carbide portion.

1. Open access door and disconnect wires from ignitor.
2. Remove two screws holding burner tube bracket to burner shield.
3. Move burner tube assembly toward rear of dryer to disengage the tube from orifice adapter, and carefully remove assembly from dryer.
4. Remove ignitor by carefully spreading mounting clip.

FLAME SENSOR REMOVAL *Figure 133B*

1. Remove cabinet top.
2. Disconnect wires from sensor, and remove screw holding sensor to heater box.

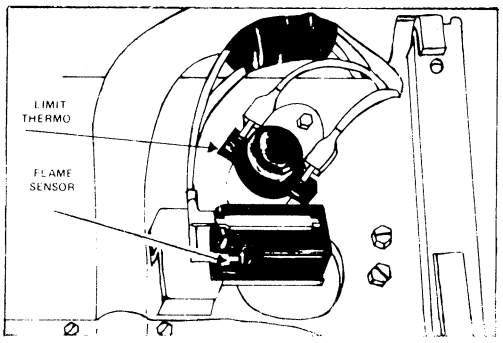


Figure 133B Flame Sensor Location

LIMIT THERMOSTAT REMOVAL *Figure 133B*

1. Remove cabinet top.
2. Disconnect wires from thermostat and remove two (2) screws holding thermostat to heater box.

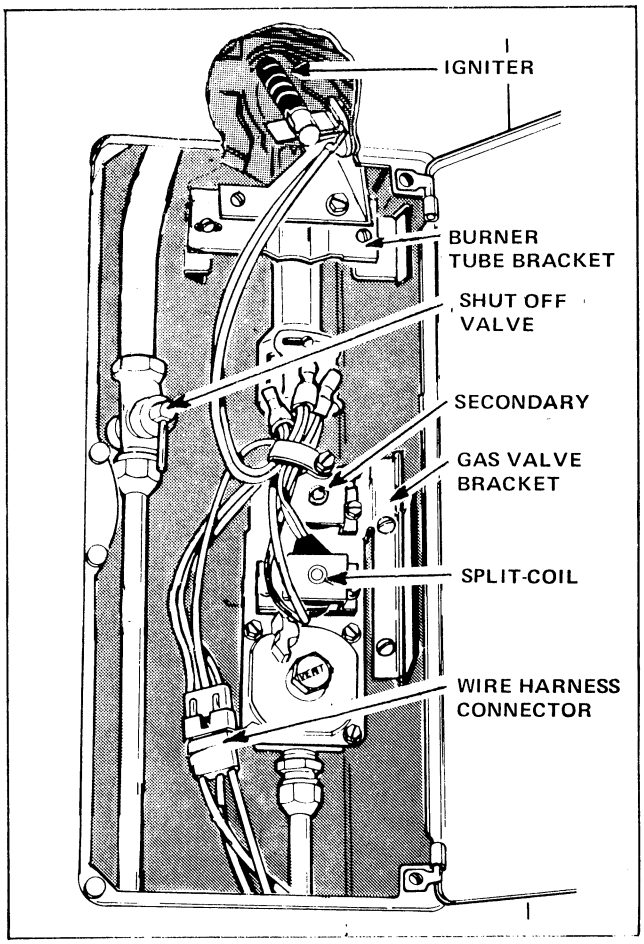


Figure 133C, Close Shut Off Valve Before Attempting Removal

OPERATIONAL SAFETY FEATURES

Momentary Power Interruption

Upon resumption of power, sensor contacts will be open, permitting secondary valve to open but primary valve will remain closed because the circuit for booster coil cannot be made through sensor contacts. When sensor contacts do reclose, secondary valve will close and primary valve will open. Dryer will then go through normal cycle of re-ignition.

Ignition Failure

If flame is not established as sensor contacts open, secondary valve will remain open until sensor contacts reclose at which time secondary valve will reclose. Sensor will continue to recycle the ignitor and secondary valve (about once per minute) until ignition is made or dryer is turned off.

Flame Failure

In event of flame failure, the sensor contacts will reclose in about 40 seconds, at which time the secondary valve will close (primary valve will stay open) and try for re-ignition will be made as in normal cycle. NOTE: Any unburned gas will be mixed with the total air flow through the dryer and exhausted out the vent. The gas to air ratio in the dryer and vent pipe will be well below the point of ignition.

COMPONENT TESTING AND REPLACEMENT

Sensor

This is a single-pole, single-throw switch, which is actuated by an infra-red heat-sensing bi-metal. Its contacts should be closed at normal room temperature.

To check, remove the two wire leads and check for continuity with an ohm meter. If no continuity, the sensor should be replaced.

The sensor can be removed by removing the single screw holding it to the combustion chamber, and pulling it down out of its slot.

Ignitor

This is a silicon-carbide resistor, spirally fluted to provide sufficient resistor length in a shorter dimension. This design also provides for both electrical connections at one end. Support wings assure proper alignment in the clip type mounting bracket.

To check, remove the two wire leads and check for continuity with an ohm meter. The resistance should be in the range of 50 - 500 ohms.

The ignitor can be removed by spreading the clip with snap ring pliers (F76901-1). Be EXTREMELY CAREFUL not to damage the ignitor by jarring or dropping it.

Valve Coils

The valve coils are all rated at 120 V., 60 HZ, and are individually replaceable.

To check, remove the three crimp connectors and check for resistance with an ohm meter. Approximate resistance readings should be:

Holding Coil — 750 ohms
Booster Coil — 750 ohms
Secondary Coil — 600 ohms

The coils can be removed by removing the two coil bracket screws and lifting off the coil.

The primary valve Holding Coil (top) has a resistance of about 750 ohms, and its wire leads are color coded Tan and White.

The primary valve Booster Coil (bottom) has a resistance of about 750 ohms, and its wire leads are color coded Red and Tan.

NOTE: The holding and booster coils are nearly identical in appearance, but are not the same. The two coils must not be interchanged.

The secondary valve coil has a resistance of about 600 ohms, and its wire leads are color coded White and Red.

Direct Ignition Bench Test

A bench test is probably the best method of explaining this type of burner assembly. It has been noted that these burner assemblies are a two wire hook up, *Figure 134*. Attach a negative clip of the test cord to 1V and the positive clip to 3V and supply gas to the burner assembly. When the voltage is applied several circuits are completed simultaneously. The negative leg is supplying current to the main coil, pilot coil through the normally closed flame switch and ignitor coil, through the relay coil to the warp switch heater and to the resistor diode assembly. The positive leg is supplying current to complete circuits to the warp switch heater and the relay coil to the normally closed warp switch, the ignitor coil, and simultaneously closing the relay.

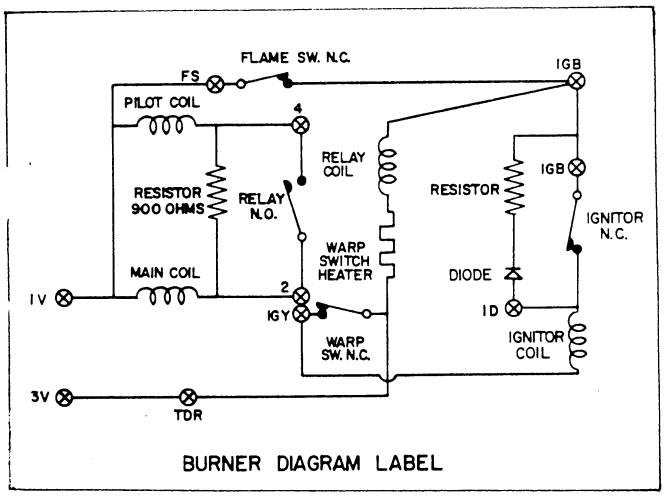


Figure 134

As the circuits are completed with full live voltage, the pilot and main coils are energized as well as the ignitor coil. Burner ignition now takes place in less than one second. After the burner ignites, heat is applied to the heat probe tube of the flame switch which causes the flame switch to open within 3 to 5 seconds. When the flame switch opens, the circuits to the ignitor and relay coils are opened, stopping ignitor action. The pilot coil circuitry is now through the 900 ohm resistor reducing the voltage to the pilot coil to *hold in* voltage only. The main burner coil is the only circuit now with full live voltage.

If the voltage is interrupted in the heat cycle, both the main and pilot coils will close, shutting off all gas supply. If voltage is immediately restored to the burner assembly, only the main burner coil will be energized. However, no gas will flow until the flame switch resets to its normally closed position, allowing normal ignition to occur. The pilot valve coil must be open to allow gas to flow through the main valve.

Let's assume for some reason the burner failed to ignite or the flame switch failed to open. When this happens, the 1000 ohm warp switch heater takes over and opens the warp switch contacts. This action takes place between 15 to 40 seconds at 115 volts and 70° ambient temperature. This warp switch is factory calibrated and should not be tampered with.

Diode and Resistor Function

If the burner fails to ignite because of lint insulating the ignitor contacts, a circuit is completed through the resistor and diode energizing the ignitor coil. As the current passes through the diode which is a rectifier, the alternating current is changed to direct pulsating current. This pulsating current will actuate the ignitor motor, allowing the ignitor contacts to open and close, and the lint to be removed. This action restores normal function of the igniting system. The diode and resistor is easily checked by placing a piece of paper between the ignitor contacts. Always have voltage to the burner **off** when doing this test. When voltage is again applied, the paper will drop free if the diode and resistor circuit is functioning properly.

PILOT & MAIN BURNER BODIES

Correct relationship of the pilot burner and electric ignition assembly to the main burner is essential for proper ignition. If slow ignition or ignition

failure is encountered on gas dryers, there is a possibility that the problem might be caused by an incorrect pilot assembly mounting bracket or incorrect mounting of the bracket. The following information will clarify the proper mounting of various pilot assemblies to different main burners:

Figure 135 illustrates the correct and incorrect mounting of the Perfex pilot burner and electric ignition assembly to a porcelain steel single port burner.

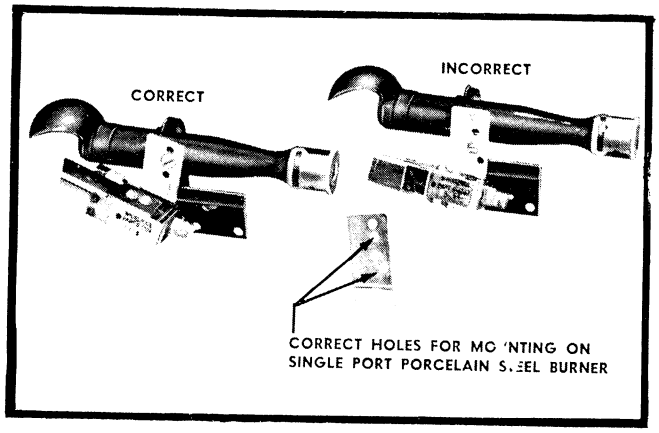


Figure 135

Figure 136 shows the correct and incorrect mounting of the Perfex pilot burner and electric ignition assembly to a cast iron burner.

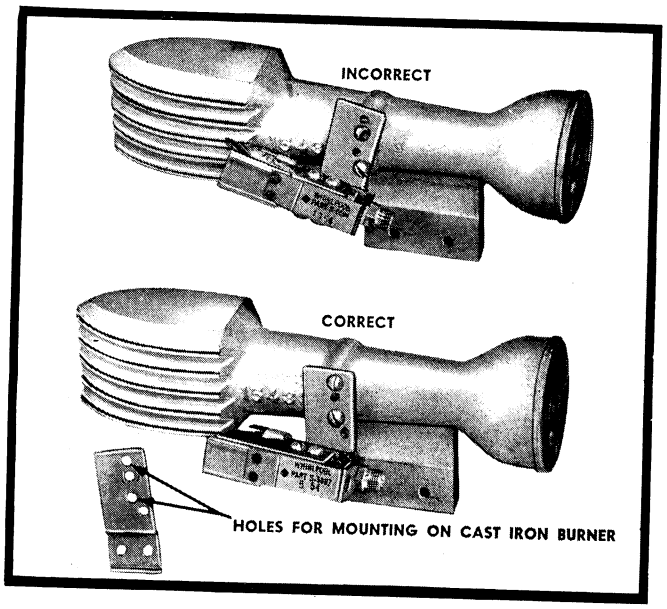


Figure 136

Figure 137 indicates the correct and incorrect mounting position of the White-Rodgers pilot burner and electric ignition assembly to a single port porcelain steel burner.

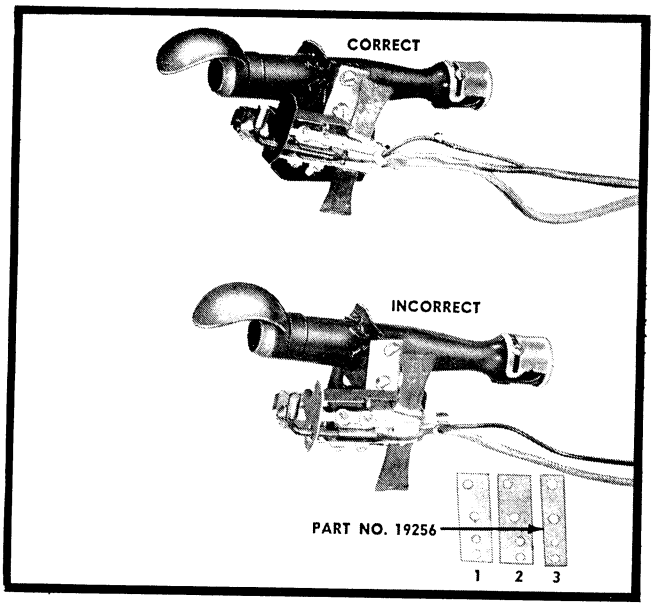


Figure 137

In handling problems of slow ignition, or ignition failure on gas dryers, a thorough check should be made to make sure that the pilot burner and electric ignition assembly is mounted to the main burner with the correct bracket and that the bracket is mounted correctly.

GAS VALVE

The dual gas valve consists of two separate valves in the same housing. Each valve has its own solenoid coil and plunger assemblies. The valve nearest the inlet end is referred to as the pilot-valve, since it controls the flow of gas to the main burner. It should be noted, however, that the gas to the main burner must also pass through the pilot-valve before it reaches the main burner valve.

The valve construction is of the ***soft-seat*** type and each section consists of a flat valve disc attached to the plunger and a molded synthetic rubber seat. This is an improvement over the ***metal-to-metal*** type of seat on the previous valve design, since it is much less subject to leakage from par-

ticles of foreign matter or distortion of the seat. To assure positive closure in any position that the valve might be mounted, the valve disc is held against the molded valve seat by a compression spring. When the solenoid coil is energized, the resulting force easily overcomes the pressure of the compression spring.

The main burner outlet is at 90° to the right of the inlet to the valve. The pilot gas outlet at the filter is directly in line with the inlet. The cross-sectional view, *Figure 138*, will show the construction of the valve body.

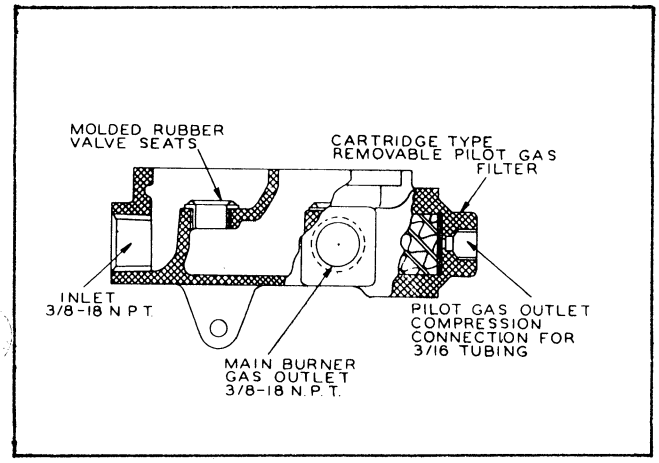


Figure 138

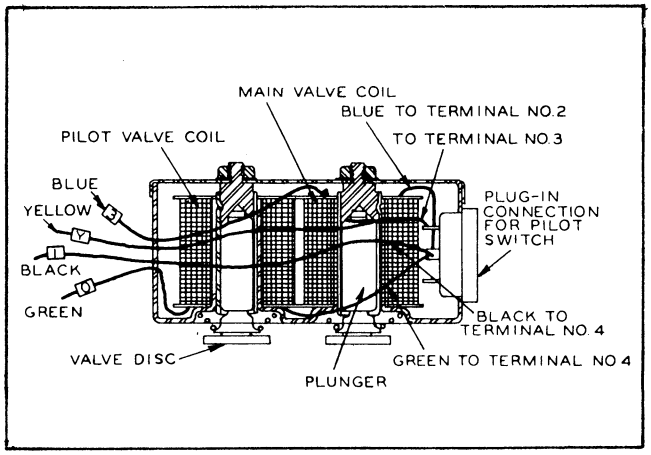


Figure 139

If it is necessary that the solenoid coils be replaced in the field, it must be remembered that the leads to the pilot coil face downward and the leads to the main burner coil face upward. The interaction of the two magnetic fields when both coils are energized requires that the coils be placed as described above in order that the least amount of heat be generated. Hence, the valve will be cooler and will perform more satisfactorily. The coils should be placed as shown in *Figure 139*

If impurities collect on the valve seat, and keep it from fully closing, they can be removed in the following manner:

1. Remove the cover over the coils.
2. Slide the coils off of the solenoid cores.
3. Remove the screws from the core plate and valve body.
4. Wipe the valve disc and seat with a clean cloth and reassemble.

As mentioned earlier in the section describing the automatic pilot, it is no longer necessary that the pilot terminals be connected to leads from the valve. Nor is it necessary that the pilot switch be mounted to the cover screws of the valve. The pilot switch is simply ***plugged in*** to the mating connector on the valve. The valve leads are soldered to this connector so that the electrical connections are automatically made to the correct terminal when the pilot is mounted. Since the four terminal pins on the pilot switch are of two different sizes, there is only one way that the connection can be made.

PILOT BURNERS

The pilot burner, *Figure 140*, provides automatic ignition for the main burner. It consists of a frame, mixing barrel, tip, ignitor, orifice, orifice clip, and lint screen, as shown in *Figure 141*.

Gas enters the pilot burner through the orifice and is forced into the mixing barrel in the form of a jet. Here it is mixed with primary air that has been brought through the lint screen. This air has been drawn through the large open annular ring between the orifice tip and the mixing barrel by venturi action. The mixture of primary air and gas flows to the tip where it is ignited by the ignitor coil. The resulting flame heats the pilot switch bulb and ignites the main burner.

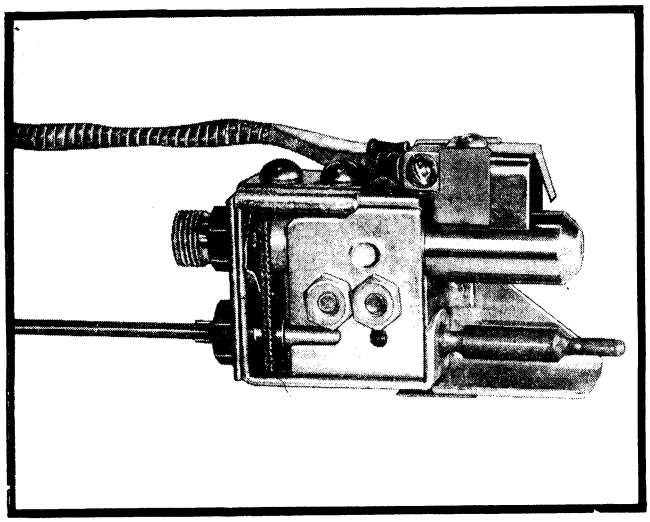


Figure 140

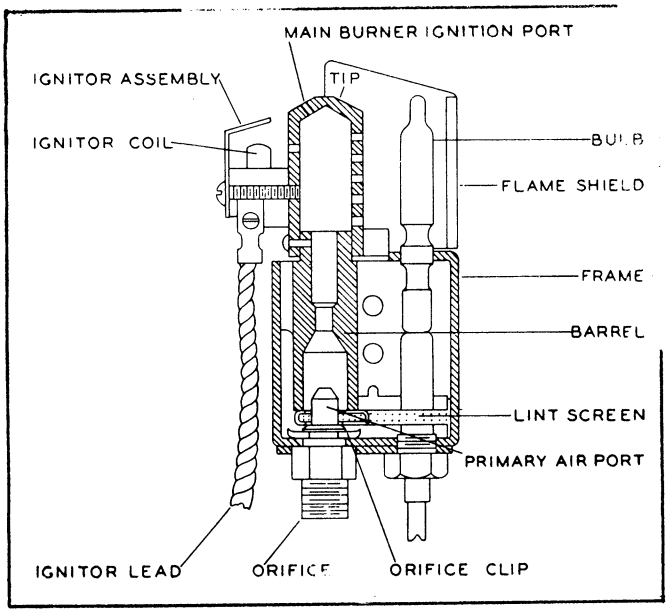


Figure 141

PRIMARY AND SECONDARY AIR

Primary air is the air mixed with the gas before ignition. Secondary air is the air around the flame during burning. The pilot burner is supplied primary air through two fixed holes in the side of the pilot burner body. Do not change the size of the primary air holes. An accumulation of lint and other dirt particles in the primary air holes will cause the pilot flame to burn a bright yellow. Clean the passage thoroughly. The primary air for the main burner is adjustable by means of a standard air shutter mounted at the rear of the burner, *Figure 142*. Adjustment should be made to obtain the proper flame characteristics at the time of installation, being sure the lockscrew is secured after any adjustment. Closing or blocking of air through this passage will cause the flame to burn a bright yellow and eventually cause failure of the gas to ignite. Clean the passage thoroughly; check air shutter adjustment. Check the alignment of the burner with the orifice plug to insure a proper mixing of the primary air with the gas. Excessive misalignment may cause inefficient burning and prevent proper adjustment of the air shutter.

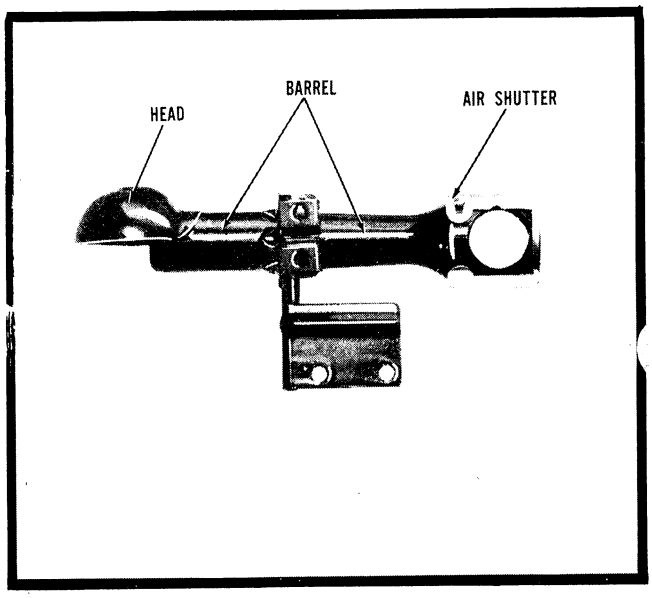


Figure 142

Flame Characteristics *Refer to Figure 143.* The pilot flame is fixed; no manual adjustment can be made to alter its characteristics. However, gas pressure, pilot orifice, filter (used with manufactured, natural, and mixed gases) and primary air passages, all affect the flame characteristic. The main burner flame characteristics can be altered by adjusting the air shutter and varying the amount of primary air. Gas pressure and main burner orifice also affect the ability to adjust for proper flame characteristics. Check the gas pressure and the orifice for size if necessary.

Generally speaking, a lack of primary air--shutter in closed position--will cause a bright yellow flam and indicates poor combustion. An excess of pr

mary air--shutter opened to maximum position--will cause pre-combustion or blow-off of the flame. A yellow flame pilot will carbonize the glow coil and appreciably reduce its life. The outer cone of

the flame should be a definitely-defined line. For best results, close the air shutter until the outer cone line is barely defined without producing a yellow flame condition. Experience will teach the installer and serviceman the best air shutter adjustment for the gas being supplied by the local utility.

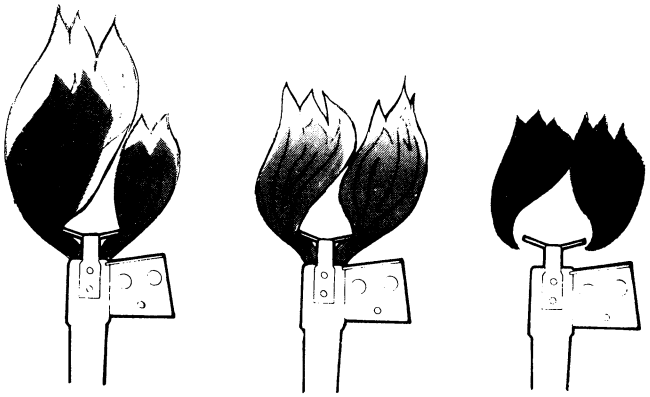


Figure 143. Proper Flame Adjustment

GASES

The following is a table of the average specific gravities of the gases that will be encountered:

Natural	.65 specific gravity
Manufactured	.38 specific gravity
Mixed (natural and manufactured)	Between the above two figures depending upon the percentage of mixture.
Propane Air	.70 specific gravity
Butane Air	.70 specific gravity
Liquid petroleum gases:	
Propane	Check supplier
Butane	Check supplier

Generally speaking, the heavier the gas the higher the B.T.U. value. If, however, the gas supplied is heavy and the B.T.U. value low, the general operating efficiency of the burner is reduced.

1. All gas dryers are manufactured with natural gas burners.
2. All gas burners can be converted for different gas uses through orifice change.
3. Special kits or orifices for converting burners from one gas to another are available through authorized parts suppliers.
4. Correct orifices should be determined and installed before delivering dryer.
5. Converting gas burners in the field does not invalidate AGA approval if done according to instructions.
6. Decal, supplied with each conversion kit, must be affixed next to rating plate on dryer door well. When pressure regulator is immobilized, place the additional decal on the burner base plate.

PRESSURE REGULATOR

A pressure regulator is placed in the gas supply pipe so that all gas must pass through it before entering the gas control valve, *Figure 144*. It is designed to regulate the flow ot gas so that a uniform pressure is present at the burner control valve at all times. This pressure is measured by a *manometer* which gives the gas pressure in terms of *inches of water.*

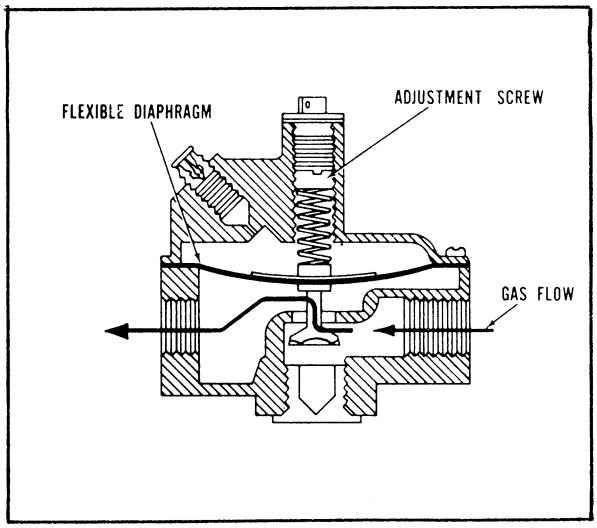


Figure 144

Gas dryers that are built for use with natural, manufactured, or mixed gas are shipped from the factory with the pressure regulator as part of the burner assembly. These pressure regulators are adjusted to provide a gas pressure of approximately three inches of water. L.P. (Liquified Petroleum) gas burners, however, are not equipped with pressure regulators since it is provided by the local bottled gas distributor. This pressure regulator is adjusted to provide a gas pressure of approximately 11 inches of water.

Pressure regulator adjustment is not recommended unless done by an experienced gas serviceman.

Checking Manifold Pressure

If the burner is not correctly rated and an operational check of the gas burner does not indicate the presence of any trouble, it is recommended that you check the manifold gas pressure. The only equipment needed is a water-filled manometer (U-tube) and appropriate fittings to connect it to the gas control valve. Remove the plug in the gas control valve and attach the manometer as shown in *Figure 145*. Turn the dryer on and wait until the main burner is operating before reading the pressure on the manometer tube scale.

The difference in inches between the water levels in each leg of the manometer tube is the gas pressure as being regulated by the pressure regulator. This reading should be between 2.7 inches and 3.3 inches (Natural Gas). If the gas pressure is considerably out of this range, the pressure regulator should be adjusted or replaced. When adjusting the regulator, leave the manometer attached and the dryer running so you can determine how much pressure is changed. The adjustment screw is located under the cap on the top of the pressure regulator.

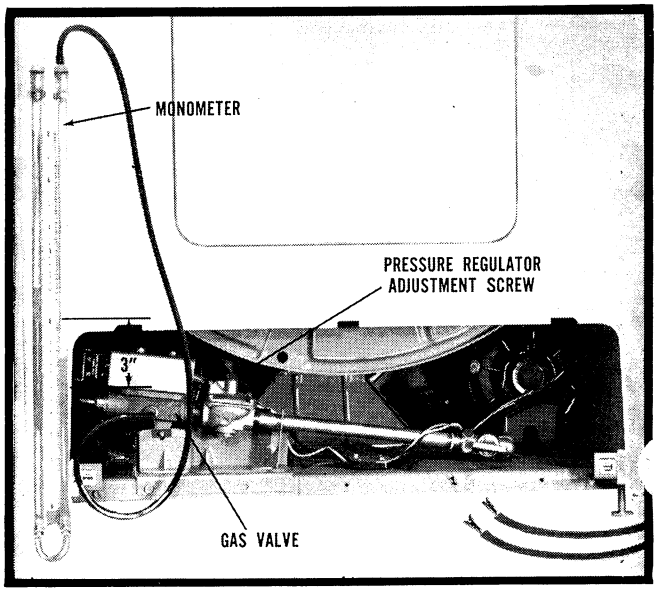


Figure 145

IMPORTANCE OF ADJUSTMENT

It is necessary to check function and flame characteristics of each gas burner at time of installation. Readjustment may be necessary in some areas to assure optimum performance that gives the customer the best possible performing gas dryer.

The main burner gas should be ignited by the pilot burner or the ignitor within one second after the gas line has been properly purged of air. Any delay in ignition can usually be corrected by adjustment of the primary air shutter.

The burner should ignite and extinguish with a minimum of noise (popping). This condition is more pronounced on Type No. 3 (500 BTU Manufactured Gas) and Type No. 4 (LP 2500 to 3200 BTU) valves. Adjustment of the primary air shutter can provide correction of the noise and improve the flame characteristics.

This type of single port burner produces a flame with orange and sometimes yellow flame tips. This is characteristic by design and is acceptable, providing the flame is not excessively yellow, so as to produce free carbon or black smoke. If a free carbon condition is encountered, it can be corrected as follows:

1. Check and place burner on rated input (do not overrate.) Refer to orifice chart.
2. Adjust air shutter to provide more primary air. Free carbon denotes a lack of primary air required for good or complete combustion.
3. Align burner tubes with orifice.

The burner and shutter assembly must be aligned so that the spud and main orifice injects the gas into the center of the burner tube. Poor alignment of the burner tube can cause improper mixing of the gas and air within the burner tube, resulting in poor performance, gas ignition or combustion.

Overrating a burner beyond rating plate input, or severe underrating, can result in shortened component life, faulty ignition, poor combustion and lack of air adjustment range.

NOTE: All burner and shutter assemblies are universal in operation. They will operate on all types of gas. Always refer to the machine parts list for specified usage.

GAS BURNER ORIFICE CHARTS

To use the charts, first determine the BTU value and the specific gravity of the gas in your area (consult your local gas company). Then locate the BTU value on the vertical column of the chart. Next, locate specific gravity value of the gas on the horizontal column; then extend lines on the chart to a point of intersection. This point of line intersection will fall within an orifice size zone, indicating proper orifice size and part number for the gas checked. If this point falls on or near a zone line, it is suggested the orifice be selected that provides best burner performance.

NOTE: For areas of over 2,000 feet elevation above sea level, derate from nameplate rating 4% per 1,000 feet elevation.

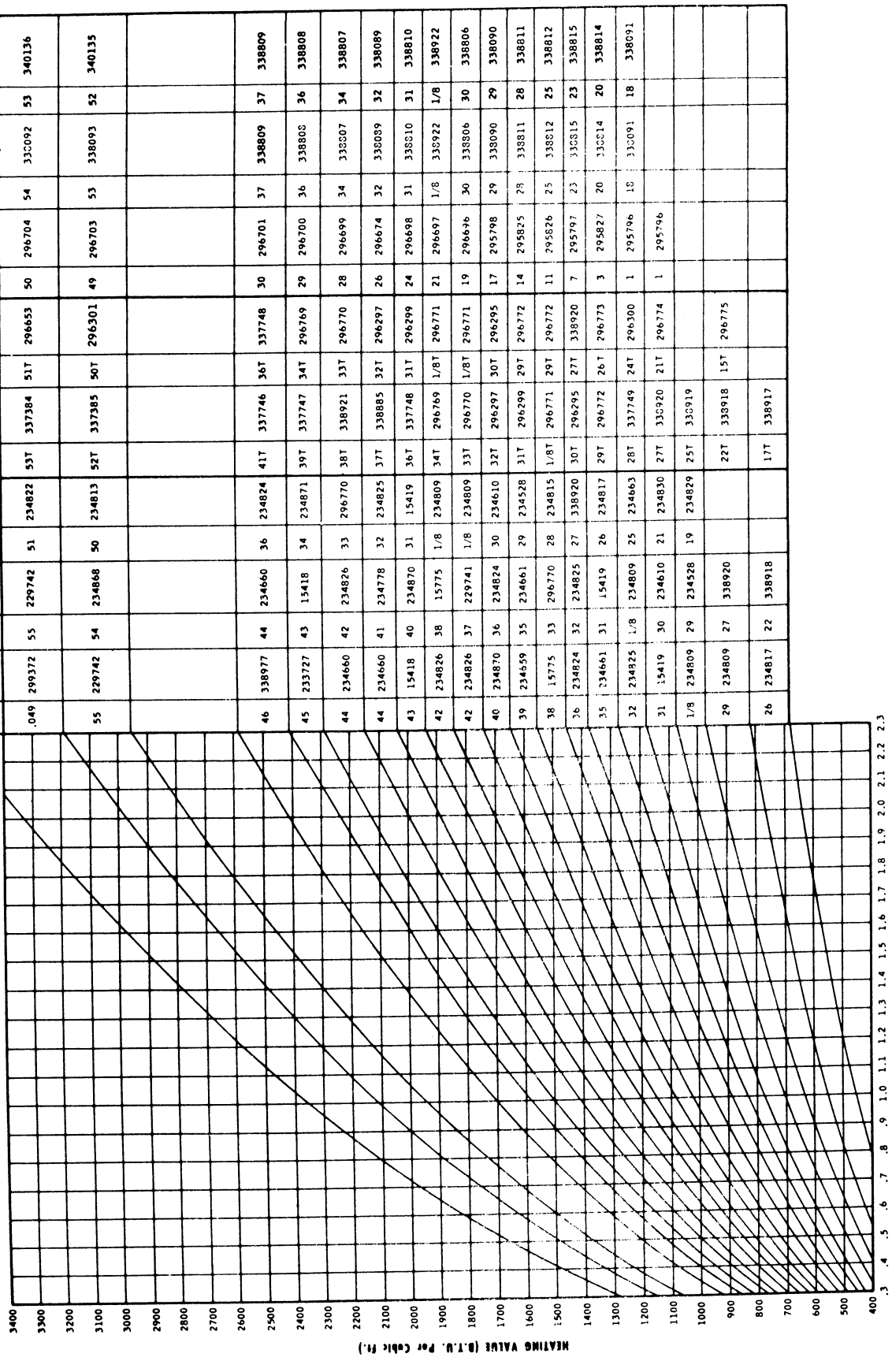
PILOT ORIFICE CHART

TYPE OF GAS	MANUFACTURER OF PILOT CONTROLS WHITE RODGERS Standing Pilot Part Number Drill Size Code No.
Natural Type No.1	296116 (.011) .011
Mixed Type No. 2	296116 (.011) .011
Mfg. Type No. 3	296114 (.016) .016
L.P. Type No. 4	296115 (.006) .006

ZIP TUBE ORIFICE CHART
White Rodgers Standing Pilot

TYPE OF GAS	PART NO.	DRILL SIZE	COLOR
Natural Type 1	296124	.028	Aluminum
Mixed Type 2	296124	.028	Aluminum
Mfg. Type 3	296126	.037	Green
L.P. Type 4	296125	.016	Black

GAS DRYER MAIN BURNER ORIFICE SELECTION CHART



SINGLE INPUT						TWO LEVEL				MODULATION					
20,000		25,000		37,000		30/20M		37/20M		37,000		25,000		30/20,000	
.049	299372	55	229742	51	234822	53T	337384	51T	296653	50	296704	54	338092	53	340136
55	229742	54	234868	50	234813	52T	337385	50T	296301	49	296703	53	338093	52	340135
46	338977	44	234660	36	234824	41T	337746	36T	337748	30	296701	37	338809	37	338809
45	233727	43	15418	34	234871	39T	337747	34T	296769	29	296700	36	338808	36	338808
44	234660	42	234826	33	296770	38T	338921	33T	296770	28	296699	34	338807	34	338807
44	234660	41	234778	32	234825	37T	338885	32T	296297	26	296674	32	338089	32	338089
43	15418	40	234870	31	15419	36T	337748	31T	296299	24	296698	31	338810	31	338810
42	234826	38	15775	1/8	234809	34T	296769	1/8T	296771	21	296697	1/8	338922	1/8	338922
42	234826	37	229741	1/8	234809	33T	296770	1/8T	296771	19	296696	30	338806	30	338806
40	234870	36	234824	30	234610	32T	296297	30T	296295	17	295798	29	338090	29	338090
39	234659	35	234661	29	234528	31T	296299	29T	296772	14	295825	28	338811	28	338811
38	15775	33	296770	28	234815	1/8T	296771	29T	296772	11	295826	25	338812	25	338812
36	234824	32	234825	27	338920	30T	296295	27T	338920	7	295797	23	338815	23	338815
35	234661	31	15419	26	234817	29T	296772	26T	296773	3	295827	20	338814	20	338814
32	234825	1/8	234809	25	234663	28T	337749	24T	296300	1	295796	18	338091	18	338091
31	15419	30	234610	21	234830	27T	338920	21T	296774	1	295796				
1/8	234809	29	234528	19	234829	25T	338919								
29	234809	27	338920			22T	338918	15T	296775						
26	234817	22	338918			17T	338917								

SECTION 5

PARTS LISTS

The following parts lists are representative of the majority of the more popular parts used in servicing Whirlpool and Kenmore Automatic Dryers. Mainly they are shown as an aid in assembly sequence and to show the nomenclature of the various parts.

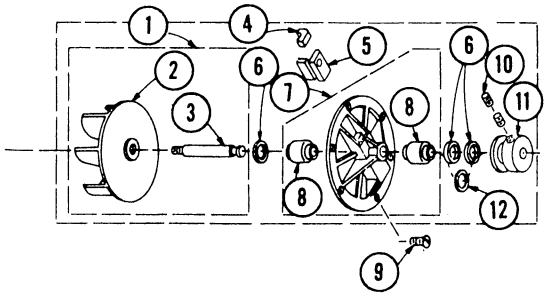
When ordering parts, always give the full model and serial number of the Dryers. These numbers are found on a metal identification plate on the back of the machine or in the clothes door well.

BLOWER ASSY.

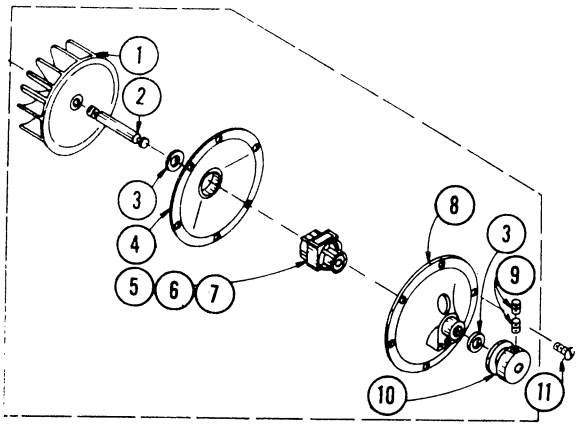
1949-1955

1. Blower wheel & shaft assy.
2. Blower wheel assembly
3. Blower wheel shaft
4. Oil felt
5. Oil felt
6. Thrust washer
7. Fan scrowl flange assy.
8. Bushing
9. Self tapping screw #8-18 x 7/16"
10. Set screw 1/4-28 x 1/4"
11. Pulley
12. Spring washer

235067



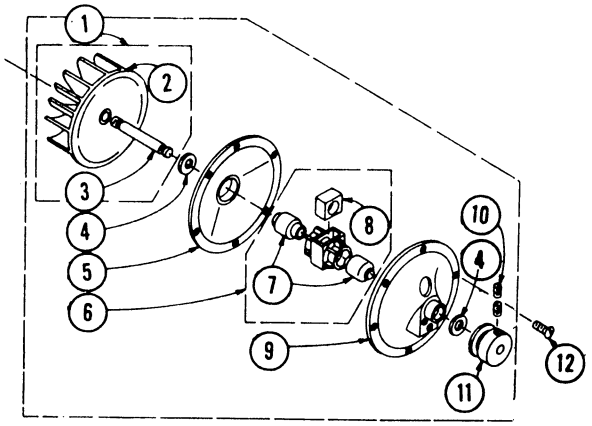
1957-1962



1. Blower wheel assembly (236163)
   Blower wh. assy. (229339)
2. Blower wheel shaft
3. Thrust washer
4. Inner flange
5. Fan bearing hub assembly
6. Fan shaft bushing
7. Oil wick
8. Outer flange
9. Set screw 1/4-28 x 1/4"
10. Pulley
11. Self tapping screw #8-18 x 7/16"

1956

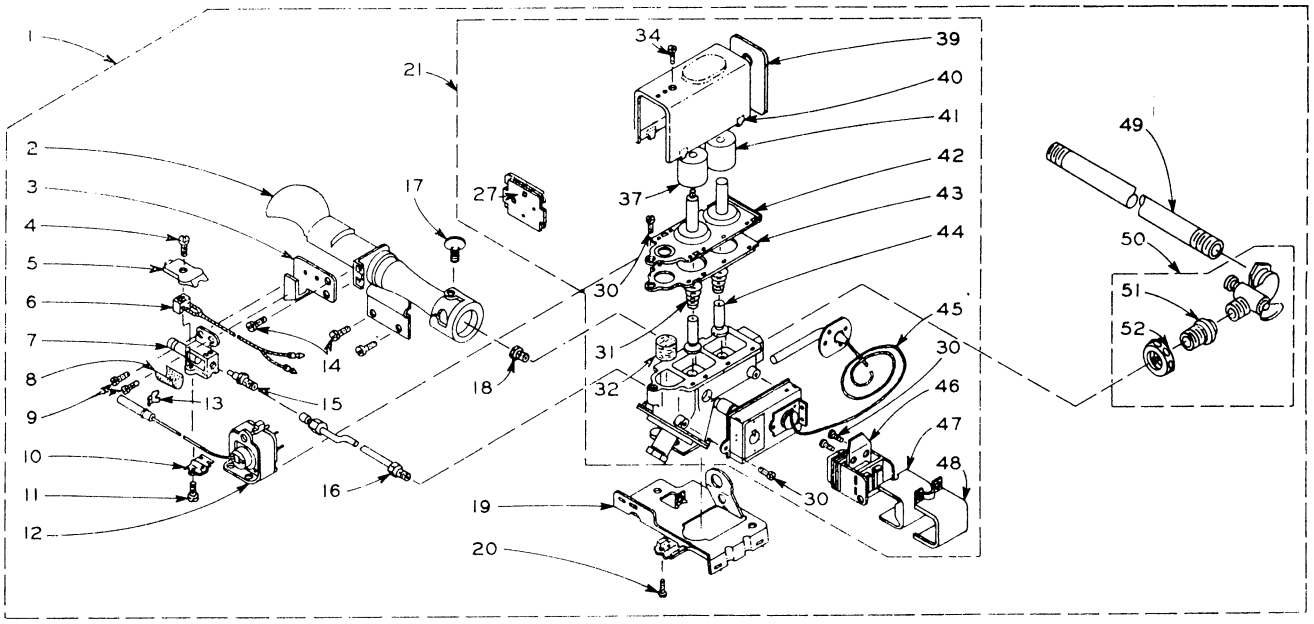
1. Blower wheel & shaft assy.
2. Blower wheel assembly
3. Blower wheel shaft
4. Thrust washer
5. Inner flange
6. Fan bearing hub assy.
7. Fan shaft bushing
8. Oil wick
9. Outer flange
10. Set screw 1/4-28 x 1/4"
11. Pulley (235965)
    Pulley (236245)
12. Self tapping screw 8-18 x 7/16"



295269 BURNER ASSEMBLY

WHITE RODGERS

USE WITH TYPE 1 — NATURAL, TYPE 2 — MIXED AND TYPE 3 — MANUFACTURED GASES



Key No.	Part No.	DESCRIPTION
		BURNER ASSEMBLY
1	295269	Burner Assembly - Type 1, 2 and 3
2	237866	Burner and Shutter
3	238207	Pilot Bracket
4	228219	No. 4-40 x 7/16 Screw
5	230964	Ignitor Shield
6	231603	Ignitor and Wire Assembly
7	231602	Pilot Assembly
8	10721	Screen
9	90767	No. 8 x 3/8 Screw
10	10724	Clamp
11	228212	No. 4-40 x 3/16 Screw
12	239643	Switch Assembly
13	234612	Orifice Clamp
15	236116	Pilot Orifice - Type 1 and 2
	236117	Pilot Orifice - Type 3

Key No.	Part No.	DESCRIPTION
16	236816	Pilot Tube Assembly
17	236640	Thumb Screw
18	238801	Burner Orifice - Type 1
	238807	Burner Orifice - Type 2
	238802	Burner Orifice - Type 3
19	237453	Burner Bracket
20	447143	No. 8-18 x 1/4 Screw
21	295270	Gas Valve Assembly
27	239818	Panel
30	90677	No. 6-32 x 3/8 Screw
31	239814	Spring
32	238834	Filter
34	271163	No. 8-32 Nut
37	290351	Main Coil
39	290352	Panel
40	290354	Control Cover
41	290350	Pilot Coil

Key No.	Part No.	DESCRIPTION
42	290353	Core Assembly
43	238828	Gasket
44	239812	Shaft Assembly
45	238803	Actuator Assembly
46	89299	Transformer
47	239815	Insulator
48	239817	Transformer Cover
49	233273	Gas Inlet Pipe
50	233074	Shut-Off Valve
51	233077	Tail Pipe
52	233076	Union Nut

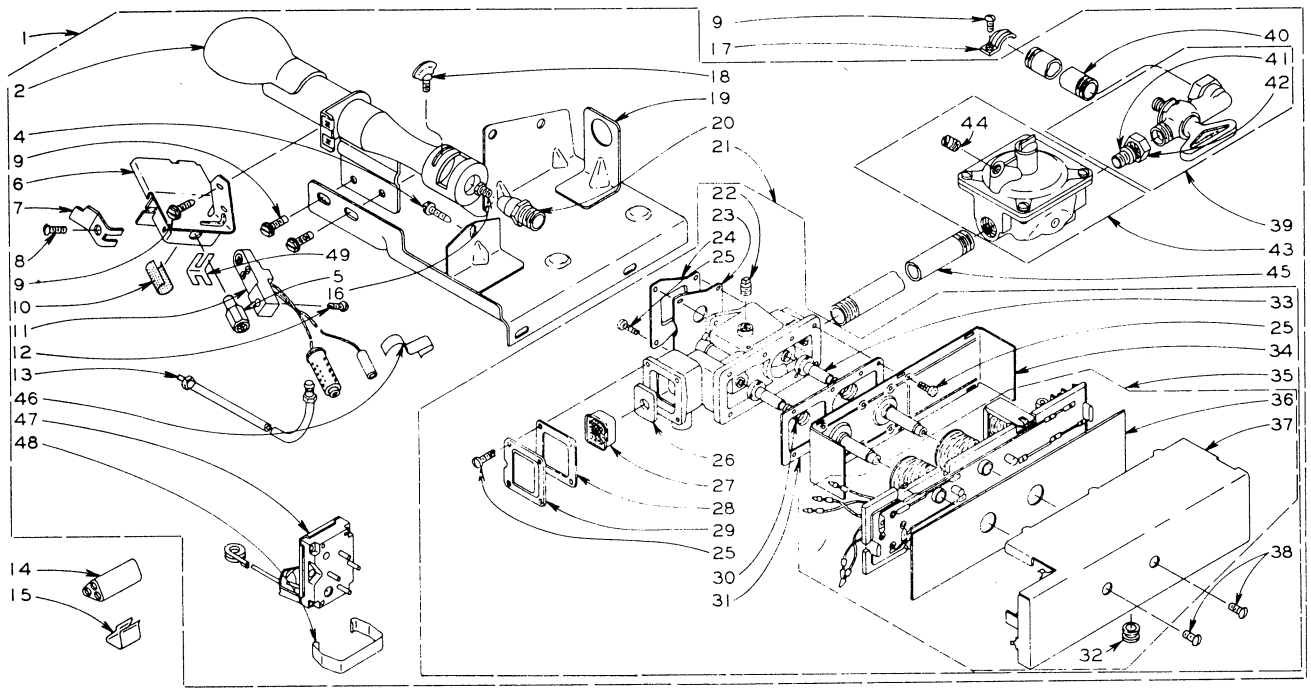
Following Part Not Illustrated

238777	Conversion Kit - Type 1, 2 and 3 to Type 4 (LPG)

295994 and 295995 BURNER ASSEMBLIES

DOLE

USE WITH TYPE 1 — NATURAL, TYPE 2 — MIXED AND TYPE 3 — MANUFACTURED GASES

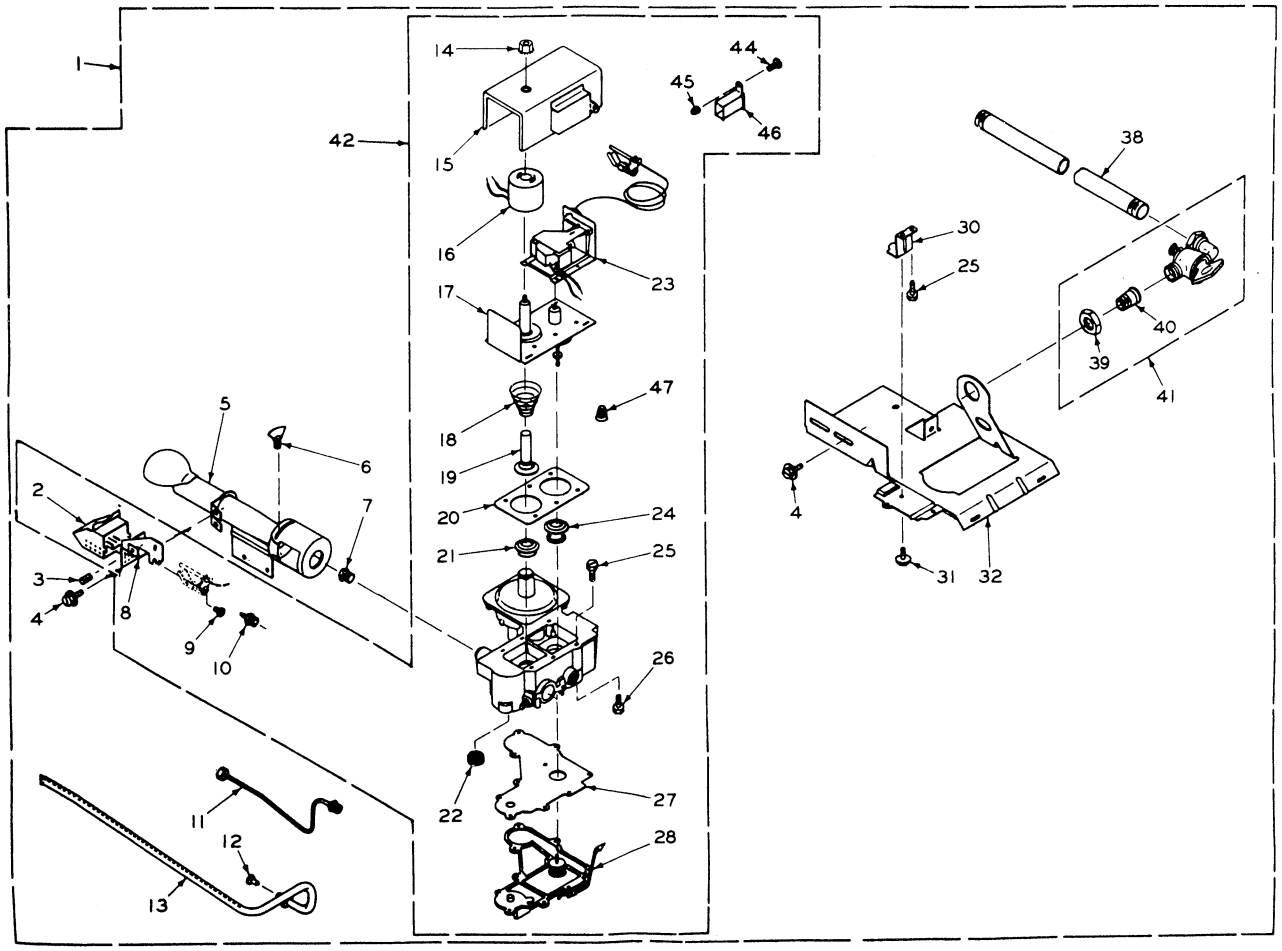


Key No.	Part No.	DESCRIPTION
		BURNER ASSEMBLY
		DOLE
1	295994	Burner - Type 1 (25,000 BTU)
	295995	Burner - Type 1 (37,000 BTU)
2	237084	Burner and Shutter
4	90866	No. 10-24 x 1/2 Screw
5	233086	Pilot Orifice - Type 1 and 2
	233087	Pilot Orifice - Type 3
6	239826	Pilot and Bracket
7	239829	Pilot Clamp
8	239831	No. 6-32 x 3/8 Screw
9	90464	No. 10-16 x 1/2 Screw
10	239915	Screen
11	239828	Ignitor and Ballast
12	239830	No. 8-32 x 5/8 Screw
13	231769	Pilot Tube
14	230341	Connector
15	230342	Clip
16	234871	Burner Orifice - Type 1 (37,000 BTU)
	234528	Burner Orifice - Type 2 (37,000 BTU)
	234663	Burner Orifice - Type 3 (37,000 BTU)
	15420	Burner Orifice - Type 1 (25,000 BTU)
	234661	Burner Orifice - Type 2 (25,000 BTU)
	15419	Burner Orifice - Type 3 (25,000 BTU)
17	234987	Pipe Clamp
18	236640	Thumb Screw
19	237486	Base and Bracket
20	234536	Burner Spud
21	295996	Gas Valve Assembly
22	103865	Plug 1/8
23	239902	Bottom Plate Gasket
24	239908	Bottom Plate
25	239914	No. 6-32 x 7/16 Screw
26	239898	Filter Gasket
27	239906	Filter
28	239899	Gasket, Filter Plate
29	239907	Filter Cover Plate
30	239897	Solenoid Spring
31	239910	Gasket
32	239900	Grommet
33	239904	Armature
34	239901	Solenoid Guide
35	296247	Control Panel Assembly
36	239905	Insulator
37	239909	Housing Panel
38	424332	No. 10-32 x 1/4 Screw
39	233074	Shut-Off Valve
40	233563	Gas Supply Pipe
41	233077	Tail Pipe
42	233076	Compression Nut
43	235722	Regulator
44	235654	Vent Plug
45	238258	Burner Feed Pipe
46	236480	Clip
47	239911	Pilot Switch
48	236543	Pilot Switch Clip
49	233089	Pilot Clip
		Following Part Not Illustrated
	238777	Conversion Kit - Type 1, 2 and 3 to Type 4 (LPG)

296128 BURNER ASSEMBLY

WHITE RODGERS

USE WITH TYPE 1—NATURAL, TYPE 2—MIXED, TYPE 3—MANUFACTURED AND TYPE 4—LIQUIFIED PROPANE AND BUTANE GASES



Illus. No.	Part No.	DESCRIPTION
1	296128	Burner Assembly Complete - Type 1, 2 and 3
2	296121	Pilot Guard
3	9400828	Set Screw
4	98605	No. 10-16 x 1/2 Screw
5	237866	Burner and Shutter
6	236640	Thumb Screw
7	15420	Burner Orifice - Type 1
	234661	Burner Orifice - Type 2
	15419	Burner Orifice - Type 3
8	296117	Pilot Bracket
9	132679	Screw
10	296116	Pilot Orifice - Type 1 and 2
	296114	Pilot Orifice - Type 3
11	296120	Pilot Tube
12	296124	Zip Tube Orifice - Type 1 and 2
	296126	Zip Tube Orifice - Type 3

Illus. No.	Part No.	DESCRIPTION
13	296113	Zip Tube
14	271163	No. 8-32 Nut
15	296137	Cover Assembly
16	296138	Coil Assembly
17	296134	Core Assembly
18	239814	Shaft Spring
19	239812	Shaft Assembly
20	296136	Gasket
21	296133	Main Valve Seat
22	286699	Pilot Filter
23	296135	Pilot and Unlatch Coil Assembly
24	296132	Pilot Valve Seat
25	90677	No. 6-32 x 3/8 Screw
26	98632	No. 8-32 x 1/2 Screw
27	296131	Gasket
28	296225	Plate Assembly
30	296123	Bracket
31	90767	No. 8 x 3/8 Screw
32	237453	Burner Baseplate

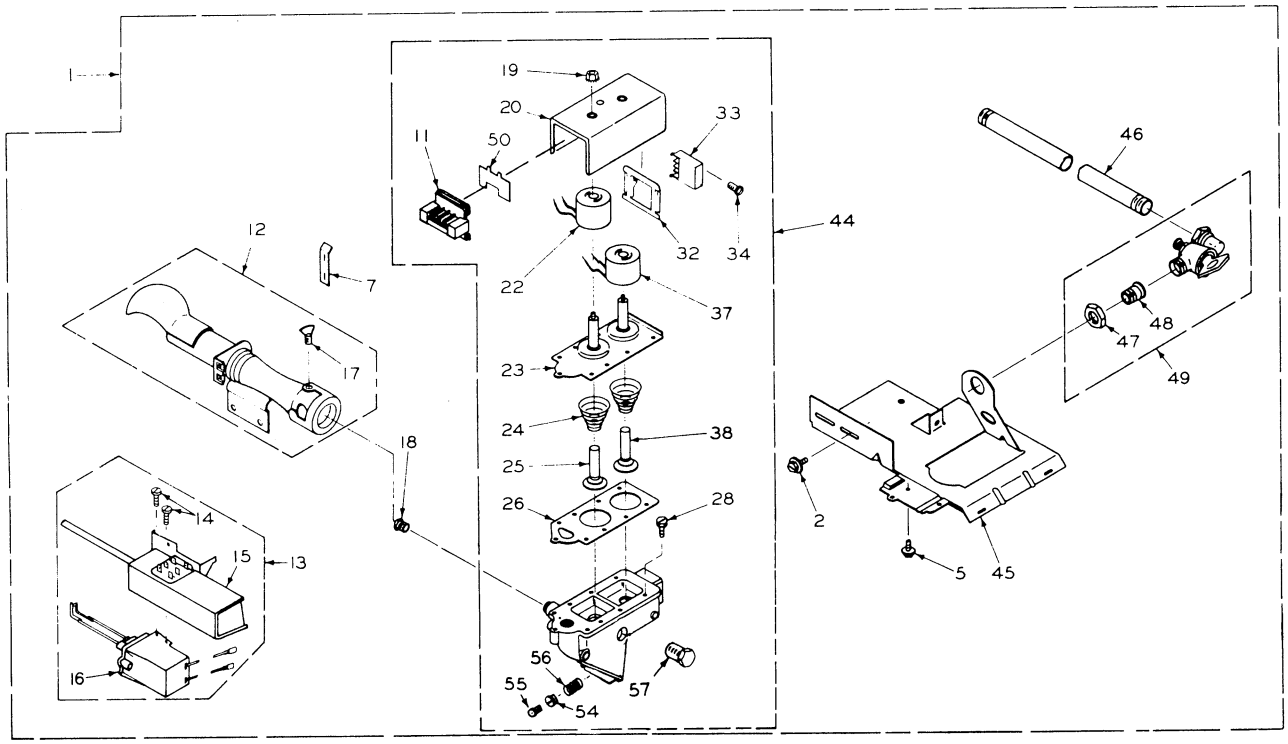
Illus. No.	Part No.	DESCRIPTION
38	233273	Gas Supply Pipe
39	233076	Compression Nut
40	233077	Tail Pipe
41	238884	Service Shut-Off Valve and Union Assembly (Production Shut-Off Valve and Union Assemblies 238467 or 296821)
42	296130	Valve Assembly
44	132696	No. 6-32 x 3/8 Screw
45	90506	No. 6-32 Acorn Nut
46	296398	Plug Connector
47	596161	Wire Connector

Following Part Not Illustrated

	299757	Conversion Kit - Type 1, 2 and 3 to Type 4 (LPG)

337714 BURNER ASSEMBLY

USE WITH TYPE 1-NATURAL, TYPE 2-MIXED AND TYPE 3-MANUFACTURED GASES



Illus. No.	Part No.	DESCRIPTION
1	337714	Burner Assembly- Type 1, 2 and 3
2	98605	Screw, No. 10-16 x 1/2
5	90767	Screw, No. 8 x 3/8
7	297212	Strap (2)
11	299831	Panel, Resistor
12	297536	Burner and Shutter
13	298118	Igniter & Master Control Assembly
14	98611	Screw, No. 6-32 x 5/16
15	298119	Master Control and Bracket Assembly
16	298117	Ignitor
17	236640	Screw, Thumb
18		Orifice, Burner
	15775	Type 1
	234823	Type 2
	234809	Type 3
	234868	Type 4
19	271163	Nut, No. 8-32
20	337579	Cover Assembly
22	298876	Coil, Main
23	290353	Core Assembly
24	239814	Spring
25	299444	Shaft Assembly
26	238828	Gasket
28	90677	Screw, No. 6-32 x 3/8
32	337578	Panel
33	296398	Connector
34	145119	Screw, No 6-20 x 5/16
37	298875	Coil, Pilot
38	291426	Shaft Assembly
44	337288	Valve Assembly
45	237453	Baseplate, Burner
46	233273	Pipe, Gas Supply
47	233076	Nut, Compression
48	233077	Pipe, Tail
49		Shut-Off Valve and Union Assembly
	238467	(Alternate)
	296821	(Alternate)
50	299235	Insulator
54	99996	Screw, Regulator Adjusting
55	99995	Leak Limiter
56	295717	Spring, Regulator
57	239822	Plug

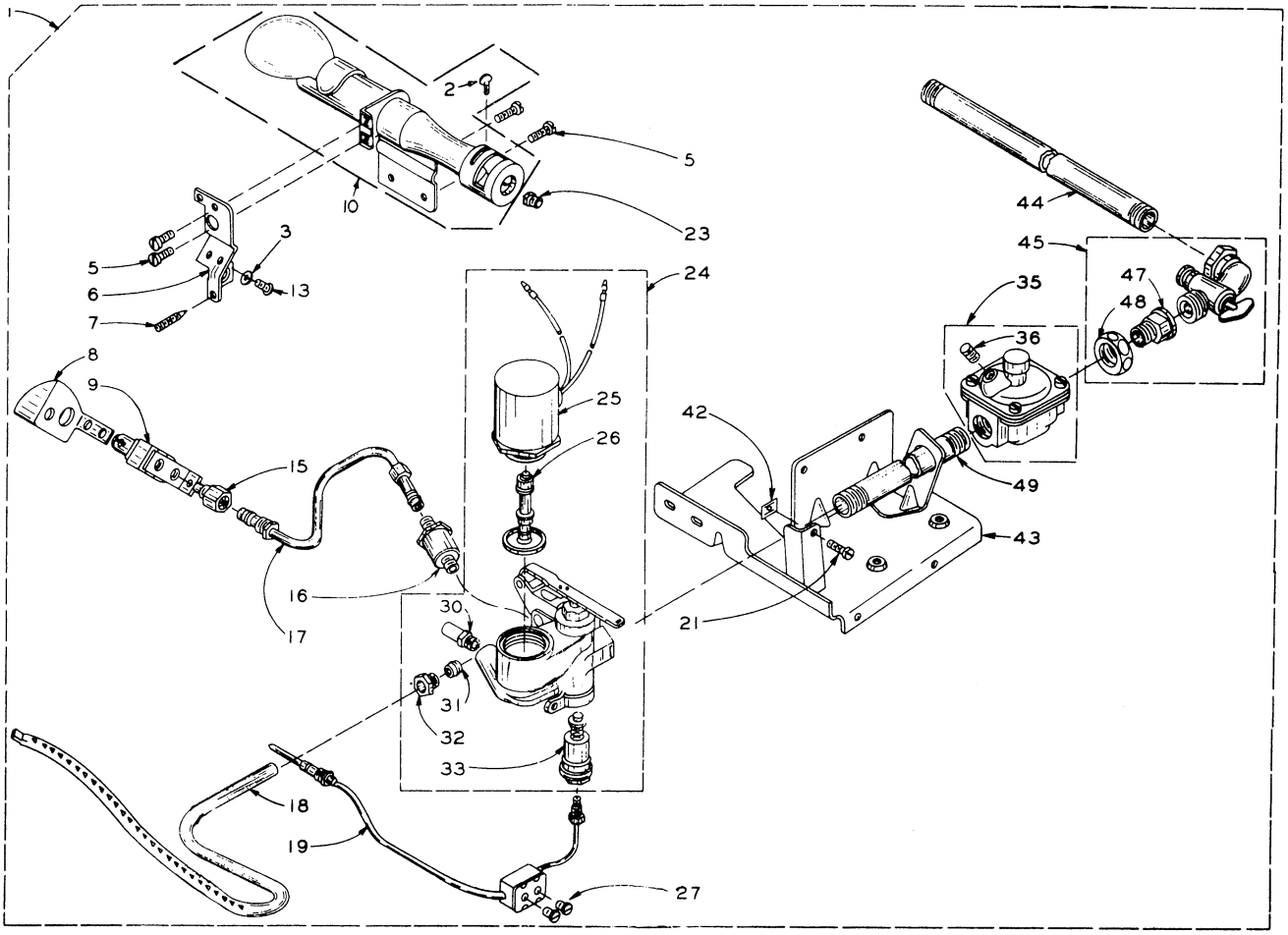
Following Part Not Illustrated

	299845	Kit, Conversion - Type 1, 2 and 3 to Type 4 (LPG)

237837 BURNER ASSEMBLY

BASOID

USE WITH TYPE 1 — NATURAL, TYPE 2 — MIXED AND TYPE 3 — MANUFACTURED GASES



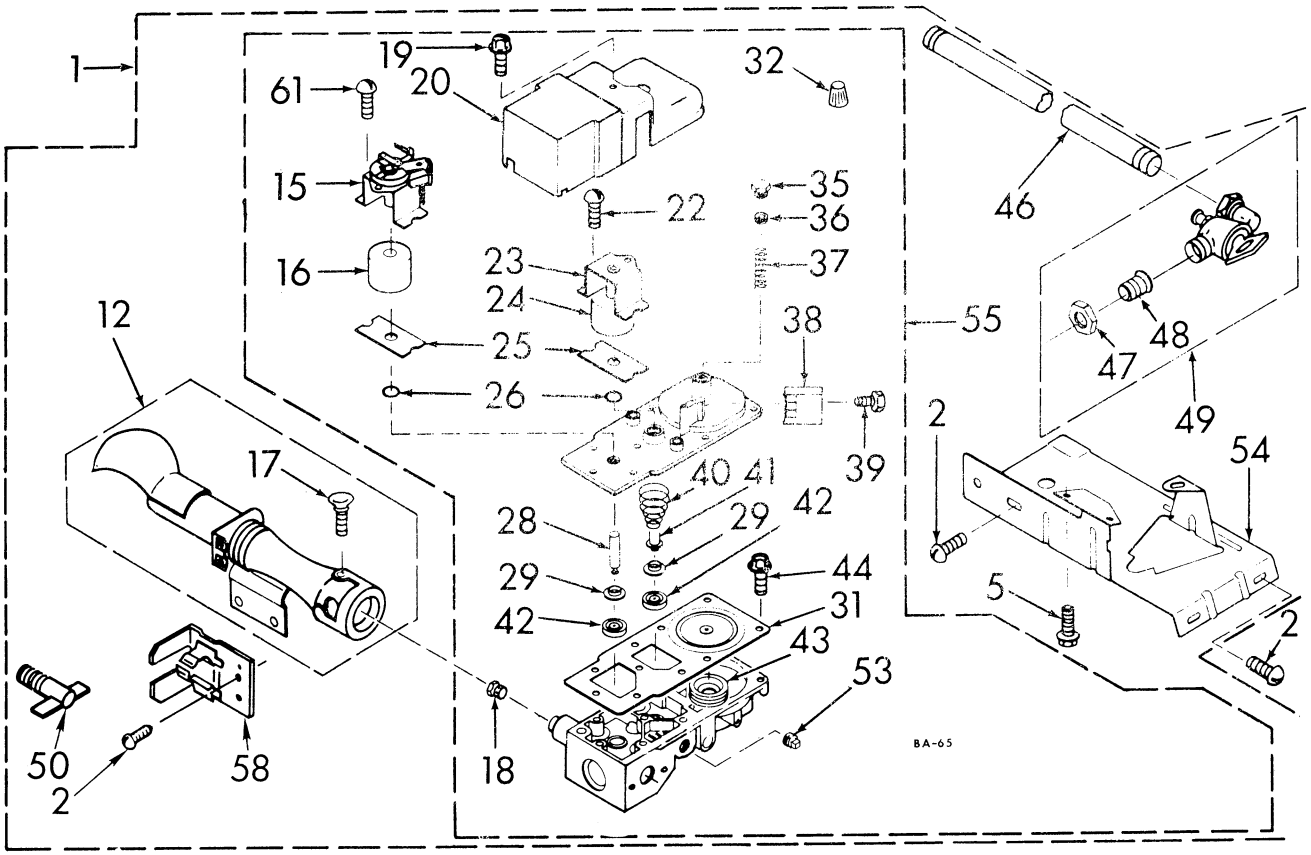
Illus. No.	Part No.	DESCRIPTION
1	237837	Burner Complete - Type 1, 2 and 3
2	236640	Screw, Thumb
3	131183	Washer
5	90464	Screw, No. 10-16 x 1/2
6	295234	Bracket, Pilot
7	90604	Screw, No. 8-32 x 5/8
8	229503	Deflector
9	235470	Pilot Assembly
10	298604	Burner and Shutter Assembly
13	132892	Screw, No. 10-32 x 1/4
15	297014	Orifice, Pilot - Type 1 and 2
	233848	Orifice, Pilot - Type 3
	298333	Orifice, Pilot - Type 4
16	235168	Filter, Gas
17	235459	Tube, Pilot
18	233855	Tube, Zip
19	229965	Thermocouple
21	98694	Screw, No. 10 x 3/8
23	233727	Orifice, Burner - Type 1
	15420	Orifice, Burner - Type 2
	234661	Orifice, Burner - Type 3
	15422	Orifice, Burner - Type 4
24	236104	Gas Valve Assembly
25	231608	Solenoid and Housing Assembly
26	231607	Plunger Assembly
27	9408736	Screw, No. 6-32 x 5/16
30	233963	Spud
31	233985	Sleeve, Compression
32	233984	Nut, Compression
33	231575	Hood Assembly
35	235722	Regulator, Pressure Alternate
	235723	Regulator, Pressure Alternate
	230116	Regulator, Pressure Alternate
36	235654	Plug, Vent
42	90416	Clip, Speed
43	237817	Base and Bracket Assembly
44	15436	Pipe, Gas Supply
45	238379	Gas Shut-Off Valve and Union Assembly Alternate
	238467	Gas Shut-Off Valve and Union Assembly Alternate
47	233077	Pipe, Tail
48	233076	Nut, Compression
49	238257	Pipe, Burner Feed

Following Part Not Illustrated

	238890	Kit, Conversion - Types 1, 2 and 3 to Type 4 (LPG)

339097 BURNER ASSEMBLY

USE WITH TYPE 1 - NATURAL, TYPE 2 - MIXED, AND TYPE 3 - MANUFACTURED GASES

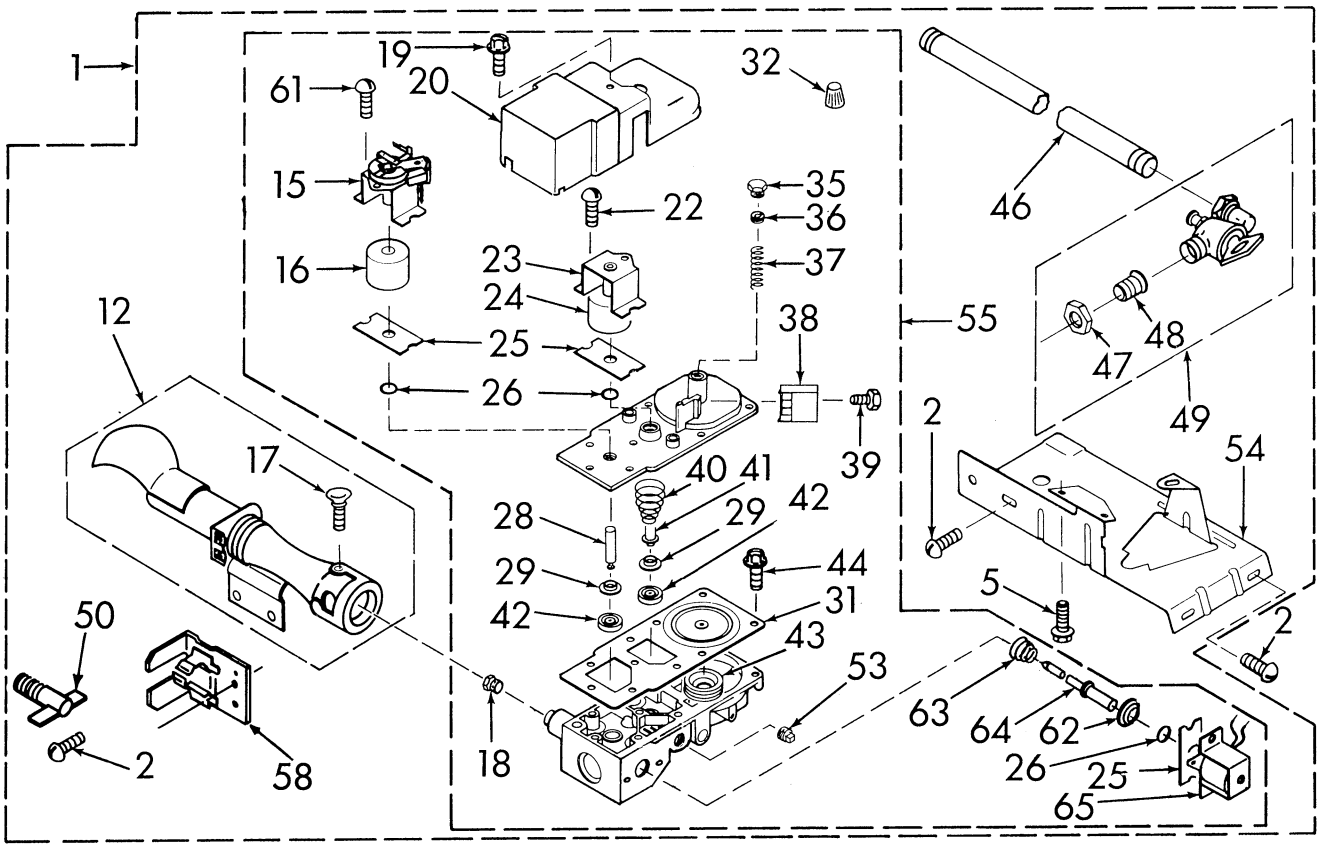


Illus. No.	Part No.	DESCRIPTION
1	339097	BURNER ASSY. TYPE 1,2,AND 3
2	98605	SCREW, 10-16 x 1/2 (5)
5	98209	SCREW, 8-32 x 3/8 (3)
12	297536	BURNER AND SHUTTER ASSY.
15	340100	RELAY ASSY.
16	340103	COIL, MAIN
17	236640	SCREW, THUMB
18		ORIFICE, BURNER
	234870	TYPE 1
	234824	TYPE 2
	234809	TYPE 3
	234868	TYPE 4 (BUTANE)
	337384	TYPE 4 (PROPANE)
19	98487	SCREW, 6-20 x 5/16
20	340813	COVER, CONTROL
22	98463	SCREW, 8-32 x 3/8

Illus. No.	Part No.	DESCRIPTION
23	338870	BRACKET and TUBE ASSY.
24	340104	COIL, PILOT
25	338869	PLATE (2)
26	296302	RING, "O" (2)
28	340102	ARMATURE, MAIN
29	338876	FLANGE, VALVE SEAT (2)
31	338874	DIAPHRAGM and GASKET ASSEMBLY
32	340140	CONNECTOR, WIRE (3)
35	338868	SCREW, LEAK LIMITER
36	99996	SCREW, REGULATOR ADJ.
37	339226	SPRING, REGULATOR
38	296398	BLOCK, CONNECTOR
39	98824	SCREW, 6-32 x 7/16
40	340141	SPRING, PILOT (2)
41	340101	PILOT ARMATURE ASSY.
42	338877	SEAT, PILOT and MAIN
43	339227	SEAT, REGULATOR

Illus. No.	Part No.	DESCRIPTION
44	340181	SCREW, 8-32 x 1/2 (8)
46	233273	PIPE, GAS SUPPLY
47	233076	NUT, COMMPRESSION
48	233077	PIPE, TAIL
49		SHUT-OFF VALVE AND UNION ASSY.
	238467	ALTERNATE
	296821	ALTERNATE
50	338900	GLO-BAR IGNITOR
53	239822	PLUG, PIPE
54	338455	BASEPLATE
55	338963	VALVE ASSY.
58	343128	BRACKET, IGNITOR
61	340182	SCREW, 8-32 x 5/8 (2)

339096 BURNER ASSEMBLY



Illus. No.	Part No.	DESCRIPTION
1	339096	Burner Assy.— Type 1, 2, and 3
2	98605	Screw, 10-16 x 1/2 (5)
5	98209	Screw, 8-32 x 3/8 (3)
12	297536	Burner and Shutter Assy.
15	340100	Relay Assy.
16	340103	Coil, Main
17	236640	Screw, Thumb
18		Orifice, Burner
	338885	Type 1
	296299	Type 2
	337749	Type 3
	337384	Type 4 (Butane)
	337385	Type 4 (Propane)
19	98487	Screw, 6-32 x 5/16 (2)
20	340814	Cover, Control
22	98463	Screw, 8-32 x 3/8
23	338870	Bracket and Tube Assy. (2)
24	340104	Coil, Pilot
25	338869	Plate (3)

Illus. No.	Part No.	DESCRIPTION
26	296302	Ring, "O" (3)
28	340102	Armature, Main
29	338876	Flange, Valve Seat (2)
31	338874	Diaphragm and Gasket Assembly
32	340140	Connector, Wire (3)
35	338868	Screw, Leak Limiter
36	99996	Screw, Regulator Adj.
37	339226	Spring, Regulator
38	296398	Block, Connector
39	145119	Screw, 6-32 x 7/16
40	340141	Spring, Pilot (2)
41	340101	Pilot Armature Assy.
42	338877	Seat, Pilot and Main
43	339227	Seat, Regulator
44	340181	Screw, 8-32 x 1/2 (8)
46	233273	Pipe, Gas Supply
47	233076	Nut, Compression
48	233077	Pipe, Tail
49		Shut-off Valve and Union Assy.
	233074	Alternate
	338235	Alternate
50	338900	Glo-Bar, Ignitor

Illus. No.	Part No.	DESCRIPTION
53	239822	Plug, Pipe
54	338455	Baseplate
55	338964	Valve Assy.
58	343128	Bracket, Ignitor
61	340182	Screw, 8-32 x 5/8
62	339756	Flange, Valve
63	399386	Spring
64	338867	Needle Assy.
65	338871	Coil Assy. (2-Level)

Following Parts Not Illustrated

239074	Kit, Conversion— Type 1, 2, and 3 to Type 4 (L.P.G.)

Service Helps

SYMPTOM	POSSIBLE CAUSE	REMEDY
BURNER DOES NOT IGNITE	Insufficient gas supply.	Open partially closed gas shutoff valve or correct low gas pressure.
	Inoperative gas valve solenoid.	Test gas valve solenoid, and replace coil if inoperative,
	Inoperative igniter control.	Test igniter control, and replace if inoperative,
	Inoperative igniter.	Test igniter, , and replace if inoperative,
	Broken, loose or incorrect wiring.	Refer to wiring diagram to check continuityoof wiring.
BURNER GOES OFF PREMATURELY	Insufficient gas pressure.	Open partially closed gas shutoff valve, replace gas valve assembly, or correct low pressure.
	Incorrect burner orifice.	Replace with proper orifice for type of gas being used,
	Improperly adjusted burner flame	Adjust burner flame.
	Burner flame not heating sensor tube of igniter control properly	Check for carbon accumulation on sensor tube and clean tube, or replace igniter control,
	Inoperative igniter control	Test igniter control, and replace if inoperative,
	Inoperative gas valve solenoid resistor.	Test resistor, and replace if inoperative.
	Broken, loose or incorrect wiring.	Refer to wiring diagram to check continuity of wiring.
IGNITER DOES NOT SHUT OFF AFTER GAS IGNITION	Burner flame not heating sensor tube of igniter control properly.	Check for bent igniter control bracket, and replace bracket if bent.
	Inoperative igniter control.	Test igniter control, and replace if inoperative,
	Improperly adjusted burner flame.	Adjust burner flame.
	Incorrect wiring.	Refer to wiring diagram to check origin.
BURNER DOES NOT SHUT OFF	Impurities on valve seat.	Disassemble and clean valve, or replace valve seat,
	Incorrect wiring.	Refer to wiring diagram to check wiring.

GLO-SIL IGNITION BURNER SYSTEM

NOTE: These service hints deal with the burner system components only.

SYMPTOM	POSSIBLE CAUSE	REMEDY
IGNITOR DOES NOT GLOW AND GAS SUPPLY SUFFICIENT—120 VOLTS TO VALVE POWER	Flame sensor failed with contacts open.	Replace flame sensor.
	Igniter broken or open.	Replace ignitor.
	White Rogers: open booster coil.	Replace coils. Kit #55433A.
BURNER IGNITES AND GOES OUT REPEATEDLY	Burner not holding flame sensor contacts open.	Replace flame sensor.
IGNITOR GLOWS BUT BURNERS DOES NOT IGNITE	Flame sensor failed in closed position.	Replace flame sensor.
	Open secondary coil or holding coils.	Replace coils. White Rogers: Kit #55433A. Eaton: Kit #55439A.

GLOSSARY OF TERMS

AERATED–Having a primary air port through which air is drawn to form a combustible air and gas mixture.

A.G.A.–Americian Gas Association

A VALVE–A shut off valve installed in the gas supply line upstream from all other controls.

BACKFIRING–Flashback of flame through the venturi causing gas to burn at the orifice.

B VALVE–Small valve downstream from the A valve supplying gas to the pilot burner.

CLOSED CIRCUIT–Millivoltage measured with the thermocouple attached to the electromagnet.

COLD JUNCTION–The junction of the thermocouple elements and the current carrying conductors.

DROP OUT–The point, defined by a millivolt or milliampere reading at which the electromagnet releases the armature and closes the valve.

ELECTROMAGNET–The magnet which, when energized by the current from the thermocouple, holds the armature which in turn holds the valve open.

FLASHBACK–See Backfiring

HOT JUNCTION–The junction of the two thermocouple elements heated by the pilot flame.

LEAK LIMITING DEVICE–A device, containing one large and one small fixed orifice which is installed in the bleed opening of a gas pressure regulator. The small orifice is used as a leak limiting orifice. The large orifice permits rapid opening of the regulator when the main burner comes on.

MAGNETIC HEAD–See electromagnet.

MANOMETER–An instrument used to measure gas pressure in inches of water column.

MERCURY VAPOR SWITCH–A mercury filled bulb and capillary tube which flexes a diaphragm according to temperature changes. The flexing of the diaphragm is used to actuate a switch. Also called a pilot switch.

MILLIVOLT–One thousandth of a volt. Used to check thermocouple output. Abbreviation mv.

OPEN CIRCUIT–Millivoltage measured without thermocouple attached to the electromagnet.

ORIFICE–The drilled opening in a cap, spud or other device which limits the flow of gas to the burner.

PORT–The hole in a burner where the gas and air mixture burns.

POWER UNIT–See electromagnet.

PRIMARY AIR–The air drawn into the burner verturi which mixes with the gas to form a combustible air and gas mixture.

RATE–The BTU input burned by an appliance during one hour of operation.

RESET BUTTON–On manual ignition burners––the button which is depressed manually to open the pilot valve.

SECONDARY AIR–The air surrounding the flame.

SENSING ELEMENT–The fluid or gas filled capillary and bulb on a thermostat or other device used to sense temperature.

THERMOCOUPLE–Two dissimilar metal elements so joined as to produce an electrical current when the junctions are at different temperatures.

TRANSFORMER–An electrical device having two windings––a primary and a secondary. Used to increase or decrease voltage as required.

VENT–A conduit or passageway used for conveying combustion products, lint and moisture to the outer air.

VOLT–Standard unit used to measure electrical pressure.

WATT–Standard unit used to measure electrical power.

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