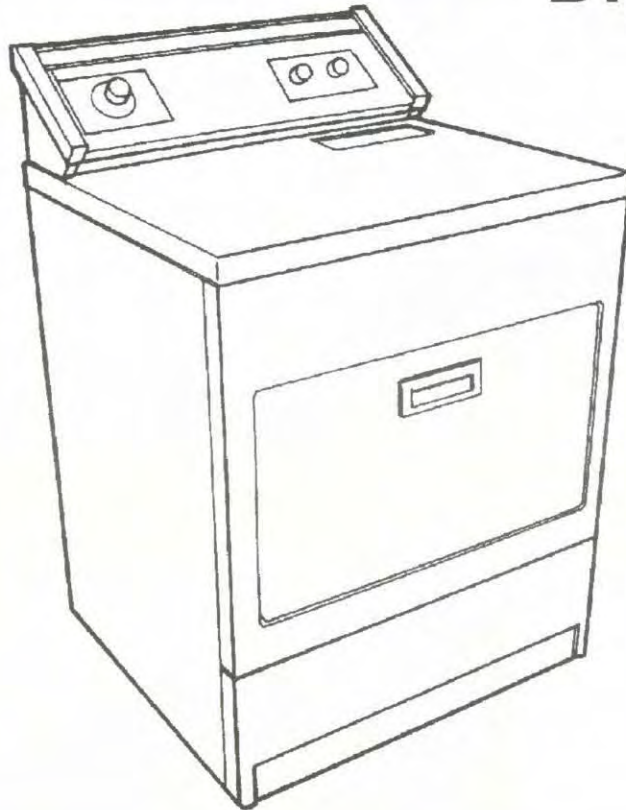




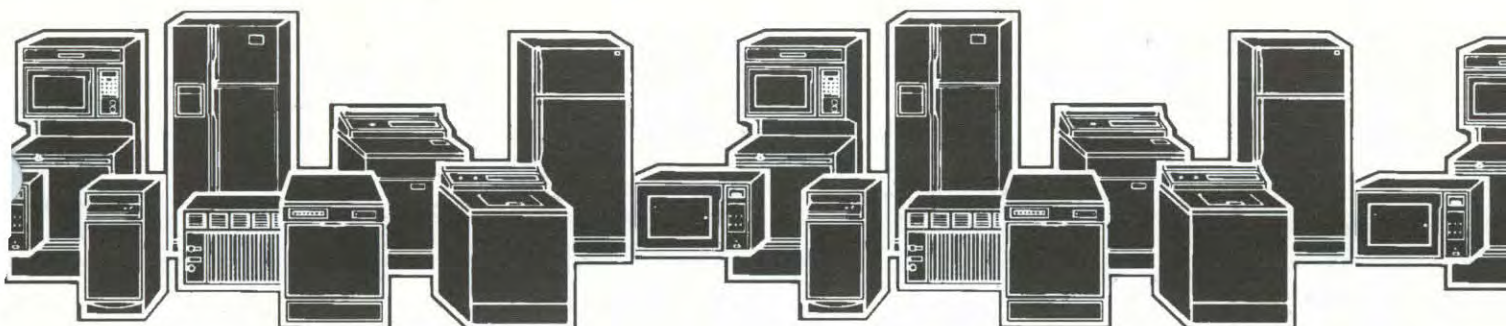
CONSUMER SERVICES TECHNICAL  
EDUCATION GROUP PRESENTS

L-58

## Dryer Mechanical Systems



JOB AID  
Part No. 4314557

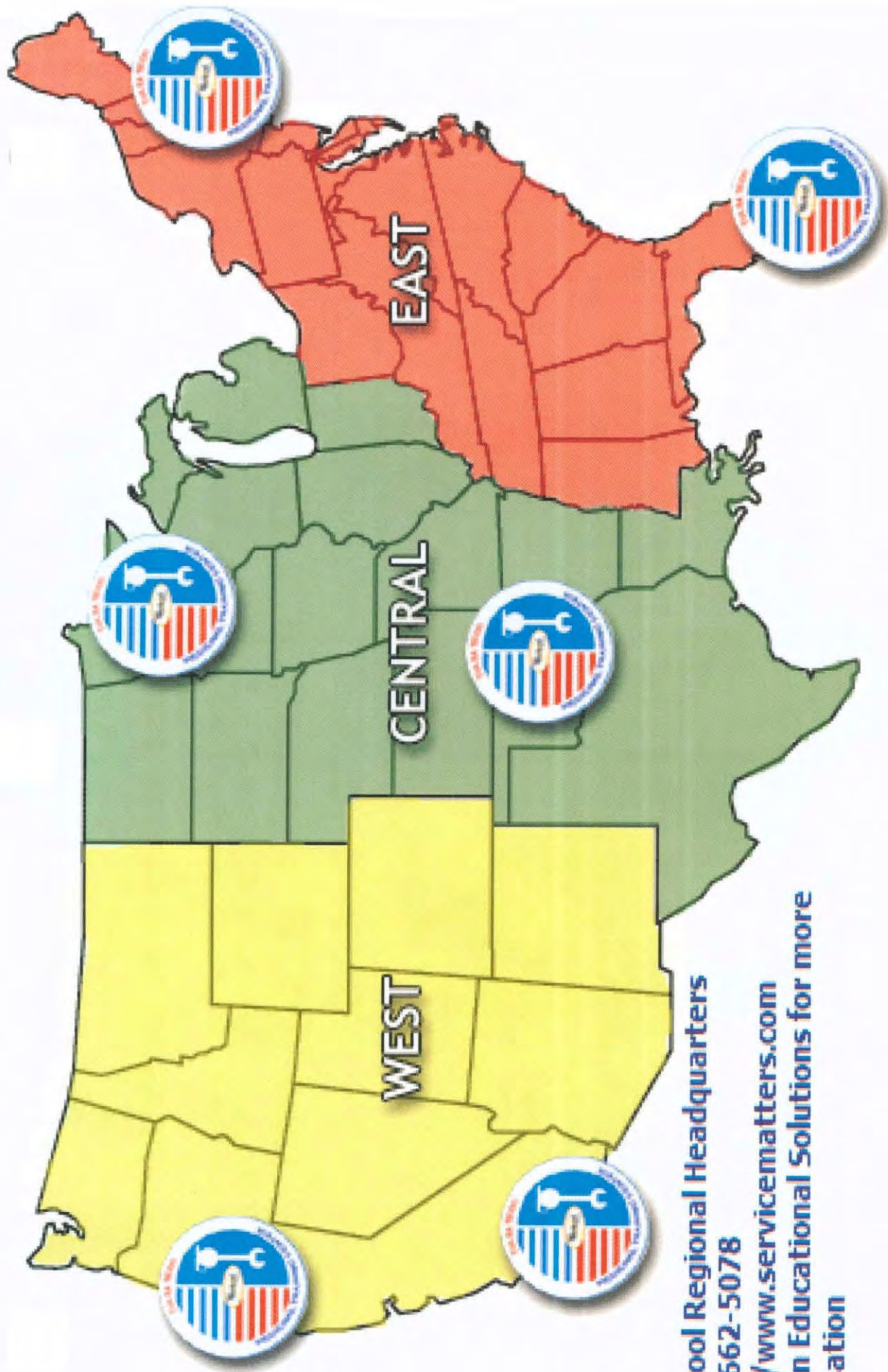




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## INTRODUCTION

The purpose of this Job Aid is to provide support to the Dryer Mechanical Systems video part number 4314543. The video and this Job Aid provide you, the technician, with a basic understanding of how a dryer dries laundry, and the basic components in the mechanical system of a dryer.

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# ***safety considerations***

## **⚠ WARNING**

**Electrical Shock Hazard      Fire Hazard**

### **On gas and electric dryers**

**Disconnect power supply cords before testing components or servicing dryer. Failure to do so may result in electrical shock or personal injury.**

### **On gas dryers**

**Do not use an open flame to test for leaks from gas connections.**

**Shut off gas supply before testing components on the burner assembly or servicing the burner assembly.**

**Failure to do so may result in a fire or explosion, and could result in fire damage and personal injury.**

## **⚠ WARNING**

**Personal Injury Hazard**

**Wear gloves to protect hands from sharp edges that may be present.**

**Failure to do so may result in personal injury.**

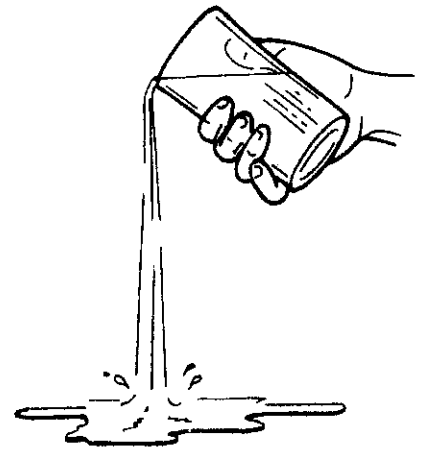
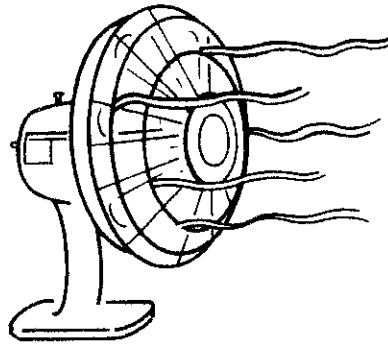
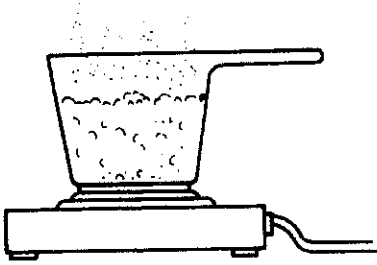
# ***theory of drying***

To understand how a dryer can dry laundry, it is necessary to understand how the process of drying, or evaporation, can be accelerated.

The goal of drying is to remove the water that has saturated the laundry during washing. During the SPIN CYCLE of the washer, much of the water is extracted while it is still in its liquid form. To remove the remaining water it is necessary to convert the remaining liquid water into water vapor. This process of changing a liquid to a vapor is called evaporation. Under normal conditions, the process of evaporation is very slow.

As an example, a water in a glass set on a table will take many days to completely evaporate. A damp towel from a shower, balled up and placed in a clothes hamper, will probably still be damp several days later when it is removed.

However, by controlling the conditions during the evaporation process, the rate of evaporation can be accelerated.

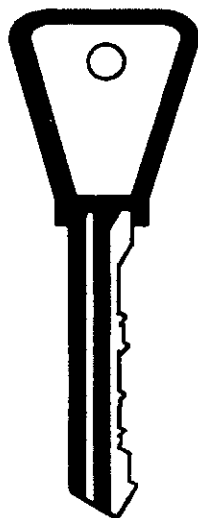


BY APPLYING HEAT, the process of evaporation can be accelerated. As an example, when a pan of water is heated on a stove top, the water rapidly boils (evaporates from liquid to vapor).

BY MOVING THE SURROUNDING AIR, the process of evaporation can be accelerated. During the process of evaporation, the air immediately surrounding the surface of the liquid water can become saturated with water vapor. At this point the air cannot accept anymore evaporating water. Moving the saturated air away from the surface of the liquid water and replacing it with air that can still accept water vapor, can accelerate the rate of evaporation.

As an example, clothes hung out to dry on a clothes line will dry faster when there is a breeze. And you will feel cooler (a sign of evaporation) when you stand in front of a fan on a hot day.

BY INCREASING THE SURFACE AREA OF THE LIQUID, the process of evaporation can be accelerated. As an example, the water in a glass can be poured out onto the floor. Spread out in a puddle, the water will likely evaporate in just a short amount of time.



## **Keys to Accelerating Evaporation**

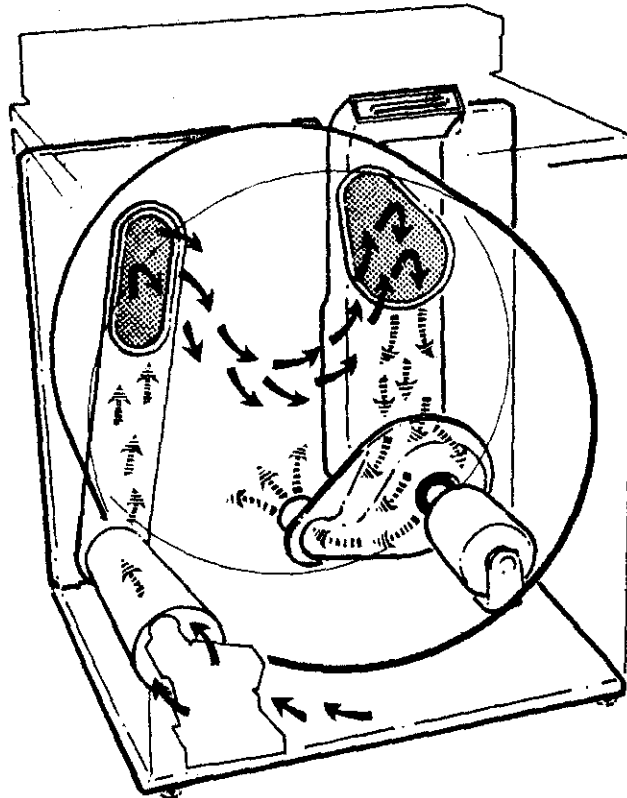
- 1. Apply heat**
- 2. Move air**
- 3. Increase surface area**

The mechanical system in a dryer controls these same three conditions to accelerate the evaporation of liquid water remaining in laundry. Within the dryer drum, the dryer applies heat to the water, provides movement of air over the water, and increases the surface exposure of the water. Efficient drying of the laundry is the result.

In a Whirlpool dryer, air is heated by either an electric element or a gas burner. The heated air is drawn into the drum and passed over the laundry. To prevent the heated air from becoming completely saturated with water vapor, the fan continually pulls the moisture-laden air from the drum and exhausts it outside. Relatively dry heated air is continually drawn into the drum to replace the moisture-laden air being exhausted.

In addition, the dryer drum revolves, and uses its baffles to tumble the laundry. This increases the surface area of the laundry from which the water can evaporate.

When you understand how a dryer works you can understand why it is important that the dryer be properly exhausted to the outside. If the moisture-laden air was vented back into the room where the dryer was located, the air in the room would quickly become saturated. This same saturated air would be continually drawn back into the dryer, heated, and passed over the wet laundry. The drying time would greatly increased.



**Air system is similar in gas and electric dryers. Gasdryer is shown.**

**To maintain the drying efficiency of the dryer:**

- the dryer must be correctly installed
- the dryer must be properly vented
- the air flow in the dryer must be unrestricted (lint screen clean)
- the dryer must not be overloaded
- the laundry must be properly sorted (heavy items dried with lightweight garments can develop over-drying and under-drying in the same load)
- the washer must extract as much water as possible during the SPIN CYCLE

# servicing components of the dryer mechanical system

Whirlpool manufactures dryers in two sizes:

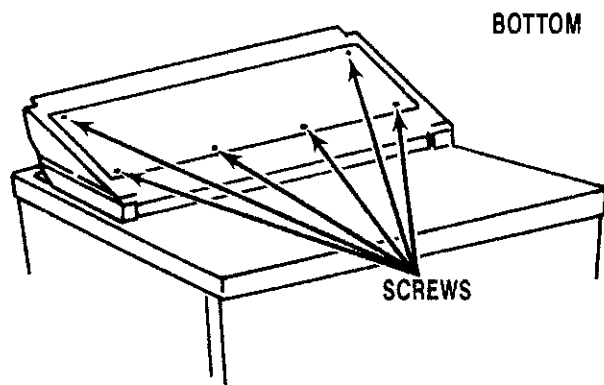
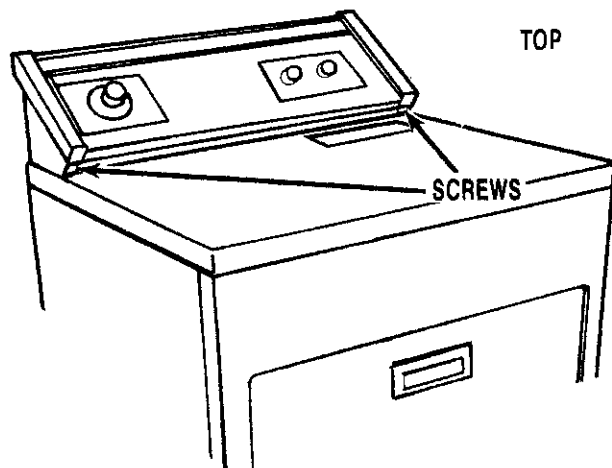
- 24-inch compact dryers
- 29-inch large capacity dryers

Even though the dryers differ in size and appearance, many of the service procedures are similar for both units. Where differences do occur, they will be noted.

## CONSOLE

To access the components in the console:

1. Remove two (2) screws that secure console to top.
2. Lay console forward onto dryer top. (Place a cloth or rag under the console to protect the finish on the top.)
3. Remove the screws that secure the back on the console.



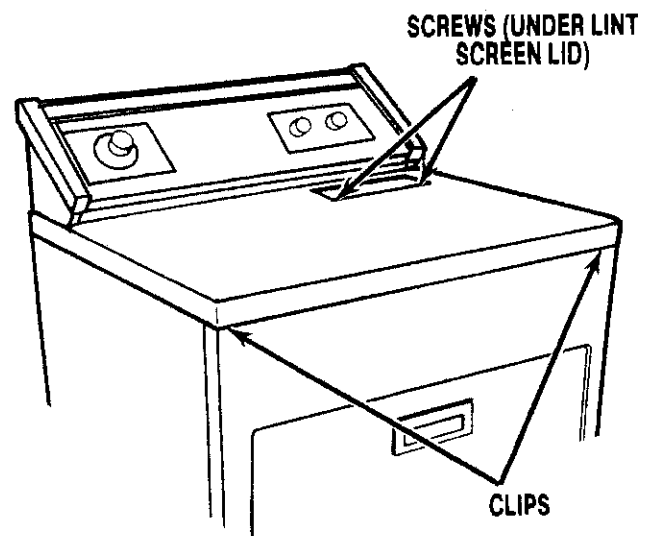
**Note:** Since most of the components in the console are part of the dryer's electrical system, they will not be discussed in this Job Aid.

## DRYER TOP

To access most of the mechanical components in the dryer, it is necessary to raise the top and remove the front of the dryer.

To raise top:

## 29-inch large capacity dryer:

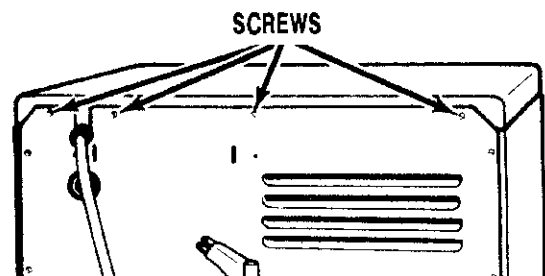


1. Remove two (2) screws under lint screen lid.
2. Either use a putty knife to release the front lock clips, or  
Pull the top forward on each side, twist slightly to release the front lock clips.
3. Raise the top and prop it against the wall behind the unit. (Place a cloth or rag between the top and wall to protect the finish on the top.)

The rear of the top is supported by two (2) strap hinges.

**Note:** If it is necessary to completely remove the top from the unit, note the ground connections. When the top is replaced, all ground wires must be reconnected to ensure an electric ground continuity between top and cabinet.

## 24-inch compact dryer:



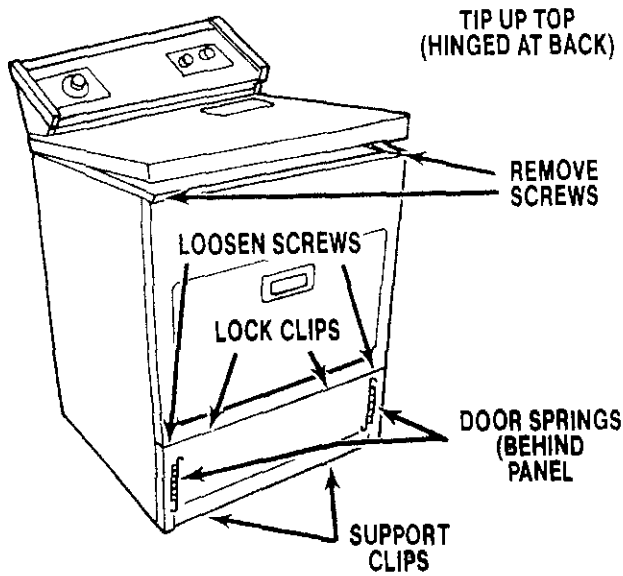
1. Remove four (4) screws along the top of the back panel.
2. Slide top forward to clear plastic lock tabs securing the top to the front of the cabinet, and remove top.

**Note:** When replacing the top make sure the lock tabs are secured before replacing the screws through the back panel.



## DRYER FRONT

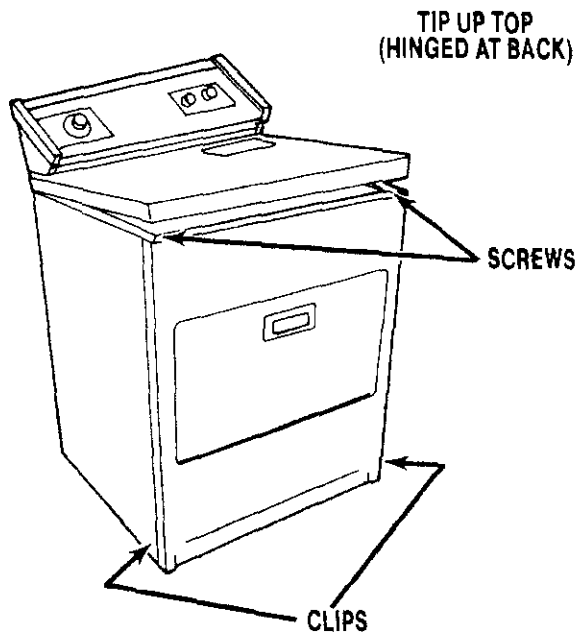
To remove dryer front:



### Units with lower access panels:

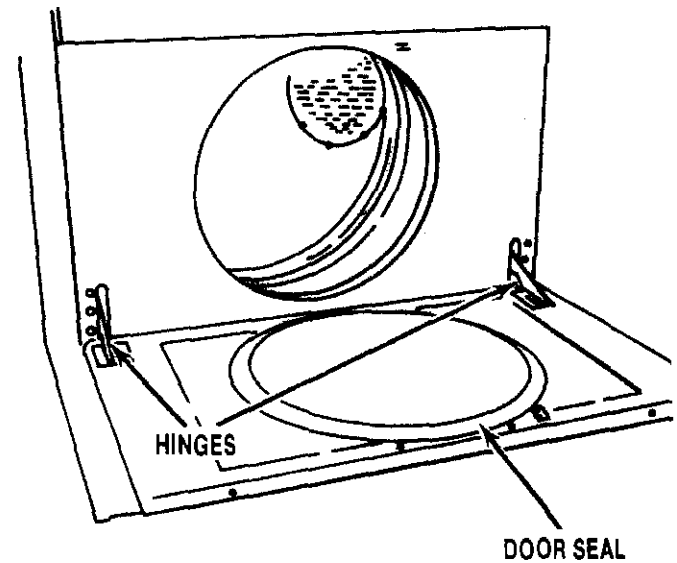
1. Use a small blade screwdriver to release the two (2) lock clips on top of the lower panel.
2. Swing the lower panel out and up off the two (2) lower support clips.
3. Remove door springs.
4. Loosen two (2) screws at bottom of front panel.
5. Disconnect door switch wire leads and wiring harness.
6. Remove two (2) screws on each side at top of the front panel.
7. Carefully remove front panel.

### Units without lower access panel:



1. Remove two (2) screws on inside of each side of front panel at the top.
2. Release spring clips on the bottom of the front panel that secure it to the side panel flanges.  
Some models may have spring clips along the sides at the top of the panel.
3. Carefully remove front panel.

All gas dryers have a lower access panel. Using this lower access panel, it is not necessary to remove the drum to service the burner and funnel assembly.



## DRYER DOOR

All types of dryer doors are hinged from the front panel with hinges secured by screws.

All doors are a two-piece assembly held together by screws, the door assembly must be separated to access the door catch and door handle.

### DOOR CATCH

To remove:

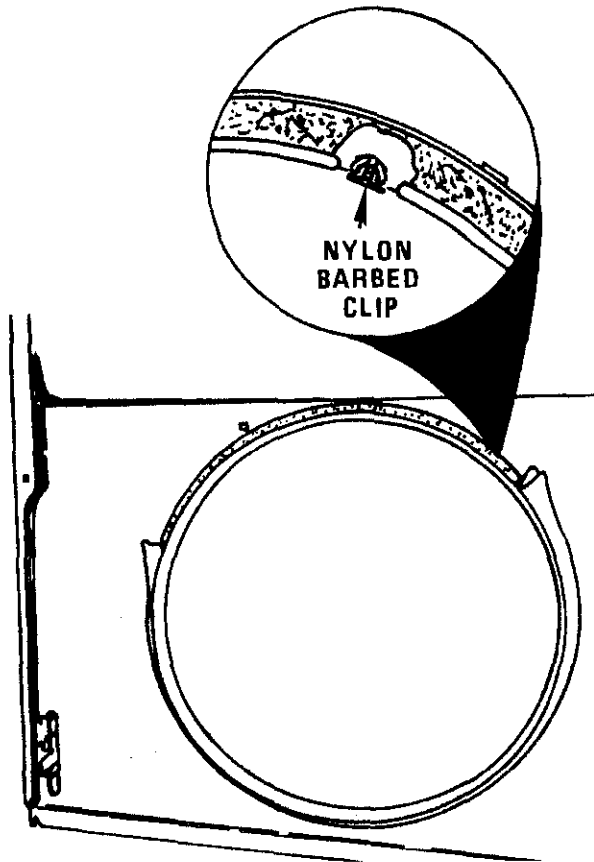
1. Depress flexible tabs on the back side of the front panel.
2. Pull the catch out through the front of the front panel.

### DOOR SEAL

The door seal is cemented to the inner door panel.

### FRONT DRUM BEARING

The reversed door opening flange in the front panel is the support for the front drum seal and bearing.

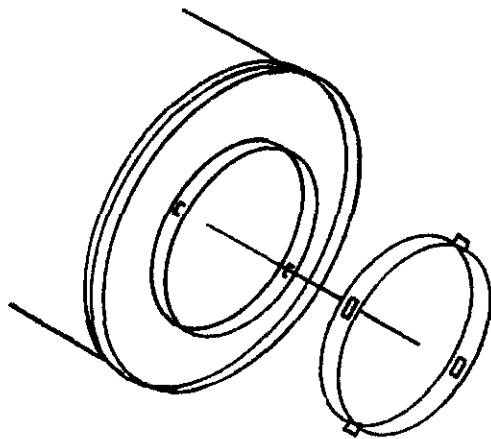


The front bearing is a teflon-impregnated felt that needs no lubrication. The bearing is held in place by plastic plugs and seal cement.

### DRUM RING

A plastic ring forms the front bearing race on the drum. To remove the pliable ring:

1. Grasp the ring from inside drum and pull down to release 2 of the tabs holding it in place.
2. Slip ring out of drum.



**Note:** When replacing the ring, be careful to keep your finger clear when releasing the ring to seat the last tab.

Fluctuating temperatures in the dryer may cause the ring to expand and contract, resulting in a loose or noisy ring. This can be corrected by applying a small amount of silastic sealer at each of the locating tabs.

### DRUM

To remove:

#### 29-inch large capacity dryer:

1. Release belt from idler pulley and motor.
2. Lift drum through the cutouts on front flanges of the side panels.

#### 24-inch compact dryer:

1. Remove the forward side panel screw from each bulkhead gusset.
2. Loosen the rear screws from each bulkhead gusset.
3. Release belt from idler pulley and motor.
4. Carefully spread the cabinet sides at the front while lifting out the drum.

To replace the drum:

1. Place belt around the drum, grooves facing the drum.
2. Insert drum through the side cutouts or the spread sides of the compact unit.
3. Rest drum on support rollers.
4. Connect belt to motor.
5. Replace front panel while raising the drum to engage the bearing ring and front bearings.
6. Before closing the top, turn the drum counter-clockwise one revolution. Use a screwdriver to make certain the rear drum seal is lying against the bulkhead bead and is not turned under into the drum. Do NOT use your fingers to check the rear drum seal because pins, broken buttons and other small items may have lodged in the seal.

### DRUM BAFFLES

#### 29-inch large capacity dryer:

The drum has two (2) formed baffles and a plastic "variator" baffle secured to the drum with screws.

#### 24-inch compact dryer:

The drum has three (3) molded plastic baffles secured to the drum with screws.

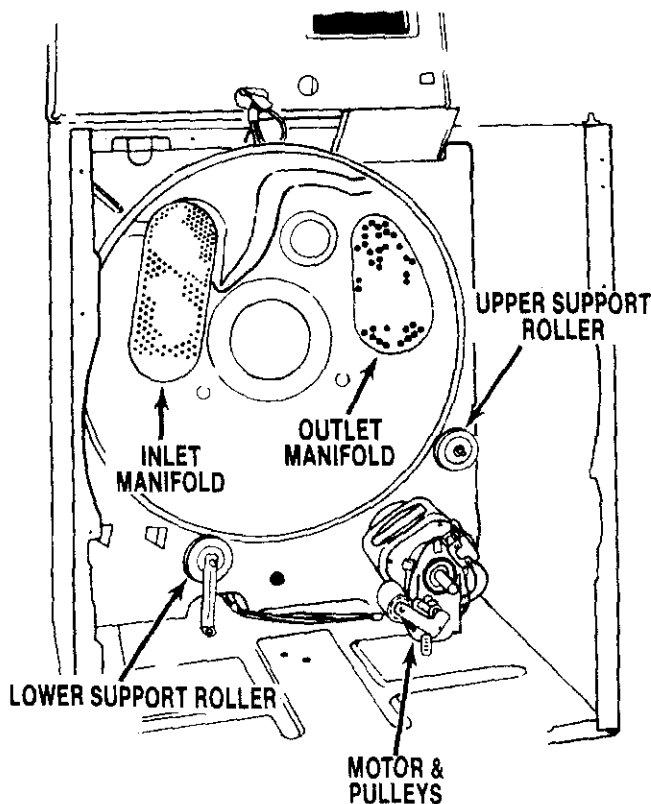
## REAR DRUM SEAL

The rear of the drum is open and butts against the bulkhead. A vinyl-covered fabric seal is cemented to the drum and closes the gap between the drum and bulkhead. The seal rides on a bead on the bulkhead.

## DRUM SUPPORT ROLLERS

Two cushioned drum support rollers turn on axles mounted in the bulkhead. The drum has a groove near the rear edge that forms a track for the rollers.

The rollers are interchangeable between different sized units. The rollers are secured to the axles by plastic retaining clips.



The lower roller turns on a fixed position on its axle. The lower roller

- maintains belt alignment
- maintains a tight air seal at rear of the drum
- holds the drum level.

The upper roller floats on the shaft to compensate for manufacturing tolerances.

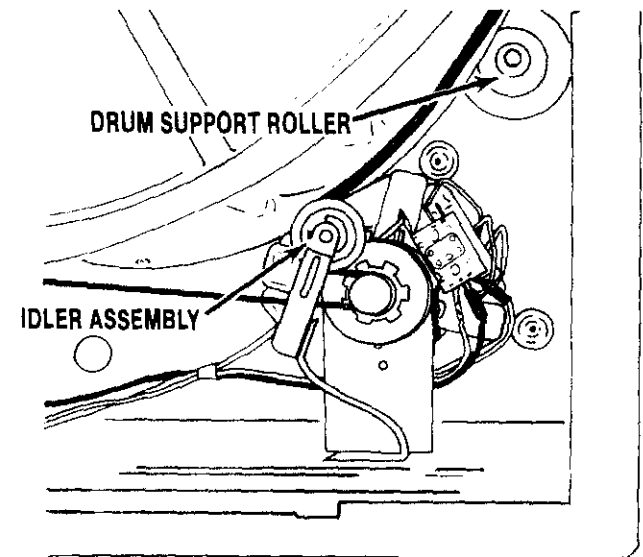
The rollers do not need lubrication and are generally service-free.

However, if the dryer is dropped, the weight of the drum may bend the axle of the lower roller. This condition can cause an alteration in the laundry tumbling pattern and open up gaps in the seal at the rear of the drum.

The locknuts that secure the support roller shafts are located on rear of the bulkhead. The lint chute covers the upper shaft nut.

## DRYER BELT

A poly-V belt engages a matching poly-V pulley on the motor. The belt is wrapped around the drum (grooved side down toward the drum), looped under an idler pulley (mounted on a spring bracket to maintain tension), and looped over the motor pulley.



The belt turns the drum counter-clockwise.

29-inch large capacity dryer—  
approximately 48 RPM's

24-inch compact dryer—  
approximately 55 RPM's

It is important to replace a belt with the correct size belt for the unit being serviced.

### Drum speed complaints:

Excessive drum speeds are usually caused by mismatched pulleys and belts.

When the drum turns too fast the laundry is forced against the drum walls. This poor tumbling action results in longer drying time and wrinkling.

A drum turning too fast, especially in 24-inch compact units, can also produce "balling" of the laundry. This condition results in wrinkling and only partially dried laundry.

**Note:** "Balling" of laundry does not necessarily indicate a drum speed problem. This condition can also be caused by drying large items in with a load of normal garments.

### To remove belt:

1. Push the idler pulley toward the motor pulley.
2. Work the belt over the end of the pulley and slip it off the idler assembly.
3. Slip the belt off of the drum.

## MOTOR

The motor is a double-shaft, single-speed, one-third horsepower motor with a counterclockwise rotation.

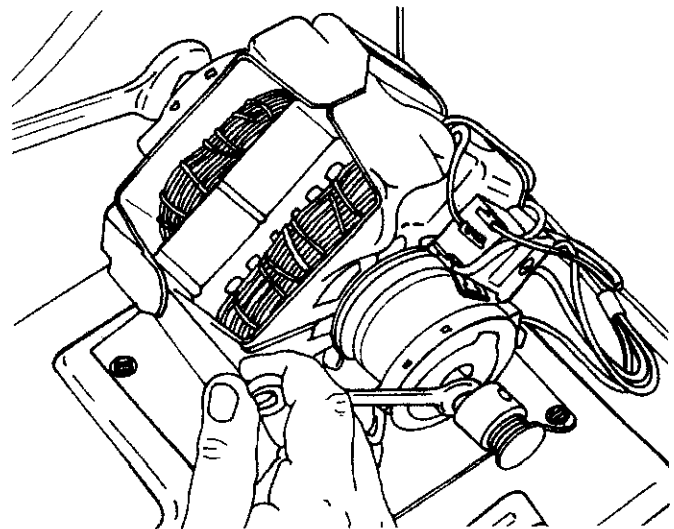
The external centrifugal switch is serviceable. But the end bells of the motor are either welded or cemented together, making the motor itself unserviceable.

On the front shaft, the motor drives a pulley, which drives the belt and drum. On the rear shaft, which is threaded and screws into the blower hub, the motor drives the blower wheel.

To remove:

1. Remove blower wheel from motor shaft by
  - holding the blower hub stationary with an open end or adjustable wrench
  - placing an open end or adjustable wrench around the flat edge on the front pulley shaft and turning clockwise toward the cabinet side

**Note:** All threads on the blower hub are left-handed.



2. Disengage motor hold-down clips by
  - placing a nut driver over the looped end of the clip
  - depressing the formed hump of the clip while pressing down and out with the nutdriver

**Note:** Remove the front clip first to relieve pressure on the first.

3. Remove the motor ground wire and the other motor wire leads, noting their placement.

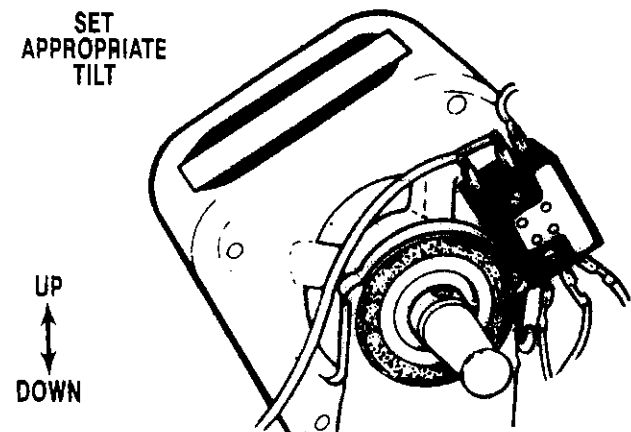
## MOTOR BRACKETS

### 29-inch large capacity dryer:

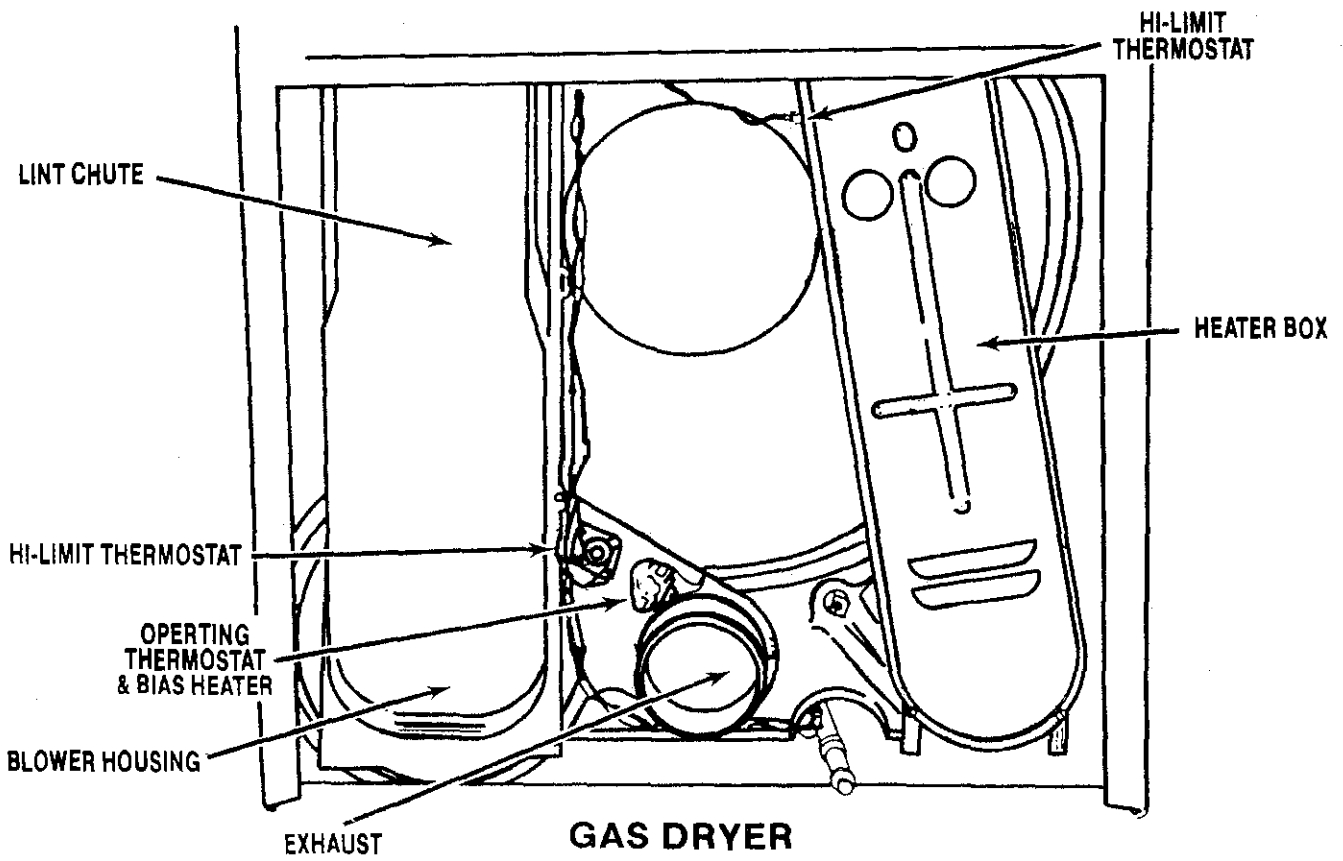
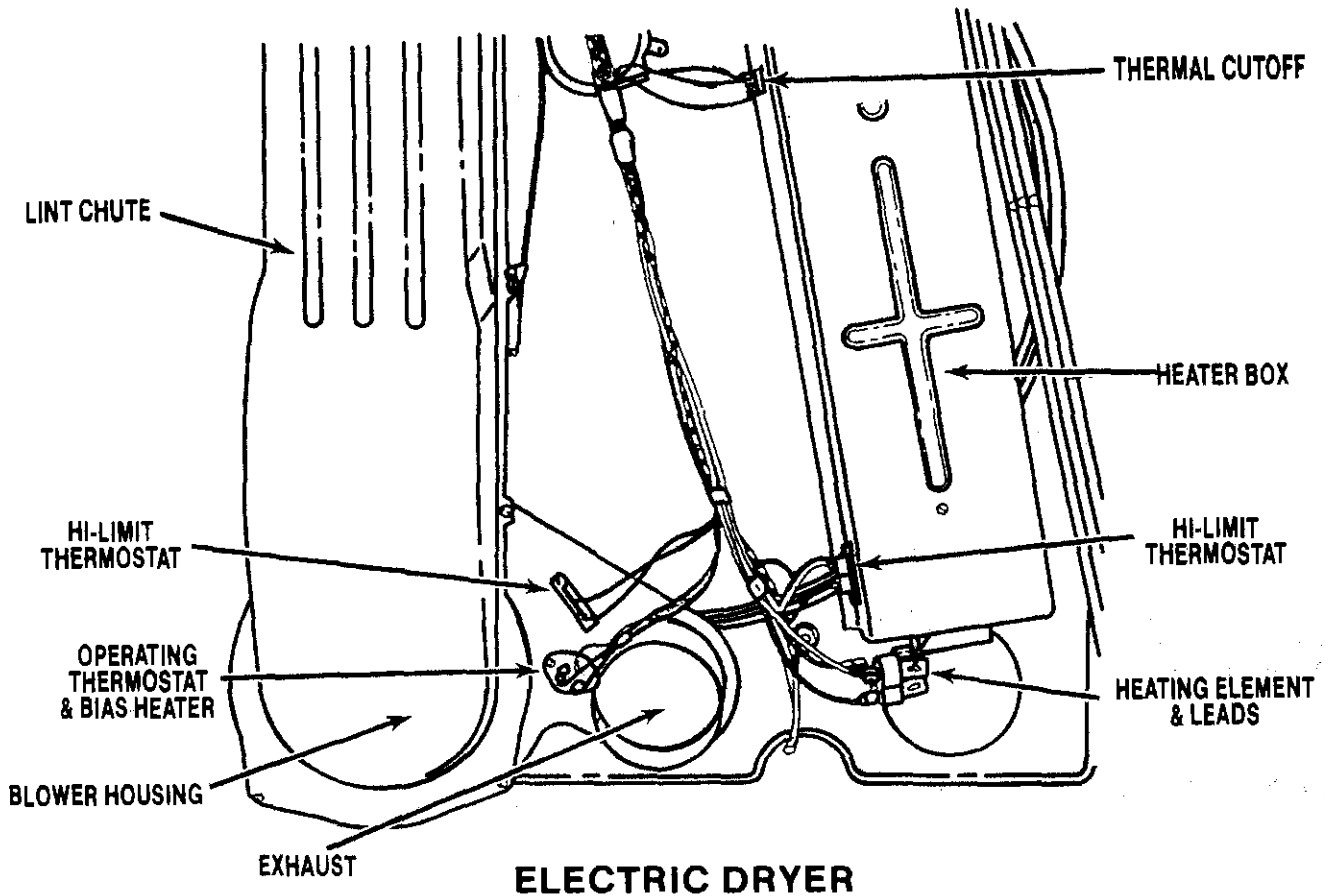
The motor sits on 2 brackets. The front bracket is secured to the baseplate with a bolt. The rear bracket is a formed part of the bulkhead.

### 24-inch compact dryer:

The motor is supported by a double bracket secured to the baseplate.



An index tab on the motor mounting ring fits into an index slot on the front bracket. This keeps the motor at the correct angle in the bracket. If the motor were placed flat on the bracket it would hit the drum. The index tab also prevents the motor from turning with the start-up torque.





## BULKHEAD

The bulkhead serves as a stationary back for the drum, and a mounting plate for the heat and air system, and several feature components.

The bulkhead is secured at the top to braces, and to the baseplate with screws. Sound pads are located between the cabinet sides and the bulkhead on some models.

## REAR SERVICE PANELS

There are two service panels on the back of the dryer.

The small service panel covers the electrical terminal block. On electric dryers, the 240 V terminal block is secured by 2 screws to a mounting bracket.

The large louvered back panel covers the intake and exhaust system. On gas dryers, the louvers also provide auxiliary air for the burner.

## AIR INTAKE AND EXHAUST SYSTEM

The blower wheel draws dry air across the burner or element where it is heated.

Incoming and outgoing air passes through ports in the bulkhead.

The heated air is circulated through the laundry and is pulled through the outlet manifold and the lint screen in the lint chute.

The moisture-laden air is then discharged through the 4-in. exhaust line to an outside vent.

## HEATER BOX

On electric dryers the heater box is open at the bottom and is supported by two (2) brackets extending out from the bulkhead.

On gas dryers the bottom of the heater box slips over the burner collar which is attached to the bulkhead.

To remove the heater box:

1. Remove the screw that secures the strap spring at the top of the box.

**Note:** The access hole for the screw-driver may be covered by the wiring diagram label on the back of the unit.

2. On electric dryers, remove the wire leads to the hi-limit thermostat and the heat element.

On gas dryers, remove the two (2) screws at the bottom that secure the box to the brackets on the baseplate.

3. Either lift the box off its supports (electric), or pull the bottom of the box out from the burner collar (gas).
4. With the bottom of the box free, pull it down and out of the dryer.

## ELECTRIC HEAT ELEMENT

To remove heat element:

1. Remove heater box.
2. Remove one (1) retaining screw at the bottom of the heater box.
3. Pull the element out through the bottom of the heater box.

## GAS BURNER ASSEMBLY

The burner assembly is located in the lower left corner of the cabinet, in front of the bulkhead. To service, it is generally only necessary to remove the lower access panel.

**FIRST**—be sure to shut off the gas supply and disconnect from the burner.

To remove burner assembly:

1. Remove wire leads from igniter and flame sensor.
2. Remove two (2) screws in the front that hold the burner assembly in place.
3. Remove two (2) screws that secure the burner funnel into a collar attached to the bulkhead.
4. Pull the burner assembly forward and out of the unit.

## MANIFOLD COVER

The manifold cover is part of the heater box and fits into a hole in the bulkhead.

**NOTE:** The discoloration of the inlet manifold cover is usually the result of excessive heat in the heater box. This can be caused by a clogged lint screen or improper venting. The cover can also be discolored as a result of chemicals sprayed in the laundry area, or added to loads of drying laundry.

Though the discoloration may be unsightly, it does not impair the operation of the manifold or decrease the efficiency of the dryer.

## LINT CHUTE

To remove lint chute

1. Remove four (4) screws securing the chute to the blower housing.
2. Remove two (2) screws on the right upper bracket securing the bulkhead.
3. Pull the bulkhead forward and lift out the chute through the top. Be careful not to damage either seal on the lint chute as it is removed.

One lint chute seal is on the back of the bulkhead around the outlet manifold.

The other seal is located where the chute flange mates with the blower housing.

**Note:** If the lower lint chute seal works loose, it will flap against the blower wheel. It can be easily cemented back into place with an adhesive.

## BLOWER WHEEL

It is often necessary to remove the lint chute and blower blade to remove small items that may have fallen down the chute.

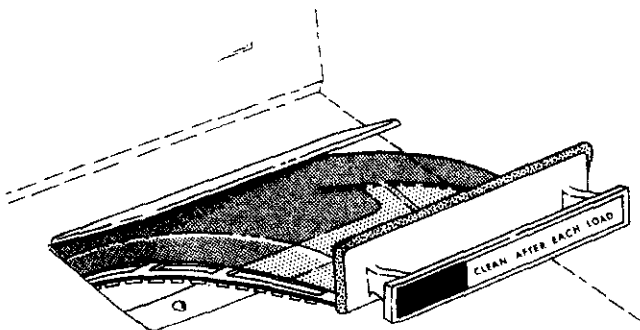
To remove blower wheel:

1. First remove wheel hub from rear motor shaft.
2. Remove lint chute.
3. Lift out blower wheel.

## LINT SCREEN

### 29-inch large capacity dryer:

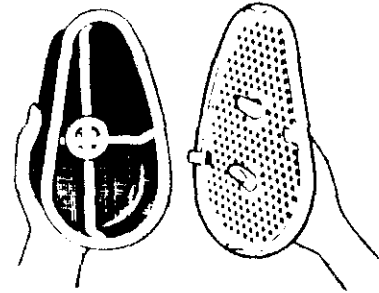
The lint chute slips down into the lint chute under a cover located on the dryer top. Flexible steel bands in the sides of the screen provide a contoured fit.



LINT SCREEN

### 24-inch compact dryer:

The lint screen is held inside the blower air duct behind the outlet manifold cover.



The lint screen is removed through the drum. Finger holes permit easy removal of the cover. Spring clips on each side of the screen assembly hold the screen and cover to the bulkhead.

**IMPORTANT:** THE LINT SCREEN MUST BE CLEANED AFTER EACH LOAD OF LAUNDRY IS DRIED.

## OPERATING THERMOSTAT AND BIAS HEATER

The operating thermostat and bias heater are located on the back side, near the top of the blower housing.

## HI-LIMIT THERMOSTATS

There is a hi-limit thermostat located on the front of the blower housing directly above the operating thermostat and bias heater. On some models this thermostat is a non-resettable thermal fuse.

A second hi-limit thermostat is located on the heater box. On electric dryers, the hi-limit thermostat located near the bottom of the heater box. On gas dryers, the hi-limit thermostat is located near the top of the heater box.

The thermostats break the circuit to the heat source if the operating thermostat fails in a closed position, or, the air flow through the dryer is severely restricted.

## THERMAL CUTOFF (Electric Dryers)

On electric dryers there is a non-resettable cutoff located near the top of the heater box. The cutoff is set up off of the side of the box.

# ***super capacity dryers***

Except for the modified designs and features noted below the component access and servicing procedures for super capacity dryers are the same as for the 29-inch large capacity dryers.

Super capacity dryers come with two different types of doors.

- standard hamper type door
- extra-large plug type door

## **LARGE CAPACITY DRUM**

The drum depth, front to back, is increased by two (2) inches. The diameter of the drum is increased except where the belt tracks and baffles are attached.

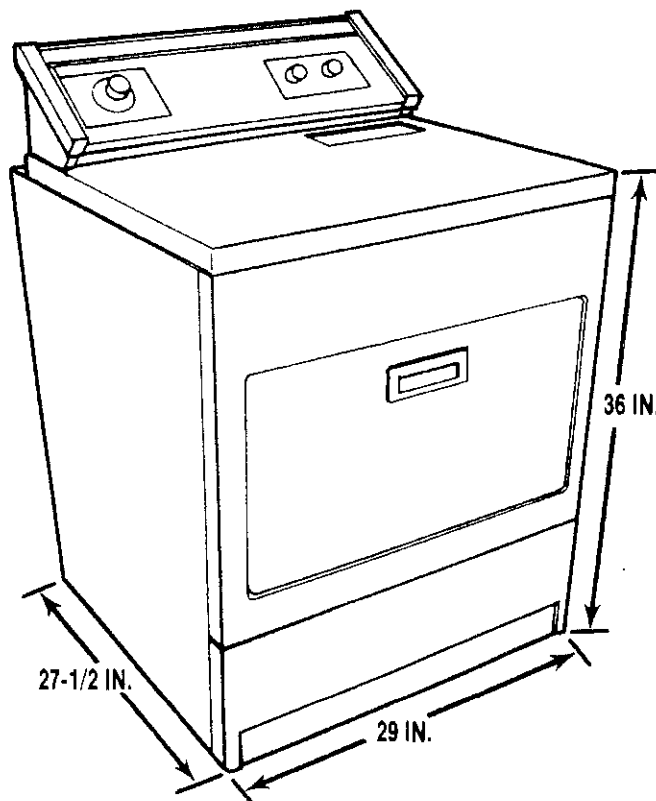
The drum has an increased capacity of approximately one cubic foot.

The drum has modified plastic "variator-type" baffles secured to the drum with screws. Two of the baffles are 4-1/4 inches high, the other is 3 inches high.

## **MODIFIED CABINET DESIGN**

The overall depth of the cabinet is increased two (2) inches, to 27-1/2 inches, front to back, to accept the larger drum.

The 29 inch width, and the 36 inch height, remains the same as large capacity dryers.



### **CABINET FLANGES**

Wherever possible, cabinet flanges on the cabinet are rolled in to eliminate sharp edges.

### **BELT AND MOTOR PULLEY**

The belt width is increased to prevent it from slipping on a smaller pulley (which decreases drum speed to approximately 45 RPMs) and to increase belt life.

### **BULKHEAD**

The bulkhead is modified to accept the larger drum.

### **FRONT DRUM BEARING RING**

The plastic front drum bearing ring is split into two pieces. Plastic locator tabs hold the ring pieces in place, similar to the single-piece ring in the large capacity dryer.

