


# JELENKO COMMODORE™ VPF

# Operating & Maintenance Instructions

# JELENKO COMMODORE™ VACUUM PORCELAIN FURNACE

## SPECIFICATIONS

**Maximum Temperature:** 2200°F (1200°C)

**Overall Dimensions:** 15½" Wide x 15¼" Deep x 21¼" High
(39.4 cm Wide x 38.7 cm Deep x 54.0 cm High)

**Muffle:** Accepts any restoration 3" Diameter x 2¼" High
(7.6 cm Diameter x 5.7 cm High)

**Electrical:** 100V 50/60 Hz - 1400 Watts (PN 311602)
115V 50/60 Hz - 1400 Watts (PN 311600)
230V 50/60 Hz - 1400 Watts (PN 311601)

**Net Weight (Unpackaged):** 48.1 lbs (21.6 Kg)

**Finish:** Black and orange textured enamel over steel

**Supplied Accessories:** Set of three - Single-Point Sagger Trays
Set of two - Crown Sagger Trays
Full Arch Sagger Tray
Calibration Kit (Includes Instrument and Silver Wire)

**WARNING**

The ceramic fiber refractory material used in this product is known to produce cristobalite (crystalline silica) after being in service at temperatures greater than 1600°F (871°C).

In certain cases, such as when servicing the equipment, insulation dust may be produced and may be irritating to the skin, eyes and respiratory tract and may be harmful if inhaled. Prolonged or repeated exposure to ceramic fiber dusts which have been exposed to the temperatures indicated above may cause lung disease (silicosis).

Where insulation dust may be produced, the following work practices are recommended:

- Use local exhaust equipment to keep airborne fiber exposure at the lowest attainable level.
- Use a NIOSH or MSHA approved high-efficiency air-purifying respirator (3M 8710 or equivalent) during installation and removal of insulation that has been exposed to high temperatures and whenever airborne concentrations exceed 2 fibers/cc or 2 mg/m of dust. For airborne concentrations greater than 5 fibers/cc, consult the MSDS on ceramic fibers.
- While handling the above insulation, wear long-sleeve clothing, gloves, hat and eye protection to prevent skin and eye contact. Wash thoroughly after handling.
- Avoid taking unwashed clothes home. Wash work clothes separately from other clothing. Rinse washing machine thoroughly after use.

# MUFFLE CURING

The Muffle in the Commodore™ vacuun porcelain furnace has been designed and constructed of the most modern, lightweight ceramic-fiber materials. As a result of this type of design, the Muffle is highly resistant to the absorption of atmospheric moisture and in most cases does not require an extensive Muffle Curing Procedure.

However, if vacuum loss is observed while operating the furnace after initial installation, or after replacing the Muffle, it is most likely the result of the Muffle Outgassing,* and the Muffle Curing Procedure outlined below should be performed two times.

Using any available Program "A" through "J," program the following firing cycle parameters:

| | |
|---|---|
| LOW TEMP | - 1000°F (538°C) |
| PREHEAT TIME | - 0 MINUTES 10 SECONDS |
| HEAT RATE | - 100°F (56°C)/MINUTE |
| VACUUM LEVEL | - 28 INCHES (71 CENTIMETERS) OF MERCURY |
| HIGH TEMP | - 1800°F (982°C) |
| HOLD TIME | - 20 MINUTES 0 SECONDS |
| COOL TIME | - 0 MINUTES 10 SECONDS |
| EVACUATION TEMP | - 1000°F (538°C) |
| VENT | - 20 MINUTES 0 SECONDS |

*Muffle Outgassing occurs when moisture contained within the muffle insulation, or door platform, is boiled and changed into a gaseous state, usually at Muffle temperatures of 1000°F (538°C) and above.

This gas results in a reduction in the vacuum level within the furnace Vacuum Chamber, thus creating APPARENT vacuum leakage.

# FRONT PANEL CONTROLS

POWER SWITCH (1): Turns the power to the furnace on or off. The indicator lamp above the switch will light when this switch is placed in the ON position.

GRAPHIC DISPLAY (2): A two-section display which indicates the status of the furnace in a programmed firing cycle and, during programming, identifies the selected firing cycle parameter.

The upper section of the display consists of an illustration of a firing cycle with indicator lamps for each of the primary parameters in a firing cycle; whereas the lower section of the display indicates vacuum-related parameters (EVACUATION TEMP, VACUUM, VENT TEMP AND VENT TIME).

While the furnace is in the process of completing each of the primary parameters in a firing cycle, the indicator lamp corresponding to that parameter in the upper section of the display will flash on and off.

In addition, a brief tone response will sound each time a different GRAPHIC DISPLAY indicator lights as the furnace advances through a firing cycle.

DIGITAL DISPLAY (3): A multiple-function display which indicates the actual Muffle temperature, actual vacuum level, remaining preheat or hold time, as well as the values of any of the nine (9) different firing cycle parameters.

PROGRAM SELECTOR KEYBOARD (4): A group of ten keys with indicator lamps, labeled "A" through "J," used to select the desired program.

A brief tone response will be heard when any of the PROGRAM SELECTOR Keys are depressed, and the indicator lamp above that key will light, indicating the program has been selected.

PROGRAM KEY (5): When this key is depressed, the furnace is placed into the "program" mode and will accept firing cycle parameter changes entered through the NUMERIC KEYBOARD. This key must always be depressed when entering or changing parameters in any of the programs, or when reviewing data in any of the programs.

STEP KEY (6): Used in conjunction with the PROGRAM Key during programming, or when reviewing a program, to advance the GRAPHIC DISPLAY to the next parameter in the program. When the last parameter in a program (VENT) has been reached, the display will return to the first parameter (LOW TEMP) when the key is depressed the next time.

Depressing the key once will cause the display to advance one parameter; holding the key depressed will cause the display to advance the parameters automatically, one parameter at a time, until the key is released. This feature allows the user to check all of the parameters of a firing cycle rapidly, or advance several parameters within a program, without having to operate the key many times.

Each time the key is depressed, a brief tone response will be heard. When advancing the parameters automatically, a brief tone response will be heard with each parameter advancement.

Once the desired temperature has been reached, this temperature may be maintained by momentarily depressing the VACUUM OVERRIDE Key. The temperature may be further increased by again momentarily depressing the VACUUM OVERRIDE Key. Any desired temperature may again be maintained by momentarily depressing the VACUUM OVERRIDE Key. This overriding and holding process may be repeated as many times as desired.

If at any time during the vacuum override procedure it is necessary to open the furnace Door, the STOP OVERRIDE Key should be depressed. By using the STOP OVERRIDE Key, it is possible again to use either the Vacuum Override Key of Air Override feature.

Each time the VACUUM OVERRIDE Key is depressed, a brief tone response will be heard, and the indicator lamp above the key will light when the Vacuum Override function is in use.

Note that the indicator lamps above the VACUUM OVERRIDE and AIR OVERRIDE Keys will alternately flash on and off during the override period, indicating that either key is operative during that period.

AIR OVERRIDE KEY (11): Used at the end of the firing cycle to automatically close the furnace Door and raise the Muffle temperature up to an additional 100°F (56°C) higher than the programmed High Temperature, without vacuum. The furnace will maintain the programmed High Temperature for approximately 45 seconds after the Door automatically opens at the end of the firing cycle, at which time this override feature may be used.

To operate, determine if a higher temperature or additional time at the original High Temperature is necessary when the furnace Door opens at the end of the firing cycle. If so, momentarily depress the AIR OVERRIDE Key. The furnace Door will close, and the Muffle temperature, as indicated on the DIGITAL DISPLAY, will increase at the Heat Rate programmed for the firing cycle in use.

Once the desired temperature has been reached, this temperature may be maintained by momentarily depressing the AIR OVERRIDE Key. The temperature may be further increased by again momentarily depressing the AIR OVERRIDE Key. Any desired temperature may again be maintained by momentarily depressing the AIR OVERRIDE Key. This overriding and holding process may be repeated as many times as desired.

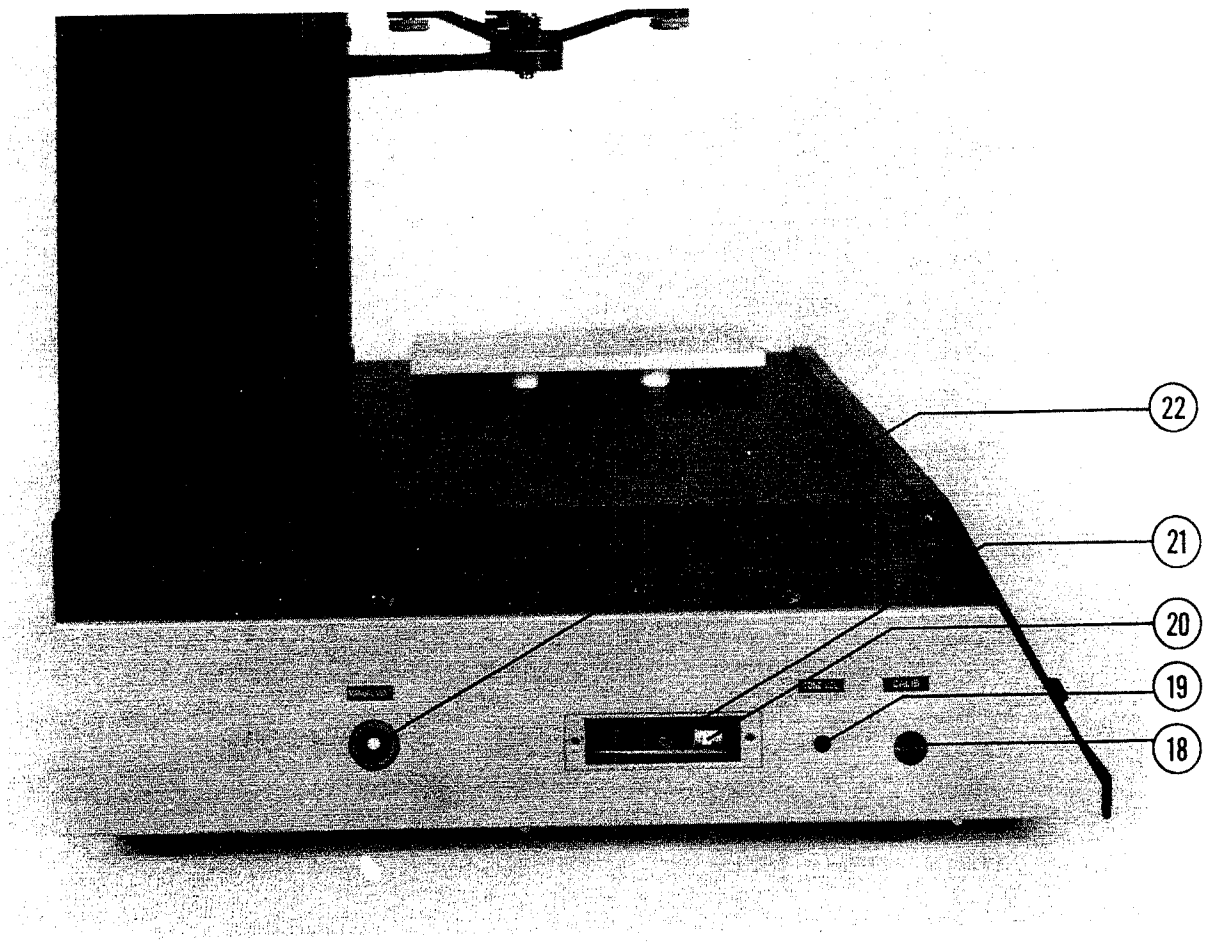
If at any time during the air override procedure it is necessary to open the furnace Door, the STOP OVERRIDE Key should be depressed. By using the STOP OVERRIDE Key, it is possible again to use either the Air Override or Vacuum Override feature.

Each time the AIR OVERRIDE Key is depressed, a brief tone response will be heard, and the indicator lamp above the key will light when the Air Override function is in use.

Note that the indicator lamps above the VACUUM OVERRIDE and AIR OVERRIDE Keys will alternately flash on and off during the override period, indicating that either key is operative during that period.

VIEWING LIGHT KEY (12): Turns the Viewing Lights, which illuminate the work area, on or off. During the opening or closing of the furnace Door, the Viewing Lights will be operated automatically by the furnace controls. The VIEWING LIGHT Key will also serve to override the automatic operation of the Viewing Lights to turn them either on or off.

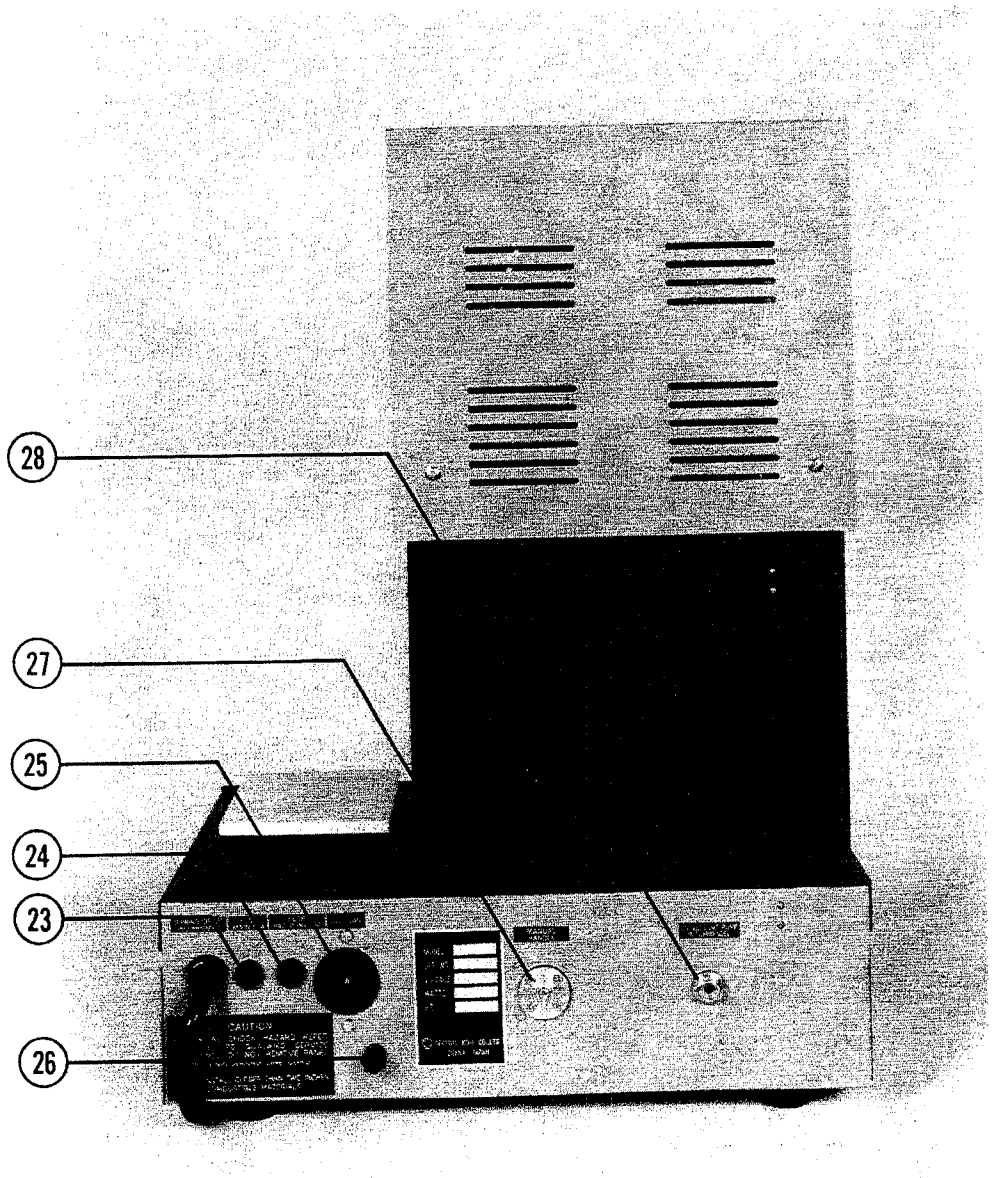
# SIDE CONTROLS




18. CALIBRATION JACK
19. TONE VOLUME ADJUSTMENT
20. °F/°C SELECTOR SWITCH*
21. CALIBRATION RESET BUTTON*
22. MANUAL VACUUM VENT

*These components visible only with access cover removed.

# REAR VIEW




23. MAIN FURNACE FUSE
24. VACUUM PUMP FUSE
25. VACUUM PUMP RECEPTACLE
26. ELECTRICAL GROUND BINDING POST
27. MANUAL DOOR CRANK
28. VACUUM HOSE CONNECTOR

# DESCRIPTION OF FIRING CYCLE PARAMETERS

LOW TEMPERATURE - The temperature at which the furnace Door will begin to close for preheating the restoration. Once the furnace Door has closed completely, the firing cycle will begin at this temperature.

Any Low Temperature between 200°F (100°C) and 2200°F (1200°C) may be programmed into the furnace.

PREHEAT TIME - The length of time, programmable in both minutes and seconds, required for the furnace Door to travel from the initial preheating position to the fully closed position. The furnace Door will not begin to close until the furnace temperature is within approximately 10°F (6°C) of the programmed Low Temperature.

Any Preheat Time from 10 seconds through 99 minutes and 59 seconds may be programmed into the furnace.

HEAT RATE - The rate of temperature rise within the Muffle, starting from the programmed Low Temperature up to the programmed High Temperature, in degrees per minute. The programmed Heat Rate will be maintained linearly throughout the firing cycle by the furnace electronic controls.

Any Heat Rate from 40°F (20°C) per minute through 300°F (165°C) per minute may be programmed into the furnace.

VACUUM LEVEL - The level of vacuum which will be maintained within the furnace Vacuum Chamber throughout the programmed firing cycle.

The furnace has been designed to precisely maintain a programmed vacuum level automatically for the duration of the firing cycle.

Any vacuum level between 6 inches (15 centimeters) and 30 inches (76 centimeters) may be programmed into the furnace. For firing cycles where no vacuum is required, zero is programmed as the desired vacuum level.

HIGH TEMPERATURE - The maximum temperature which will be obtained during a programmed firing cycle. Once the High Temperature has been attained, the furnace will maintain this temperature for the duration of the programmed Hold Time.

Any High Temperature between 200°F (100°C) and 2200°F (1200°C) may be programmed into the furnace.

HOLD TIME - The length of time, programmable in both minutes and seconds, over which the programmed High Temperature will be maintained prior to the furnace Door opening.

At the end of the programmed Hold Time, the furnace Door will automatically open over the programmed Cool Time.

Any Hold Time from 0 seconds through 99 minutes and 59 seconds may be programmed into the furnace.

# UPPER AND LOWER LIMITS FOR NINE FIRING CYCLE PARAMETERS

| PARAMETER NUMBER | PARAMETER | LOWER LIMIT | UPPER LIMIT |
|---|---|---|---|
| 1 | Low Temperature | 200°F (100°C) | 2200°F (1200°C) |
| 2 | Preheat Time | 10 Seconds | 99 Minutes 59 Seconds |
| 3 | Heat Rate | 40°F (20°C)/Minute | 300°F (165°C)/Minute |
| 4 | Vacuum Level | 0 OR 6 Inches (15 Centimeters) | 30 Inches (76 Centimeters) |
| 5 | High Temperature | 200°F (100°C) | 2200°F (1200°C) |
| 6 | Hold Time | 0 Seconds | 99 Minutes 59 Seconds |
| 7 | Cool Time* | "0" THROUGH "9" | |
| 8 | Evacuation Temperature | 200°F (100°C) | 2200°F (1200°C) |
| 9 | Vent | 0 Seconds OR 200°F (100°C) | 99 Minutes 59 Seconds OR 2200°F (1200°C) |

*Refer to the Table of Cool Times outlined under DESCRIPTION OF FIRING CYCLE PARAMETERS on page 15 of this manual.

NOTE: When a Vacuum Level of zero (0) is programmed, the Evacuation Temperature and Vent parameters will be bypassed during programming and while reviewing a program.

## ERROR CODES

The Commodore™ VPF has been designed to provide the operator with a series of Error Codes which indicate the reason for the furnace not accepting an operator entry. The Error Codes provided by the furnace, their causes, and the action required by the user are outlined in this section.

1. "Err 1"

Cause

When changing a parameter while a firing cycle is in progress, the entry does not correspond with the allowable "in-cycle" parameter changes.

Action Required by User

Virtually any parameter change while a firing cycle is in progress is permitted. However, certain changers are not permitted as outlined under "IN-CYCLE PARAMETER CHANGES" on page 22 of this manual.

# PROGRAMMING PROGRAMS "A" THROUGH "J"

The ten programs "A" through "J" on the Commodore™ VPF are fully programmable by the operator, with each program consisting of nine different firing cycle parameters.

Once programmed, each of the ten programs will be retained in the furnace memory for use as needed, even when the furnace POWER SWITCH has been turned OFF or line power to the furnace is disconnected.

Outlined below is the procedure to be used when programming programs "A" through "J." To illustrate this procedure, the following firing cycle parameters will be input to program "A":*

| PARAMETER NAME | PARAMETER VALUE |
|---|---|
| Low Temperature | 1250°F (677°C) |
| Preheat Time | 3 Minutes 45 Seconds |
| Heat Rate | 100°F (56°C)/Minute |
| Vacuum Level | 27 Inches (69 Centimeters)/Mercury |
| High Temperature | 1800°F (982°C) |
| Hold Time | 0 Minutes 30 Seconds |
| Cool Time | 10 Seconds |
| Evacuation Temperature | 1250°F (677°C) |
| Vent | 1750°F (954°C) |

If, when following this procedure, an ERROR CODE appears on the display after depressing the ENTER Key, refer to the description of ERROR CODES outlined on pages 16-17 of this manual for an explanation of the cause.

1. Make certain the Commodore™ furnace has been installed as outlined under "INSTALLATION" on page 3 of this manual and that the POWER SWITCH has been placed in the ON position.

   The indicator lamp above the IDLE Key will light, and the DIGITAL DISPLAY will indicate the actual Muffle temperature.

2. Depress PROGRAM SELECTOR key "A." The indicator lamp above this key will light, indicating program "A" has been selected.

   *NOTE: The procedure outlined in this section uses degrees Fahrenheit for temperature and inches of mercury for vacuum. If the furnace is being used with the °F/°C SELECTOR SWITCH in the °C position, degrees Celsius for temperature and centimeters of mercury for vacuum (numbers in parentheses) should be used.

3. Depress the PROGRAM Key. The indicator lamp above this key will light, indicating the furnace is in the Program mode, and the LOW TEMP indicator lamp on the GRAPHIC DISPLAY will light.

   The Low Temperature presently programmed into the furnace will appear on the DIGITAL DISPLAY.

4. Depress the following numbers on the NUMERIC KEYBOARD:

   1 2 5 0 - to correspond to the desired Low Temperature

   If, while making these entries, an incorrect key is depressed, the display may be cleared by depressing the CLEAR Key.

   Note that the TEMP indicator lamp to the right of the display will flash on and off to indicate that a temperature parameter is being programmed.

   Once the desired Low Temperature appears correctly on the display, depress the ENTER Key. This parameter will be entered, the display will automatically advance to the next parameter, and the PREHEAT TIME indicator lamp on the GRAPHIC DISPLAY will light.

   The Preheat Time presently programmed into the furnace will appear on the DIGITAL DISPLAY.

9. Depress the following numbers on the NUMERIC KEYBOARD:

   0 0 - to correspond to the desired number of minutes to maintain the High Temperature

   AND

   3 0 - to correspond to the desired number of seconds to maintain the High Temperature

   Note that the TIME indicator lamp to the right of the display will flash on and off to indicate that a time parameter is being programmed, and that the minutes and seconds are separated by a decimal point on the display.

   Once the desired Hold Time appears correctly on the display, depress the ENTER Key. This parameter will be entered, the display will automatically advance to the next parameter, and the COOLING indicator lamp on the GRAPHIC DISPLAY will light.

   The code number for the Cool Time presently programmed into the furnace will appear on the DIGITAL DISPLAY.

10. In accordance with the Table of Cool Times outlined on page 15 of this manual, the Code Number which corresponds to the Cool Time used for this exercise is "0."

    Depress "0" on the NUMERIC KEYBOARD.

    Once the Code Number for the desired Cool Time appears correctly on the display, depress the ENTER Key. This parameter will be entered, the display will automatically advance to the next parameter, and the EVACUATION TEMP indicator lamp on the GRAPHIC DISPLAY will light.

    The Evacuation Temperature presently programmed into the furnace will appear on the DIGITAL DISPLAY.

11. Depress the following numbers on the NUMERIC KEYBOARD:

    1 2 5 0 - to correspond to the desired Evacuation Temperature

    Note that the TEMP indicator lamp to the right of the display will flash on and off to indicate that a temperature parameter is being programmed.

    Once the desired Evacuation Temperature appears correctly on the display, depress the ENTER Key. This parameter will be entered, the display will automatically advance to the next parameter, and the first VENT indicator lamp on the GRAPHIC DISPLAY will light.

    The Vent Temperature presently programmed into the furnace will appear on the DIGITAL DISPLAY.

12. The Vent parameter may be expressed as either a temperature or time. If it is desired to vent vacuum at or before the programmed High Temperature (as in this exercise), the desired Vent Temperature would be programmed at this time by depressing the following numbers on the NUMERIC KEYBOARD:

    1 7 5 0 - to correspond to the desired Vent Temperature

# "IN-CYCLE" PARAMETER CHANGES

The Commodore™ VPF has been designed for superior flexibility by permitting the operator to change the firing cycle parameters while a firing cycle is in progress.

Any firing cycle parameter may be changed during a firing cycle, with the following exceptions:

1. The Low Temperature cannot be changed once the furnace has reached the programmed Low Temperature.

2. Once a vacuum has been obtained in the furnace Vacuum Chamber, the Evacuation Temperature cannot be changed.

3. Once a vacuum has been obtained in the furnace Vacuum Chamber, the Vacuum Level cannot be changed.

4. The Vent Temperature cannot be changed once vacuum within the furnace Vacuum Chamber has been vented.

5. The Vent Time cannot be changed once the furnace has reached the programmed High Temperature.

6. During the temperature increase portion of a firing cycle, a High Temperature LOWER than the ACTUAL furnace temperature cannot be entered.

7. Once the furnace has reached the Cooling portion of a firing cycle, the Cool Time cannot be changed.

### OPERATING THE IDLE PROGRAM

Once the Idle Program has been programmed for temperature and vacuum as outlined on previous page, it may be operated in the following manner:

1. With the furnace POWER SWITCH in the ON position, make certain that the PROGRAM Key has not been selected and that the indicator lamp above this key is not lighted.

2. Depress the IDLE Key. The indicator lamp above this key will light to indicate that the Idle Program has been selected.

3. Depress the START/STOP Key. The indicator lamp above this key will light to indicate that the Idle Program is in operation, the furnace Door will begin to close, and the DIGITAL DISPLAY will indicate the actual Muffle temperature.

4. If vacuum has been programmed for the Idle Program, the vacuum pump will turn on as soon as the furnace Door closes completely. The vacuum pump will operate until the programmed vacuum level is achieved and then automatically turn off. If a vacuum level greater than 27 inches (69 centimeters) of mercury is programmed, but this programmed vacuum level is not achieved, the vacuum pump will operate for one minute after achieving 27 inches (69 centimeters) of mercury. Once the vacuum pump has turned off, the pump will not turn on again should the vacuum level within the Vacuum Chamber drop below the programmed value.

5. To stop the Idle Program, depress the START/STOP Key. The indicator lamp above this key will turn off, vacuum within the furnace Vacuum Chamber will be vented (if vacuum is programmed), and the furnace Door will automatically open.

## OPERATING THE NIGHT PROGRAM

The Night Program is a fixed program which will maintain the furnace at a temperature of 590°F (310°C) with vacuum.

The Night Program may be operated in the following manner:

1. With the furnace POWER SWITCH in the ON position, make certain that the PROGRAM Key has not been selected and that the indicator lamp above this key is not lighted.

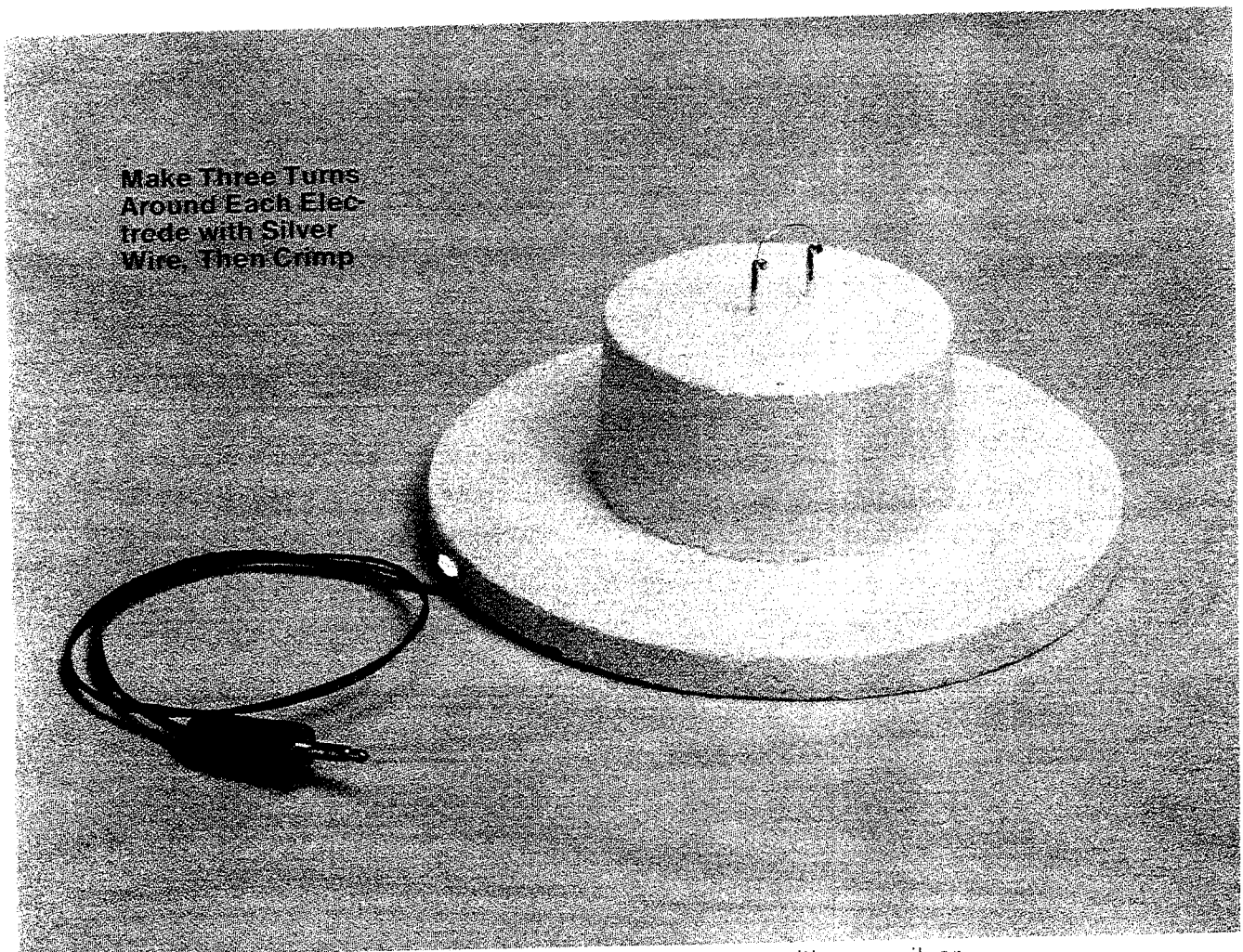
2. Depress the NIGHT Key. The indicator lamp above this key will light to indicate that the Night Program has been selected.

3. Depress the START/STOP Key. The indicator lamp above this key will light to indicate that the Night Program is in operation, the furnace Door will begin to close, and the DIGITAL DISPLAY will indicate the actual Muffle temperature.

4. Once the furnace Door closes completely, the vacuum pump will turn on and operate for one minute and then automatically turn off. Once the vacuum pump has turned off, the pump will not turn on again, even in the event the vacuum level within the Vacuum Chamber drops.

5. To stop the Night Program, depress the START/STOP Key. The indicator lamp above this key will turn off, vacuum within the furnace Vacuum Chamber will be vented, and the furnace Door will automatically open.

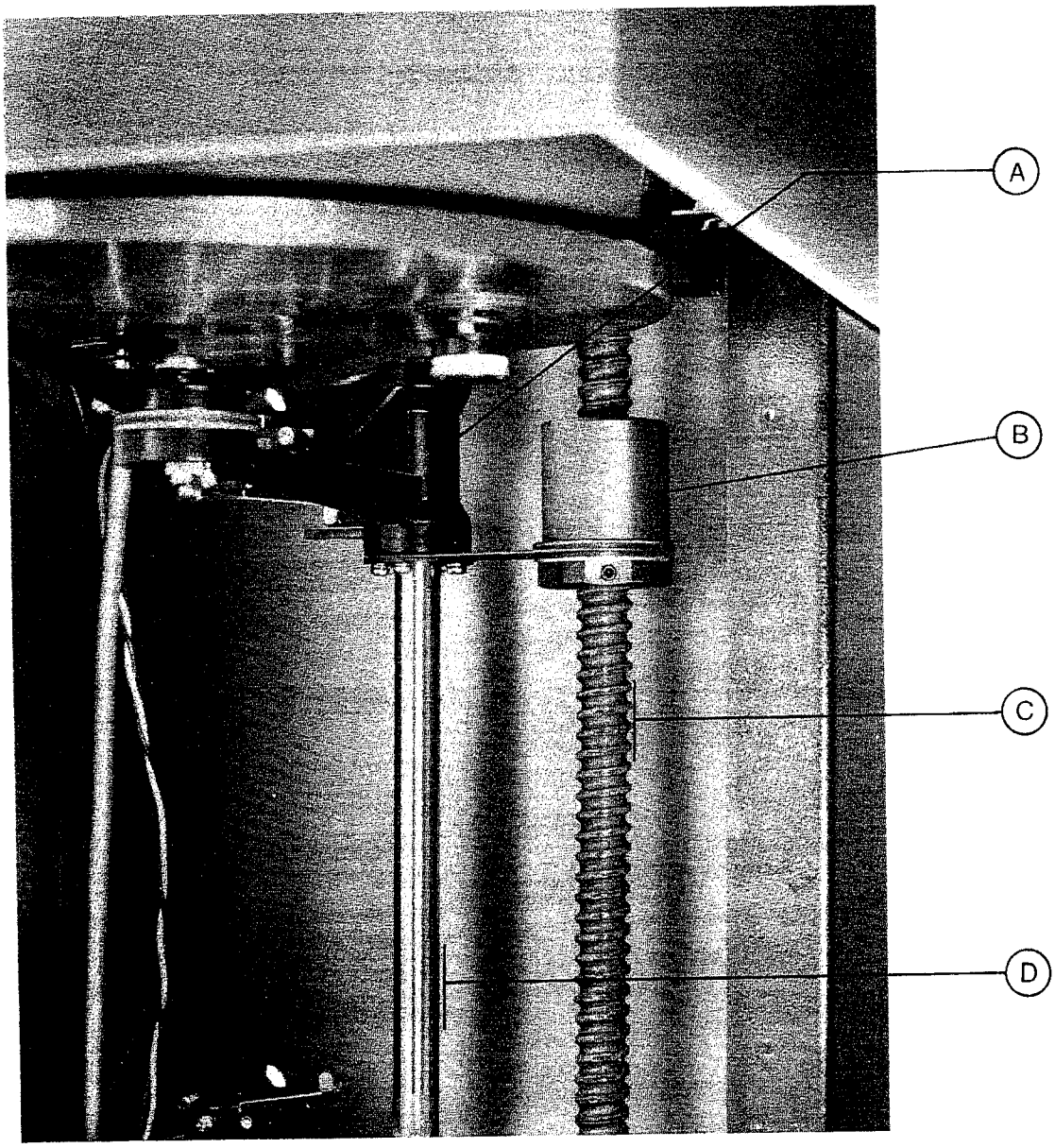
# CALIBRATING INSTRUMENT PREPARATION




Bridge the electrodes of the Calibrating Instrument, as shown, with pure silver wire. The wire should be wrapped around electrode three times, leaving a small loop of wire between the electrodes.

It is important NOT to stretch the wire between the two electrodes.

# COMMODORE™ VPF DOOR LIFT MECHANISM (COVER PLATES REMOVED)




A. DOOR LIFT ARM
B. DRIVE MECHANISM
C. DRIVE SHAFT
D. ARM SHAFT

"AL-4"

This Alarm Code will appear for several reasons related to the vacuum function of the furnace. When this Alarm Code appears, a warning tone* will sound, and if there is no vacuum present within the furnace Vacuum Chamber, the furnace Door will automatically open.

The causes for this Alarm Code and the corrective action required are outlined below.

1. When a program using vacuum has started and no vacuum is achieved, this display will appear approximately ten seconds after the furnace Door closes. Possible causes are:
   a. Vacuum pump not plugged into the Vacuum Pump Receptacle at the rear of the furnace.
   b. Vacuum pump hose not connected to the Vacuum Hose Connector at the rear of the furnace.
   c. Defective Vacuum Pump.
   d. Defective Relay Circuit Board.
   e. Defective Control Circuit Board.

2. When a program using vacuum has been started and vacuum is achieved, but the programmed Vacuum Level or 27 inches (69 centimeters) of mercury is not attained within approximately one minute after the furnace Door closes, the possible causes are:
   a. Vacuum pump being used is not capable of producing sufficient vacuum.
   b. Furnace has a rapid vacuum leak.
   c. Defective Control Circuit Board.

3. During a program using vacuum, the vacuum venting point is reached, but vacuum is not vented within approximately 25 seconds. Possible causes for this malfunction are:
   a. Defective Vacuum Vent Valve.
   b. Defective Control Circuit Board.

"AL-5"

This Alarm Code will appear and a warning tone* will sound if, during the furnace calibration procedure, the melting of the pure silver wire on the Calibration Instrument occurs before 1580°F (860°C) or after 1940°F (1060°C). This could occur for one of the following reasons:

1. The silver wire has not been wrapped tightly around the electrodes of the Calibration Instrument.
2. The electrodes of the Calibration Instrument are covered with oxide and need to be scraped clean prior to use.
3. The Calibration Instrument is defective.
4. The furnace calibration must be reset. Depress the CALIBRATION RESET BUTTON and turn the POWER SWITCH on while holding the button depressed.**
5. Defective Control Circuit Board.

"AL-6"

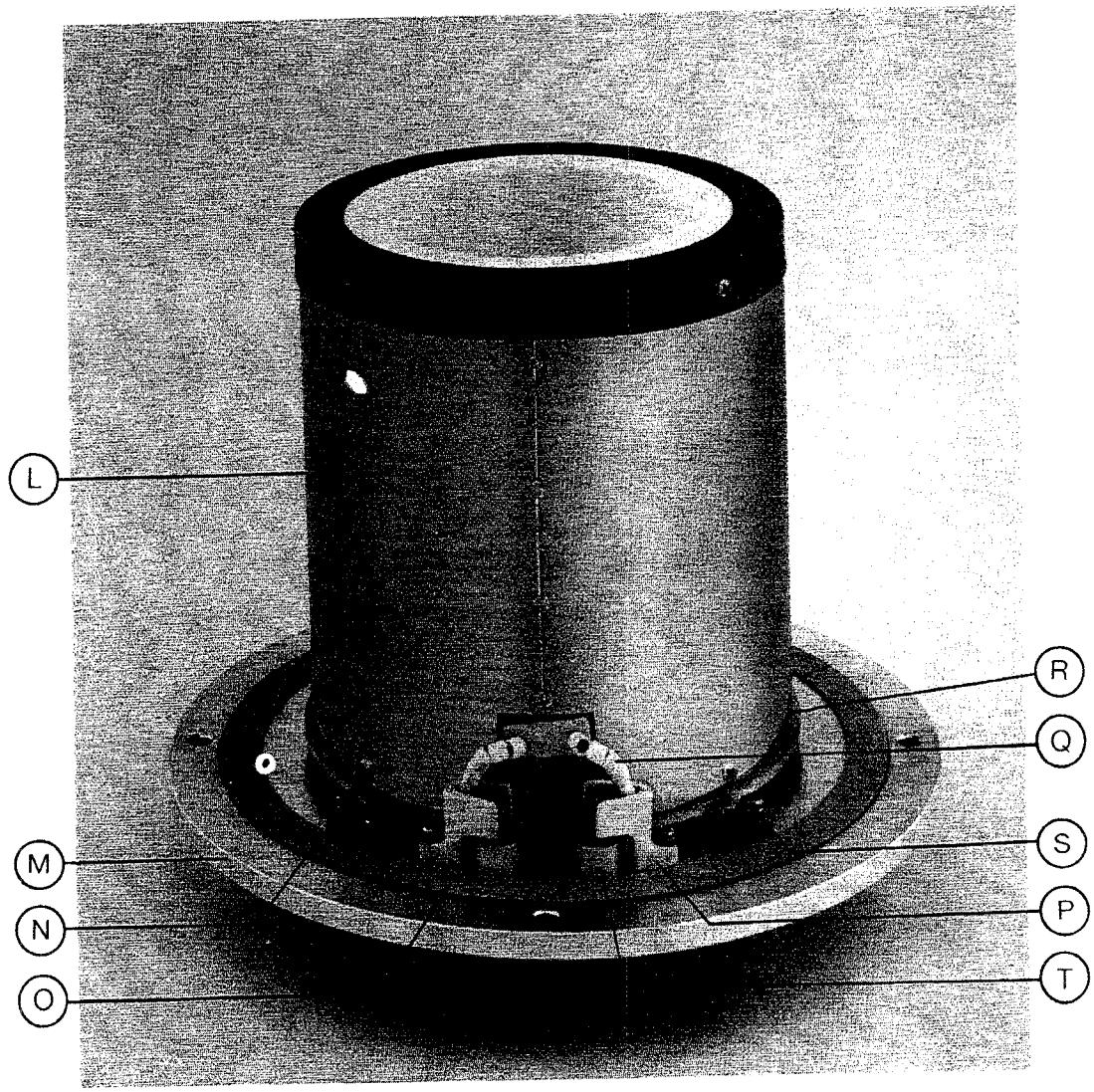
In the event the furnace Thermocouple fails, this Alarm Code will appear, and a warning tone* will sound; vacuum within the furnace Vacuum Chamber will be vented, and the Door will automatically open.

When this Alarm Code appears, the Thermocouple is most likely defective and should be replaced. However, this Alarm Code may also appear as a result of a Control Circuit Board defect.

*When the warning tone sounds, the CLEAR Key must be depressed to silence the ALARM.

**If the CALIBRATION RESET BUTTON is depressed, the furnace must be recalibrated prior to use.

# COMMODORE™ MUFFLE
# (SHOWN MOUNTED ON TOP PLATE)




L. MUFFLE
M. TOP PLATE
N. MUFFLE MOUNTING SCREW (1 of 4)
O. TOP GASKET
P. MUFFLE POWER TERMINAL INSULATOR (1 of 2)
Q. MUFFLE POWER LEADS
R. MUFFLE BASE
S. MUFFLE BASE MOUNTING SCREW (1 of 4)
T. MUFFLE POWER TERMINAL (1 of 2)

## REPLACEMENT OF THE MUFFLE VIEWING WINDOW

1. Press the furnace POWER SWITCH to the OFF position.
2. Unplug the Power Cord from your electrical outlet.
3. With the rear of the furnace facing you, loosen and remove the two screws located at the rear of the orange Upper Housing Cover. Also loosen and remove each screw on either side of the Upper Housing Cover.
4. With the front of the furnace facing you, lift the orange Upper Housing Cover off the furnace.
5. Loosen and remove the four screws which secure the Muffle Viewing Window retaining ring to the ring flange. Remove the retaining ring.
6. Reverse this procedure to install the replacement window, making certain that a vacuum seal '0' ring is placed on either side of the window as originally positioned. When tightening the retaining ring screws, make sure they are tightened completely and uniformly.

## REPLACEMENT OF THE VIEWING LAMPS

1. Press the furnace POWER SWITCH to the OFF position.
2. Unplug the Power Cord from your electrical outlet.
3. With the rear of the furnace facing you, loosen and remove the two screws located at the rear of the orange Upper Housing Cover. Also loosen and remove each screw on either side of the Upper Housing Cover.
4. With the front of the furnace facing you, lift the orange Upper Housing Cover off the furnace.
5. Remove the defective Viewing Lamp(s) by pressing the Lamp inward and turning slightly counter-clockwise.
6. Reverse this procedure to install the replacement Viewing Lamp(s).

**IMPORTANT:** The Viewing Lamps in this furnace are powered by a special power supply circuit designed to eliminate lamp flickering. To prevent possible damage to this circuit, always use genuine Jelenko replacement lamps.

## REPLACEMENT OF THE POWER SUPPLY CIRCUIT BOARD

1. With the furnace POWER SWITCH in the ON position, depress the DOOR UP Key and allow the furnace Door to close completely.
2. Press the furnace POWER SWITCH to the OFF position.
3. Unplug the Power Cord from your electrical outlet.
4. With the front of the furnace facing you, loosen and remove the six screws which secure the two covers located on either side of the Door Lift Arm. Remove these two covers.
5. Loosen and remove the two screws located on top of the Lower Housing Cover, at the rear of the furnace.
6. While facing each side of the furnace, loosen and remove the three screws located along the edge of the Lower Housing Cover. Note that one screw is located near the furnace control panel; while the remaining two screws are located within the recessed portion on the side of the furnace.
7. Raise the rear portion of the Lower Housing Cover slightly and then lift the entire Lower Housing Cover upward and off the furnace.
8. Unplug, from the Power Supply Circuit Board, the two cable connectors located at either end of the circuit board. These connectors are removed by pulling directly upward on the connector.
9. The Power Supply Circuit Board is held in place by four plastic standoffs with tabs. To release the circuit board from the standoff, use pliers to squeeze the two tabs together while pulling directly upward on the circuit board. The circuit board must be removed from each standoff, one at a time, until all four are disengaged.
10. Reverse this procedure to install the replacement Power Supply Circuit Board.
11. Recalibrate the furnace after replacing the Power Supply Circuit Board, as outlined under "CALIBRATION" on page 25 of this manual.

## REPLACEMENT OF THE RELAY CIRCUIT BOARD

1. With the furnace POWER SWITCH in the ON position, depress the DOOR UP key and allow the furnace Door to close completely.
2. Press the furnace POWER SWITCH to the OFF position.
3. Unplug the Power Cord from your electrical outlet.
4. With the front of the furnace facing you, loosen and remove the six screws which secure the two covers located on either side of the Door Lift Arm. Remove these two covers.
5. Loosen and remove the two screws located on top of the Lower Housing Cover, at the rear of the furnace.
6. While facing each side of the furnace, loosen and remove the three screws located along the edge of the Lower Housing Cover. Note that one screw is located near the furnace control panel; while the remaining two screws are located within the recessed portion on the side of the furnace.
7. Raise the rear portion of the Lower Housing Cover slightly and then lift the entire Lower Housing Cover upward and off the furnace.
8. Note the position and color-coding of the wires connected to four terminals of the large Terminal Strip on the Relay Circuit Board. Disconnect these four wires.
9. Note the position and color-coding of the wires connected to the two remaining terminals on the Relay Circuit Board. Disconnect these two wires.

# REPLACEMENT OF THE CONTROL CIRCUIT BOARD

1. With the furnace POWER SWITCH in the ON position, depress the DOOR UP Key and allow the furnace Door to close completely.

2. Press the furnace POWER SWITCH to the OFF position.

3. Unplug the Power Cord from your electrical outlet.

4. With the front of the furnace facing you, loosen and remove the six screws which secure the two covers located on either side of the Door Lift Arm. Remove these two covers.

5. Loosen and remove the two screws located on top of the Lower Housing Cover, at the rear of the furnace.

6. While facing each side of the furnace, loosen and remove the three screws located along the edge of the Lower Housing Cover. Note that one screw is located near the furnace control panel; while the remaining two screws are located within the recessed portion on the side of the furnace.

7. Raise the rear portion of the Lower Housing Cover slightly and then lift the entire Lower Housing Cover upward and off the furnace.

8. Loosen and remove the two screws which secure the front control panel to the furnace. These screws are located on the bottom of the furnace, along the front edge.

9. Unplug, from the Control Circuit Board, the connector for the flat cable which interconnects the Control Circuit Board and the Front Circuit Board. This connector is released by pressing the tabs located at both ends of the connector away from the connector.

10. Once the flat cable has been disconnected, lift the front control panel upward and off the furnace. Position the front control panel faced downward in front of the furnace.

11. Note the position of the two cable connectors located at either end of the Power Supply Circuit Board and unplug these connectors from the board. These connectors are removed by pulling directly upward on the connector.

12. The Power Supply Circuit Board is held in place by four plastic standoffs with tabs. To release the circuit board from the standoffs, use pliers to squeeze the two tabs together while pulling directly upward on the circuit board. The circuit board must be removed from each standoff, one at a time, until all four are disengaged.

    Once the Power Supply Circuit Board has been released from the standoffs, lift the board out of the furnace.

13. Locate and disconnect the two Thermocouple Wires which are connected to the terminals at the rear of the Control Circuit Board. Before removing these wires, note the color-coding on each so that they may be reconnected in the same manner.

14. Locate and disconnect the vacuum tubing connected to the Vacuum Transducer at the rear of the Control Circuit Board. Note that the tubing is secured to the vacuum transducer with a small spring clamp, which must first be slid back along the tubing before the tubing can be disconnected.

15. Unplug, from the Control Circuit Board, the cable connector located at the rear of the circuit board. This connector is released by squeezing the tabs located at both ends of the connector together and pulling directly upward on the connector.

16. The Control Circuit Board is held in place by six plastic standoffs with tabs. To release the circuit board from the standoffs, use pliers to squeeze the two tabs together while pulling directly upward on the circuit board. The circuit board must be removed from each standoff, one at a time, until all six are disengaged.

# COMMODORE™ RENEWAL PARTS LIST

| Product Number | Part Description |
|---|---|
| 311105 | Power Switch |
| 311106 | Vacuum Pump Receptacle - 100/115V |
| 311107 | Vacuum Pump Receptacle - 230V |
| 311108 | Viewing Lamp (1) |
| 311109 | Viewing Lamp Fuse (Pkg of 5) |
| 311110 | Noise Filter |
| 476000 | Solid-State Relay |
| 311610 | Relay Circuit Board |
| 311112 | Power Transformer - 100/115V |
| 311113 | Power Transformer - 230V |
| 335514 | Power Supply Circuit Board |
| 311611 | Control Circuit Board - 115V |
| 311612 | Control Circuit Board - 230V |
| 311613 | Front Circuit Board |
| 311119 | Door Up/Down Limit Switch |
| 311120 | Over-Temperature Fuse |
| 311121 | Thermocouple Assembly |
| 311123 | Door Brick Platform |
| 311124 | Calibration Kit |
| 311126 | Muffle - 115V |
| 311127 | Muffle - 230V |
| 311128 | Upper Housing View Glass |
| 311129 | Door Drive Belt — 11.50 |
| 311614 | Vacuum Valve Assembly |
| 311615 | Door Drive Motor |
| 311132 | Muffle Power Terminal Insulator |
| 311133 | Muffle Power Terminal Replacement Kit |
| 311134 | Door Seal Gasket |
| 311135 | Top Gasket |
| 311136 | Viewing Window '0' Ring |
| 311137 | Muffle Viewing Window |
| 311138 | Door Leg Spring |
| 311139 | Door Leg Pin |
| 311140 | Manual Door Crank Handle |
| 311141 | Elevator Door |
| 311142 | Fuseholder |
| 437096 | 15A Furnace Fuse (Pkg of 5) |
| 429213 | 10A Pump Fuse (Pkg of 5) |
| 311143 | Main Power Relay |
| 311144 | Thermocouple Nut |
| 311145 | Thermocouple Fitting |
| 311146 | Thermocouple '0' Ring |
| 311616 | Cooling Tray |
| 311153 | Door Grease (15 gr) |
| 311154 | Door Center Pin |
| 311155 | Door Center Spring |