

# HYFRECATOR PLUS

## *Table of Contents*

Section	Title	Page
1	Symbols . . . . .	.1
2	Foreword . . . . .	.1
3	General Information . . . . .	.1
4	Operating Controls and Indicators . . . . .	.2
5	Theory of Operation . . . . .	.5
6	Circuit Description . . . . .	.5
7	Service Information . . . . .	.7
8	Suggestions for First Time Operation . . . . .	.8
9	Removal and Replacement Procedures . . . . .	.8
10	Safety and Performance Checks . . . . .	.8
11	Problem Solving . . . . .	.10
12	Calibration . . . . .	.11
13	Maintenance . . . . .	.12
14	Warranty . . . . .	.13
15	Repair Return Policy . . . . .	.13
16	Specifications . . . . .	.14
17	Figures and Schematics . . . . .	.15

Figure	Title	Page
1	Front, Side and Bottom Panel Controls . . . . .	.3
2	Back Panel Controls . . . . .	.4
3	Block Diagram . . . . .	.15
4	Power Output-Voltage, Low & Bipolar . . . . .	.16
5	Power Output-Voltage, High . . . . .	.17
6	Output Power vs. Display Setting; Bipolar, 500 Ohm Load . . . . .	.18
7	Output Power vs. Display Setting; High, 500 Ohm Load . . . . .	.19
8	Output Power vs. Display Setting; Low, 500 Ohm Load . . . . .	.20
9	High Load Curve . . . . .	.21
10	Low Load Curve . . . . .	.22
11	Bipolar Load Curve . . . . .	.23
12	Mother PWB Detail & Schematic, sheet 1 . . . . .	.24
13	Mother PWB Parts List & Schematic, sheet 2 . . . . .	.25
14	Display PWB Schematic . . . . .	.26
15	Display PWB Detail and Display/Main Housing Parts List . . . . .	.27





HYFRECATOR PLUS

HYFRECATOR PLUS

This page intentionally left blank.



## Section 1 - Symbols



**CAUTION:** To reduce the risk of an electric shock, do not remove the back cover of the instrument. To retain memory of the previously used power setting, 115, 215, 230 or 245 VAC line power is supplied to the instrument while it is plugged into a hospital grade wall receptacle.

**CAUTION:** The Hyfrecator Plus 7-797-J is wired for 100 VAC line power and does not include the memory feature. There is no VAC line power supplied to the instrument when the ON/OFF switch is in the OFF position.



**CAUTION:** Site is a source of high voltage.



**CAUTION:** Before using instrument, read operating manual. The green, green/yellow wire of the line, which is inside the unit, is connected to the transformer housing and patient return to reduce the hazard of electric shock. Grounding of the equipment is achieved by connecting the line to a three conductor grounded hospital grade wall receptacle.



Equipment is classified as Type BF; it has an internal electrical power source that provides an adequate degree of protection against electric shock, particularly in regard to the allowable leakage current and the reliability of the Protective Earth connection. The unit is also protected against the effects of the discharge of cardiac defibrillation.

## Section 2 - Foreword

This easy-to-follow manual is designed to assist you in the servicing of the CONMED Model 7-797 HYFRECATOR PLUS®. For basic information on how to operate or care for your unit, please refer to the operating manual that was included with the unit at the time of purchase. If you have questions, or would like personal assistance regarding how to service the unit, please call CONMED Corporation Customer Service at (800) 448-6506.

## Section 3 - General Information

The HYFRECATOR was introduced in 1937 and has since become the world leader in office-based electro-surgery. With the latest model, the HYFRECATOR PLUS® 7-797, CONMED has refined the concept and utilized today's technology to produce the finest machine of its kind.

Safe and simple to use, the HYFRECATOR PLUS® has a wide range of applications - from dermatology and gynecology to ophthalmology and urology. The sophisticated electronic circuitry of the HYFRECATOR PLUS® provides a near linear power output. Whether it's full power for broad surface coagulation, or low output for delicate facial procedures, the HYFRECATOR PLUS® provides the precision you demand. Compatible with existing HYFRECATOR accessories, such as bipolar forceps and reusable electrodes, the HYFRECATOR PLUS® features an ergonomic design and contemporary style that complements modern office decor.



## Section 4 - Operating Controls and Indicators

### Front, Side and Bottom Panel Controls

1. **ON/STANDBY OFF SWITCH\***  
Turns unit on or off. In the off mode, standby allows the unit to automatically “power up” to the setting last used.
2. **POWER ACTIVATION BUTTON**  
When pressed, high frequency energy is emitted from the electrode. Additionally, an audible tone is generated and the active “on” indicator illuminates.
3. **POWER UP/DOWN SWITCHING HANDLE AND CORD\*\***  
Remove or insert the power handle in the indicated direction.
4. **POWER OUTPUT INDICATOR**  
Displays the actual power being delivered. Power selection ranges from zero to 30 watts in high and bipolar outputs and zero to 15 watts in low output. In the low output, deliveries less than five watts are displayed in two tenth increments.
5. **ACTIVE “ON” INDICATOR**  
Illuminates when the power activation button is pressed.
6. **POWER UP BUTTONS**  
Increases power either incrementally or rapidly. Each “click” advances the power by one watt or by two-tenths of a watt when less than five watts in the low output. Holding the button down rapidly advances the output.
7. **POWER DOWN BUTTONS**  
Decreases power either incrementally or rapidly. Each “click” decreases the power by one watt or by two-tenths of a watt when less than five watts in the low output. Holding down the button rapidly decreases the output.
8. **HIGH OUTPUT TERMINAL**  
Insert the power up/down switching handle and cord single pin into this outlet for heavy desiccation and fulguration procedures requiring high intensity. Provides between zero and 30 watts with high voltage. Power settings in High are changed when power is changed in the Bipolar mode.
9. **LOW OUTPUT TERMINAL**  
Insert the power up/down switching handle and cord single pin into this outlet for light desiccation and fulguration procedures requiring low intensity. Provides between zero and 15 watts with a voltage lower than the high output terminal.
10. **BIPOLAR OUTPUT TERMINAL**  
For coagulation procedures using either a dispersive patient plate or forceps. When using the dispersive plate, the plate plugs into either bipolar outlet and the handle plugs into the remaining outlet. When using forceps, the forceps plug into both bipolar outlets (a footswitch is required when forceps are utilized). Bipolar provides between zero and 30 watts with a voltage lower than the high or low output terminals. Bipolar power tracks with power changes made with “High” selected.
11. **SWITCHING CONNECTOR**  
The power up/down switching handle and cord socket plugs into this connector. Be sure to align the connector pins before inserting. NOTE: The optional foot switch plugs into this same connector.
12. **TERMINAL SELECTOR SWITCH**  
Selects the desired output terminal. Output displayed will be the last setting used (0-15 watts in low power, 0-30 watts in high and bipolar).

\*The 100V HYFREACATOR PLUS®, 7-707-J, does not include the standby feature.

\*\*The 240V HYFREACATOR PLUS® 7-797-B, contains a non-switching handle and a footswitch.



Figure 1 - Front, Side and Bottom Panel Controls

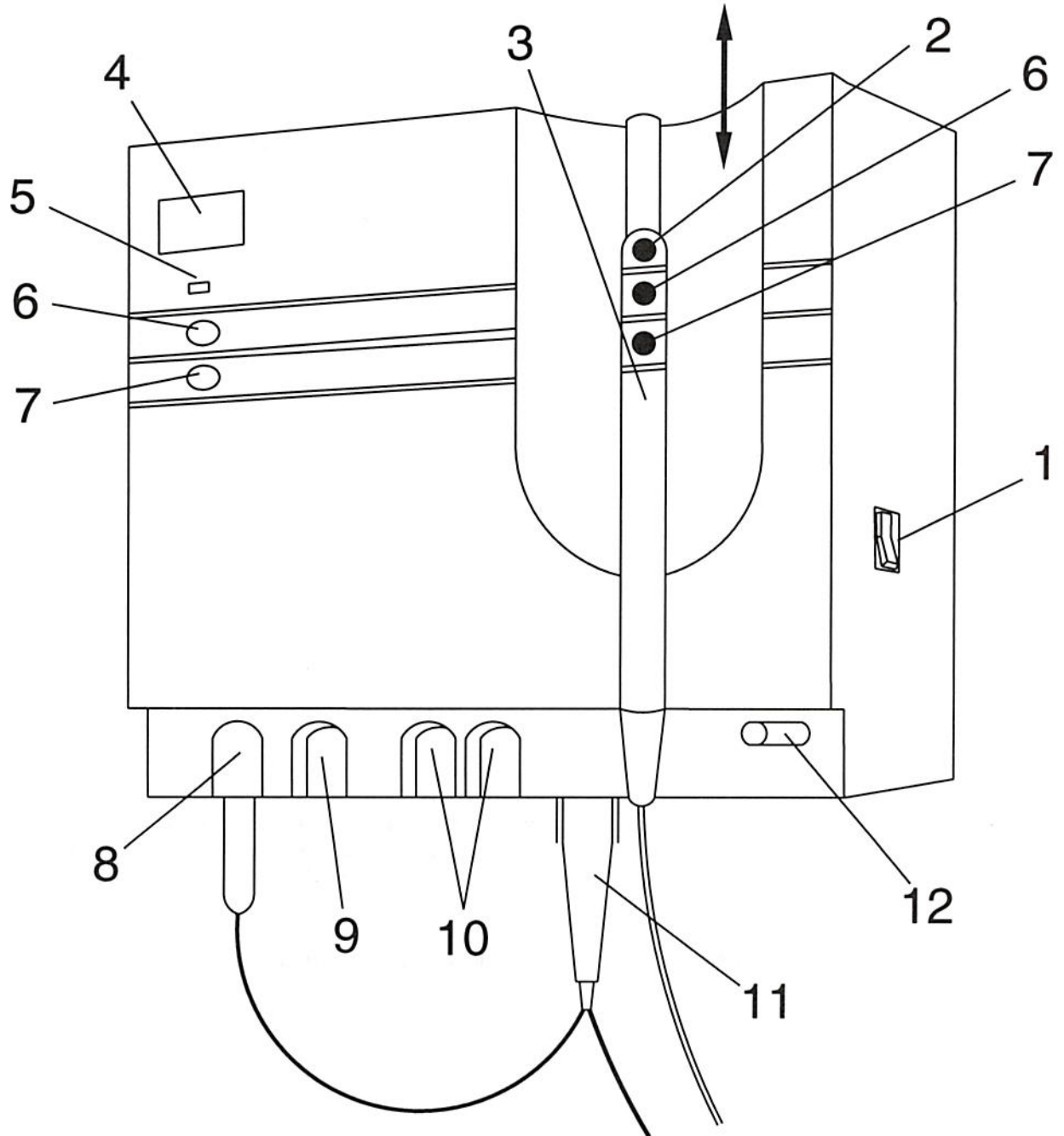
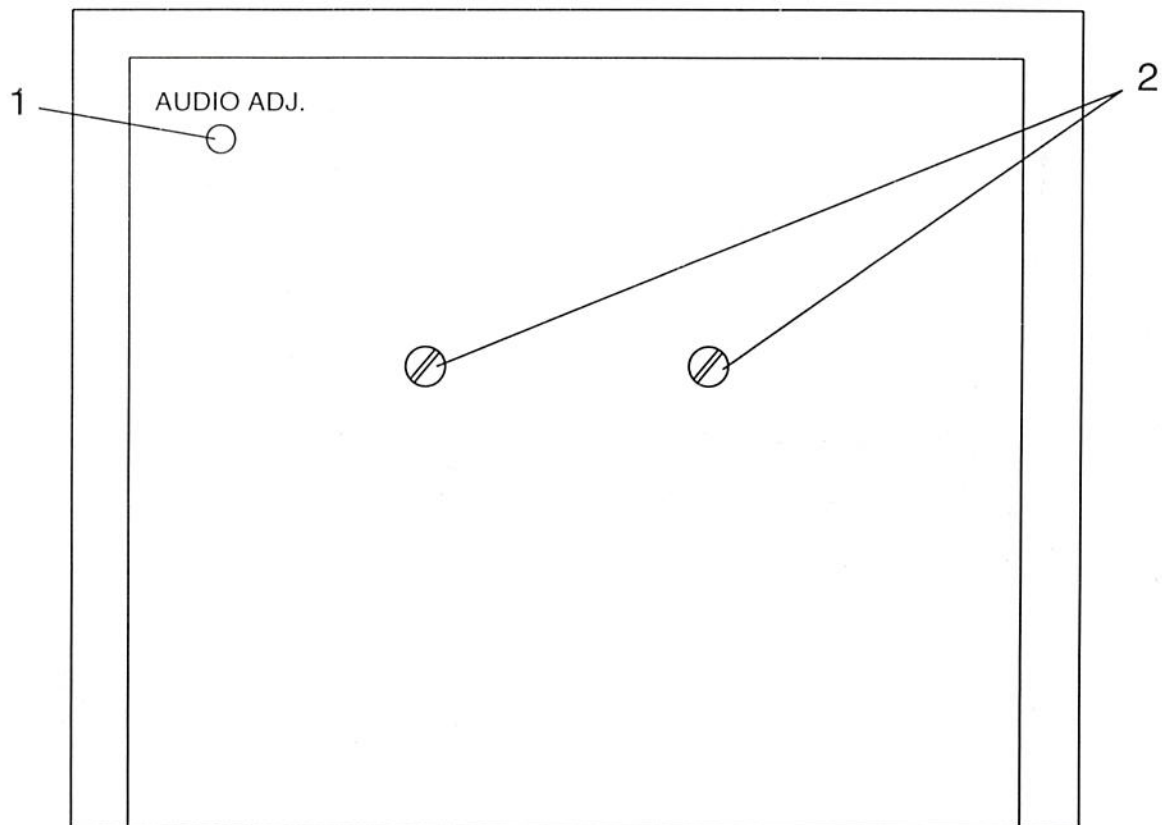


Figure 2 - Back Panel Controls



1. VOLUME CONTROL

Adjusts volume of the audible tone generated when the power activation button is pressed. To increase volume, insert a screwdriver and rotate clockwise until resistance is felt. Do not force adjustment past the resistance point. For safety reasons, the tone cannot be completely turned off.

2. WALL MOUNTING STUDS

Used with standard wall mounting kit (see the kit for instructions). Instrument may also be mounted on optional mobile pedestal stand (product number 7-796-1).



## Section 5 - Theory Of Operation

All of the circuitry for the CONMED HYFRECATOR PLUS® is contained on two printed circuit boards. Board number 30-0164 contains microcontroller U56, DAC U57, 7-segment LED Display Decoder/Driver U59, 8 Bit Latch U58, DC Amplifier U52 and U53, 2MHz Amplifier U60 and gates U54 and U55. Board number 30-0165 contains the SCR Q1 and Photo-Triac A1 unregulated 55 DC volts, 15 DC Volts Regulator VR1, 5 DC Volts Regulator VR2, minus 5 DC Volts Regulator VR3, Dual D Flip-Flop U1, Comparator U2, Drivers Q3, Q4 and Q5, Power Fets Q6, Q7 and the control circuit.

### Circuit Function

The microcontroller U56 with its built in oscillator controls all the timing for the HYFRECATOR. The 2MHz frequency via amplifier U60 drives the counter producing 31,250 pulses per second at TP57, enabling U2 to turn on and off. Drivers Q3, Q4 and Q5 are turned on and off for a period of 0.2-6 micro seconds, which is determined by the Up/Down switches on the front panel or on the Switching Handle.

During the "ON" time, the drain of Q3 and Q5 are high, and Q4, Q6 and Q7 are switched on. Current through the output transformer primary increases linearly by  $I = ET/L$ . When Q6 and Q7 are switched off, the energy in T2 primary resonates with C21 producing a damped sine wave in the secondaries.

## Section 6 - Circuit Description

### Power Supply

**CAUTION:** The 115, 215, 230, or 245 volt AC mains is never turned off in this instrument. The power switch is in the low voltage power supply. A constant 5 volts is supplied to U56 to retain memory. (Units wired for 100 volts AC mains do not have memory, the power switch controls the 100 VAC mains.)

The power supply delivers three regulated voltages, -5, +5 and +15, and one unregulated high voltage, 55, at TP5. These voltages are generated from two secondary windings on transformer T1. Full wave bridges BR1 and BR2 supply the plus voltages. Doubler diodes CR1 and CR2 supply the voltage for the -5 volts.

### Microcontroller

Eprom-Based 8-bit Microcontroller, U56, with its built in oscillator controls the base frequency for timing. The oscillator with its ceramic resonator Y51 operates at 2MHz.

The microcontroller U56 has two controlled set levels. These levels can be referred to as the 15 watt low output and the 30 watt high or bipolar output. The last setting of these two levels is independently remembered and controlled by the microcontroller. When I/O port pin 18 is held low, the microcontroller counts Up. When I/O port pin 17 is held low the microcontroller counts Down.

In the 15 watt low terminal, the scale changes in increments of .2 from 0-5 and in increments of 1 from 5-15. In the 30 watt high or bipolar terminal, the scale changes in increments of 1 from 0-30.

The microcontroller U56 generates the two levels, data, clock and strobe signals necessary to operate a 8 stage shift/store register U58 and a 7-segment decoder driver U59.

One I/O port pin 2 held low disables all input I/O ports during activation of the output power.



### Reference Voltage

The reference voltage is a digital signal from the microcontroller U56 driving U58 8-stage shift register. The digital signal drives U57 Digital Analog Converter and U53 amplifier to generate the DC reference voltage of 2.50 for full scale. The voltage is controlled by the switches at the I/O ports Up/Down of the microcontroller.

### LED Display

The two seven segment light-emitting displays are driven digitally from the data U59, 7-segment decoder driver.

### Control Circuit

When pin 3 of J2 is at ground, or a low, current flows through R6, photo triac diode A1, illuminating LED DS51. This turns on the photo triac A1 turning on Q1, supplying the high voltage. A low at U51 12-bit binary counter enables the device, and pulses are generated for sound and the repetition rate. The repetition rate pulses of 31,250 Hz trigger U1 D Flip-Flop to generate a positive pulse at pin 12 and a negative pulse at pin 13 approximately 1.75 microseconds in width.

A low at U54 pins 8 and 9 produces a low at U54 pin 10 and U56 microcontroller pin 2. This low disables the microcontroller U56 for the period the unit is delivering power and 30 milliseconds after U51 binary counter is reset.

A low at U55 pin 2 gates a 2000 Hz signal for the audio tone.

If pin 3 of J2 is low and a up or down switch is activated, U55 pins 12 and 13 will gate a 1000 Hz audio tone superimposed on the 2000 Hz. This represents a different tone than the activation switch for power output.

### Comparator

The pulse width to control output power is generated by the comparator U2. U2 is gated on and off at a repetition rate of 31,250 Hz. This repetition rate of 32 microseconds is generated by the 12 bit binary counter U51. Strobe pin 6 of U2 and timing capacitor C15 are gated on and off via U1 and Q2 by the pulses at TP8 and TP10. When Q2 is saturated, reducing the charge on C15 to zero, the strobe pin 6 is low. When the strobe pin 6 of U2 goes high, test point TP3 goes low. TP3 will go high again when the charge on C15 is greater than the reference voltage at pin 3, of U2. The larger the reference voltage setting between pins 2 and 3 of U2, the larger the negative pulse width at TP3.

### Driver

The drain of Q3 and Q5 are out of phase with pin 7 of comparator U2. When TP3 is high, Q3 and Q5 are saturated, turning off Q4, Q6 and Q7. When TP3 is low, Q3 and Q5 are turned off, turning on Q4, charging the input capacity of Q6 and Q7.





## Output

The power stage consists of two Power Mosfets, Q6 and Q7, operating as pure switches once the input capacity is charged sufficiently for drain current to flow. When Q3 and Q5 are turned off by the drive from U2, Q6 and Q7 switch on, and conduct high amperes of peak current, storing magnetic energy in the primary of T2. When Q6 and Q7 are turned off, the primary of T2 resonates with C21. The result is a damped sinusoid wave shape. The energy is coupled by secondary windings to generate output power. The damped wave shape varies with the output load. With average physiological loads, one high amplitude pulse exists with subsequent lower oscillating amplitudes.

## Sound

A tone is generated when the HYFRECATOR PLUS(R) is delivering power. The tone is generated by an audio transducer LS1, driven by one section of U1. The frequency of the tone is approximately 2000 Hz and is generated by a 12-bit binary counter U51. The audio level is adjustable with R25 to a level not less than 65 db. A second tone is generated when the HYFRECATOR PLUS(R) is delivering power and one of the Up/Down buttons is operated.

## Section 7 - Service Information

### Safety And Service Precautions

#### CAUTIONS

- For your safety, unplug the HYFRECATOR PLUS® before you attempt to disassemble or service. When calibrating the HYFRECATOR PLUS® with the power ON, please use extreme caution.
- This device contains components which will be damaged by static electricity.. Proper handling by a grounded person is mandatory. CONMED will provide assistance if needed in safeguard precautions necessary to avoid any question of warranty responsibility.
- Do not insert power cord connector into the wall socket unless the line voltage and frequency are as stated on the serial number plate.
- Ground circuit reliability can be achieved only when the HYFRECATOR PLUS® is connected to a properly grounded hospital grade wall receptacle.
- Do not operate the HYFRECATOR PLUS® in the presence of flammable anesthetics. Doing so may cause injury to patient, staff, physician or damage to the unit.
- Federal law restricts operation of the HYFRECATOR PLUS® to qualified physicians or other qualified practitioners.

### Tools and Test Equipment

The model 7-797 HYFRECATOR PLUS® requires only standard electronic tools for maintenance. The following is a list of suggested equipment for maintenance of your unit.

1. Digital Multimeter Beckman Tech 310
2. Electrosurgery Analyzer Dempsey 443
3. Leakage Meter Bio-Tek 150M
4. Oscilloscope Tektronic 5440

NOTE: Test equipment manufactured by a company other than specified may be substituted if comparable. Please call the CONMED Customer Service at (800) 448-6506 if you are unsure.



## Section 8 - Suggestions For First Time Operation

Before using the HYFREATOR PLUS® clinically, we suggest the following experiment.

Hold a quarter-pound piece of room temperature beef or chicken in hand or place it on a table, and touch it with your hand to improve the path of electrical flow. Starting with a low power setting, experiment as follows:

- **Desiccation:** In the monoterminal without a dispersive plate mode, using an ELECTROLASE® Tip, touch the meat and turn on the current for one to five seconds. Use different intensities with the low and the high output terminals. Cut the meat open with a scalpel and view the depth of penetration. A mild blanching of the tissue is sufficient for most conditions.
- **Fulguration:** Using either the low or high output terminals, bring the electrode near, but not touching the meat (one to three mm). Use various settings and observe the different degrees of fulguration that can be produced. Short bursts of a spark alternated with short cooling periods are most acceptable to the patient. Continuous application of the spark creates heat that may become intolerable. Cut the meat open at the fulgurated spots to view the relatively shallow effect.
- **Coagulation:** If you have purchased the optional foot switch, non-switching handle and cord and dispersive patient plate or the forceps and footswitch, you may wish to experiment with the effects of monoterminal and bipolar coagulation. You will find that monoterminal coagulation produces very deep effects while bipolar coagulation produces relatively superficial effects.

A training tape covering basic dermatological procedures utilizing the HYFREATOR PLUS® is available from your authorized CONMED distributor (Product Number 7-796-21).

## Section 9 - Removal And Replacement Procedures

**CAUTION:** For your safety, please be sure that the HYFREATOR PLUS® is unplugged prior to performing any service.

1. The front cover can be removed by removing the six Phillips head screws from the recesses on the back panel.
2. The Main Printed Circuit Board can be removed from the rear cover by removing four small Phillips head screws and four large Phillips screws from the corners of the transformer.
3. The display board can be removed from the front cover by removing the four small Phillips head screws.

## Section 10 - Safety And Performance Checks

### Safety Checks

#### Line Cord Continuity

1. Disconnect the power cord from the wall receptacle.
2. Connect an ohmmeter between the positive and the neutral terminal of the line cord for proper continuity.
3. If the line cord has been repaired or replaced, check to see that proper polarity has been maintained.

**NOTE:** Leakage tests should be conducted using a Bio-Tek 150M leakage meter, or comparable meter with



similar characteristics capable of testing to AAMI specifications. Inappropriate meters can produce "ERRO-NEOUS LEAKAGE" readings. Leakage tests should be performed at a **nonconductive work station**.

**WARNING: Use caution when conducting these tests. The meter must be suitably insulated and capable of withstanding the power line voltage.**

### Chassis Leakage

1. Push the HYFRECATOR PLUS® side ON/STANDBY OFF switch to ON.
2. Connect the leakage meter in series with the line cord and line power receptacle.
3. Ensure that leakage current is less than 50 microamps.
4. Open ground line and ensure leakage current is less than 50 microamps.
5. Reverse line polarity and ensure that leakage current is less than 50 microamps.
6. Turn the HYFRECATOR PLUS® ON/STANDBY OFF switch off. Repeat above leakage tests.

### Performance Checks

1. Plug in the power cord, and switch the ON/STANDBY OFF switch to the ON position.
  - a. The LED display illuminates zero.
  - b. Move Terminal Selector switch to the extreme left.
  - c. Push UP button for full scale reading.
  - d. The LED's should Display 30.
  - e. Move the Terminal selector switch to the center position.
  - f. The LED's should Display 0.

Note: Displays in all modes default to zero during power up if the unit power has been interrupted or disconnected from the wall socket. Last setting applies to switching the unit from "Standby" to "On".

2. Attach Switching Handle and Cord Socket and Plug.
  - a. Press the DOWN button, and the display should decrease one digit at a time for approximately six counts and then decrease rapidly.
  - b. Press UP button, and the display should advance one digit at a time for approximately six counts and then advance rapidly.
  - c. Switch the ON/STANDBY OFF switch to the OFF position for ten seconds.
  - d. Switch the ON/STANDBY OFF switch to the ON position and the LED display will display the last setting in item b above. (Not applicable for a 7-797-J)
  - e. The active indicator green LED should illuminate and a tone should be audible each time the POWER ACTIVATION button is pressed.
  - f. Pressing the POWER ACTIVATION button and a UP or DOWN button at the same time inhibits the UP/DOWN function, and a distinct tone is audible.
3. Test the power output in one of three ways.
  - a. Follow the suggestions for first time operation.
  - b. Connect the electrosurgery analyzer to bipolar terminals, and check the power output correlation to the LED display.
  - c. Connect a 25 Watt light bulb across the bipolar terminals, and the light bulb should illuminate at approximately three-quarters intensity.



## Section 11- Problem-Solving

NOTE: Before following any of the troubleshooting remedies outlined below, please read and follow the Removal and Replacement Procedures and the Block Diagram.

### Troubleshooting

Fault/Condition	Probable Cause	Remedy
Front Panel inoperative	Fuses F1 and F2 are blown or missing.	Replace the blown fuse(s) with the appropriate replacement.
	Power switch is faulty.	Disconnect line cord from power mains; turn power switch to the on position; check continuity of switch and primary circuit; replace defective component.
	Transformer T1 is defective.	Connect line cord to power mains; turn power switch to on position; check for the following AC voltages at T1; 22 at pins 10-12, 45 at pins 7-9.
No output power, however, there is defective sound and DS51 illuminates.	No low voltage.	Check for DC voltage at the following: 55 at TP5, 15 at TP11, -5 at TP12, 5 at TP13, minus probe of volt meter at TP7.
	Q6 and Q7.	Check for proper wave form at TP4. Replace Q6 and Q7.
	No 55 DC volts at TP5.	Check Q1, U3, BR2, C8, for proper operation. Replace defective component.
	U1, U2, Q2, Q3, Q4 or Q5 is defective.	Check for correct voltage and wave forms per block diagram and schematic. Replace defective component.
LED Display does not light.	U56, 59, 54, 55 DP51, 52, VR51, 3 and 1.	Check for +5 DC Volts at TP51; -5 DC Volts at TP53; +5 DC Volts at TP9, 11. Replace defective component.
Display reads 0, will not go up in number with the UP/DOWN Switches.	U56, 59, 54 VR3. DP51, or 52.	Check for 5 DC Volts at TP51. Check for 5 DC Volts at pin 2 of U56. Check wave forms. Replace defective component.
No sound when unit activated.	U55, 1, LS1, or R25.	Check wave form at TP55 and pin 1 U1. Replace defective component.



## Section 12 - Calibration

**WARNING:** The electrical voltages present in the HYFRECATOR PLUS® are capable of causing death or injury. Please be sure to use extreme caution when servicing this equipment with the power on.

For optimum performance, you should calibrate your HYFRECATOR PLUS® following the replacement of any component on the display PCB or power supply PCB, or following the replacement of either PCB itself.

1. Press ON/STANDBY OFF SWITCH to the ON position.
2. LED display should display zero.
3. Set TERMINAL SELECTOR SWITCH to the extreme left position.
4. Activate UP button for a display of 30.
5. Adjust R68 for 2.5 volts  $\pm$ .1 volt at TP54.
6. Activate DOWN button for a display of 20.
7. At a display of 20, activate the Switching Handle, and adjust R14 for 20 Watts output into the Electrosurgery Analyzer, 500 ohm load.
8. At a display of 5, activate the Switching Handle, and adjust R53 for 5 Watts output into the Electrosurgery Analyzer, 500 ohm load.
9. Repeat steps 7 and 8 as necessary to achieve proper calibration.
10. Check power output at zero display for zero output power.
11. Adjust R25 for desired sound level.

### Characteristics

1. Display Digital, no flicker.
2. Up/Down function.
  - a. Advances display in .02 increment, 0-5 range, low terminal.
  - b. Advances display in 1 increment, 5-15 range, low terminal.
  - c. Advances display in 1 increment, high and Bi-polar terminal.
  - d. Advances display from zero to full scale in 10 seconds.
3. Power Output.
  - a. Zero at Zero display.
  - b. 15 watts full scale, 500 ohm load, low terminal.
  - c. 30 watts full scale, 500 ohm load, high terminal and Bipolar terminal
4. Activation of Handswitch or Footswitch.
  - a. Enables 2KHz audible tone.
  - b. Disables Up/Down function.
  - c. Enables Amber LED display.
  - d. Enables power output.
5. On/Standby Off.
  - a. Turns off display.
  - b. Holds Micro-controller in memory.
  - c. Disables Up/Down functions.
  - d. Disables power output.
6. UP/DOWN, Handswitch or Footswitch activated at same time.
  - a. Enables 1 Khz and 2kHz audible tone mixed.
  - b. Disables power output.



## Section 13 - Maintenance

The HYFREATOR PLUS® requires little maintenance. To keep the instrument performing at its best, however, external cleaning should be performed on a regular basis.

**NOTE:** All internal service should be performed by qualified maintenance personnel only.

### External Cleaning

To clean the external case of the HYFREATOR PLUS® and the up/down switching handle and cord:

- Moisten a lint-free cloth with a mixture of mild soap and water.
- Clean all external surfaces with this solution.
- Dry all surfaces thoroughly using a clean, lint-free cloth.

Soap-based solutions, rather than harsh chemicals, are recommended cleaning agents for the HYFREATOR PLUS®. Evaporative solutions are preferred so as to limit exposure of internal electrical components. Material characteristics of the unit do not allow for gas, steam or cold sterilization techniques.

### Steam Sterilization of Accessories

**NOTE:** Do not autoclave the 7-796-5 power up/down switching handle and cord. If procedures require sterility, use Ethylene Oxide at <140 degrees F.

[If a footswitch is utilized, a sterile disposable non-switching pencil and a reusable adapter can be utilized (Product Number 137657 for the pencil and 670-3 for the adapter). An autoclavable reusable non-switching pencil is also available (Product Number 7-796-6), which also requires a footswitch (Product Number 7-796-4).]

To steam sterilize accessories and electrodes:

- Place accessories in autoclavable packaging or wrap with a cloth.
- Autoclave at 121°C (250F) + 3C for 15 minutes minimum/20 minutes maximum.
- Remove accessories from the autoclave and allow to cool for 30 minutes minimum.

**NOTE:** It is not advisable to cold sterilize surgical electrodes due to potential corrosion.



## Section 14 - Warranty

\$ 605<sup>02</sup>

As manufacturer of the Conmed HYFRECATOR PLUS® 7-797 and other high quality medical equipment, Conmed Corporation warrants all of its products to be free from defects in material and workmanship under normal operation and use. The warranty period for the Conmed HYFRECATOR PLUS® is twelve (12) months to the product's original owner.

NOTE: The warranty card must be returned by the original owner to Conmed Corporation within ten (10) days of receipt of the invoice.

A ninety (90) day warranty is provided for standard and optional accessories. The ninety (90) day warranty includes the 7-796-5 power up/down switching handle and cord. There is no warranty on disposable, single-use items.

The warranty is limited to the repair or replacement (at the manufacturer's discretion) of any HYFRECATOR PLUS® (or part thereof) that is returned to the manufacturer within the specified warranty period and which, after examination, is found to be defective.

Transportation of the HYFRECATOR PLUS(R) must be prepaid by the sender. The unit will be returned pre-paid to the owner by the same manner of transportation used in shipping the product to the manufacturer.

The warranty does not apply to any product, or integral part thereof, that has been altered or serviced by anyone other than the manufacturer. Nor does it apply toward any product that has been damaged as a result of accident, abuse, misuse or negligence on the part of the user.

This device contains components which will be damaged by static electricity. Proper handling by a grounded person is mandatory. CONMED will provide assistance if needed in safeguard precautions necessary to avoid any question of warranty responsibility.

## Section 15 - Repair Return Policy

HYFRECATOR PLUS® units and any standard or optional accessories should not be returned to the manufacturer for warranty or non-warranty repair without prior authorization. A "Return Authorization" (RA) number will be issued by CONMED Customer Service department upon request. This number must be prominently written in the upper left hand corner of the shipping container. To receive an RA number, please call (800) 552-0138 or (303) 699-7600.

NOTE: Any merchandise returned to CONMED without a Return Authorization number will not be accepted by the receiving department and will be returned to the sender.

The Conmed Corporation Warranty and Return Policy for the HYFRECATOR PLUS® 7-797 supersedes all other warranties either expressed or implied and shall be governed and executed under the laws for the state of New York, U.S.A.



**Section 16 - Specifications**

**PARAMETER**

**CHARACTERISTICS**

**Environmental Conditions for Transport & Storage**

Temperature Range  
Humidity

-20 to +60 degrees C  
0% to 97%

**Primary Power Requirements**

Model 7-797  
HYFREATOR PLUS®

120V 10% 50/60 Hz 1 Phase  
100V 10% 50/60 Hz 1 Phase  
230V 10% 50/60 Hz 1 Phase

Input Current

120V - 900 Milliamps max.  
100V - 1000 Milliamps max.  
230V - 500 Milliamps max.

**Dimension and Weight**

Depth:  
Width:  
Height:  
Weight:

4 inches (102 mm)  
8.75 inches (222 mm)  
7.5 inches (190 mm)  
6 pounds (2.7 kg)

**Functional Characteristics**

Output Power

Maximum Power:  
Bipolar:  
High:  
Low:

36 Watts (500 Ohm load)  
30+/- 6 Watts (500 Ohm load)  
30+/- 6 Watts (1000 Ohm load)  
15+2/-6 Watts (500 Ohm load)

Open Circuit Voltage

Bipolar:  
High:  
Low:

3000 Vp-p Max.  
8000 Vp, 10,000 Vp-p Max.  
4000 Vp-p Max.

Mode of Operation

Intermittent

Leakage

60 Hz: 50 microamps max, with third wire of line open.

Frequency:

500 KHz at 31.25 KHz rate

Output Wave Shape:

Damped sinusoidal

Output Regulation:

+/- 30% at 30Watts (500 Ohm load)  
for a +/- 10% line voltage

Duty Cycle:

10 sec. on, 30 sec. off

Audio:

1 KHz & 2 KHz, 65 db min.

Display Reading

Speed 0-30:

10 seconds

Accuracy:

1% at any setting

Low Output Terminal

0-5 range:

0.2 watt increments

5-15 range:

1 watt increments

Bipolar & High Output Terminals

0-30 range:

1 watt increments

Approvals:

CSA, Standard C22.2, No. 125

Risk Class:

UL 544, Medical and Dental Equipment

Protection:

High, Low: 2G; Bipolar: 2  
BF Defibrillator, Class 1





Section 17 - Figures and Schematics

Figure 3 - Block Diagram

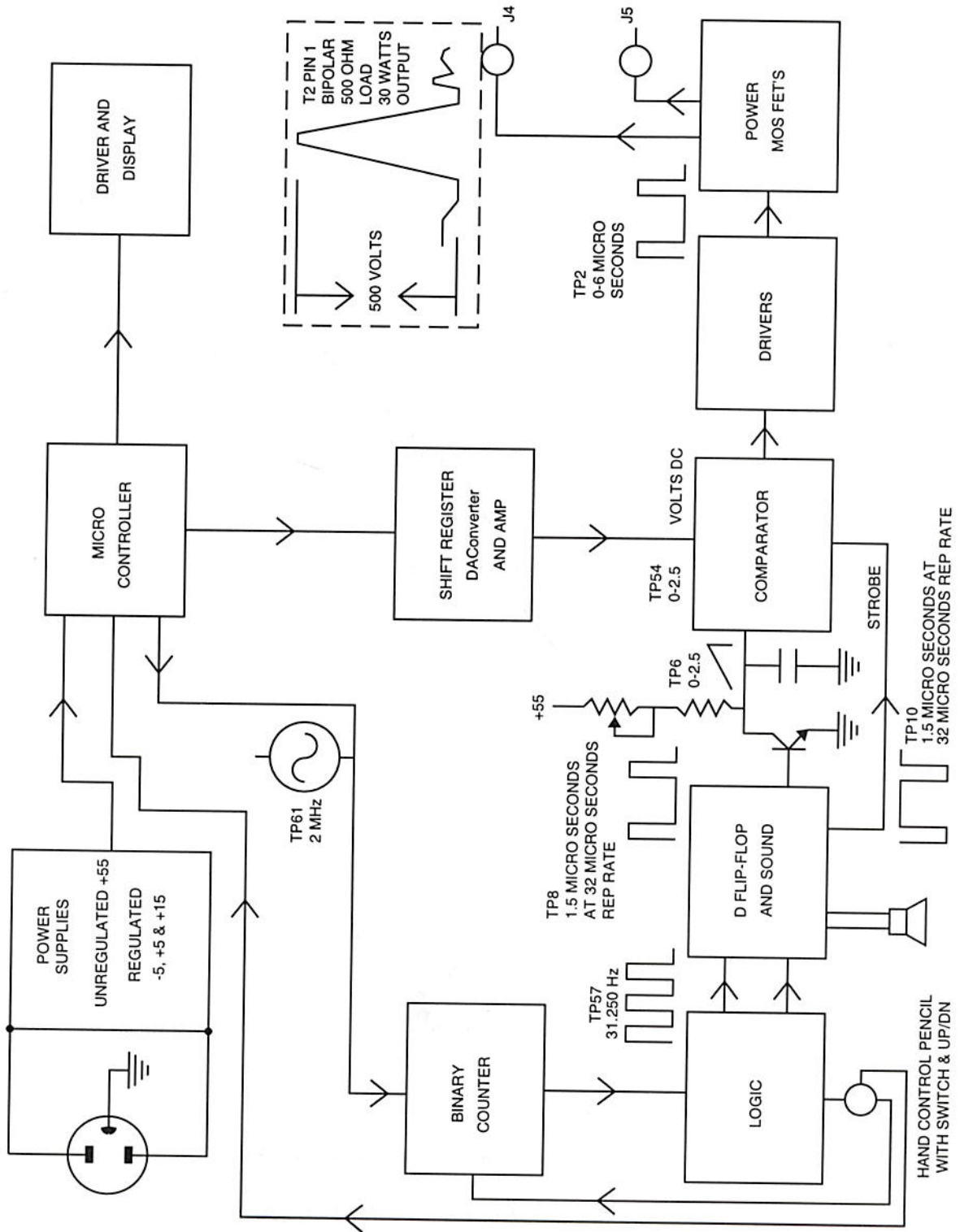


Figure 4 - Power Output-Voltage

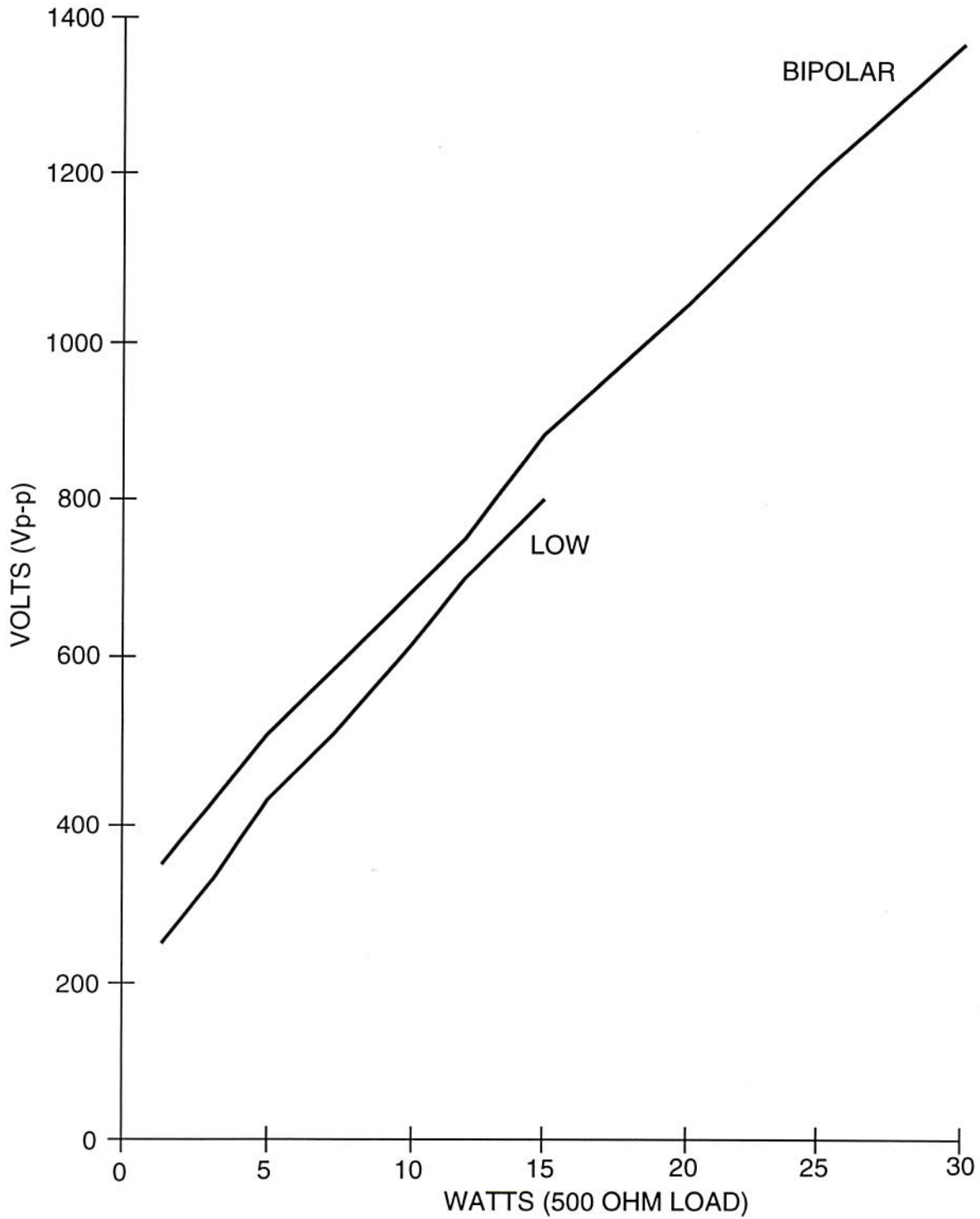


Figure 5 - Power Output-Voltage

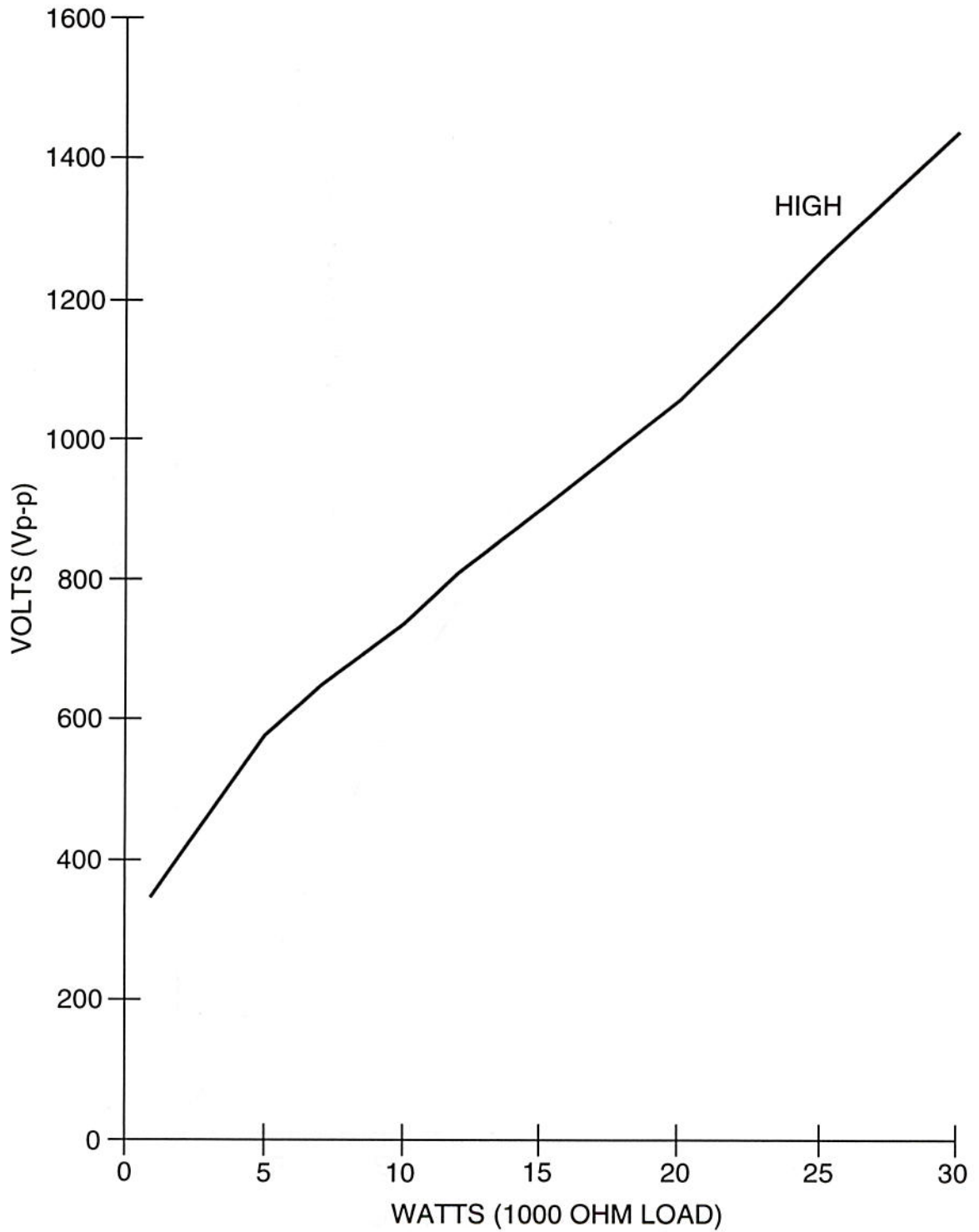


Figure 6 - Output Power vs. Display Setting; Bipolar, 500 Ohm Load

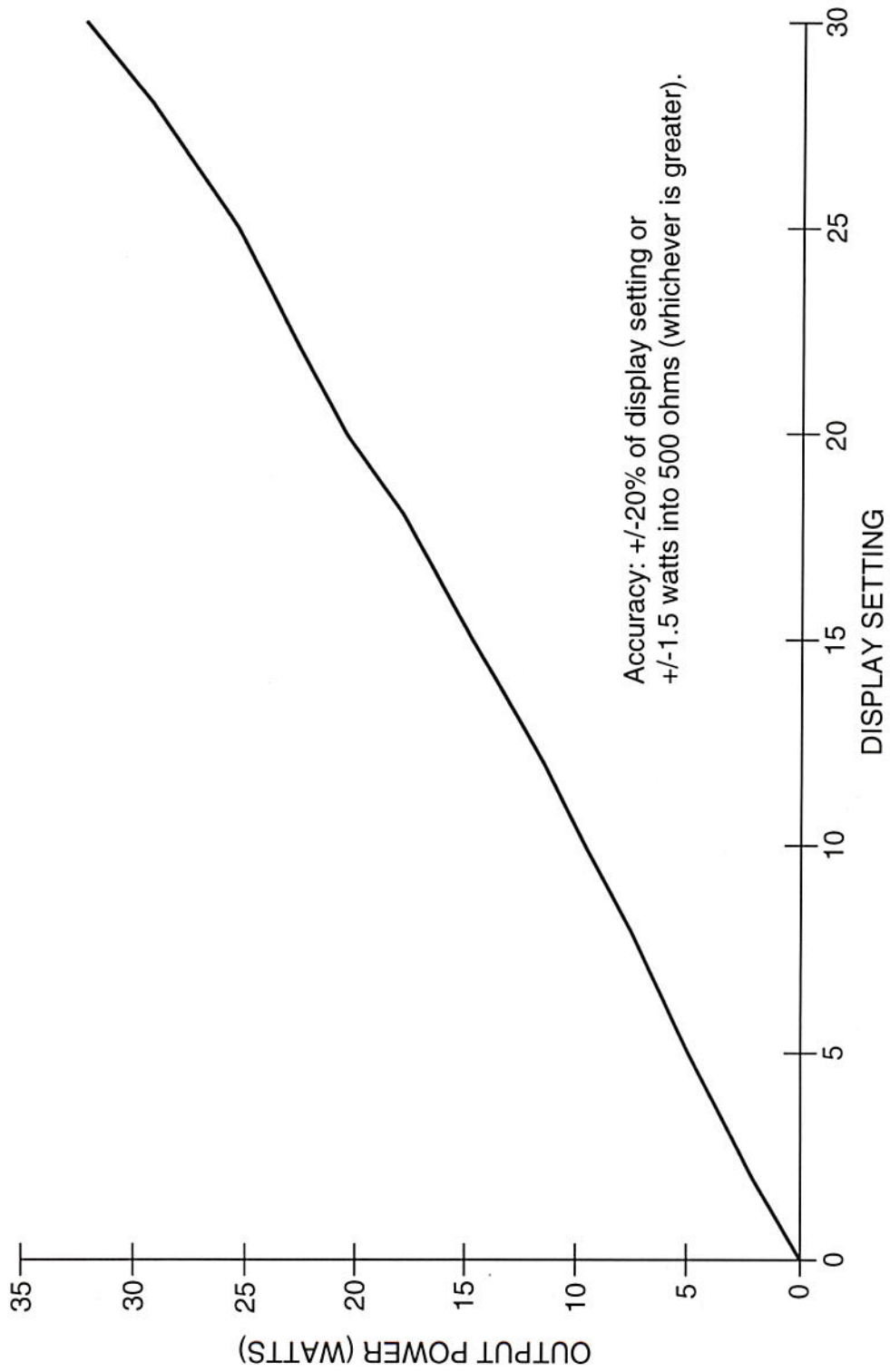


Figure 7 - Output Power vs. Display Setting; High, 1000 Ohm Load

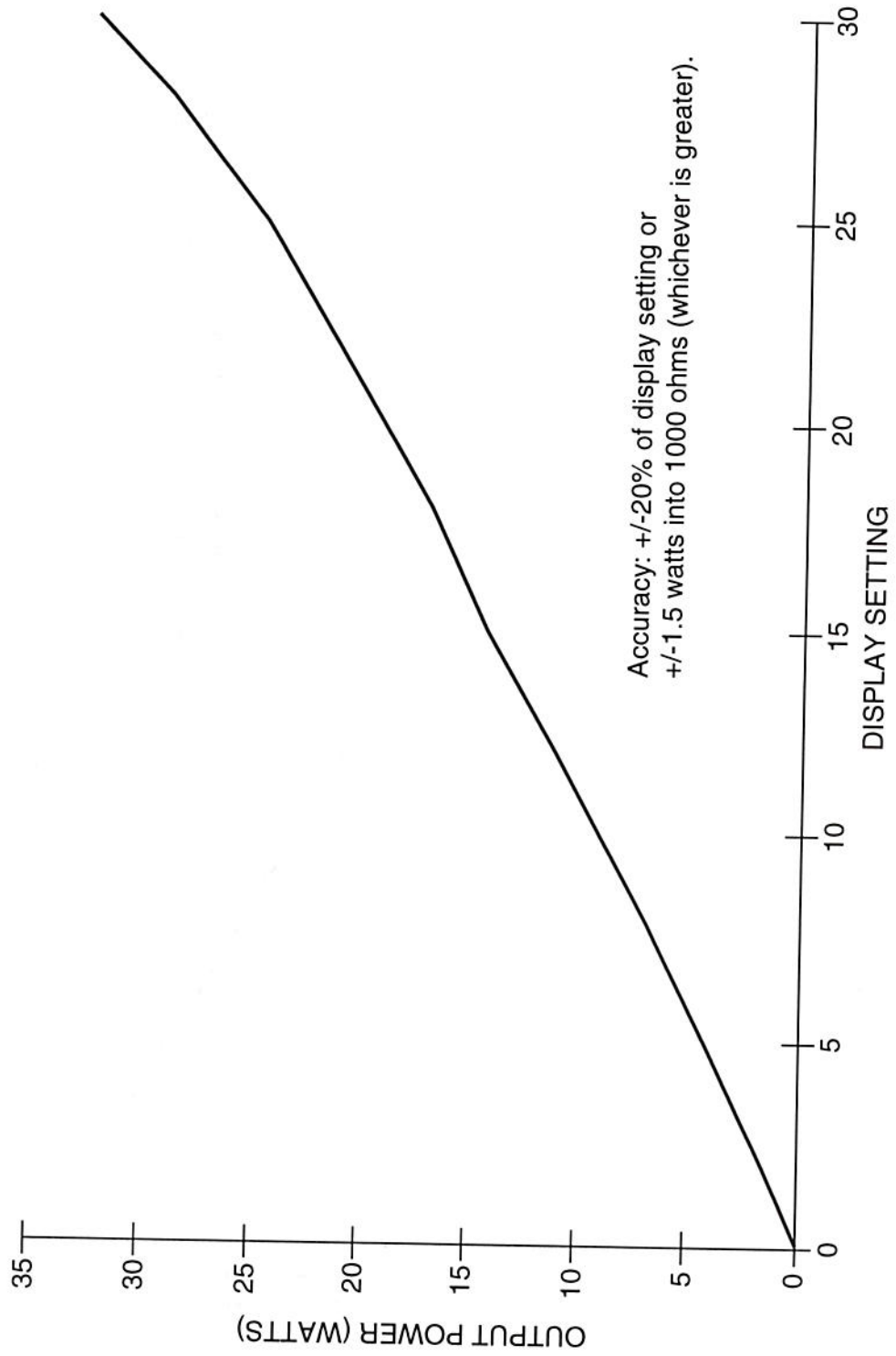


Figure 8 - Output Power vs. Display Setting; Low, 500 Ohm Load

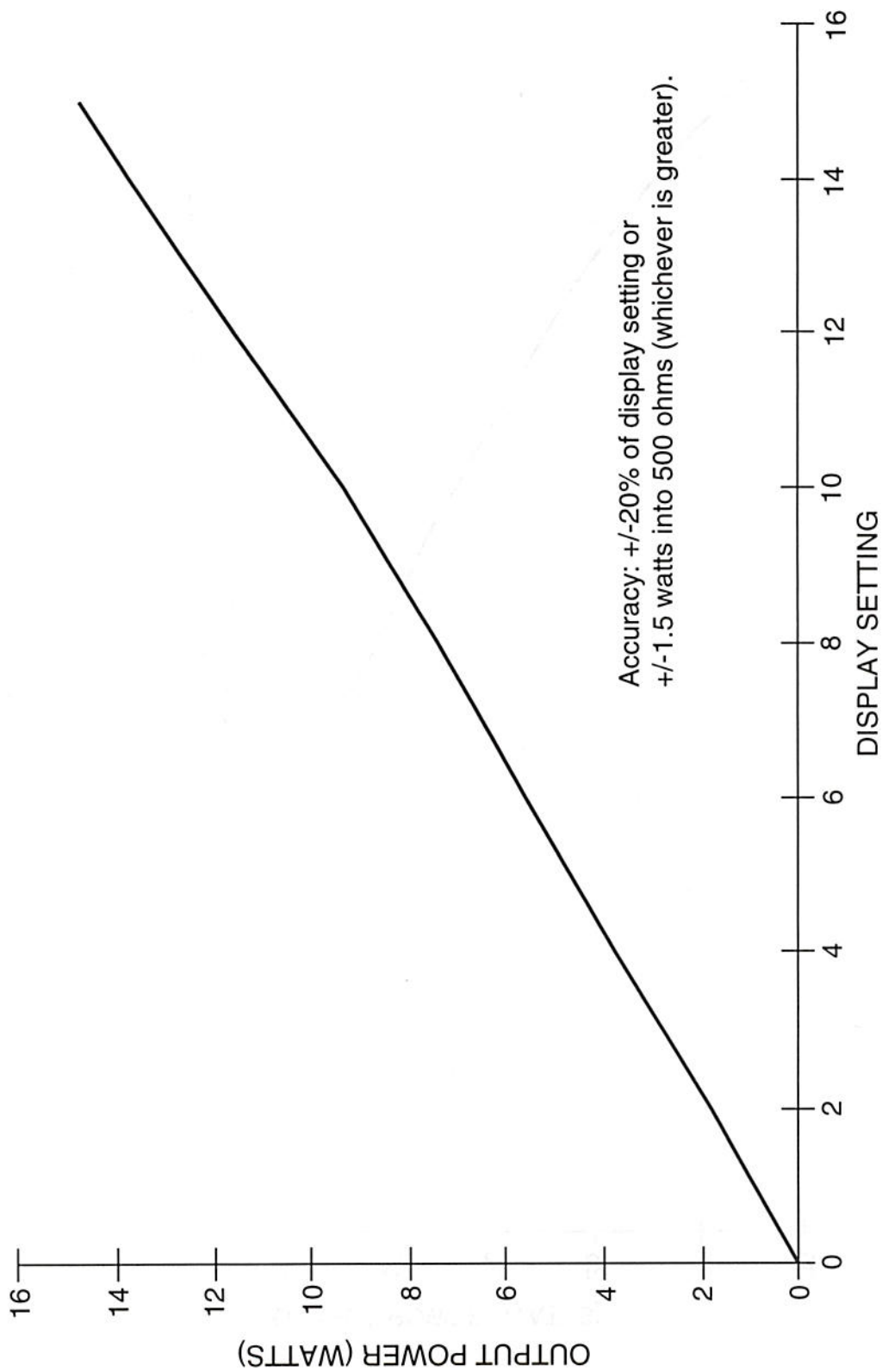


Figure 9 - High Load Curve

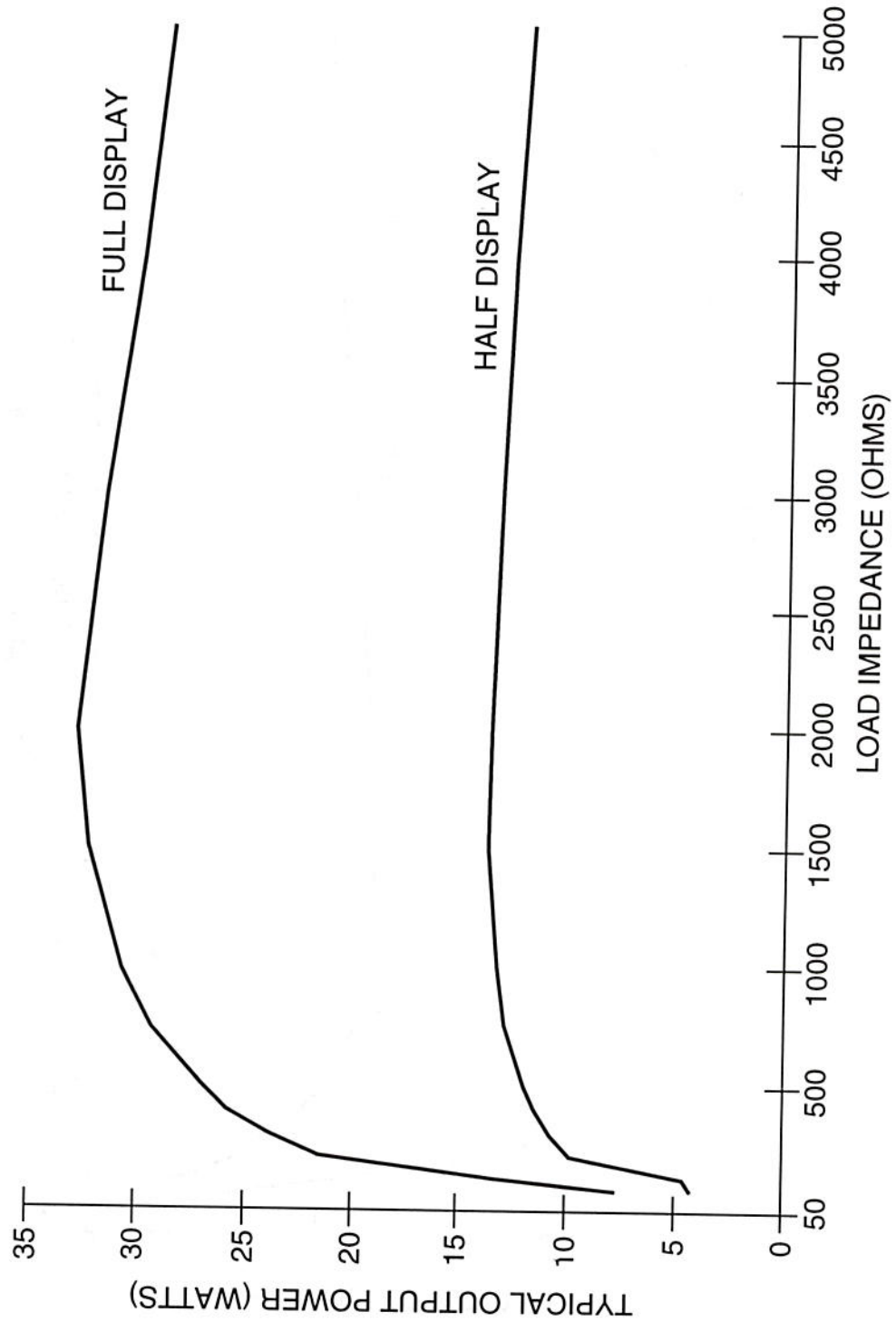


Figure 10 - Low Load Curve

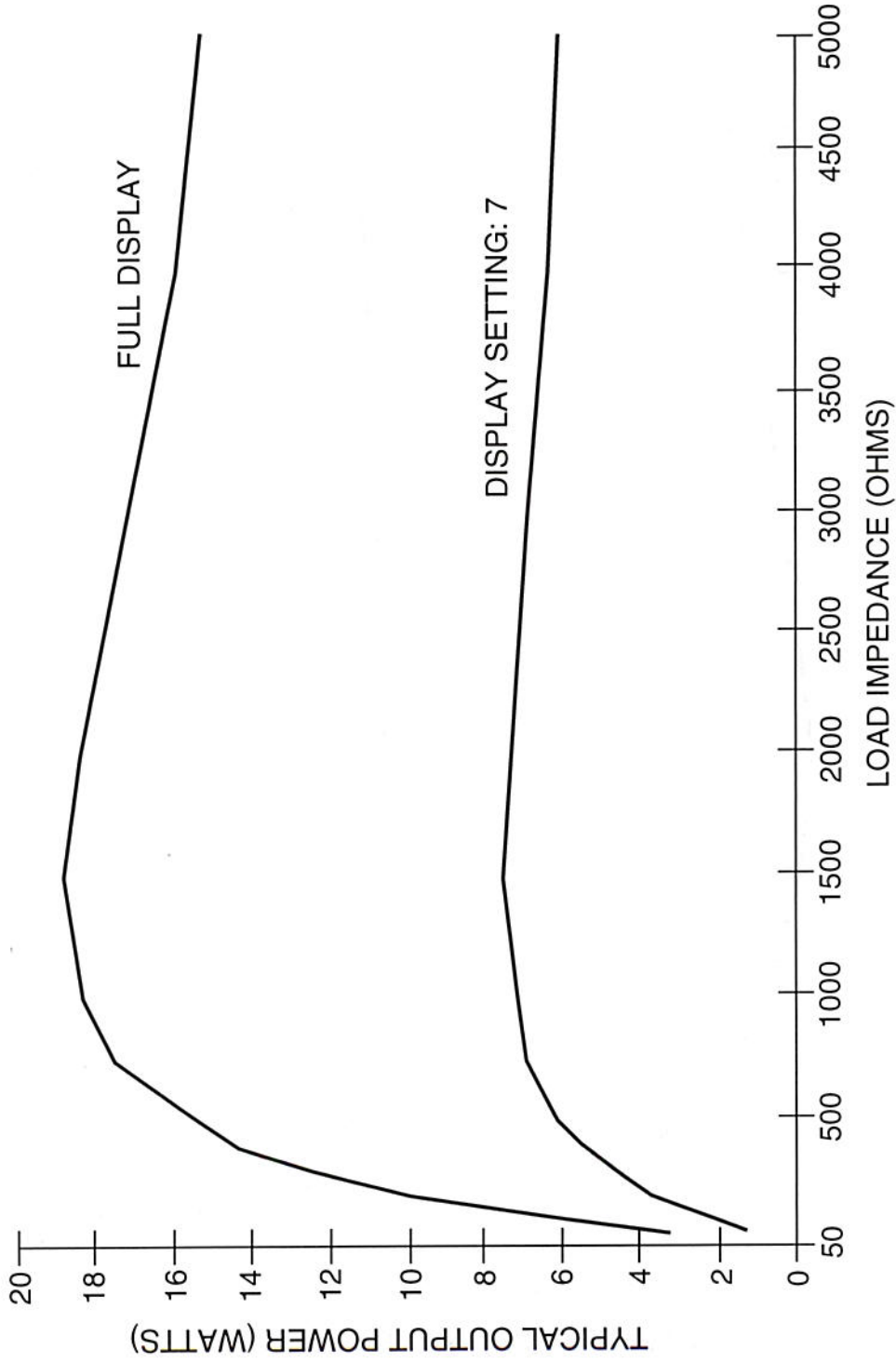




Figure 11 - Bipolar Load Curve

