Model 7620

DC to 1MHz General Purpose
Wideband Power Amplifier

OPERATING MANUAL

Date: 12/7/22 Revision 1.8

Serial No. _____

15 Jonathan Drive, Unit 4 Brockton, MA 02301-5566 U.S.A.

Tel: (508) 580-1660; Fax: (508) 583-8989

Email: sales@krohn-hite.com

Service: service@krohn-hite.com www.krohn-hite.com

TABLE OF CONTENTS

SAFETY PRECAUTIONS

The following general safety precautions must be observed during all phases of operation, service, and repair. Failure to comply with these precautions or with specific warnings elsewhere in this manual violate safety standards of design, manufacture and intended use of this instrument. Krohn-Hite assumes no liability for the customer's failure to comply with these requirements. For the correct and safe use of this instrument, operating and service personnel must follow generally accepted safety procedures.

HIGH VOLTAGE WARNING

Potentially lethal voltages may be present on the instrument's output terminals. Please observe all safety precautions when operating this instrument.

POWER SOURCE

The 7620 is designed to operate from a $105V_{rms}$ to $240V_{rms}$ AC source. The protective ground connection, provided by the grounding conductor in the power cord, is essential for safe operation. Refer to section 2.2 for complete power requirements and section 2.3 to configure the power input.

PROPER FUSE

To avoid damage to the 7620 or to prevent a fire hazard, use the correct fuse for the line voltage selected. Refer to section 2.6.2 for proper fuse rating.

ENVIRONMENTAL WARNING

Do not operate the instrument in the presence of flammable gases or fumes. Do not operate the instrument in damp, wet or dusty environments. Operation of this instrument in such environments constitutes a safety hazard.

DO NOT REMOVE COVER

Operating personnel must not remove the instrument covers. Only qualified maintenance personnel following proper safety precautions may remove the cover. To avoid injuries, always disconnect the AC line cord and disconnect all cables and equipment from the input and output terminals before removing the covers.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

To avoid damaging the instrument, causing injuring or creating unsafe conditions, do not install substitute parts or perform any unauthorized modifications. For service and repairs contact Krohn-Hite.

DO NOT OPERATE A DAMAGED INSTRUMENT

Do not operate the instrument if it is damaged. Disconnect the AC line cord and disconnect all cables and equipment from the input and output terminals. For service and repairs contact Krohn-Hite.

SECTION 1 PRODUCT DESCRIPTION AND SPECIFICATIONS

1.1 PRODUCT DESCRIPTION

The 7620 wideband power amplifier offers extended output power and voltage capabilities with low distortion, using the latest in hybrid power operational amplifier technology. This makes the 7620 suitable for a broad array of applications.

With two inputs, both non-inverted and inverted, the unit is configurable for either single-end or differential operation. A maximum input voltage of ±200V, AC or DC, and a frequency range from DC to 1MHz, allows for a wide range of input signals. Additionally, the two outputs, either non-inverted or inverted, provide a maximum voltage of ±200V and 200mA (34W maximum).

The instrument is operated either using the local front panel controls and menu driven configuration, or remotely through the standard GPIB port, or optional LAN or USB connections.

Features include DC offset, 0V to ±200V in 0.1V increments, and three selectable gain ranges X5, X25 and X125 with incremental output gain control, as well as, an automatic gain adjustment setting with clipping control. These settings are controlled in real-time using the front panel buttons or remotely and all active settings are shown on the two-line display.

In addition, the unit continuously monitors and displays the heatsink temperature, output peak voltage and average output current to warn of any potential issues. Warnings are triggered to alert the user of the problem condition and to prevent damage to equipment.

The unit is equipped with ten unique memory locations used to store pre-configured setups and a recall function to quickly restore the unit to a previous configuration.

All the information needed to operate this instrument is contained in this manual. For application specific information or other questions, please contact Krohn-Hite.

1.2 PRODUCT SPECIFICATIONS

1.2.1 OUTPUT

Note: All values are measured from each output to GND.

- Frequency Range: DC to 1MHz
- Power:
  - 1kΩ Load:
    - $17W_{rms}$ (34W DC) (DC to 500kHz)
    - $5W_{rms}$ (>500kHz to 1MHz)
  - 600Ω Load:
    - $4W_{rms}$ (9W DC) (DC to 100Hz)
    - $9W_{rms}$ (>100Hz to 1MHz)
- Voltage:
  - No Load to 10kΩ:
    - $\pm 200V_{peak}$ ($141V_{rms}$) (DC to 200kHz)
    - $\pm 180V_{peak}$ ($127V_{rms}$) (>200kHz to 500kHz)
    - $\pm 120V_{peak}$ ($85V_{rms}$) (>500kHz to 800kHz)
    - $\pm 100V_{peak}$ ($71V_{rms}$) (>800kHz to 900kHz)
    - $\pm 92V_{peak}$ ($65V_{rms}$) (>900kHz to 1MHz)
  - 1kΩ Load:
    - $\pm 188V_{peak}$ ($132V_{rms}$) (DC to 200kHz)
    - $\pm 170V_{peak}$ ($120V_{rms}$) (>200kHz to 500kHz)
    - $\pm 100V_{peak}$ ($71V_{rms}$) (>500kHz to 900kHz)
    - ±90Vpeak ($64V_{rms}$) (>900kHz to 1MHz)
  - 600Ω Load:
    - $\pm 85V_{peak}$ ($60V_{rms}$) (DC to 200Hz)
    - $\pm 100V_{peak}$ ($71V_{rms}$) (>200Hz to 100kHz)
    - $\pm 115V_{peak}$ ($82V_{rms}$) (>100kHz to 700kHz)
    - $\pm 85V_{peak}$ ($60V_{rms}$) (700kHz to 1MHz)
- Current: 910Ω load $\pm 200mA_{peak}$ ($141mA_{rms}$) (DC to 500kHz)
- Frequency Response:
  - ±0.5dB DC to 1MHz
- Harmonic Distortion:
  - 0.02% (typical), 0.1% (max)
- Voltage Gain Ranges:
  - X5: X0.0 to X5.0 (X0.1 increments)
  - X25: X0.0 to X25.0 (X0.5 increments)
  - X125: X0.0 to X125 (X1.0 increments)
- Step Accuracy: ±0.1dB plus frequency response specification
- Stability: < 0.001dB change for each 10% change in line voltage.
- Dynamic Range: > 70dB

- Hum and Noise (2MHz bandwidth): referred to output:
  - X5: < 15mV$_{rms}$
  - X25: < 15mV$_{rms}$
  - X125: < 25mV$_{rms}$
- Phase Shift: A input 0° ±1°, -B input, 180° ±1° dc to 10kHz increasing linearly 60° lagging at 1MHz. (Inverted output relative to non-inverted) 180°, –0.3° at 10kHz; 180°, –3° at 100kHz; 180°, –20° at 1MHz.
- Square wave Response:
  - Rise/Fall Time: <250ns to 50V$_{p-p}$; <600ns to 200V$_{p-p}$
  - Slew Rate: > 500V/µs, 400V$_{p-p}$
  - Aberrations: ≤ 10%
- Regulation: < 0.1% with no load to 1kΩ (DC to 10kHz), rising to 2% at 1MHz.
- DC Coupling:
  - DC Level: Nominal zero volts; vs. temperature, 2mV/°C.
  - DC Offset Control (no load): 0V to ±200V.
  - DC Offset Accuracy
    - ±10% from ±1V to ±10V
    - ±1% from > ±10V to ±200V
  - DC Level Stability
    - Vs. Line: < 1mV for each 10% change in line voltage
    - Vs. Temperature: < 0.01%/°C or 2mV/°C (whichever is greater)
- Internal Impedance:
  - < 0.5Ω (DC to 10kHz)
  - 5Ω (>10kHz to 100kHz)
  - 20Ω (>100kHz to 1MHz)

1.2.2 INPUT

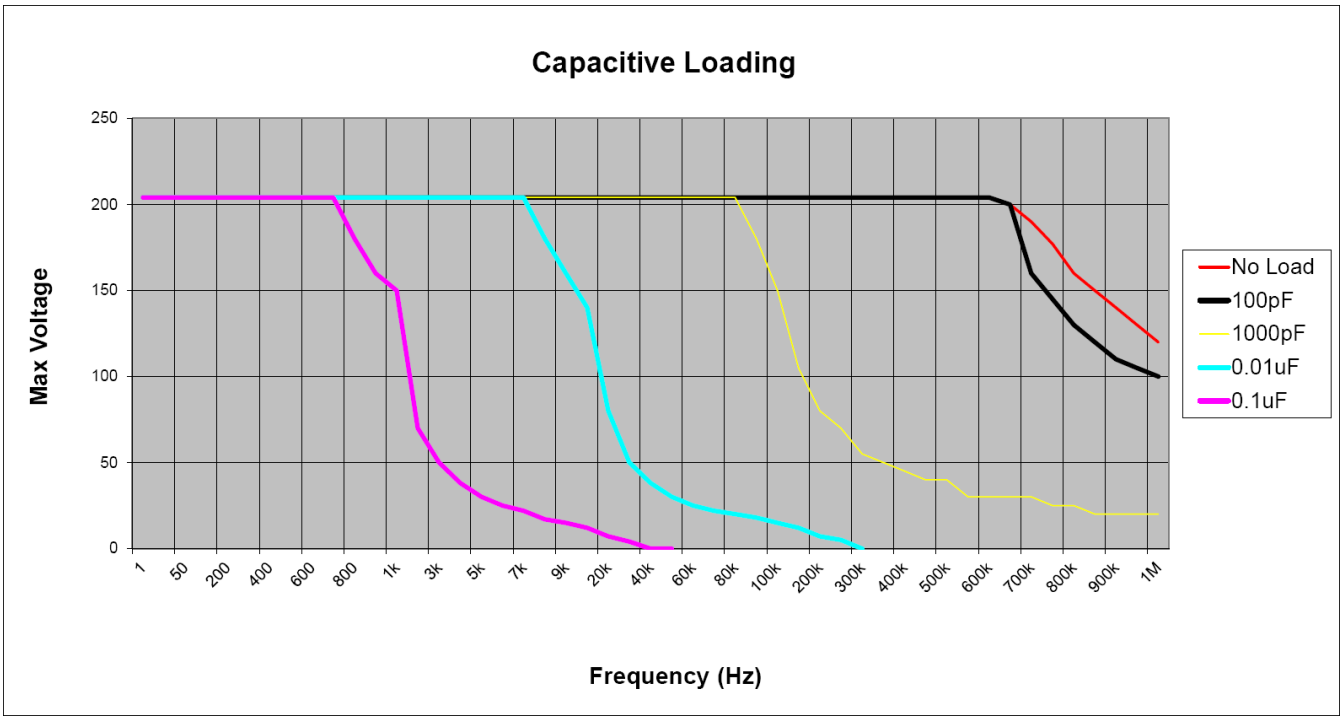
- Configurations:
  - A (Single-Ended, Non-Inverted)
  - -B (Single-Ended, Inverted)
  - A–B (Differential)
- Maximum Voltage: ±200VDC (referenced to ground)
- Maximum Common Mode:
  - X5 range: $\pm 200V_{peak}$
  - X25 range: $\pm 40V_{peak}$
  - X125 range: $\pm 8V_{peak}$
- Common Mode Rejection:
  - 70dB: DC to 200Hz (at max gain setting)
  - 60dB: >200Hz to 1kHz (at max gain setting)
  - 40dB: >1kHz to 10kHz (at max gain setting)
  - 20dB: >10kHz to 1MHz (at max gain setting)

Note: Improves to < 80dB at lower gain settings.

- Sensitivity: ±1.6V peak
- Coupling: Direct (DC) or capacitive (AC) with low frequency cutoff of approximately 1Hz
- Impedance: 1 MΩ in parallel with 30pF

1.2.3 CAPACITIVE LOADING CHART

The chart below illustrates the capacitive loading of the 7620 from 1Hz to 1MHz.



1.2.4 GENERAL

- Temperature Range: 0°C to 45°C.
- Power Requirements: 120V or 240V, 50Hz-400Hz, 200W
- Dimensions: 14” W (35.6cm) x 13.64” L (34.6cm) x 3.5” H (8.9 cm)
  4” H (10.2 cm) with feet installed
- Weight: 12.8 lbs. (5.81 kg.)

1.3 REMOTE COMMUNICATION OPTIONS

The standard 7620 is equipped with a GPIB/IEEE-488 remote communications port. An optional LAN only, USB only or combination LAN and USB module is also available. Please specify which option you prefer when placing your order.

- IEEE-COM (GPIB/IEEE-4888 module) - 24-Pin, Female Connector
- LAN-COM (optional LAN only module) – RJ45 Connector
- USB-COM (optional USB only module) –Mini Type B 5-Pin Connector
- LANUSB-COM (optional LAN and USB module – RJ45 Connector and Mini Type B 5-Pin Connector

1.4 OPTIONAL ACCESSORIES

- RK-314: Rack Mount Kit (for mounting the 7620 into a standard 19" rack)
- CAB-10: GPIB Cable with Connectors (2 meters)
- CAB-11: GPIB Cable with Connectors (1 meter)
- CAB-018: Cable, Multi-Stacking Double Banana Plug
- CAB-025: BNC Cable (3 Feet)
- 7620EXT: One Year Extended Warranty

SECTION 2 OPERATION

2.1 INTRODUCTION

This section describes the operation of the Model 7620. It includes the proper AC requirements, the initial power-up procedure, initial functional test and a detailed explanation of the operating controls.

2.2 POWER REQUIREMENTS

The Model 7620 Amplifier operates from a single-phase, 50Hz to 400Hz AC power source with the following voltage ranges:

- 90V to 110V
- 108V to 132V
- 198V to 242V
- 216V to 264V

The unit is equipped with a standard 3-pin AC power receptacle on the rear panel, which complies with the European I.E.C. A standard detachable 3-wire line cord is supplied.

2.3 INITIAL POWER-UP SEQUENCE

Use the following procedure when powering up the 7620 for the first time, or if your power requirements change:

CAUTION: Verify the power cord is disconnected and the power switch is in the off position. Due to potentially dangerous voltage within the 7620, do not remove the covers when the unit is connected to an AC outlet.

1. Set the line switches on the rear panel to the desired voltage range:

- For the 90 to 110 voltage range: set the voltage range switch to 120V and the NORM/LOW switch to LOW.
- For the 108 to 132 voltage range: set the voltage range switch to 120V and the NORM/LOW switch to NORM.
- For the 198 to 242 voltage range: set the voltage range switch to 240V and the NORM/LOW switch to LOW.
- For the 216 to 264 voltage range: set the voltage range switch to 240V and the NORM/LOW switch to NORM.

2. Set the CHASSIS/FLOAT GROUND switch on the rear panel to the desired ground setting.

CAUTION: The unit must be connected to a grounded, 3-terminal AC outlet.

3. Plug the line cord into the unit and then into the AC outlet.
4. Turn the power switch on and allow the unit to warm-up for 30 minutes before using to achieve optimal performance specifications.

When the unit turns on, all front panel LEDs are momentarily illuminated (except >15V) and KROHN-HITE 7620 POWER-UP appears on the display.

2.4 INITIAL FUNCTIONAL TEST

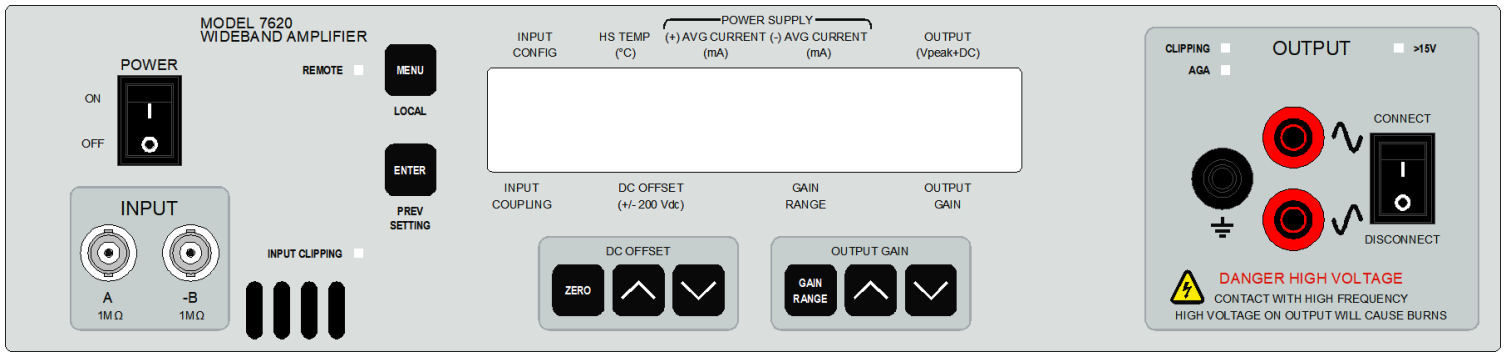
To verify the 7620 is operating correctly, use the following steps:

1. Follow the power-up sequence described in the previous section.
2. Set the DC OFFSET to zero by pressing the ZERO front panel key.
3. Set the GAIN to zero using the GAIN DOWN front panel key.
4. Set the INPUT MODE to OFF using the menu system.
5. Set the INPUT COUPLING to DC using the menu system.
6. Connect a voltmeter to the output terminals and check for 0V DC.

When finished, set the OFFSET, GAIN, INPUT COUPLING and INPUT CONFIGURATION and other settings, as described in the following sections, to meet your requirements.

Caution: The output terminals can reach up to 400V peak. To prevent possible electrical shock, set the output switch to DISCONNECT before connecting/disconnecting cables or loads from the output terminals.

2.5 FRONT PANEL



2.5.1 KEYS

KEY	PRIMARY FUNCTION	SECONDARY FUNCTION
MENU (LOCAL)	Enter the menu and scroll through menu options.	Place the unit in local mode.
ENTER (PREV SETTING)	Select menu option and implement new setting.	Restore previous setting.
ZERO	Set DC offset to zero.	Set gain range to X1.0 (if pressed while holding GAIN RANGE down arrow)
DC OFFSET (UP) ^	Adjust DC offset up.	Change menu setting up.
DC OFFSET (DOWN) v	Adjust DC offset down.	Change menu setting down.
GAIN RANGE	Change gain range.	(no second function)
OUTPUT GAIN (UP) ^	Adjust output gain up.	Change menu setting up.
OUTPUT GAIN (DOWN) v	Adjust output gain down.	Change menu setting down.

2.5.2 LED INDICATORS

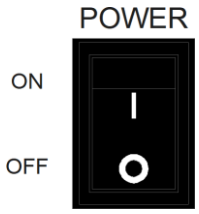
LED	DESCRIPTION
REMOTE	Solid when unit is in remote mode.
INPUT CLIPPING	AGA mode setting 1: Flashes when input signal is clipping. AGA mode setting 2: Solid when input signal is clipping.
CLIPPING (OUTPUT)	AGA mode setting 1: Flashes when output signal is clipping. AGA mode setting 2: Solid when output signal is clipping.
AGA	Solid when AGA setting 1 or 2 enabled. Flashes when input/output signal is clipping (AGA mode setting 1 only).
>15V	Solid when output voltage is greater than ±15V.

2.5.3 FRONT PANEL SELF-TEST

To ensure the 7620 front panel is functioning properly use the built-in self-test feature. To initiate a front panel self-test, press both the MENU and ENTER keys simultaneously. The unit presents instructions on the display that direct you to press each key, verify LED function and sound operation. When the self-test is complete, the unit returns to normal operation.

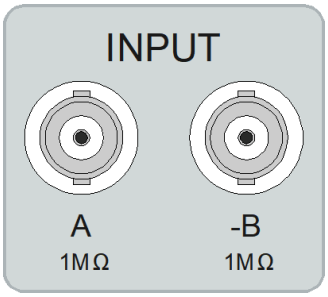
2.5.4 POWER SWITCH

The unit's power switch is located on the upper left side of the front panel. To turn the unit on, flip the switch to the ON (I) position. To turn the unit off, flip the switch to the OFF (O) position.



2.5.5 INPUT CONNECTORS

The 7620 has both a non-inverted (A) and an inverted (-B) input BNC connector. The center pin is the signal connection and the outer shell is GND. Please refer to section 1.2.2 for complete specifications. By default both inputs are disabled; refer to section 2.7.1 to configure the inputs.



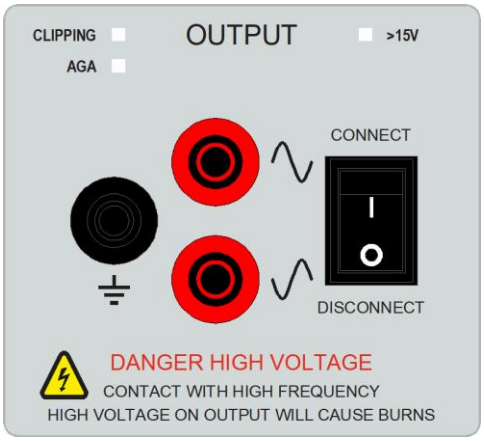
2.5.6 OUTPUT CONNECTORS

The two red binding posts are the signal outputs and the black binding post is the output ground (GND).

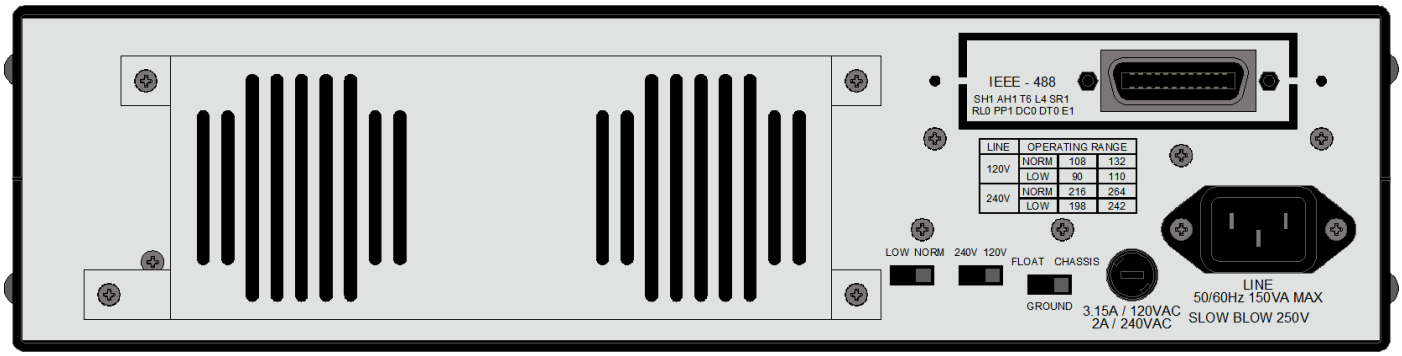
Non-Inverted Output

Inverted Output

To enable the outputs, flip the switch to the CONNECT (I) position. To disable the outputs, flip the switch to the DISCONNECT (O) position. When in remote mode the switch is not required to disable the output. In remote mode, put the switch in the CONNECT position and use the remote commands to enable or disable the output.



2.6 REAR PANEL



2.6.1 AC POWER RECEPTACLE (LINE)

The unit is equipped with a standard 3-pin AC power receptacle, which complies with the European I.E.C. The accepted AC line voltage is either 120V or 240V, single-phase, 50Hz to 400Hz. A standard detachable 3-wire line cord is supplied. Please refer to section 2.2 for further details.

2.6.2 AC LINE FUSE

The AC line fuse, located near the AC receptacle, is installed at the factory. The fuse rating corresponds with the line voltage specified when you ordered the instrument.

The fuse is a 5 x 20mm cylindrical cartridge style fuse. Below is the required fuse rating for each line voltage and the recommended manufacturer and part number.

- 120V: 3.15A SLO BLO (Bel Fuse # 5ST 3.15-R)
- 240V: 2A SLO BLO (Bel Fuse # 5ST 2-R)

CAUTION: Remove the AC line cord before changing the line fuse.

To change the fuse, insert a flat-bladed screwdriver into the slot and turn counter-clockwise until the fuse holder releases. Gently remove the fuse from the unit and replace it with the value rated for your line voltage. Insert the fuse back into the unit by lining up the tabs with the slots in the fuse holder on the chassis, and then turn clockwise.

2.6.3 AC LINE SWITCHES

You must configure the two AC line switches (LOW/NORM and 240V/120V) prior to powering-up the amplifier. Set the switches to correspond to your line voltage. Below are the four possible combinations.

- For the 90 to 110 voltage range: set the voltage range switch to 120V and the NORM/LOW switch to LOW.
- For the 108 to 132 voltage range: set the voltage range switch to 120V and the NORM/LOW switch to NORM.
- For the 198 to 242 voltage range: set the voltage range switch to 240V and the NORM/LOW switch to LOW.
- For the 216 to 264 voltage range: set the voltage range switch to 240V and the NORM/LOW switch to NORM.

For quick references, these settings are also listed in the table on the unit's rear panel.

2.6.4 CHASSIS/FLOATING GROUND SWITCH

Use the CHASSIS/FLOATING GROUND switch to connect the 7620 chassis to signal ground, or to break the connection.

- CHASSIS position: The chassis is shorted to the amplifier's signal ground.
- FLOATING position: The chassis and signal ground are disconnected.

Please note the chassis is tied directly to the ground connection on the AC receptacle.

2.6.5 REMOTE COMMUNICATIONS PORT

A GPIB/ IEEE-488 port is installed in the standard 7620 unit. An optional LAN and/or USB port is available upon request.

2.7 MENU

The 7620 menu consists of the nine selections listed below:

1. INPUT CONFIG (Input Configuration, Section 2.7.1)
2. INPUT COUPLING (Section 2.7.2)
3. AGA (Automatic Gain Adjustment, Section 2.7.3)
4. SAVE SETUP (Section 2.7.4)
5. RECALL (Section 2.7.5)
6. REMOTE ADDRESS (GPIB/LAN/USB), Section 2.7.6)
7. DEVICE INFORMATION (Serial Number and Software Version, Section 2.7.7)
8. SOUND (Section 2.7.8)
9. PRESS ENTER TO EXIT MENUS (Section 2.7.9)

Each menu selection is described in detail in the following sections.

To enter the menu, press the MENU key. Pressing the MENU key displays the first item in the list. To scroll through the menu, continue pressing the MENU key until you reach the desired option.

To select a menu option, press the ENTER key. Pressing the ENTER key activates that menu option and allows you to change the setting. When you activate the menu option, the setting flashes. To change the setting, press the up and down arrows, below the display, underneath either DC OFFSET or OUTPUT GAIN, until you reach the desired setting. Press the ENTER key to implement your changes and exit back to the menu.

CAUTION: All setting changes are implemented immediately upon pressing the ENTER key.

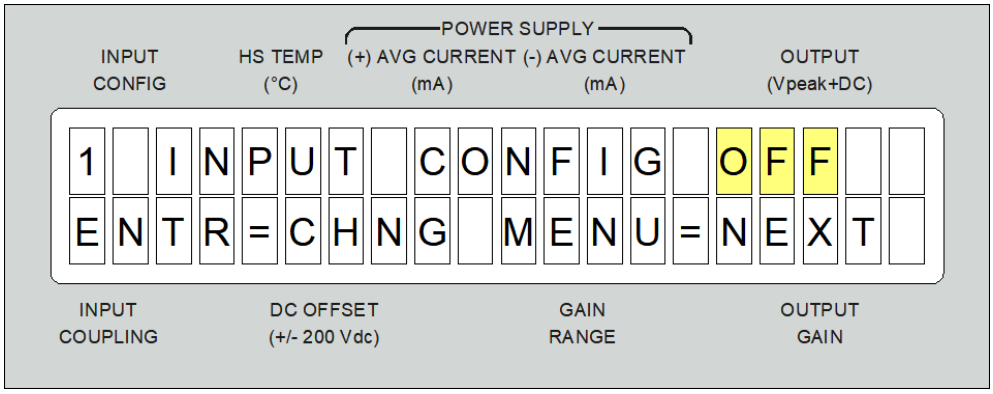
To exit the menu, scroll to option nine and press the ENTER key. The menu also times out after seven seconds of inactivity and the unit returns to normal operation.

2.7.1 INPUT CONFIGURATION

Input Configuration refers to the operation of the input connectors. You can change this setting through option one, INPUT CONFIG, in the menu system. You can choose between four settings: OFF, A, -B or A-B.

- OFF: Inputs are inactive
- A: Input A is active (single-ended, non-inverted)
- -B: Input –B is active (single-ended, inverted)
- A-B: Inputs A and –B are active (differential)

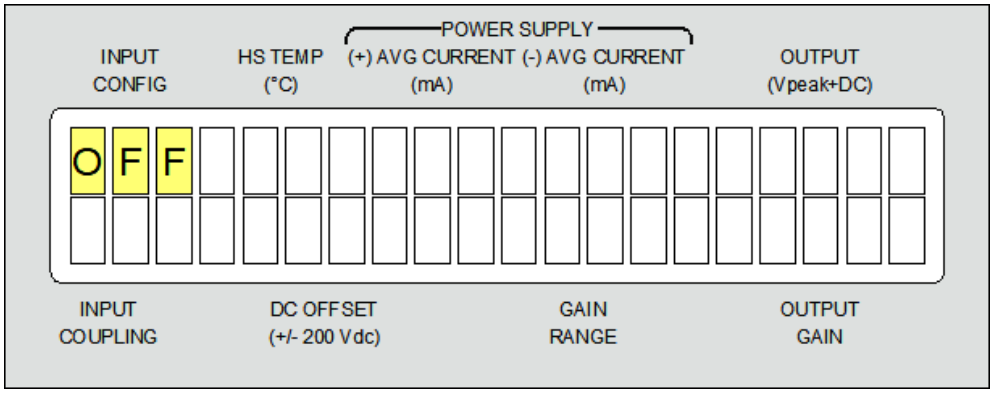
To change the input configuration, press the MENU key to enter the menu. INPUT CONFIG is the first menu item. Press the ENTER key, then use the up and down arrows to scroll through the options. Finally, press the ENTER key to change the setting.



CAUTION: Pressing the ENTER key changes the INPUT CONFIG setting immediately and activates/deactivates the inputs in real-time.

To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

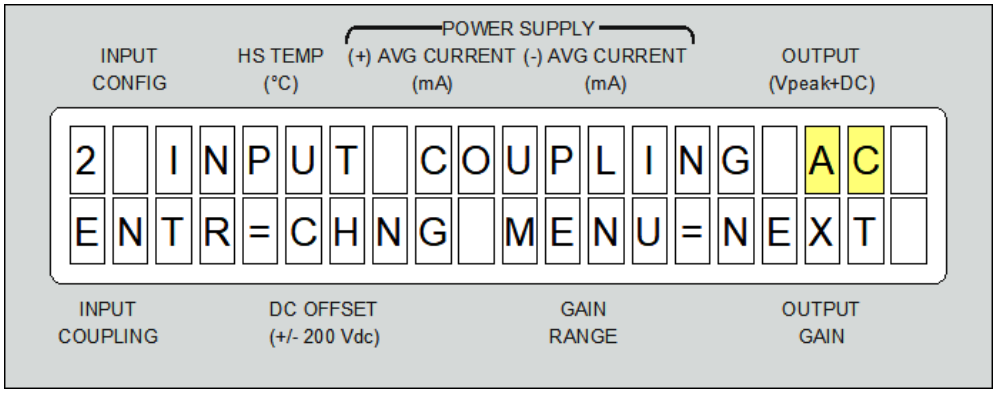
The active setting is located on the top line of the display below INPUT CONFIG.



2.7.2 INPUT COUPLING

The 7620 inputs accept either AC or DC signals. You must configure the inputs for your mode of operation using the INPUT COUPLING option. By default, the unit is set for AC. In this mode, there is a capacitor in both input signal paths to block DC signals. When DC is active, the unit bypasses the capacitors in the input paths to pass DC signals through. This setting affects both the A and –B inputs together.

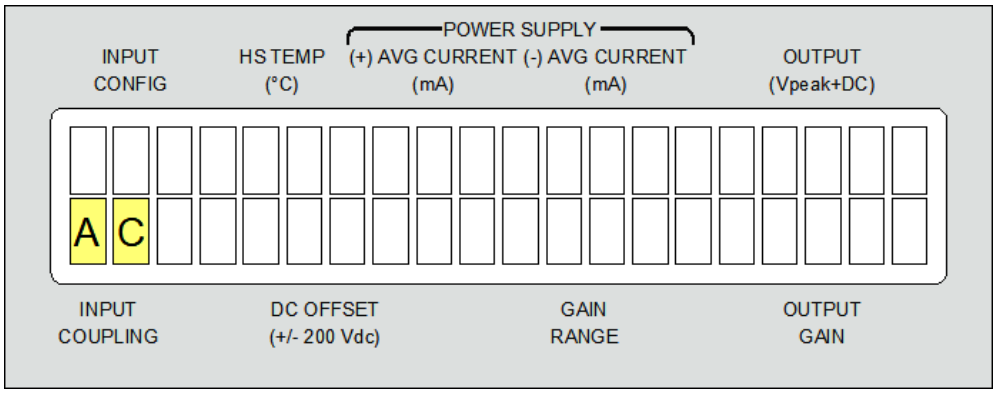
To change the input coupling setting, press the MENU key to enter the menu, and then press the MENU key again to scroll to INPUT COUPLING, which is the second menu item. Press the ENTER key, then use the up and down arrows to select either AC or DC. Finally, press the ENTER key to change the setting.



CAUTION: Pressing the ENTER key changes the INPUT COUPLING setting immediately and changes the inputs in real-time.

To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

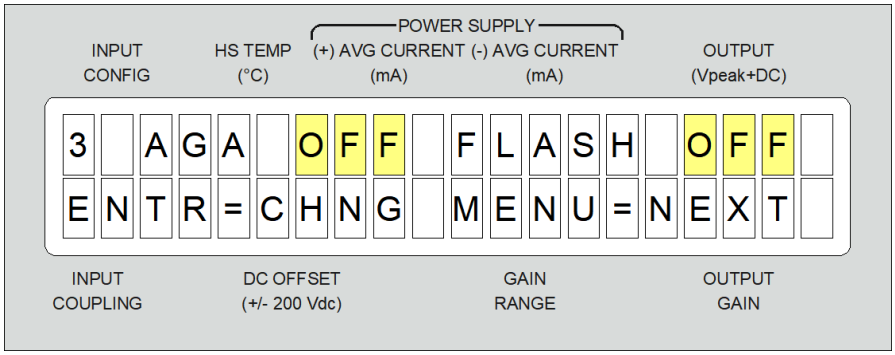
The active setting is located on the bottom line of the display above INPUT COUPLING.



2.7.3 AGA (AUTOMATIC GAIN ADJUST)

The Automatic Gain Adjust (AGA) feature prevents the unit from clipping the input or output signal. When enabled, the unit automatically reduces the output gain to eliminate output clipping and lowers the input gain range to eliminate input clipping. AGA is disabled by default and is controlled using menu option three.

To enable AGA, press the MENU key to enter the menu. Continue pressing the MENU key to scroll to option three. Next, press the ENTER key and use the up and down arrows to change the option to either setting one or setting two, as described in the table below. To disable the feature, set the option to setting three.



Setting	Operation	Description
1	AGA ON	AGA is enabled
	FLASH ON	AGA and Clipping LED flashing is enabled
2	AGA ON	AGA is enabled
	FLASH OFF	AGA and Clipping LEDs flashing is disabled
3	AGA OFF	AGA is disabled
	FLASH OFF	AGA and Clipping LEDs are disabled

Setting 1: This setting enables both the AGA feature and the LED indicators. When clipping is not detected the AGA LED is on solid and both clipping LEDs are off. When clipping occurs, both the AGA and CLIPPING (input or output) LEDs flash and the changes to the gain settings are implemented immediately. The corrected gain values are then reported on the display in the GAIN RANGE and OUTPUT GAIN areas. Press the ENTER key to stop the flashing LED's. Press the ENTER key a second time to restore the original output gain and gain range values.

Setting 2: This setting enables the AGA feature, but the CLIPPING LED's do not flash. The AGA LED remains solid when this setting is active, regardless of clipping activity. When clipping occurs, the CLIPPING LED's turn on solid and the corrected gain values are reported on the display in the GAIN RANGE and OUTPUT GAIN areas without warning. When clipping is removed the clipping LED's turn off.

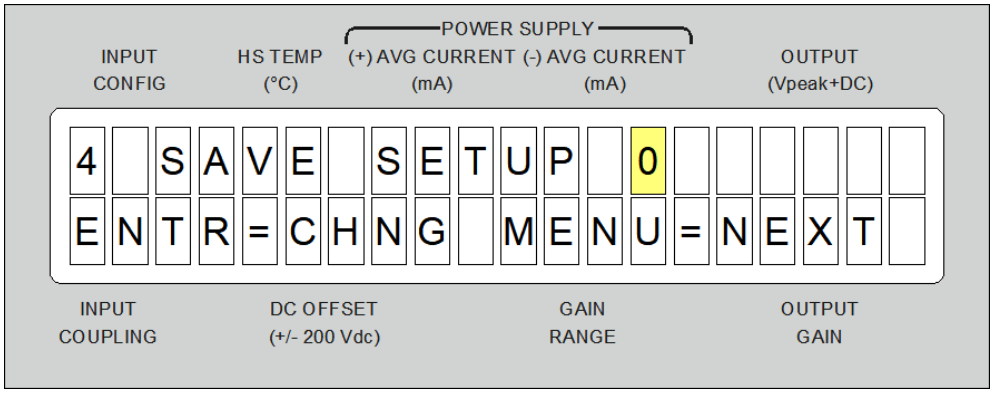
Setting 3: This setting disables the AGA feature and LED indicators.

To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

2.7.4 SAVE SETUP

Use option four in the menu system, SAVE SETUP, to save various configurations. You can save up to ten unique setups in memory.

To save your setup, press the MENU key to enter the menu. Continue pressing the MENU key to scroll to option four, SAVE SETUP. Next, press the ENTER key and use the up and down arrows to select a memory location, 0 through 9. Finally, press the ENTER key to save your setup to that location.

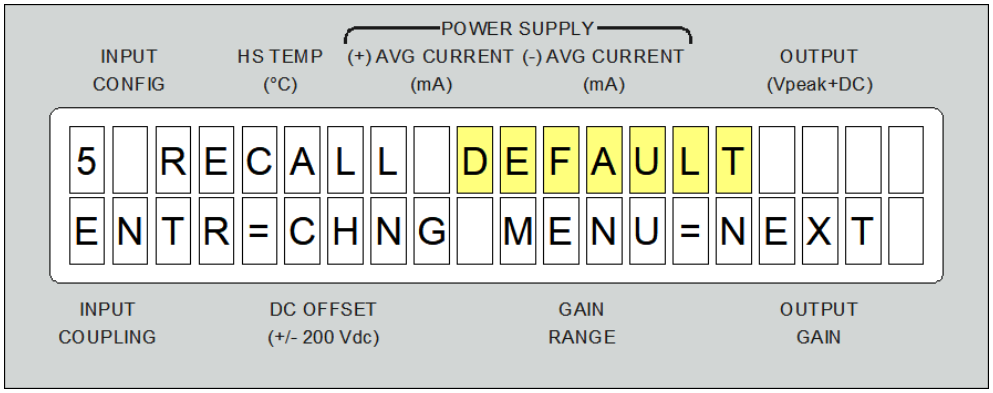


To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

2.7.5 RECALL SETUP

Use option five in the menu system, RECALL, to restore a previously saved setup.

To recall a saved setup, press the MENU key to enter the menu. Continue pressing the MENU key to scroll to option five, RECALL. Next, press the ENTER key and use the up and down arrows to select a memory location, 0 through 9, or DEFAULT. Finally, press the ENTER key to recall a saved setup.



The DEFAULT option restores the unit to factory default settings (refer to section 2.15). This does not reset the GPIB address or delete saved setups. If the unit is controlled remotely, restoring the default settings temporarily places the unit into local mode. Once remote activity is detected, however, the unit automatically returns to remote mode.

To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

2.7.6 REMOTE ADDRESS (GPIB/LAN/USB)

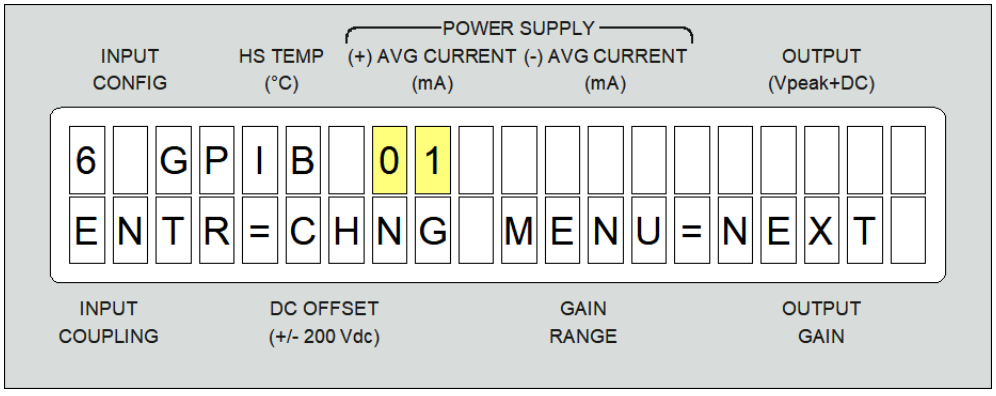
The 7620 is equipped with a remote communication port. Depending on the type installed, use option six to either set the GPIB address or select either USB or LAN.

To access the device's remote address, press the MENU key to enter the menu. Pressing this key also places the unit in local mode if the unit was in remote mode (indicated by an illuminated REMOTE LED). Continue pressing the MENU key to scroll to option six.

When unit is in remote mode, the REMOTE LED turns on solid and all front panel keys are disabled, except the MENU (LOCAL) key. All setting changes made via the remote interface are implemented immediately and actively reflected on the display. If the remote interface is disconnected, the unit reverts to local mode. When remote communication is reestablished, any activity addressed to the unit switches it back to remote mode.

GPIB

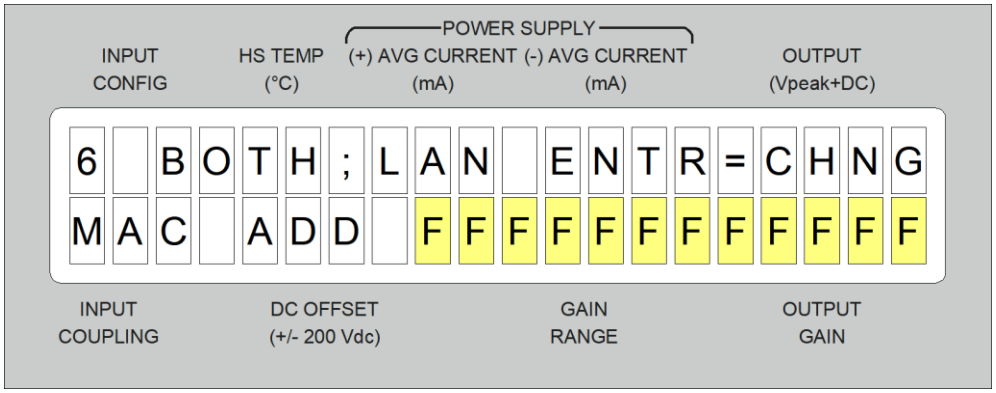
For GPIB units, press the ENTER key and use the up and down arrows to change the unit's address, 1 through 30. Press the ENTER key to set the address. Please note, that you cannot change the GPIB address remotely.



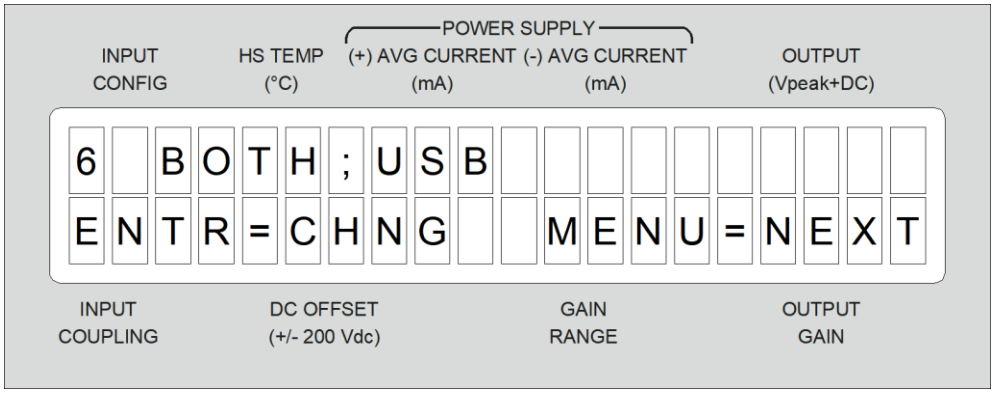
LAN OR USB

For units with both the USB and LAN option installed, use menu option six to select your communication type. To change the option, press the ENTER key, then use the up and down arrows to cycle between LAN and USB. Press ENTER to save the selection.

When LAN is selected, the factory set MAC address is displayed, as shown below. You cannot change this address.

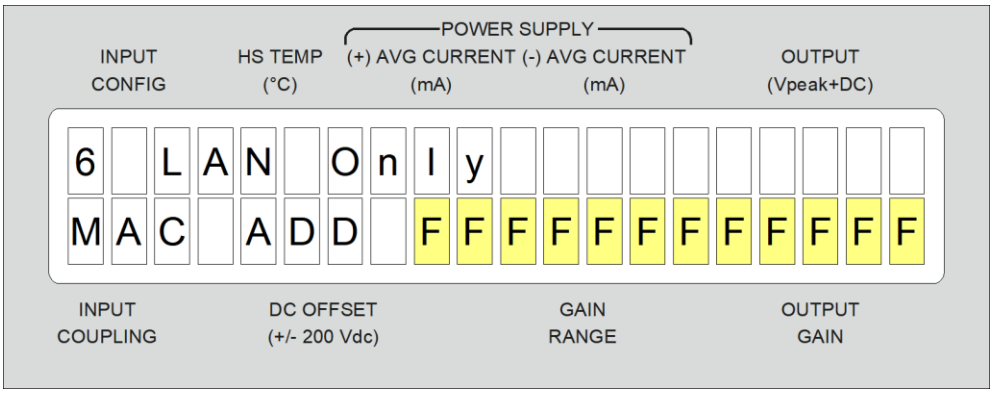


When USB is selected, the screen below is displayed. There is no address or additional information to display.



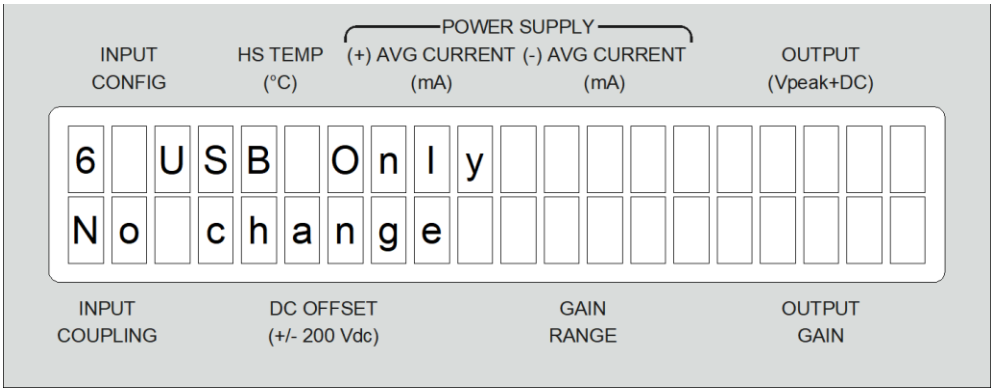
LAN ONLY

If the LAN only option is installed, menu option six displays the screen shown below, which contains the factory set MAC address. You cannot change this address.



USB ONLY

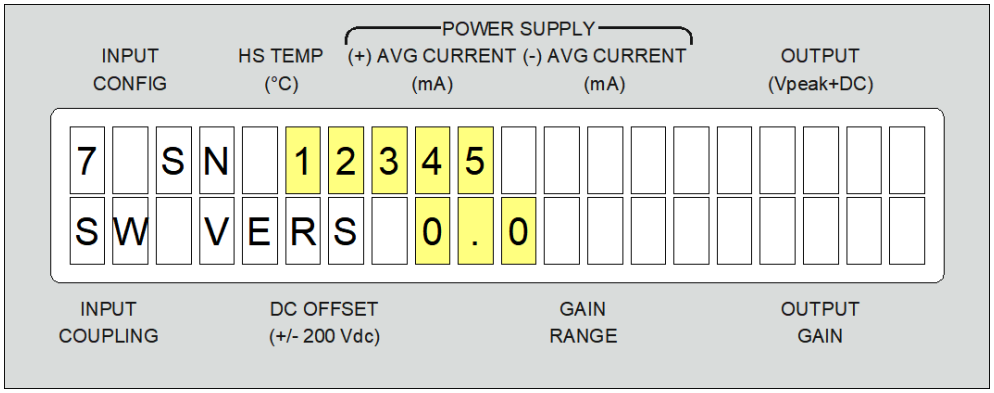
When USB only option is installed, menu option six displays the screen shown below.



2.7.7 DEVICE INFORMATION

Menu option seven displays the device information. This information is preset from the factory and cannot be changed. Included on this screen is the unit's serial number and software version.

To view this information, press the MENU key to enter the menu. Continue pressing the MENU key to scroll to option seven. The first line is the serial number (SN) and the second line is the software version (SW VERS).



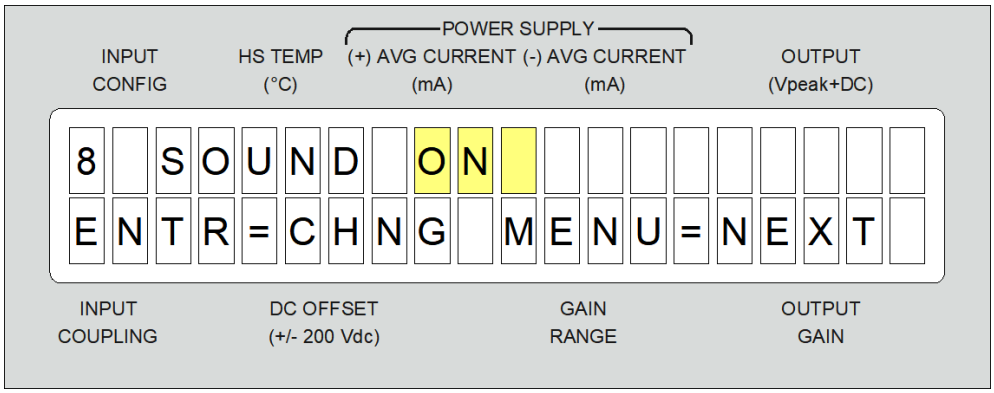
To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

NOTE: On power-up, the unit momentarily displays the software version.

2.7.8 SOUND

By default, the unit's sound indicator is enabled and this indicator generates a momentary beep with each key press, as well as, produces audible alerts. This feature is controlled with menu option eight.

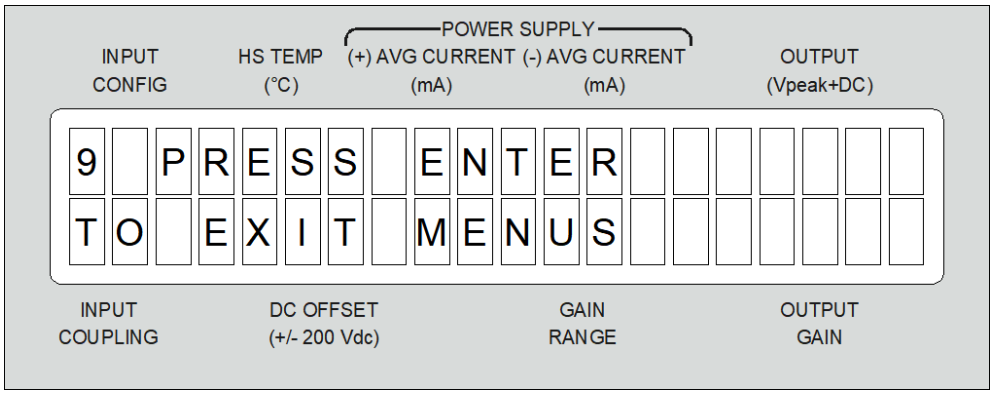
To disable the sound, press the MENU key to enter the menu. Continue pressing the MENU key to scroll to option eight. Next, press the ENTER key and use the up and down arrows to change the option to OFF. Finally, press the ENTER key to change the setting. To re-enable the sound set the option to ON.



To exit the menu, either scroll to option nine and press the ENTER key or wait until the menu times out.

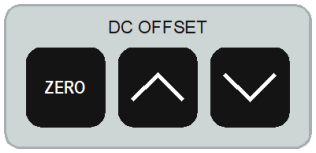
2.7.9 EXIT

To exit the 7620 menu system, scroll to option nine by pressing the MENU key. When you reach option nine press the ENTER key to return the unit to normal operation.



2.8 DC OFFSET

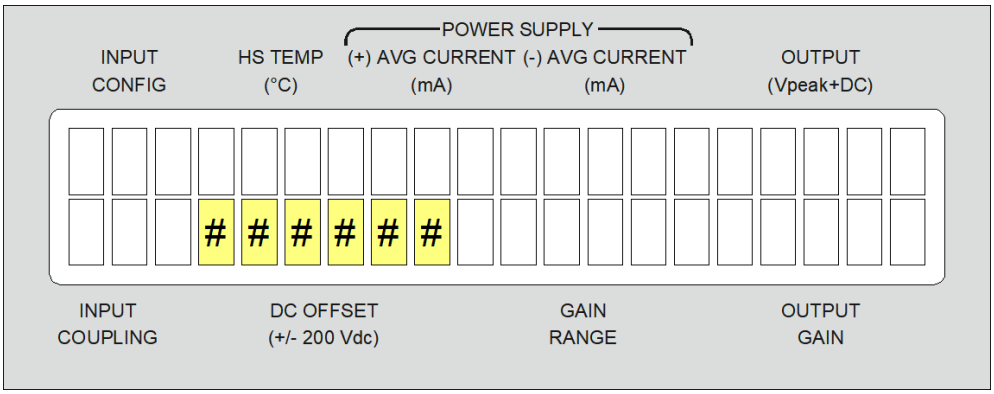
During normal operation, press the DC OFFSET up and down arrow keys to change the setting.



CAUTION: Pressing the DC OFFSET arrow keys changes the setting immediately and changes the output signal in real-time.

You can change the setting either incrementally with a single key press or by holding down the arrow keys to change the setting quickly. The value on the display changes as you press the arrow keys and flashes for three seconds after reaching the final setting.

The active setting is located on the bottom line of the display above DC OFFSETT.

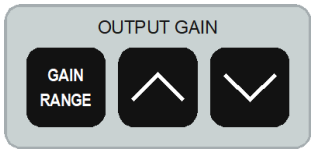


Pressing the DC OFFSET ZERO key restores the setting to zero immediately.

NOTE: The maximum peak output voltage (AC+DC), including the DC OFFEST value, cannot exceed ±200V.

2.9 OUTPUT GAIN

During normal operation, press the OUTPUT GAIN up and down arrow keys to change the setting.

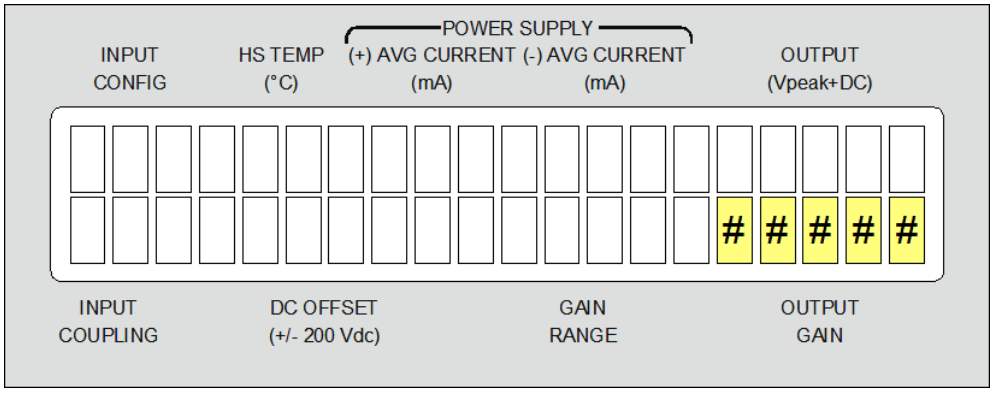


CAUTION: Pressing the OUTPUT GAIN arrow keys changes the setting immediately and changes the output signal in real-time.

You can change the setting either incrementally with a single key press or by holding down the arrow keys to change the setting quickly. The value on the display changes as you press the arrow keys and flashes for three seconds after reaching the final setting.

To quickly change the OUTPUT GAIN to the X0 setting in any range, hold the OUTPUT GAIN down arrow key and press the DC OFFSET ZERO key.

The active setting is located on the bottom line of the display above OUTPUT GAIN.



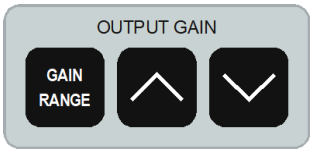
You cannot adjust the OUTPUT GAIN to a value larger than the GAIN RANGE. For example, if the GAIN RANGE is set to X25 and you attempt to adjust the OUTPUT GAIN to a higher value, both items on the display flash to indicate you have reached the upper limit of the range. The display values flash for three seconds after releasing the key.

2.10 GAIN RANGE

The unit has three selectable gain ranges: X5, X25 and X125. Use these settings to increase the sensitivity for small signals and decrease the sensitivity for larger signals (up to 200V). This prevents the input stage from clipping the input signal. The table below lists the available output gain ranges with the corresponding input gain value. In addition, the table indicates the maximum allowable input voltage levels for each range before clipping occurs on the input signal. The resolution column shows the supported incremental changes to the OUTPUT GAIN value.

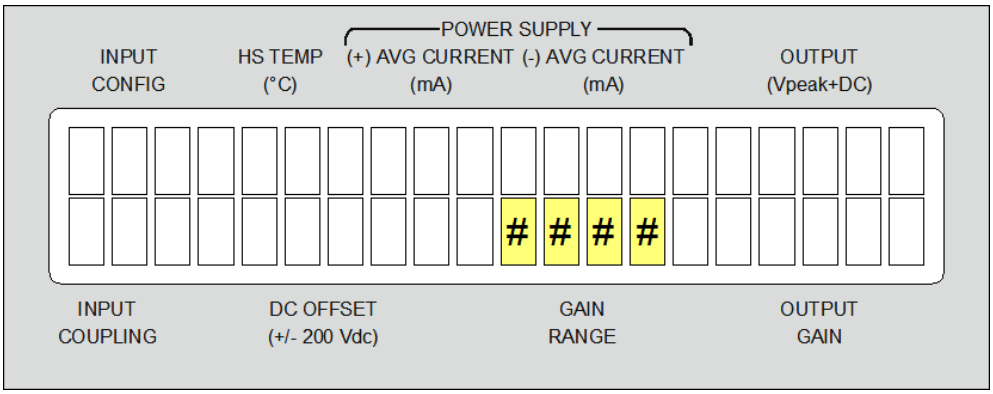
Output Gain Range	Input Amplifier Gain	Max Input Voltage	Output Gain Resolution
X5	X0.05	±200V	X0.1 Increments
X25	X0.25	±40V	X0.5 Increments
X125	X1.25	±8V	X1.0 Increments

To change the gain range, press the GAIN RANGE key. The setting changes immediately to the next value with each key press until reaching the desired range. When starting at X5 or X25, the value increases until reaching X125. When starting at X125, the value decreases to X25, then X5.



CAUTION: Pressing the GAIN RANGE key changes the GAIN RANGE setting and output signal immediately.

The active setting is located on the bottom line of the display above GAIN RANGE.



If the current OUTPUT GAIN setting is larger than the new GAIN RANGE's maximum setting, the value is set to the new range's maximum setting. For example, if the GAIN RANGE is set to X25 and the OUTPUT GAIN is set to X15.0, then you change the GAIN RANGE to X5, the OUTPUT GAIN changes to X5.0. If the OUTPUT GAIN value is within the new range, then it remains unchanged. Please note that the DC OFFSET value is momentarily set to 0 while the GAIN RANGE is adjusted, then restored to its previous level.

Additionally, when the GAIN RANGE is changed, the unit's power amp input is momentarily disconnected and grounded to reduce the amplifier noise while the internal range adjustment relays change. The power amp is turned back on after a brief settling time. The gain and offset levels are then raised back to their current settings from a 0V output setting.

NOTE: A minimum signal of ±1.6V peak is required to achieve maximum output at X125.

2.11 PREVIOUS SETTING (ENTER) KEY

While in normal operation, the ENTER key's second function, PREVIOUS SETTING, is active. This function restores the most recent change to its last setting. This applies to INPUT CONFIGURATION, INPUT COUPLING, DC OFFSET, GAIN RANGE and OUTPUT GAIN. To restore the unit to its last setting, simply press the ENTER KEY. When you press the key, the unit's previous setting is immediately restored. Please note, that if you power down the unit, restoring power clears the most recent change, so it cannot be restored.

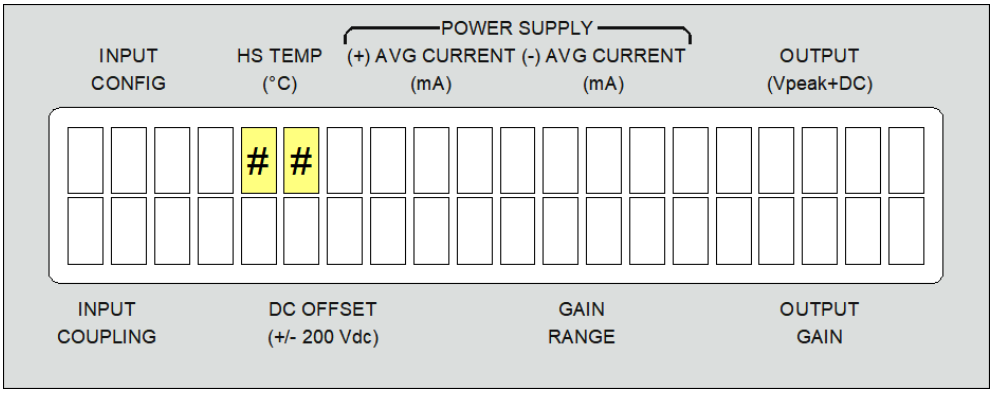
With this function you can quickly switch the unit between two complete unit setups. You can use it to switch between the current active setup and a saved setup or between two saved setups.

To switch between the current active setup and a saved setup, first recall your saved setup using option five in the menu system. This changes the unit settings to the saved setup. Next, simply press the ENTER key to recall the previous active setup. Please note that if you make any manual changes to any settings, you can't use the PREVIOUS SETTING function to recall the last unit setup. It only restores the single setting change.

To switch between two saved setups, first recall a saved setup using option five, RECALL, in the menu system. Next, recall a second saved setup. When the unit returns to normal operation, simply press the ENTER key to switch between the two saved setups.

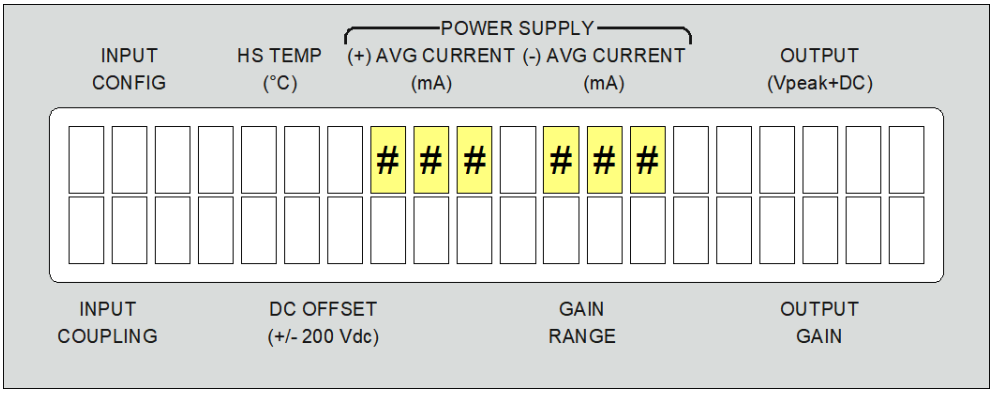
2.12 HEATSINK TEMPERATURE MONITOR

The 7620 continuously monitors the temperature of the heatsink on the interior of the unit and actively reports it on the top line of the display, below HS TEMP, in °C. Temperature in excess of 55°C triggers an audible alert (when enabled) and flashes the value on the display, indicating a problem. In this situation, the output is disabled until the problem is corrected and the temperature drops below 50°C. Please be aware that when the SOUND option is disabled through the menu, this audible alert is also disabled.



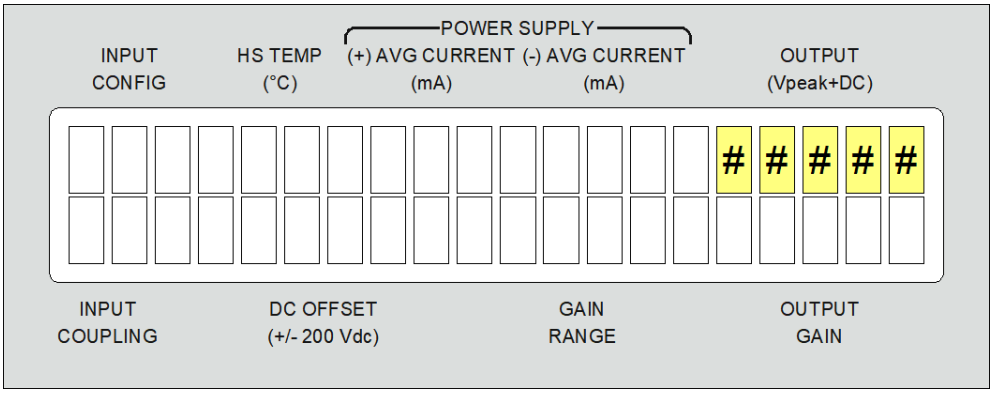
2.13 AVERAGE CURRENT MONITOR

The 7620 continuously monitors the average current from the unit's power supply. This value is actively reported on the top line of the display below (+) AVG CURRENT and (-) AVG CURRENT. Current in excess of +200Ma or -180Ma triggers an audible alert (when enabled) and flashes the value on the display, indicating a problem. The built-in current-limiting circuit prevents an overload and causing damage to the unit. Please be aware that when the SOUND option is disabled through the menu, this audible alert is also disabled.



2.14 OUTPUT VOLTAGE MONITOR

The 7620 continuously monitors the peak output voltage with 1V resolution. This value is actively reported on the top line of the display below OUTPUT (Vpeak+DC). Voltage in excess of ±200V triggers an audible alert (when enabled) and flashes the value on the display, indicating a problem. The built-in voltage-limiting circuit prevents an overload and causing damage to the unit. Please be aware that when the SOUND option is disabled through the menu, this audible alert is also disabled.



2.15 DEFAULT SETTINGS

The following are the factory default settings:

- INPUT CONFIGURATION = OFF
- INPUT COUPLING = AC
- GAIN RANGE = X5
- OUTPUT GAIN = X1
- DC OFFSET = 0
- AGA AND INDICATOR = OFF
- SOUND = ON
- OUTPUT RELAY = CLOSED
- LOCAL MODE

The following settings are retained when the unit is powered down and restored on power-up.

- INPUT CONFIGURATION
- INPUT COUPLING
- OUTPUT GAIN
- GAIN RANGE
- DC OFFSET
- AGA
- SOUND
- OUTPUT RELAY STATE
- LOCAL/REMOTE
- GPIB ADDRESS (when installed)
- USB or LAN active (when installed)

SECTION 3 REMOTE COMMUNICATION

3.1 INTRODUCTION

The standard 7620 is equipped with a GPIB/IEEE-488 remote communications port. An optional LAN or USB option is also available. The following section describes the programming commands and details how to set up each communication type.

3.2 GPIB/IEEE-488 SETUP

To communicate over the GPIB bus, an IEEE-488 controller is required, in addition to compatible IEEE-488 software. The 7620, with the GPIB option installed, includes a 24-pin, female IEEE-488 compatible connector on the rear panel. See section 2.7.6 for instructions to configure the 7620 GPIB address (from 0 to 30). Each device must have a unique address. A system supports up to fifteen interconnected devices on a single bus, including the controller. Connect the units together in a star configuration, linear configuration, or any combination of the two. The maximum total wire length in any system is 20 meters and a maximum of 4 meters between units, with an average distance of 2 meters between units over the entire bus. For further details, refer the latest IEEE-488 standard.

3.3 GPIB/IEEE-488 INTERFACE COMMANDS

The 7620 uses the standard IEEE-488 protocol, including standard interface messages. Included in this section are the supported interface capabilities and device commands.

Note: By default, the unit powers-up in local mode in the listener idle state. If an MLA command is received with an active ATN or REN signal, the 7620 immediately enters remote mode in the listener active state. When power is lost, the local/remote status is retained and restored upon power-up.

The following interface capabilities are supported by the GPIB/IEE-488 interface: SH1, AH1, T6, L4, SR1, RL0, PP1, DC0, DT0, E1.

FUNCTION	ABBREVIATION	DESCRIPTION
SOURCE HANDSHAKE	SH1	FULL CAPABILITY
ACCEPTOR HANDSHAKE	AH1	FULL CAPABILITY
BASIC TALKER	T6	ALLOWED TO TRANSMIT DATA, NO TALK ONLY MODE, CAN'T BE TALKER AND LISTENER SIMULTANEOUSLY, RESPONDS TO SERIAL POLL
BASIC LISTENER	L4	ALLOWED TO RECEIVE DATA, NO LISTEN ONLY MODE, CAN'T BE TALKER AND LISTENER SIMULTANEOUSLY
SERVICE REQUEST	SR1	FULL CAPABILITY
REMOTE-LOCAL	RL0	NO CAPABILITY
PARALLEL POLL	PP1	RESPONDS TO PARALLEL POLL, ALLOWS CONTROLLER TO CONFIGURE PARALLEL POLL
DEVICE CLEAR	DC0	NO CAPABILITY
DEVICE TRIGGER	DT0	NO CAPABILITY
ELECTRICAL DRIVERS	E1	OPEN COLLECTOR DRIVES ELECTRONICS

The following chart contains the GPIB interface commands:

COMMAND	FUNCTION	DEFINITION
MLA	My Listen Address	When sent with ATN= 1, the unit enters listener active state waiting for a command string. The unit enters remote mode when it receives this command.
MTA	My Talk Address	When sent with ATN= 1, the unit enters talker active state and transmits responses previously set up by the MLA and a query command.
UNL	Un-Listen	When sent with ATN = 1, the unit enters listener idle state and ignores all messages, except for MLA. The unit remains in remote mode.
*IFC (or signal)	Interface Clear	Resets communication bus, and places the unit into listener idle state. If unit is in local mode when the command is received, it's placed into remote mode.
*STB?	Status Byte Register	Reads status byte register.
*DCL	Device Clear	Clears all devices.
*SDC	Selected Device Clear	Clears only the addressed device
*IDY?	Identify	Used in parallel mode to cause unit to output parallel bit if cause of SQR.
*PPC	Parallel Poll Configure	Puts devices into parallel configure mode.

COMMAND	FUNCTION	DEFINITION
*PPU	Parallel Poll Unlisten	Removes all devices in parallel poll mode and sets them to unlisten.
*PPE1-8	Parallel Poll Mode Enable	Sets bit to use for reporting during *IDY? Query.
*PPD	Parallel Poll Disable	Clears parallel poll mode and clears PPE bit setting to 0.
*SPE	Serial Poll Enable	Puts the unit into serial poll mode. Responds with status byte register and clears SRQ when MTA is sent
*SPD	Serial Pole Disable	Removes unit from serial pole mode.

3.4 REMOTE PROGRAMMING COMMANDS

To change the 7620 settings remotely, use the commands listed in the chart below. These commands are used for all connection types, GPIB, LAN and USB. For GPIB, in order to use these commands, the unit must be in an active listener state. Otherwise, precede the commands with an MLA command and ATN signal.

COMMAND	FUNCTION	DEFINITION
*GTL	Go to Local	When sent with ATN = 1, the unit enters listener idle state and returns to local mode.
*RST	Reset all devices listening	Resets the device to listener idle mode.
*IDN?	Request Identification	Precede command with MLA and follow with MTA. Format: **Krohn-Hite, Model 7620, SN XXXXXX,** **FP SWV X.X, GPIB SWV X (EOI)** **SN = Serial Number** **FP SWV = Front Panel Software Version** **IO SWV = IO Module Software Version**
Gxxxx	Set Output Gain	xxxx = output gain value (max 4 digits, including decimal point, leading and trailing 0's not required) Examples: G22 (gain = 22); G1.1 (gain = 1.1) Maximum value depends on gain range: 5, 25 or 125.
OFS±xxxxx	Set DC Offset	xxxxx = dc offset value (max 5 digits, including decimal point; must include + or – character for polarity, leading and trailing 0's not required) Examples: OFS+100.5 (DC Offset = +100.5V); OFS-12 (DC Offset = -12V) The maximum value is ±200.
IC(A,B,D,O)	Set Input Configuration	ICA = +A ICB = -B ICD = Input A-B ICO = Input Off
AC, DC	Set Input Coupling	AC = AC coupled DC = DC coupled
RNG(5,25,125)	Set Gain Range	RNG5 = X5 Range RNG25 = X25 Range RNG125 = X125 Range
SOU(0,1)	Sound setting	SOU1 = Sound On SOU0 = Sound Off

COMMAND	FUNCTION	DEFINITION
AGA(0,1); AGI(0,1)	Enable/Disable Automatic Gain Adjust (AGA) and LED Indicator	AGA1 = AGA On, AGA0 = AGA Off AGI1 = AGA Indicator On, AGI0 = AGA Indicator Off Note: The AGA and AGI functions are linked. When AGA = 1, AGI is settable. When AGA = 0, AGI is ignored.
COR, DOR	Connect /Disconnect Output Relay	COR = Connect the Output Relay DOR = Disconnect the Output Relay
ST(0-9)	Save Setup	Saves the current setup in specified memory location (0 through 9).
RL(0-9)	Recall Setup	Recall the setup stored in memory location (0 through 9).
DER	Default	Restores the unit to default settings.
PRV	Previous Setting	Restores the unit's previous setting (see section 2.11).
RCS?	Request for Status	Precede command with MLA and follow with MTA. Format is: **(T)** Heatsink Temperature (°C) **(-I)** – Power Supply current (mA) **(+I)** + Power Supply current (mA) **(V)** Output Voltage (Peak + DC) **(G)** Gain Value **(RNG)** Gain Range **(OFS)** Offset Value **(IC)** Input Clipping Occurring (0 = No, 1 = Yes) **(OC)** Output Clipping Occurring (0 = No, 1 = Yes) **(AGL)** AGA Limiting Activity (0 = No, 1 = Yes) Example: **T27,-I120,+I100,V50,G42,RNG25,OFS5,IC1,OC0, AGL0 (EOI)**
RCC?	Request Current Configuration	Precede command with MLA and follow with MTA. Format is: **(ICA,ICB,ICD,ICO)** Input Configuration (see IC command) **(AC, DC)** Input Coupling **(G)** Gain Setting **(OFS)** DC Offset **(RNG)** Gain Range **(CONN, OPEN)** Output Relay Status **(AGA)** Automatic Gain Adjust (0 = Off, 1 = On) **(AGI)** AGA Indicator (0 = Off, 1 = On) **(SOU)** Sound On (0 = Off, 1 = On) Example: **ICO,DC,G0125,OFS+8.0,RNG125,CONN, AGA0,AGI0, SOU1 (EOI)**

COMMAND	FUNCTION	DEFINITION
?	Service Request Info Request	Sending "?" followed by the MTA command causes the unit to respond with an error code that defines the hardware service request. It also clears the request. The number is reported in SBT response to Serial Poll SBT # / Error messages are as follows: **0/ No Message (EOI)**: Sent if nothing available or if no change is made. **1/ Change Accepted**: Sent if change is made. **2/ No Entry G, O, R, I, S (EOI)**: Sent if value not allowed. Definitions: **G** =Gain out of bounds **O** = Offset out of bounds **R** = Range out of bounds **I** = Input Configuration out of bounds **S** = Serial Number or Date Code out of bounds **3/ Gain Beyond Range (EOI):** Sent if Gain value is beyond the range of the range setting. **4/ Unrecognized (EOI):** Sent if command invalid. **5/ Store Must be 0 to 9 (EOI:** Sent if a store request is not 0 to 9. **6/ Recall Must be 0 to 9 (EOI)**: Sent if a recall request is not 0 to 9. **7/ Recall NA** (**EOI**): No previous store done. Subsequent requests result in "No Message" (EOI) being returned.

3.5 LAN (LOCAL AREA NETWORK) SETUP

The optional LAN communication port provides TCP/IP connectivity. Connect the unit, from the RJ45 Ethernet connector on the rear panel, either to your network or directly to your PC. Detailed in this section are instructions to connect the 7620 using both methods, as well as, how to find the unit's dynamic IP address or to configure a static IP address.

3.5.1 NETWORK CONNECTION

To connect the 7620 to your LAN, plug a straight-through CAT5e Ethernet cable, from your network, into the Ethernet port on the unit's rear panel. Next power-up the unit so it can automatically obtain an IP address from your network's DHCP server. You can find the unit's IP address using Krohn-Hite's LANScan software. Refer to section 3.5.3 for instructions.

3.5.2 DIRECT PC CONNECTION

To connect the 7620 directly to your computer, plug a crossover CAT5e Ethernet cable, from your PC's network card, into the Ethernet port on the unit's rear panel. Next power-up the unit so it can automatically obtain an IP address from your computer. You can find the unit's IP address using Krohn-Hite's LANScan software. Refer to section 3.5.3 for instructions.

3.5.3 FIND UNIT'S IP ADDRESS

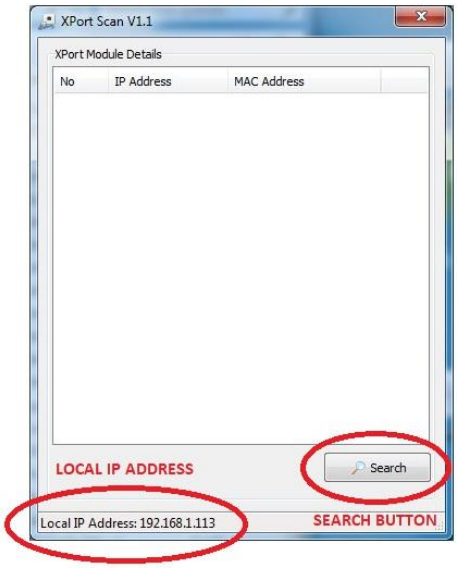
Use Krohn-Hite's LANScan application to find the 7620's IP address, assigned from either your network's DHCP server or your computer. The 7620 must be powered up and connected to either your LAN or PC before searching for the IP address.

To download the LANScan.exe file from Krohn-Hite's website, go to www.krohn-hite.com and click on the IP Scanner link below Software on the main page, or use the link below:

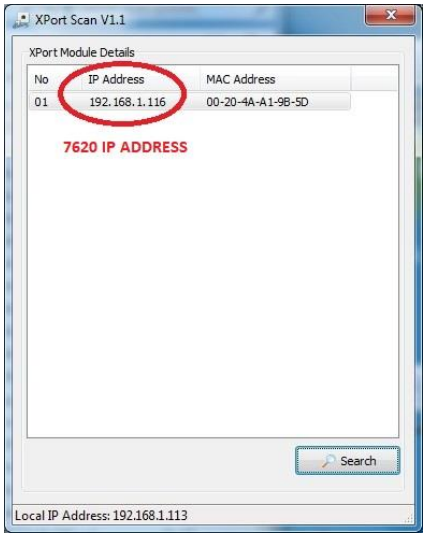
https://www.krohn-hite.com/htm/calibrators/Progr/LANScan.exe

LANScan is single executable file that does not require installation. Simply double-click the file to run the software. Windows may present security warnings when attempting to start the program; follow the instructions on the prompts to run the software.

Initially, the list of devices is blank, as shown in the image below (Xport Module refers to Krohn-Hite instruments). Your local computer's IP address is shown at the bottom of the window. Click on the search button to find the 7620.



Match the unit's MAC address (see section 2.7.6) to a device listed to ensure you found the correct unit. Use the IP address in the corresponding column to communicate to the instrument.

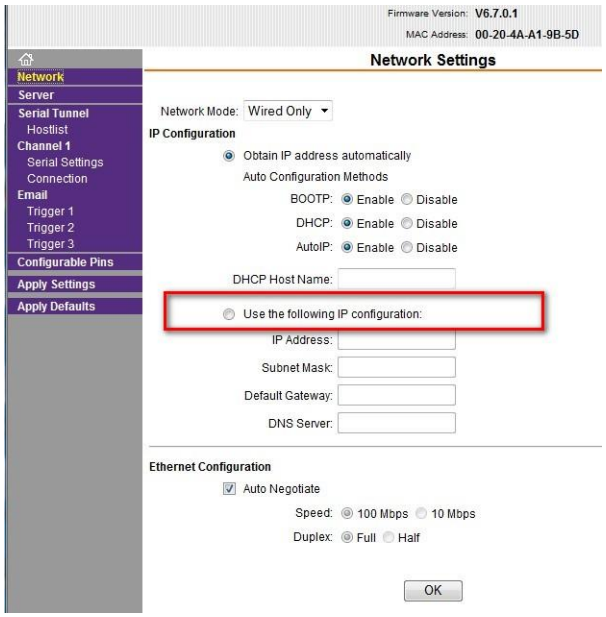


3.5.4 SET A STATIC IP ADDRESS

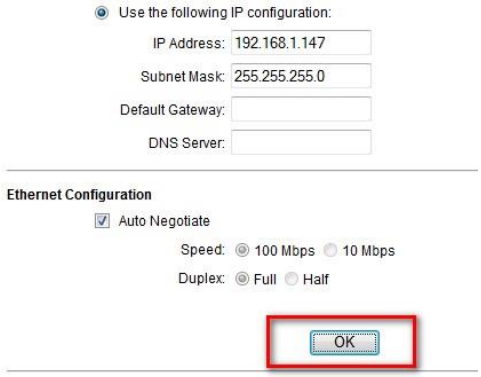
If you prefer to use a static IP address, follow the instructions in section 3.5.3 to find the unit's current IP address. Now, open your internet browser and type the unit's IP address into the browser's address bar. When prompted for a username and password, leave both fields blank and click OK. If a password was previously defined, leave the username field blank and enter the password. When finished, the Device Server Configuration Manager opens. Follow these steps to change the IP address:

1. Click on Network to open the Network Settings screen.

2. Select the "Use the following IP configuration" option.



3. Enter the new IP address, then the subnet mask, which is typically 255.255.255.0. Click OK at the bottom the screen, when finished. Leave the other fields blank, unless required by your network.



4. Click Apply Settings and wait for the notification that the LAN rebooted and saved the new settings.

5. Close the internet browser.

3.6 LAN COMMUNICATION

A terminal emulator software application, such as PuTTY or Tera Term, is required to communicate to the 7620 through a LAN connection; both applications are free and open source. You may also use any other terminal emulator you prefer. Refer to the user documentation supplied with the terminal software for complete instructions.

Tera Term is available for download at: https://osdn.net/projects/ttssh2/releases

PuTTY is available for download at: https://www.putty.org.

For LAN connections, choose the TCP/IP connection type, select the Telnet service, and enter the IP address (Host) of your device (see section 3.5.3 or 3.5.4) and use port 10027.

Type the commands listed in section 3.4 into the terminal emulator software to configure your 7620.

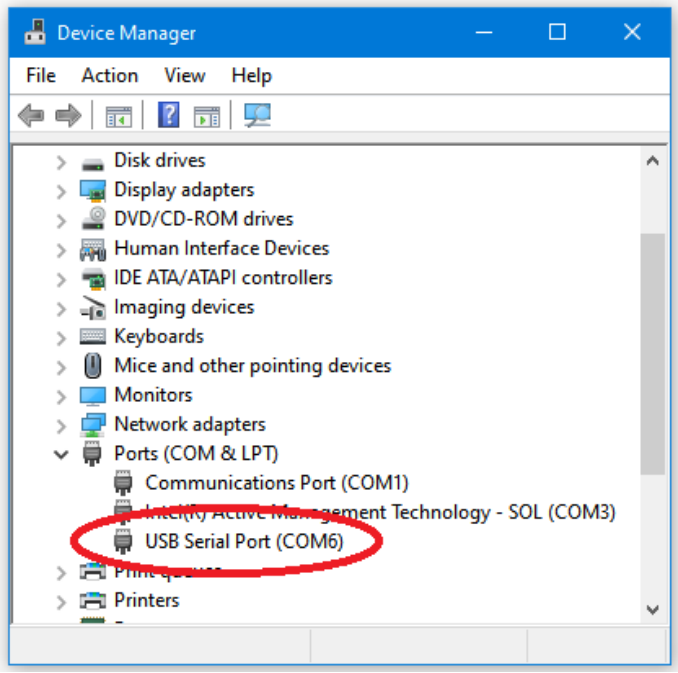
3.7 USB SETUP

The optional USB communication port provides USB 2.0 functionality. Simply connect the unit, from the USB Mini Type B 5-pin connector on the rear panel, directly to any USB port on your computer using a standard USB cable.

Typically, the USB drivers install automatically when the unit is plugged into a PC. If not, visit https://www.ftdichip.com/Drivers/VCP.htm on the FTDI Chip website and download and install the VCP (Virtual COM Port) drivers. Be sure to choose the driver matching your computer's operating system.

Once installed, the USB port acts as virtual COM port, functioning like an ordinary serial port. Each 7620 USB device is pre-programmed with a unique serial number matching the serial number of the instrument. This means that once installed on your PC, the COM port number assigned to the device remains the same, regardless of which USB port it's connected to or if the unit is unplugged, then reconnected later to the same PC. Additionally, you can connect multiple USB enabled Krohn-Hite instruments to the same computer, since each is assigned a unique COM port number.

To find the COM port number assigned to the 7620, open Device Manager on your PC and scroll down to Ports (COM & LPT). As shown below, the device appears as a USB Serial Port followed by the COM port number. In this example it's COM6.



3.8 USB COMMUNICATION

In order to communicate to your USB device, a terminal emulator software application, such as PuTTY or Tera Term, is required; both applications are free and open source. You may also use any other terminal emulator you prefer. Refer to the user documentation supplied with the terminal software for complete instructions.

Tera Term is available for download at: https://osdn.net/projects/ttssh2/releases

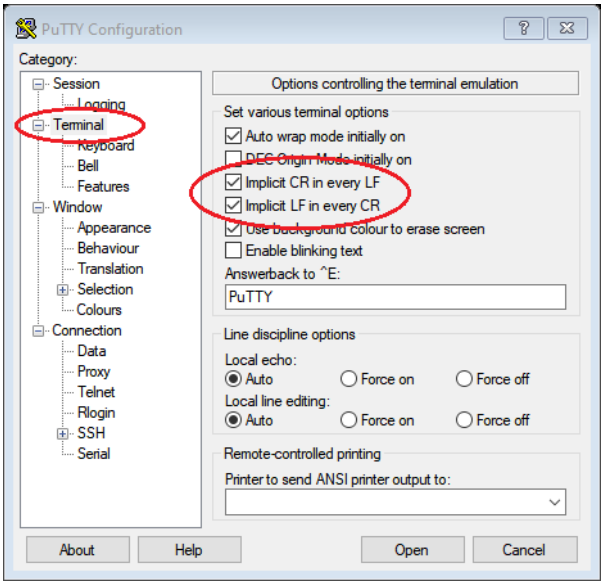
PuTTY is available for download at: https://www.putty.org.

For USB connections, choose the serial connection type and select the COM port number of your device (see section 3.7). Configure the COM port with the following settings:

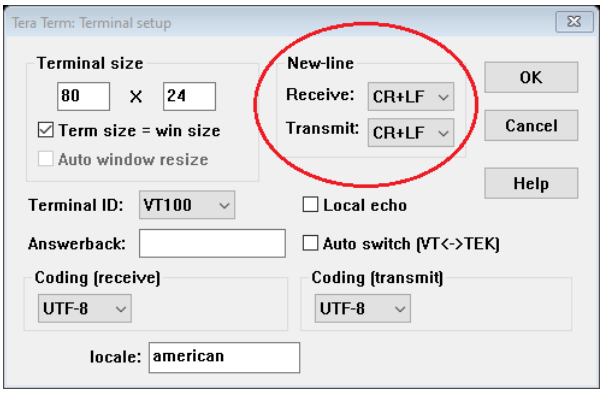
- Bits per second: 38400 (also referred to as Baud Rate or Speed)
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Also, in the terminal setup, CR+LF must be selected, as shown below:

PuTTY



Tera Term



Type the commands listed in section 3.4 into the terminal emulator software to configure your 7620.

SECTION 4 INCOMING ACCEPTANCE

4.1 INTRODUCTION

To verify the 7620 is operating within specifications, follow the procedures in this section.

NOTE: Perform all tests with the covers on the unit.

For reference, the non-inverted output is marked with a sine wave and the inverted output is marked with an inverted sine wave, as shown below.

 Non-Inverted Output

 Inverted Output

4.2 REQUIRED TEST EQUIPMENT

Below is the list of required test equipment:

- DC voltmeter able to measure 1mV to 200V with 0.1% accuracy at 200V. Fluke 8010A or equivalent.
- AC voltmeter able to measure 100mV to 150Vrms with a 1MHz bandwidth. Fluke 8920A RMS voltmeter or equivalent.
- Dual channel oscilloscope with X10 probes and a 50MHz bandwidth. Tektronix 2245A or equivalent.
- 1kΩ, 40W resistive load.
- Sine wave Source from 10Hz to 1MHz.
- Sine wave source with <0.01% distortion at 1kHz. Krohn-Hite 4402B or equivalent.
- Square wave source from 1kHz to 200kHz with 40ns rise and fall time and 5% aberrations.
- Distortion Analyzer able to measure down to 0.005%. Krohn-Hite 6900B or equivalent.

4.3 FRONT PANEL SELF-TEST

Perform the front panel self-test:

1. Power up the unit.
2. Set the output switch to DISCONNECT (O).
3. Press the MENU and ENTER keys simultaneously.
4. Follow the instructions presented on the display.

4.4 DC OFFSET AND PEAK VOLTS DISPLAY CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
OFF	DC	X125	X0	0V	DISCONNECT

1. Set the output switch to CONNECT (I)
2. Set DC OFFSET to each voltage listed in the table below (both + and -) and measure the output voltage with a voltmeter. Verify each measurement is within the specified range. Also verify the front panel display reads the magnitude of the voltage ±1V.

NOTE: Take measurements on both the non-inverted and inverted outputs. The inverted output voltage polarity is opposite the non-inverted output.

VOLTAGE	RANGE (±2.5%)
±0.1V	±0.0975V to ±0.1025V
±0.5V	±0.4875V to ±0.5125V
±1V	±0.975V to ±1.025V
±5V	±4.875V to ±5.125V
±10V	±9.75V to ±10.25V

VOLTAGE	RANGE (±1%)
±20V	±19.8V to ±20.2V
±40V	±39.6V to ±40.4V
±60V	±59.4V to ±60.6V
±80V	±79.2V to ±80.8V
±100V	±99V to ±100V
±120V	±118.8V to ±121.2V
±140V	±138.6V to ±141.4V
±160V	±158.4V to ±161.6V
±180V	±178.2V to ±181.8V
±200V	±198V to ±202V

NOTE: During this test verify both CLIPPING LEDs remain off. Also verify the >15V LED turns on for voltages above │15V│ and is off for voltages below │15V│.

3. Set the output switch to DISCONNECT (O).

4.5 SQUARE WAVE BROADBANDING CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
A	AC	X125	X50	0V	CONNECT

1. Connect a 1kHz, 1.0V_{peak} square wave to the both the A and -B inputs.
2. Connect an oscilloscope to the input and the non-inverted output with 10X probes.
3. Apply the input waveform.
4. Verify the output waveform on the oscilloscope is a 50V_{peak} square wave. Waveform characteristics such as droop, slant, or overshoot should be less than 5V.
5. Adjust the oscilloscope so both the input and output waveforms are visible on the screen. The two waveforms should match. Also, verify the square wave corners match.
6. Set the INPUT CONFIGURATION to –B.
7. Verify the waveforms are inverted, but with matching inverted waveforms
8. Set the INPUT CONFIGURATION to A.
9. Set the GAIN RANGE to X25 and verify the OUTPUT GAIN decreases to X25.
10. Adjust the oscilloscope so both the input and output waveforms are visible on the screen. The two waveforms should match.
11. Verify the output amplitude is 25V_{peak}.
12. Set the Input Configuration to –B.
13. Verify the waveforms match, but are inverted.
14. Set the Input Configuration to A.
15. Set the GAIN RANGE to X5 and verify the OUTPUT GAIN decreases to X5.
16. Adjust the oscilloscope so both the input and output waveforms are visible on the screen. The two waveforms should match.
17. Verify the output amplitude is 5V_{peak}.
18. Set the INPUT CONFIGURATION to –B.
19. Verify the waveforms match, but are inverted.

4.6 SQUARE WAVE RISE AND FALL TIME CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
A	AC	X125	X50	0V	Connect

1. Connect a 200kHz, 1.0V_{peak} square wave to the both the A and -B inputs.
2. Connect an oscilloscope to the input and the non-inverted output with 10X probes.
3. Apply the input waveform.
4. Set the GAIN RANGE to X125 and the OUTPUT GAIN to X50.
5. Adjust the oscilloscope to display one full cycle of a 50V_{peak} square wave with the rising edge in the center of the screen. The waveform aberrations should be < 10% or 5V.

6. Measure the rise time from the 10% to the 90% points on the rising edge. Verify it is ≤ 240ns.
7. Set the oscilloscope trigger to positive slope. Locate the falling edge using the horizontal position control. Measure the fall time from the 90% to the 10% points on the falling edge. Verify it is ≤ 240ns.
8. Repeat these steps for the inverted output.

4.7 SLEW RATE CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
A	AC	X125	X100	0V	CONNECT

1. Connect a 200kHz, 1.8V_{peak} square wave to the both the A and -B inputs.
2. Connect an oscilloscope to the input and the non-inverted output with 10X probes.
3. Apply the input waveform.
4. Adjust the oscilloscope to display one full cycle of a 180V_{peak} (360V_{p-p}) square wave with the rising edge in the center of the screen.
5. Measure the rising edge slew time from the –150V point to the +150V point. It should be < 600ns.
6. Set the oscilloscope trigger slope to negative.
7. Measure the falling edge slew time from the +150V point to the –150V point. It should be < 600ns.
8. Repeat these steps for the inverted output.

4.8 GAIN CALIBRATION CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
-B	AC	X125	X125	0V	CONNECT

1. Connect a 1kHz, 0.5V_{p-p} sine wave to the both the A and -B inputs.
2. Connect the Fluke 8920A voltmeter to the input using a T-adapter. Set it for dB relative operation and zero reference the meter to the input amplitude.
3. Connect the Fluke to the non-inverted output.
4. Measure the gain on the non-inverted output. Verify the voltmeter reads 42dB ±0.5dB.
5. Measure the gain to the inverted output. Verify the voltmeter reads 42dB ±0.5dB.
6. Verify the 7620 OUTPUT displays 31±1V.
7. Change the GAIN RANGE to be X25 and OUTPUT GAIN to X25.
8. Measure the gain on the non-inverted output. Verify the voltmeter reads 28dB ±0.5dB.
9. Measure the gain on the inverted output. Verify thevoltmeter reads 28dB ±0.5dB.

10. Verify the 7620 OUTPUT displays 6V±1V.
11. Change the GAIN RANGE to X5 and the OUTPUT GAIN to X5.
12. Measure the gain on the non-inverted output. Verify the voltmeter reads 14dB ±0.5dB.
13. Measure the gain on the inverted output. Verify the voltmeter reads 14dB ±0.5dB.
14. Verify the 7620 OUTPUT displays 1V±1V.
15. Set the 7620 OUTPUT GAIN to X1.
16. Measure the gain on the non-inverted output. Verify the voltmeter reads 0dB ±0.1dB.
17. Measure the gain to the inverted output. Verify the voltmeter reads 0dB ±0.1dB.
18. Repeat these steps with the INPUT CONFIGURATION set to A.

4.9 FREQUENCY RESPONSE CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
-B	AC	X125	X87	0V	CONNECT

Measure the non-inverted and inverted output for each step.

1. Connect a 1kHz flat-response signal source oscillator to both the A and -B inputs.
2. Set the amplitude to 4.0V_{p-p} (2.0V_{peak}) or 1.5V_{rms} (the precise value is not critical).
3. Connect the Fluke 8920A voltmeter, set to volts, to the output under test (for each step measure both the non-inverted and inverted output).
4. Adjust the 7620 OUTPUT GAIN until the voltmeter reads 100V ±1V_{rms}.
5. Set the voltmeter to dB relative operation and zero reference the reading.
6. Set the frequency to 10kHz. Measure the change in output amplitude on the voltmeter and verify it reads < ±0.5dB.
7. Set the frequency to 100Hz. Measure the change in output amplitude on the voltmeter and verify it reads < ±0.5dB.
8. Set the frequency to 200kHz. Measure the change in output amplitude on the voltmeter and verify it reads < ±0.5dB.
9. Set the frequency to 500kHz. Measure the change in output amplitude on the voltmeter and verify it reads < ±0.5dB.
10. Repeat these steps with the INPUT CONFIGURATION set to A.

4.10 1K LOAD MAXIMUM POWER

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
A	AC	X125	X100	0V	CONNECT

1. Connect a 1kHz flat-response signal source oscillator to both the A input.
2. Set the amplitude to 4.0V_{p-p} (2.0V_{peak}) or 1.5V_{rms} (the precise value is not critical).
3. Connect the 1kΩ resistive load to the non-inverted output.
4. Connect the oscilloscope to the non-inverted output.
5. Increase the 7620 OUTPUT GAIN until the output signal starts clipping.
6. Measure the rms voltage with the Fluke 8920A voltmeter and verify it reads >130V_{rms}.
7. Change the frequency to 500kHz.
8. Increase the 7620 OUTPUT GAIN until the output signal starts clipping.
9. Measure the rms voltage with the Fluke 8920A voltmeter and verify it reads >100V_{rms}.
10. Repeat these steps for the inverted output and connect the resistive load to this output.

4.11 DISTORTION CHECK

Configure the 7620 with the following settings:

INPUT CONFIGURATION	INPUT COUPLING	GAIN RANGE	OUTPUT GAIN	DC OFFSET	OUTPUT SWITCH
A	AC	X125	X87	0V	CONNECT

1. Connect a low distortion sinewave source (Krohn-Hite 4402B), to the A input.
2. Set the frequency to 5kHz and the amplitude to 2.0V_{p-p}.
3. Connect a distortion analyzer (Krohn-Hite 6900B) to the non-inverted output.
4. Adjust the OUTPUT GAIN until the OUTPUT voltage, on the 7620, reads 175V. Verify the distortion analyzer reads < 0.01% distortion.
5. Set the frequency to 100kHz. Verify the distortion analyzer reads < 0.1%.

SECTION 5 SERVICE AND WARRANTY

5.1 SERVICE

Krohn-Hite Instruments are designed and manufactured to deliver long, trouble-free service when operated within product specifications. If the instrument fails to provide satisfactory performance, or your product malfunctions, contact our service department at (508) 580-1660. When you contact Krohn-Hite, please supply all available information regarding the issue, to assist our technicians with troubleshooting your instrument.

In cases when the problem is not resolved over the phone, the unit may need repair. A Krohn-Hite representative will instruct you to return the instrument and issue you a Return Authorization Number. Please reference this number on the packing slip and your purchase order. All instruments returned to Krohn-Hite must be properly packaged to ensure the product is not damaged during shipping. All returns must be shipped prepaid.

Please do not return instruments without written or verbal authorization from a Krohn-Hite representative or without a Return Authorization Number.

5.2 WARRANTY

All Krohn-Hite products are warranted against defective materials and workmanship. This warranty applies for a period of one year from the date of delivery to the original purchaser. Any instrument that is found within the one year warranty period not to meet these standards will be repaired or replaced. This warranty does not apply to fuses or batteries. No other warranty is expressed or implied.

Krohn-Hite Corporation reserves the right to make design changes at any time without incurring any obligation to incorporate these changes in instruments previously purchased.

Modifications to this instrument must not be made without the written consent of an authorized employee of Krohn-Hite Corporation.

5.3 CLAIM FOR DAMAGE IN SHIPMENT TO PURCHASER

Krohn-Hite carefully tests, ages and inspects all products before shipment to ensure proper operation. Upon product arrival, immediately inspect the instrument and verify the contents listed on the enclosed packing list are included with the shipment. Krohn-Hite is not responsible for missing items, unless notified immediately. If the instrument is damaged in shipment inform the freight carrier and file a claim for the damage, then notify Krohn-Hite or its nearest sales office immediately (to obtain a quotation to repair the shipment damage).The customer must complete the final claim and negotiate with the carrier.

5.4 SHIPPING TO KROHN-HITE FOR REPAIR OR CALIBRATION

Krohn-Hite prefers instruments are returned using United Parcel Service (UPS). All return shipments must be prepaid by the customer. Ship the instrument in the original shipping container when possible; otherwise use an adequately size, rigid container. If a substitute container is used, wrap the unit in paper or plastic bubble wrap and surround it with at least four inches of shock-absorbing material.