OWNERS MANUAL

MODEL 801R
REMOTE CONTROL
MICROPHONE PREAMPLIFIER

Software version 1.4

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Thank you for purchasing the Grace Design Model 801R preamplifier system. The 801R represents the absolute state of the art in microphone preamplifier technology. With the combination of unmatched sonic performance, remote control capability, and supreme reliability the 801R is the ultimate microphone preamplifier solution. We have designed the 801R to be as easy to use as possible. If after reading this manual you have any questions please do not hesitate to contact Grace Design. We welcome any questions, comments, or suggestions that you might have.

Overview

The 801R system consists of an 8 channel preamplifier chassis, a power supply chassis and an optional remote control unit (referred to as the RCU in the rest of this manual). The preamplifier chassis contains 8 audio amplifier PCBs, a micro controller PCB and a front panel LCD display. The preamplifier chassis is equipped with two Philips I^2C Bus connectors (D-sub 9 pin) and MIDI IN and OUT connectors. The RCU contains identical micro controller and display PCBs and has a single Philips I^2C Bus connector.

The preamplifier can be controlled by the RCU, via MIDI, or directly from its front panel. The RCU connects to the preamplifier via I^2C which provides a bi-directional data link. I^2C is a serial buss which makes parallel connections between all of the devices in the system. In an 801R system, the RCU is the "Master" and all of the preamplifiers are slaves. The data on the display of the RCU is "echoed" back from the preamplifier so it shows the actual status of the preamplifier. For instance, when you tell a preamplifier to change its gain the RCU will send the gain change command to the preamplifier and then ask the preamplifier what its current gain setting is. The RCU will then update its own display to reflect the change. This gives the user absolute confidence that what is visible on the display is exactly what is happening at the preamplifier. If the RCU is disconnected from the preamplifier(s) the data fields in the display will go blank.

Only one RCU can be connected to a system at any time.

Please Note: The 9pin I^2C is a proprietary interface. It is not compatible with RS-232, RS-422, or any other 9 pin based serial protocol found in the recording studio environment.

The RCU can control up to 8 preamplifiers (64 channels) by connecting it to one preamplifier and then connecting the remaining preamplifiers together with I^2C cables in a daisy chain fashion. The RCU can be located up to 1000" (305 meters) away from the preamplifiers. Using the adapters included with the RCU, standard microphone cable can be used for this interface.
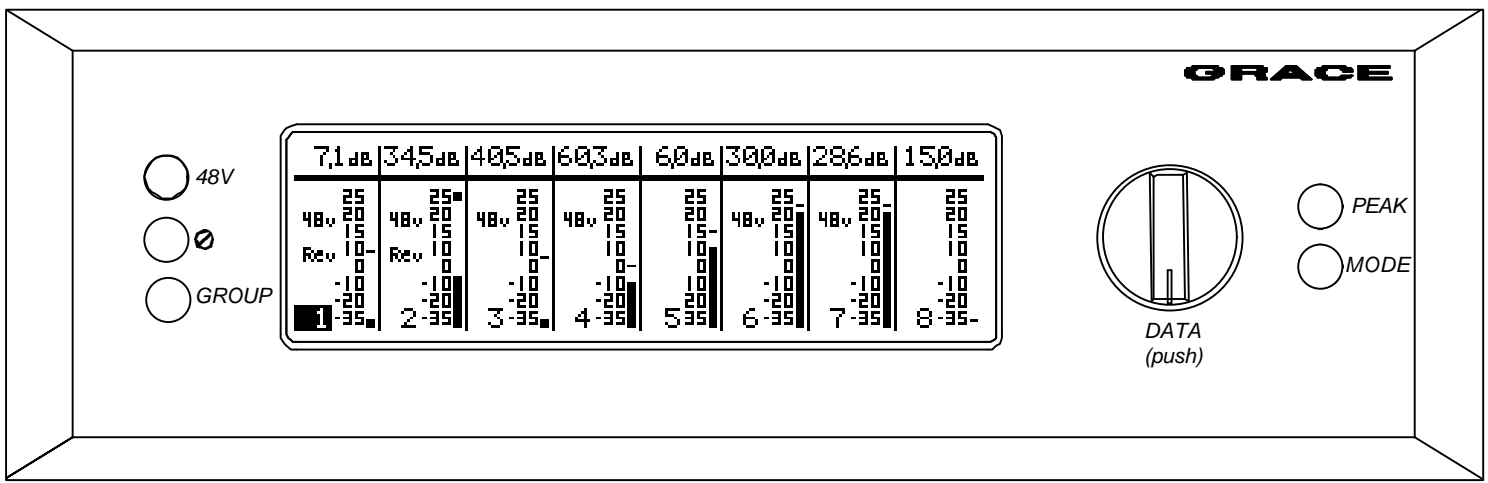
Operation

Front Panel Controls

Figure 1. RCU front panel

The front panel controls and display of the RCU and the 801R preamplifier are identical and consist of the following:

  +48 Volt phantom power push-button

  PHASE reverse push-button

  GROUP push-button

  PEAK Indicator Reset push-button

  DATA Variable function rotary encoder with push-button

  MODE select push-button

  LCD display 64x240 pixels

Preamplifier Modes

Channel mode: This is the default power on mode. In Channel mode the rotary encoder is used to select one of the eight visible channels for adjustment. When selected, the settings for a channel can be adjusted with the +48, PHASE, or DATA controls. Pushing the +48V or PHASE button toggles that function on or off on that channel. Pushing the DATA control enters the Gain Adjust mode. While in Gain Adjust Mode the Gain numeric display characters at the top of the screen are highlighted and the rotary encoder adjusts the gain up or down in approximately 1.5dB steps. Pushing the DATA control again exits the Gain Adjust mode and returns to the Channel select mode. You will notice that changes can be made from the front panel of the preamplifier or at the RCU and both units will always show updated data.

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In a multiple preamplifier system the RCU channel mode allows the user to "page" from preamplifier to preamplifier. For example, in a 2 preamplifier system (16 channels), the RCU will show two "pages"; channels 1-8 and channels 9-16. With the cursor on channel 8, turning the DATA control one click clockwise will page the screen and move the selected channel to 9.

   The bar graph meter at the right edge of each channel section is a 15 segment peak meter that indicates preamplifier output levels from –35dBu to +25dBu. Unlike the typical log scale level meter in a tape recorder, the 801R meter represents level in a mostly linear dB scale. This allows for a meter range of 60dB and useful peak output level information up to 4dB of the output clip point. When using the peak hold feature you will notice that the peak hold indicator is a small line for all levels except +25dBu, which is indicated with a square "box". The clipping level of the 801R is +29dBu. It should be noted that the bar graph meters in the 801R have an integration time that is approximately that of the DIN 45406 PPM meter standard. This means that it is possible to clip the preamplifier on transient program material without the meter indicating a full level. This is unlike the typical "over" indicator in a digital system which responds instantaneously to an overload.
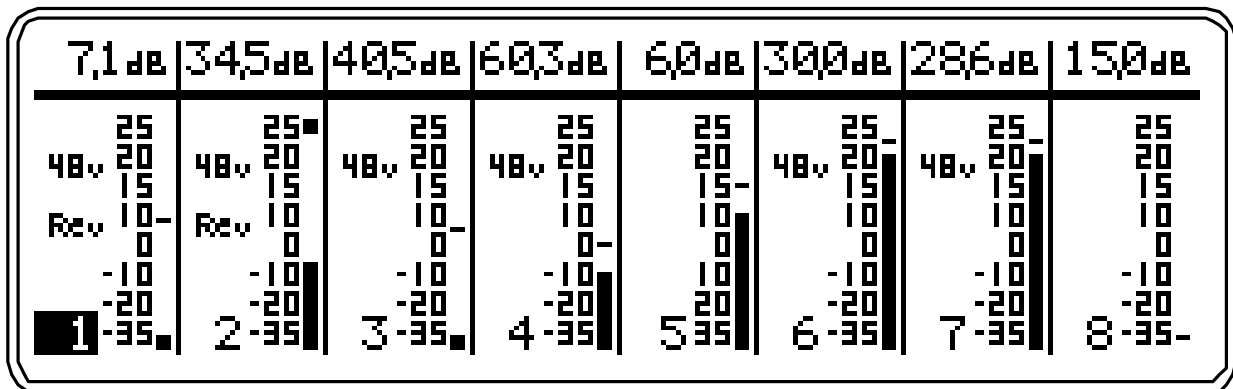

Figure 2. Channel Mode

Note: You will notice that the meter ballistics will at first seem sluggish but this arrangement actually provides more useful information about your peak levels and headroom status than a typical log scale meter.

Meter Mode: Meter mode is only available on the RCU. In Meter mode the LCD displays bargraph level meters for up to 24 channels at a time. The DATA control is used to highlight an individual channel. The display will "page" from channels 1-24 to channels 25-48 and then to channels 49-64 as the DATA control is rotated. Pushing the DATA control when a given channel is highlighted "zooms" to the Channel mode for channel parameter adjustment. In meter mode, there are always 64 channels of meters available to view even if there are only 8 channels (one preamplifier) in the system. There will be a small dot above the channel numbers where there is an actual preamplifier in the system. The picture below shows the meter mode for a system with 2 preamplifiers (16 channels).
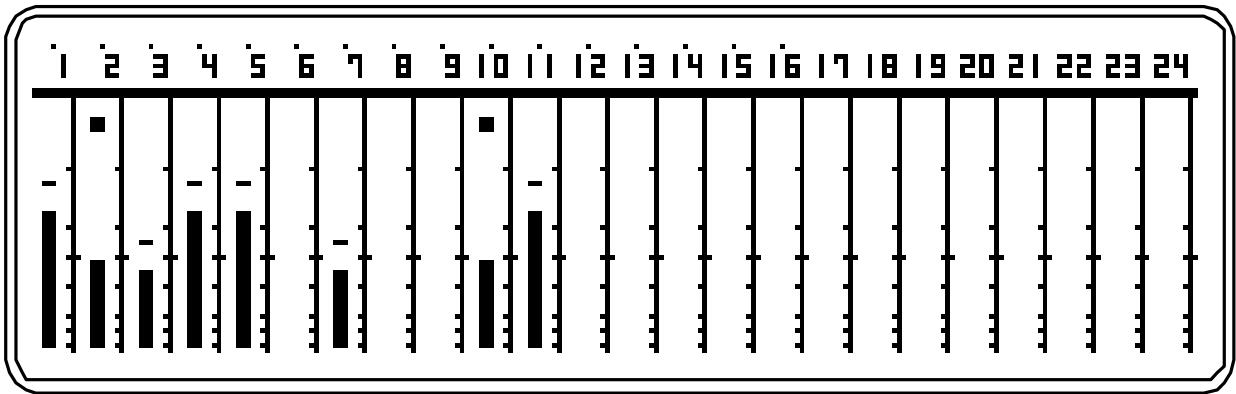

Figure 3. Meter Mode

To access Group Mode from Meter Mode, it is first necessary to return to Channel mode. Group Mode can not be directly accessed from Meter Mode.

Setup Mode: The Setup mode displays a series of menus for various user setup options. Step through the various setup screens on a preamplifier by pushing the MODE pushbutton. On the RCU, setup mode is accessed by pushing and holding the MODE pushbutton for two seconds and then releasing it. Once in setup mode pressing the MODE button will step the top line of the display through the following menus:

Preset Store: The settings for each channel in a preamplifier can be manually stored for later recall in one of 99 user preset registers. Gain, +48V, Phase and Group settings are stored in the pre-set registers.

Note: that when you store a preset from the front panel of a preamplifier you are storing in that preamplifier only. If you store a preset from the RCU a store command will be sent to all of the preamplifiers in the system.

On a preamplifier the menu will indicate:

Store Preamp Preset #: 01 Store: go

On the RCU the menu will indicate:

Store System Preset #: 01 Store: go

To select a preset register push the DATA control to highlight the preset number digits. Turn the DATA control to increment the number to the desired register and then push the DATA control again. To store the preset turn the DATA control until the word "Store:" is highlighted. Next, push the DATA control. This will highlight the word "go" as well. At this point turning the DATA control clockwise or counter-clockwise will execute the store function. The display will briefly display "*** Confirmed ***" and then return to the Channel Mode.

> NOTE: A preamplifier will automatically store all of its current settings into a non-volatile memory whenever power is removed. When power is restored the preamplifier will retrieve these settings. This ensures that no settings are lost during power line interruptions.

Preset Recall: Registers 1 through 99 are available for user storage and recall. Register number 0 can not be over-written and contains a "null" set-up. The "null" setup sets all channels to the lowest gain setting, +48V off, phase reverse off and deletes any channel groups. Pre-set register 0 is helpful when setting up for a new session.

> Note: when you recall a preset from the front panel of a preamplifier you are recalling from that preamplifier only. If you recall a preset from the RCU a recall command will be sent to all of the preamplifiers in the system.

On a preamplifier the recall menu will indicate:

> *Recall Preamp Preset* #: 01 Store: go

On the RCU the recall menu will indicate:

> *Recall System Preset* #: 01 Store: go

Recalling a preset is identical to storing a preset.

The following setup fields all appear on the last page of the Setup Mode:

> ID:1 Peak:hld Contrast :126 Backlight: on

The Preamplifier ID: This field allows one to select a unique identification for each preamplifier in a system. The ID number also assigns channel numbers to the preamplifier. For instance, ID 1 includes channels 1-8, ID 2 includes channels 9-16 and so on to ID 8 which includes channels 57-64. Pushing the DATA knob once allows the ID number field to changed by rotating the DATA knob. Pushing the DATA knob again saves the setting.

Note: It is very important that all preamplifiers in a multiple preamplifier system have unique ID numbers. However, the ID numbers do not need to be contiguous. For example, you could have one preamplifier set to ID1 and another set to ID3. The result would be that in channel mode the RCU would page from channels 1-8 to channels 17-24. In meter mode you would see small dots over channels 1-8 and 17-24.

Peak Hold: This field sets the behavior of the bar graph meters. Selecting "off" turns off the peak hold function. Selecting "dcy" sets the bar graph meters to hold the highest peak level for 3 seconds. Selecting "hld" stets the meters to hold the highest peak setting until the PEAK button is pressed. The Peak hold settings can be adjusted by pushing the DATA knob once and then turning the DATA knob until the desired function is visible. Pushing the DATA knob again saves the setting.

Display contrast: The display contrast can be adjusted to optimize the display for various viewing angles. The Display contrast settings can be adjusted by pushing the DATA knob once and then turning the DATA knob until the desired contrast is achieved. Pushing the DATA knob again saves the setting.

Back light control: The LCD display back light illumination can be turned off if desired.

GROUP MODE: The group mode allows two to eight adjacent channels to be grouped together for gain change operations. This can be very convenient when using stereo pairs or groups of microphones on one instrument. To enter group mode push the GROUP pushbutton. The words "Group Mode Active" will appear just below the gain status characters. To define a group, place the cursor on the left most channel of the channels to be grouped and turn the DATA knob clockwise while pressing the GROUP pushbutton. You will notice that the vertical dividing lines between channels disappear as channels are added to a group. Once in Group mode, gain changes are made in the same manner as in normal Channel select mode. To remove a group place the cursor on the right most channel of the channels in the group and turn the DATA knob counter clockwise while holding the GROUP pushbutton. You will notice that the vertical dividing lines between channels reappear as channels are removed from a group.

Note: On the RCU, Meter Mode can not be directly accessed from Group Mode. It is first necessary to return to Cannel Mode before accessing Mete Mode.

Note: Groups are limited to adjacent channels only and groups can not span between preamplifier units. Also, only gain can be adjusted when in group mode. To toggle the status of Phantom power or Phase on a channel you must exit group mode.
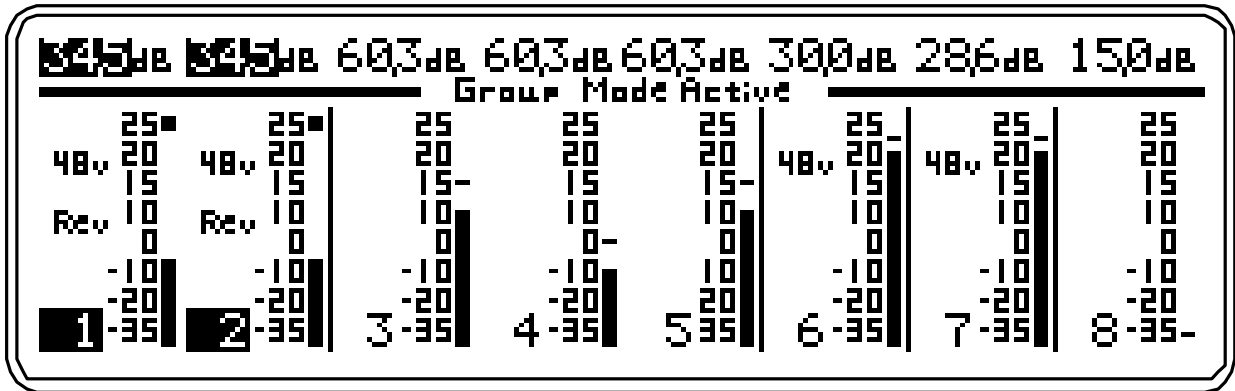
Figure 4. Group Mode

INSTALLATION

PREAMPLIFIER POWER CONNECTIONS

An 8' (2.8m) DC power cord is supplied to connect the power supply unit to the preamplifier unit. This cord can be identified by the 9 pin circular connectors at each end.

Please note that the DC power cord should be connected before the AC power is turned on. This prevents incorrect power sequencing which can cause damage to the audio circuits.

To avoid any interference with the low level audio circuitry, the power supply should be located at least 3' (1m) from the preamplifier unit.

A standard AC power cable is included. For safety, it is recommended that the cord be connected to a grounded outlet (please see grounding options next page).

AC input voltage settings can be adjusted for 100V, 120V, 220V and 240V operation at 50-60Hz. If your voltage is 230V, use the 240V setting. From the rear of the power supply unit, open the trap door next to the IEC power inlet with a small screwdriver. Carefully pull the voltage select cam straight out and then insert with the desired voltage showing. Do not try to rotate the cam while it is in the power input module. Replace the fuses with the proper value selected from the table below. Be sure to use a GMC type time delay or fuse with a 250V rating.

Voltage	100V	120V	220V	240V
Fuse rating	0.75A	0.75A	0.5A	0.5A

Figure 5. Fuse value table

Grounding options: In certain installations, it may be desirable to separate the preamplifier signal ground from the power supply chassis and earth grounds. Noise inducing ground loops can be broken while retaining the safety feature of the grounded AC power cord. The 801R should not be operated with a ground lift or "cheater" plug on the AC power cord. Simply set the AUDIO GND toggle switch on the rear panel of the power supply unit to the desired setting (ISO or EARTH).

REMOTE UNIT POWER CONNECTION

The RCU is powered with the supplied AC wall adapter. It is recommended that the I^2C data connections be made before applying power to the RCU. Simply plugging the 2.1mm barrel connector into the DC power jack turns the power on. The AC wall adapter is rated for 7.5V / 1A DC. (+) is in the center and (–) is on the outside sleeve.

AUDIO CONNECTIONS

Input connections are made via female XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground. 48V phantom power is supplied on pins 2 and 3.

Output connections are made via male XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground. An additional set of parallel outputs is provided with a 25 pin D-sub connector. Both sets of output connectors can be used simultaneously.

If the output is to be used unbalanced, pin 1 should be connected to signal ground and pin 2 to signal hot. Due to the nature of the balanced output stage, pin 3 should be left open for unbalanced operation. See figure below. Note: This will provide a signal of positive absolute polarity when the preamplifier is being used with a microphone which produces a positive voltage on pin 2 with positive air pressure on the front of the diaphragm. While a vast majority of microphones conform to this standard a few do not. Use the phase reverse switch to compensate if necessary.
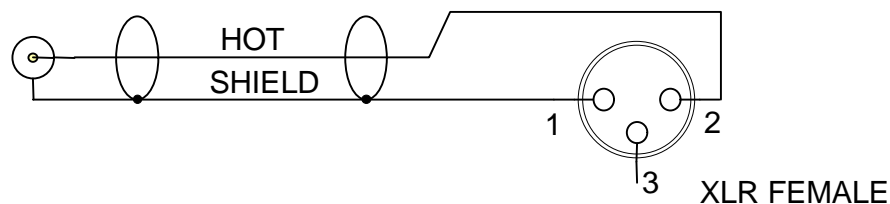

HOT

SHIELD

1   2

3   XLR FEMALE

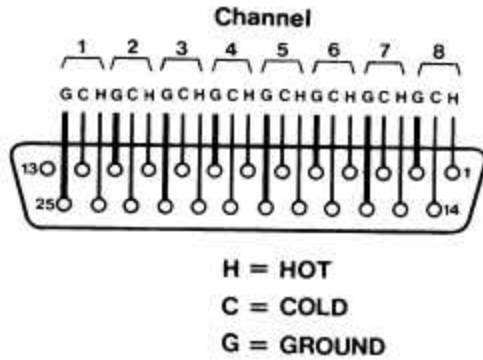Figure 6. Unbalanced output cable termination

Figure 7. 25 pin D-sub output connector

DATA CONNECTIONS

RCU to Preamplifier data connections are made with an I^2C serial cable. This cable has a male 9 pin D-sub connector at each end. The data cable can be supplied by the factory in any length up to 1000' The I^2C cable should be connected to the 9 pin D-sub connector on the remote unit and to the I^2C IN 9 pin D-sub connector on the preamplifier. As well, the RCU is supplied with a set of adapters that allow one to use a standard microphone cable for the serial data link. The microphone cable can be up to 1000' long. It is not recommended to use a line in a multi-channel snake that contains mic level signals for this application because the serial data activity can induce noise into adjacent low level audio signal lines. However, it is acceptable to include the data signal in a snake that contains only line level signals.

Preamplifier to Preamplifier connections are made by connecting a 9 pin I^2C cable from the I^2C OUT connector on one preamplifier to the I^2C IN connector on another preamplifier.

Note: In a multiple preamplifier system, all preamplifiers must be powered on for the RCU to communicate at all. If one preamplifier is accidentally powered down, the display on the RCU will go blank indicating that a preamplifier is not responding. This will not affect the continued operation of the remaining preamplifiers. If the un-powered preamplifier can not be powered on then it must be disconnected from the data daisy chain to restore proper communication.

If the I^2C link between the RCU and the preamplifiers is interrupted by disconnecting the data cable the RCU may freeze. If this happens simply reset the RCU by removing its power momentarily. If the RCU does freeze there is no effect on the continued functioning of the preamplifiers in the system.

SPECIFICATIONS

PREAMPLIFIER SPECIFICATIONS

FREQUENCY RESPONSE
@ 40.5dB gain ± 0.2dB 50Ω source   15Hz-300KHz
@ 40.5dB gain ± 3dB 50Ω source   4.5Hz-1.0MHz

THD+N
@ 20dB gain +20dBu out   <.0010%
@ 40.5dB gain +20dBu out   <.0010%
@ 60.0dB gain +20dBu out   <.0050%

INTERMODULATION DISTORTION
@40dB gain +25dBu out
SMPTE/DIN 1:1 (50Hz, 7kHz)   <.0020%
SMPTE/DIN 4:1 (50Hz, 7kHz)   <.0040%

NOISE - REFERRED TO INPUT
@60dB gain 50Ω source   -129dB
@60dB gain 150Ω source   -127dB
@60dB gain 600Ω source   -123dB

PHASE DEVIATION
50-20KHz   <4°

CROSSTALK
Any Channel @40.5dB gain 1kHz   -100dB

CMRR
@60dB gain, 3.5Vcm, 1KHz   >70dB
@60dB gain, 3.5Vcm, 10KHz   >70dB
Output CMRR   >60dB

PHANTOM POWER
Voltage   +48V +0.9/ -0.0
6.8kΩ resistor match tolerance   +/- 0.01%

MAXIMUM OUTPUT LEVEL
Balanced   +28dBu
Unbalanced   +22dBu

IMPEDANCE
Input   1600Ω
Output   50Ω
Minimum Load Impedance   50Ω

WEIGHT   12lbs

DIMENSIONS   2U rack mount x 10" deep

POWER SUPPLY SPECIFICATIONS

POWER CONSUMPTION
100-240VAC 50/60Hz   63 Watts max

WEIGHT   4lbs

DIMENSIONS   H1.7" x W8.5" x D8.5"

REMOTE CONTROL UNIT SPECIFICATIONS

POWER CONSUMTION
7.5VDC   .55A

WEIGHT   3.3lbs

DIMENSIONS   H2.5" x W11.0" x D3.5"