



Boulder 2020 Advance D/A Converter

Owners Manual

V1.2 8/1/98

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APPENDIX	RECORDING	REMOTE PROGRAMMING	PROGRAMMING	REMOTE CONTROL	OPERATION	GETTING STARTED
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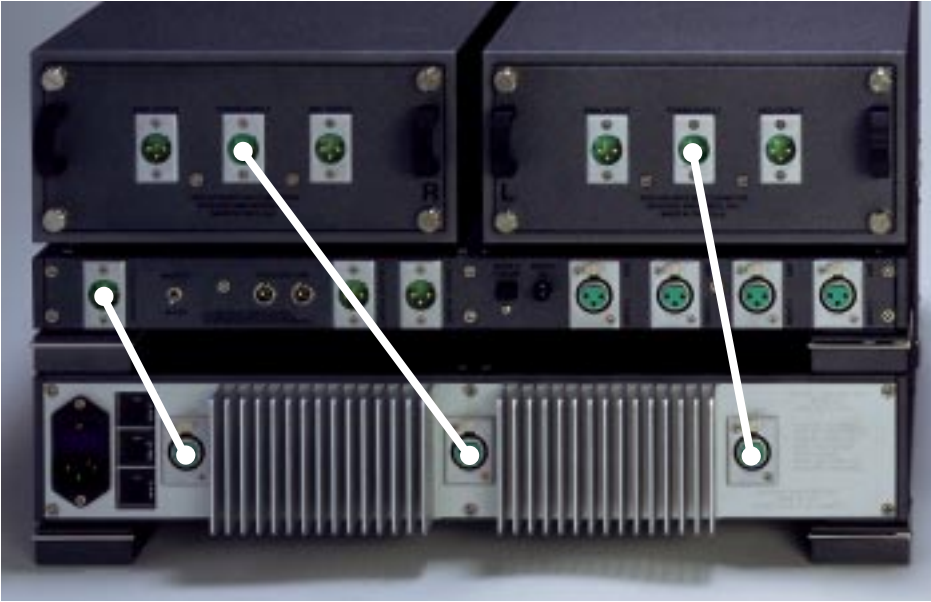
GETTING STARTED

PLACEMENT OF YOUR 2020 D/A CONVERTER

Your Boulder 2020 is designed to reduce interference from external magnetic and radio fields (RF). While placement is not critical, known magnetic fields should be avoided. Line of sight from the listening position is necessary for the remote control to function properly.

Because the converter and its power supply are heavy, a solid, stable surface should be used. As both will generate some heat, they should be allowed to have good air circulation around them. In particular, make certain that the fins on the rear of the supply are not blocked.

You may want to have some access to the rear panels for cable changes.



CONNECTING THE POWER SUPPLY TO THE MAIN CHASSIS

Your Boulder 2020 Converter is supplied with a Boulder 2000 Triple Power Supply. Each of the three supplies is independent of the others except for the front panel LED which confirms correct power supply operation of all three supplies.

Three cables are provided for connecting the power supply to the main chassis. Two of these cables have 4 pin connectors and are used for connecting the left and right audio supplies ($\pm 27V$). The third one has 5 pin connectors and is used for the digital supplies (+5V).

Care must be taken not to confuse these as any attempt to insert the wrong connector will result in a damaged connector.

CAUTION: Connect and disconnect these cables only with the power supply turned off.

CONNECTING TO THE MAINS OUTLET

Your 2000 Power Supply is supplied with a mains cord suitable to the location where it was purchased.

One of the features of the 2000 is its universal automatic voltage-selecting power supply. Simply plug it into any standard outlet. (Exact voltage and frequency compatibility is stated in the specifications section.)



Toslink Input #6

ST Glass Input #5

AES/EBU Input #4

AES/EBU Input #1

CONNECTING A HARDWIRE DIGITAL AUDIO SOURCE

Four balanced AES/EBU digital audio inputs are provided on the rear panel of the main chassis. Each input may be converted to unbalanced 75Ω coax by the use of a Boulder Digital Input Adapter. This adapter has a special internal network to properly terminate the cable, and must not be confused with one made for analog audio.

Connect each source to one of the four inputs provided. Later, you will be able to name each input with the source's name, so you might want to make a list as you connect them.

CONNECTING AN OPTICAL DIGITAL AUDIO SOURCE

Two optical inputs are also provided on the main chassis— a glass fiber connection known as “ST Glass” and a plastic fiber known as “Toslink.” Remove the protective caps before trying to insert the connector. (Store the caps in a safe place.)

The “ST Glass” input will be selected as input 5, and the “Toslink” input will be selected as input 6. Again, keep track of what sources you connect because you will be able to name them later.



Right Main Output

Left Main Output

CONNECTING TO A BALANCED INPUT PREAMPLIFIER

Because your 2020 Converter's balanced output has a very low output impedance, any practical distance between converter and preamplifier will not be a problem.

The Boulder series Balanced Cables will give the best possible sonic connection.

Connect each of the 2020's outputs marked "MAIN OUTPUT" on the channel audio assemblies to the inputs on your preamplifier.

POLARITY

Please note that your Boulder 2020 Converter conforms to the new standard of pin 2 as the high or hot pin for all balanced outputs.

CONNECTING TO AN UNBALANCED INPUT PREAMPLIFIER

The Boulder series Output Adapting Cables may be used to connect the balanced converter outputs to an unbalanced preamplifier input. This cable connects pin 1 to the shield and pin 2 to the center pin. It leaves the output pin 3 unconnected.

If another brand of cable is used, be certain that this same electrical connection is made. Connecting the unused output pin (usually pin 3) to ground will cause excessive ground currents and degrade performance. Use an ohmmeter or continuity checker to determine how a cable is wired.

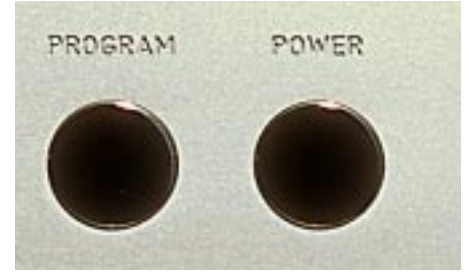


Right Analog Record Output

Left Analog Record Output

CONNECTING AN ANALOG RECORDING DEVICE

If desired, the “REC OUTPUT” on each channel audio assembly may be connected directly to a recording device, thus bypassing a preamplifier. This output will always have the same digital source as the main output.



OPERATION

POWERING UP

With all your connections made, you are ready to listen to your Boulder 2020 Converter.

Push on the upper portion of the rocker switch on the rear panel of the 2000 Triple Power Supply. The indicator on the supply will first turn red, then amber.

The indicator will be amber during normal operation. If for any reason, any of the power supplies' voltages are low, the indicator will change to red.

During the powerup sequence, "Boulder" and then "2020" will slowly appear in the display window.

The front panel power switch can later be used for everyday turn on and off. This switch mutes the audio, turns off the display, and puts the converter in a standby mode.





INPUT SELECTIONS

Select an input by pressing one of the pushbuttons labeled ONE through SIX. The respective input will be displayed in the display and that signal will be routed to the audio assemblies outputs. For example, if input one is chosen, "1. AES 1" will show in the display.

Holding down any of the pushbuttons labeled ONE through SIX for several seconds will cause no input to be selected, and "SOURCE NONE" will show in the display.





DISPLAY

The display brightness may be set to any of 8 brightness levels and also completely off.

To change the brightness level, press the DISPLAY pushbutton. "DISPLAY 8" will show in the display. Continue pressing the DISPLAY pushbutton until the desired brightness is obtained such as "DISPLAY 6." The number in the display will reflect the relative brightness.

After several seconds of not changing the brightness level, the display will return to the source indication.

With the display at a brightness less than that of 8, any operation of a pushbutton will cause the display to go to full brightness for several seconds, and then return to the desired brightness. This ensures that if a function is changed, it will be noticed whether intentional or inadvertent.



ADVANCE

Your 2020 Converter features an advance feature which actually moves one channel (left or right) in time relative to the other channel.

There are several uses for this feature.

One use is to correct for listening positions which are off-center. Perhaps a favorite chair or desk is placed to one side. Or if your main listening position is in the center of a couch, you might like to recline at one end of the couch from time to time.

Another is a difficult listening room where certain objects or walls prevent the speakers from being placed equidistant from the main listening position.

While some correction for these problems can be made using only a balance control on a preamplifier, the ultimate solution is to use that balance control together with the time advance feature. The 2020's advance feature works in time similar to the way a balance control works in level.

When we speak of advancing a channel, say the left channel, it means that we are sending the audio signal to the left speaker sooner than to the right speaker.

The effect is as though someone is moving the left speaker closer to the listener, making it seem more prominent if you are sitting in the physical center. If you are sitting to the right as the left channel is advancing, the soundstage will seem to come around to a more natural feeling.



Let us assume that "INCHES" is chosen as the units of advance. To advance the left channel, press the L ADVANCE pushbutton. "ADV 0.00" will show in the display. Holding down the L ADVANCE pushbutton will cause increasingly higher numbers of advance until the button is released.

The advance can be further increased in the left channel or swept through 0 and then start advancing the right channel by use of the L ADVANCE and R ADVANCE pushbuttons. This works much like a balance control.

The ADVANCE pushbutton will turn on and off the advance without changing the setting. The ADV CLEAR pushbutton will clear the setting to zero.

Determining the correct amount of delay to use is possible to do by ear with some practice. It is best to use a recording which has a strong mono content such as a single voice or instrument along with some accompaniment to give a feeling of soundstage.

It also helps to have a rough idea of how much delay will work for a given situation.

Let's take the example of sitting 24 inches to the right of center. Assuming that the two speakers and the center listening position form an equal sided triangle, and that they are some 120 inches from the listener, a left advance of 23.7 inches would be correct. (This is a number very nearly that of the lateral offset of the listener. So for small changes, a distance slightly less than the lateral offset can be used as a starting point.)



To verify this by listening, press the L ADVANCE pushbutton until “ADV L 23.67”” appears in the display. Now by successive presses of the ADVANCE pushbutton, the advance will be turned on and off as indicated by the display.

First try sitting in the center with the advance turned off. Listen to the music and get a mental picture of the image. Then sit 24 inches to the right and turn on the delay. The sound image will be very nearly that of the one first heard in the center.



Nine advance times may be stored for later use. See the section on operating the remote control.



If you are using different advance units, then the display would read either “ADV L 60.1cm” or “ADV L 1.746 ms.”



To make only a small adjustment in the location of one speaker, clear the advance feature by pressing the CLEAR pushbutton, and then use the L ADVANCE and R ADVANCE pushbuttons to obtain small increments of advance. Even small increments such as 1.3cm can make the soundstage noticeably different.

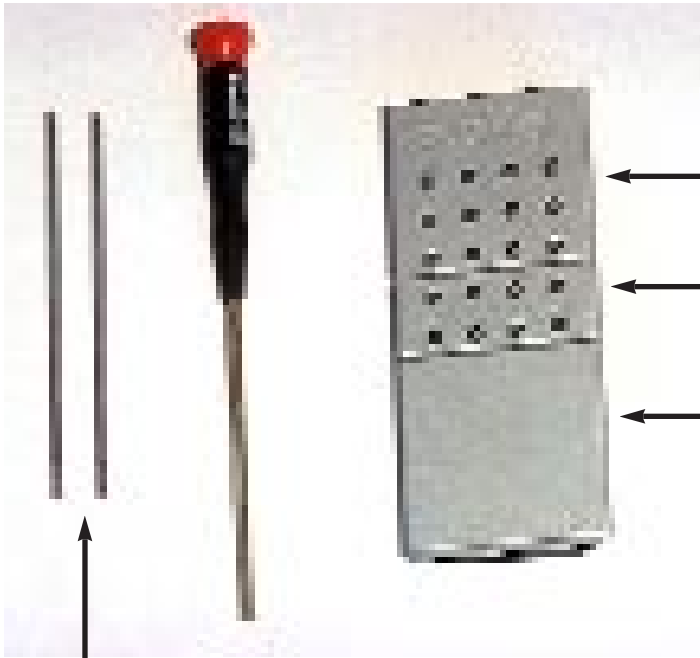


DIGITAL MAXIMUM INDICATION

Analog sources have an inherent maximum voltage limit known as “clipping.” Similarly, all digital sources have an inherent maximum numerical limit in the recording process. A special circuit which detects that this limit was reached is included in your Boulder 2020 D/A Converter.

If “DIG MAX ON” is selected in the programming mode, then “DIGITAL MAX” will be displayed when the limit is detected.





Screws for
2 Modules

REMOTE CONTROL

The remote control for your Boulder 2020 D/A Converter is in three sections—the transmitter, the 2020 module and the battery pack. These sections are held together by long screws inserted into the top of the transmitter and running through all sections.

Additional longer screws are provided for adding sections from other Boulder series 2000 products to make one convenient control. A special screwdriver designed to fit the end of the screws is provided. The modules may be assembled in any order desired.

When removing sections, it is important to use the screws to maintain con-

connector alignment. **DO NOT PULL THE SCREWS OUT FIRST.**

To separate sections, loosen the screws while slowly pulling the battery pack from the 2020 module. Slide the battery pack off the screws. Then slide the module off the screws. Once all sections are removed from the transmitter, you may remove the screws from the transmitter.



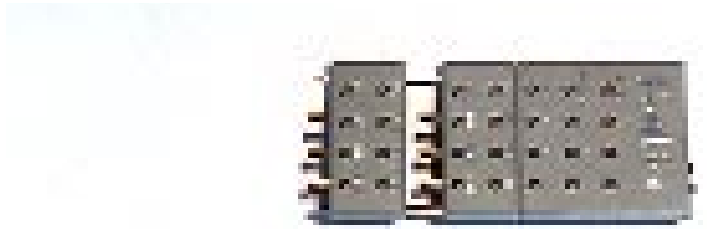
To reassemble the remote control, insert the 2-module screws into the transmitter section first.



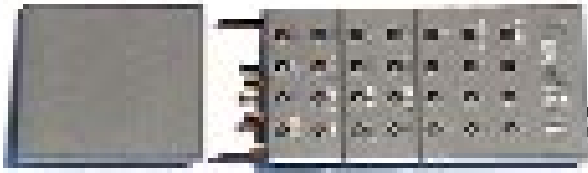
Carefully slide the module you want at the top onto the screws. Continue to push it up to the transmitter allowing the connector to engage.



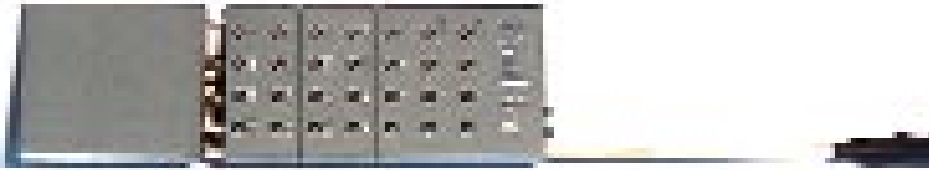
Slide the next module onto the screws.



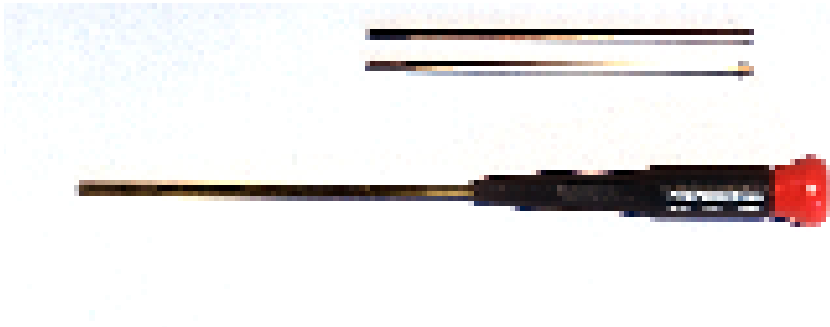
Continue to push the second module up to the first module allowing the connector to engage.



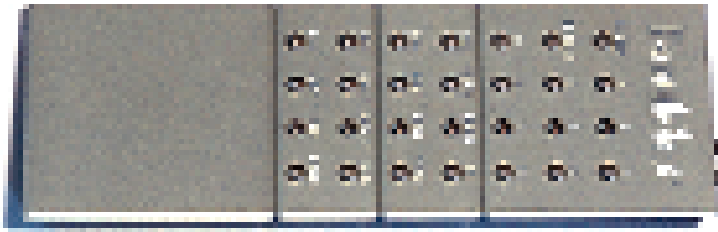
Slide the battery pack onto the screws just enough so that the screws can be started simultaneously.

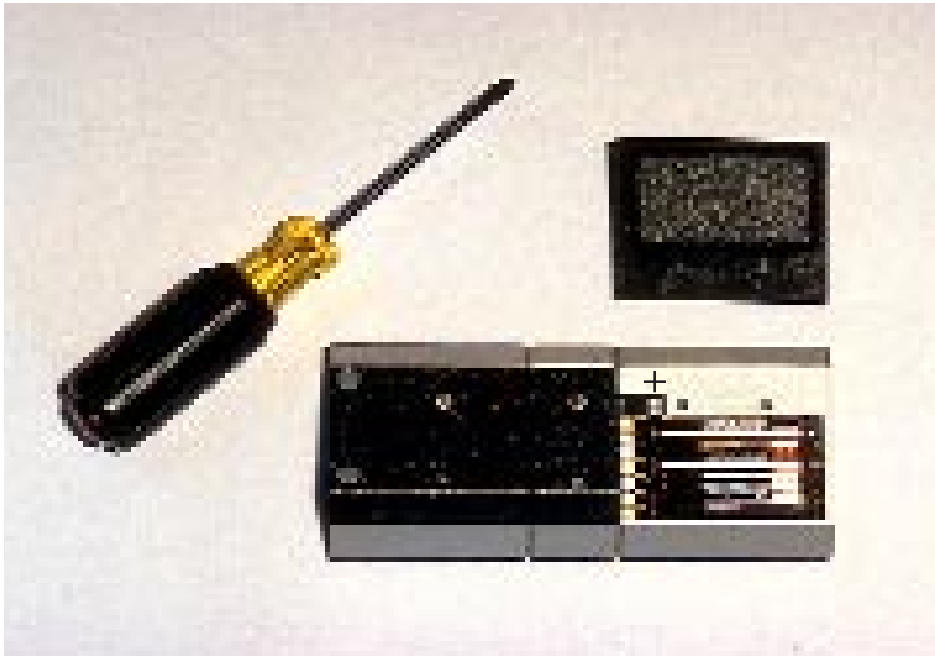


Use the special screwdriver to tighten the screws, drawing up the battery pack. Make sure the connector properly engages.



When finished, be certain to keep the original single-module screws and screwdriver for future use.





BATTERIES

It is not necessary to remove the above mentioned screws to install batteries in the remote control. However, a standard #1 Phillips screwdriver is required to install the 3 AAA batteries.

Turn the remote control over and remove the two screws located on the cover of the battery pack (the bottom module). Lift off the cover and set aside. Install the batteries with the positive (+) terminals facing toward the top of the remote control and replace the cover.



REMOTE CONTROL OPERATION

Operation of the Boulder 2020 D/A Converter by remote control uses buttons on both the transmitter and 2020 module sections.

3-6

REMOTE
CONTROL



ENTER SOURCE



1. AES 1



SOURCE NONE

SOURCE SELECTION

To select an input (source) press the button marked SRC on the converter module. While “ENTER SOURCE” is then showing in the display, press the desired input number (1-6) on the transmitter module. You will now be listening to your desired source, and it will be showing in the display. Entering a 0 will cause no input to be selected, and “SOURCE NONE” will show in the display.

If SRC is inadvertently pushed, and no change is desired, pressing the SRC button again will maintain the previously selected source.

ADVANCE

To advance the left channel, press the ADV L button. Holding down the ADV L button will cause increasingly higher numbers of advance until the button is released.

The advance can be further increased in the left channel or swept through 0 and then start delaying the right channel by use of the ADV L and ADV R buttons.

The ADV button will turn on and off the delay without changing the setting. The CLR button will clear the setting to zero.

It is possible to save nine advance settings. To do so, first make certain that the desired advance is engaged. Then press the ENTER button. While “SAVE MEMORY #” is showing in the display, press the desired memory number



SAVE MEMORY#



LOAD MEMORY#

from 1 to 9 on the transmitter module. The display will return to the advance setting chosen.

To recall an advance setting, press the MEM button. While “LOAD MEMORY #” is showing in the display, press the desired memory number. The display will show the new advance setting recalled from memory.

PROGRAMMING

While it is not necessary to ever use any optional programming functions, you will probably find them helpful in using your Boulder 2020 Converter.

All programming is done by pressing the PROGRAM pushbutton which causes "PROGRAM MODE" to be shown in the display. This is the starting point for all of the following programming options. You may leave program mode at any time by again pressing the PROGRAM pushbutton.



PROGRAM MODE

INPUTS

Each input has several features associated with it. These include assigning an alphanumeric name of your choosing, and setting recordability.

From “PROGRAM MODE” press the input source number you wish to program from ONE through SIX.

“1._ AES 1” will be displayed in the display with a blinking cursor in the name’s first character. Press the L ADVANCE and the R ADVANCE pushbuttons until the desired character appears. Press the same input source number to accept the displayed character and go to the next character. Continue in this manner until all 10 characters are set. For example, “1.Boulder CD” can be used for the Boulder Series 2000 CD Transport.

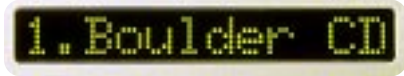
If you make a mistake repeatedly press the same input source number until all ten characters are passed by and then continue until the other settings are passed through and the name assignment display reappears.

After the tenth character is assigned, “1.RECORDABLE” will show in the display. Use of this program feature will be described in the “Recording” section.

Press the same input source number to return to the program mode starting point. Press PROGRAM to return to normal mode.



1._ AES 1



1.Boulder CD



1.RECORDABLE

ADVANCE PARAMETER

The time and distance units used in the advance feature can be programmed for one of three choices.

From "PROGRAM MODE" press the ADVANCE pushbutton. As you continue to successively press the ADVANCE pushbutton, "INCHES," "CENTIMETERS," and "MILLISECONDS" will alternately be displayed. When the desired units are shown, press the PROGRAM pushbutton to set your selection and return to normal mode.



DIGITAL MAXIMUM INDICATION

The digital maximum detector can be turned on or off. From “PROGRAM MODE” press the DISPLAY pushbutton. “DIG MAX OFF” will show in the display. As you continue to successively press the DISPLAY pushbutton, “DIG MAX ON” and “DIG MAX OFF” will alternately be displayed. When your desired mode is shown, press the PROGRAM pushbutton to set your selection and return to normal mode.

A rectangular digital display with a black background and yellow-green characters showing the text "DIG MAX OFF".A rectangular digital display with a black background and yellow-green characters showing the text "DIG MAX ON".

MASTER RESET

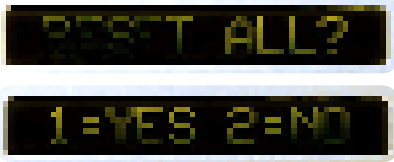
Should you wish to have all settings reset to original factory defaults, you may execute a master reset. Normally, this function is not used.

From "PROGRAM MODE" press the POWER pushbutton. "RESET ALL?" will show in the display for 5 seconds, and then "1=YES 2=NO" will show in the display.

To leave all settings as they currently are, press the TWO pushbutton.

To reset all settings, press the ONE pushbutton.

All other pushbuttons are inoperative during this time. The 2020 Converter will then return to normal operating mode.



PROGRAMMING FROM THE REMOTE CONTROL

Programming may also be conveniently done from the remote control. Similar to programming from the front panel, all programming is done by pressing the PGM button which causes “PROGRAM MODE” to be displayed in the left display. You may leave program mode at any time by again pressing the PGM pushbutton.

INPUTS

From “PROGRAM MODE” press the SRC button. “ENTER SOURCE” will be displayed and you may press the input source number you wish to program from 1 through 6.

If you selected 1, then “1._ AES 1” will be shown in the display with a blinking cursor in the name’s first character. Press the ADV L and ADV R buttons until the desired character appears. Press the SRC button to accept the displayed character and go to the next character. Continue in this manner until all 10 characters are set.

If you make a mistake repeatedly press the SRC button until all ten characters are passed by and then continue until the other settings are passed through and the name assignment display reappears.

After the tenth character is assigned, “1.RECORDABLE” will show in the display. Use of this program feature will be described in the “Using a Digital Recorder” section.



PROGRAM MODE



ENTER SOURCE



1._ AES 1



1.RECORDABLE



REMOTE
PROGRAMMING

Press the SRC button to return to the program mode starting point. Press PGM to return to normal mode.

ADVANCE PARAMETER

From "PROGRAM MODE" press the ADV pushbutton. As you continue to successively press the ADV pushbutton, "INCHES," "CENTIMETERS," and "MILLISECONDS" will alternately be displayed. When the desired units are shown, press the PGM pushbutton to set your selection and return to normal mode.

A rectangular LCD display with a black background and yellow-green characters showing the word "INCHES".A rectangular LCD display with a black background and yellow-green characters showing the word "CENTIMETERS".A rectangular LCD display with a black background and yellow-green characters showing the word "MILLISECONDS".A rectangular LCD display with a black background and yellow-green characters showing the text "DIG MAX OFF".A rectangular LCD display with a black background and yellow-green characters showing the text "DIG MAX ON".

DIGITAL MAXIMUM INDICATION

From "PROGRAM MODE" press the DISPLAY pushbutton on the transmitter section of the remote control. "DIG MAX OFF" will show in the display. As you continue to successively press the DISPLAY pushbutton, "DIG MAX ON" and "DIG MAX OFF" will alternately be displayed. When your desired mode is shown, press the PGM button to set your selection and return to normal mode.



Digital Output 2

Digital Output 1

USING A DIGITAL AUDIO RECORDER

CONNECTIONS

Two balanced AES/EBU digital audio outputs are provided on the rear panel of the main chassis.

Each output may be converted to unbalanced 75Ω coax by the use of a Boulder XXXX Digital Output Adapter. This adapter has a special internal network to properly match the level and impedance of the cable, and must not be confused with one made for analog

audio. Any attempt to use other adapters will result in overloading the coax input and may cause damage to that input.

MAIN OUT CONNECTION

The digital audio output labeled “DIGITAL OUTPUT 1” is provided on the main chassis rear panel. This output always follows the selected listening source. Connect this to the input of your recording device or to any other digital audio input desired.

RECORD OUT CONNECTION

A digital audio recording device may be connected to the Boulder 2020 Converter.

A digital audio output labeled “DIGITAL OUTPUT 2” is provided on the main chassis rear panel. Connect this to the input of your recording device.

RECORD SOURCE SELECTION

Any one of the 6 inputs may be routed to the digital record outputs. Select an input by pressing the RECORD pushbutton on the front panel, and then one of the pushbuttons labeled ONE through SIX. The respective input will be displayed in the display. For example, if input one is chosen, “R1 AES 1” will show in the display.

While “R...” is showing in the display, holding down any of the pushbuttons labeled ONE through SIX for several seconds will cause no input to be selected, and “RECORD NONE” will show in the display.

To return to the listening input selection, press the RECORD pushbutton. The display will show the input previously chosen for listening.

If the input selected has not been programmed for recording, “R...REC ERROR” will show in the display and the record output will not be connected to any source. See the following section.



R1 AES 1



RECORD NONE



R1 REC ERROR

PROGRAMMING FOR RECORDING

Instead of having hardware-dedicated inputs for playback (tape) monitors, any input may be chosen for this purpose through software selection. Connect the outputs of these recorders to any of the 6 inputs you choose.

Then for the chosen input, follow the instructions in the programming section for inputs until "...RECORDABLE" shows in the display. To prevent that input from being connected to the record outputs (which would cause feedback) press the R ADVANCE until "...NOT RECORD" shows in the display. Similarly the L ADVANCE pushbutton may be used to return the input to "...RECORDABLE."

This feature may be changed at any time by going through the programming steps. You would need to do so if you wanted to dub from one recorder to another. Just make certain that only the inputs connected to the playback device are changed to "...RECORDABLE" and not the recording device.

It is good practice to return that input's mode back to "...NOT RECORD" immediately after the dubbing is finished.

The recordable function may also be changed from the remote control. Follow the instructions in the programming from the remote control section for inputs until "...RECORDABLE" shows in the display. Press the ADV L and ADV R buttons until the desired mode is reached.

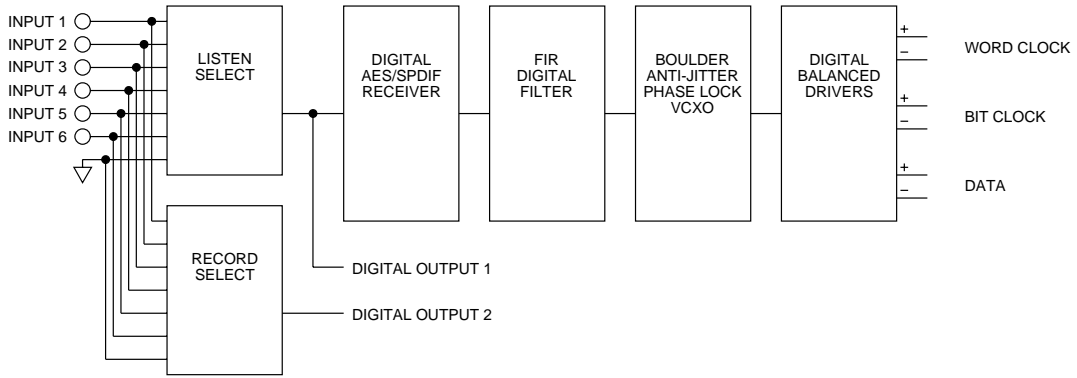


1. RECORDABLE

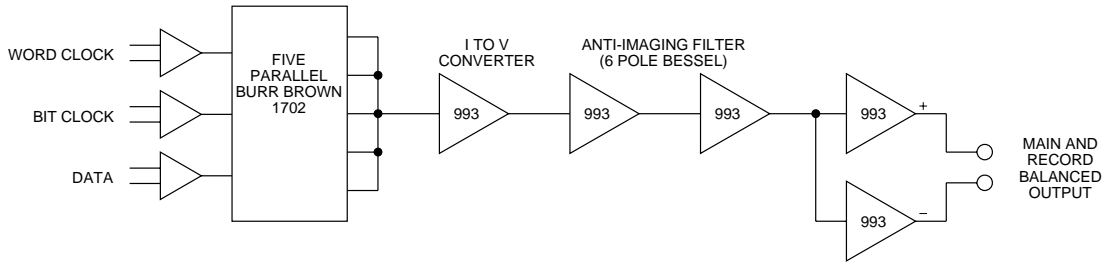


1. NOT RECORD

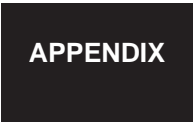
BOTTOM CHASSIS



CHANNEL CHASSIS



BOULDER 2020 ADVANCE CONVERTER AUDIO BLOCK DIAGRAM



BOULDER 2020 ADVANCE D/A CONVERTER SPECIFICATIONS

Digital Inputs	4 AES/EBU, Converts to SPDIF 1 ST Glass Fiber 1 Toslink
Digital Outputs	2 AES/EBU, Converts to SPDIF
Sampling Rates	32, 44.1, 48 kHz
Decoding System	20 bit, 8X oversampling
Converters per Channel	5
Analog Anti-Imaging Filter	Boulder 3 stage, 6 pole Bessel
Analog Balanced Outputs	2
Normal Output Level	4 Vrms
Analog Headroom	10 dB
THD+N, 0 dBFS, from 20 Hz to 1 kHz	0.0009% (-101 dB) at 20 kHz 0.0020% (-94 dB)
S/N Ratio, A wtd.	118 dB
S/N Ratio, unweighted	115 dB
Frequency Response, 0.03 Hz to 20 kHz	+0.00, -0.50 dB
Crosstalk, L to R or R to L	-122 dB or better, 20 Hz to 20kHz
Output Impedance	100Ω
Converter Size, W X H X D	18.0 x 6.875 x 16.25 inches
Power Supply Size, W X H X D	18.0 x 4.25 x 15.5 inches
Power Requirements	90-120 V / 200-240 V, 50-60 Hz, 240 W Max. (160 W nominal)

TROUBLESHOOTING		
SYMPTOM	CAUSE	REMEDY
No power indication	Power switch is not on	Turn on power switch
	Converter is not plugged in	Connect to an AC outlet
	Home circuit breaker is tripped	Reset circuit breaker
Red power indication	Low line voltage	Have line voltage checked
	Power supply's breakers tripped	Reset breakers on rear panel
	Defective power supply cables	Have cables tested
	Defective power supply or converter	Return to dealer for service
Amber power indication, but no sound is heard in one channel	No signal from source	Check source controls, cables, and connections
	No signal out to preamplifier	Check connections to preamplifier
	No power supply to this channel	Turn off power supply, check cables
	Converter is faulty	Return to dealer for servicing
Amber power indication, but sound is not heard from either channel	No signal from source	Check source controls, cables, and connections
	No signal out to preamplifier	Check connections to preamplifier
	No power supply to audio channels	Check power supply cables
	Converter is faulty	Return to dealer for servicing