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CARVER

SD/A-450 Linear Single-Bit CD Player
Owner's Manual

CARVER

es of this manual to our forum @ www



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Safety Instructions

1. Read Instructions — All the safety and operation instructions should be read before the Carver Component is operated.
2. Retain Instructions — The safety and operating instructions should be kept for future reference.
3. Heed Warnings — All warnings on the Component and in these operating instructions should be followed.
4. Follow Instructions — All operating and other instructions should be followed.
5. Water and Moisture — The Component should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. Ventilation — The Component should be situated so that its location or position does not interfere with its proper ventilation. For example, the Component should not be situated on a bed, sofa, rug, or similar surface that may block any ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through ventilation openings.
7. Heat — The Component should be situated away from heat sources such as radiators, or other devices which produce heat.
8. Power Sources — The Component should be connected to a power supply only of the type described in these operation instructions or as marked on the Component.
9. Power Cord Protection — Power-supply cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit the Component.

10. Cleaning — The Component should be cleaned only as recommended in this manual.

11. Non-use Periods — The power cord of the Component should be unplugged from the outlet when unused for a long period of time.

12. Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the Component.

13. Damage Requiring Service — The Component should be serviced only by qualified service personnel when:

- A. The power-supply cord or the plug has been damaged; or
- B. Objects have fallen, or liquid has spilled into the Component; or
- C. The Component has been exposed to rain; or
- D. The Component does not appear to operate normally or exhibits a marked change in performance; or
- E. The Component has been dropped, or its cabinet damaged.

PORTABLE CART WARNING



Carts and stands - The Component should be used only with a cart or stand that is recommended by the manufacturer. A Component and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the Component and cart combination to overturn.

14. Servicing — The user should not attempt to service the Component beyond those means described in this operating manual. All other servicing should be referred to qualified service personnel.

15. To prevent electric shock do not use this plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Pour prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans laisser aucune partie à découvert.

16. Grounding or Polarization - Precautions should be taken so that the grounding or polarization means of the Component is not defeated.


17. Internal/External Voltage Selectors — Internal or external line voltage selector switches, if any, should only be reset and re-equipped with a proper plug for alternate voltage by a qualified service technician. See an Authorized Carver Dealer for more information.

18. Attachment Plugs for Alternate Line Voltage (Dual voltage models only) — See your Authorized Carver Dealer for information on the attachment plug for alternate voltage use. This pertains to dual-voltage units only.

This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION - Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministre des communications du Canada.

WARNING - To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.



CAUTION - HAZARDOUS LASER AND ELECTROMAGNETIC RADIATION WHEN OPEN AND INTERLOCK DEFEATED.
ATTENTION - RAYONNEMENT LASER ET ELECTROMAGNETIQUE DANGEREUX SI OUVERT AVEC L'ENCLENCHEMENT DE SECURITE ANNULE.

DANGER - Invisible laser radiation when open and interlock failed or defeated. AVOID DIRECT EXPOSURE TO BEAM.

A MESSAGE FROM BOB CARVER



Dear Carver Customer,

Thank you for choosing a Carver CD player. You are about to enter the remarkable world of digital audio with its increased dynamics, frequency response, and hiss-free performance.

We at Carver Corporation realize that there is an abundance of home electronics from which to choose, and the differences between various compact disc player models are not always apparent at first glance. Carver strives to produce for you the finest in audio reproduction equipment, integrating the latest and best technology with the most competitive price possible. When you purchase any of our products, including this superb single-play bitstream technology CD player, you are receiving electronics that will provide you with years of enjoyment.

Useful features and advanced technology

You have chosen a first-quality CD player with triple-beam laser scanning, full remote control, random play and a Bitstream Conversion Linear Single Bit D/A Converter which represents the latest in digital-to-analog translation technologies.

For convenience in making CD-to-tape copies, the SD/A-450 has a variable-length fade feature, an Edit/Time Fade control and the ability to split your selected program into "A" and "B" sides. These features can help you make better-than-ever tapes which are tailored to the CD's length (and vice versa).

In addition, a version of our Digital Time Lens circuit called "Soft EQ" sets the SD/A-450 apart from other CD Players. "Soft EQ" is an extremely sophisticated circuit which prevents the loss of sonic front-to-back depth imaging, as well as the excessive brightness sometimes associated with compact disc recordings. How and when you use it depends on your choice of discs, your type of speakers, and your own musical taste. We have

included an explanation of why Digital Time Lens/Soft EQ was invented and what it can do for you.

Made where?

Carver is American-owned and based in Lynnwood, Washington. Of the almost 250 people who work here, most are engaged in building Carver home, mobile and professional audio products. Carver's goal is and always will be to provide audiophile-quality products at affordable prices. Thus, we strive to take advantage of manufacturing economies and methods wherever possible. As a result, we DO use outside production facilities for some products and take great pains to indicate this on your packing box, but some people are still surprised. Suffice it to say that the SD/A-450 is the great value it is because we have chosen the most effective production source for this particular model.

About this manual

In response to Carver customer suggestions, we're using a new style of manual. It is designed to better explain the operation of the SD/A-450 and yet not bore experienced stereo hobbyists silly. If you're not experienced in hooking up stereo equipment, we think that you will appreciate the detail to which we have gone. However, we've also provided a method by which the advanced user can quickly grasp the key points and differences of the SD/A-450. Important information is enclosed in boxes like the one on the previous page. Even if you don't read any other part of the manual, please check out each of these boxes before proceeding.

Once again, thank you!

There are a mind-boggling number of CD player brands and models on the market today. We appreciate your choice of the Carver SD/A-450. Its clean appearance belies the wealth of features and great sound that it is capable of. I hope that you will have many years of listening enjoyment.

Sincerely,

Bob Carver

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Hook-Up

Hook-up and Installation

STOP!
PLEASE READ THIS!



Key Points Are Highlighted in Boxes

Ultra-important information about hooking up and operating your SD/A-450 is enclosed in boxes like this one. If you're an experienced hi-fi buff and don't usually read manuals all the way through (or are just super-impatient), at least read all the info in the boxes throughout this manual. The SD/A-450 has some unique features which are not immediately obvious.

Don't plug it in yet!

NOTE: Do not connect the SD/A-450 to AC power until all signal connections have been made and the installation is complete.

Save the packing box and your sales invoice!

The box is necessary for re-packing your SD/A-450 if it ever needs service (or if you move).

Keep the sales receipt from the store where you bought your SD/A-450

- 1) to establish the duration of your Warranty;*
- 2) for insurance purposes.*

Upon opening the box, please check for any visible signs of damage that did not appear on the outside of the box. If you DO encounter what appears to be concealed damage, please consult your Carver Dealer before further unpacking or installing the unit.

Along with the steps noted above, take a moment and fill in the following information for convenient reference:

Model SD/A-450 Compact Disc Player

Serial number

Purchased at

Date of purchase

Finally, take a moment to fill out and return the Warranty Card that came with your Carver CD player.

Placement

The real no-no's are listed on the first page of this manual. They include common sense stuff like "don't use the SD/A-450 in your swimming pool." Assuming your general location for usage is OK, the SD/A-450 can be positioned as part of a "stack" of components if you observe the following restrictions:

1. Don't place the SD/A-450 directly next to, or on top of a receiver or FM/AM tuner. Instead, to prevent possible interference when listening to AM or FM while the SD/A-450 is turned on, we suggest that your new CD player be positioned at least one component away from a tuner or receiver when stacking or placing your equipment in a row on a shelf.
2. Avoid placing the SD/A-450 next to or on top of a television set, cable converter box, or video cassette recorder.
3. Make sure that no super-heavy components are placed on top of the SD/A-450. Also, avoid placing stacks of heavy records or a speaker on top of the unit.
4. Be sure not to block your power amplifier's top panel ventilation areas if you set the SD/A-450 on top of it. If the amplifier often gets hot to the touch on top, don't put the SD/A-450 on top of it at all unless you want grilled CD player.
5. Avoid placing the SD/A-450 where it will receive heavy vibration, such as on top of a large speaker or subwoofer. While the SD/A-450 is acoustically isolated against most physical shocks, it WILL skip if jarred too violently.

Connection tips

We're about to launch into the actual nitty gritty patch cord frenzy that results when you get a new component. First, though, consider the following tips.

- Turn all stereo system components OFF before making any connections.
- Make sure that "left is hooked to left and right is hooked to right" at each connection. The obvious way to assure this is to assign

one hook-up cord plug color to left and the other to right. Generally RED is used to signify RIGHT. White, grey or black then represents left. If the plugs are white and black, black is LEFT and white is RIGHT.

- Whenever possible, keep power cords away from signal cables (inputs from the SD/A-450, tape deck etc.) to prevent hum. While hum is less of a problem today than it was in the past, noise can still find its way into your system if a component's power cord becomes too intimately wrapped up with a hook-up cable. Carver components' power cords and convenience outlets are on the right side of the chassis (when viewed from the back). This allows you to bundle all the power cords and keep them separate from signal connections.
- Type of hook-up cords. Also called interconnects, patch cords or RCA cables. There are lots of different grades of hook-up cables. You can pay as much as \$100 per foot for some of them! Whether or not you get an incremental increase in sound quality with "audiophile" interconnects is up to your own ears. However, REALLY cheap connection cables can sometimes disconnect themselves inside, causing a loss of sound in one channel or hum problems. Before you send a component in for service, swap hook-up cables to see if they're the culprit.
- DON'T PANIC. The SD/A-450 only has two connection sockets on its backside. You should have no problem connecting it to your receiver, preamplifier or integrated amplifier.

Phono-No-No

WARNING: Never plug the SD/A-450 into a receiver or preamplifier's PHONO inputs, either moving coil or moving magnet.

Connections — conventional hook-up

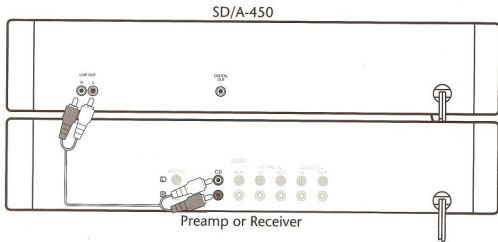
Follow these steps to connect your SD/A-450 to the rest of your system.

1. Make sure that the SD/A-450 and the rest of your stereo system are turned off or disconnected.

2. Locate the LINE OUT sockets on the SD/A-450's rear panel.
3. Connect one end of a WHITE connection cable (patch cord) plug to the (L) socket on the SD/A-450.
4. Connect the corresponding RED connection cable plug to the SD/A-450's (R) LINE OUT socket.
5. You're now ready to attach the other end of the connection cable to something. Depending on what kind of receiver or preamplifier you have, there may be several options.
 - A. Use the CD INPUTS that are provided on newer preamplifiers and receivers.
 - B. Hook the SD/A-450 to the receiver/preamp's AUX inputs.
 - C. If options A or B are unavailable, use one of the receiver/preamp's TAPE IN inputs.
6. When you have made your choice, plug the free end of the WHITE connection cable into the receiver/preamp's LEFT CD INPUT socket and plug the free end of the RED connection cable into the RIGHT CD INPUT socket.
7. Connect the SD/A-450's power cord to an AC outlet. This can be a wall socket, an extension cord or a switched/unswitched outlet on the back of a receiver or preamplifier.

NOTE: You may not be able to record from CD's if you use the TAPE IN inputs.

Conventional Hook-up.



Connections — digital hook-up

If you have a separate D/A converter or a preamplifier or receiver which has its own DIGITAL INPUT JACK and internal D/A converter, you can bypass the SD/A-450's own digital-to-analog and analog output circuitry entirely.

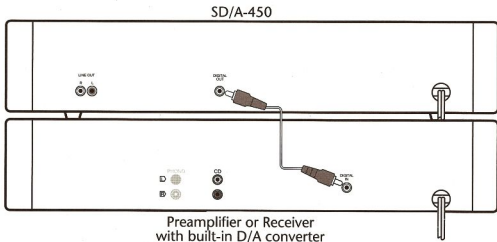
Circuitry bypassed by DIGITAL OUT

The SD/A-450's FADE and SOFT EQ features are not operable when you use the DIGITAL OUTput.

1. Make sure that the SD/A-450 and the rest of your stereo system is turned off or disconnected.
2. Locate the single DIGITAL OUT socket on the SD/A-450's rear panel.
3. Connect one end of a connection cable (patch cord) plug to the DIGITAL OUT socket on the SD/A-450.
4. Connect the other end to the DIGITAL IN socket of your outboard D/A converter or preamplifier with built-in D/A converter.
5. Connect the SD/A-450's power cord to an AC outlet. This can be a wall socket, an extension cord or a switched/unswitched outlet on the back of a receiver or preamplifier.

Following a short section on the SD/A-450's remote control and a guided tour of front panel features, you'll be ready to start enjoying your new component.

Digital Hook-up.



is provided free, courtesy of C

Remote control

Batteries

The SD/A-450's wireless infrared remote requires two AAA batteries. Remove the battery compartment door on the back of the remote control by sliding it parallel to the surface of the remote. Insert the batteries supplied making sure to match the positive (+) and negative (-) ends as indicated by the diagram embossed in tasteful black-on-black inside the bottom of the battery compartment.

Remote Operation

The remote control unit will work in a range of approximately 20 feet in front of and about 30 degrees to either side of the SD/A-450.

If the remote control begins to occasionally not respond, 1) check its batteries; 2) make sure the infrared projection area on its tip is clear; 3) check that the SD/A-450 infrared remote sensor window (on the front panel) is not dirty or blocked from direct line-of-sight contact with the remote.

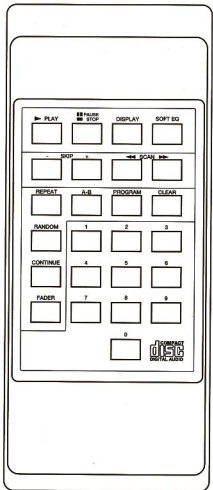
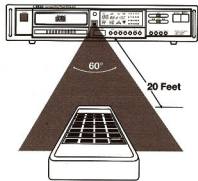
If you choose not to use the SD/A-450's remote, put the batteries in it anyway just to try it out once, then remove them to prevent corrosion damage. AAA cells are not housebroken.

Remote differences

The SD/A-450 remote has all the controls you'll normally need for programming and playing CDs while lounging in the comfort of your favorite easy chair. However, several infrequently-used front panel features have been omitted in order to keep the remote a reasonable size. These buttons are found only on the SD/A-450 front panel:

EDIT/TIME FADE
TIME SET

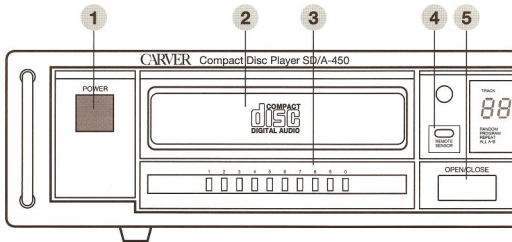
In addition, to conserve space, the button marked REPEAT ALL on the SD/A-450 front panel is simply titled REPEAT on the remote control.

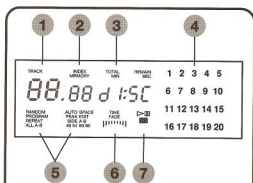
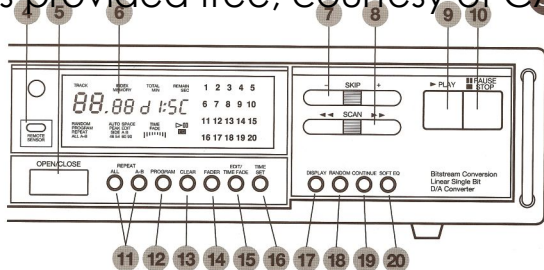


Features and functions

It's time for a short guided tour of some of the SD/A-450's controls and features. If you're eager to listen instead of read, skip to the next section starting on page 14 and read this part later.

- 1. POWER (AC Power Switch)** This is a push on/push off switch that applies or removes power to the unit. Push once to turn the SD/A-450 on; push again to turn it off.
- 2. DISC TRAY.** This is the opening where you put the compact discs (okay, that may sound patronizing to experienced hi-fi buffs but some people have never owned a CD player before). Anyway, the tray works like a drawer, moving in and out as you activate the OPEN/CLOSE button. Keep the tray closed when you're not using the unit to keep the laser pickup clean and protected.
- 3. TRACK SELECTION BUTTONS (1, 2, 3, 4, 5, 6, 7, 8, 9, 0)** These buttons allow you to access or program a specific selection on the disc. For example, in PLAY mode, pressing 9 immediately plays the ninth selection on the disc. Similarly, press "2" then "4" to play the twenty-fourth selection.
- 4. REMOTE SENSOR.** This sensor receives signals from the remote control unit. The remote control can be used up to 20 feet from your SD/A-450 and must be aimed in the player's direction.
- 5. OPEN/CLOSE.** Press this button once to slide the disc tray out; press it again to retract it.
- 6. DISPLAY.** This fluorescent display panel helps you keep track of the SD/A-450's various functions including which track is currently playing, programming, status (such as whether RANDOM or REPEAT is turned on), elapsed time and many other pieces of information. Each display function is discussed farther on.
- 7. SKIP (+) AND (-).** Digital disc technology allows you to move forward or backward on the disc, song by song (we'll call songs "tracks" from now on).
 - Press SKIP - (minus) once to move back to the start of the current track. Press SKIP -(minus) TWICE to move back to the start of the previous selection.
 - Press SKIP + (plus) repeatedly to move forward through the tracks or selections.



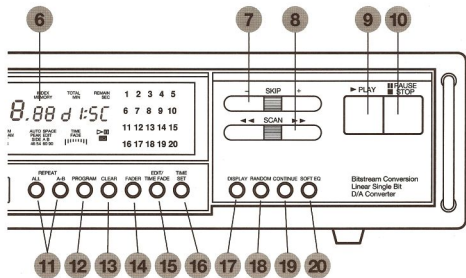


A mini-tour of the display panel

Of course you'll never see everything on at once the way we're showing it, but here are some of the terms and corresponding areas of the display which are frequently used in this manual.

1. **TRACK display.** Shows which song is currently playing or has been selected during programming.
2. **MEMORY/INDEX.** During programming, it shows the numerical sequence of programmed selections. During playback it indicates index marks within a track.
3. **MINUTE/SECOND display.** Shows times during programming, playback, EDIT/TIME FADE mode and FADE length set.
4. **TRACK SELECTION GRID.** This is a visual display of the number of tracks on a CD. When you first insert a disk, you'll see one number for each track on the disc. When a song is selected during programming, its number Rights. When a track has finished playing, its corresponding number disappears.
5. **FUNCTION indicators.** Various combinations are used in different SD/A-450 operations.
6. **FADE UP and FADE DOWN indicators.**
7. **PAUSE, PLAY and SOFT EQ indicators.**

- Both buttons can be used in conjunction with PLAY and PAUSE as described later in the "How to Use..." section of this manual.
8. **SCAN (<<) AND (>>).** Besides being able to skip whole songs, you can also move backwards or forwards WITHIN a song. When you press and hold either SCAN >> or SCAN <<, you will hear a speeded-up version of the music at reduced volume. Thus the SCAN feature may be considered analogous to fast forward or reverse buttons on a cassette deck.
 9. **PLAY** begins playback operation of the SD/A-450.
 - If you haven't programmed anything, playback will start at Track 1.
 - If you've programmed a sequence of songs, playback starts with your first programmed selection.
 - If you've selected RANDOM play, the SD/A-450 will pick the starting song.
 - PLAY is also used to resume play after you have used the PAUSE control.
 10. **PAUSE/STOP.** This is a multi-purpose button.
 - Press PAUSE once to temporarily interrupt play. The laser pickup (sort of analogous to a phono stylus) does not move to another selection (it's as if you used a turntable's cueing lever to raise the stylus above the record).



- Push PLAY to resume operation at the same point.
- Press PAUSE/STOP twice to move the pickup back to the beginning of the first selection on the disc. This is analogous to using the "reject" lever on many turntables to return the tone arm to the beginning of a record. The SD/A-450 is still turned on and is considered to be in standby mode. Press PLAY to start play again at the beginning.
- 11A. REPEAT — ALL.** Press once to activate a repeat playback cycle for the entire disc or programmed disc selections. Press it again to cancel the repeat playback function. Full instructions are included in the "How to Use..." section of this manual.
- 11B. REPEAT — A-B.** Use this button to set starting and ending points for repeat playback. You can choose a segment anywhere on the disc, then repeat playback indefinitely. Full instructions are included in the "How to Use..." section of this manual.
- 12. PROGRAM.** This button is part of the SD/A-450 CD player's sophisticated programming playback system and is used when setting the selection order (See "How to Use..." section, page 14).
- 13. CLEAR.** Used during programming, this button allows you to "edit" your programmed selection sequence much like the CLEAR ENTRY key does on a calculator).
- 14. FADER.** The SD/A-450 automatically "fades out" a song when this button is pushed during playback. If no CD is playing, the FADER and SKIP buttons are used to set fade time anywhere from 2 to 10 seconds. The SD/A-450's FADE feature is particularly handy when making CD-to-tape transfers since you can fade a track down before the tape runs out, or make pleasant transitions between different tracks.
- FADE is also a pleasant feature when you're just listening to music and NOT taping. It's a far less jarring way to stop a song than simply hitting PAUSE/STOP. The music tapers off rather than just cutting off.
- Fade time is variable from 2 seconds to 10 seconds.
 - The SD/A-450 goes into PAUSE mode at the end of the fade.
 - Pressing FADE a second time resumes playback while fading the sound level BACK UP to normal (at the same rate it was previously faded down).

OR

- Pressing **PLAY** again resumes playback of the same track at normal volume.

15. EDIT/TIME FADE. This is a special Carver feature which "fits" a CD's songs to a specific tape length. You tell the SD/A-450 whether you're using a C-46, C-60 or C-90 and the CD player selects the right number of songs to fit on each side. You can also program the exact time you desire and the SD/A-450 will choose songs to fit into that amount of time. Full instructions for use of **EDIT/TIME FADE** are included in the "How to Use..." section of this manual.

16. TIME SET is used in conjunction with **EDIT/TIME FADE** to select the appropriate length of cassette.

17. DISPLAY. The SD/A-450's digital time display has three different modes.

- Normally, the display shows elapsed time of the track that is playing. When the song has finished, the display again shows 00:00 and then begins to display the elapsed time of the next song.

- Pressing the **DISPLAY** button changes the time display to **REMAINing** time, that is, how much longer the song will last.

- Pressing **DISPLAY** again changes the display to **TOTAL REMAINing** time. This is how much total time is left either a) on the CD, if you're just playing it straight through; or b) total remaining time of a programmed sequence of songs. In other words, if you put in a CD that's 46 minutes long and hit **PLAY**,

the **TOTAL REMAINing** time will count down from 46 minutes. If you program only three songs on the disc, totalling 9:35, **TOTAL REMAINing** time counts down from 9:35.

- Since the **DISPLAY** button "cycles" through the three display modes, pressing it again returns the display to the original elapsed time for the individual song.

18. RANDOM. If you press this button before hitting **PLAY**, the SD/A-450 will automatically select songs at random from the CD.

- A **RANDOM** indicator will light on the SD/A-450 display when you press the **RANDOM** button.

- **RANDOM** keeps selecting different songs until all the tracks on a CD have been played **ONCE**.

- No song will be played more than once.

- To **STOP** random play and continue playback in order from the song that is currently playing, press **CONTINUE**. The **RANDOM** indicator will go out on the SD/A-450 display.

19. CONTINUE completely deletes a programming sequence and is also used to stop random play.

20. SOFT EQ (Digital Time Lens). Press this button once to turn the SD/A-450's special EQ/ambience circuitry on; press again to turn it off. When **SOFT EQ** is on, the word "EQ" is illuminated in the display (See Page 11).

How to Use Your SD/A-450

It's what you want to make of it.

Some of us like technology and some of us don't. CD players such as the SD/A-450 are great for both types. If you just want to hear music, you can pop in a CD, press play and enjoy.

But if you're inclined to learn a few simple operations, the SD/A-450 can do a lot more than just play back a shiny disk from beginning to end. It can...

- Select any combination of up to 24 different songs in any order
- Choose songs at random
- Repeat a whole CD, a programmed sequence of songs, just a single song or even a single passage within a song
- Fade down a selection before it's finished — and then gently fade it back up
- Change the length of the fade up/down to anywhere between 2 and 10 seconds
- Select different programming sequences for sides "A" and "B" of a tape
- Let the SD/A-450 select music which will fit on one or both sides of a cassette
- Define a program length and let the CD player choose songs that will fit within that time period

We have provided detailed steps for each SD/A-450 playback function. We start with the very basic and work into the complicated stuff. If you're a CD Veteran, just skip to the functions which are new and/or of interest to you. Note that each function includes a series of numbered steps and then, in many cases, a series of tips or further comments.

But first a stern lecture like your hygiene teacher used to give you in grade school.

How to handle CD's

When the compact disc first came out, much was made of its indestructibility. Yes, it IS more impervious to damage than a record. But no, it ISN'T impervious to careless handling. Underneath a layer of clear plastic, the shiny side of the CD is covered with billions and billions of tiny indentations which alternately absorb and reflect a laser beam. Anything that gets on the clear plastic has interposed itself between the laser and the reflective part of the CD. That can cause trouble. In order of seriousness, enemies of compact discs are:

1. Warps caused by leaving the CD out in the sun or near a heat producing device such as a big power amplifier.
2. Scratches. Really fine ones are less critical, but deep ones are often beyond a CD player's ability to compensate with error correction circuitry.
3. Fingerprints, spots caused by dried-on liquids (beer, champagne, Jolt® Cola, etc.).
4. Dust.

CD players, including the SD/A-450, are equipped with error detection circuits which can compensate for a lot of external flaws. But eventually, all will encounter an obstruction which causes audible mis-tracking. If it's minor, you may just think it's distortion. If the CD player has really run into something nasty, you'll hear a sort of stuttering. If it simply can't get past an exceptionally large obstruction (such as a deep gash or opaque substance such as ink marker splotch) it may just sort of "hang up" on that stop, like a record skipping in the groove. So why tempt fate? Handle CD's carefully and you'll be able to enjoy them for many years to come. Here are some simple precautions:

1. Hold a CD with a finger through the hole and your thumb on the outside. Don't just grab it on the flat part.
2. Put CD's back in their plastic cases after you've listened to them and keep 'em there when not in use. A whole stack of "naked" CD's is an open invitation to potential destruction.
3. Keep CD's out of direct sunlight and away from heat sources.
4. Don't use CD's as mini-Frisbee™s unless they're especially obnoxious heavy metal bands favored by your kid brother or teenage son.

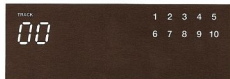
Clean a CD with mild soap and warm water and gently dry with a VERY soft cloth. Or use one of the commercial CD cleaning kits available at many Carver dealers. For you true cultists, try the motorized Nitty Gritty CD Cleaner which can actually buff out light scratches.

Loading a CD

1. Press the POWER button on the SD/A-450's front panel. After a few seconds, you'll see the word "DISC" on the fluorescent display panel.



2. Press the OPEN/CLOSE button to slide the disc tray out.
3. Remove a compact disc from its case and place it in the drawer LABEL SIDE UP. Gently grasp the disc on the edges only. If you're playing a smaller, 3-inch CD, be careful to center the disc carefully in the loading tray's smaller cutout area.
4. Press the OPEN/CLOSE button again to retract the tray. After about three seconds, the multi-function display shows the number of tracks and the total playing time on the disc, then switches to "TRACK 00."



5. The SD/A-450 is now ready to play according to your instructions.
 - If the multi-function display continues to flash "DISC" after the disc tray has been retracted, see the Troubleshooting Guide farther on in this manual.
 - If you press the DISPLAY button, the REMAINING TIME indicator lights and the read out shows the total playing time and the number of tracks on the disc. This information is especially helpful when you are getting ready to make tape recordings.



How to Use Your SD/A-450

Playing a whole CD

1. After loading a CD, press PLAY.
 - **Shortcut:** Press the PLAY button immediately after placing the disc in the disc tray and the SD/A-450 will automatically retract the disc tray and begin playing.
 - **To PAUSE during playback:** Press the PAUSE/STOP button once to interrupt playback. The "pause" (||) indicator will flash. Press PLAY to resume playback exactly where you left off.
 - **To STOP during playback:**
 - A. Press PAUSE/STOP twice to stop playback at any time; OR
 - B. Press OPEN/CLOSE to slide out the disc tray and remove the disc. Push OPEN/CLOSE again to close the tray.

"Moving around" during PLAY

You can move from one place on the disc to another using the SKIP buttons, or the TRACK SELECT (1-0) buttons.

- 1A. Use the SCAN >> and << buttons just the way you would with a cassette deck. For the first three seconds, these operations are carried out at low speed, allowing you to back up or advance slightly. After three seconds, the operations switch to high-speed mode so that you can move quickly through the disc. You will hear the speeded up music at 1/4 the normal volume,
OR
- 1B. Use the SKIP (+) and (-) buttons to move forward or backward to the exact beginning of a track selection, or to move quickly through the track selections without listening to the intervening music.
OR
- 1C. Press a TRACK SELECTION button during playback to choose a specific track. The laser pickup moves to the track selection, then begins playing immediately.

Playing just one song

1. After loading a CD or during PLAY, press a TRACK SELECT button during playback to choose a specific track. The laser pickup moves to the track selection, then begins playing immediately.
- To choose a song numbered 10 or above, press the first and second digits consecutively without much pause between. If you wait too long between button presses, the CD player will act on the first digit. For example, when choosing Track 12, press 1 and then quickly press 2. Otherwise the SD/A-450 will think you want Track 1 and start playing it instead.

Programming sequences of songs

The SD/A-450 allows you great versatility in the order in which you listen to selections on a compact disc. You can skip selections you don't wish to hear, make up a new order, or repeat a favorite selection more than once.

This feature allows you to hear track selections in any order desired with up to 24 different songs programmed at one time. Between each programmed selection, the SD/A-450 inserts a short pause. To program track selections:

1. Press the PROGRAM button. The PROGRAM indicator will light and the MEMORY indicator will start flashing. The small numeric display next to the track indicator will read 01.



2. Press one or more TRACK SELECT buttons (or SKIP +/-) to pick your first choice. The total time of the song will appear and the corresponding number will blink in the programming display "grid".



3. Press PROGRAM again. The program sequence number will change to 02 and the number of the first programmed song will appear in the programming display "grid".



4. Pick additional selections by repeating steps 2 and 3. Program up to 24 track selections in any order. You may repeat a selection more than once.
5. When you have finished programming the selection order, press PROGRAM, then press PLAY.
 - To change a selection once you've entered it (but before playback), press CLEAR. The program sequence number will back up one number. You can now enter a new selection.
 - To CANCEL a programmed sequence at any time, either before it starts or during play, press CONTINUE. If done during playback, the SD/A-450 will simply continue with the next track on the CD after it's through with the one that's playing.
 - To ADVANCE or BACK UP through the programmed sequence quickly, press SKIP (+) or (-). Remember that the SKIP button moves in accordance with the programmed order. For example, if you programmed a disc to play selections 3, 5, 6, 7 and 8, the (-) button would not take you any closer to the beginning of the disc than track selection 3. Similarly, the (+) button would stop at the beginning of selection 8.
 - To REPEAT a programmed sequence, press REPEAT ALL during playback. The SD/A-450 will then repeat all programmed tracks until manually stopped or the end of the world, whichever comes first.
 - After a programmed sequence has been played, the SD/A-450 will stop play.

Index Search

A compact disc can hold an impressive amount of music. While this makes it an excellent medium for classical music, it also makes the SKIP feature less useful in some cases.

For example, a three-movement symphony would only display three track selections, or just one if the movements blend into each other without a pause. The developers of the compact disc took this into account and devised a way to further subdivide track selections into indexes. These may be arbitrary divisions or special highpoints, famous mellow-dies, movement transitions or even scene changes in an opera.

If a compact disc has been indexed, it will be noted in the program booklet which came with the disc. Consult the index listing to determine the significance and placement of each index segment. To search through a track selection's indexes:

1. Press STOP to place the SD/A-450 in playback standby mode.
2. Select a track number using the SKIP < and > buttons.
3. Immediately search for index marks using momentary presses on the SCAN >> button. The fluorescent read-out displays the track first, then the index number. For example, Index 3 on Track 2 would be displayed as "02 03".



4. When you reach the index mark you are seeking, just take your finger off the button.
 - Playback begins from the point where the index was programmed onto the disc by its manufacturers.
 - To stop playback, press PAUSE/STOP; otherwise playback continues past the index mark to the end of the disc.

- Index numbers are displayed even if the Index Search function is used with discs that do not have index markers. When play is initiated, however, it starts from the beginning of the track already selected.
 - If an index number is selected that is greater than the number of actual index markers on the disc, play begins from the final index marker on the track.
 - In some cases, playback may begin slightly before the index mark.
 - NOTE: Indexing cannot be used with programmed playback.
5. To operate Index Search during play, press SCAN >> or SCAN << momentarily to advance or go back through index numbers. The SD/A-450 will search and play accordingly.

Repeating (repeating)

This feature lets you repeat a whole compact disc, a complete program or a segment of a single track selection.

FULL DISC REPEAT. To repeat a disc from beginning to end:

1. Press the REPEAT ALL button. The corresponding fluorescent display lights in the multi-function panel.



2. Press PLAY. As long as the REPEAT indicator is on, the disc will play again and again.
- To cancel the repeat function at any time, press REPEAT again. The REPEAT indicator will go out indicating that repeat playback has been cancelled.

PROGRAM REPEAT. To repeat a programmed sequence:

1. Program your selections.
2. Press PLAY.
3. Press REPEAT. The SD/A-450 will continue to play the programmed selections in order, over and over until the repeat feature is turned off.

TRACK SELECTION REPEAT. To repeat one or more selections:

1. Program just one desired selection.
2. Follow Steps 2 and 3 of PROGRAM REPEAT.

PHRASE REPEAT. The REPEAT A-B button is used to repeat a passage on a compact disc that does not start at the beginning of a selection or on an index mark. Why would you do this? To make out an indistinct vocal, to re-live your favorite moment on an album,

optimize your system's control settings, practice a riff (if you're a musician) or just to drive someone crazy.

1. Press PLAY to start the playback of either the disc or a specific track.
2. When the disc reaches the beginning of the passage you wish to repeat, press the REPEAT A-B button ONCE. The A-B indicator on the multi-function display will read A - and the disc continues playing. This point on the disc is now set as the beginning of the repeat passage.



3. When the disc reaches the end of the passage you wish to repeat, press the REPEAT A-B button again. The A-B indicator now reads A - B. This point on the disc is now set as the end of the repeat passage and A-B REPEAT begins.



The selected passage continues to repeat until you press the REPEAT A-B button again (or someone walks in carrying a big stick). Then the A-B indicator goes out and the disc continues to play.

Random play

Tired of the same old order of songs on a disc you listen to often? Let the SD/A-450 be your personal DJ. It will rarely select the same order twice.

1. Press RANDOM.
2. Press PLAY. A nifty little "round and round" display will appear for several seconds and then the CD player will pick a track and start to play it.



- After the track has finished, the corresponding track number will disappear from the track programming grid at the right of the display. When the SD/A-450 picks its next random track, it will choose from only the remaining songs on the CD.
 - If you don't like the CD player's choice of selection, press SKIP (+). Random selection will again occur from the remaining songs.
 - To STOP random play, but continue playback of the CD, press CONTINUE. The RANDOM indicator will go out and the SD/A-450 will continue from that point to the end of the disc. For example, if RANDOM play had selected Track 5, and you pressed CONTINUE, the player will play the remainder of track 5, then will move on to Track 6, then Track 7, etc. until the CD has finished.
3. Pressing RANDOM during .PLAY mode will return *all* track numbers to the grid and begin a new random play sequence. Tracks will be played in a different order than the previous random sequence.

Fader

The SD/A-450 allows you to fade a song down before it's finished and also fade it up part way through. This is handy during CD-to-tape copying when you only want part of a long song or are nearing the end of one side of a tape (although the SD/A-450 has a better way to do this — see EDIT TIME FADE). It's also a sedate way to stop playback. The sound doesn't just abruptly stop, but goes away gently.

1. During playback, press FADER. The FADE DOWN indicator will light and the sound will go away. Then the CD player enters the PAUSE mode.



2. To resume playback, press FADER again. The FADE UP indicator lights up, the CD begins again with the music gently fading up to normal volume.



Changing the speed of a fade

You can vary the length of time it takes for the music to fade up/down. The longest fade is 10 seconds, which is very gentle. The shortest possible fade is 2 seconds, which is almost like turning a volume control down as fast as you can. If you don't change the setting, it "defaults" to 5 seconds. To change the speed/duration of a fade:

1. Make sure the SD/A-450 is in STOP (standby mode).
2. Press FADER. A fade duration display will appear.



3. Quickly press the SKIP (-) or (+) buttons to adjust the length of the fade.
 4. Wait a few seconds and the fade duration display will disappear. The SD/A-450's fade speed has now been changed.
- To find out what length of time/speed the CD player's fade is now set at, press FADE during standby mode. The current fade length will be displayed for several seconds.

TAPING AIDS — A/B-side programming

The SD/A-450 can split a program into two parts so that you can record one portion on one side of a cassette (A) and the rest on the other (side B). This may not seem necessary, but if you've done any taping you'll appreciate it. It's very easy to later forget just which tracks you selected for one side of a tape. Since the SD/A-450's program selection grid display shows you what has been selected, you can choose a variety of songs for BOTH sides at once without duplication. To program separate "A" and "B" portions of a program:

1. Program track selections for the first side of the tape. The SIDE A indicator will be lit during this process. Note the total time for the selected tracks.



2. When you're through programming tape side A, press PAUSE/STOP. The SIDE indicator will read A B, and the TRACK indicator will read P.



3. Select programming selections for the B side of the tape.
4. Press PLAY to begin playback and taping of cassette tape side A. The SIDE indicator will read A. The track indicator grid will display ONLY those programs intended for side A (the B-side selections will temporarily disappear). After all the programmed selections for side A have been played, the SD/A-450 will go into PAUSE mode.



5. After you've turned the tape over (or reversed direction on an auto-reverse deck) press PLAY. The programmed selections for side B will play back while the SIDE indicator reads B and the appropriate selections are displayed on the track indicator grid.

Occasionally, if you've entered a lot of instructions or started over a couple of times, the SD/A-450 may not seem to respond correctly. If so, simply open and close the disc tray once to fully "clear" the CD player's memory.

TAPING AIDS — FADING UP AT THE BEGINNING OF A SONG

You can fade a song without having to adjust the recording level on your cassette deck by using the SD/A-450's fade feature.

1. Put the CD player in PAUSE.
 2. Select the desired song and/or starting point using the SKIP (+/-) keys or TRACK SELECT buttons.
 3. Press FADER. The song will fade up to normal volume at the rate you have set (from 2 to 10 seconds).
- You can fade the sound back down by pressing FADER again.

TAPING AIDS — Edit/Time Fade

You have a stack of CD's and a pile of C-90 cassettes. The job is to transfer one onto the other. There's 45 minutes on each side of the tapes. But none of the CD's have convenient breaks at 45 minutes. So you're faced with either adding up the times of the songs to find how many will fit on each side of the tape, or resigned to having a song cut off abruptly when the tape runs out.

The SD/A-450's Edit/Time Fade feature can make taping a lot easier.

First you "tell" the CD player how long the tape is. Then it tells YOU how many songs will fit on each side and selects them, switching the order of songs where necessary to maximize tape use.

You record side A of the tape and the SD/A-450 obediently waits in pause until you turn the tape over and resume recording on side B.

Now you're through with that CD. It probably averaged about 50 minutes in length, so you have all but one song on side A and a lot of blank tape on side B. Say, about 41 minutes worth.

You load a new CD into the SD/A-450, "tell" it how much time is left and let it automatically fit as many of the CD's songs as it can onto the remaining B side of the tape.

This "on-board computer" can really streamline taping operations.

**Edit/Time Fade —
Fitting a CD to A Tape**

1. After you've loaded a CD, press EDIT/TIME FADE once. Blanks will appear in the MINUTES/SECONDS display.



2. Press TIME SET. 23:00 appears in the MINUTES/SECONDS display and 46 appears under SIDE in the lower left hand portion of the display. This is the first of 4 tape length choices. The 46 means a C-46 and the 23:00 means you have 23 minutes of recording time per side.



3. Press TIME SET repeatedly until the correct tape length appears — either 46, 54, 60 or 90 minutes (with appropriate times for one side of these lengths appearing in the MINUTES/SECONDS window).
4. Press EDIT/TIME FADE again. The SD/A-450 has now calculated how many and which songs will fit on side A of your tape!



- The TRACK display shows the last song chosen.

- The PROGRAM indicator will be turned on.
 - The MEMORY display shows how many songs were picked for side A.
 - The MINUTES/SECONDS shows the total combined times of the tracks selected.
 - The track selection grid shows the numbers of the songs which were picked. In many cases, these programmed selections won't be entirely consecutive. That's because the SD/A-450 picks as many songs IN ORDER as it can until the very next song is too long. Then it looks ahead and finds a shorter song and adds that one in. It keeps doing this, looking for shorter and shorter songs until it has filled the maximum length of time possible on each tape side.
 - The SIDE indicator will display A and a blinking B.
5. Press EDIT/TIME FADE again. The songs for tape side B will be selected and displayed.
 6. Press PLAY. Playback begins on the side A program.
- Only the tracks selected for side A will be displayed on the track selection grid.



- When all side A songs have been placed, the SD/A-450 goes into PAUSE mode.
7. Press PLAY again to start playback of tape side B's selected tracks.



- You can cancel the EDIT/TIME FADE program at any time by pressing CONTINUE.
- If you want to make ANOTHER tape with the same programmed order, press PROGRAM (side A and B programs will be displayed) and then PLAY.

Edit/Time Fade -- Fitting tracks to specified times.

What if you have 18 minutes and 33 seconds left on a tape and want to fill it with songs from a CD? Instead of specifying a tape length, you can fill in your own times.

1. Figure out how much time is left on side B of the tape.
2. After you've loaded a CD, press EDIT/TIME FADE once. Blanks will appear in the MINUTES/SECONDS display.
3. Use the TRACK SELECT buttons as a numeric keypad to enter the desired duration of taping in the MINUTES/SECONDS display.



4. Press EDIT/TIME FADE again. The SD/A-450 has now calculated how many and which songs will fit into the length of time you specified.
5. Press PLAY to start the recording sequence.

Edit/Time Fade — Combining programming and automatic track selection

It's also possible to pick the songs you want for the start of a tape and then let the SD/A-450 work out what else fits.

1. After you've loaded a CD, follow the instructions for programming a sequence of songs (see page 17 in this section).
2. When you're through, press EDIT/TIME FADE once. Blanks will appear in the MINUTES/SECONDS display.
3. Press TIME SET to select a tape length or use TRACK SELECT to fill in the time.
4. Press EDIT/TIME FADE again. The SD/A-450 has now taken into account your programmed selections and then added others to fill out side A.
5. Select any tracks you especially want on side B of the tape (press a TRACK SELECT button and then PROGRAM for each choice).
6. Press EDIT/TIME FADE again. The SD/A-450 has now taken into account your B-side programmed selections and then added on others to fill out side B.
7. Press PLAY to start the recording sequence.

Clearing The SD/A-450's Memory

Occasionally, if you've entered a lot of instructions or started over a couple of times, the SD/A-450 may not seem to respond correctly. If so, simply open and close the disc tray once to fully "clear" the CD player's memory.

EDIT/TIME FADE — Adding fades

Don't go away, there's still more!

You can use the SD/A-450's tape length/time duration to fade the tape down at the end of a tape side. This is especially handy when transcribing a continuous orchestral piece onto a shorter tape. You're going to have to break it somewhere. But now there won't be a jarring cut at the end of side A. Instead, the music can gently fade down to silence. And come back up to full volume at the start of the B side.

1. After loading a CD, press EDIT/TIME FADE twice. The FADE DOWN symbol will appear in the SD/A-450's display.



- 2A. Set the desired recording time (46, 54, 60 or 90 minutes) with the TIME SET button;

OR



- 2B. Use the TRACK SELECT buttons to enter a desired length of time.
3. Press PLAY. Playback will begin with track 1 and continue until a few seconds before the length of time you specified. At that point, fade-down will begin. When it's complete, the SD/A-450 will go into PAUSE mode.

4. Press PLAY again to play more tracks onto side B. When the FADER button is depressed, the music will gently fade UP at the beginning of side B and fade down again after the length of time you specified.

■ Remember, you can set the FADE length from as short as 2 seconds to as long as 10 seconds. See page 21 in this section.

HELP!

A troubleshooting guide

Simple measures will correct most of the problems encountered in setting up and operating the SD/A-450. If none of these solutions works for you, do not attempt to open or repair the SD/A-450. Disconnect the unit's power and patch cords and contact the dealer from whom you purchased the CD player, or call us directly at the number shown later on in this chapter.

SD/A-450 fails to turn on

1. The power cord is loose.
2. It's plugged into the switched outlet of a receiver or preamplifier — and that component is not turned on.
3. Plug a lamp or something else into the socket to make sure that the AC line is live.
4. You're having a general power failure and blackout.

Playback will not begin

1. The disc is upside down. Reload the disc with the label side up.
2. The disc is dirty or damaged (tsk. tsk.). Check it for smudges, peanut butter smears, deep scratches, Golden Retriever tooth marks, etc.
3. Static discharge may have caused an error. It can cause the CD player's internal microprocessor to temporarily lose its mind. Turn the SD/A-450 off, then back on. If static discharge is a continuing problem, try lightly spraying the carpet around your stereo system with an antistatic spray. Do NOT spray the disc — it's already encased in permanent antistatic plastic.
4. If the SD/A-450 has been brought in from a cold area, condensation can occur on the laser pickup. Allow the player to warm up to room temperature.

No sound from one or both channels

1. Loose or defective hook-up cables. Check the output cables for proper connection. If necessary, substitute one set for another.
2. Preamplifier or receiver controls not set correctly.
Is the correct source selected?
Are the volume and balance controls set right?
Is the tape monitor button pushed in by any chance?
If there is a Speaker A/B Select switch, are the correct pair of speaker outputs selected?
Is the power amplifier turned on?
These questions may sound a bit patronizing, but you'd be surprised how often the problem lies with one of the various arcane buttons on today's complex preamps and receivers.
3. Incorrect connection. Are BOTH of the connectors from the SD/A-450 connected to the correct inputs on the receiver and/or preamplifier?

Playback is mixed with hum.

1. Check or replace the connecting cables.
2. Make sure that each cable plug is securely pushed into its socket.
3. Signal cables may have been routed too closely to AC cables, power transformers, motors or TV sets.
4. Try relocating the SD/A-450, allowing more space between it and your receiver, integrated amp or power amplifier.
5. Listen to other preamplifier sources. If the hum persists, it's not the CD player's fault.

Sound skips or stutters.

1. The SD/A-450 is receiving excess vibrations or physical shock. Read the recommendation on page 6 about correct placement.
 2. Bad disc. Check the disc for dirt or deep scratches.
-

The DISC indicator lights, but the disc doesn't play

1. Bad disc. The compact disc is not providing lead-in information. Check for disc damage and/or try another disc that you know works. Return and/or replace the disc as necessary.
 2. Disc is inserted label side down. Check the person operating the CD player for possible damage.
-

Programming Sequence does not execute correctly.

1. Very occasionally, the player may accidentally function incorrectly even if you press the appropriate buttons. If this happens, turn the player off. After a few seconds, turn it back on and it will operate normally.

Cleaning

You'll want to wipe off the SD/A-450's front panel and chassis from time to time with a soft, dry cloth. If you have something stubborn to remove, use a mild dish soap or detergent sparingly applied to a soft cloth; don't use alcohol, ammonia, or other strong solvents.

Service Assistance

We suggest that you read the LIMITED WARRANTY completely to fully understand what your service coverage constitutes and its duration. Please promptly complete and return the WARRANTY REGISTRATION CARD for validation of your LIMITED WARRANTY. Also be sure to save the sales receipt in a safe place. It will be necessary for warranty service.

If your SD/A-450 should require service, we suggest you first contact the Authorized Carver Dealer from whom you purchased it. Should the

Dealer be unable to take care of your needs, you may contact the CARVER Service Department by phoning (206) 775-6245, or by writing CARVER CORPORATION, Service Department, P.O. Box 1237, Lynnwood, WA 98046. We will then direct you to the nearest in our national network of Authorized Warranty Service Centers, or give you detailed instructions on how to return the product to us for prompt action.

If your SD/A-450 must be sent in for service, please try to describe the problem as completely as possible.

- Does the problem occur with all discs, or just with certain discs?
- Is the problem continuous or intermittent?
- Is the problem related to other factors such as cold or warm operation of the player?

If the problem is related to sound quality, making a cassette tape of the playback while the unit is malfunctioning is extremely helpful to the Service Center and can allow them to identify and correct the problem faster. Such a tape is especially helpful when a problem is intermittent.

If the problem occurs with particular discs, please try to include the disc(s) with the player for testing. The Service Center will DEFINITELY return any discs you include with the SD/A-450.

We wish you many hours of musical enjoyment. If you should have questions or comments, please write to us at the address above.

Specifications

Frequency Response: 8 Hz-20 kHz -1 dB+ 0.2 dB
 Total Harmonic Distortion: 0.002% at 1 kHz
 Signal-to-Noise Ratio: 100 dB
 Channel Separation: 96 dB at 1 kHz
 Dynamic Range: 100 dB
 Wow and Flutter: Unmeasurable
 D/A Conversion: 1-bit MASH
 Quantization: 16 bits
 Optical Pick-Up: 3-beam 780nm laser
 Output Voltage: 2.2V (F.S.)
 Power Consumption: AC 120 V 0.12 A
 Dimensions: 19" W x 3.5" H x 11.5" D (483mm x 89mm x 290mm) not including "feet" and rack handles
 Weight: 9 lbs.

is provided free, courtesy of CARVER

About Soft EQ

(called Digital Time Lens on previous models)

While compact discs represent the first significant improvement in audio sound sources since the stereo phonograph record, they are not without their variations and, subsequently, faults.

Just as Bob Carver has addressed problems inherent in processes such as FM broadcast reception, power amplification and stereo, so he has taken a realistic and scientific approach to restoring certain sound deficiencies which can be present in AAD (Analog/Analog/Digital) compact discs.

Deficiencies? Yes. Any manufacturing process is variable. Mastering (the process of transferring the analog master tape to digital) is even more variable, since it consists of many subjective decisions made by a mastering engineer during the conversion process. In short, all compact discs don't sound the same.

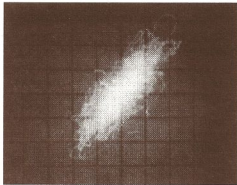
Many professional musicians, audiophiles and audio journalists, while praising the quietness and dynamic range of compact discs, have often expressed a lingering disappointment in the way music itself sounds on many AAD examples. This is particularly evident when the compact disc is compared with a well-executed vinyl version of the same master tape! The complaints generally center around a particular compact disc's lack of ambience and spatial detail. In addition, the midrange is often described as sounding bright, hot and harsh.

When Bob Carver began comparing CD's to quality vinyl discs played with an audiophile turntable/cartridge combination, he, too, was dismayed by the compromises he heard on some discs. The lush, abundant, three-dimensional perspective which his turntable and cartridge provided, suddenly evaporated into a flat, brittle wasteland. He immediately purchased a large number of compact discs which had well-mastered, well-pressed vinyl counterparts and set about quantifying the differences.

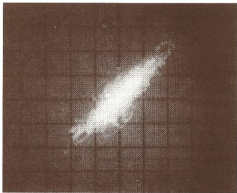
Ambient information deficiency

To quantify "stereo perspective", which is actually the L-R component of the signal, Bob devised a special test circuit that would amplify the difference. The figures show the Lissajous oscilloscope

patterns obtained from the same instant of musical program in its LP and CD versions.



A. Phonograph version of song.



B. Compact disc version of same song.

In this type of display, a straight, thin diagonal line from the lower left to the upper right would represent a purely monophonic signal. The more stereo "difference" information there is, the more the line spreads out into an ellipse. Notice that there is considerably more difference (L-R) signal in the LP version of the music! In fact the average amount of Left-minus-Right channel information versus the amount of Left-plus-Right differed by about 1.25dB between analog and digital versions of the same music.

It is important to understand that the Left-minus-Right (L-R) component of stereo carries the three-dimensional part of sound field information, much as is done with FM stereo. A reduction of 1.25dB doesn't sound like much. But since power goes up as the square of the voltage, it means that analog records carry a whopping thirty-three percent more ambience information than digital discs. That's a noticeable difference in three-dimensionality, imaging and other psychoacoustic factors that put the realism into music.

Equalization differences

In addition, Bob discovered that many CD's exhibit a significantly *different spectral energy balance* than an analog version of the same music. Using a fine, moving-coil cartridge to play the LP versions of certain programs, Carver noted that there was a slight BOOST in the mid-bass region and a slight CUT in the mid-treble region compared with the response obtained when playing the CD version of the same program. In other words, the overall frequency response is shifted on the CD towards more midrange above 400 Hz.

Even today after almost a decade of accumulated compact disc mastering and production experience, these two fundamental CD deficiencies show up on many releases, especially those which have been prepared from older analog sources.

How does Soft EQ correct these problems?

Bob Carver's circuitry adjusts the ratio of L - R to L + R and restores the octave-to-octave balance originally intended by the musician and recording engineer as evidenced by the analog recording.

Do all CD's need Soft EQ's effect? No. In fact, with some speaker systems which don't image as well as they could, almost no difference can be detected. That said, we must point out that, on the right CD, — and there are many of them which qualify — the discriminating listener will immediately notice a significant improvement. As one reviewer put it, "I suspect that many owners will put little marks on their CDs that indicate whether they should be played with the Time Lens (Soft EQ) or not. I find nothing wrong with such an arrangement."

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