

SERIAL NUMBER

# *dynaco*

## SCA-50 AMPLIFIER

This number must be mentioned in all communications concerning this equipment.

### INSTRUCTIONS FOR ASSEMBLY OPERATION



929053-1

*dynaco inc.*

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BLACKWOOD, N. J. 08012, U.S.A.

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**CAUTION: For continued protection, replace power fuse with the same type and rating as indicated.**

**WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.**

## SPECIFICATIONS

**Rated Power Output:**

25 watts continuous average power per channel into 8 ohms, 20-20,000 Hz, at less than 0.25% total harmonic distortion. Distortion decreases at lower power outputs.

**Power at Clipping, Single Channel, 1000 Hz, less than 1% distortion:**

35 watts @ 8 ohms; 35 watts @ 4 ohms; 20 watts @ 16 ohms.

**Intermodulation Distortion:**

Less than 0.1% at any power level up to 25 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower outputs.

**Frequency Response:**

Phono:  $\pm 1$  dB of RIAA curve @ 1 watt into 8 ohms.  
High Level:  $\pm 0.5$  dB, 15 Hz to 45 kHz @ 1 watt into 8 ohms.

**Hum and Noise:**

Phono: 72 dB below a 10 mv input (Ref: 1 kHz).  
High Level: 89 dB below a 0.5 v input.

**Input Sensitivity:**

Phono: 1.65 mv for 25 watts output.  
High Level: 125 mv for 25 watts output.

**Phono Input Overload:**

100 mv @ 1000 Hz.

**Tone Controls:**

$\pm 10$  dB @ 50 Hz;  $\pm 10$  dB @ 15 kHz

**Impedances:**

Magnetic Phono: 47,000 ohms.  
High Level: 50,000 ohms.  
Tape Output: From Phono inputs, 10,000 ohms minimum load.  
From High Level inputs, same as source.  
Headphone Output: 4 ohms or greater.

**Separation:**

60 dB @ 1000 Hz minimum; 40 dB @ 10,000 Hz.

**Semiconductor Complement:**

17 transistors, 2 integrated circuits, 2 FET's, 24 diodes.

**Dimensions:**

13½" wide x 12" deep x 4¼" high.

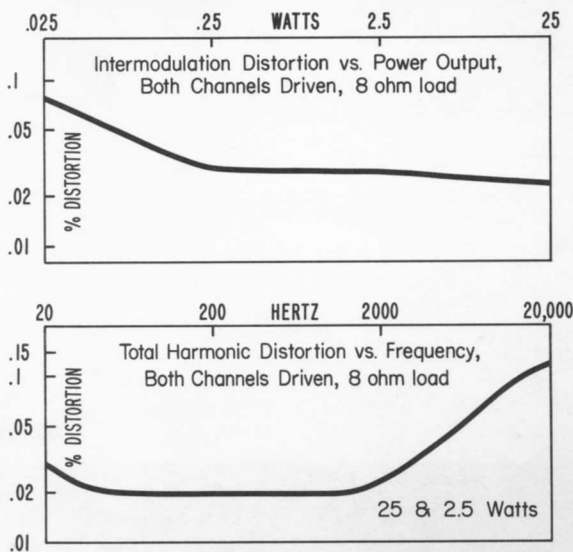
**Shipping Weight:**

15 lbs.

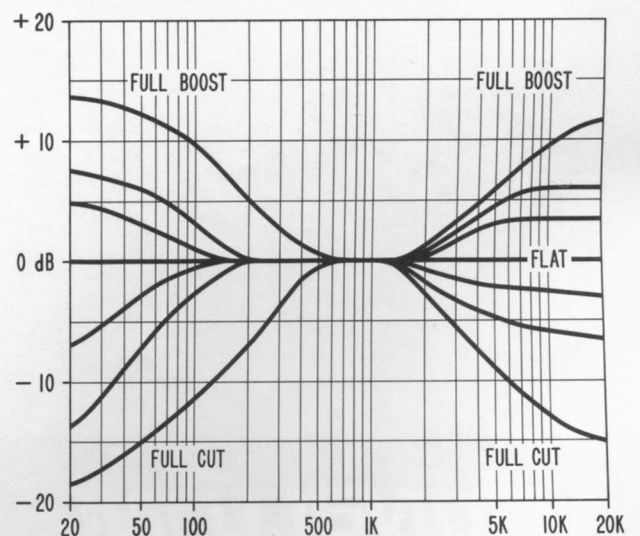
**Power Consumption:**

20 watts quiescent; 240 watts maximum; 50/60 Hz, 120 or 240 VAC.

### TYPICAL PERFORMANCE CURVES



### TONE CONTROL RANGE



## INTRODUCTION

The Dynaco SCA-50 is a medium power solid state stereo control amplifier of exceedingly high quality. Thorough planning has provided flexibility in a full function control center with remarkable simplicity and operating ease. A high gain RIAA-equalized magnetic phono input is accompanied by 4 high level inputs for accommodating a radio tuner, 2 tape recorders, and television sound or similar signals. Two constant level tape outputs are provided ahead of the volume and tone controls, with monitoring access on one of them. A front panel headphone output is in addition to switch-selected main and remote stereo speakers.

The components of the SCA-50 are of notably high quality, operating conservatively with substantial safety margins in a circuit which includes multiple protective techniques to assure long, trouble-free operation. The transistors and integrated circuits have been selected for minimum noise and distortion in sustained use. Many close tolerance components, employed wherever warranted, assure continued adherence to the excellent specifications. The added ruggedness of all silicon transistors assures maximum reliability. The 3 factory-assembled epoxy-filled fiberglass circuit board modules in the kit, which contain all the semiconductors and active circuitry, are tested and critically adjusted for optimum performance under actual operating conditions before shipment. This assures that every unit can, with proper assembly, meet the specifications normally associated with laboratory prototypes. An entire power amplifier stage, including the output transistors, comprises one circuit board, so this complete section has in effect been factory tested in every kit.

The SCA-50 specifications speak for themselves, but specifications are unable to reveal all the facets contributing to exemplary sound quality. Separate regulated low voltage plus and minus power supplies for the preamplifier circuits assure freedom from AC line fluctuations or interaction with the power amplifier demands on high level passages. The output amplifier circuit is full complementary symmetry—

more likely seen in the most expensive designs, but rare in this power class. The bias supply thermally tracks the output transistors and thus “notch distortion” is avoided—often thought to be the source of “transistor sound” in otherwise technically competent designs showing very good specifications. Even the tone controls are unique. With the knowledge that the SCA-50 will frequently be selected by purists, a front panel switch *engages* the tone controls when desired, as they are normally out of the circuit. And, to make them more useful for most needs, their essential effect is limited to the extremes of the band, with a variable turnover characteristic in the bass.

This amplifier incorporates a number of protection techniques and circuits to guard against damage as a result of builder error or user abuse. Nonetheless, care in assembly and an understanding of the capabilities and the limits of so fine a piece of audio equipment is one of the best guarantees for continued satisfaction. Five fuses are employed—in the B+ and B- lines for each amplifier, and the AC line fuse for the entire unit. The failure of any of these should be cause for thorough investigation of the reason, especially if an identical replacement fuse also fails. Under no circumstances should you ever attempt to use a larger value fuse. Automatic current limiting protects the output devices without degrading the sound in the event of an output short or a load below 4 ohms until the B+ and B- fuses can blow. A thermal breaker will interrupt the program if excessive power demands cause appreciable temperature rise with potential damage to the outputs. It will automatically restore the signal after a cooldown period. Separate transient thump suppression circuits are incorporated in both power amplifier and preamplifier sections to minimize the possibility of turn-on and turn-off noises.

Proper interconnection and operation of your SCA-50 will assure your complete satisfaction. Therefore, read carefully the Operating Instructions next, and make all the connections to the audio inputs, and to the loudspeakers *before connecting the amplifier to the AC line.*

## OPERATING INSTRUCTIONS

### Connection to Loudspeakers

The *accuracy* and *security* of speaker connections is of significant importance in assuring trouble-free operation of a solid state amplifier. Please read this section through before turning the amplifier on, even though you may be familiar with most of it.

Two stereo pairs of loudspeakers may be connected to the SCA-50, speaker pair A, and speaker pair B. A symbol indicates the two adjacent terminals for each connection. The left channel is the top row of terminals. The black (common) terminals are internally connected, so you can use other equipment which requires common output grounds.

*You must be certain that accessory equipment connections on the output never connect the + or live terminals together.*

*Likewise, the amplifier must never be operated into a shorted speaker connection between the + and common terminals.*

Damage to the amplifier could result.

The A pair and B pair of speakers are selected by the front panel switches. Both may be operated at the same time, provided the load on the amplifier is 4 ohms or greater (parallel connection of two 8 ohm speakers), and so long as you do not try to operate the amplifier well beyond its capabilities, into “hard clipping” for any length of time.

If stranded wire, such as the popular lamp cord is used for speaker connections, the strands must first be twisted tightly together, or preferably “tinned” with solder to avoid fraying. It is *essential* that no wire strands can possibly touch the chassis, or another terminal at either the amplifier or the speaker.

Speakers may be either 8 or 16 ohm impedance. If 4 ohm speakers are used in one location, you should be careful not to play other speakers at the same time. Only one speaker system should be connected to each pair of terminals.

The power rating of the SCA-50 is based on a load impedance of 8 ohms. Into 16 ohms, solid state amplifiers deliver less power. As the load impedance is lowered, power output increases along with the heat, until either a protective circuit is actuated along with greatly increased distortion or shutdown, or a fault occurs. The actual impedance of most speakers is considerably less than their rated impedance at some frequencies—hence the importance of following the above paragraph, especially when playing at loud volume levels.

For speaker cables of less than 25 feet, ordinary #18 lamp cord is satisfactory. For longer distances, #16 lamp cord is suggested. Many speakers show slight sonic improvement with heavier gauge connecting cables, so it is wise to avoid the lighter wire often provided. The marking of speaker

terminals varies, but one terminal is usually identified as (+), (8 ohms), or in red. It is only important that the "sense" of the wiring to each speaker be consistent, so that all speakers will be connected *in phase*. Lamp cord invariably codes one lead—with a tracer thread wound around one wire, with a molded ridge on the outer plastic insulation, or with different color conductors.

Two speakers are connected in phase when maximum low frequency output is heard when they are driven from a *mono* source. Lowered output is the result when the connection to *one* of the speakers is reversed (out of phase, or reversed polarity). This is most apparent when the speakers are placed face to face about 6 inches apart for test purposes. No damage will result from improper phasing, but the sound quality will be impaired.

### Phonograph Input Connection

The pair of input sockets marked *Phono* provide RIAA equalization for magnetic phonograph cartridges. The preamplifier stage has plenty of gain to accommodate all normal magnetic cartridges (nominal output 0.5 millivolt per centimeter per second, or greater) intended for the standard load impedance of 47,000 ohms. The reflected capacitance at the input is 10 picofarads. The upper row of input connections is intended for the left channel.

### Ground Connection

Some phonograph cables include an extra wire which is to be attached to the amplifier chassis. The screw marked GND is provided for this purpose. Under some unusual conditions of use, where it is advisable to ground the system to an earth ground, such as a water pipe, this screw can serve as the connection point.

In general, it is advisable to use the *minimum* number of separate ground leads necessary to achieve lowest hum. Some experimentation may be necessary, but extra leads often cause an increase in the hum level of the system.

### Tuner and Spare Connection

These identical high level inputs accept flat signals of ½ volt or more from AM and FM Multiplex tuners, the audio signal from a television set, or a third tape recorder.

### Connection from Tape Recorders

Inputs are provided for playback from two tape recorders, identified as *Tape 1* and *Tape 2*. These are similar to the *Tuner* and *Spare* inputs, with the exception that monitoring access is also provided on the *Tape 1* input. This feature, applicable to recorders having independent heads and electronics for record and playback, is explained later in connection with the Monitor Switch.

Cables from the "preamp output" or "line output" of the recorder connect to these Tape inputs, and for normal playback, are selected by the Selector Switch. The Monitor Switch will also select the *Tape 1* input, as described later.

Do not operate a tape recorder in the fast wind or rewind mode when the volume control is advanced, as this could produce large signals at inaudible frequencies, with consequent risk to your amplifier and speakers.

Tape "decks", which do not contain playback electronics, but supply only a very low level signal directly from the playback head, are not intended for use with equipment like the SCA-50.

### Connection to Tape Recorders

For direct recording of an input to the amplifier, such as a record or radio program, audio cables connect from the *Tape Out* jacks on the SCA-50 to the "radio", "high level" or "line" inputs on the recorder. These inputs should have a nominal sensitivity between 100 millivolts and one volt. Microphone inputs have too high a sensitivity (a few millivolts) and are not suitable.

The output from *Tape Out 1* is paralleled with *Tape Out 2*. The combined load impedance on these two outputs should be more than 10,000 ohms. In other words, if two recorders are connected, each should have an input impedance of at least 20,000 ohms. These tape outputs are ahead of the Mono switch in the SCA-50, as well as all other controls except the Selector Switch and Monitor Switch, so tape out signals are always stereo. If an external Y adapter is used to obtain a mono recording, it will have the same effect on the speaker outputs as switching the amplifier to mono. The amplifier controls can adjust the speaker signals at will, without affecting signals to the recorder.

### Selector Switch

This selects the program source in both channels simultaneously. Unlike some other amplifiers, even routine playback from a tape recorder is selected here, to avoid confusion. The tape Monitor Switch must be "out" for selector functioning.

### Volume Control

The output level of both channels is adjusted simultaneously by this control, with close tracking so that the program material will remain in balance over most of its range. The control taper provides a relatively slow increase in volume over the first half of rotation, with a more rapid increase above 12 o'clock. This helps to accommodate both high and low output phono cartridges, as well as speakers of differing efficiencies.

The particular setting of the volume control in no way indicates relative power outputs, either between units, or as a percentage of maximum output capability. The design of the control, the input level and the speaker efficiency are of far greater significance in such comparisons.

### Balance Control

This control will normally be centered for equal signals in the two channels. Rotation to the right reduces the left channel level, shifting the apparent source to the right, and conversely. This control has a very gradual change for the first 90° either side of center to facilitate subtle adjustments, but one channel is silenced at either extreme of rotation.

Adjustment for proper balance may be necessary because of differing speaker efficiencies or inequities in energy distribution from speaker placement or furnishings, as well as occasional program variations. You may wish to re-position the knob so it is centered, correcting for an essentially "permanent" difference in normal listening.

### Tone Controls

The normal or "flat" position is centered, with increasing effect to the right, and reduction to the left. Tone controls alter the signal to suit the user; such deviations from the assumed accuracy of the original should be undertaken with care, and the reference point should always be the center. However, particular effort was expended in the design to make these controls musically useful, to help correct for room and speaker deficiencies, or program limitations.

The tone controls are engaged only when the Tone Controls switch is *in*. Audio purists frequently prefer a flat output, and the quality of the SCA-50 is of such high order that it will often be chosen by such critical listeners.

Initially these controls may seem less effective than some others, because they have been deliberately designed to have very little effect on the midrange, even though substantial alteration of the extremes is possible. This superior design assures that the critical voice range is essentially unaltered until the controls are rotated close to their limits.

### Monitor Switch

This switch, on the *Tape 1* input, enables direct comparison of the source indicated by the Selector Switch (button normally *out*) with the signal from the playback amplifier of the tape recorder (button *in*). This is realizable only with tape recorders which have independent heads and electronics for record and playback—common on reel to reel machines, but available on only a few expensive cassette models. This switching does not interfere with the normal recording process—that signal as indicated by the Selector Switch continues unaltered. When the button is depressed, you will hear the program from the tape a fraction of a second after it has been recorded (the time interval is determined by the head spacing and tape speed). The recorder's own monitor switch must remain in the *tape, compare, playback* or *monitor* position.

Remember to keep the Monitor Switch *out* normally, or you will get no signal from any of the other program sources selected by the Selector Switch. The Monitor Switch does nothing when the Selector Switch is in the *Tape 1* position.

### Mono Switch

The normal *out* position is for stereo listening with maximum separation. When pushed *in*, the two channel signals are paralleled, and the combined signal is heard through both speakers, unless the Balance Control is turned to one extreme. This is the proper position for listening to monophonic records played by a stereo cartridge, as it eliminates the vertical noise components of the signal. When listening to a monophonic radio broadcast with some tuners, too, or when listening to a very weak stereo signal, some improvement may be noted in the mono position. If a monophonic

source, such as TV sound, is connected to one channel input, this signal will be heard through both speakers when this switch is in the mono position. If two different mono sources are connected to the left and right Spare inputs, for instance, they will be mixed in proportion to their relative levels unless the unwanted one is switched off at the source.

### Loudness Switch

This provides automatic bass boost in the lower half of volume control rotation to compensate for the ear's lack of sensitivity to low frequencies at low sound levels. The high fidelity purist often avoids such compensation, but many listeners will find it adds listening enjoyment at low levels.

### Tone Controls Switch

To actuate tonal correction with the Bass and Treble Controls, this switch must be *in*.

### Speakers Switches

Speaker pairs A (main) or B (remote) are connected when these switches are *in*. No speakers are connected when both switches are *out*.

### Headphone Jack

A standard 3-circuit phone plug fits this output, wired so that the tip connection is the left channel. Series resistors attenuate the amplifier output, and headphones of 4 ohms or higher impedance may be used. Usually, you would disconnect the speakers (buttons *out*) when headphones are used, so you must be careful that the phones are not damaged by excessive signal when they are plugged in, but not in use. It is advisable to switch on one set of speakers when the headphones are unplugged, so you are aware the amplifier is operating.

### Power Switch

This switch also operates the two AC outlets on the back panel identified as "switched", turning them on and off with the amplifier. It is recommended that mechanical units, such as record players and tape recorders, be connected to *unswitched* outlets. Their drive mechanisms cannot then be damaged if the power is turned off without disengaging the machine.

## INSTALLATION INSTRUCTIONS

The SCA-50 amplifier generates some heat in normal use, so adequate ventilation must be provided to assure long, trouble-free life. As with all transistorized amplifiers, heat output increases with higher power demands, up to a maximum at about half the power rating. Also, the lower the load impedance, the greater the heat, so operating two sets of speakers will cause the amplifier to run warmer.

You must never limit the air flow through and around the SCA-50. **Do not set anything on top of the cover.** Vertical (face up) mounting is not encouraged, since the heat dissipation is not as effective as in the normal horizontal placement for which the amplifier was intended. If the unit *must* be mounted face up, a fan is recommended to circulate the air around the heat sink fins.

If the amplifier remains on without signal input for an extended period of time, no problems will be encountered, for the transistors remain relatively cool except under high signal conditions. With sustained high power output, it is normal for the bottom plate to get much warmer than the cover, for the heat sinks dissipate heat to the chassis. At full (or half) power, the SCA-50 puts out as much heat as a 200 watt light bulb—just as much heat as an equivalently

powered tube amplifier. Excessive temperature rise will automatically shut off the amplifier, and it will turn on again after the heat sinks and chassis have cooled down.

Panel mounting requires a single rectangular cutout 13-1/16" by 3-15/16". The rubber feet are removed for such installations. You can simply provide a shelf flush with the bottom of the opening. Be sure to cut out the shelf in the area of the ventilation perforations in the chassis. If you wish to stack the SCA-50 with a Dynaco tuner, the amplifier *must be mounted on top* for adequate ventilation. If the tuner is shorter, like the FM-5, the rear feet may be moved forward for support.

For single unit panel installations, you can avoid the need for the supporting shelf if you have access from the rear, with the accessory PBK bracket kit. It can accommodate panels up to 1" thick. The PBK kit is available only direct from Dynaco for \$3.50 postpaid (no CODs, please).

Oiled walnut veneer cabinets are available from your dealer to handsomely set off your Dynaco components. Either single or double stacked versions are provided at modest cost.

