

dynaco *dynakit*



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Vertriebsgesellschaft für
ausgewählte HiFi-Produkte
mbH & Co. KG
annex
Beusselstr. 71, D-1000 Berlin 21
Telefon (030) 392 10 20

For the Audio Perfectionist

Why Us?

For two decades Dynaco products have consistently enjoyed an unparalleled reputation for sound value. Satisfied customers have always been our best advertising. Audio enthusiasts, and especially kit builders, are among the most critical of judges. We are particularly proud that these people seek us out in increasing numbers for the very best in sound at the lowest possible cost. "Best for the money" is a traditional Dynaco accolade. As high fidelity perfectionists ourselves, we frankly doubt the implication that better sound could be achieved by spending more money, at least within the physical considerations (size, power, etc.) which define practical limits.

Never is an attempt made to limit quality for the sake of cost. Yet, our demand for maximum value dictates that every ounce of fat comes off if it does not directly aid sound quality, reliability, or easier kit construction. Most of the products we sell are kits. Inherent simplicity is the key to our electronics. Not only does that make them easier to build (and easier to service, too) but simpler circuits that do the job as well or better manifest refinement of design which is a key to success. The additional engineering needed to successfully yield a kit at the hands of the rankest novice means even greater assurance of conservative operating margins and ultimate performance.

Every Dynakit buyer can be certain that the kit he buys is identical to the factory built version. Completely assembled circuit boards on premium FR4 fiberglass are in-circuit tested before each kit is packed. Only in this way can we be sure that nearly every diode, transistor and IC is fully performance-checked prior to shipment. The factory assembled units are each further checked in total.

In loudspeakers, which are comparatively recent additions to the Dynaco line, our success was built on consumer contact and recognition. The A-25 is, we believe, by far the largest selling quality loudspeaker system in the world, having passed 600,000 units. They are not kits, because it doesn't pay—automated fabricating techniques reduce total labor time to less than 1/2 hour.

Dynaco warranties are not ambiguous. All kits have a one year parts replacement warranty; factory-assembled units add a one year labor warranty which includes return freight

to the owner. Speaker systems have a one year warranty, plus an added four years on the drivers themselves, provided they have not been subjected to abuse.

Model changes are rare, for sophisticated, practical designs stay current for a decade or more. The Mark III, from 1957, is still widely used by those who appreciate the unique advantages of tubes. Many of these go to Japan!

Dyna's specialty is introducing state-of-the-art designs which not only remain on top soundwise for years, but also are frequently capable of retrofitting accessories to maintain their currency. Dynaco was one of only three manufacturers who made it simple to convert mono preamps for stereo use. It was also the only company to provide an integral multiplex adaptor for converting its mono tuners to stereo—at 1/2 to 1/4 the cost of external units.

Even when we made a styling change years ago, panel and knob kits were offered to inexpensively update the tens of thousands of similar units already in use. When tone control circuitry changed, a conversion kit was offered.

Now the DBF-5 Dolby processor makes it possible for many FM-5 owners to update present tuners.

The 4-channel dilemma has again demonstrated Dynaco's consumer consciousness. As a major amplifier maker, Dynaco was the innovator of "speaker matrix" techniques which enabled 4-dimensional sound at low cost *without* an additional stereo amplifier! Now widely imitated, the Dynaquad™ system's ability to reveal added realism from stereo recordings as well, is proof of its value. In its most simple variation, it needs no more than a single added back speaker. Information will be provided on request.

"Over the past decade, Dyna amplifiers have achieved an enviable reputation for uncompromised quality at bargain prices. Either in the form of easy-to-build kits or as factory-wired models, the Dyna units have consistently matched or surpassed the performance of competitive models costing far more.

"As we see it, the 'secret' of Dynaco's success has been in their refusal to incorporate gadgets or passing fads into their products. Sound engineering practice, combined with deceptively simple yet highly effective circuit design, has characterized every Dyna product we have tested over the years."

JULIAN HIRSCH IN STEREO REVIEW

Choosing Your Music System

Bewildered by specs? Understood, they can be a real help, but they are meaningful only if they afford a true basis of comparison in ways that serve your needs. Because Dynakits separate the electronics into amplifiers, preamplifiers and tuners to attain better performance and enable easier assembly, we appear a little more complex to the novice. Our specs are really thorough because hobbyists expect it, (see the last 3 pages) but this catalog tries to describe the important points in everyday language.

We have devoted much time and effort to defining and improving those factors which correlate with reproduction accuracy. We believe that deeds, not words, connote value, which discourages selecting something just because it is "new". Fads have no place in quality equipment.

We suggest the serious listener look to specialized publications like the Audio Alternative, Stereophile, or The Absolute Sound for critical opinions. We'll be glad to supply their addresses. We believe independent reviewers' comments are a helpful guide in choosing the best sound for the dollar. We abhor excerpts, but they are necessary here. The full review incorporating any quotations is

available from Dynaco on request.

While equipment that measures poorly never sounds good, specifications are incapable of distinguishing nuances of design which make the difference between fine sound and superlative accuracy. The critical listener must look beyond specifications. Stability, for example, is a commonly referenced amplifier characteristic which is rarely quantified, but it is considered of critical importance with the most elaborate loudspeaker systems. Dyna conceived this criteria in developing the Mark II two decades ago, and it has been crucial to any quality amplifier ever since. Bandwidth is another commonly abused specification, since it does not directly relate to sound quality, so long as it is sufficient. The PAT-5, for instance, has a narrower bandwidth than the PAT-4 preamplifier. Similarly, square wave response beyond certain limits is needless technicalia.

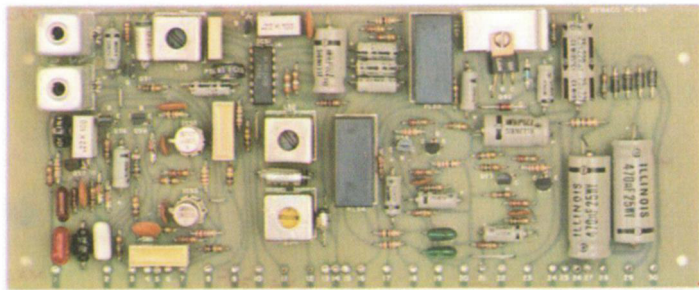
Power amplifiers are generally rated by power output. Be sure you compare them on the same power basis, which should be the FTC specified rating which must include the RMS output power, maximum distortion, impedance, and bandwidth in the single specification. A detailed explanation of this criteria is available on request.

At the high listening levels currently popular, not only is

Dynakits Are Easy!

In 1955 the first Dynakit Mark II opened a new era in low cost high performance audio for the hobbyist. And, it initiated the concept of preassembled etched circuit modules as the heart of successful kit designs. Supplying most of the circuitry prewired and tested assured consistent reproducibility, easy assembly, and compact, uncluttered designs with high reliability. Hundreds of thousands of Dynakits, including many Mark IIs still in use today, are ample evidence that successful kit building requires no special skills or knowledge.

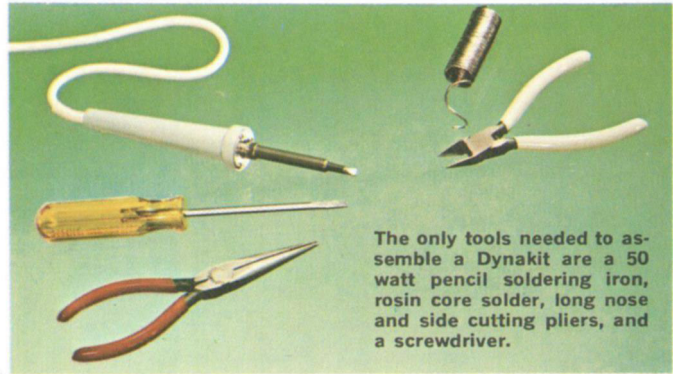
Reasonable familiarity with common hand tools, an appreciation of the importance of a good solder connection and how it is made (each manual describes the procedure in detail), and a willingness to follow instructions are your keys to success. Step-by-step instructions which are geared to the novice rather than to the technician, coupled with detailed pictorial diagrams which permit tracing every step against the completed layout, have enabled teenagers, secretaries and housewives, as well as doctors and lawyers to build thousands of Dynakits without error.



Every audio circuit board comes assembled and tested.

All of the semiconductors (transistors, diodes and integrated circuits) on the circuit boards in every solid state Dynakit are checked under actual operating conditions before they are packed. Only the interconnection of the circuit boards to the controls, switches and other major components is left to the builder after mechanical assembly. Meters or other instrumentation are not required upon completion, except for tube amplifiers.

Most Dynakits can be built in one or two long evenings unless this is your first kit. We don't stress the short time involved (experienced technicians often find they require far less time than our estimates) because it is more important that you do the job carefully. However, if you have yet to build your first kit, you will find that power amplifiers and tuners will seem less complicated than preamplifiers or control amplifiers.



The only tools needed to assemble a Dynakit are a 50 watt pencil soldering iron, rosin core solder, long nose and side cutting pliers, and a screwdriver.

If you have built other brands of kits, you may be surprised at Dynakit simplicity, where the typical manual is under 24 pages, and less than half of that is actual construction steps. In contrast to other kits where you must check many diagrams for the total picture, Dynakits are so simple a single pictorial layout makes checking your work easy. If you are still uncertain, ask your dealer to lift the cover of his demonstrator or show you the instruction manual for a kit. Or, send \$1.50 to Dynaco for any manual. The one for the Stereo 400 is \$2.50. The manual not only provides detailed operating instructions and background information, but it also includes a schematic diagram and service information to aid the technician, as well as trouble-shooting information which often enables the builder to solve minor difficulties himself.

In addition, Dynaco's Technical Service Department is always there to help you by mail.

higher power necessary for clean sound, but the amplifier should incorporate massive heat sinks to dissipate the heat it produces. Likewise, protective circuits in the larger amplifiers, for the speakers as well, offer real benefits.

Sensitivity is the catchword in tuners, but really is of little import in most listening situations. Generally more important are the ultimate signal-to-noise ratio and how strong a signal is needed for "full limiting" so the best possible signal is received. Other vital concerns are multipath rejection, stereo distortion (mono distortion, which often is much lower, has been the only popular industry specification), and distortion of out-of-phase signals which seriously affects SQ and QS matrixed broadcasts. Ready accommodation of overmodulation means much with some stations. Most important is the ease with which the station may be precisely tuned—so that you can reap the benefits of the design you paid for.

Compare tuners on the same antenna under difficult reception conditions. Remember that the selection of a good antenna benefits reception far more than doubling or quadrupling the cost of a good tuner.

Loudspeaker standards are sadly lacking in America. Most specifications are meaningless because they are not arrived at uniformly, often with artificial aids, and in

unrepresentative listening situations. Smoothness is more important than wide response. The number of actual drivers, specific cabinet design, or crossover frequencies are almost meaningless. Listen for articulation (revelation of detail), cohesiveness (blending of drivers), accuracy of image localization and acceptably uniform high frequency dispersion.

Judge speakers in your listening environment if possible. Use familiar program material, and be sure the volume is kept identical for different speakers, because the louder speaker will always tend to impress you initially. Be wary of any speaker which sounds markedly different, whether brilliant, very "forward", bass-heavy (or shy), or one which smears the delineation of instruments or their placement. Listen to a truly high quality recording of a solo human voice, and close your eyes. The best speakers put that person right in the room.

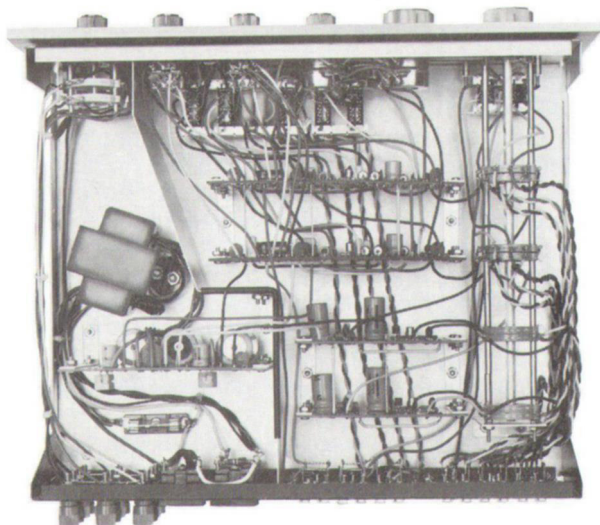
Evaluate Dynaco performance against the most expensive alternatives. We apply the same standards to everything we make, differing only in power output or versatility. Evaluate our amplifiers on the most costly loudspeakers as well as with our own. Listen to our speakers using the most expensive high power amplifiers, and then try a Dynakit.

PAT-5 Deluxe Preamplifier Control Center

The first state-of-the-art preamplifier ever to be made in kit form, the PAT-5 combines the traditional Dynaco attributes of design simplicity and superlative performance. Described by one subscriber-supported magazine for audio perfectionists, *The Stereophile*, as having "clobbered their previous absolute standard" preamplifier, the new PAT-5 is establishing itself as the preferred solid state control center for the most critical audiophiles, with no qualification as to price.

With tone controls and filters switched out, the PAT-5 is capable of passing the most nearly perfect program material without audible degradation. For signals of lesser fidelity, the newly-designed bass and treble controls (separate for each channel) can effectively correct for common speaker aberrations as well as for tonal imbalances that are too frequently encountered in commercial recordings and broadcasts. This success is the result of extensive evaluative integration of listening and engineering talents. The bass control has a variable turnover frequency so that in small increments it acts much like the lowest section of an octave equalizer. A fixed turnover treble control, but at a higher frequency than usual, was found to be most useful. Thorough design assures that the controls do not alter the response when set "flat", even though a defeat ("engage", actually) switch is provided. This switch can also function as a "loudness switch" by presetting the tone controls appropriately. Dropping the typical loudness compensation enables more accurate tracking of the volume control. Switches are provided for an active 15 dB/octave high frequency filter, and an R/C low frequency roll-off.

Two sets of tape recorder connections provide front panel switching allowing tape-to-tape copying in either direction (with off-the-tape monitoring), or enable tape recording of one input while listening to the playback of another recorder. For convenience, two of the four high level inputs on the selector switch duplicate tape monitor playback.



E.P.L. designates the PAT-5's exclusive independent switching provision for an external processing loop such as an equalizer or noise reduction device.

Two magnetic phono inputs can be modified, if desired, to suit cartridges having different requirements for load impedance, terminating capacitance and preamplifier sensitivity. The purist will find the instruction manual

unusually comprehensive on this score.

Dynaco's approach to speaker switching in the preamplifier is unique. The input and output connections are standard 3/4" spaced "banana" jacks, and the switch uses solid silver contacts so it can safely handle 200 watt/channel outputs. This facility also enables headphones of any impedance to be connected to the front panel jack, since it is driven by the amplifier output. Thus power is available to drive even electrostatic headphones to full listening levels.

Switching is provided for full L+R blending for cleanest reproduction of monophonic signals, or 2-channel operation from a monophonic signal at either stereo input. The extensive manual section on optional connections includes provision for alternatively providing 6 dB of blending in the combined channel mode, which is often preferred for headphone listening.

As an ideal companion for monster power amplifiers, the power switch, back panel outlets (three switched, plus one unswitched for turntables), and line cord can handle 15 amperes. Thus it is one of the few preamplifiers which can safely remotely switch the big amps.

A three stage, transistor-regulated power supply prevents line voltage fluctuations from marring the PAT-5's performance. This is particularly important if a very powerful amplifier is used, where its current demands can exceed the wall outlet capability and cause voltage shifts.

The PAT-5 is intended for always-on operation, and in fact the power switch controls only the back panel AC outlets. Several benefits accrue from this choice: 1) the slight heat from the power supply helps drive off moisture and maintains a stable environment [vent slots in the wood cabinet shown are not needed by the solid-cover PAT-5, but the same cabinet is used for other models]; 2) anticipated life expectancy of components is increased because cycling is avoided; 3) because capacitors stay "formed", potentially annoying start-up control and switch noises are virtually eliminated. The PAT-5 draws current equivalent to two or three electric clocks, so energy conservationists may optionally wire it for fully off switching. It is then advised that the "off" position of the speaker switch be utilized for the first ten seconds after turn-on. Alternatively, an accessory relay circuit kit—RCT-5—may be installed in the PAT-5 to provide protective signal interruption.

A most conservative tack in PAT-5 ratings contrasts with listenably lower noise than the PAT-4; that, plus its gain increase is breathtaking (and the PAT-5 has a 6 dB additional gain option!). Differences such as narrower bandwidth in the PAT-5, despite its obvious sonic superiority, belie the total importance of specifications. As the September 1975 High Fidelity Magazine reported, "The measurements made at CBS Labs match the preamp's published specifications or exceed them, sometimes to a spectacular degree. Distortion readings generally are one hundred times better than claimed. Response is a ruler-straight line across the audio band . . .".

The high phono input acceptance is even better than it appears under competitive comparison, because figures are generally given only for 1,000 Hz, and the PAT-5 excels at high frequencies. More important is the attention to design detail which engineered the phono input stage to



accommodate actual cartridge demands and variations. It is a key to the PAT-5's recognition as a superior magnetic phono preamplifier.

There is, in other words, little more that the most critical audiophile or serious music listener could ask for. Typically Dyna, the PAT-5 is human-engineered to combine ultimate simplicity of operation with all the versatility that the hobbyist needs. For professional use, the PAT-5 may be rack mounted. The optional rack mounting kit (RMA) is described on page 23.

In direct listening comparisons with the most respected and costly tube and transistor preamplifiers, the PAT-5

delivers on all counts: low frequency range and tautness, high frequency transparency and separation, resolution of detail, focus of sonic image, and stability and longevity of design. Though not inexpensive, its dollar value is extraordinary. No other product better represents Dynaco's success and aspirations.

"To sum up, the Dynaco PAT-5 is a typical Dynaco product, offering unsurpassed performance and more than adequate operating flexibility at a bargain price even in factory-wired form. And in kit form, it could almost be considered a 'steal'."—Julian Hirsch in Stereo Review.

Detailed specifications are on page 21.

Stereo 400-400M/A High Power Amplifiers



The Stereo 400 represents the pinnacle of amplifier achievement. This is your ultimate amplifier, unequivocally superior on three counts: sound quality; thermal (heat sink) design; and protection of the loudspeaker load from excessive signals. The Stereo 400 initiated the "second generation" of Dynaco solid state designs distinguishing the next plateau of solid state audio technology.

The Stereo 400 has established new standards for

conservative design and operation. Its mammoth heat sink—four times that of some with similar ratings—provides over 1,000 square inches of radiating area so that continuous operation, even at maximum power, is achieved into 8 ohms without a fan. Yet chassis space is provided for easy installation of an optional "whisper fan" for severe service applications, and the heat sink is designed for maximum efficiency with forced air flow.

Dynaguard™—an exclusive dynamic power limiting circuit described by one reviewer as "excellent . . . a similar device should be part of any high-power amplifier . . . (It) is a particularly attractive feature when running high power into a pair of expensive speakers", is the most important of the many protective systems in the 400. It provides loudspeaker protection in direct proportion to the damage potential of the signal. Unlike conventional "clipping" circuits which simply reduce power output to a fraction of what you've paid for, or compressor circuits which restrict the dynamic range, Dynaguard delivers the superior sonic quality of a high power amplifier with the safety of more conservative levels. At any switch setting (20 watts/channel up) full power capability is available for short term transient wave forms, but it senses excessive sustained output and smoothly clamps the input at the indicated limit. Most importantly, this circuit has zero effect until called for, and front panel lights indicate when it is operating. It is a giant step in mating the power handling limitations of fine loudspeakers with the obvious sonic improvements afforded by high power availability.

Absolute stability is an essential ingredient of every Dynaco amplifier design and the sonic benefits are apparent. The Stereo 400 conveys consummate delineation of texture and detail, transcending the handicaps common to other transistorized amplifiers when driving some of the more complex loudspeakers such as full range electrostatics, or those using elaborate crossover networks. The conservative distortion specifications (see review figures separately to compare) inadequately express the Stereo 400's ability to reveal delicate shadings and nuances of complex musical passages when employing the most definitive of loudspeakers.

Low distortion at high power outputs is not a problem in good solid state amplifiers. But most of your listening is at fractional-watt levels, and assuring that the distortion remains at vanishingly low values here is one key to extraordinary sound quality. At low power outputs the Stereo 400 eliminates the common fault of "crossover notch distortion" and thus vanishes the epithet "transistor sound".

The power switch provides alternate polarity input, since the three-wire grounded power cable cannot be reversed. The input impedance is 50,000 ohms, and correct design of the input level controls negates any audio limitations. The input filters have minimal sonic effect, but are useful to reduce RF or subsonic interference for higher effective output, and added loudspeaker protection.

In addition to Dynaguard, several protective systems ensure virtually complete loudspeaker and amplifier safety in normal operation. A delay circuit eliminates the turn-on thump common in other amplifiers. Relay protection against DC at the output affords speaker protection from the all-too-common hazards of tuner muting circuits; the tendency to flick a stylus clean with the finger; or a carelessly dropped tone arm. Such disasters transmitted by a brute amplifier have been responsible for the demise of many a speaker. The relay also ensures quiet shut-off with no decaying transients.

Volt-amp limiting protects the output stage against reactive and low-impedance loads. Separate thermal sensors for each channel are mounted directly on the output

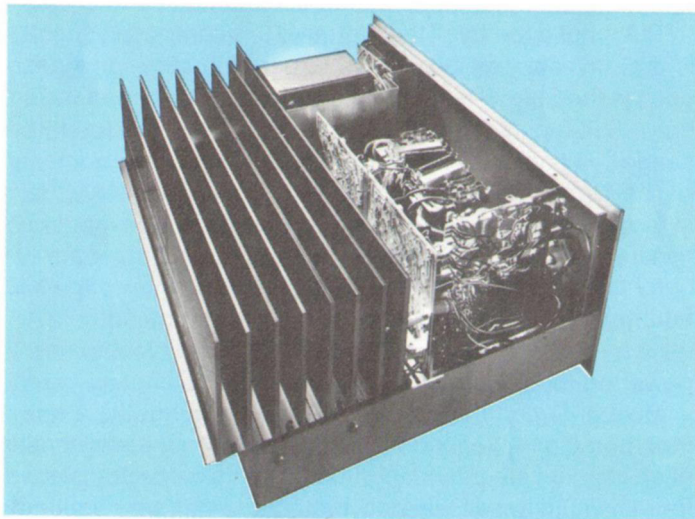
transistors for maximum sensitivity. Four B+ fuses are used in addition to the primary circuit breaker. Front panel output fuses for each channel enable you to limit maximum power capability into the load.

Each transistor in the fully complementary symmetry output is cooled by 1.2 pounds of aluminum heat sink—130 square inches—and the driver transistors are coupled directly to the heat sink by a 1/8" thick heat transfer assembly for accurate thermal tracking. The entire amplifier (except for the input) is DC coupled. The power supply includes a 25 ampere bridge rectifier, 20,000 microfarads of filtering, and a 23 pound power transformer on the 14 gauge steel chassis.

An alternative front panel includes illuminated output level meters and a 4-position meter range switch as the assembled Stereo 400M/A. It is available as a separate MC-4 kit (including the new front panel) for installation at any time on the standard version. Special requirements for extremely high power are accommodated by wiring in an accessory circuit board kit, MBI-400, which provides for bridged outputs to deliver a monophonic 600 watt output (into 8 ohms, less than 0.25% distortion, 20-20k Hz), which is suitable for directly driving 70.7 volt line distribution systems.

Relay rack installation is particularly easy since the accessory brackets may be secured in position first, and then the amplifier placed on them. The fan shown is a complete accessory kit Fan-1, but its mounting bracket is available separately for \$3 on request.

Typical Dynaco thoroughness makes this a three or four evening project for those familiar with kit construction, and even easier for the professional. As the most complex Dynakit project, it is not encouraged for the novice, but more than one person has successfully built it as his first kit. Three fully assembled circuit boards greatly simplify construction, and a full color pictorial diagram shows every wire connection clearly. For \$2.50 we'll be glad to send you the 40-page construction manual with detailed performance data and a complete circuit description, to answer almost every question.



The Stereo 400 is the culmination of extensive Dynaco amplifier expertise, delivering recognized sonic superiority and reliability at a remarkably reasonable cost per watt.

Detailed specifications are on page 21.

Stereo 410 High Power Amplifier



This is our lowest cost high powered amplifier. In the traditional Dynaco image of rugged functionalism, every component and every facility which does not directly contribute to its remarkable sound quality has been eliminated. The sound is the same; the audio specifications are *identical* to our Stereo 400. But the cost is a lot lower—less than a dollar a watt in kit form.

The input circuitry of the Stereo 410 is connected directly to the driver circuit boards, which are the same as those used in the Stereo 400. This provides an input impedance of only 20,000 ohms. Input level controls may be added, if needed, as holes are provided on the back panel.

The Stereo 410 has the same full complementary symmetry circuitry and thermal tracking bias design to assure no "crossover notch distortion" even at low power outputs. "Transistor sound," so often linked with solid state equipment, is gone. Intermodulation distortion and harmonic distortion products are vanishingly low at any power up to 200 watts per channel into 8 ohms.

Most of Dynaco's high power protective circuits are incorporated in the Stereo 410. Separate thermal sensors for each channel are mounted directly on the output transistors for maximum sensitivity and protection; volt-amp limiting; four B+ fuses; and an AC line fuse—all assure safety against amplifier and load (loudspeaker) damage that can occur in other very powerful amplifiers. Output fuses, located on the back panel, offer selective loudspeaker

protection by change of the fuse values.

What's new is the built-in two speed fan which draws air in from the bottom, circulates it inside, and exhausts it upwards under each heat sink fin for maximum effectiveness. An independent back panel thermal sensor switches the whisper fan to normal high speed when a temperature rise dictates. But just forget the fan, and still compare the Stereo 410's heat sink with the competition. There's no skimping here!

The Stereo 410 accurately delineates texture and detail, which overcomes the handicaps common to other solid state designs, even when driving complex loudspeakers, such as full range electrostatics, or those using elaborate crossover networks. As with every Dynaco design, stability is absolute, and the benefits are purer sonics. Distortion at fractional-power levels—where most listening occurs—virtually disappears and is yet another key to its extraordinary sound quality.

Accessories include rack panel mounting brackets, a monophonic bridging circuit board kit for ultra high power operation (600 watts into 8 ohms; 400 watts into 16 ohms), and a dual meter panel kit with four-position range switch.

The amplifier kit is in an open and uncluttered arrangement, which makes it the simplest big brute Dynakit you can build!

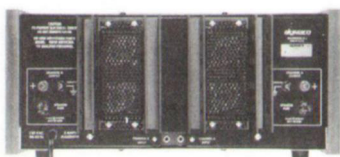
Detailed specifications are on page 21.

Stereo 150 Medium Power Amplifier



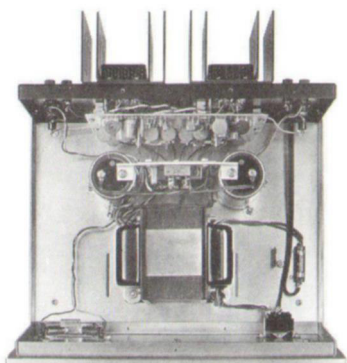
The Stereo 150 is in all respects Dynaco's finest medium powered amplifier. Never before has Dynaco stated that a new amplifier design was sonically superior to prior models of similar rating. Without a doubt the Stereo 150 is superior, featuring the implementation of circuit concepts previously confined to the most expensive gear.

In keeping with its performance capabilities, Dynaco has forsaken its traditional spartan image, and provided the 150 with the accoutrements befitting its rank. The walnut veneer end panels are included, and the front panel segment may be replaced with a transparent version which displays concealed meters, as part of the optional meter accessory kit



which includes a four-position push-button range switch. This accessory will be available in early 1976.

Like other new Dynaco amplifiers, the Stereo 150 has a massive heat sink, full complementary symmetry output



stage, DC coupling, thermally tracking bias supply, 25 ampere bridge rectifier, 20,000 microfarads of filtering, and an extra large power transformer. All of these performance-potent features assure unexcelled sound and design longevity within its power rating.

Protective devices include volt-amp limiting, independent thermal sensors on each output channel which reduce the input with excessive temperature, four separate B+ fuses, speaker fuses, and AC line fuse.

The conservative distortion ratings inadequately describe the Stereo 150's ability to resolve detail. Crossover notch distortion is virtually non-existent. Exceptional stability, even at low load impedances and with any type of loudspeaker, was an intrinsic design consideration. Its sonic accuracy can only be compared with the Stereo 400, where the real distinction is one of ultimate power.

A single preassembled circuit board comprises nearly all of the active audio circuitry, so even the kit has been 90% operationally verified before you begin construction. Precise adjustments for minimum distortion have already been determined. The layout is open, uncluttered, and thus recommended as a first kit. An experienced kit builder can complete the Stereo 150 in one long evening.

For special applications the Stereo 150 may be strapped for higher power monophonic operation with some internal change-overs described in the manual.

Detailed specifications are on page 21.

PAT-4 Preamplifier Control Center

The extraordinarily popular PAT-4 ranks as an outstanding audio value. With 100,000 units in the field, it has been classed only with other preamplifiers of markedly higher cost.

Almost unmeasurable noise and distortion are taken for granted in any good preamplifier. Circuit simplicity is a distinct advantage of the PAT-4 which contributes to easy kit assembly (perhaps 8 hours), yet considerable flexibility is provided. The four independent tone controls are stacked for easy operation, and their design assures that they are completely out of the circuit in the center flat position. Three high filter cutoff frequencies may be selected with steep attenuation. Stereo/mono switching also provides 6 dB of blending for often-preferred headphone listening. A switchable low filter, loudness compensation and tape monitor are included. A front panel input and output

facilitates tape recording (plus similar back panel connections). The "Special" input provides optional equalization choices as one of the three low level (high gain) inputs. The dual amplifier outputs permit driving one or two tube or solid state amplifiers at the same time. For professional use, an optional rack mounting kit (RMA) is available. See page 23 for information.

The PAT-4 is a combination of exceptional flexibility and performance of which Julian Hirsch said in Stereo Review "In sonic quality we would unhesitatingly say that the Dynaco PAT-4 is unsurpassed by any preamplifier we have seen . . . a remarkable unit and unmatched at anywhere near its low price." More emphatic than was the Stereophile: "(Sonicallly) we cannot see how any preamp, present or future, could surpass the PAT-4."

Detailed specifications are on page 21.



FM-5 Multiplex FM Tuner / DBF-5 Dolby® Kit

When the FM-5 was released, High Fidelity magazine commented on the long waiting line "It was worth waiting for, without question. Dyna has done it again—given us a component that will bear comparison with other companies' top models, but at moderate price. The value it represents is most striking in the kit version; many readers will think the \$104.00 saving a windfall in view of the unit's simple assembly . . . The FM-5 looks like a real winner."

Culminating years of development, the FM-5 achieves a tuner's operational ideal: each station is received in exact tune, or there is utter silence. Dynatune™ is an exclusive circuit that automatically fine-tunes the desired station, and continues to track the *precise center of channel* in a servo-loop to assure minimum distortion reception. No manual tuning aid such as meters can do the job as well. This is coupled with a sophisticated muting circuit that "releases" only when you are in tune. Spin the dial and all is silent. Stop on any station, and it is unerringly in tune.

A special amplifier drives the signal strength meter with a unique non-linear action to provide the most information for the signals which present the greatest problems—the very powerful ones, as well as the weakest ones. Thus the meter is an aid to antenna orientation, but signals between 50 and 50,000 microvolts will all read about the same, near the center. It's a Dyna-simple solution to a complex problem.

The FM-5 automatically switches to mono on very weak stereo signals for less noise, but a switch provides high frequency blending and filtering on noisy stereo signals, or deliberate mono operation. Of course, the FM-5 automatically switches from mono to stereo as you tune the appropriate stations.

A combination of extremely low distortion and low phase shift are particularly evident when listening to matrixed 4-channel (SQ, QS, Dynaquad) broadcasts. In the FM-5, even out-of-phase or separate channel stereo signals (which are the worst cases) rarely exceed 0.5% distortion on the FM-5, but you don't find comparable data in anyone's listed specifications.

And, the FM-5 shines under adverse reception conditions. City dwellers need its high multipath rejection, and its superior rejection of the 67 kHz SCA subcarrier, with the ability to handle up to 200% modulation with low distortion.

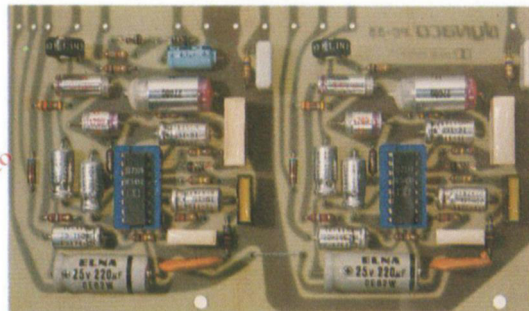
In fringe areas its 1.75 microvolt sensitivity is impressive, but more important is its steep quieting curve which achieves a 40 dB signal-to-noise ratio at 2 microvolts, and full limiting at 10 microvolts.

The Dynaco tradition of sophisticated design with simplicity is clearly evident. Two 4-pole ceramic IF filters contribute sharp selectivity and virtually permanent alignment. All active circuitry—3 FETs, 12 transistors, 8 ICs, and 21 diodes—is preassembled and aligned on two circuit boards and the "front end", enabling kit completion in six hours or so. The FM-5 may be rack mounted for monitor or professional use. The RMA Rack Mount Kit is available as an option. See page 23 for information.

An accessory phono preamplifier kit—PPM-5—can be installed inside the FM-5's back panel to convert the switch-selected auxiliary input for an RIAA equalized magnetic cartridge. The PPM-5 includes IC amplifiers with

32 dB of gain, which added to the FM-5's 28 dB, yields an overall sensitivity of 2 millivolts for 2 volts output with a 75 dB signal-to-noise ratio and distortion below 0.05%. Thus the FM-5 becomes a compact control center for a simple, but high quality music system with just the tuner's volume control. Then the power amplifier can be connected to the tuner's switched AC outlet. It is excellent for stores, offices or as a starter system for the collegian.

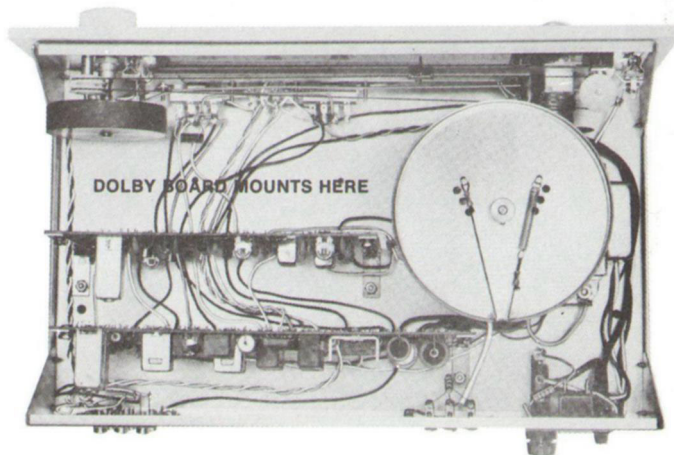
Alternatively, the front panel switch provides a normal high level input, or it becomes a necessary part of the DBF-5 accessory. This Dolby® B processor kit makes it possible to add Dolby decoding to the FM-5 now or later, as the expanding number of Dolby broadcasts warrants it. The DBF-5 can be retrofitted to most earlier FM-5s (except the first ones, with PC-20 and PC-21 boards) as well. The DBF-5 cannot be fitted into the AF-6, nor is it usable with other brands of tuners. The kit includes another preassembled circuit board utilizing two ICs, for which chassis space has already been provided. Switching to Dolby decoding automatically provides proper de-emphasis.



Kit assembly involves replacing the switch, installing the pre-built circuit board, and adjusting the circuit to the proper Dolby Test tone level, as provided by any station transmitting Dolby encoded broadcasts. Once adjusted, this level should be the same for all stations. The signal level meter in the tuner can be used with reasonable accuracy for this purpose. Precise adjustment can be made with an AC voltmeter capable of reading 580 mv (which is Dolby 0 VU) accurately.

According to Stereo Review, "The Dynaco FM-5 is indeed one of the finest FM tuners available at any price. As for overall performance and sound quality, the first is the equal of any tuner we have used, and the second is entirely a function of the FM program quality."

Detailed specifications are on page 22.





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ALTEC LANSING

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Aperiodic Loudspeaker Systems

More than 600,000 A-25s have been produced since its premiere. This Dynaco value leader clearly ranks as the most popular quality speaker system of all time. First it was listened to with doubt of its pretentious claims; then with awe for its performance; later with admiration for its listening ease; and finally with respect by the host of copiers it engendered.

This acceptance prompted Dynaco to develop other models which represented refinements of sonic quality or application to meet a variety of needs and personal tastes. In contrast to some loudspeaker lines which apparently strive for a different sound from each model, the sonic characters of all Dynaco speakers are very closely related. All of our designs stress clarity, smoothness, precision, and above all, *value*.

Since the continuing design intent is literal translation of the original performance, or verbatim reproduction, the casual listener may at first perceive no differences between some models at moderate sound levels. Careful listening, which is most important when choosing any speaker system, will elicit the distinctions which brought about successive designs. Yet the original A-25 has not been found wanting in this comparison.

Every loudspeaker design represents some compromises, and it is in weighing the designer's choice against the listener's ear and wallet that success is determined. Dynaco has concentrated its attention on smoothness of response, delineation of detail, cohesiveness of image, sensible efficiency and reasonable power handling capability. The cost had to be low to assure the evident value from the outset, so that high sales volume would facilitate production efficiencies to continue this record. The A-25 was introduced when Dynaco felt that it had achieved a sonic balance which, in comparison with speakers two and three times its cost, fulfilled most listening requirements in a true bookshelf size at well under \$100.00.

How well we succeeded is indicated by Gordon Holt's statement in *The Stereophile* magazine, "You will have a hard time buying more musical naturalness at any price . . . (the A-25s) are quite probably the best buy in high fidelity today." As Julian Hirsch commented in *Stereo Review*, "When the music contained low bass . . . the Dynaco (A-25) left no doubt of its capabilities . . . Nothing we tested had a better overall transient response." And *Audio* magazine echoed, "The A-25 produced the finest tone-burst response of any speaker tested in this manner, regardless of price."

The various Dyna models are remarkably similar on close examination. That's only logical, in light of the original design's manifest success. There may be differences of detail in the drivers which may not be superficially apparent. Or, the crossover networks may differ (the crossover frequency is but one aspect). Even structural differences in the cabinets have a decisive bearing on sonic refinements. Since differences in speakers are not readily quantified, and are largely subjective, Dynaco has exerted its expertise where the results are most apparent.

All Dynaco speakers are two-way systems (the A-50 employs two identical woofers) to avoid the problems of complex crossovers, and to minimize the effects of different

drivers reproducing the same frequencies. While the ideal reproducer would be a unified source, physical limitations preclude this in practical systems. Careful tailoring of Dynaco drivers for integral rolloff characteristics eliminates the need for elaborate networks, assures smooth mid-range transition, and minimizes time-delay and phase distortion.

A single high power wide-range tweeter provides sonic homogeneity and excellent dispersion with minimal interference effects. We use a non-rigid dome which is specially treated to reduce cavity resonance effects. Wherever possible, it is located near the center of the panel to minimize edge interference aberrations.

Extensive investigation has shown that a 10" woofer affords the optimum combination of low frequency generating capability, low moving mass, and adequate structural rigidity to avoid cone breakup for a smoother mid-range blending.

The patented *aperiodic* (essentially non-resonant) woofer design utilizes a highly damped vent (not a reflex port) whose acoustic resistance is very carefully controlled. Its high friction venting action lowers the "Q" of the system and reduces the impedance variation near resonance in Dynaco speakers to 2:1, contrasted with 400% or greater variations in most systems. The advantages are smoother response with better bass definition and reduced Doppler distortion, plus more efficient amplifier power transfer (Dynaco speakers can sound louder than others of the same efficiency from a given amplifier), since the amplifier works into a more nearly resistive load. All Dynaco speakers have a nominal 8 ohm impedance (minimum 7 ohms) which permits parallel connection of pairs.

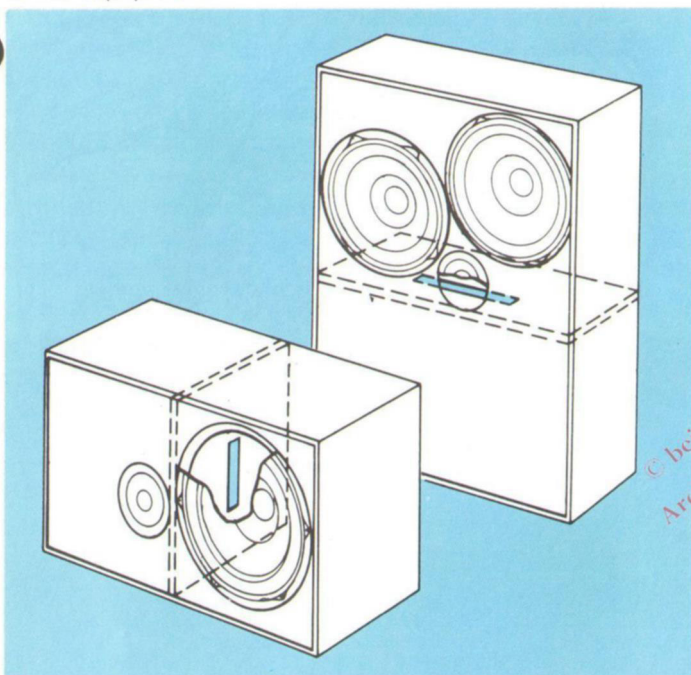
The A-25VW has an attractive walnut vinyl-covered cabinet, with a dark brown multi-hued grille cloth which offers an alternative to the conventional beige linen. In other respects, it is similar to the A-25, but is not available in all countries. All other Dynaco speakers are walnut veneer.

The A-35 is a sonic refinement of the A-25 in a slightly larger, more complex cabinet with a different crossover for a subtly smoother, wider range, and more articulate sound. Though on first listen some will believe that the A-25 has more bass, extended listening will reveal the authenticity of the A-35's tighter, better defined and extended low end. Perceptibly smoother mid-range transition yields a unified, clear imaging that is the key to the A-35's resolution of detail. *Audio* magazine described the A-35 as "unobtrusive". It is a most appropriate accolade. Many consider it to be the most accurate Dynaco speaker.

The A-35 and A-50 use the same tweeter and similar woofers in an exclusive double compartment cabinet (also in the A-40XL) which places the woofer(s) in one section which is internally vented to the other half. Thus are combined the *aperiodic* advantages of variable volume action for critical damping at resonance, with the benefits of a larger sealed enclosure for minimum distortion at the lowest frequencies.

The sonic balance of the A-50 tends to favor the middle low bass range, and emulates the sound quality of one of the most expensive and widely regarded compact speakers. The A-50's dual woofers provide 1/3 more radiating area than a 12" cone with superior transient response and exceptional power handling capacity. The

shallow cabinet depth affords a unique opportunity for a system of its capability to be installed in room dividers, or flush mounted in normal bookshelf depths. The high mounting of the woofers minimizes excessive bottom end, which can arise if the A-50 is placed on the floor. Like our other speakers, the most realistic reproduction will usually be achieved when it is mounted near ear level in most rooms. All but the A-50 are supplied with hangers for wall mounting. The efficiency of the A-50 matches the A-25 and A-35, but it really comes into its own when driven by a high power amplifier like the Stereo 400. Then, as Norman Eisenberg said in High Fidelity magazine, "We soon found ourselves . . . listening to the program material rather than to the equipment."



The A-25XL differs in two respects: efficiency and high frequency response. With about 3 dB higher efficiency than the A-25, it's like having an amplifier of twice the power. This significant change required much coincident effort to assure retention of a similar sonic character. The XL version utilizes a newly developed 1 inch soft dome tweeter which has higher power handling capacity, some 3 kHz extended high frequency response, and improved polar dispersion. The XL series is also capable of handling appreciably higher continuous power levels. High Fidelity magazine reported, "If you liked the original A-25, you will like the new version at least as much. It offers a little more detail at the frequency extremes than its predecessor, but the sound of the two versions is so similar that they should make excellent companions . . ." The Absolute Sound magazine also provided an apt comparison. Their complete report is available on request.

The newest entry is the A-40XL, with the avowed intention of combining the best features of the A-35 and the A-25XL. Utilizing the dual compartment cabinet for an accurate low end, with the higher efficiency and higher power rating of the drivers in the XL series and a different crossover network, the A-40XL is characterized by a smooth, robust sound characteristic with a notably extended and uniformly dispersed high end.

The XL series was specifically designed to deliver maximum performance at the currently popular high listening levels with all-too-often inadequately powered amplifiers or receivers. The A-25XL is popularly priced, and the A-40XL offers more-than-subtle refinements at modestly higher cost.

Users seeking maximum performance systems, who are impressed with the soundness of the basic Dynaco speakers, have reported increasing enthusiasm for multiples of similar models. Two, four and even six speakers per channel are being employed where extraordinary power handling capability, greater dispersion and much versatility are wanted at moderate cost. We'll supply hookup details on request. A-25s are probably most often selected for their cost and adaptability to equalization. A-25XLs are preferred when projection, maximum output and freedom from overload are the primary considerations. Their relatively uniform impedance characteristics, and high value quotient make them thus particularly suitable.

A word about speaker power ratings. There are currently no U.S. standards. The specifications are rated according to the accepted German DIN spec #45500. Simply stated, this standard specifies a noise signal, uniform between 50 and 5,000 Hz, applied cyclically for one minute on, two minutes off for 300 hours. In our estimation, all speakers should be rated thus. It would obviate the invalid music and peak power ratings which only confuse the buyer.

The suggested amplifier power range is a minimum that is likely to provide indication of the speaker's potential, up to the maximum wattage generally regarded as safe at normal listening levels. Lower power amplifiers can make just as loud sound, but it won't be "clean". Operation with amplifiers above the stated range is permissible, and will in fact yield better sound, but the speaker *must* then be properly protected with a fuse.

On music signals, speaker protection is afforded only by low amperage fuses. Many do not realize that typical fuses blow only with a *sustained* signal of 20 seconds or more at *twice* their current rating. Too, wide impedance variations of most speakers alter the apparent powers passed, based on simple fuse rating calculations. And "clipping" of lower power amplifiers is more likely to damage a speaker than sensible operation of a high power amplifier. More information for fusing Dynaco speakers will be supplied on request. Note, though, that speaker fusing is advisable with all but the lowest power amplifiers.

Frequency response is missing from our specifications because it defies meaningful quantification. The only useful comparison is precise graphs made under identical conditions, and even they are difficult to equate to listening. Your ear is still your best judge. And remember to equalize volume levels, because the louder speaker will invariably impress you more at first. Sustained listening may alter your initial impression.

Dynaco's success in the loudspeaker field is based on the same factors as its success in electronics. As Julian Hirsch wrote in Stereo Review, "Dynaco has long been noted for its development of inexpensive components capable of the highest quality performance . . . (the) A-25, we are happy to note, lived up to our expectations."

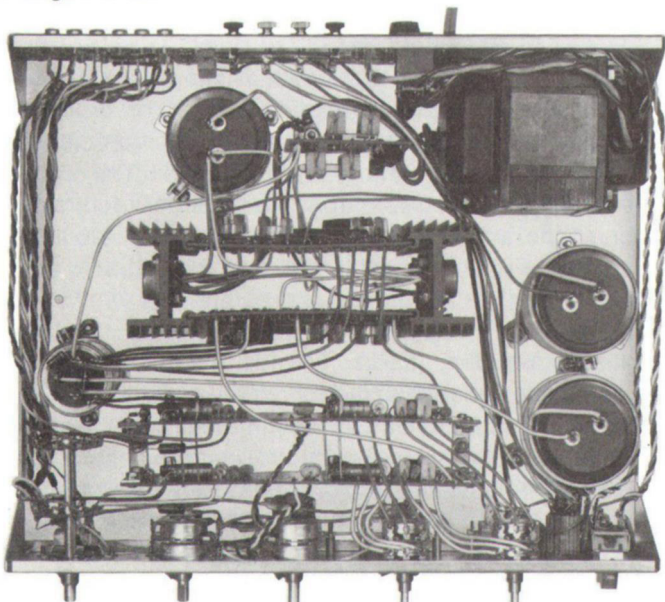
Detailed specifications are on page 23.

SCA-80Q Control Amplifier

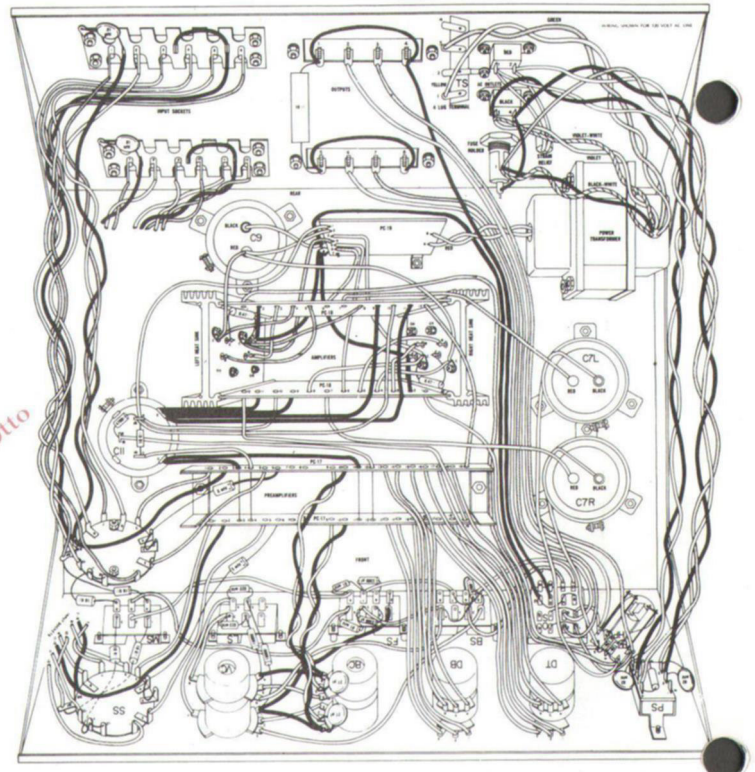
The SCA-80Q is the ideal amplifier for the music listener who seeks outstanding sound from popular speakers like the Dynaco Aperiodic series in his living room. In one single unit it combines the superb performance and most of the features of the PAT-4 preamplifier with the Stereo 80 power amplifier, plus the 4-Dimensional decoding circuitry of the Quadaptor™ for surround-sound capability.

Essentially a high quality stereo amplifier, with the availability of the Dynaquad™ speaker matrix decoding, the SCA-80Q offers extraordinary realism and value. 4-Dimensional sound is Dynaco's more precise term for the Dynaquad matrix decoding technique which is Dyna-simple in concept. Like the other matrix systems (such as SQ and QS), it enables four directions of sound to be recovered from specially encoded stereo FM, tape and records. The Dynaquad system is far simpler, since it does not require two more amplifier channels, and is thus less costly, yet it accomplishes similar results. It has the further benefit of yielding markedly greater realism from many *conventional* stereo recordings as well. You will be astounded at what two additional speakers can add, even to your present record library, when connected for 4-D sound. All of the various matrix systems are compatible to the extent of providing additional back information, even if the decoder does not match the source material. It is the inherent logic of the Dynaquad system which achieves so much added ambience or "hall sound" effect previously hidden in conventional playback of many stereo recordings.

With 30 watts of power per channel by FTC preconditioned standards (into 8 ohms, less than 0.5% distortion, 20-20k Hz) the SCA-80Q has plenty of reserve for almost any need. You can connect two speakers now for stereo, or four speakers for 4-Dimensional sound now or later. Alternatively, you can connect two pairs of speakers for stereo in separate locations. The front panel headphone output accommodates any headphone, disconnecting all speakers when the phone plug is inserted. The stereo/mono mode selector switch also includes a 6 dB blend position which frequently provides a more natural perspective for headphone listening, as well as helping to overcome the problem of excessive speaker separation in some room arrangements.



The speaker selector, in addition to switching between 4-D and stereo listening, provides a spring-return "null" position which, in conjunction with the balance control, makes adjustment for optimum front-to-back separation particularly easy. The filter switch provides just low frequency cut-off for eliminating rumble, or a "narrow band" position which rolls off both frequency extremes simultaneously to preserve the original tonal balance and thus make listening to poorer program material more enjoyable. The "special" input, which is a second high gain preamp position, is normally wired for RIAA equalization



One oversize pictorial diagram shows all connections for easy checking.

to provide another magnetic phono input. A number of alternative options for this switch position are suggested for your particular needs. The SCA-80Q may be rack mounted with optional rack mount kit, RMA, described on page 23.

The circuit includes 20 silicon transistors and 10 diodes in a modular format employing 4 preassembled and tested circuit boards (you build a 5th). If you are familiar with kit construction, it is an easy three evening project. Since the SCA-80Q is often the start for many who are new to kit building, do not worry about the time, because this unit is necessarily solidly packed for it is a combination of preamplifier and power amplifier. If you are building the SCA-80Q and a tuner for the first time, the tuner is easier to work on, but less forgiving of poor soldering techniques than the amplifier.

Detailed specifications are on page 22.

AF-6 Multiplex FM/AM Tuner

The spectacular success of Dyna's FM-5 tuner prompted demand for an AM/FM version. While AM is not generally regarded as a high fidelity medium, the system's potential is much greater than is generally realized by commercial AM receivers. If you are fortunate to have an AM station of particularly high broadcast quality, and are not unduly restricted by the interference of local devices, the AF-6 offers an unusually high quality AM reception capability.

It must be recognized, however, that AM signals are so subject to local interference (such as fluorescent lights and dimmer switches), that the realization of quality AM reception is not just a matter of a good tuner. In many instances, a simple table radio provides a more intelligible signal because of its narrow IF bandwidth.

But, if the program source warrants it and local interference is not a problem, the AF-6 has the innate capability for superlative AM listening, with broad frequency response, low distortion, low noise and exceptional selectivity.

To achieve quality AM reception Dynaco engineers included a three-step audio bandwidth circuit. It provides extended audio range when the signal quality warrants it; normal reception of weaker signals, and a narrow bandwidth

for high interference conditions. A broad band twelve section LC design IF filter provides superior selectivity. The signal strength meter facilitates precise AM tuning, and an outstanding AGC characteristic accommodates signal levels from 50 microvolts to 500,000 microvolts with low distortion. A 10 kHz notch filter reduces effects of off-channel interference.

A third preassembled circuit board and AM/FM front end is added to the two circuit boards used in the FM-5, delivering the same FM specifications. Easy dial stringing aids construction in just two evenings. For professional and monitor applications an optional rack mount kit (RMA) is available. See page 23 for information.

As High Fidelity magazine reported in the June 1974 issue, "Dynaco once again has come up with a unit that offers uncontestable value in terms of performance vs. cost. If you build the kit version, the bargain becomes even more striking. The AF-6 is, in short, a top-quality tuner whose performance is exceptional on FM and simply the best we have yet encountered on AM. In terms of station-pulling power, clear sound, and low distortion, the AM section of the AF-6 has to be heard to be believed."

Detailed specifications are on page 22.



Stereo 120 and Stereo 80 Medium Power Amplifiers

The Dynaco reputation was built on and has been sustained by its power amplifiers. Where fanfare accompanies new designs every year, only to see them vanish quickly, after nearly 120,000 Stereo 120s it is likely that more have been purchased than all other basic solid state stereo power amplifiers put together.

When it was introduced, *The Stereophile* magazine greeted the Stereo 120 with, "We are finally forced to do an about-face on our long-held conviction that transistor amps are not for the perfectionist. Not only does this one seem to have no sound of its own, it also makes most loudspeakers sound *better* than do tube amplifiers. This kind of performance, finally, justifies switching from tubes to transistors."

The 120's sonic qualities remain meritorious now as well as then. As technology has provided new devices, small changes have been made in the Stereo 120's circuit which enhance reliability (referred to as the TIP modification, available from Dynaco at modest cost), but no audio improvements have been made or needed.

The Stereo 80 has similar circuitry and many of the same components with the exception of the Stereo 120's regulated power supply. With its simpler conventional power supply and lower operating voltages, the Stereo 80 gains an added measure of reliability, while the Stereo 120 has the advantage of 50% more continuous power.

Electronic regulation has several advantages: freedom from line voltage variations and transients; assured operating margins; a "clean" overload characteristic; and protection against transient distortion caused by shifting operating parameters when the supply voltages change under heavy current demands.

To protect the amplifier and speaker load from damage that could result from excessive current, a separate circuit switches the supply from full regulation to de-regulation when a predetermined maximum current is reached. With

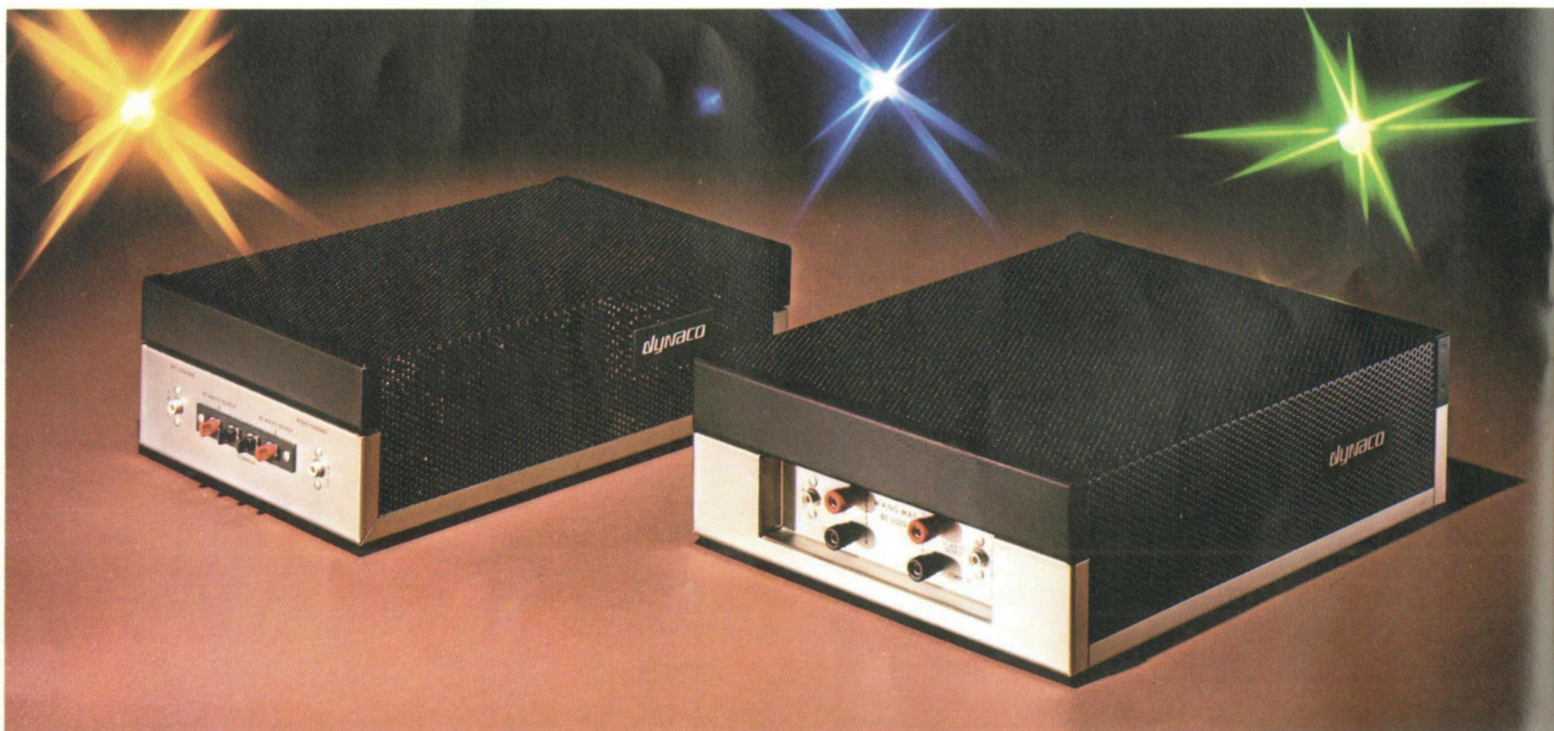
the unusually high average power levels frequently employed today, such conditions can sometimes occur during loud passages, and thus limit audio quality under severe overdrive. For this reason, it is most suited to less demanding sustained power needs. And at levels within the music power capabilities of the two amplifiers, the Stereo 80 is almost indistinguishable from the Stereo 120.

Both amplifiers use a unique biasing system which is an integral part of the automatic electronic protection circuit, and markedly drops distortion at low power without any need for periodic adjustments. The output transistors operate without quiescent current and without the consequent heat rise caused by the bias current, to eliminate the need for temperature compensating devices. However, there is no "Class B notch" commonly attributed to a lack of bias current. The Stereo 80 employs 5,000 microfarad output coupling capacitors in each channel to assure loudspeaker protection with superior low frequency performance. The Stereo 120 includes its 3,300 microfarad couplers within the feedback loop, and thus greatly increases their apparent size.

Each of these kits is suitable for a beginner, and an experienced kit builder will complete it in a full evening.

The detailed specifications attempt to define the performance capabilities of these amplifiers. But these specifications are not alone sufficient to assure the natural and effortless sound quality which has characterized every Dynaco product. Conscious of this, Dynaco designs have sought to eliminate or minimize many of the customary transient and non-linear distortions which have been prevalent in less sophisticated solid state equipment. As *High Fidelity* magazine reported, "(The Stereo 120) is utterly uncolored and neutral; its ability to drive any speaker system self-evident. Truly, another 'amplifier great' and at a very reasonable price on today's market."

Detailed specifications are on page 22.



QSA-300 Stereo / Quadraphonic Power Amplifier



The purist quadra-sound enthusiast will fully appreciate Dynaco's entry into this market. Essentially two Stereo 150s on one chassis, the QSA-300 offers plenty of pure power in a compact design which is comparatively easy to build.

An optional MC-3 meter kit is available for the kit version, but the factory-assembled amplifier is supplied only with meters, including a 4-position meter range switch. The walnut veneer end panels are standard, and rack mounting brackets will be available as an optional accessory.

In addition to operation as four discrete channels, the QSA-300 can be internally reconnected for parallel output operation as a stereo amplifier of higher power. Two different connection options are offered, depending on the intended load impedance, for maximum power capability. Wholly independent operation of the two halves of the amplifier is possible, since nothing is shared except the chassis, AC fuse and switch. Thus operation as one 150 watt channel plus two 75 watt channels is also feasible. In

the strapped (paralleled) mode, very large power outputs into impedances less than 4 ohms can be obtained.

Protection systems are similar to the Stereo 150, with the exception that volt-amp limiting is adjusted to complement the particular choice of strapped operation. Each half (two channels) of the QSA-300 includes four B+ fuses, two speaker fuses, and a back panel thermal breaker. A single circuit board for each half includes all active circuitry for both channels except the output transistors, with DC coupling and thermally tracking bias like the Stereo 400.

The sound quality is easily the equal of the Stereo 150, and its optional strapping provisions afford some advantages. Extraordinarily low intermodulation and harmonic distortion at all power levels, with no crossover notch, assure long-term freedom from listening fatigue. Direct comparisons with the Stereo 400 are inevitable.

Detailed specifications are on page 22.

Mark III / PAS-3X / Stereo 70 Vacuum Tube Designs

Hundreds of thousands of Dynaco tube amplifiers and preamplifiers are in use around the globe. It is probable that more music systems have included the PAS preamplifier and Stereo 70 power amplifier than any other combination. As High Fidelity magazine summed up the Stereo 70's original test report, "This amplifier's components are operated more conservatively than those in any other commercial amplifier we have tested . . . its power and distortion ratings are completely conservative. Its listening quality is unsurpassed." You can build it in five hours.

The PAS-3X is the latest (1966) version of a preamplifier design which is still regarded with awe. Though now surpassed by the PAT-5, it has that elusive combination of flawless performance, high gain, extraordinary freedom from phono overload, infinitesimal noise and low cost in an eight hour kit. So conservative is its design that tube replacement is rare, even in ten year old units. For professional use, an optional rack mount kit (RMA) is available. See page 23.

The Mark III monophonic power amplifier is currently the most popular of Dynaco's tube units by a wide margin, though its design is unchanged in nearly twenty years. The strongest demand is from Japan, but it is the unit of choice where the need is for pure power with absolute reliability under abusive operating conditions. The Mark III is often specified for sound distribution, public address, industrial and laboratory applications as well as by professional

musicians. To meet these specialized requirements, two additional models are available. The Mark III-70 provides a 70 volt line output, plus the usual 4, 8 and 16 ohm connections. The Mark III-500 provides either 500 ohm or 125 ohm balanced or unbalanced outputs, only. Any can be built in just three hours .

Tube amplifiers are preferred in severe service applications where even short-term equipment failure must be avoided. Tube designs are capable of withstanding most types of user and signal abuse which can cause transistor failure, and they generally give adequate warning of impending breakdown. Field replacement of components is also much easier, though the cost of some tubes has recently been rising rapidly. Tube amplifiers are also less affected than transistors by high ambient temperatures, and the output transformers in tube designs have the added benefit of providing the same power at different load impedances. This generally gains a power advantage at 16 ohms and more conservative operation into low impedances, compared with the typical 8 ohm load to which transistor amplifiers are matched.

The Stereo 70 and PAS-3X are available only as kits, but the Mark III is available factory-assembled as well. The Mark III and Stereo 70 amplifiers require a simple meter adjustment on completion to assure proper operation. Dynaco's patented Biaset™ makes this setting independent of meter inconsistencies.

Detailed specifications are on pages 22 and 23.



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Specifications

PAT-5

Frequency Response: High level input: ± 1 dB, 10 Hz—50 kHz.
Low level input: ± 1 dB of RIAA equalization.

Distortion at 2 Volts Output into 10k Load or Higher:
THD less than 0.05%, 20 Hz—20 kHz (0.01% typical).
IM less than 0.05% with any test frequencies (0.005% typical).

Hum and Noise: Magnetic Phono: 70 dB below a 10 mv input @ 1000 Hz.
High Level: 85 dB below a 0.5 volt input.

Gain: Magnetic Phono to Audio Out: 57 dB @ 1000 Hz. Optional + 6dB.
Magnetic Phono to Tape Out: 37 dB @ 1000 Hz.
High level: 20 dB.

Phono Input Overload: Greater than 115 mv @ 1000 Hz.

Tone Controls: ± 10 dB @ 50 Hz; ± 10 dB @ 15 kHz.

Filters: Low: -12 dB @ 15 Hz; 6 dB/octave.
High: -10 dB @ 10 kHz; 15 dB/octave.

Output Voltage: 7 volts into 10,000 ohms; 4.5 volts into 1000 ohms.

Impedances: Magnetic Phono: 47,000 ohms in parallel with 10 pf.
High Level: 50,000 ohms.
Tape Outputs: From Phono inputs, 15,000 ohms minimum load;
From High Level inputs, same as source.
Audio Output: Less than 600 ohms.

Separation at 2 Volts Output into 10,000 Ohms:
70 dB @ 20 Hz; 70 dB @ 2 kHz; 45 dB @ 20 kHz (minimum).

Inputs: 2 RIAA magnetic Phono inputs (1 with flat option for microphone); 2 Tape inputs;
Tuner; Spare; External Processor Loop; amplifier connections.

Outputs: 2 Tape outputs ahead of controls; E.P.L. output after volume and balance controls; 2 audio outputs; front panel headphone output; speaker connections.

Semiconductor Complement: 13 transistors, 2 integrated circuits, 3 zener diodes, 4 silicon diodes.

Dimensions: 13½" wide x 12" deep x 4¼" high.

Shipping Weight: 13 lbs.

Power Consumption: 12 watts; 50/60 Hz, 120/240 vAC.

STEREO 400

Rated Power Output: 200 watts continuous average power per channel into 8 ohms (100 watts per channel into 16 ohms), 20—20,000 Hz, at less than 0.25% total harmonic distortion. Distortion decreases at lower power outputs.

Available Output Power: (see above for F.T.C. Power Ratings)
20—20,000 Hz, both channels driven, 0.25% maximum THD:
200 watts continuous average per channel @ 8 ohms.
300 watts continuous average per channel @ 4 ohms.*
100 watts continuous average per channel @ 16 ohms.

Monophonically:
600 watts continuous average @ 8 ohms.*
*5 minute sustained full power limit without external fan cooling.

Power at Clipping, Single Channel, 2500 Hz, less than 1% distortion: 235 watts @ 8 ohms; 350 watts @ 4 ohms; 135 watts @ 16 ohms.

Intermodulation Distortion: Less than 0.1% at any power level up to 200 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.

Half-Power Bandwidth: 100 watts per channel at less than 0.25% total harmonic distortion from 5 Hz to 35 kHz into 8 ohms.

Frequency Response: +0, -1 dB, 8 Hz—50 kHz @ 1 watt into 8 ohms.
 ± 0.5 dB, 20 Hz—20 kHz @ 200 watts into 8 ohms.

Hum and Noise: More than 95 dB below rated output, full spectrum.
More than 100 dB below rated output, 20 Hz—20 kHz.

Input: 50,000 ohm load; 1.6 volts for 200 watts into 8 ohms.

Semiconductor Complement: 44 transistors, 51 diodes, 2 silicon controlled rectifiers, 4 integrated circuits.

Slewing Rate: 8 volts per microsecond.

Damping Factor: Greater than 80 to 1 kHz into 8 ohms.
Greater than 30 to 10 kHz into 8 ohms.

Channel Separation: Greater than 60 dB by IHF standards.

Connectors: Inputs: phono jacks.
Outputs: color coded 3-way binding posts with 3/4" spacing.

Filters: -3 dB @ 50 Hz; -3 dB @ 15 kHz; 8 dB per octave.

Dynaguard Protection Circuit: Dynamic power limiter for total power delivered to the load under steady state conditions. Operates independently on each channel. Graduated power/time relationship regulates duration of permissible signal above selected power limit as a function of the percentage of overdrive. Provides up to 5 second total envelope delay. Zero breathing effect. Until actuated, no change in distortion or frequency response.

Dimensions: 17" wide x 14" deep x 7" high panel. Add 5/8" for feet. Accessory brackets for 19" rack mounting are available.

Shipping Weight: 58 lbs. **Net Weight:** 52 lbs.

Power Consumption: 120 v.a. quiescent; 11 amps maximum; 50/60 Hz, 120 vAC.
Alternative international version includes multi-voltage power transformer (100, 120, 200, 220 or 240 vAC) at extra cost.

STEREO 410

Rated Power Output: 200 watts continuous average power per channel into 8 ohms (100 watts per channel into 16 ohms), 20—20,000 Hz, at less than 0.25% total harmonic distortion. Distortion decreases at lower power outputs.

Available Output Power: (see above for F.T.C. Power Ratings)
20—20,000 Hz, both channels driven, 0.25% maximum THD:
200 watts continuous average per channel @ 8 ohms.
300 watts continuous average per channel @ 4 ohms.*
100 watts continuous average per channel @ 16 ohms.

Monophonically:
600 watts continuous average @ 8 ohms.*
*5 minute sustained full power limit without external fan cooling.

Stereo 410 continued—

Power at Clipping, Single Channel, 2500 Hz, less than 1% distortion: 235 watts @ 8 ohms; 350 watts @ 4 ohms; 135 watts @ 16 ohms.

Intermodulation Distortion: Less than 0.1% at any power level up to 200 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.

Half-Power Bandwidth: 100 watts per channel at less than 0.25% total harmonic distortion from 5 Hz to 35 kHz into 8 ohms.

Frequency Response: +0, -1 dB, 8 Hz—50 kHz @ 1 watt into 8 ohms.
 ± 0.5 dB, 20 Hz—20 kHz @ 200 watts into 8 ohms.

Hum and Noise: More than 95 dB below rated output, full spectrum.
More than 100 dB below rated output, 20 Hz—20 kHz.

Input: 20,000 ohm load; 1.6 volts for 200 watts into 8 ohms.

Semiconductor Complement: 38 transistors, 26 diodes.

Slewing Rate: 8 volts per microsecond.

Damping Factor: Greater than 80 to 1 kHz into 8 ohms.
Greater than 30 to 10 kHz into 8 ohms.

Channel Separation: Greater than 60 dB by IHF standards.

Connectors: Inputs: phono jacks.
Outputs: color coded 3-way binding posts with 3/4" spacing.

Dimensions: 17" wide; 14½" deep; 6¾" high. Add 5/8" for feet. Accessory brackets for 19" rack mounting are available.

Shipping Weight: 50 lbs. **Net Weight:** 45 lbs.

Power Consumption: 120 v.a. quiescent; 11 amps maximum; 50/60 Hz, 120 vAC.
Alternative international version includes multi-voltage power transformer (100, 120, 200, 220 or 240 vAC) at extra cost.

STEREO 150

Rated Power Output: 75 watts continuous average power per channel into 8 ohms (40 watts per channel into 16 ohms), 20—20,000 Hz, at less than 0.25% total harmonic distortion. Distortion decreases at lower power outputs.

Available Output Power: (see above for F.T.C. Power Ratings)
20—20,000 Hz, both channels driven, 0.25% maximum THD:
75 watts continuous average per channel @ 8 ohms.
100 watts continuous average per channel @ 4 ohms.*
40 watts continuous average per channel @ 16 ohms.

Monophonically:
150 watts continuous average @ 8 ohms.*
*4 minute sustained full power limit without a fan.

Power at Clipping, Single Channel, 2500 Hz, less than 1% distortion: 90 watts @ 8 ohms; 130 watts @ 4 ohms; 45 watts @ 16 ohms.

Intermodulation Distortion: Less than 0.25% at any power level up to 75 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.

Half-Power Bandwidth: 37.5 watts per channel at less than 0.25% total harmonic distortion from 5 Hz to 50 kHz into 8 ohms.

Frequency Response: +0, -1 dB, 10 Hz—40 kHz @ 1 watt into 8 ohms.
 ± 0.5 dB, 20 Hz—20 kHz @ 75 watts into 8 ohms.

Hum and Noise: More than 95 dB below rated output, full spectrum.

Input: 35,000 ohm load; 1 volt for 75 watts into 8 ohms.

Semiconductor Complement: 24 transistors, 18 diodes.

Slewing Rate: 5 volts per microsecond.

Damping Factor: Greater than 80 to 1 kHz into 8 ohms.
Greater than 50 to 10 kHz into 8 ohms.

Channel Separation: Greater than 70 dB by IHF standards.

Connectors: Inputs: phono jacks.
Outputs: color coded 3-way binding posts with 3/4" spacing.

Dimensions: 14½" wide x 13½" deep x 6¼" high panel, 14" wide. Add ½" for feet.

Shipping Weight: 34 lbs. **Net Weight:** 29 lbs.

Power Consumption: 60 v.a. quiescent; 5 amps maximum; 50/60 Hz, 120/240 vAC.

PAT-4

Frequency Response: High level input: ± 0.5 dB, 10 Hz—100 kHz.
Low level input: ± 1 dB of RIAA equalization.

Distortion at 2 Volts Output into 10k Load or Higher:
THD less than 0.05%, 20 Hz—20 kHz.
IM less than 0.05% with any test frequencies.

Hum and Noise: Magnetic Phono: 70 dB below a 10 mv input @ 1000 Hz.
High Level: 85 dB below a 0.5 volt input.

Gain: Magnetic Phono to Audio Out: 54 dB @ 1000 Hz.
High Level: 20 dB.

Phono Input Overload: 80 mv @ 1000 Hz.

Tone Controls: ± 12 dB @ 50 Hz; ± 12 dB @ 10 kHz.

Output Voltage: 10 volts into 10,000 ohms; 5 volts into 600 ohms.

Impedances: Magnetic Phono: 47,000 ohms.
Tape Head: 100,000 ohms.
High Level: 100,000 ohms.
Tape Output: From Phono inputs, 10,000 ohms minimum load.
From High Level inputs, same as source.
Audio Output: 600 ohms.

Inputs: RIAA magnetic Phono (low or high level) or alternate ceramic phono; NAB 7½" Tape Head; Special (normally flat microphone); Tape amplifier; Tuner; Spare; front panel high level.

Outputs: Tape output ahead of controls; two audio outputs (1 switched by front panel jack); front panel output.

Semiconductor Complement: 8 transistors, 2 silicon diodes.

Dimensions: 13½" wide x 9" deep x 4¼" high.

Shipping Weight: 10 lbs.

Power Consumption: 5 watts; 50/60 Hz, 120/240 vAC.

Specifications

FM-5

IHF Sensitivity: (Noise and distortion 30 dB down @ 100% modulation): 1.75 μ v.
Input Required for 50 dB S/N @ 100% modulation: 5 μ v.
Frequency Response Before De-Emphasis: \pm 1 dB, 20 Hz—52 kHz.
Frequency Response in Stereo: \pm 1 dB, 30 Hz—15 kHz.
Harmonic and Intermodulation Distortion @ 100% Modulation:
Mono: less than 0.5% (0.25% typical)
Stereo: less than 0.9% (0.5% typical)
Capture Ratio: 1.5 dB.
Output @ 100% Modulation: 2 volts @ 1000 ohms output impedance.
Ultimate Signal-to-Noise Ratio @ 100% Modulation: 65 dB.
Selectivity: (alternate channel): 65 dB.
AM Suppression: 58 dB.
Stereo Separation: 40 dB @ 1000 Hz; 30 dB, 50 Hz—10 kHz.
19 kHz and 38 kHz Subcarrier Suppression: 50 dB minimum.
67 kHz SCA Subcarrier Suppression: 80 dB minimum.
Antenna Input: 72 ohm balanced and 300 ohm unbalanced.
Muting and Stereo Switching Threshold: 4 μ v.
Dimensions: 13½" wide x 9" deep x 4¼" high.
Shipping Weight: 11 lbs.
Power Consumption: 10 watts; 50/60 Hz, 120/240 vAC.

AF-6

FM SPECIFICATIONS

See FM-5 Electrical Specifications above.

AM SPECIFICATIONS

Sensitivity: 50 microvolts with external input.
Selectivity: 20 dB @ 10 kHz, 55 dB @ 20 kHz.
Image Rejection: 60 dB.
Total Harmonic Distortion: Less than 2%.
Intermediate Frequency: 455 kHz. **IF Rejection:** 70 dB @ 1000 kHz.
Tuning Range: 535-1620 kHz.
Antenna Provisions: Built-in ferrite rod. Connections for external antenna and ground.
Dimensions: 13½" wide x 12" deep x 4¼" high.
Shipping Weight: 13 lbs.
Power Consumption: 12 watts; 50/60 Hz, 120/240 vAC.

SCA-80Q

Rated Power Output: 30 watts continuous average power per channel into 8 ohms, 20—20,000 Hz, at less than 0.5% total harmonic distortion. Distortion decreases at lower power outputs.
Power at Clipping, Single Channel, 1000 Hz, less than 1% distortion: 50 watts @ 8 ohms; 36 watts @ 4 ohms; 26 watts @ 16 ohms.
Intermodulation Distortion: Less than 0.5% at any power level up to 40 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.
Half-Power Bandwidth: 20 watts per channel at less than 0.5% total harmonic distortion from 8 Hz to 50 kHz into 8 ohms.
Frequency Response: Phono: \pm 1 dB of RIAA curve @ 1 watt into 8 ohms.
High Level: \pm 0.5 dB, 15 Hz to 50 kHz @ 1 watt into 8 ohms.
Hum and Noise: Phono: More than 60 dB below 40 watts output.
High Level: More than 80 dB below 40 watts output.
Input Sensitivity: Phono: 3 mv for 40 watts output.
High Level: 0.13 volts for 40 watts output.
Phono Input Overload: 80 mv @ 1000 Hz.
Tone Controls: \pm 12 dB @ 50 Hz; \pm 12 dB @ 10 kHz.
Impedances: Magnetic Phono: 47,000 ohms.
High Level: 100,000 ohms.
Tape Output: From Phono inputs, 10,000 ohms minimum load.
From High Level inputs, same as source.
Headphone Output: 8 ohms or greater.
Separation: 65 dB by IHF standards.
Semiconductor Complement: 20 transistors, 10 diodes.
Dimensions: 13½" wide x 12" deep x 4¼" high.
Shipping Weight: 18 lbs.
Power Consumption: 35 watts quiescent; 250 watts maximum; 50/60 Hz, 100, 120, 220 or 240 vAC.

STEREO 120

Rated Power Output: 60 watts continuous average power per channel into 8 ohms, 25—15,000 Hz, at less than 0.5% total harmonic distortion. Distortion decreases at lower power outputs.
Power at Clipping, Single Channel, 1000 Hz, less than 1% distortion: 60 watts @ 8 and 4 ohms; 35 watts @ 16 ohms.
Intermodulation Distortion: Less than 0.5% at any power level up to 60 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.
Half-Power Bandwidth: 30 watts per channel at less than 0.5% total harmonic distortion from 5 Hz to 50 kHz into 8 ohms.
Frequency Response: \pm 0.5 dB, 5 Hz—100 kHz @ 1 watt into 8 ohms.
Hum and Noise: 95 dB below rated output, full spectrum.
100 dB down by IHF standards.
Channel Separation: Greater than 70 dB from 20 Hz to 20 kHz.
Input: 100,000 ohm load; 1.5 volts for 60 watts into 8 ohms.
Semiconductor Complement: 15 transistors, 15 diodes.
Dimensions: 13" wide x 10½" deep x 4" high.
Shipping Weight: 20 lbs.
Power Consumption: 35 watts quiescent; 400 watts maximum; 50/60 Hz, 100-120, or 220-240 vAC.

STEREO 80

Rated Power Output: 30 watts continuous average power per channel into 8 ohms, 20—20,000 Hz, at less than 0.5% total harmonic distortion. Distortion decreases at lower power outputs.
Power at Clipping, Single Channel, 1000 Hz, less than 1% distortion: 50 watts @ 8 ohms; 36 watts @ 4 ohms; 26 watts @ 16 ohms.
Intermodulation Distortion: Less than 0.5% at any power level up to 40 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.
Half-Power Bandwidth: 20 watts per channel at less than 0.5% total harmonic distortion from 8 Hz to 50 kHz into 8 ohms.
Frequency Response: \pm 0.5 dB, 10 Hz—50 kHz @ 1 watt into 8 ohms.
Hum and Noise: More than 90 dB below 40 watts output, full spectrum.
Channel Separation: Greater than 60 dB from 20 Hz to 10 kHz.
Input: 100,000 ohm load; 1.3 volts for 40 watts into 8 ohms.
Semiconductor Complement: 12 transistors, 10 diodes.
Dimensions: 14" x 8" x 4" high.
Shipping Weight: 13 lbs.
Power Consumption: 35 watts quiescent; 250 watts maximum; 50/60 Hz, 100, 120, 220 or 240 vAC.

QSA-300

Rated 4-Channel Power Output: 75 watts continuous average power per channel into 8 ohms (40 watts per channel into 16 ohms), 20—20,000 Hz, at less than 0.25% total harmonic distortion. Distortion decreases at lower power outputs. For optional conversion to stereo use, see available output power listed below.
Available 4-Channel Output Power: (see above for F.T.C. Power Ratings)
20—20,000 Hz, all channels driven, 0.25% maximum THD.:
75 watts continuous average per channel @ 8 ohms.
100 watts continuous average per channel @ 4 ohms.*
40 watts continuous average per channel @ 16 ohms.
Stereo Operation Available Output Power (optional):
Low Impedance Mode Connections:
80 watts continuous average per channel @ 8 ohms.
150 watts continuous average per channel @ 4 ohms.
200 watts continuous average per channel @ 2 ohms.*
High Impedance Mode Connections:
80 watts continuous average per channel @ 16 ohms.
150 watts continuous average per channel @ 8 ohms.*
* 5 minutes sustained full power limit without a fan.
Power at Clipping, 1 of 4 Channels, 2500 Hz, less than 1% distortion:
90 watts @ 8 ohms; 130 watts @ 4 ohms; 45 watts @ 16 ohms.
Power at Clipping, Each Stereo Channel, 2500 Hz, less than 1% distortion:
Low-Z Mode: 95 watts @ 8 ohms; 160 watts @ 4 ohms; 240 watts @ 2 ohms.
High-Z Mode: 90 watts @ 16 ohms; 160 watts @ 8 ohms.
Intermodulation Distortion: Less than 0.25% at any power level up to 75 watts rms per channel into 8 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.
Half-Power Bandwidth: 37.5 watts per channel at less than 0.25% total harmonic distortion from 5 Hz to 50 kHz into 8 ohms.
Frequency Response: +0, -1 dB, 10 Hz—40 kHz @ 1 watt into 8 ohms.
 \pm 0.5 dB, 20 Hz—20 kHz @ 75 watts into 8 ohms.
Hum and Noise: More than 95 dB below rated output, full spectrum.
Input: 35,000 ohm load; 1 volt for 75 watts into 8 ohms.
Semiconductor Complement: 52 transistors, 40 diodes.
Slewing Rate: 7 volts per microsecond.
Damping Factor: Greater than 80 to 1 kHz into 8 ohms.
Greater than 50 to 10 kHz into 8 ohms.
Channel Separation: Greater than 70 dB by IHF standards.
Connectors: Inputs: phono jacks.
Outputs: color coded 3-way binding posts with ¼" spacing.
Dimensions: 18¼" wide; 14½" deep; 7" high panel, 17½" wide. Add ½" for feet.
Shipping Weight: 58 lbs. **Net Weight:** 52 lbs.
Power Consumption: 120 v.a. quiescent; 10 amps maximum; 50/60 Hz, 120/240 vAC.

PAS-3X

Frequency Response: High level input: \pm 0.5 dB, 10 Hz—40 kHz.
Low level input: \pm 1 dB of RIAA equalization.
Distortion at 2 Volts Output into 100k Load or Higher:
THD less 0.05%, 20 Hz—20 kHz.
IM less than 0.05% with any test frequencies.
Hum and Noise: Magnetic Phono: 72 dB below a 10 mv input @ 1000 Hz.
High Level: 85 dB below a 0.5 volt input.
Gain: Magnetic Phono to Audio Out: 60 dB @ 1000 Hz.
High Level: 20 dB.
Phono Input Overload: Greater than 250 mv @ 1000 Hz.
Tone Controls: \pm 20 dB @ 20 Hz; \pm 14 dB @ 20 kHz.
Output Voltage: 10 volts into 100,000 ohms.
Impedances: Magnetic Phono: 47,000 ohms.
Tape Head: 47,000 ohms.
High Level: 250,000 ohms.
Tape Outputs: From Phono inputs, 47,000 ohms minimum load.
From High Level inputs, same as source.
Audio Output: 1000 ohms nominal.
Inputs: RIAA magnetic Phono; NAB 7½" Tape Head; Special (normally flat microphone); 4 high level inputs including Spare and separately switched tape monitor playback.
Outputs: Tape output ahead of controls; audio output.
Tube Complement: 12AX7 (4); 12X4; selenium rectifier.
Dimensions: 13½" wide x 9" deep x 4¼" high.
Shipping Weight: 11 lbs.
Power Consumption: 30 watts; 50/60 Hz, 120 vAC. Dual voltage power transformer for 120-240 volt operation available on special order at additional cost.

MARK III

Rated Power Output: 50 watts continuous average power into 4, 8 or 16 ohms, 50—10,000 Hz, at less than 1% total harmonic distortion. Distortion decreases at lower power outputs.

Intermodulation Distortion: Less than 1% at any power level up to 60 watts into 4, 8 or 16 ohms. Distortion decreases at lower power outputs.

Frequency Response: ± 0.5 dB, 6 Hz—60 kHz @ 1 watt.

Hum and Noise: More than 90 dB below 60 watts, full spectrum.

Input: 470,000 ohm load; 1.6 volts for 60 watts into 8 ohms.

Damping Factor: 15

Tube Complement: 6550 (2); 6AN8; GZ-34; silicon diode.

Dimensions: 9" wide x 9" deep x 7" high.

Shipping Weight: 28 lbs.

Power Consumption: 150 watts; 50/60 Hz, 120 vAC. Dual voltage power transformer for 120/240 volt operation available on special order at additional cost.

STEREO 70

Rated Power Output: 20 watts continuous average power per channel into 4, 8 or 16 ohms, 50—10,000 Hz, at less than 1% total harmonic distortion. Distortion decreases at lower power outputs.

Power at Clipping, Single Channel, 1000 Hz, less than 1% distortion: 40 watts into 4, 8 or 16 ohms.

Intermodulation Distortion: Less than 1% at any power level up to 35 watts rms per channel into 4, 8 or 16 ohms with any combination of test frequencies. Distortion decreases at lower power outputs.

Frequency Response: ± 0.5 dB, 10 Hz—40 kHz @ 1 watt.

Hum and Noise: More than 90 dB below 35 watts, full spectrum.

Input: 470,000 ohm load; 1.3 volts for 35 watts into 8 ohms.

Damping Factor: 15

Tube Complement: EL-34 (4); 7199 (2); GZ-34; selenium rectifier.

Dimensions: 13" wide x 9½" deep x 6½" high.

Shipping Weight: 32 lbs.

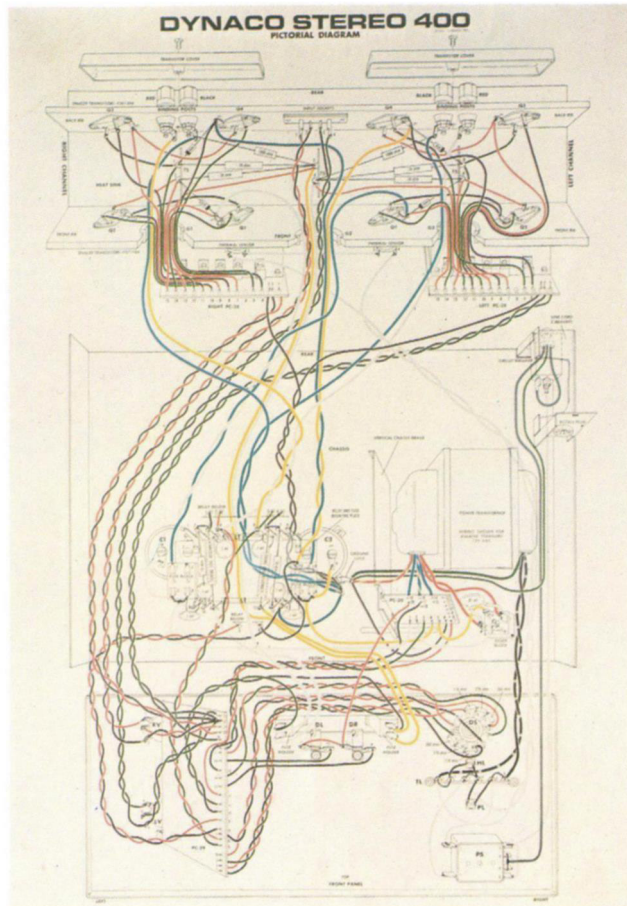
Power Consumption: 190 watts; 50/60 Hz, 120 vAC. Dual voltage power transformer for 120/240 volt operation available on special order at additional cost.

LOUDSPEAKER SYSTEMS

SPECIFICATIONS	A-25	A-25VW	A-25XL	A-35	A-40XL	A-50
Recommended Amplifier Range (watts)	20-60	20-60	15-100	20-60	15-100	30-100
DIN Power Rating (watts)	35	35	50	35	50	50
Tweeter	1½"	1½"	1"	1½"	1"	1½"
Woofer	10"	10"	10"	10"	10"	(2) 10"
Tweeter Control Positions	5	3	3	5	3	5
Replaceable Grille	no	no	yes	yes	yes	yes
Enclosure Design	aperiodic	aperiodic	aperiodic	dual chamber aperiodic	dual chamber aperiodic	dual chamber aperiodic
Dimensions W x H x D	11½" x 20" x 10"	11½" x 20" x 10"	11½" x 20" x 10"	12½" x 22½" x 10"	13½" x 22½" x 10"	21½" x 28" x 10"
Shipping Weight	24 lbs.	24 lbs.	25 lbs.	30 lbs.	32 lbs.	47 lbs.

RMA RACK MOUNT ASSEMBLY

Universal panel mount for standard 19" rack, 5" high, fits all "faceplate" models. Three piece assembly; includes mounting hardware.



The single pictorial diagram of the Stereo 400, which is the most complex Dynakit to build, shows all connections clearly, and in color, for easy checking of your work.

4-Dimensional Sound With The Quadaptor™

The QD-1 is an inexpensive speaker matrix adaptor which connects to your present stereo amplifier's speaker terminals, and four speakers are connected to it. It contains the passive decoding circuitry to separate the four related signals, but it does not alter the incoming information in any way, and it is not a synthesizer. Its function is to fully utilize *all* of the material that has been recorded, including signals of dissimilar phase which contribute the "ambience" or "hall sound" effects previously hidden in conventional two-channel playback of many of your *present* recordings.

The Quadaptor circuit, now widely copied and licensed, saves you a stereo amplifier by reconstructing the four related signals at the output of the power amplifier, rather than between the preamp and power stages, as is the case with other matrix techniques.

The rear speakers connected to the Quadaptor should be at least as efficient as the front speakers for proper balance. They should be 8 ohms, matched, and for best results should be similar to those in front in sonic characteristics. A very smooth impedance characteristic is desirable, for the smaller this variation, the more accurate will be the Quadaptor's decoding. The front speakers should be matched and may be 4, 8 or 16 ohms.

The normal listening position is in the rear 1/3 of the room when four matched speakers are chosen. The Quadaptor provides up to 12 dB attenuation of the back speakers for proper balance if they are too close; it facilitates easy, accurate adjustment of the system for optimum separation, and it enables switching off the back speakers when conventional stereo listening is desired.



The Quadaptor may be used with any Dynaco amplifier (it is redundant with the SCA-80Q) and nearly all other amplifiers and receivers. The kit can be assembled in an hour. If you desire more complete information on the theory behind this most practical of matrix decoding systems, as well as complete application advice, the very detailed instruction manual is available from Dynaco for \$1.50.

WALNUT ENCLOSURES

Accessory genuine oiled-walnut veneer cabinets are available to fit all current solid state and tube type "faceplate" units, as well as most previous designs. Double stacked versions are offered so that typical Dynaco value

lets the cost of one cabinet do the work of two. The short ones are for units which do not require ventilation. The lower unit in double cabinets must be one which does not require ventilation. The PAT-5 does not need ventilation, but fits only the deeper cabinet.

CAB-1S Single short cabinet fits PAT-4, FM-5 or PAS-3X, but **not** the FM-3. 14½" x 5" x 8½" deep. Shipping weight 6 lbs.

CAB-2S Double short cabinet fits FM-5 with either PAT-4 or PAS-3X. **Not** for FM-3. 14½" x 9½" x 8½" deep. Shipping weight 7 lbs.

CAB-1D Single deep vented cabinet fits PAT-5, SCA-80Q, AF-6, SCA-80, SCA-35 or FM-3. 14½" x 5" x 11" deep. Shipping weight 6 lbs.

CAB-2D Double deep vented cabinet fits SCA-80Q or PAT-5 with either AF-6 or FM-5; or SCA-35 with either AF-6 or FM-5; or either AF-6 or FM-3 with either PAT-4 or PAS-3X. 14½" x 9½" x 11" deep. Shipping weight 7 lbs.



dynaco

Box 88 / Coles Rd., Blackwood, N.J. 08012, U.S.A.
DYNACO OF CANADA LTD., 109 Montee de Liesse, St. Laurent, Quebec H4T 1S9

SPECIFICATIONS
SUBJECT TO CHANGE
WITHOUT NOTICE