

## 1954 Ampex Tape Recorder Catalog

- Ampex Magnetic Tape Recording (16 pages)
- Ampex Ultra High Fidelity Tape Recorders (16 pages)
- Ampex 300 (4 pages)
- Ampex S-3200 (4 pages)
- Ampex 350 (4 pages)
- Ampex 352 (2 pages)
- Ampex Two & Three Channel Audio Tape Recorders (4 pages)
- Ampex 400 (4 pages)
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- Ampex 620 monitor (4 pages)
- Ampex APL-1 1952 Price List (4 pages)
- Ampex APL-1 1953 Supplement Price List (2 pages)

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DATA RECORDING, MACHINE CONTROL AND PROCESS REGULATION BY

# AMPEX

## MAGNETIC TAPE RECORDING

A rapidly growing new technique that offers greater precision, versatility and range than any other recording and reproduction method yet devised.



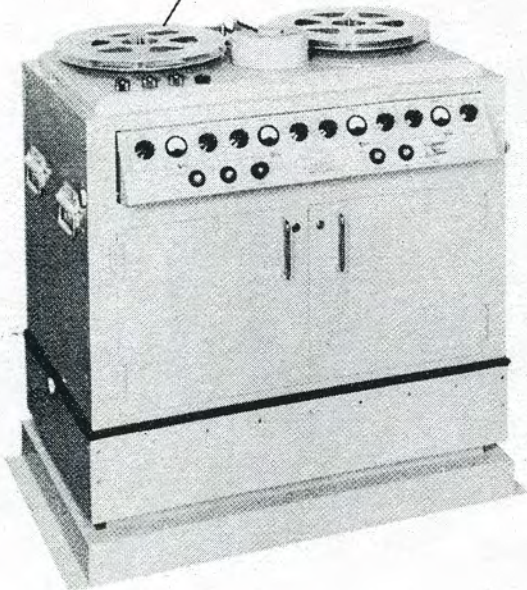
## A SUBSTANCE AND METHOD THAT OFFER MUCH TO YOU

With today's emphasis on research, development and new manufacturing techniques, the use of magnetic tape recording is spreading with great rapidity. It has a vital role in the race for military superiority and a growing place in the intense technological competition of industry.

One of many spectacular examples of its usefulness is the flight testing of guided missiles. Here great numbers of physical, mechanical and electrical occurrences must be recorded simultaneously. On tape all can be recorded together — either in the missile itself or from radio receivers on the ground. The tape recorded information is accurate in value, precise in timing and versatile in its subsequent uses. Yet compared to other data recording techniques in this field, it is low in overall cost.

The broad usefulness of magnetic tape recording extends to numerous other fields: **in machine control** to convert blueprints to machined contours; **in geophysical exploration** to create accurate subterranean maps; **in automatic process control** to achieve consistent perfection; and **in research of all kinds** to record information more accurately and completely.

*To further explain the versatility of magnetic tape recording, this brochure attempts a thorough exposition of its properties and applications and a description of available equipment and services to adapt it to your specific needs.*



## THE MOST VERSATILE "MEMORY" THAT MAN HAS MADE

Magnetic tape has become widely familiar today because it "remembers" sound better (and more conveniently) than any other recording medium. But beyond the recording of sound, tape has a "memory" of vastly wider scope — a "memory" sometimes more versatile than the human mind — and always more precise, permanent and reliable.

### Tape can "remember" any physical measurement

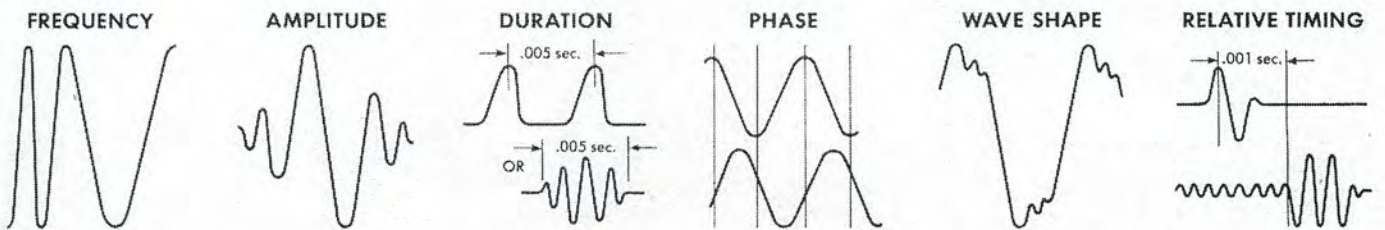
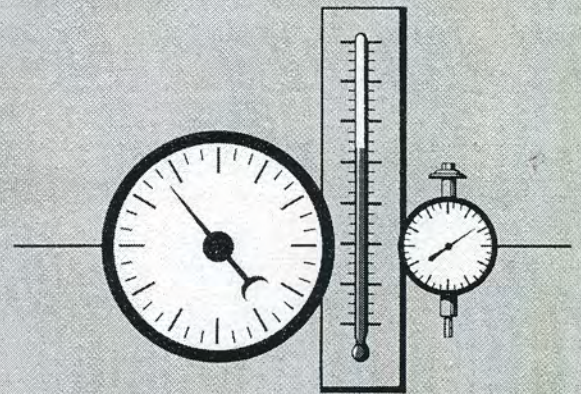
Any phenomena which can be converted into an electrical signal may be recorded magnetically. For instance, magnetic tape can record vibrations, temperatures, pressures, forces, motions, numbers, and similar phenomena in almost any conceivable combination or relation.

Tape can record numerous occurrences taking place at one time. The exact time relation of each is maintained perfectly because all are on parallel channels on a single width of tape.

Either fleeting transients or slow changes can be captured by tape recorders. Some models respond to frequencies as low as zero (D.C.); others record as high as 100,000 cycles per second or even more. And by use of suitable accessory equipment, signals can be recorded that range from the minute voltages generated in brain cells to the enormous outputs of instruments exposed to atomic blasts.

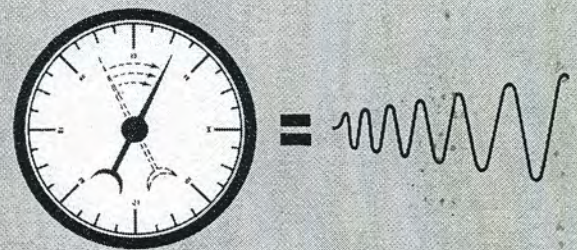
### Tape recordings are made by "freezing" electrical patterns

Magnetic tape recorders receive "intelligence" as a pattern of electrical voltage fluctuations. The recorder converts this to a corresponding magnetic pattern on a moving tape. In this way tape "remembers" the following electrical characteristics:



### These patterns are a common denominator for all information

Tape's electrical memory is a convenient form because electrical voltage patterns are universally used to convey information and commands. Throughout the broad fields of recording, instrumentation and control they are the one best common denominator. For instance, mechanical vibrations can easily become electrical voltage oscillations. Rises in temperature or changes in pressure can be translated to a scale of voltage amplitudes. Numbers can become a sequence of electrical pulses. And sounds are recorded as a combination of amplitude and frequency. Hundreds of types of sensing elements are commercially available to make these types of conversions.



## **TAPE RECORDED INFORMATION CAN BE FED TO ANY INSTRUMENT OR MACHINE**

*(That reacts to electrical signals)*

Tape "plays back" like a re-run of the original test or phenomenon because it gives back the same precise electrical signals it received. Taped signals are "live." They can do anything that the original data signals could have done, but with this important difference: tape can be replayed any number of times—any place—and in any number of ways.

### **TO INSTRUMENTS THAT SCAN**

— *such as Oscilloscopes and Galvanometers*

If the original data signals themselves could be monitored by oscilloscope or other direct reading instruments, these same means can be used to scan the taped data.

But even if not, oscilloscopes can often be used on taped data by clipping or copying a short length of the tape and running it in loop form to create a repeating signal.

For locating high points, inflection points, low points, specified values, or particular correlations between parallel data channels, specialized scanning devices can take advantage of the electrical nature of magnetic taped data.

### **TO INSTRUMENTS THAT WRITE**

— *Oscillographs and Pen Recorders*

Selected portions of the taped data can, if desired, be played onto an oscillograph numerous times, each time making a different visual record and revealing more information. As examples: (1) scales can be expanded or contracted in either lateral or longitudinal direction; (2) channels can be

transposed; (3) higher frequencies on tape can be brought within range of oscillographs or even pen recorders by slowing down the tape playback; and (4) data can be filtered in various ways (with tape speedup, if necessary).

### **TO MACHINES THAT ANALYZE**

— *such as Computers and Automatic Data Reducers*

In elaborate testing and computation programs, enormous numbers of man hours can be saved by recording the data on magnetic tape in a coded electrical form that can be fed directly to computing devices. In this way computed and correlated test results may be obtained with a minimum of intermediate handling and reduc-

tion of recorded data. And because tape can be an input medium as fast as the computer itself, time is conserved.

For recorded data that is below the level of accompanying "noise", tape can be used with special correlation techniques that cancel out the noise and reveal the desired information.

### **TO MACHINES THAT TRANSLATE**

— *such as Card Punch Machines*

Where punched cards, plotted graphs or other physical forms are required, taped data can be slowed down and translated into the desired form. The

fact that taped data is electrical makes it possible to make these translations continuously and automatically.

### **TO MACHINES THAT ACT**

— *such as Process Controls and Machine Tools*

Any machine function that can be regulated electrically, can be controlled by tape. Taped signals can open valves, regulate movements, determine positions, control timing, etc.

For example in machine tool control, taped signals can generate the complete finished form of an intricately machined shape.

## SOME OTHER SPECIAL ADVANTAGES OF TAPE

- **Vast information on little material**

Tape has enormous data capacity per linear inch, square inch, cubic inch — or per dollar's worth of the medium. A one inch width can satisfactorily record up to 14 parallel channels of information. And tape inherently has broad frequency response and dynamic range.

- **Data is replayable thousands of times**

Under most conditions replaying of the tape has no significant effect on the accuracy of the recorded information. This is true because the information becomes a magnetic property of the tape's coating and is largely unaffected by likely amounts of mechanical wear.

With proper storage magnetic tape is not adversely affected by time. Accelerated life tests by the tape manufacturers indicate that taped data can probably be retained for periods as great as 50 years without significant change.

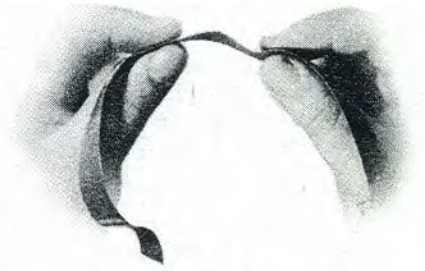
- **Tape can be erased and reused**

In uses where the recorded information need not be retained the tape can be erased and reused. Erasure is done magnetically (either in bulk or on the recorder). No significant trace of previous signals remains or accumulates.

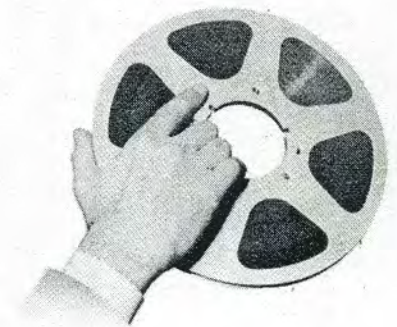
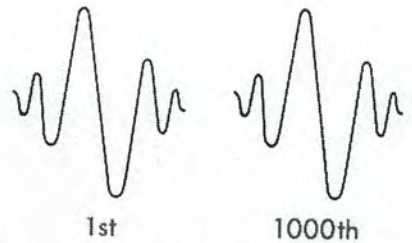
In closed loop uses tape may be erased and re-recorded on each cycle. In this way a continuous stream of information may be delayed from fractions of a second up to many minutes depending on the loop length.

- **Tape can be cut and spliced**

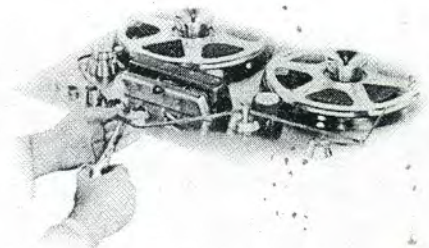
Segments of taped data can be cut out of their original positions and spliced together into rearranged tapes. Also sections of a data tape can be cut out and spliced into loop form for repetitive signals to oscilloscopes or other uses. Later, if desired, the sections can be returned to their places to reform the original tape.



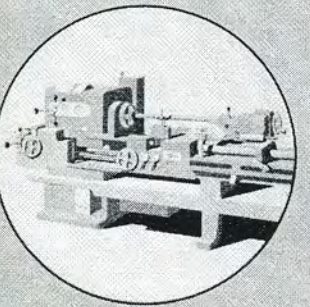
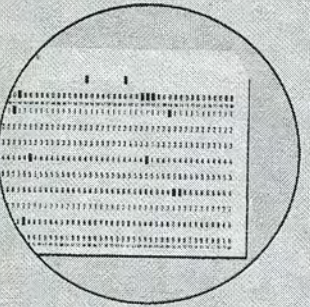
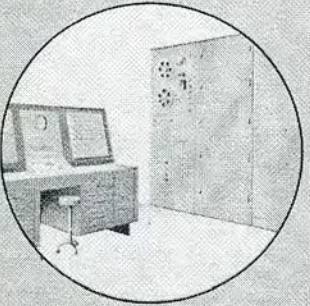
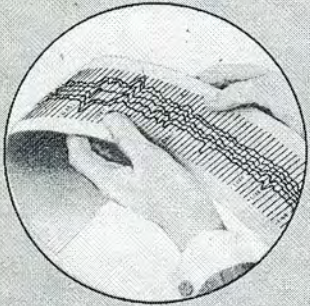
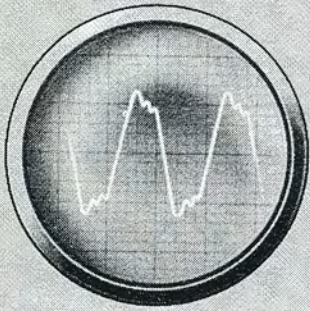
*Thousands of facts per inch*



*Reused hundreds of times — costs only pennies per usage.*

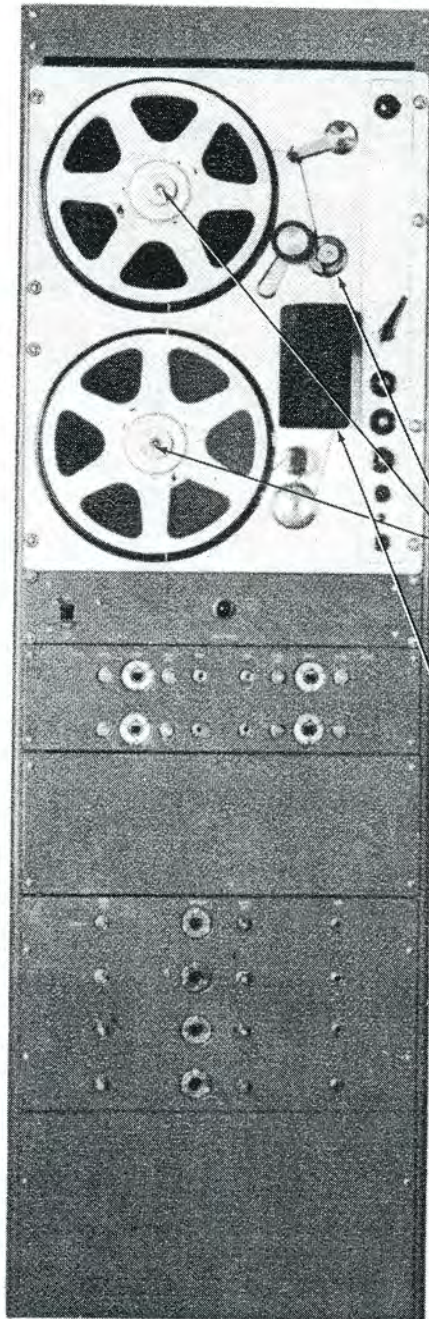


*A versatility unmatched by any other medium*



# THE TAPE RECORDER (AND REPRODUCER)

The character and accuracy of data that can be recorded on tape is largely determined by the machine that does the recording. The tape itself is a blank, homogeneous material with "memory" properties. The tape recorder takes this uniform substance and imposes "intelligence" with whatever scope and accuracy is engineered into its design.



Three distinct types are referred to:

- **DIRECT RECORDERS** which record the data signals essentially as received (audio recorders are one version of this type).
- **CARRIER TYPE RECORDERS** also called **low frequency and transient recorders**. These use the data signals to frequency modulate a carrier wave which is then recorded on tape.
- **PULSE-WIDTH RECORDERS** which receive pulse-width modulated information and record it as a sequence of precisely timed positive and negative impulses (beginnings and ends of pulses).

Although the data is recorded in greatly differing forms on these three types of recorders, the playback data is in each case returned to a form essentially identical to the data that was fed to the machine.

## How a Magnetic Tape Recorder Operates

All the above types of tape recorders have functions falling into the following subassembly groups (differences are noted wherever they occur).

### 1 The tape transport mechanism

The most critical function of this assembly is the maintaining of extremely uniform tape speed and accurate timing. Other functions are starting, stopping, fast forward, rewind, and the feeding out and taking up of the tape supply under proper tension.



Closeup of capstan and idler

### 2 The magnetic heads (erase, record and playback)

Each head is a tiny electro-magnet. On the record head "electrical intelligence" passes through the windings and induces "magnetic intelligence". This induced magnetic flux concentrates at a narrow gap where it penetrates the oxide coating on the tape. The playback head functions in a reverse manner; magnetism on the tape induces electrical voltage in its windings. The erase head is optional and functions only during recording. It clears the tape of previous signals.



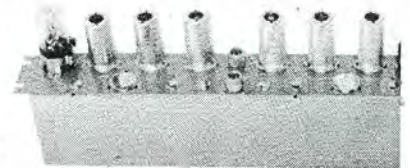
Single track head

### 3 The electronic components

These assemblies perform various functions according to the type of recorder.

#### THE RECORD AMPLIFIER

amplifies the input signal and puts it in optimum recording form. On F-M carrier type recorders this assembly includes a multi-vibrator oscillator which is modulated in frequency by the signal to be recorded.



Typical amplifier strip

**THE PLAYBACK AMPLIFIER** amplifies the output signal during playback. On F-M carrier type recorders it includes demodulation equipment. On direct recorders it includes equalization circuitry for flat response of the various frequencies of the playback signal.

**THE ERASE AND BIAS OSCILLATOR** supplies high frequency current for the erase head (where used) and furnishes high frequency bias current to the record head to achieve a linear transfer characteristic. This oscillator is used only on direct recorders.

**POWER SUPPLIES** are provided as needed for the requirements of the record and playback amplifiers.

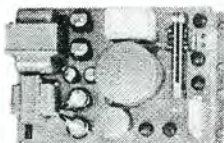
### 4 Accessories

For special performance requirements, the basic recorder assemblies described above are sometimes supplemented by various accessories:

**SPEEDLOCK** is an electronic system to assure exact conformity between recording speed and reproduction speed. It corrects any effects of tape slippage, machine speed difference or tape stretch.

**PRECISION 60 CYCLE POWER SOURCE** provides precise 60 cycle current for the synchronous capstan motor of the tape recorder. It is necessary where other available power is not sufficiently stable or reliable to meet the particular data accuracy requirements.

**TAPE LOOP DEVICES** accommodate endless loops of tape (in place of reels). The loop makes possible the reproduction of a continuously repeating cycle.



Typical accessory item, precision power supply (reduced scale)

## ... AND THE SCOPE OF THEIR PERFORMANCE

The characteristic performance figures shown below are typical of the various Ampex tape recorders that have been furnished. Naturally all values cannot be realized on any one machine since some performance factors may require adjustments which preclude others. Complete specifications on individual models can be obtained from specification sheets available on request.

<b>FREQUENCY RESPONSE</b>	<p>The following are typical values of standard Ampex recorders but are not necessarily maximums:</p> <p>F-M carrier type recorders: 60 in/sec. — 0 to 10,000 cycles (+ 1 db — 3 db)          30 in/sec. — 0 to 5,000 cycles (<math>\pm</math> 1 db)          15 in/sec. — 0 to 2,500 cycles (+ 1 db — 3 db)</p> <p>Direct data recorders: 60 in/sec. — 200 to 80,000 cycles (<math>\pm</math> 3 db)          60 in/sec. — 100 to 100,000 cycles (<math>\pm</math> 10 db)          30 in/sec. — 200 to 40,000 cycles (<math>\pm</math> 3 db)          15 in/sec. — 200 to 20,000 cycles (<math>\pm</math> 3 db)</p> <p>Audio recorders: 15 in/sec. — 30 to 15,000 cycles (<math>\pm</math> 2 db)          7½ in/sec. — 30 to 15,000 cycles (<math>\pm</math> 4 db)</p> <p>Approximate rules for frequency response at other tape speeds are as follows: FOR DIRECT RECORDERS 1500 cycles/sec. per in/sec. of tape speed; FOR CARRIER TYPE RECORDERS 166 cycles/sec. per in/sec.</p>
<b>TAPE SPEEDS</b>	<p>3, 3¾, 6, 7½, 15, 30 and 60 in/sec. are the common speeds. Also, speeds as high as 100 in/sec. and as low as 0.3 in/sec. have often been used.</p>
<b>DURATION OF RECORDING</b>	<p>SOME TYPICAL EXAMPLES (USING CELLULOSE ACETATE TAPE)</p> <p>Short duration — 8 minutes at 60 in/sec. on a 10½ inch reel of tape (2400 feet).          Nominal — 32 minutes at 15 in/sec. on a 10½ inch reel of tape (2400 feet).          Long duration — Over 53 hours at 0.3 in/sec. on a 14-inch reel of tape (4,800 feet).</p>
<b>NUMBER OF PARALLEL TRACKS OF DATA</b>	<p>Up to 2 on quarter inch tape          Up to 7 on half inch tape          Up to 14 on one inch tape          14 tracks per inch on wider tapes</p>
<b>SIGNAL-TO-NOISE RATIO (including cross-talk)</b>	<p>This is a function of type of recorder, tape speed and chosen reference level. Three typical examples are given below:</p> <p>AMPEX MODEL 307-1 SINGLE-TRACK DIRECT RECORDER          Wide band noise is 35 db below the recommended operating level of 1% overall distortion.</p> <p>AMPEX MODEL 306 CARRIER TYPE RECORDER          The RMS noise level is more than 40 db below maximum recording level of 2% distortion.</p> <p>AMPEX MODEL 300 AUDIO RECORDER          The RMS noise level is more than 60 db below peak signal of 3% distortion.</p>
<b>FLUTTER AND WOW</b>	<p>The term flutter as employed herein designates any variation from uniform tape motion. Wow is a term sometimes used to describe low frequency flutter. Flutter must be held to a practical minimum in data recording machines because it can become "noise", distortion or error in many types of data signals.</p> <p>NOMINAL — Well under 0.1% RMS measuring all flutter components from 0 to 300 cycles/sec. on a standard Ampex 300 series recorder operating at 15 inches per second.</p> <p>MINIMUM — Less than one quarter of the above value. This low flutter is achieved on the Ampex Model 500 which was developed for extremely critical telemetering applications.</p>
<b>ACCURACY</b>	<ol style="list-style-type: none"> <li>1. FREQUENCY REPRODUCTION — Average frequency error between original and recorded data is less than 0.02% when SPEEDLOCK is used; it is nominally less than 0.2% WITHOUT SPEEDLOCK.</li> <li>2. AMPLITUDE REPRODUCTION — Error does not exceed 2% of full scale value when recorded on an F-M carrier type recorder.</li> <li>3. TIMING — Timing between original and recorded data can be held within 0.01 second throughout the reel if SPEEDLOCK equipment is used. WITHOUT SPEEDLOCK, timing is accurate within <math>\pm</math> 3.6 seconds in 30 minutes.</li> <li>4. TIME ALIGNMENT BETWEEN DATA CHANNELS — Better than 50 microseconds at 60 in/sec. tape speed.</li> <li>5. PULSE WIDTH — On information converted to pulse width modulation, individual pulses are recorded with less than 2 microseconds constant error.</li> </ol>
<b>SHOCK RESISTANCE DURING RECORDING</b>	<p>Shock resistant tape recorders have been built which recorded satisfactorily under vibrations as high as 10Gs at 60 cycles per second and shocks up to 40Gs for 1 millisecond.</p>



## TYPICAL MAGNETIC TAPE APPLICATIONS

### ● FLIGHT TESTING (Both piloted aircraft and missiles)

*Recording can be done either in the air or on the ground*

Magnetic tape recording is very suitable either to airborne recording or telemetering (radio transmission of data). In airborne recording the recorder is located in the aircraft and the tapes are brought back for analysis. In telemetering only a radio transmitter is carried. The tape machine records from a receiver output on the ground — the data is saved regardless of the outcome of the flight.

*Magnetic tape eliminates the problem of timing*

Relative timing of numerous separate instrument readings and occurrences becomes simple with magnetic tape because all can be recorded together on the same tape. Absolute timing from some particular reference point can be held within .001 second throughout a reel of tape by using Ampex Speedlock equipment.

*One tape can record the readings of hundreds of instruments*

With data converted to pulse width modulation, sample readings from many separate data channels are all fed onto one tape recorder track by a rotating commutator. The commutator may have as many as 45 segments each fed by a separate data channel. A tape recorder using 1-inch tape may in turn have as many as 14 parallel tracks each fed by a separate commutator. Hence, the one tape recorder could sample many hundreds of separate readings on each rotation of the commutator. This technique is suitable for D.C. and low frequency data.

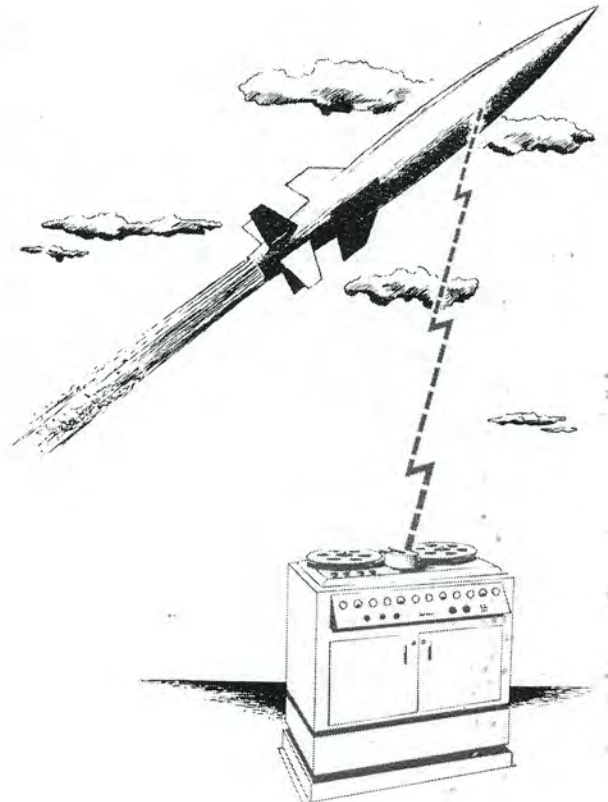
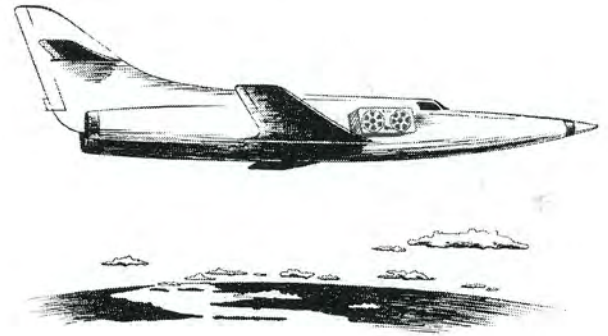
*Tape captures spectrums of data bands (100 to 100,000 cycles/sec.)*

Where a much broader frequency response is required on each of many instrument pickups, a series of sub-carrier frequencies is used. The output of each instrument frequency-modulates one of these sub-carriers. The sub-carriers are at different frequencies spread across the available spectrum and so a number of them can be combined and recorded on one tape track. If a multi-track tape recorder is used, it can still further multiply the number of simultaneous instrument pickups.

To recover this type of data, the sub-carriers are separated through appropriate filters and are then demodulated.

*Handling of miles of data is electrically simplified*

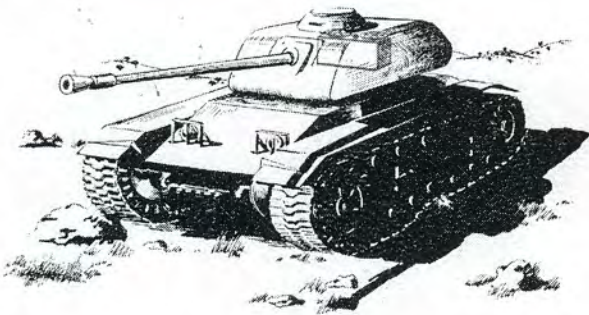
Tape overcomes some of the problems of handling and analyzing the enormous quantities of data accumulated on test grounds. Tape is relatively compact and unlike film it requires no processing. Because data is in electrical form, it lends itself to rapid electronic scanning methods that locate maximum and minimum values, inflection points and frequency components. Its electrical nature also for the first time makes possible automatic data reduction methods and high speed feed to electronic computers.



## ● SHOCK AND VIBRATION RECORDING

### *A tape recorder goes for a rough ride and takes it*

The tape recording principle is inherently adaptable to rough usage because the recording process itself does not directly involve any delicate moving parts. For shock and vibration testing aboard moving vehicles, Ampex has developed special tape recorders that can record accurately while being subjected to shocks up to 40Gs for 1 millisecond.



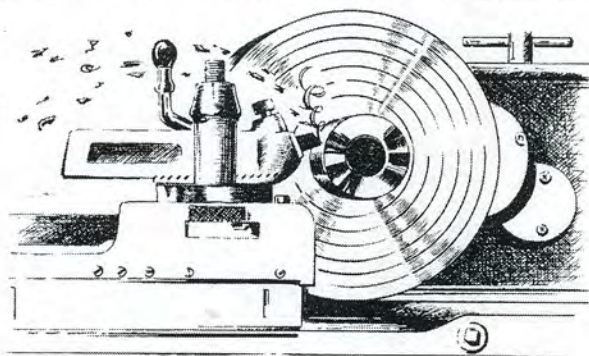
### *Frequency response from zero to 10,000 cycles/sec. covers everything*

Since mechanical shocks and vibrations always involve mass, both the lowest and highest frequencies likely to have importance will generally fall well within the zero to 10,000 cycle range of carrier type tape recorders. These recorders have the high transient accuracy necessary for shock and vibration studies. When the original recording is made on tape and then played back at lower speed into oscillographs or pen recorders it can bring the higher frequencies within range of these visual methods. Where quantitative analysis of frequencies and energy content is desired, taped data is in electrical form and can be fed to electronic wave analyzers.

## ● MACHINE CONTROL

### *A complex contour from blueprint — to tape — to metal*

Relative movements of cutting tools and work can be controlled with great precision by electrical signals from magnetic tape. With coordinated signals controlling each axis



of motion, there is practically no limit to the complexity of surfaces that can be accurately generated. The servo controls which translate signals to movements are adaptable to any basic type of machine tool.

### *A fast setup on a reel of tape*

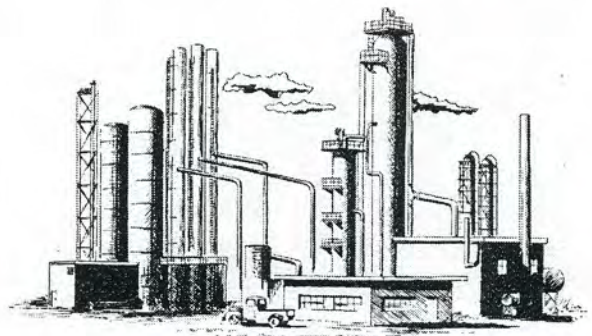
Just like stops on a turret lathe, the control pattern recorded on tape is a machine setup. But tape differs from other setups in that it can be put on a shelf and saved for later re-runs of the same part. Set-up time is cut to a minimum; the machine's working time is utilized to a maximum. And one reproducer can control a bank of machines.

"Tape setups" can be made in various ways. One technique uses points plotted from drawings, interpolated and transformed into servo signals by computer and then recorded on tape. By this means it is possible to create machined shapes that would be impossible under manual control of the machine; (machined turbine blades are one example). For less intricate forms the movements of a machine tool can be recorded while a skilled operator cuts a sample part.

## ● PROCESS CONTROL (Chemical, metallurgical, manufacturing and similar fields)

### *Consistent results by tape controlled process patterns*

Electrical signals from magnetic tape can operate valves, thermostats, pressure controls, motors, speed controls or any other desired mechanical or electrical responses. In this way taped signals in a process sequence can repeat any pattern of temperatures, pressures, agitations, timed feeding of ingredients, etc. that has previously achieved a successful result. Control is precise since timing and synchronization of all variables are inherently "perfect."



### *A measurement—then a correction*

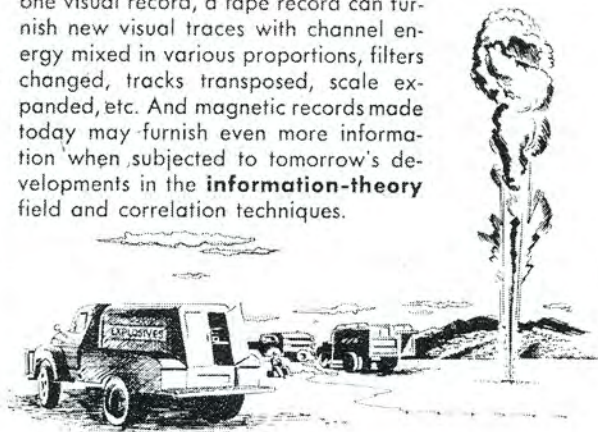
Magnetic tape can also be used to make a continuous correction in flowing or cycling processes. It can pick up a measurement at one point—be timed exactly with the steady process flow or cycle—then apply a correction at another point some definite time interval later in the process. The tape is used in loop form and is erased and re-used each time around.

# TYPICAL MAGNETIC TAPE APPLICATIONS

## ● GEOPHYSICAL EXPLORATION

### *Tape brings back a more complete story*

The fact that taped data is "live" complete data can become critically important in geophysical exploration. Review of key geophysical data may take place after crews have returned from the field. Where information is obscure on any one visual record, a tape record can furnish new visual traces with channel energy mixed in various proportions, filters changed, tracks transposed, scale expanded, etc. And magnetic records made today may furnish even more information when subjected to tomorrow's developments in the **information-theory** field and correlation techniques.



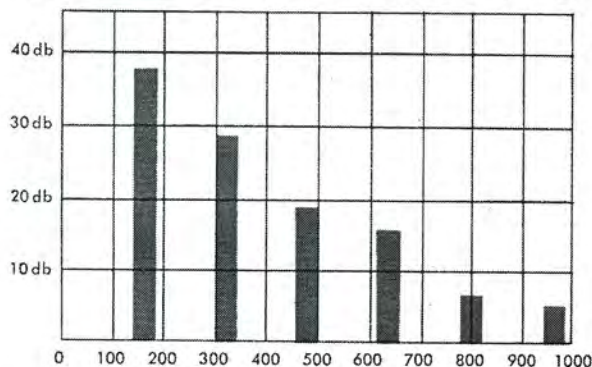
### *Magnetic recording has superior range and sensitivity*

The F-M carrier type magnetic recording that is used in geophysical work has less distortion and phase shift, wider frequency response and greater signal-to-noise ratio than either direct magnetic recording or the older oscillograph methods. The low overall distortion of this magnetic recording method permits an analysis of higher frequency seismic energy which can be isolated by filters. This is a new field of seismic information which could not be explored by older techniques whose harmonic distortion concealed and confused these higher frequency components.

## ● WAVE ANALYSIS

### *Tape provides ideal "test tube samples" for electronic methods*

Tape recording eliminates tedious graphic methods of wave analysis which would be necessary if a visual recording technique were used. Since tape recorded data is played back in electrical form, it can be played directly into an



electronic wave analyzer. Readings are given in energy versus frequency. By this means, highly complex wave shapes can be reduced to their component frequencies in a few minutes time — or in a matter of seconds with automatic plotting instruments.

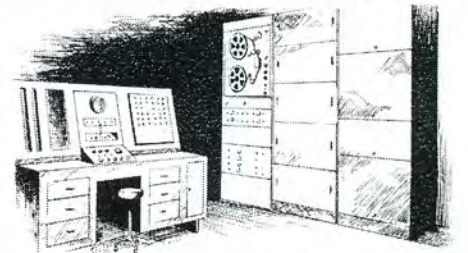
### *A tape loop makes any signal into a periodic signal*

For purposes of analysis any small section of a reel of tape can be made into an endless loop (either by clipping or copying). Its wave pattern will then repeat itself in a period corresponding to the circumference of the loop. No matter what its instantaneous variations, any section of the wave pattern can in this way be viewed on an oscilloscope or be fed to a wave analyzer.

## ● COMPUTING DEVICES

### *A fast "stream of thought" for electronic brains*

For feeding computers with numbers, equations and programming information magnetic tape signals have the advantage of being largely free of physical inertia. Thus

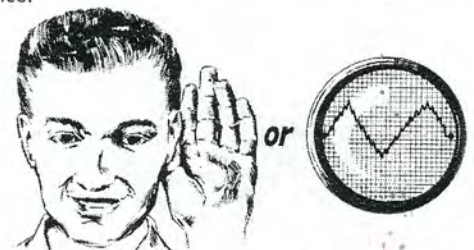


magnetic tape overcomes the speed limitations of other media such as manual operations, perforated tape or punched cards. Magnetic tape (or magnetic drums) are also useful as internal elements to provide high capacity memory for any time duration from milliseconds on up.

## ● STUDY OF SOUNDS

### *A sensitive means to record comparative samples of sound*

In effect magnetic tape captures "test tube samples of sound". These are extremely useful in reducing or isolating noise in machines and vehicles — in studying comparative acoustical properties of materials and structures — in observing the effects of sounds on listeners — and in training men to recognize and diagnose noises of particular significance.



### *Taped sounds can be analyzed by hearing or measurement*

In such uses as psychiatry, psychological research and noise reduction studies, it is the effect on listeners that is important.

For these purposes magnetic recording reproduces sound more realistically than any other recording method. Its complete realism can even include a sense of direction and depth as is accomplished by multi-track stereophonic tape recordings.

Where actual measurements of sound levels and frequency components are needed, the taped sound is in electrical form which is ideal for quantitative analysis (see wave analysis).

## ● MEDICAL TEACHING AND RESEARCH

### *Tape recorded heart sounds are like live examples*

The sounds associated with heart disorders can be recorded on tape as true to life as a trained ear can discern. As patients with various types of heart trouble pass through the clinic or hospital, their heart sounds can be recorded and saved. For teaching purposes these tapes are like having hundreds of live patients instantly available on call. And where heart sounds are tape recorded periodically over patients' histories, it becomes possible to make a review and analysis of months or even years of development.



### *Nerve, muscle and brain impulses can be tape recorded for study*

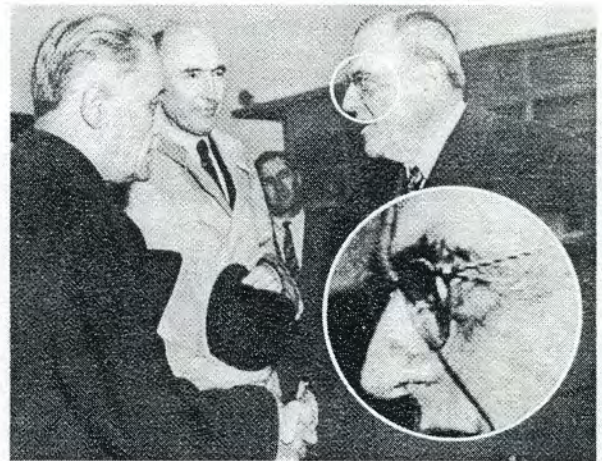
For basic studies of nerve and brain functions, tape recordings can actually record the voltage changes occurring with each nerve impulse. In this way relations between various nerve endings and the brain can be charted. Similarly, in the study of degenerative muscular ailments, tape recordings can be made of electrical shocks transmitted through connecting muscles. In all these uses, tapes saved from unusual pathological conditions become a valuable fund of research material that can later be referred to or studied in the light of new theories or techniques.

## ● FACSIMILE (picture) RECORDING

### *Photographs in electrical form can be recorded on tape*

Tape can record an accurately spaced sequence of electrical impulses that form a halftone picture in shaded lines (much like a printed photograph). This "electrical photograph" is received over wires or radio links that bring it

from any distance. The tape holds the photograph and plays it back at any desired time, sending it on or reducing it to visual form. The wire relaying of photos in news services is a typical application.



The facsimile recorder is similar to other data tape recorders but includes speed control provisions of high accuracy to assure proper alignment of the lines in the transmitted image.

## ● UNIFORM RE-CREATION OF PHENOMENA

### *A bomb explodes a hundred times from tape*

For design and test purposes, magnetic recordings can in effect repeat phenomena which would be extremely difficult to re-stage in their actual form. For example, when equipment is being designed to measure or resist the force



of bomb explosions, it would be desirable, but impractical, to explode bombs frequently during intermediate stages in the development. But a tape recording from one explosion could in many respects repeat a usable equivalent of the blast signal as many times as needed.

### *Tape recordings simulate highways and airways in indoor proving grounds*

The bumps of a highway surface, the forces in an aircraft maneuver, or the joggling of a crate in a railroad car are typical of the conditions that can be recorded and repeated by magnetic recordings. The "tape recorded highway" can be fed to equipment that amplifies the signals into full size impacts. These can subject axles, gears and truck frames to "thousands of miles of road tests" under the close observation possible in a laboratory.

# AMPEX

MAGNETIC RECORDERS

Today standard Ampex Magnetic Tape Recorders meet a broad range of needs. But since data and control requirements are far too diverse to be fully covered by any standard line of equipment, Ampex has divided its production facilities into two complementary sections. First is the standard production division which builds certain basic machines in quantities that achieve reasonable production economy and permit prompt delivery. Then a separate modification department makes those changes necessary to adapt these basic models to highly specialized requirements.

## THE STANDARD MODELS

### ● Low Frequency Transient Type Recorder — MODEL 306

Standard frequency response of the 306 is zero (D.C.) up to 5000 cycles/sec. and if needed, special machines can be furnished with frequency response to 10,000 cycles. Signal-to-noise ratio is better than 40 db at a level of 2% distortion. Response down to D.C. and freedom from low frequency phase shift are achieved in the Model 306 by use of an F-M carrier.

In addition, the Model 306 is able to record with high "instantaneous" accuracy, because the F-M carrier makes the recorded data essentially independent of possible tape flaws and variations. Because of these characteristics, the Model 306 has a greater range of application than any other one model. Typical uses are the recording of vibrations, shocks, explosions, geophysical data, control signals and other situations having important instant-to-instant change.

**OPTIONS:** One to 14 tracks  
Rack, console or portable mounting  
Record and playback, record only or playback only.

### ● Wide Frequency Range Direct Recorder — MODEL 307

Frequency response is 100 to 100,000 cycles per second. Signal-to-noise ratio is 35 db at recommended operating level of 1% overall distortion. Over this wide range, the Model 307 is well suited to types of data that can be observed on direct indicating instruments; (for transient data see the Model 306).

Applications for the Model 307 occur wherever a broad range of frequencies must be covered by one recorder. One example is frequency analysis of vibrations that include high frequency components. Another is the recording of broad bands of multiplexed data. The Model 307 has had extensive application in FM-FM telemetering, sharing this field with the Model 500 described below:

**OPTIONS:** One to 14 tracks  
Rack, console or portable mounting  
Record and playback, record only or playback only.

### ● Pulse Width Recorder — MODEL 303

The Model 303 is designed to record pulse width modulated signals varying between 60 and 1000 microseconds in duration. The time durations of square wave pulses correspond to data values. They can be recorded with an accuracy closer than 2 microseconds. Coding and recording is in accordance with RDB specifications for pulse-width frequency modulated systems.

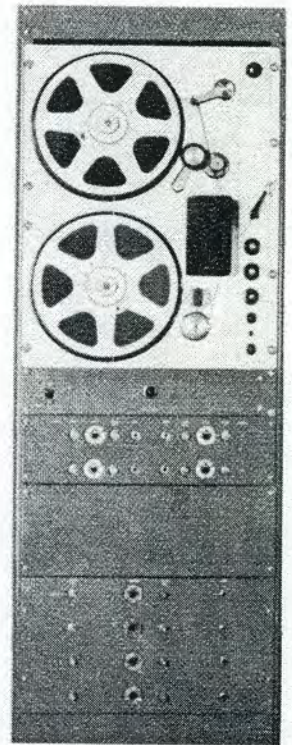
Pulse width coding makes it possible to record up to 45 or more data channels on each track of the recorder. It is applicable where data signals require only limited frequency response.

**OPTIONS:** One to 14 tracks  
Rack, console or portable mounting.

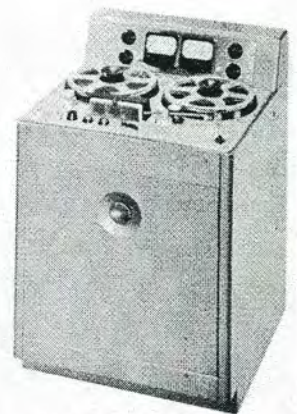
### ● Combination Recorders — MODELS 309, 311, ETC.

The Model 311 Recorder is a two track machine having a 306 and 307 track. Between them it has an overall frequency response from 0 to 70,000 cycles/sec. (Individual track characteristics are as described under models 306 and 307 above). Either track can be used for a timing signal.

The Model 309 similarly combines a 303 track and 307 track and so is able to record both pulse-width modulated data and FM-FM telemetering data with either track usable for timing.



Model 306 data recorder in rack mounting



Model 307 data recorder in console mounting

Other combinations can be assembled to order as special modifications.

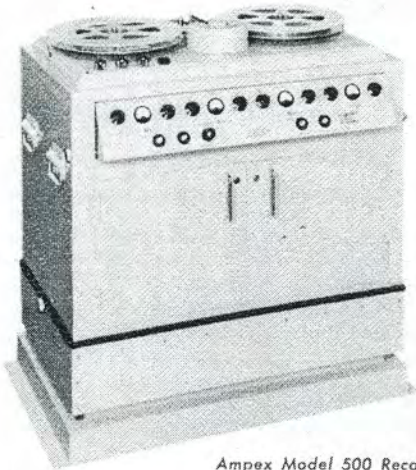
**OPTIONS:**  
2 tracks are standard; others are special.  
Rack, console or portable.

● **"Low Flutter" Wide Range Recorder —**

MODEL 500

The Model 500 is a four-track, two-speed magnetic tape recorder designed to achieve extreme stability of tape motion while recording information in the frequency range between 100 and 100,000 cycles. Thus it is able to record FM-FM telemetering data without introducing any objectionable data error from small variations in tape speed. It has the lowest flutter and wow characteristics of any tape recorder yet developed — less than 0.1% peak to peak by RDB standards.

Console mounting only  
Four tracks only

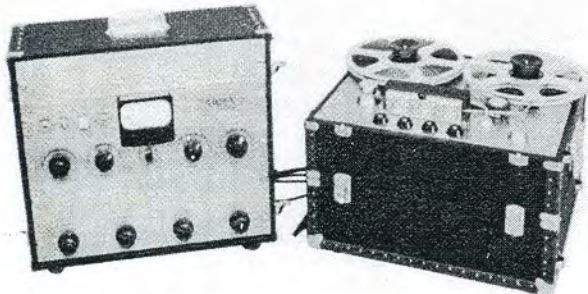


Ampex Model 500 Recorder

● **Audio Recorders and Reproducers —**

300, 350 AND 450 SERIES

For sound recording Ampex's audio recorders provide the highest order of fidelity commercially available. In addition to conventional types, Ampex produces various specialized audio machines: (1) stereophonic recorders which provide direction and depth of hearing for added realism; (2) eight hour long playing reproducers or recorders; (3) tape duplicators; (4) stereophonic reproducers operating from four magnetic tracks on 35 mm film (CinemaScope).



Model 350 portable audio recorder

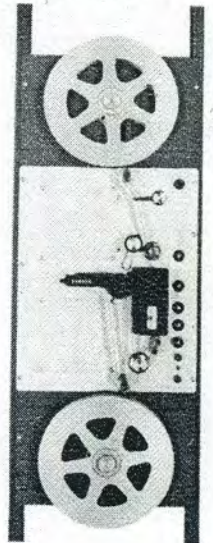
**MODIFIED VERSIONS OF STANDARD MODELS**

By far the most satisfactory and economical approach to most specialized problems is modification of standard Ampex models. In terms of performance these become "one of a kind" designs, but they use a maximum of proven production components and can be furnished on better delivery schedules than would be feasible on custom made designs.

The following are typical modifications:

- Tape speeds other than standard
- Adjustable spacing between heads
- Reel size of 14-inch or larger instead of 10½ inch
- Shock proof cases
- Extension of low frequency response on Model 307 machines
- Non-standard input or output levels
- Reversible tape drives
- Replacement of erase heads with a roller for reduced high frequency flutter
- Combination recorders

An Ampex Modified Recorder



**SPECIALIZED RECORDERS (OR REPRODUCERS)**

Where a need justifies a completely different approach, Ampex is well equipped to undertake special tape recorder designs. Ampex's engineering division has the greatest cumulative experience of this type of any group in the world. They have undertaken numerous special designs; the following are typical:

● **Shock and Vibration Recorder**

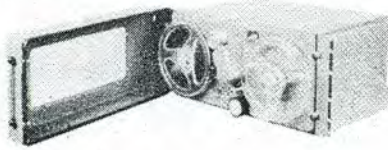
An F-M carrier type machine designed to record satisfactorily even while it is being subjected to heavy shock and vibration. It will perform satisfactorily under vibrations up to 2G at 2 cycles per second, 10G at 60 c.p.s. or shock up to 40G for one millisecond. Frequency response is D.C. to 5000 cycles/sec. This machine is a recorder only; tape is played back on an Ampex Model 306.



Shock and Vibration Recorder

● **Airborne Recorder**

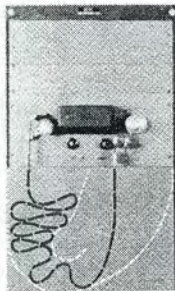
A light weight recorder which is carried in the aircraft for direct recording of telemetering channels. Frequency response is 400 to 80,000 cycles per second. Since this machine records only, the data is later played back on an Ampex Model 307 which is a standard machine of the same characteristics.



Airborne recorder

● **Continuous Tape Loop Top-Plate**

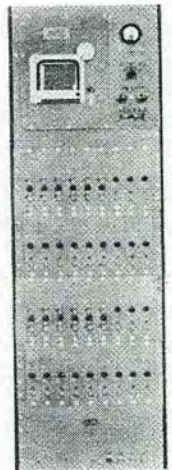
A tape loop machine for time delay systems or data analysis requiring repetitive signals. This top plate is used in lieu of the normal two reel top plate. With suitable heads and electronic equipment, it can become a tape loop recorder of any of the basic 300 series types described on page 12. Either quarter or half inch tape can be used. Tape loop can vary in length from three to 100 feet; repeat cycle (or time delay) equals loop length divided by tape speed.



Loop top plate

● **Seismic Drum Recorder— MODEL 700**

A rugged drum recorder for mobile use in geophysical exploration. A 12-inch drum comprises the entire tape transport mechanism. It carries a readily replaceable 4" x 40 1/4" tape which records 26 channels of data for a 5 second duration. In one rotation of the drum, the tape receives complete data from one shot. Frequency response is 1 1/2 to 300 cycles/sec.; signal-to-noise ratio is 45 db; harmonic distortion is less than 1%. This unit also features compact plug-in electronic assemblies, low power drain and rugged construction compatible with stringent field use.



Model 700

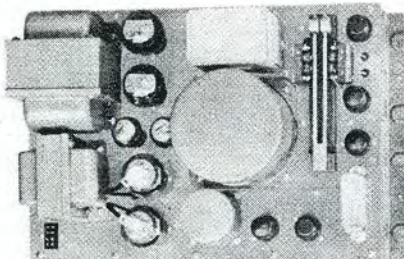
● **Other Specialized Recorders**

- **Completely "JANized" recorders** for maximum resistance to adverse effects of tropical or seaborne conditions.
- **Precision pulse recorders** for pulse width modulation to greater degree of accuracy than that available from standard pulse-width machines.
- **Wide tape machines** for handling tape widths greater than 1-inch and accommodating large numbers of parallel tracks.
- **Drum recorders** for industrial control and various time delay or repetitive signals.
- **Low power drain recorders** for special airborne uses where limited power is available.

**ACCESSORIES**

● **PRECISION 60 CYCLE POWER SUPPLY — MODEL 375**

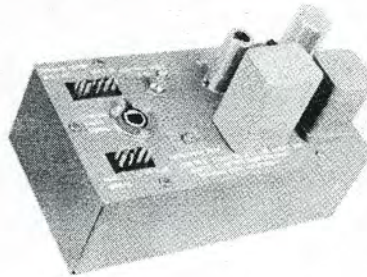
Furnishes precision power to operate tape recorder motors at a uniform speed. This accessory is used when greater stability and accuracy is needed than would be possible if the recorder were operated directly from the normally available 60 cycle power. The precision power supply operates from 115 volt A.C. power and is not affected by fluctuations in its frequency. Precision frequency is maintained by a tuning fork oscillator of high temperature stability.



Model 375

● **SPEED-LOCK EQUIPMENT — MODEL 381**

Provides a positive uniformity of speed between recording and playback of data, despite slippage, machine speed difference, tape stretch or any other factor that might otherwise affect relative speed. This is important where timing accuracy is extremely critical or where



Control track generator, Model 381

the data is contained in a frequency modulated carrier. In this latter case errors in tape speed introduce erroneous or extraneous information.

Model 381 speedlock equipment adjusts playback speed to recording speed with such accuracy that at no time is there a timing error of more than .001 seconds between the original data and the reproduced data.

● **TAPE LOOP ADAPTATION EQUIPMENT**

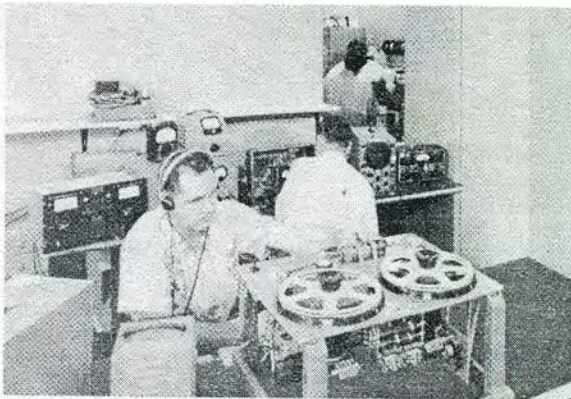
Tape loops can be recorded and played back on regular Ampex 300 series (303, 306, 307, etc.) and 350 series top plates by use of one of the following:

● **Tape loop adapter arms** accommodate loops from three to five feet in circumference. They can be used to adapt tape loops to any of the 300 or 350 series top plates in any mounting.

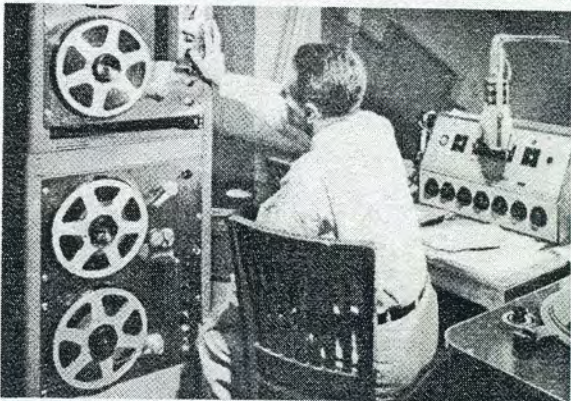
● **Loop idlers** permit use of loops from five to fifteen feet in circumference. However, they are applicable only to rack mounted units since they run sections of the loop up and down the face of the rack.

● **Tape loop box** handles any loop length from three to 100 feet. It is applicable only to rack mounted units.

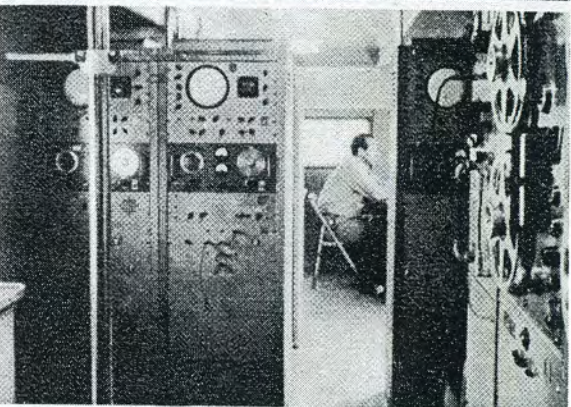
*The Ampex story began  
with an early emphasis  
on quality of product.*



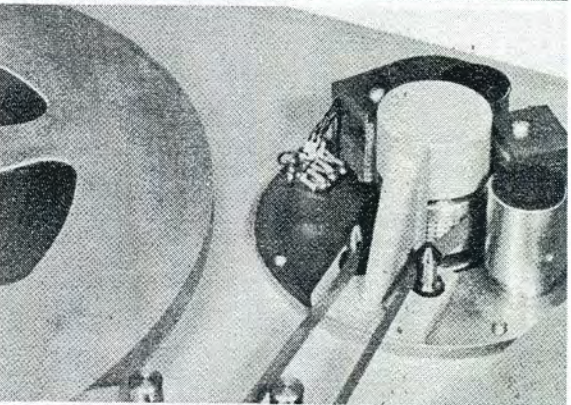
*It led to Ampex's  
leadership in  
audio recorders*



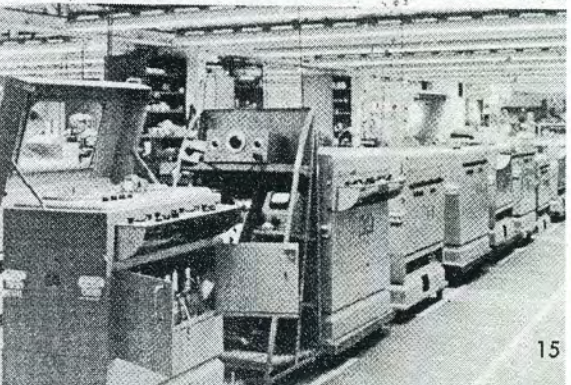
*The next logical step  
was tape for  
data recording.*



*Ampex built the most  
highly perfected  
tape machine (the 500)*



*And today Ampex has built  
the greatest number of  
data tape machines  
in service.*



# AMPEX

## ENGINEERING SERVICE

Ampex's sales and engineering departments are organized to render maximum technical assistance to those with potential applications for magnetic tape. Technical representatives will make personal calls anywhere in the United States; an application engineering department will prepare detailed recommendations; and Ampex's engineering design division can be called upon where special equipment is needed.

Ampex engineering proposals can cover (1) feasibility of using magnetic tape for the application; (2) recommended choices of tape equipment and (3) related equipment required.

### COMPLETE SYSTEMS

In addition to furnishing the data recorders themselves, Ampex can engineer the complete application and furnish related equipment obtained from other manufacturers.

**further inquiry on particular machines or applications is invited. Detailed literature and specifications are available on each model.**



*AMPEX experience  
assures the best answers  
in magnetic recording*

**AMPEX**  
CORPORATION

AMPEX CORPORATION

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BRANCH OFFICES:

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CHICAGO — 111 E. Ontario St., Mlchigan 2-2083

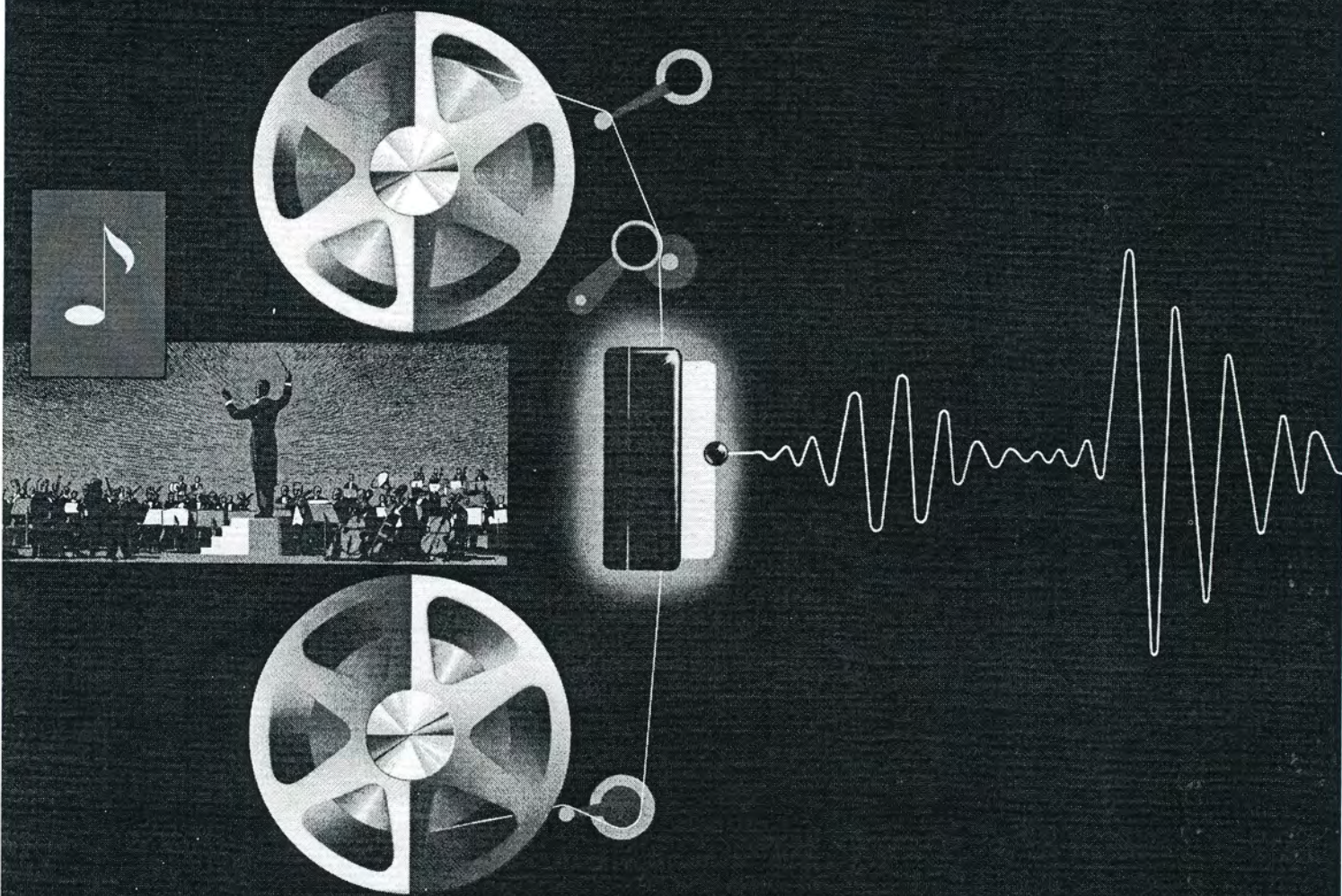
NEW YORK — 405 Lexington Ave., MUrray Hill 4-4437

SAN FRANCISCO — 100 Bush St., YUkon 6-5654

WASHINGTON, D. C. AREA — 7338 Baltimore Ave.,  
College Park, Maryland, APpleton 7-9276

# AMPEX

**ULTRA HIGH FIDELITY TAPE RECORDERS**  
FOR STUDIO RECORDING, BROADCASTING AND OTHER USES



- captures and reproduces with lifelike quality the full range of sound



**Ampex Machines  
in Use at  
Capitol Records, Inc.**

*In making irreplaceable master tapes, record makers are interested in achieving the highest possible fidelity. They prefer Ampex recorders for their flat frequency response and freedom from flutter, wow and harmonic distortion. And because of its dependability, an Ampex affords maximum assurance of a perfect master recording regardless of whether or not duplicate equipment is used.*



**Muzak's Ampex Installation at Honolulu**

*On this continuous music service, an Ampex Model 300 has demonstrated its durability by operating for over 11,000 hours without losing one minute of program time and without major repairs. The service operated 17 hours daily, seven days per week. The recently developed Ampex Model 450 Reproducer plays up to eight hours of music unattended from one reel of tape, ideally fitting this type of service.*



**An Ampex Recorder at San Jose State College**

*Ampex fidelity and durability are of value in such fields as education, medicine, psychiatry, research, law, business, government and home enjoyment.*

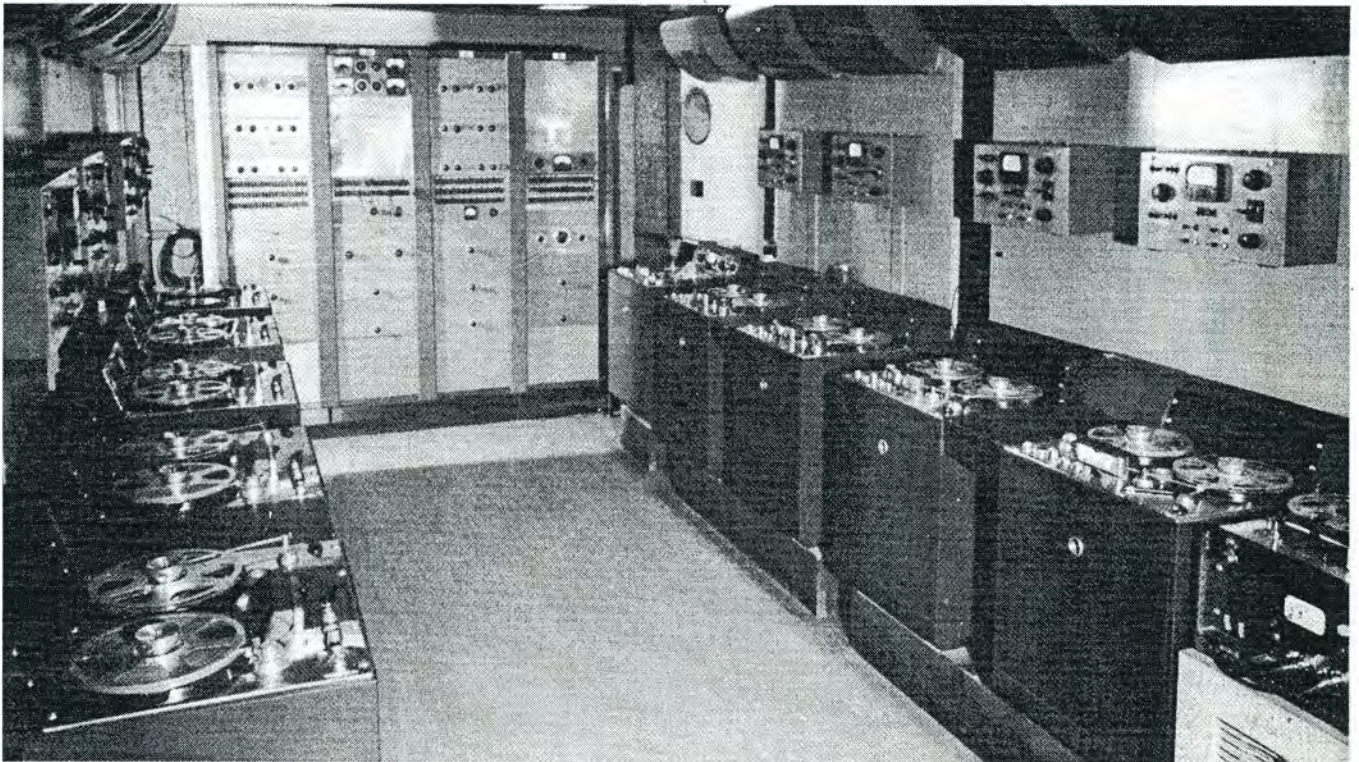
# AMPEX

## MAGNETIC RECORDERS

*Rated supreme by critical users of recorded sound*

Sound engineers have been quick to recognize magnetic tape as a big stride toward perfect sound recording. Its low inherent noise level, wide frequency response, great dynamic range and easy editing make tape an ideal recording medium. To match its challenging possibilities, Ampex has designed equipment as close to perfection as the medium itself.

From its start, Ampex has consistently led the tape recorder industry. Ampex machines are the best available. They offer the greatest value and operate at the lowest cost per hour. As a result, Ampex Tape Recorders are preferred over all others in the high quality field. America's four major broadcast networks, and the country's leading makers of phonograph records, are all Ampex users. Professional preference has established Ampex as the world's standard of excellence in sound recording.



### **A Broadcast Installation at Station WENR**

*Accuracy of program timing, utmost reliability and highest fidelity are reasons why Ampex Recorders are extensively used by the major broadcast networks. To all stations — whether 250 or 50,000 watts — Ampex durability and low maintenance cost are prime considerations. Neither duplicate equipment nor a maintenance engineer need stand by for an Ampex.*

## PERFECT sound recording and reproduction

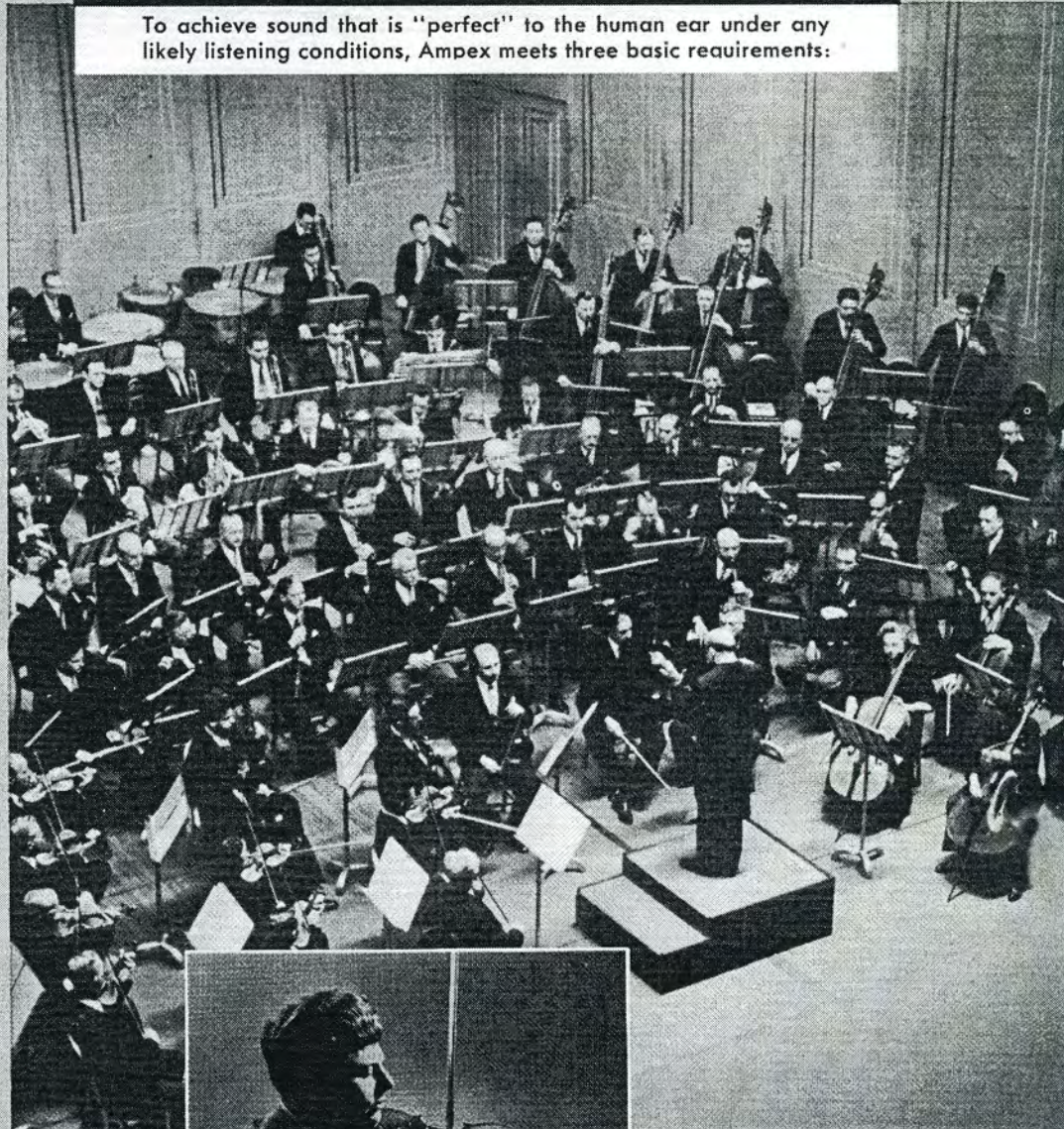
To achieve sound that is "perfect" to the human ear under any likely listening conditions, Ampex meets three basic requirements:

# AMPEX

PERFORMANCE

*Relying on hearing, emotion and the most perceptive musical sense, a great musician might well describe an Ampex recording as "perfect." Many have passed such judgment and Ampex recorders are in the possession of several leading symphony orchestras. More significant still, some are in the homes of great musical artists such as Arthur Fiedler and Arturo Toscanini, and popular performers like Bing Crosby and Les Paul.*

*But, besides an appraisal by sense and emotion, every Ampex machine has been instrument-tested to equal or exceed the published specification for the model. Ampex specifications are extremely high—but actual performance generally exceeds even these ratings.*



*Philadelphia Orchestra with Eugene Ormandy conducting, Jacob Krachmalnick, Concertmaster.*

**Dynamic Range**—Ampex can record the full crashing brilliance of a symphonic fortissimo, yet, when the delicacy of a single solo instrument is recorded, it is not lost in a confusion of mechanical noise. This is the potential range and sensitivity of magnetic tape. The potential is fully realized on the Ampex machine because the level of amplifier and background noise is held far below generally audible levels.

**Signal to noise ratio**—300 series over 60 db. by NARTB standards; 400 series over 55 db.

## FREEDOM FROM NOISE AND DISTORTION

Ampex records and reproduces a tonal quality of utmost clarity. The Ampex playback is free from perceptible noise, distortion, flutter, wow and other mechanical and electrical imperfections. This is dramatically demonstrated by Les Paul in his five to ten part guitar recordings in which one by one he plays all parts. He does this by accompanying an Ampex playback of his prior parts. Upon completion, all parts stand out clearly above any accumulated noise from the five to ten recordings.

The Ampex Recorder keeps flutter and wow at a level far below human perception. This is of great importance in the recording of music. Flutter is a high frequency oscillation in the tape motion: its effect on the listener is as irritating as severe frequency or harmonic distortion. Wow is a low frequency tape motion that can create waver in sustained notes (a familiar effect on disc record players). These effects would become noticeable to even the non-critical listener at a level of about 0.5% rms.; note how far below this level Ampex keeps these distortions:

**Flutter and wow**—At 15 in/sec.: well under 0.1% rms on the model 300; under 0.2% on the series 400. At 7½ in/sec.: well under 0.2% rms on the model 300; under 0.25% on the series 400.

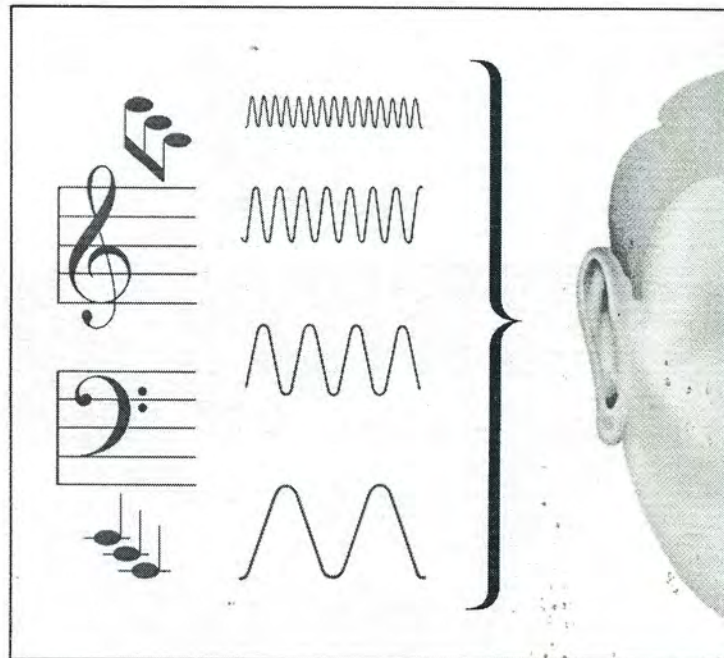
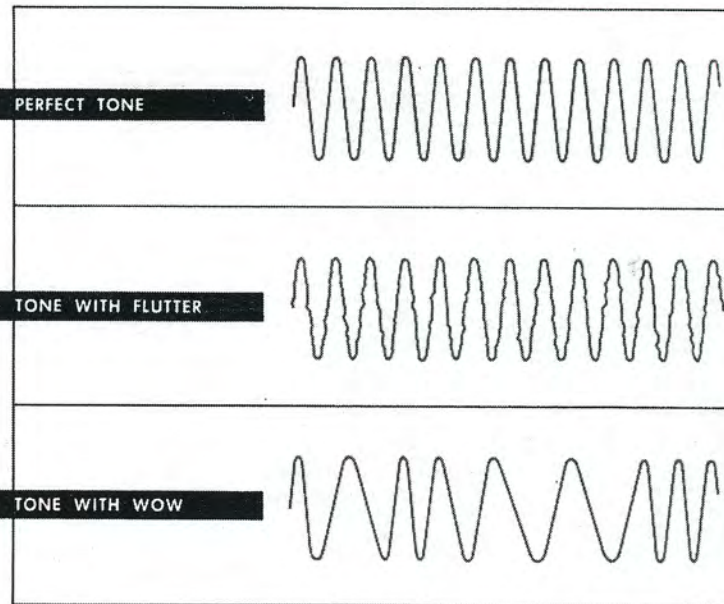
## FREQUENCY RESPONSE

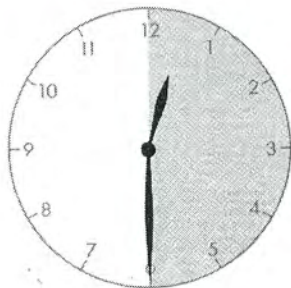
Ampex records frequencies well beyond 15,000 cycles, the top range of the sensitive human ear. It retains all the harmonic overtones which give musical instruments and human voices their characteristic sounds and live, resonant qualities.

In achieving a level frequency response, the Ampex Recorders adhere to NARTB equalization curves, the **one established standard of the industry**. Thus, a recording from one Ampex machine can be played back on any other Ampex or other machine adhering to these same standards; frequency response will remain correct.

Ampex frequency response at various tape speeds is as follows:

- 30 to 15,000 cycles within  $\pm 2$  db at 15 in/sec. tape speed
- 30 to 15,000 cycles within  $\pm 4$  db at 7½ in/sec. tape speed
- 40 to 10,000 cycles within  $\pm 2$  db at 7½ in/sec. tape speed
- 50 to 7500 cycles within  $\pm 2$  db at 3¾ in/sec. tape speed

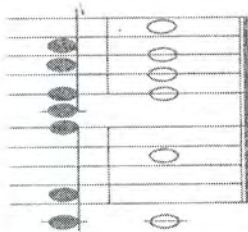




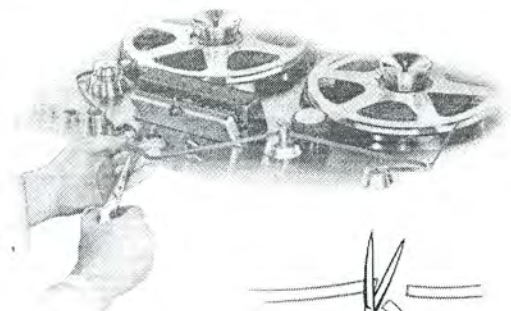
30 MINUTES



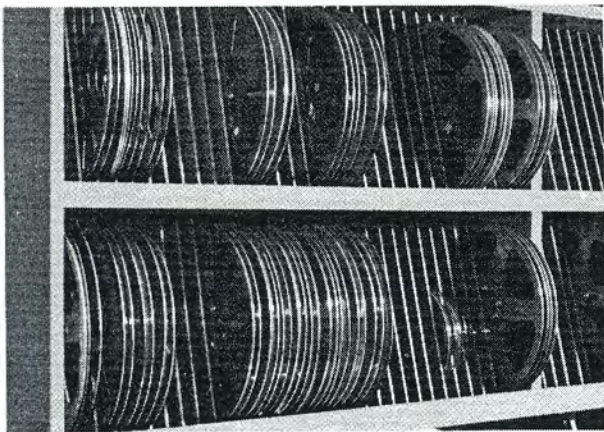
3.6 SECONDS



...Your sponsor has been —



It is now ~~the~~ time



In this typical radio broadcast station, these tapes will be reused thousands of times.

### ACCURATE PROGRAM TIMING

Ampex meets the exacting requirements of radio broadcast timing. It avoids the embarrassment of programs cut short and commercials that overlap. It enables the radio broadcast station to maintain its obligation to both the listening audience and to the sponsor whose message must be delivered to the fullest advantage.

Accuracy of timing is inherent in the Ampex design — it is not a precarious balance of adjustments. Month after month Ampex timing will remain correct — not only on any one machine, but also between one Ampex and another. Recordings made on any Ampex can be played back on another Ampex without causing an appreciable change in timing.

**Playback time** —  $\pm 3.6$  seconds (0.2%) in 30 minutes; this includes allowance for likely change in tape dimensions due to temperature, humidity and tape stretch.

### EASE OF EDITING

The cutting of a word, the adding of a sentence or the stretching of a pause is done in a simple snipping and splicing of tapes. For example two radio actors in New York and Hollywood could recite their separate parts onto Ampex tapes and the two tapes could be spliced together into a fast-moving dialogue. The splices are completely silent.

In the recording studio, tape has a tremendous psychological advantage. The performers are at ease, knowing that a mistake in the critical last minutes of a 15-minute program will not necessitate a complete rerecording. It also eliminates concern with exact timing, since excess time can generally be eliminated in editing.

The Model 300 Ampex is designed to simplify editing. Even more important, it is sturdily constructed to stand up under the repeated starting, stopping and fast rewinds required in extensive editing work.

### COST SAVINGS THROUGH REUSE OF TAPE

Each tape can be erased and reused countless times; one tape manufacturer has recorded and erased over 10,000 times without affecting the quality of sound reproduction on the tape.

To the recording studio it means that the numerous retakes which may be necessary to achieve a perfect program add no extra tape expense. To the broadcast station it means that the heavy load of day to day transcriptions make repeated use of a comparatively few reels of tape. The cost of consumed material is reduced to practically nothing.

In reusing a tape, the erasing of the previous program is done automatically in the same pass that records the new sound. There is no extra labor or expense involved.

### SIMPLICITY AND CONVENIENCE OF OPERATION

In a few minutes time a new operator can learn to thread a tape and operate all the controls of an Ampex. In a short time he will find that it operates itself with but a minimum of attention and the simplest of precautions.

To the experienced recording and broadcast engineer, Ampex's reliability and ease of operation leave him free to devote his attention to other problems. In the small radio station, Ampex makes it more readily possible for one man to carry on the entire operation.



#### **Direct or remote control**

All functions of the recorder are handled by simple push-button controls. Easily connected remote controls are available as an Ampex accessory.

#### **Fast start**

The tape reaches a full constant speed in 1/10th second when the proper button is pressed. Split-second timing of programs is easily handled.

#### **Quick positive brakes**

Brakes respond instantly to the stop button, to tape breakage or to end-of-the-reel runoff. Brakes act on both the feed and takeup reel. No slack or spillage of tape will occur under any condition.



*Ampex responds instantly and precisely to any phase of control.*

- *In every detail  
AMPEX performance  
reflects  
AMPEX quality.*
- *To operate the  
machine is to know that  
AMPEX is the finest.*



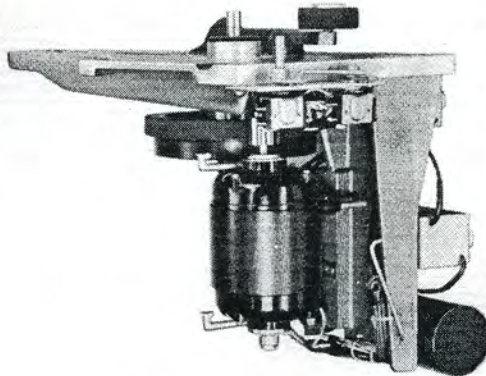
## THE ENGINEERING BEHIND THE SOUND

To build a machine that is both fine and practical, Ampex engineers have aimed for two objectives in the design of every component and accessory.

First was the direct problem of function. Each part has had to make its contribution toward fidelity, timing or utility and convenience. Elimination of inherent circuit noises, leveling out of unwanted mechanical motions and creation of desired starting, stopping and tape handling characteristics have presented challenging design and manufacturing problems. Persistence and ingenuity have solved them. Second is reliability and durability. This consideration has received persistent attention throughout Ampex design. As a result the machine not only meets and exceeds high specifications, but it maintains this exceedingly high order of performance through thousands of hours of service—reason enough why engineers have implicit faith in Ampex machines.

### STABILITY OF TAPE MOTION

Accuracy of program timing and freedom from distracting flutters and wows both depend on extreme stability of tape motion. Since the capstan shaft, capstan driving components, idlers and tension arms determine the accuracy of this motion, utmost care has gone into their design and manufacture.



#### STEADY DRIVING MOTION

is furnished by a hysteresis synchronous motor. Speed is "electrically locked" to the frequency of the alternating current source.

#### CONSISTENT TAPE SPEED

from one Ampex machine to another is achieved by precise grinding of the capstan shaft. Ampex capstan diameters are held to a tolerance closer than one ten-thousandth inch. Final grinding is done with the capstan mounted on its own bearings, reducing runout to a practical minimum.

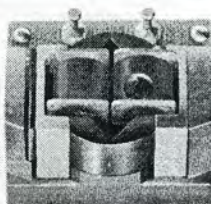
#### POSITIVE TAPE DRIVE AND UNIFORM TENSION

result from the interaction of the capstan, capstan idler, reel idler and tape tension arm. A solenoid pivots the capstan idler, pressing the tape against the capstan. The pressure exerted is sufficient for positive drive. The reel idler shortens the unsupported tape length and provides inertia that resists high frequency tape motion.

#### RAPID START AND STOP

and quick tape speed stabilization are additional results of the Ampex capstan and idler design. The capstan runs continuously at normal operating speed while the pivoting capstan idler engages or disengages the tape in response to the start or stop buttons.

### HIGH PERFORMANCE MAGNETIC HEADS



Design of the record and playback heads is responsible for Ampex's extremely wide frequency response and is also an important factor in high signal to noise ratio. Equally important is the fact that the Ampex head characteristics remain essentially uniform over thousands of operating hours.

#### PRECISION LAPPING

of gap surfaces to a microscopic flatness is responsible for achieving desired performance. When the heads are assembled, these surfaces are separated by a thin, uniform spacer to form a magnetic gap (.00025-inch wide on the playback head). Narrowness of this gap gives Ampex its high frequency response. Uniformity of the gap preserves constant head characteristics throughout the wear incurred in thousands of hours of service.

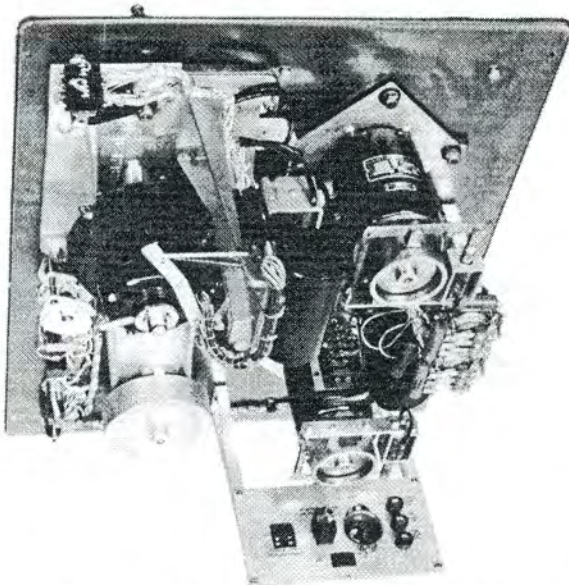
#### HIGH IMPEDANCE DESIGN

of the Ampex heads helps keep noise level to a minimum. By using a large number of turns on the head, Ampex eliminates head circuit transformers which would be a source of hum. To eliminate eddy currents, the head segments are laminated, consisting of very thin alternating layers of high permeability metal and dielectric material.

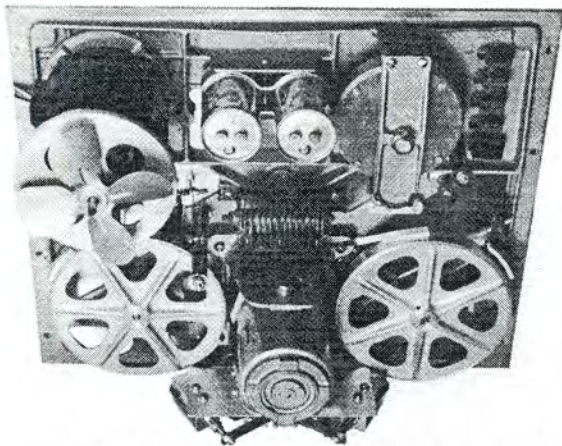
#### A SPECTACULAR EXAMPLE

of the value of Ampex's careful head design was furnished by a head assembly that was returned to the factory after 11,000 known hours of operation. An instrument check revealed that the head performance was still within Ampex specifications.

### BRAKING AND TAPE TENSION CONTROL



**300 SERIES** Tape handling mechanism of the 300 series is a model of simplicity and effectiveness. Both feed and takeup reels operate on separate motors with torque in opposite directions. Torque-speed relation of these motors is such that they retain very nearly constant tension on the tape throughout the playing of a reel of tape.



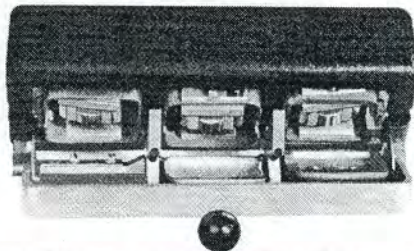
**400 SERIES** Tape feed and takeup tension on the 400 Series Ampex is maintained by a constant tension holdback arm and a motor driving the takeup reel. The entire system is somewhat lighter in weight than the 300 series system and is partially responsible for the greater portability of the 400 series machine. Very little sacrifice is made in tape handling qualities.

### BRAKING

The 300 series machines use quick acting band type brakes; the 400 series use equally fast shoe type brakes. Both types are applied by spring tension, the brakes being held off by a restraining solenoid while in play, fast forward or rewind. Pressing of the stop button, current failure or tape breakage de-energizes the solenoids and applies the brakes.

### SHIELDING OF ALL CRITICAL CIRCUIT PARTS

Thorough shielding of the recording and playback heads of the Ampex Recorders minimizes the picking up of noise from stray magnetic fields. Mu-Metal housings with precision fit covers enclose the magnetic heads, shielding them from all external fields. Coaxial head cables are shielded throughout their lengths and use coaxial shielded type connectors.



### LOW NOISE LEVEL IN THE AMPLIFICATION CIRCUITRY

The entire amplification circuitry of the Ampex operates substantially below the low basic noise level of the tape itself. To achieve this, the head circuits use no transformers; head leads have low capacitance and minimum surface to intercept stray fields; preamplifier tubes are D.C. heated and all amplifier components are carefully laid out to minimize hum.

### ACCESSIBILITY FOR SERVICE AND CHECKING

Ampex tape recorders have been designed for accessibility to a maximum number of test points while the machine is recording or playing. Accessibility is particularly notable in the latest Ampex model 402 and 403 consoles which have slide-out front panels, lipover electronic chassis and other provisions that make them the most accessible console machines on the market.

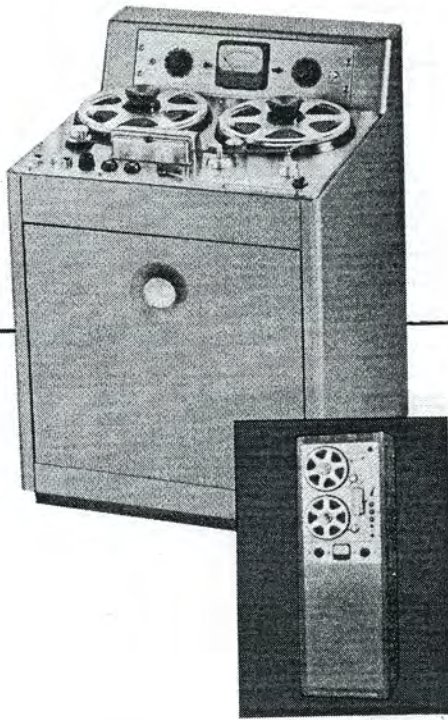


# AMPEX

## AUDIO TAPE RECORDERS IN TWO SERIES

SERIES

300



Where a speaking or musical performance justifies the finest recording that it is possible to make, the Ampex 300 Series Recorder is universally preferred. It is the most carefully engineered sound recorder ever perfected for commercial use—and by far the most widely used machine in its price class.

In fidelity, reliability and ease of operation, the Series 300 Recorder shows its superlative design. Recordings produced on the Model 300 have flutter and wow reduced to minimum feasible levels (substantially below human perception). Signal to noise ratio exceeds 60 decibels, by NARTB standards. Starting, stopping, reversing and all other aspects of tape movement are flawlessly controlled.

The 300 Series Ampex is also the preferred type for tape editing. By a single control switch, the tape can be shuttled rapidly between forward and reverse to locate correct cutting places.

SERIES

400



By providing high fidelity, reliability and durability in a tape recorder of more modest cost, the Ampex 400 Series fills the need of radio stations, music conservatories, schools, universities and numerous other professional and non-professional uses.

In every sense, the Ampex 400 Series are high fidelity machines. For the radio station they provide transcriptions that are indiscernible from live broadcasts. For the school, university and music conservatory, the 400 Series records and plays back with lifelike fidelity that has maximum teaching value. For commercial, industrial, medical and other uses, they provide the highest professional class of performance.

As an investment in long, trouble-free service, the Ampex 400 is a truly outstanding value. Life expectancy of the recording and playback heads is more than 5000 hours depending on tape speed (many times as long as that of any other recorder). Other mechanical and electrical components are built to similarly high standards of durability.

## APPLICATIONS

### BROADCASTING

For studio recording of radio shows, spot commercials, holding of programs for delayed broadcasts, editing of program material and special sound effects.

### RECORD MANUFACTURERS

For the making of full fidelity master recordings of all types of musical and dramatic performances.

### COMMERCIAL RECORDING STUDIOS

For recording radio shows, spot commercials, musical performances and spot insertions and for editing.

### SYMPHONY ORCHESTRAS, BANDS, CONCERT ARTISTS

For recording and playback of rehearsals and the making of private recordings.

## SPECIFICATIONS

These brief specifications are conservative ratings, each individual machine being instrument-tested to equal or exceed all figures. More detailed specifications are given in bulletins on each particular model.

### FREQUENCY RESPONSE

15 in/sec. — 30 to 15,000 cycles within  $\pm 2$  db.  
7½ in/sec. — 40 to 15,000 cycles within  $\pm 4$  db.  
— 40 to 10,000 cycles within  $\pm 2$  db.

### SIGNAL TO NOISE RATIO

Over 70 db. maximum recording level to unweighted noise.  
Over 60 db. as defined by NARTB standards.

### STARTING TIME

0.1 second to stable playing speed at 15 inches per second.

### STOPPING TIME

Less than 2 inches tape movement after the stop button is pressed at 15 in/sec. tape speed.

### FLUTTER AND WOW

Well under 0.1% rms. at 15 in/sec.  
Well under 0.2% rms. at 7½ in/sec.

### PLAYBACK TIMING ACCURACY

0.2% or  $\pm 3.6$  seconds in a 30 minute program.

### REWIND TIME

One minute for the full NARTB reel (2400 feet).

## APPLICATIONS

### RADIO STATIONS

Recording and delayed broadcasting of commercials, announcements and programs; exchange of program material; outside pickup of programs (on portable models).

### BANDS, ORCHESTRAS AND MUSIC CONSERVATORIES

Recording and playback as a teaching and rehearsal aid; making of private recordings.

### INFORMATION SERVICES

Preparation of informational programs for dissemination of religious, educational or propaganda material.

### MEDICAL

Study and teaching of heart sounds, psychiatric interviews, etc.

### HOME MUSIC SYSTEMS

Ultra high fidelity recording and playback.

### OTHER APPLICATIONS

Any use where reliability, fidelity and long life are important.

## SPECIFICATIONS

Each individual 400 Series machine is instrument-tested to equal or exceed all figures. More detailed specifications are given in bulletins on each particular model.

### FREQUENCY RESPONSE

Same as the 300 Series.

### SIGNAL TO NOISE RATIO

Over 65 db. maximum recording level to unweighted noise.  
Over 55 db. as defined by NARTB standards.

### STARTING TIME

0.5 seconds to stable playing speed at 15 in/sec.

### STOPPING TIME

Same as 300 Series.

### FLUTTER AND WOW

Well under 0.2% rms. at 15 in/sec.  
Well under 0.25% rms at 7½ in/sec.

### PLAYBACK TIMING ACCURACY

Same as 300 Series.

### REWIND TIME

Approximately 1½ minutes for the full 2400 foot NARTB reel.

# AMPEX

## APPLICATIONS

*Ampex Tape Recorders are in greatest use in radio broadcasting and commercial studio recording. It is in these fields of discriminating usage that Ampex has established its leadership in the tape recorder industry. In some of the other fields of tape recorder usage, the demand for high fidelity and long reliable life are causing more and more users to turn to Ampex.*

*These descriptions of the various fields of use are necessarily short. More detailed information will be found in Ampex bulletins on each application.*

### RADIO NETWORKS AND MAJOR BROADCASTING STATIONS



Ampex Tape Recorders are firmly established as a basic item of equipment in network broadcasting. Tape is used as a program-originating medium and is utilized throughout the network as a means to hold and relay programs.

When used as an originating medium, the Ampex Tape Recorder allows performers to give a free moving, spontaneous performance. In tape form the program is easily edited for corrections and exact timing. As a program holdover, the Ampex tape has the advantage that successive rerecording adds no perceptible noise or distortion.

High fidelity, accurate playback timing, ease of editing, reliability and durability are Ampex advantages of great importance in this application.

### LOCAL RADIO STATIONS



Tape transcriptions of programs, announcements and commercials give the local station greatly increased flexibility with its limited personnel. Also, an Ampex can be used to pick up program material from local events, schools, businesses and farms. If desired, programs can be exchanged with other independent stations, networks and other outside sources.

Although the need for tape recorders in local broadcasting is universally recognized, many operators have underestimated the demands they would make on the equipment. Consequently they have purchased relatively light equipment. In prolonged usage these machines prove uneconomical from the standpoint of maintenance and reliability.

By comparison, Ampex offers reduced maintenance cost, longer practical life, more accurate program timing and far higher reliability. These savings alone justify purchase of Ampex Recorders as replacements for existing light-duty equipment.

### RECORDING STUDIOS

Economy, flexibility and high fidelity have made the Ampex Tape Recorder the heart of practically every well-equipped commercial recording studio. Whether the job is a radio commercial, a 15 or 30 minute radio program or a master recording for disc records, the original recording is almost always done on tape.



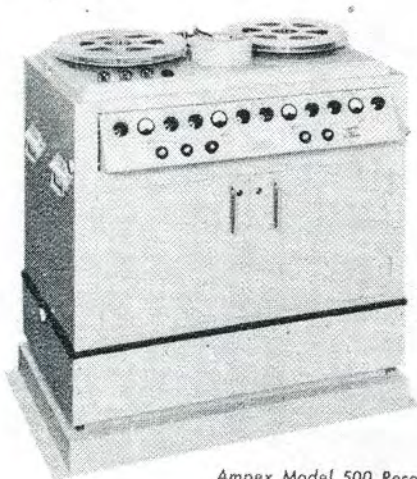
Tape recording has a tremendous psychological advantage in putting performers at ease. Exact timing becomes less important and minor errors can be corrected in editing.

For the manufacture of disc recordings, Ampex makes master tapes that defy obsolescence. The fidelity of the master is ample to handle any likely future improvements in record manufacture—or to meet future demands for high fidelity copy tapes. Fidelity, ease of editing and durability are Ampex characteristics of great importance to the recording studio.

● **"Low Flutter" Wide Range Recorder —**  
MODEL 500

The Model 500 is a four-track, two-speed magnetic tape recorder designed to achieve extreme stability of tape motion while recording information in the frequency range between 100 and 100,000 cycles. Thus it is able to record FM-FM telemetering data without introducing any objectionable data error from small variations in tape speed. It has the lowest flutter and wow characteristics of any tape recorder yet developed — less than 0.1% peak to peak by RDB standards.

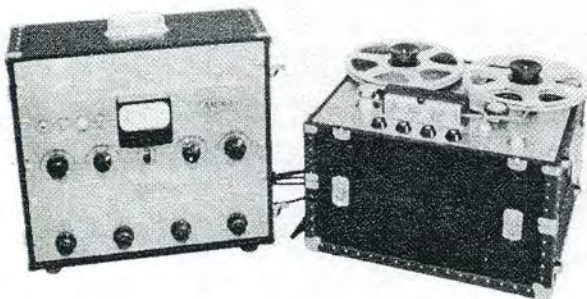
Console mounting only  
Four tracks only



Ampex Model 500 Recorder

● **Audio Recorders and Reproducers —**  
300, 350 AND 450 SERIES

For sound recording Ampex's audio recorders provide the highest order of fidelity commercially available. In addition to conventional types, Ampex produces various specialized audio machines: (1) stereophonic recorders which provide direction and depth of hearing for added realism; (2) eight hour long playing reproducers or recorders; (3) tape duplicators; (4) stereophonic reproducers operating from four magnetic tracks on 35 mm film (CinemaScope).



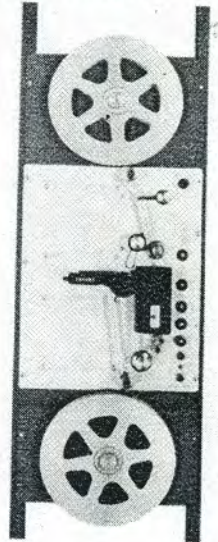
Model 350 portable audio recorder

**MODIFIED VERSIONS OF STANDARD MODELS**

By far the most satisfactory and economical approach to most specialized problems is modification of standard Ampex models. In terms of performances these become "one of a kind" designs, but they use a maximum of proven production components and can be furnished on better delivery schedules than would be feasible on custom made designs.

**The following are typical modifications:**

- Tape speeds other than standard
- Adjustable spacing between heads
- Reel size of 14-inch or larger instead of 10½ inch
- Shock proof cases
- Extension of low frequency response on Model 307 machines
- Non-standard input or output levels
- Reversible tape drives
- Replacement of erase heads with a roller for reduced high frequency flutter
- Combination recorders



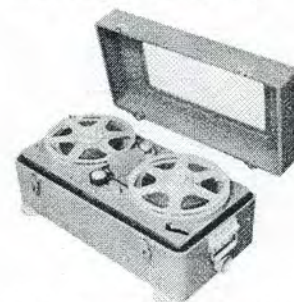
An Ampex Modified Recorder

**SPECIALIZED RECORDERS (OR REPRODUCERS)**

Where a need justifies a completely different approach, Ampex is well equipped to undertake special tape recorder designs. Ampex's engineering division has the greatest cumulative experience of this type of any group in the world. They have undertaken numerous special designs; the following are typical:

● **Shock and Vibration Recorder**

An F-M carrier type machine designed to record satisfactorily even while it is being subjected to heavy shock and vibration. It will perform satisfactorily under vibrations up to 2G at 2 cycles per second, 10G at 60 c.p.s. or shock up to 40G for one millisecond. Frequency response is D.C. to 5000 cycles/sec. This machine is a recorder only; tape is played back on an Ampex Model 306.



Shock and Vibration Recorder

# 300 SERIES

	<p><b>CONSOLE RECORDERS, STANDARD TYPE</b></p>	<p><b>MODEL 300-C</b>            Console recorder — full track; two speed, 7½ and 15 inches per second; matching or bridging inputs optional.</p>
	<p><b>RACK MOUNTED RECORDERS, STANDARD TYPE</b></p>	<p><b>MODEL 300-R</b>            Rack mounted recorder — same components and performance as the model 300-C.</p>
	<p><b>PORTABLE RECORDERS, STANDARD TYPE</b></p>	<p><b>MODEL 300-S</b>            Two case portable recorder — same components and performance as the model 300-C.</p>
<p><b>AMPEX</b></p>		
<p><b>AUDIO RECORDER MODELS</b></p>	<p><b>RECORDERS WITH SPECIAL SPEEDS, TWO-SPEED TYPES</b></p>	<p><b>MODEL 301</b>            Recorders of console, rack mount or portable type — tape speeds 15 and 30 inches per second; otherwise same as model 300. Other special speed combinations — 3¾ and 7½ inches per second and 1⅞ and 3¾ inches per second.</p>
	<p><b>RECORDERS WITH SPECIAL SPEEDS, THREE-SPEED TYPES</b></p>	<p><b>MODEL 305</b>            Recorders of console, rack mount or portable type — tape speeds 7½, 15 and 30 inches per second; otherwise same as model 300. Other special speed combinations — 3¾, 7½ and 15 inches per second and 1⅞, 3¾ and 7½ inches per second.</p>
	<p><b>STEREOPHONIC RECORDERS</b></p>	<p><b>MODEL 300-2C</b>            Console mounted stereophonic recorder — records two tracks simultaneously; dual track erase, record and playback heads; two amplifiers and power supplies; two speeds, 7½ and 15 inches per second; matching or bridging input optional.</p> <p><b>MODEL 300-2R</b>            Rack mounted stereophonic recorder — same components and performance as the model 300-2C.</p>
	<p><b>CONTINUOUS TAPE PLAY-BACK MACHINES</b></p>	

## 400 SERIES

### MODEL 403-C

Console recorder—full track; two speed, 7½ and 15 inches per second; input selector for microphone or bridging (balanced or unbalanced line).

### MODEL 402-C

Console recorder—same as 403-C except for half track heads.

### MODELS 403-R AND 402-R

Rack mounted recorders—same components and performance as models 403-C and 402-C respectively.

### MODELS 403-P AND 402-P

Two case portable recorders—same components and performance as models 403-C and 402-C respectively.

### MODEL 401-A

Single case portable recorder—full track; similar components and performance to the model 403.

### MODEL 400-A

Single case portable recorder—half track; similar components and performance to the model 402.

### MODEL 403-2S

Three case portable stereophonic recorder—all interconnecting cables furnished; two speeds, 7½ and 15 inches per second; input selectors for microphones or bridging inputs (balanced or unbalanced).

### MODEL 403-2R

Rack mounted stereophonic recorder—same components and performance as the model 403-2S.

### MODEL 450

Continuous player—up to 8-hours continuous playback at 3¾ inches per second standard tape speed; dual track to play double track tape without turning over reel; no erase or record heads and no rapid rewind.

## ACCESSORIES

To adapt Ampex Recorders to special physical or operational requirements, various Ampex accessories are available, a few of which are briefly described below. Full descriptions of accessories are given in individual specification sheets.

### MIXERS



Mixing of low level inputs of several microphones is provided by these units. Each microphone input is individually amplified and attenuated before mixing. Mixers are designed and built to give the highest practical signal to noise ratio. Mixer output feeds to a single input of the recorder itself.

**Model 385**—Three channel mixer for the Series 300 Ampex Recorders; designed for mounting on a standard 19-inch relay rack or in a portable case.

**Four channel mixer**—Designed for the 400 Series Recorders, this four channel mixer fits the electronics case of the two case portable. It also fits a standard 19-inch relay rack.

### MOVING PICTURE SYNCHRONIZATION EQUIPMENT

To tape record the sound track for moving pictures, Ampex Speed-Lock Equipment provides positive "lip synchronization" between picture and tape. During filming, sound is recorded with a 60-cycle control signal incorporated. For playback during projection or copying of the film, this control signal is electrically compared to the frequency of the projector drive current. From this frequency comparison the tape playback is synchronized with the picture, eliminating the effects of tape stretch and other variables.

### 380 SPEED LOCK EQUIPMENT

**380 Control Track Generator**—Used with the magnetic tape recorder at the time the original recording is made. It puts a control signal onto the tape along with the program material.

**380 Demodulator**—Separates the control signal from the program and compares frequencies of the control signal and the current to the projector motor.

**380 Power Amplifier**—Provides the tape capstan motor with driving power whose frequency is controlled to make necessary speed adjustments. The power amplifier is controlled by the frequency corrections provided by the demodulator.

### REMOTE CONTROL PANELS



Start, stop, rewind and record functions of the 400 Series Recorders can be controlled from any desired location by using the simple Ampex remote control panel. Since all these functions are already solenoid operated, the remote control panel connects very simply to the recorder and in no way changes any of the control circuits of the recorder itself (there is an additional charge for recorders factory-equipped with plug-in socket).



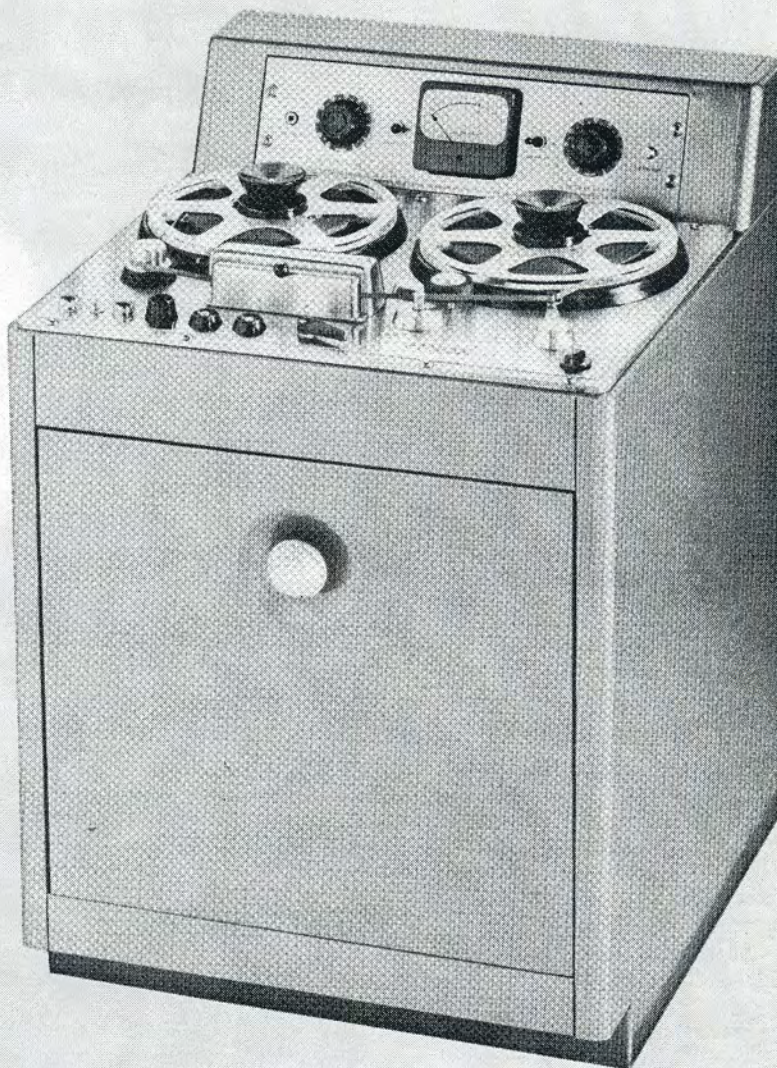
*those who plan  
for tomorrow  
buy AMPEX today*

**AMPEX**

**ELECTRIC CORPORATION**

**AMPEX ELECTRIC CORPORATION**  
934 CHARTER STREET • REDWOOD CITY, CALIF.

**Model  
300**



Precision Built  
*for*  
Long-Life

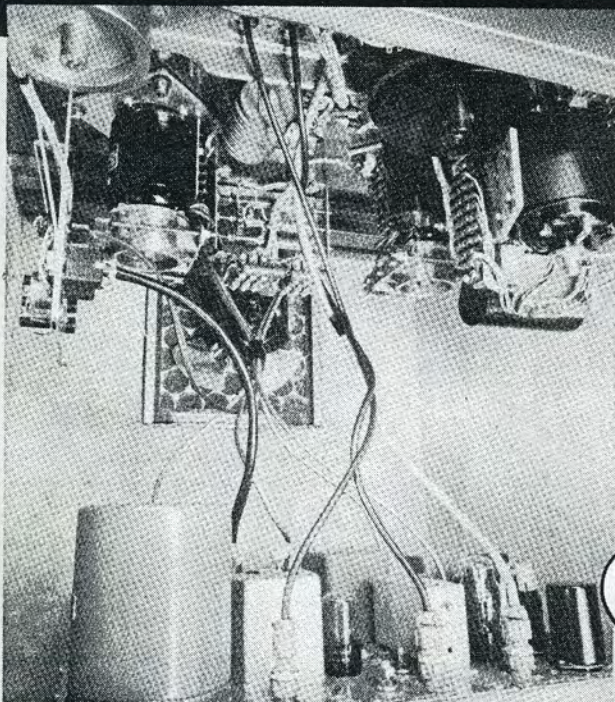
dependability

**AMPEX** *Magnetic Tape*  
**RECORDERS**

# Features.....

- 1 LONG-LIFE MAGNETIC HEADS**  
(Uniform characteristics during their long life)
- 2 WIDE RANGE RECORDING**  
(30 to 15,000 cps at 15 & 7 1/2 inches per second)
- 3 RELIABLE FAST START**  
(Full speed in less than 1/10 of a second)
- 4 SOLENOID PUSH BUTTON OPERATION**  
(Adaptable for remote control)
- 5 QUICK ACTING MECHANICAL BRAKES**  
(On turntable motors)
- 6 EFFORTLESS TAPE THREADING**  
("Drop-in" and self-aligning)
- 7 DEPENDABLE PRECISION TIMING**  
(Varies less than 3.6 seconds in 30 minutes including tape stretch from humidity and temperature change)
- 8 EASY EDITING**  
(Fast operating selector switch)
- 9 NEGLIGIBLE MAINTENANCE**  
(Rugged precision drive)

**STAYS IN ADJUSTMENT**  
....eliminates costly servicing



## HEAVY-DUTY RECORDING is *EASY* for Model 300!

*Ampex Model 300 Recorder completely dominates the heavy-duty recording field. In radio network broadcasting, studio quality recording, show transcription, disc record manufacture and master tape recording of numerous types, Ampex Model 300 has been adopted in preference to other methods and equipment. The reason, complete dependability. This reflects in a very real dollar saving. These savings come from greatly reduced maintenance, elimination of mechanical breakdowns, and negligible out-of-service periods. Many users have more than paid for their Ampex Model 300 out of these sizable savings.*

*Ampex Model 300 can deliver on these promises because it is a masterpiece in precision manufacture. It has extra capacities in power, ruggedness and wide range recording abilities, making it ideal for grueling continuous service. Superb mechanical stability, together with the finest magnetic heads ever built, faithfully capture wide range tonal qualities of voice and instrument. The precision speeds of the tape transport system successfully avoid objectionable flutter and produces split-second program timing. Studio engineers are able to devote full attention to programming because Ampex Model 300 responds instantly and reliably to its principal modes of operation, either by top plate push-button control or by remote control.*

View inside Model 300 . . . note extra rugged construction. Large, quiet ventilating fan removes objectionable heat. Arrangement makes all elements accessible for inspection. Entire cabinet is sound proofed.

**Unerring  
CONTINUOUS  
Performance**

Captures **EVERY** Mood, Le



**Realistic  
Reproduction**  
*Year-after-Year*

The ability of Model 300 to maintain its initial accuracy of motion is largely due to its carefully designed capstan drive. By precision manufacture and rigid unit assembly construction both flutter and mechanical vibration are eliminated. Under continuous duty Model 300's reserve capacity pays off in unequalled recording performance and negligible maintenance and servicing requirements.

**PRECISION DRIVE MOTORS  
SPECIALLY BUILT FOR MODEL 300**

**FINEST TAPE TRANSPORT MECHANISM *Ever Built for Audio Recording!***

## SPECIFICATIONS

All performance characteristics of the Model 300 Magnetic Tape Recorder equal or exceed the standards of the NAB (National Association of Broadcasters). All Ampex audio recorders produce a tape frequency characteristic which has been accepted as standard by NAB.

### TAPE SPEED

15 inches per second and 7.5 inches per second, with speed change effected by a single control. The same control also provides the necessary equalization change to compensate for the change in speed.

### FREQUENCY RESPONSE

15 inches  $\pm 2$  db. 30-15,000 cycles.  
7 1/2 inches  $\pm 4$  db. 40-15,000 cycles.  
 $\pm 2$  db. 40-10,000 cycles.

### SIGNAL-TO-NOISE RATIO

Over 70 db. unweighted noise to maximum recording level. Over 60 db, as defined by NAB standards. By NAB definition, the signal-to-noise ratio is the ratio of peak recording level to the total unweighted playback noise when erasing a signal of peak recording level and in the absence of a new signal. Thus bias and erase noise are included, as well as playback amplifier noise. All frequencies between 50 and 15,000 cycles are measured. The peak recording level is defined as that level at which the overall (input to output) total rms harmonic distortion does not exceed 3% when measured on a 400 cycle tone.

### STARTING TIME

Instantaneous. (When starting in the Normal Play mode of operation, the tape is up to full speed in less than 1/10 second.)

### STOPPING TIME

When playing at 15 inches per second, tape moves less than 2 inches after depressing Stop button.

### FLUTTER AND WOW

At 15 inches per second, well under 0.1% rms, measuring all flutter components from 0 to 300 cycles, using a tone of 3,000 cycles. At 7.5 inches, under 0.2%.

### PLAYBACK TIMING ACCURACY

0.2% or  $\pm 3.6$  seconds for a 30 minute recording.

### PLAYING TIME

33 minutes at 15 inch speed on standard NAB reel, 66 minutes at 7.5 inch speed. The Model 300 will also accommodate the standard RMA reel in various thicknesses.

### REWIND TIME

One minute for the full NAB reel (2400 feet).

### CONTROLS

Start, Stop and Record are push-button, relay operated and may be remote controlled. Normal Play, Fast Forward, and Rewind on a selector switch, with rapid shuttling back and forth made possible by instantly changing from one mode of operation to the other without stopping in between.

### COMPLETE PLUG-IN HEAD HOUSING

Double mumetal shield cans on playback head, equivalent shielding on record head, matching self-aligned covers on hinged gate. Drop-in threading.

### SIMULTANEOUS MONITORING

Independent record and playback systems allow the tape to be monitored while recording.

### RECORD AMPLIFIER

10,000 ohms bridging input, normally set up for +4 VU in balanced or unbalanced.

### PLAYBACK AMPLIFIER

Adjusted for +4 VU output, 600 ohms or 150 ohms balanced or unbalanced. Will deliver +20 dbm without exceeding 1% total harmonic distortion at any frequency from 30-15,000 cycles.

### DIMENSIONS

Mechanical unit on 24 1/2" panel and Electronic unit on 12 1/4" panel. For standard rack, console or two case portable mounting.

### SHIPPING WEIGHTS AND MOUNTING

Console 270 pounds, 2 Case Portable 175 pounds, Rack 140 pounds.

### POWER INPUT REQUIRED

3 amperes, 115 volts, 60 cycles. (Also available for 50 cycles.)

### METER CONTROL PANEL

Available at extra cost with features outlined as follows: Mounted on 5 1/4" panel for rack, console, or portable case mounting. Bridge Input step control will adjust record level for any input greater than -20 VU, 10,000 ohm bridging, any balanced or unbalanced line. Output Step control will adjust level up to +8 VU with normal of tape level - 600 ohm or 150 ohm balanced or unbalanced line. VU meter will meter playback output while recording or playing back. Calibrated for +4 VU output. Output key (line or cue). Phone Jack with input-output key (A-B Key).

### CATALOG NUMBER (115-120 Volt AC)

MODEL NUMBER	cycle	50 cycle
300-C . . . . . Console	560-C	3389
300-R . . . . . Rack Mounted	560-R	3390
300-S . . . . . Two Case Portable	560-S	3391

NOTE: The above Catalog Numbers do not include Control Panel. When ordering Bridging Meter Control Panel specify Catalog Number 515-2.

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Level, Pace and Inflection of **VOICE** and **INSTRUMENT**

**NEGLECTIBLE MAINTENANCE COST**

**UNEQUALLED for all HEAVY-DUTY RECORDING NEEDS**



- 1 In San Francisco, Station KCBS operates two Model 300's and two Model 400's.
- 2 Ampex Model 300 Recorders at Station WENR, Chicago.
- 3 Capitol Records use Ampex exclusively because they demand 100% of the artist's ability on the tape.
- 4 Bob Crosby, Star of Radio, Screen and Television programs "Club 15" on Model 300's.
- 5 ABC in Hollywood relies on Ampex performance.



# AMPEX *Magnetic Tape* RECORDERS

• Leader in AUDIO and DATA Recording

**AMPEX ELECTRIC CORPORATION** Redwood City, California

*Distributed by*

# AMPEX

TAPE DUPLICATOR

## SERIES S-3200



- *Makes duplicates that retain the fidelity of the master tape.*
- *Cuts tape duplicating cost to a fraction of previous levels.*

# HIGH QUALITY TAPE DUPLICATES AT LOW COST...

*either single copies  
or mass production  
runs are now  
economically  
practical...*

## SPEED

True mass production of pre-recorded tapes can now be achieved. For example, a full system of ten slave recorders could in just eight minutes make ten exact copies of a 2400 foot double-track master of 7½ in./sec. tape speed. It would take 20 hours to produce the same number of duplicates on a pair of standard recorders operating at 7½ in./sec.

Ampex's tremendous speed-up results from three things: (1) duplicator tape speed of 60 in./sec; (2) simultaneous duplication of **both** tracks of a double track tape; (3) use of up to 10 slave recorders with one master playback unit.

## QUALITY

The superb fidelity of a good master tape can now be faithfully reproduced in any number of duplicate tapes. Ampex tape "know-how" and engineering skill has produced a tape duplicator which meets the sound quality demands of audio engineers, broadcast technicians, high fidelity enthusiasts and other critical users. Frequency response to 15,000 cycles is available on 7½ in./sec. duplicates. Signal-to-noise ratio is more than 45 db over the entire range. Flutter and wow is below 0.2% rms.

## DESIGN

The basic Ampex Tape Duplicator system has a master playback unit, master amplifier panel, master bias oscillator, master control panel and one duplicating recorder. This equipment would make one duplicate at a time.

Additional slave recorders may be added to this basic duplicating system — one or more at a time — up to a maximum of ten. This Ampex "building block" design provides complete equipment flexibility because the initial installation of the basic Ampex Tape Duplicator can be quickly and economically expanded to suit growing needs of the user.

The duplicating process consists of playing a master tape on the master playback unit and feeding the output to one or more duplicating recorders. Proper amplification and equalization is provided by the master amplifier panel; high power, high frequency bias for all recorders is generated by the master bias oscillator. Hence it is unnecessary for each of the individual slave recorders to contain these electronic functions.

All operating components are started by one push-button on the master control panel. Normally these master controls are used in lieu of the individual controls on each recorder.

## SUMMARY OF FEATURES

### *Convenient and versatile operation*

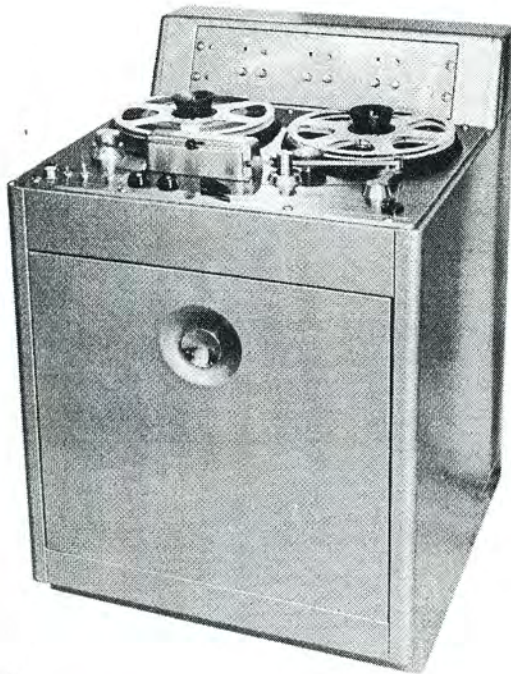
- Makes 3¾, 7½ or 15 in./sec. duplicates from masters of the same speed; also makes 3¾ in./sec. duplicates from 7½ in./sec. masters.
- Handles all reel sizes up to 10½ inches — up to 14 inches on special order.
- Duplicates both single and double track masters in one pass of the tape.
- Runs master tapes "backward" to eliminate need for rewinding duplicates before use.

### *Quality, economy and reliability*

- Duplicates 3¾ in./sec. tapes with response to 7,500 cycles (15,000 cycles for 7½ in./sec. tapes).
- Maintains 45 to 50 db signal-to-noise ratio.
- Produces up to 1200 hours of playback material in an 8-hour work day.
- Uses major components that have been operationally tested and proved in standard Ampex recorders.

### *Positive and flexible control*

- Simultaneous control of all components is provided by the master control panel.
- Duplication starts at the push of a button; full speed is attained in five to ten seconds.
- The master playback unit and **each** duplicating recorder are also equipped with full controls.
- Any slave recorder may be stopped or started during duplication without affecting operation of the others.
- All operations are meter-monitored.



*Slave unit — from one to ten of these units can be used with each master playback machine.*

## RELIABILITY

Identical quality is assured on all the duplicates being made at the same time. One master amplifier and bias oscillator feed all the individual slaves. Once the proper duplicating level is established, the only additional checking procedure necessary is the playing of a portion of one tape from the last run. If it is "perfect" all duplicates from all slaves will be equally satisfactory.

Ampex Tape Duplicators use major components similar to those in the familiar Ampex Series 300 Recorders. They have been tested and proved by thousands of hours of successful commercial operation.

## ECONOMY

Ampex reduces the cost of tape duplication to a fraction of previous levels. There are five key factors: (1) low set-up time, (2) high duplicating speed, (3) simultaneous use of ten slave recorders, (4) simplified quality control procedure and (5) the traditionally long life of Ampex equipment.

These advantages are equally applicable whether duplicates are needed in mass production quantities or only one or two at a time. In the latter case, the master and one slave would be used but the high running speed would have the same labor-saving advantages.

## PRODUCTION SPEED-UP

Figures listed are ratios of playing time to duplicating time.

TAPE SPEEDS AND TRACKS	STANDARD 7½/15 IN/SEC. RECORDER*	TAPE DUPLICATOR	
		WITH ONE SLAVE	WITH TEN SLAVES
3¾ IPS. DOUBLE TRACK	2/1	32/1	320/1
3¾ IPS. SINGLE TRACK	2/1	16/1	160/1
7½ IPS. DOUBLE TRACK	1/1	16/1	160/1
7½ IPS. SINGLE TRACK	1/1	8/1	80/1
15 IPS. DOUBLE TRACK	1/1	8/1	80/1
15 IPS. SINGLE TRACK	1/1	4/1	40/1

\* Standard recorders can duplicate 3¾ in/sec. tapes at 7½ in/sec., but cannot duplicate 3¾ or 7½ in/sec. tapes at 15 in/sec. except with extensive changes in equalization circuitry.

## LOW COST DUPLICATION OFFERS NEW OPPORTUNITIES . . .



### RADIO

Tape networks now become practical supplements or alternatives to line networks. For example, programs of national interest can be recorded, duplicated and distributed in taped form to all network stations. Also, stock musical and dramatic program material of any length can be economically duplicated and distributed to hundreds of stations on a lease or subscription basis.



### BACKGROUND MUSIC

Background music services, transcription services and recording companies can now profitably produce background music tapes. Users of such machines as the Ampex 450 Tape Reproducer, which plays 8 full hours of music without repetition, will benefit from the availability of a wider music selection.



### RECORD MANUFACTURE

The growing demand for high fidelity music can be met successfully with economical tape duplication. Tape recordings can now be manufactured to compete favorably with LP records in the retail market.



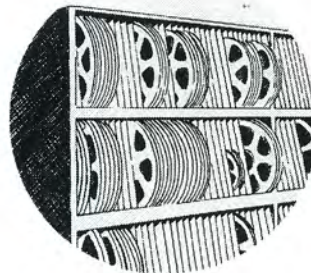
### SELLING

Companies of national scope can duplicate, and distribute to their sales agencies, tape recordings of sales meetings, talks by sales managers and a variety of information which is **most** effective when presented orally. Rapid, low cost tape duplication also paves the way for the presentation of sales training programs on a national basis with far greater effect and economy than heretofore possible.



### EDUCATION

The usefulness of tape and record libraries of school systems is increased enormously by tape duplication. More rapid and widespread distribution of duplicate tape and greatly expanded subject-matter coverage is now made possible.



### LIBRARIES FOR THE BLIND

Books, magazines, music and drama can be read or played onto tape and duplicated in whatever number is needed. Thus, it becomes feasible to maintain large circulating libraries of tapes as a practical means of entertainment and education for the blind.



# GENERAL PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

**TAPE SPEEDS  
FREQUENCY RESPONSE**

Two Speed, 30 and 60 in/sec.  
Specifications apply to duplicates made either at 30 or 60 in/sec. tape speed.  
3¾ IN/SEC DUPLICATES (made either from 3¾ or 7½ in/sec. masters).  
± 2 db from 50 to 5000 cps.  
± 4 db from 50 to 7500 cps.

**SIGNAL-TO-NOISE RATIO  
FLUTTER AND WOW**

7½ IN/SEC. DUPLICATES (from 7½ in/sec. masters).  
± 2 db from 70 to 10,000 cps.  
± 4 db from 50 to 15,000 cps.  
Exceeds 45 db. in 3¾ or 7½ in/sec. duplicates made at either 30 or 60 in/sec. duplicating speed.  
Will not exceed 0.2% rms in duplicates, measuring all components up to 300 cycles/sec., at ANY duplicating speed.

**DUPLICATING TIME**

REEL SIZE	AT 30 IN/SEC.	AT 60 IN/SEC.
7" (1200 feet)	8 minutes	4 minutes
10½" (2400 feet)	16 minutes	8 minutes
14" (4800 feet)	32 minutes	16 minutes

**STARTING TIME  
STOPPING TIME**

At both 30 and 60 in/sec., full operating speed is attained in 5 to 10 seconds for 10½" NARTB reels.  
Approximately 10 inches of tape passes through the head housing after stop button is pressed at 60 in/sec. with 10½" NARTB reels.

**MASTER TAPE  
REWIND TIME  
CONTROLS**

Approximately 60 seconds for a 10½" NARTB reel.

**MASTER CONTROL PANEL (RACK MOUNTED):**  
Provides simultaneous control of all units. Duplicating is controlled by a master power control (and indicator light), a start button, (and recording indicator light) and a stop button.

**INDIVIDUAL CONTROLS:**  
Provide optional separate control of each unit.  
The master playback unit and each duplicating recorder have the following controls:

Pilot Light	Rewind-Fast Forward-Play Lever
Power Switch	Tape Speed Selector Switch
Start Button	Reel Size Selector
Stop Button	

**MASTER PANEL  
AMPLIFIERS**

Two separate high powered amplifiers are provided, one for each channel. They are of extremely low effective impedance in order to provide a virtually constant voltage source for the record buss which each feeds. Thus the number of duplicating recorders being fed can be varied from one to ten without appreciably varying the feed level to any one individual recorder.

**HEADS**

**MASTER PLAYBACK** — Plug-in type head assembly containing two half-track playback heads. On single track recordings, only one of the heads is used.

**DUPLICATING RECORDERS** — Plug-in type head assembly containing two half-track recording heads and one full-track recording head.

**TYPES OF DUPLICATES**

Any of the following can be made: (1) full-track duplicates; (2) half-track duplicates; (3) simultaneous (double) half-track duplicates, and (4) two-track stereophonic duplicates.

**MONITORING**

Each head circuit has individual metering jacks for rapid, accurate adjustment of the record level and bias peak. A vacuum tube voltmeter and an audio oscillator are generally used. The ten slaves can be checked in a matter of minutes, making it simple to maintain exact adjustments for peak performance.

**POWER REQUIREMENTS  
SPACE RACK  
REQUIREMENTS**

10 amperes at 115 volts A.C.  
Master playback unit 49 inches  
Master bias oscillator 8¾ inches  
Master amplifier panel 8¾ inches  
Master control panel 3½ inches  
Each duplicating recorder 29¾ inches.

**CONSOLE DIMENSIONS  
SHIPPING WEIGHTS  
(APPROXIMATE)**

Each console stands 36½ inches high and occupies floor space 26 x 25½ inches.  
Master playback and master control panel in console; master bias oscillator and master amplifier panel for rack mounting . . . 335 lbs. OR Master playback, control panel, master bias oscillator, and master amplifier panel for rack mounting . . . 260 lbs.  
Each duplicating recorder and slave switch in console . . . 265 lbs. OR Each duplicating recorder and slave switch for rack mounting . . . 140 lbs.

## OPTIONS TO SPECIFY WHEN ORDERING

Basic system makes one duplicate at a time. It consists of the master playback unit, master amplifier, oscillator and control unit, and one duplicating recorder. Additional duplicates (up to 9 more) can be made by additional duplicating recorders.

Specify desired number of simultaneous duplicates: \_\_\_\_\_

Up to 10½" NARTB (Standard); up to 14" (optional at extra cost) \_\_\_\_\_

Console or rack mount (racks not included) \_\_\_\_\_

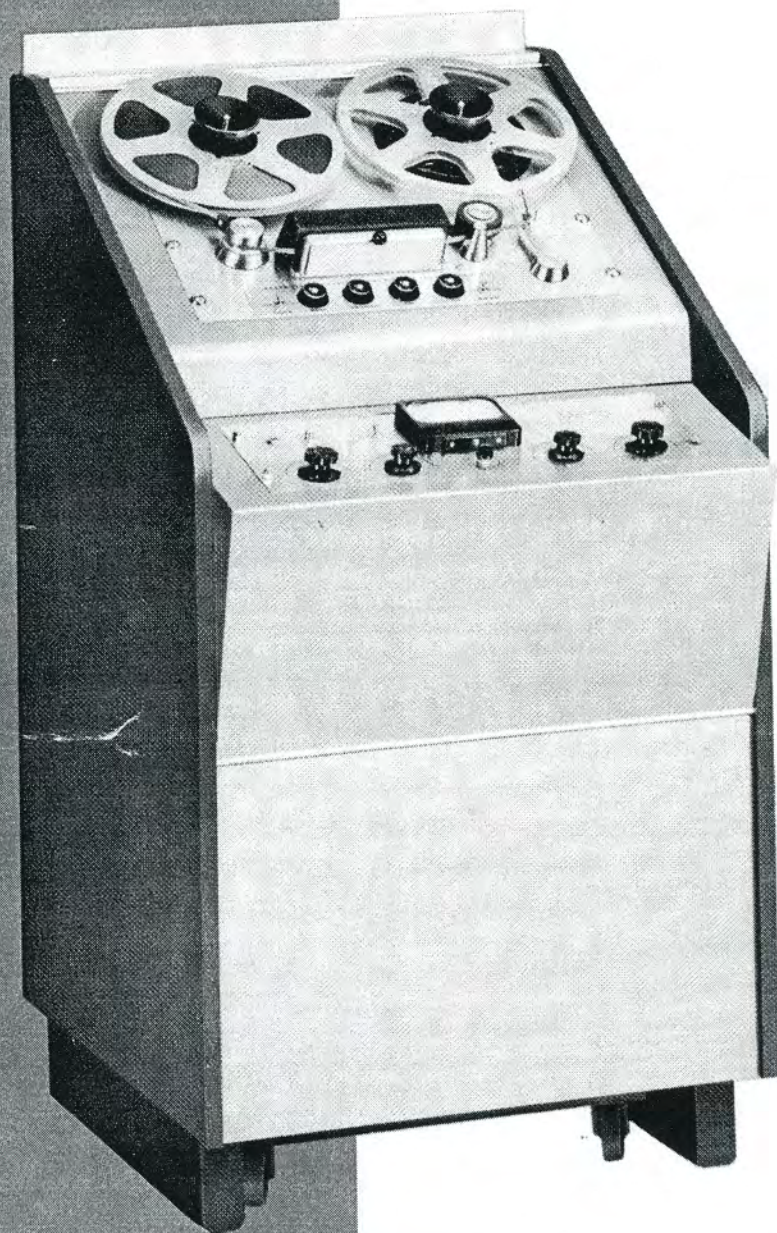
(In console units, the master playback unit and duplicating slaves are in console, but all master control units must be rack mounted.)



934 CHARTER STREET  
REDWOOD CITY, CALIFORNIA

*Announcing...*

THE **AMPEX** 350 TAPE RECORDER



A NEW MODEL *by the leader in tape recording*

# AMPEX

# MODEL 350

# Newest

AMPEX is the name that made magnetic recording a professional reality. It's a name that made tape a great research tool in the world's laboratories. Hence the Model 350 carries on an unrivaled standard of excellence. Like prior Ampex machines, the Model 350 is a professional type recorder. It is designed for broadcast stations, recording studios, educational institutions, high fidelity enthusiasts and other highly critical users.

All Ampex recorders have had widespread professional acceptance because of their fidelity, timing accuracy and great reliability. To these qualities the Model 350 adds new refinements that make it easier to operate, to maintain and to service.

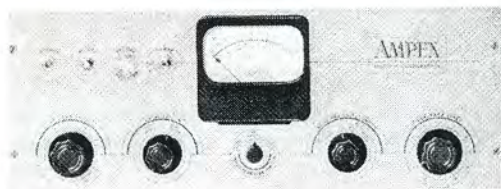
## **NEW CONVENIENCE**

A new 30° slant on the top-plate puts the reels, editing knobs and all controls within easier reach of any operator — tall or short, standing or sitting. The operator is not fatigued by reaching, stooping, leaning or straining.

To save unnecessary steps, a remote control panel can easily be attached to a connector which is an integral part of the machine.

## **NEW EASE OF CUEING AND EDITING**

Exact locating of cues or spots to be edited is facilitated by new controls that permit rapid shuttling between fast forward and rewind. Capstan drive is on the "pull" side of the head assembly to provide tape movement while cutting and splicing tape during editing.



## **NEW SIMPLICITY OF CONTROL**

At a glance the operator can identify and read all settings of the machine. "Feather-touch" push-buttons are set in individual protective wells with their functions clearly labeled.

A control switch selects proper holdback tension for 10 1/2" NARTB reels or the smaller RMA plastic reels. Any possibility of tape breakage or timing inaccuracy is eliminated.



### **AMPEX MODEL 350**

As shown in this photo, the table top console is mounted on a base which is available as a standard accessory. This pedestal base provides a stable mounting at convenient operating height. Concealed casters are provided for moving the machine.

# of the Best

## THE AMPEX STANDARD OF EXCELLENCE

In addition to its new features, the Model 350 incorporates these basic characteristics that have put Ampex Tape Recorders in a class by themselves.

### ADHERENCE TO SPECIFICATIONS

All published specifications (given in full on the back page) are conservative ratings, **not exaggerated claims**. Before it leaves the factory, each Ampex Model 350 is instrument-tested to equal or exceed every performance figure.

### 15,000 CYCLE/SEC. RESPONSE AT 7½ IN/SEC.

Ampex machines meet NARTB **primary** standards at a tape speed of 7½ in/sec. as well as at 15 in/sec. Substantial tape economy can be achieved without perceptible sacrifice of quality.

### FREEDOM FROM NOISE AND DISTORTION

Signal-to-noise ratio of single track Model 350 recorders is over 60 db by NARTB standards. Flutter and wow are well under 0.2% rms at 15 in/sec. and under 0.25% rms at 7½ in/sec. Even on successive re-recording of Ampex tapes, build up of noise is negligible.

### ACCURACY OF TIMING

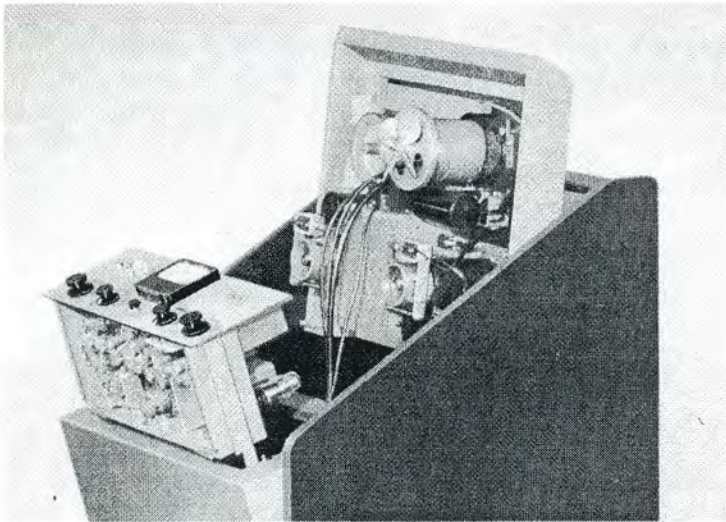
Timing is accurate within  $\pm 3.6$  seconds in 30 minutes program time. Timing accuracy is a "built-in feature"—not a precarious balance of adjustments. Tapes can be interchanged from one Ampex to another without affecting timing of the recorded material.

### FAST RESPONSE TO CONTROLS

Starting time is "instantaneous"—full stable tape speed in less than 1/10th second. In stopping, the tape moves less than 2 inches even at 15 in/sec. tape speed. Exact cueing is routine on an Ampex.

### LOW OPERATING COST

Because an Ampex Recorder is built to give thousands of hours of reliable service, it saves on maintenance and outlasts a succession of lower quality machines. An Ampex costs less per hour, per month and per year—reason enough to buy the best.

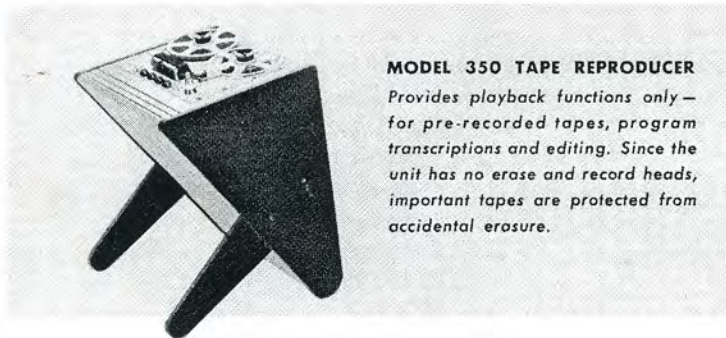


## NEW ACCESSIBILITY FOR SERVICING

The top-plate is pivoted to give access to motors, brakes and all electrical connections. The control panel lifts up and locks in position, exposing electronic components, control switches and connections. Similarly, the internal assemblies slide out for checking, servicing and replacement of tubes. Plug-in type connections are used throughout.

## NEW RELIABILITY

For foolproof tape handling qualities, the Ampex 350 has a three motor tape transport mechanism. Mechanical refinements have been made, based on Ampex's experience with recorders that have been subjected to thousands of hours of accelerated usage.



### MODEL 350 TAPE REPRODUCER

*Provides playback functions only—for pre-recorded tapes, program transcriptions and editing. Since the unit has no erase and record heads, important tapes are protected from accidental erasure.*

IF YOU PLAN FOR TOMORROW, BUY AN AMPEX TODAY

# MODEL 350

## GENERAL PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

<p><b>TAPE SPEEDS</b></p> <p><b>FREQUENCY RESPONSE</b></p> <p><b>SIGNAL-TO-NOISE RATIO</b></p> <p><b>FLUTTER AND WOW</b></p> <p><b>PLAYING TIMES</b></p> <p><b>STARTING TIME</b></p> <p><b>STOPPING TIME</b></p> <p><b>PLAYBACK TIMING ACCURACY</b></p> <p><b>REWIND TIME</b></p> <p><b>CONTROLS</b></p> <p><b>RECORD INPUT</b></p> <p><b>PLAYBACK OUTPUT</b></p> <p><b>AMPLIFIERS</b></p> <p><b>PLUG-IN HEAD HOUSING MONITORING</b></p> <p><b>POWER REQUIREMENTS</b></p> <p><b>RACK SPACE</b></p>	<p>Either 7 1/2 and 15 in./sec. or 3 3/4 and 7 1/2 in./sec.</p> <p>15 in./sec. ± 2 db 30 to 15,000 cycles/sec. 7 1/2 in./sec. ± 4 db 30 to 15,000 cycles/sec. (± 2 db 40 to 10,000 cycles/sec.) 3 3/4 in./sec. ± 2 db 50 to 7,500 cycles/sec.</p> <table border="0"> <tr> <td style="text-align: right;"><b>Speed</b></td> <td style="text-align: center;"><b>Max. Record Level to Unweighted Noise</b></td> <td style="text-align: center;"><b>Peak Record Level to Unweighted Noise</b></td> <td rowspan="4" style="vertical-align: top; padding-left: 20px;">The peak record level is defined as that level at which the overall (input to output) total RMS harmonic distortion is 3% when measured on a 400 cycle tone. Noise is measured when erasing a signal of peak recording level and in absence of new signal. Thus, bias and erase noise are included as well as playback amplifier noise. All frequencies between 30 and 15,000 cycles are measured.</td> </tr> <tr> <td>15"</td> <td>Full track 70 db Half track 65 db</td> <td>Full track 60 db Half track 55 db</td> </tr> <tr> <td>7 1/2"</td> <td>Full track 70 db Half track 65 db</td> <td>Full track 60 db Half track 55 db</td> </tr> <tr> <td>3 3/4"</td> <td>60 db</td> <td>50 db</td> </tr> </table> <p>15 in./sec. Well below 0.2% 7 1/2 in./sec. Well below 0.25% 3 3/4 in./sec. Well below 0.3%</p> <p>The flutter and wow measurements include all components between 0 and 300 cycles/sec. using an RMS meter calibrated to read the peak value of constant amplitude sinusoidal flutter.</p> <table border="0"> <tr> <td></td> <td style="text-align: center;"><b>Speed</b></td> <td style="text-align: center;"><b>Half Track</b></td> <td style="text-align: center;"><b>Full Track</b></td> </tr> <tr> <td>With NARTB 10 1/2" reels (2400 feet of tape)</td> <td>15 in./sec. 7 1/2 in./sec. 3 3/4 in./sec.</td> <td>64 min. 2 hrs. 8 min. 4 hrs. 16 min.</td> <td>32 min. 64 min. 2 hrs. 8 min.</td> </tr> </table> <p>Instantaneous (tape accelerates to full speed in less than 1/10 second). At 15 in./sec. speed, tape moves less than two inches after pressing "Stop" button.</p> <p>± 0.2% (± 3.6 seconds in a thirty minute recording). Approximately one minute for 2400-foot NARTB reel; 30 seconds for 1200-foot RMA reel.</p> <p>Tape motion controlled by four pushbuttons; Start, Stop, Fast Forward and Rewind. Separate Record button energizes record circuits, which drop out when machine is stopped. Motor speed and electronic equalization for various tape speeds are controlled by separate switches. Reel Size Switch provides proper tape tensions for NARTB 10 1/2" reels or RMA 5" and 7" reels.</p> <p>A switch allows recorder to accommodate either microphone level low impedance input or to bridge a 600 ohm + 4 VU line, balanced or unbalanced. Levels as low as minus 80 dbm. on the microphone input will produce the recommended record level.</p> <p>Plus 4 VU output into 600 ohms, balanced or unbalanced. Will feed a high input impedance amplifier directly with approximately one volt.</p> <p>Separate record and playback amplifiers are used. Amplifier distortion at any operating level is negligible compared to tape distortion, even using new high-output tapes.</p> <p>Erase, record and playback heads are contained in a single plug-in head housing.</p> <p>Independent record and playback systems allow tape to be monitored while recording. A phone jack is provided to monitor either the record input signal before or during recording, or the output signal from the playback head while recording or during playback. An A-B switch is incorporated in order that direct comparison can be made between the original program and the recorded program. The same switch transfers a 4-inch VU meter for level comparison and monitoring. The VU meter is also used to read bias and erase current.</p> <p>Either half or full-track machines require 2.7 amperes at 115 volts A.C. Machines are available for either 50 or 60 cycle operation.</p> <p>Standard 19 inch wide panel with commercial notching.</p> <p>Tape Transport, 15 3/4 inches of rack space, weight . . . 58 lbs. Electronic Assembly, 7 inches of rack space, weight . . . 18 lbs. Power Supply, 3 1/2 inches of rack space, weight . . . 8 lbs.</p>	<b>Speed</b>	<b>Max. Record Level to Unweighted Noise</b>	<b>Peak Record Level to Unweighted Noise</b>	The peak record level is defined as that level at which the overall (input to output) total RMS harmonic distortion is 3% when measured on a 400 cycle tone. Noise is measured when erasing a signal of peak recording level and in absence of new signal. Thus, bias and erase noise are included as well as playback amplifier noise. All frequencies between 30 and 15,000 cycles are measured.	15"	Full track 70 db Half track 65 db	Full track 60 db Half track 55 db	7 1/2"	Full track 70 db Half track 65 db	Full track 60 db Half track 55 db	3 3/4"	60 db	50 db		<b>Speed</b>	<b>Half Track</b>	<b>Full Track</b>	With NARTB 10 1/2" reels (2400 feet of tape)	15 in./sec. 7 1/2 in./sec. 3 3/4 in./sec.	64 min. 2 hrs. 8 min. 4 hrs. 16 min.	32 min. 64 min. 2 hrs. 8 min.
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### OPTIONS TO SPECIFY WHEN ORDERING

<p><b>MOUNTING STYLE</b></p> <p><b>TAPE SPEED</b></p> <p><b>TRACK WIDTH</b></p> <p><b>POWER LINE FREQUENCY</b></p>	<p>Console, rack-mount or two case portable _____</p> <p>7 1/2 and 15 in./sec. or 3 3/4 and 7 1/2 in./sec. _____</p> <p>Full track or half track _____</p> <p>60 or 50 cycle/sec. _____</p>
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### ACCESSORIES

<p><b>REMOTE CONTROL UNITS</b> (Cat. #5763 and Cat. #5763-1)</p> <p><b>FOUR CHANNEL MIXER</b> (Cat. #3761)</p>	<p>Controls Start, Stop, Fast Forward, Rewind and Record from a remote location. Catalog #5763 is mounted in a wooden case and is completely wired. Catalog #5763-1 is mounted on a flat plate for flush mounting in studio consoles and is not wired.</p> <p>High level mixer preamplifier for use with portable and rack-mounted recorders (mounts directly in electronics case of two case portable).</p>
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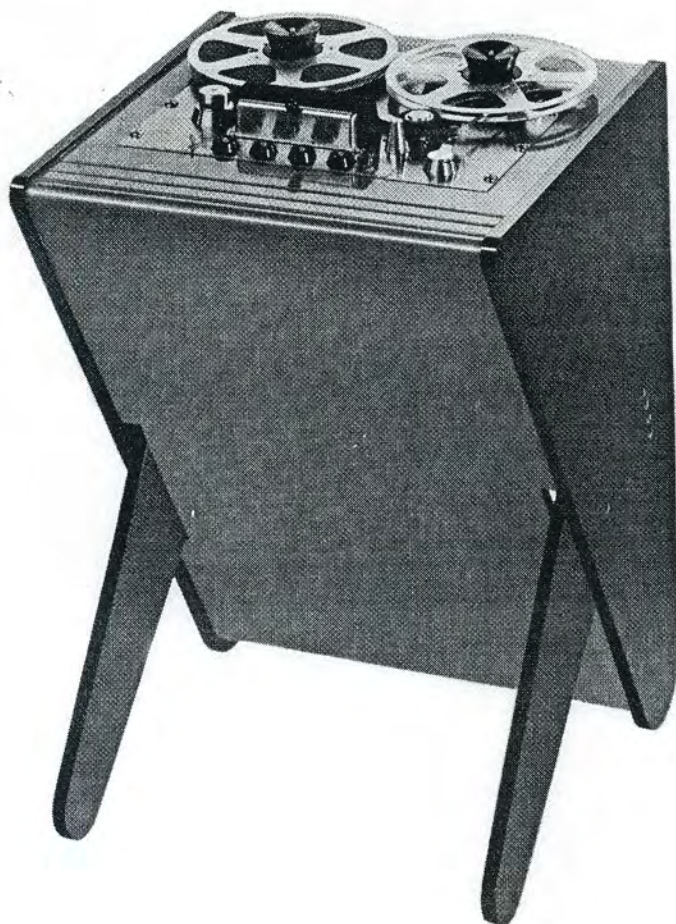


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# THE AMPEX

## MODEL 352 TAPE REPRODUCER



### for high fidelity playback of pre-recorded tapes

The Ampex Model 352 is a reproducer that plays pre-recorded tapes much as a turntable plays disc records. For those many applications where only the playback function is needed, it serves in lieu of a high quality tape recorder and has special advantages of its own.

**No accidental erasures** — Since the Model 352 has no recording or erase heads, irreplaceable tape recordings are fully protected from accidental erasure. Thus the 352 is particularly suitable where non-technical personnel will play tapes — or in professional applications where loss through erasure could be high.

**Highest quality of reproduction** — The finest tape recordings can be reproduced "perfectly" on the Ampex Model 352. It is identical in performance to the playback functions of the Ampex Model 350 Recorder which is so widely used in radio network broadcasting and professional studio recording.

**Lower cost** — The Ampex 352 Tape Reproducer costs less than a recorder of comparable quality. Radio stations, recording studios and educational institutions can in many places use a tape reproducer in lieu of another recorder. Equipment costs are cut without sacrificing quality.

### APPLICATIONS

**In radio broadcasting** the Model 352 plays transcribed programs and time-delayed network material. In addition it is the safest machine for editing.

**For advertising agencies and theatrical and radio booking agents**, it is an ideal machine for auditioning taped radio programs, dramatic performances and commercials.

**In the professional recording studio**, the Ampex 352 provides high quality playback for checking, editing and hearings by studio clients, critics and others.

**For educational institutions**, it is an exceedingly durable machine for playing pre-recorded tapes. It can be entrusted to student use with minimum danger to tapes.

### The AMPEX Standard of excellence...

The 352 Tape Reproducer incorporates those characteristics that have put Ampex Tape Recorders in a class by themselves.

**ADHERENCE TO SPECIFICATIONS.** All published specifications are conservative ratings, not exaggerated claims. Each Ampex is instrument-tested to equal or exceed every performance figure (see back page).

**15,000 CYCLE/SEC. RESPONSE AT 7 1/2 IN/SEC.** Ampex machines meet NARTB primary standards at a tape speed of 7 1/2 in/sec. as well as at 15 in/sec. Tapes maintain these characteristics when interchanged between any Ampex equipment.

**FREEDOM FROM NOISE AND DISTORTION.** Signal-to-noise ratio of single track Model 352 Reproducers is over 60 db at the level of 3% distortion of a 400 cycle tone. Flutter and wow are well under 0.2% rms at 15 in/sec. and under 0.25% rms at 7 1/2 in/sec

**ACCURACY OF TIMING.** Timing is accurate within  $\pm 3.6$  seconds in 30 minutes program time. Timing accuracy is a "built-in feature" — not a precarious balance of adjustments. It is standard from one Ampex to another.

**FAST RESPONSE TO CONTROLS.** Starting time is "instantaneous" — full stable tape speed in less than 1/10th second. In stopping, the tape moves less than 2 inches even at 15 in/sec. tape speed. Exact cueing is routine on an Ampex.

IF YOU PLAN FOR TOMORROW, BUY AN AMPEX TODAY.

**MODEL**  
**352**  
**REPRODUCER**

**GENERAL PERFORMANCE CHARACTERISTICS  
AND SPECIFICATIONS**

<b>TAPE SPEEDS</b>	7½ and 15 in/sec.		
<b>FREQUENCY RESPONSE</b>	15 in/sec. ± 2 db 30 to 15,000 cycles/sec. 7½ in/sec. ± 4 db 30 to 15,000 cycles/sec. (± 2 db 40 to 10,000 cycles/sec.)		
<b>SIGNAL-TO-NOISE RATIO</b>	<b>Speed</b>	<b>Max. Record Level to Unweighted Noise</b>	<b>Peak Record Level to Unweighted Noise</b>
	15"	Full track 70 db Half track 65 db	Full track 60 db Half track 55 db
	7½"	Full track 70 db Half Track 65 db	Full track 60 db Half track 55 db
	The peak record level is defined as that level at which an overall (input to output) total RMS harmonic distortion is 3% when measured on a 400 cycle tone. Noise is measured when erasing a signal of peak recording level and in absence of new signal. Thus, bias and erase noise are included as well as playback amplifier noise. All frequencies between 30 and 15,000 cycles are measured.		
<b>FLUTTER AND WOW</b>	15 in/sec.	Well below 0.2%	The flutter and wow measurements, include all components between 0 and 300 cycles/sec. using an RMS meter calibrated to read the peak value of constant amplitude sinusoidal flutter.
	7½ in/sec.	Well below 0.25%	
<b>PLAYING TIMES</b>		<b>Speed -</b>	<b>Half Track</b>
	With NARTB 10½" reels (2400 feet of tape)	15 in/sec. 7½ in/sec.	64 min. 2 hrs. 8 min.
			<b>Full Track</b> 32 min. 64 min.
<b>STARTING TIME</b>	Instantaneous (tape accelerates to full speed in less than 1/10 second).		
<b>STOPPING TIME</b>	At 15 in/sec. speed, tape moves less than two inches after pressing "Stop" button.		
<b>PLAYBACK TIMING ACCURACY</b>	± 0.2% (± 3.6 seconds in a thirty minute recording).		
<b>REWIND TIME</b>	Approximately one minute for 2400-foot NARTB reel; 30 seconds for 1200-foot RMA reel.		
<b>CONTROLS</b>	Tape motion controlled by four pushbuttons; Start, Stop, Fast Forward and Rewind. Tape speed changed by a Motor Speed Switch and Equalization Switch. Reel Size Switch provides proper tape tensions for NARTB 10½" reels or RMA 5" and 7" reels.		
<b>OUTPUT</b>	Plus 4 VU output into 600 ohms, balanced or unbalanced. Will feed a high input impedance amplifier directly with approximately one volt.		
<b>PLUG-IN HEAD HOUSING</b>	Playback heads are contained in a single plug-in head housing.		
<b>POWER REQUIREMENTS</b>	Either half or full-track machines require 2.4 amperes at 117 volts A.C. Machines are available for either 50 or 60 cycle operation.		
<b>RACK SPACE</b>	Standard 19 inch wide panel with commercial notching. Tape Transport, 15¾ inches of rack space, weight . . . . 50 lbs. Electronic Assembly, 5¼ inches of rack space, weight . . . 13½ lbs. Power Panel, 1¾ inches of rack space, weight . . . . . 1 lb.		
<b>CONSOLE DIMENSIONS</b>	35" high x 24¼" wide x 24¾" deep; weight 109 lbs.		

**OPTIONS TO SPECIFY WHEN ORDERING**

<b>MOUNTING STYLE</b>	Console or rack-mount_____
<b>TRACK WIDTH</b>	Full track or half track_____
<b>POWER LINE FREQUENCY</b>	60 or 50 cycle/sec._____

**ACCESSORIES**

<b>REMOTE CONTROL UNITS</b> (Cat. # 5763 and Cat. # 5763-1)	Controls, <b>Start</b> , <b>Stop</b> , <b>Fast Forward</b> , and <b>Rewind</b> from a remote location. Catalog #5763 is mounted in a wooden case and is completely wired. Catalog #5763-1 is mounted on a flat plate for flush mounting in studio consoles and is not wired.
<b>VU METER PANEL</b> Cat. #4331-1)	Includes VU meter, attenuation controls and phone jack. The attenuator and VU meter permit control of output level (otherwise output of the 352 Reproducer has a fixed setting of 4 VU and must be controlled externally).

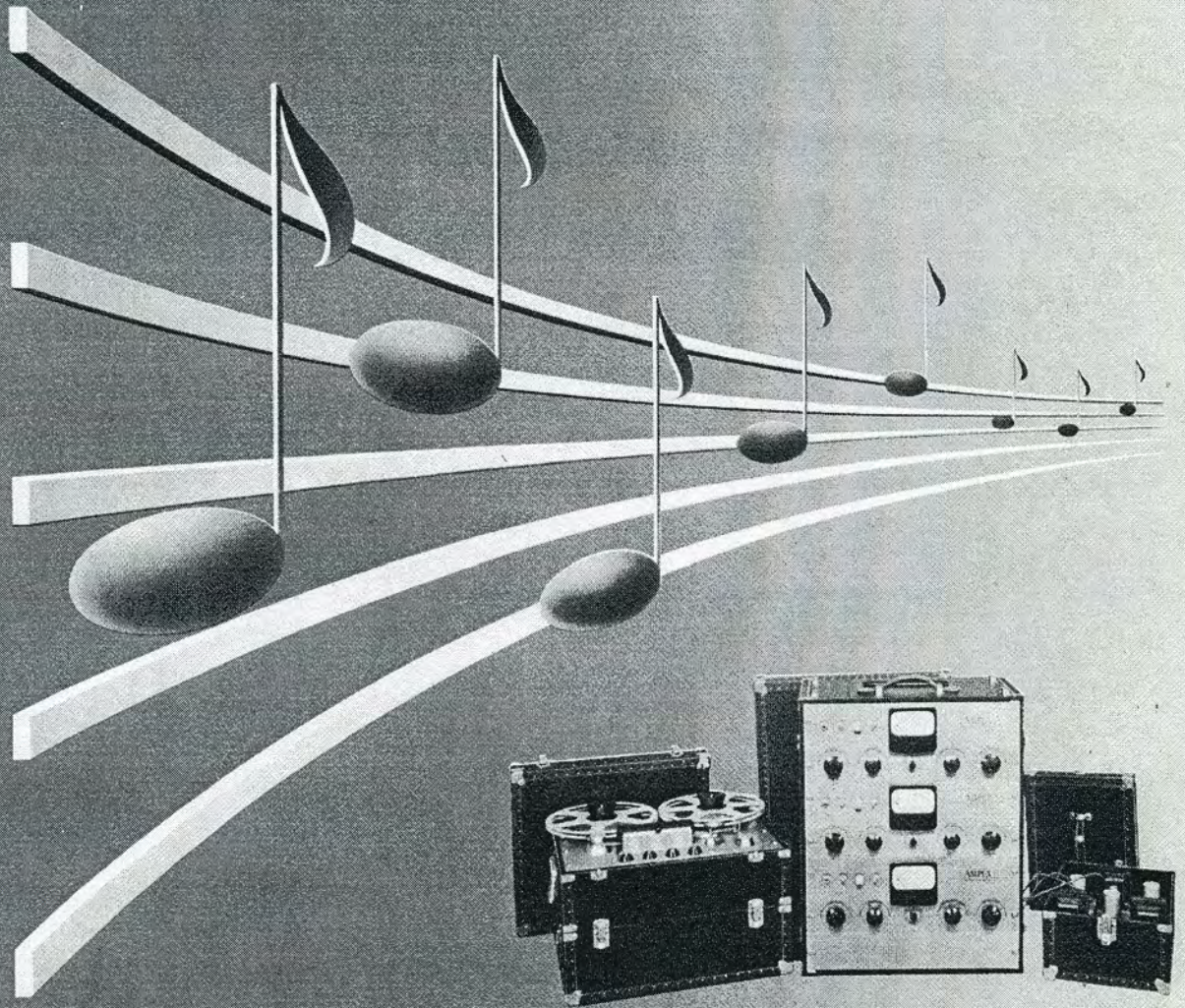


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REDWOOD CITY, CALIFORNIA

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# AMPEX

## TWO AND THREE CHANNEL AUDIO TAPE RECORDERS



- **FOR STEREOPHONIC SOUND**

Achieving depth, direction and utmost realism in recorded music, dialogue and other sounds — used for entertainment, education or scientific research.

- **FOR PARALLEL RECORDING**

Synchronizing separate sounds — such as music with commentary, dialogue with cues, or noises with spoken identification.



## FOR THE REALISM OF STEREOPHONIC SOUND

Stereophonic recordings are a sensational listening experience because of their extreme realism. They attain a natural sense of depth and direction by dividing sounds into components. These reach the listener's left and right ears at precisely separated instants. The result is so effective you feel as though you were listening to a live performance. But in addition to its striking effect, this "third dimension in sound" has great practical advantages in numerous fields:

In sound research such as noise reduction and acoustical studies, it permits a far more acute degree of identification, comparison and study than is possible by other means.

In musical or dramatic rehearsal the playback of stereophonic recordings enables the participants to sit as a sensitive and critical audience to their own performance.

In motion pictures the theater audience is given an audible "sense of presence." Dialogue and sound effects have depth and a proper directional source. (Rather than tape, this uses magnetic tracks on film.)

In the teaching of sound recognition, stereophonic recordings make it possible to present military, professional or industrial trainees with "perfect" samples of the sounds they are learning to identify.

In home listening the utter realism of stereophonic recordings can be a sensational source of enjoyment and entertainment.

# AMPEX

TWO AND  
THREE CHANNEL  
AUDIO RECORDERS



## FOR THE VERSATILITY OF PARALLEL RECORDING

On the two or three channels of these Ampex machines, any conceivable combination of sounds can be recorded, provided a 30 db signal separation between tracks is adequate. They remain independent of each other except for their closely timed parallel positions on the tape.

Purchasers of these versatile machines have put them to work in the most diverse ways:

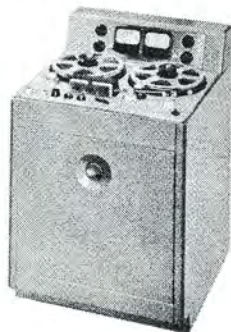
A Chicago impresario operating a puppet opera records music on one track and simultaneous keyed instructions to the puppeteers on another. This provides a simple method of cueing action to music.

- An industrial concern records research sound data on one track and a simultaneous commentary on another. Thus the recorded sounds are explained at the same time they are being recorded.
- The medical department of a midwestern university uses an Ampex two channel recorder for otological research and subjective hearing tests. Sound phenomena recorded on one track and the subject's responses on another provide precise experimental control.
- A language school records correctly pronounced sentences on one channel. Individual students listen and repeat the sentences onto the other. By this means they are able to hear and compare their pronunciation with the correct example.

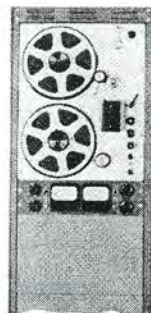


**NOTE:** It has often been mistakenly assumed that Ampex multi-channel audio recorders could be used for magnetic data recording. Actually data recording generally requires different heads and equalization. Inquiries should be referred directly to Ampex Corporation to assure purchase of the correct machine.

## AMPEX MULTI-CHANNEL AUDIO MODELS



300-2C  
Two-track  
console recorder

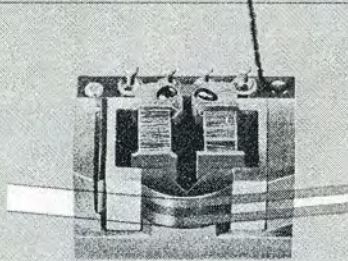


300-2R  
Two-track  
rack mounted



350-2R  
Two-track  
rack mounted

## THE PRINCIPLE OF TWO (or three) CHANNEL RECORDERS

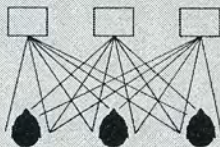
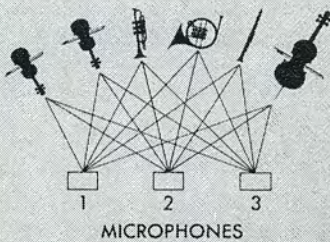


In effect a two channel recorder is like two recorders operating on the same tape. The recording head unit is actually two separate heads one on top of the other (i.e. side-by-side) with an insulating material between; the playback head is the same. There are two record amplifiers, two playback amplifiers, two V-U meters and two sets of controls. Thus the sounds on the two (or three) channels are kept independent except for their precise relative timing.

### TWO TECHNIQUES FOR "SOUND WITH DEPTH"

In speaking of recordings with depth and direction, two words **stereophonic** and **binaural** have often been loosely interchanged. Ampex multi-channel recorders can be used for either type, but actually they are two entirely different techniques:

#### • Stereophonic recording and reproduction



This technique is essentially "panoramic" and can be heard by a large audience. It can use either two or three channel recording (three is preferable).

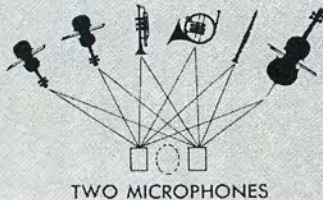
##### RECORDING

Microphones are spaced out in a standard pattern to "hear a panorama of sound." Each picks up all of the sounds in a "space-time-loudness" relationship and transmits it to a separate track on the tape.

##### REPRODUCTION

Speakers playing off the separate tracks are placed in the same relative position as were the microphones. Thus they pass on the same "space-time-loudness" relationship that the microphones picked up.

#### • Binaural recording and reproduction



TWO MICROPHONES



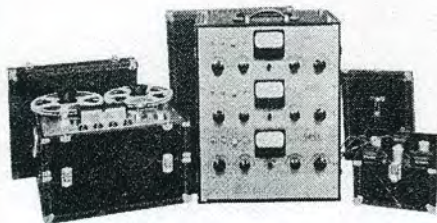
This is "two ear" sound. It achieves the sense of depth and direction using only two tracks. **But each listener must wear earphones.**

##### RECORDING

Two microphones are spaced like human ears and separated by a non-resonant wall simulating the human head.

##### REPRODUCTION

The listener hears a separate sound track through each earphone. This duplicates his normal two ear hearing.



350-3P  
Three-track  
portable

## AMPEX RECORDERS

### Professionally accepted as the finest

Ampex magnetic tape recorders of various models are widely used by the most critical professionals:

- The radio broadcasting industry including all four major networks.
- The phonograph record manufacturers including the four largest and many of the smaller.
- Commercial recording studios in practically every sizeable U. S. city.

In addition they have had wide acceptance by universities, schools, government and high fidelity enthusiasts. In total they have far outsold any other tape recorders of comparable professional quality.

### THE AMPEX STANDARD OF EXCELLENCE

The two and three channel audio recorders described in this brochure are special types, but they incorporate these basic characteristics that have put Ampex machines in a class by themselves:

#### • Adherence to specification

Each Ampex is factory tested to equal or exceed every published specification (back page). Ampex makes conservative ratings, not exaggerated claims.

#### • 15,000 cycles/sec. Response at either 7½ or 15 in/sec.

Precise head construction results in Ampex's high frequency response at low tape speeds. Substantial tape economy can be achieved without perceptible sacrifice in quality.

#### • Accuracy of timing

Timing accuracy within  $\pm 0.2\%$  prevents any discernable change in pitch between recording and playback or in transferring tapes from one Ampex to another.

#### • Precision of phase relation

Channel-to-channel gap alignment is held within  $\pm 0.0005$  inch to preserve exact phase relation (and directional sense) of stereophonic sound.

#### • Fast response to controls

All tape motions are pushbutton controlled — starting in 1/10th second — stopping within less than two inches — 2400 foot tape rewind in one minute — fast forward to rewind, at the touch of a button.

#### • Low operating cost

Ampex quality greatly extends "life expectancy" and trouble-free operation. In long service it has been proven that Ampex machines cost the least per hour, per month and per year of any tape recorders built today.

See back page for detailed specifications

**MULTI-CHANNEL  
AUDIO  
RECORDERS  
300 AND 350 SERIES**

**GENERAL PERFORMANCE CHARACTERISTICS  
AND SPECIFICATIONS**

<b>FREQUENCY RESPONSE</b>	<p><i>NOTE: The following data pertains to both the 300 and the 350 series machines.</i></p> <p>15 in./sec. — 30 to 15,000 cycles/sec. <math>\pm 2</math> db.          7½ in./sec. — 30 to 15,000 cycles/sec. (40 to 10,000 cycles <math>\pm 2</math> db; down no more than 4 db at 15,000 cycles)          3¾ in./sec. (optional speed) — 50 to 7,500 cycles/sec. (50 to 5000 cycles <math>\pm 2</math> db; down no more than 4 db at 7,500 cycles)</p>															
<b>STARTING TIME PLAYBACK PLAYING TIMES</b>	<p>Instantaneous (tape accelerates to full speed in less than 1/10th second).          32 min. at 15 in./sec. <span style="float: right;">Using NARTB</span>          64 min. at 7½ in./sec. <span style="float: right;">10½" reel.</span>          2 hrs. 8 min. at 3¾ in./sec. (optional speed) <span style="float: right;">(2400 feet of tape).</span>          At 15 in./sec., tape moves less than 2 inches after pressing "stop" button.</p>															
<b>STOPPING TIME PLAYBACK TIMING ACCURACY REWIND TIME</b>	<p><math>\pm 0.2\%</math> or <math>\pm 3.6</math> seconds in a thirty minute recording.          Approximately one minute for 10½ inch NARTB reels.</p>															
<b>SIGNAL-TO-NOISE RATIO MONITORING</b>	<p>Over 55 db at either 7½ or 15 in./sec.          Independent record and playback systems permit simultaneous monitoring while recording. Full track erase assures freedom from confusion with previous recordings.          Phone jack permits monitoring input signal before recording or output signal during playback.          A-B switch makes possible direct comparison between original and recorded program.          VU meters permit signal-level comparison, also read bias and erase current when switched to suitable positions.</p>															
<b>HEAD HOUSING</b>	<p>Erase, record and playback heads contained in single unit.</p>															
<b>POWER REQUIRED</b>	<p>Both record and playback heads are separately shielded; (playback head in a double mu-metal box).          117 volts, 3 amperes, 60 cycles (also available for 50 cycles).</p>															
<b>FLUTTER AND WOW</b>	<p><i>NOTE: The following data pertains to either the 300 or the 350 series as indicated.</i></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 33%;"><b>300 SERIES</b></td> <td style="width: 33%;"></td> <td style="width: 33%;"><b>350 SERIES</b></td> </tr> <tr> <td>15 in./sec. well under 0.1%</td> <td rowspan="3">includes all RMS peak value components of constant amplitude between 0 &amp; 300 cycles/sec.</td> <td>15 in./sec. well under 0.2%</td> </tr> <tr> <td>7½ in./sec. well under 0.2%</td> <td>7½ in./sec. well under 0.25%</td> </tr> <tr> <td>3¾ in./sec. well under 0.25%</td> <td>3¾ in./sec. well under 0.3%</td> </tr> </table>		<b>300 SERIES</b>		<b>350 SERIES</b>	15 in./sec. well under 0.1%	includes all RMS peak value components of constant amplitude between 0 & 300 cycles/sec.	15 in./sec. well under 0.2%	7½ in./sec. well under 0.2%	7½ in./sec. well under 0.25%	3¾ in./sec. well under 0.25%	3¾ in./sec. well under 0.3%				
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<b>RECORD AMPLIFIER</b>	<p>Distortion in amplifiers is a negligible part of the total system distortion at any level.</p>															
<b>PLAYBACK AMPLIFIER</b>	<p>Bridging or matching input (as ordered).          Delivers + 20 dbm with approximately 1% total harmonic distortion.</p>															
<b>CONTROLS</b>	<p>Adjusted for + 4 VU output, 600 ohms. (or 150 ohms balanced or unbalanced).          "In-line" pushbuttons: START, STOP, and RECORD.</p> <p>Selector switch for NORMAL PLAY, FAST FORWARD and REWIND — "instant changing" without stopping in between.</p>															
<b>RACK SPACE AND WEIGHT</b>	<p>Tape transport — 24½" of rack space; 72 lbs.          Each electronic assembly — 12¼" of rack space; 36 lbs. (Two required.)          Meter control panel — 5¼" of rack space; 6¾ lbs.</p>															
<b>DIMENSIONS AND WEIGHTS FOR CONSOLE AND PORTABLE CASES</b>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"><b>Console (Model 300)</b></td> <td style="width: 50%;"><b>Portable (Series 350)</b></td> </tr> <tr> <td>36½" high x 26¼" wide x 26" deep; 75 lbs.</td> <td>Model 350-2P — two track top-plate case — 15½" x 20¼" x 17"; 17 lbs.</td> </tr> <tr> <td></td> <td>Electronics case — 18¾" x 20½" x 11½"; 18 lbs.</td> </tr> <tr> <td></td> <td>Power supply case — 7¾" x 8½" x 15½"; 5 lbs.</td> </tr> <tr> <td></td> <td>Model 350-3P — three track top-plate case — 15½" x 20¼" x 17"; 17 lbs.</td> </tr> <tr> <td></td> <td>Electronics case — 27¾" x 21¼" x 15½"; 25 lbs.</td> </tr> <tr> <td></td> <td>Power supply case — 14½" x 8" x 11½"; 7 lbs.</td> </tr> </table>		<b>Console (Model 300)</b>	<b>Portable (Series 350)</b>	36½" high x 26¼" wide x 26" deep; 75 lbs.	Model 350-2P — two track top-plate case — 15½" x 20¼" x 17"; 17 lbs.		Electronics case — 18¾" x 20½" x 11½"; 18 lbs.		Power supply case — 7¾" x 8½" x 15½"; 5 lbs.		Model 350-3P — three track top-plate case — 15½" x 20¼" x 17"; 17 lbs.		Electronics case — 27¾" x 21¼" x 15½"; 25 lbs.		Power supply case — 14½" x 8" x 11½"; 7 lbs.
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<p><b>SERIES 300 OR 350 MOUNTING STYLE TAPE SPEEDS NUMBER OF TRACKS POWER FREQUENCY</b></p>	<p><b>OPTIONS TO SPECIFY WHEN ORDERING</b></p>
	<p>Console (300 only), Rack Mounted (either 300 or 350) or Three-Case Portable (350 only).          7½ and 15 in./sec. or 3¾ and 7½ in./sec.          Two Track or Three Track (350 only).          60 or 50 cycles/sec.</p>

<p><b>REMOTE CONTROL UNITS (350 only)</b></p>	<p><b>ACCESSORIES</b></p>
	<p>Control START, STOP, FAST FORWARD, REWIND and RECORD from remote location.          Catalog No. 5763 is mounted in wooden case and is completely wired.          Catalog No. 5763-1 is on flat plate for flush mounting in studio consoles and is not wired.</p>



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# AMPEX

## TAPE RECORDERS

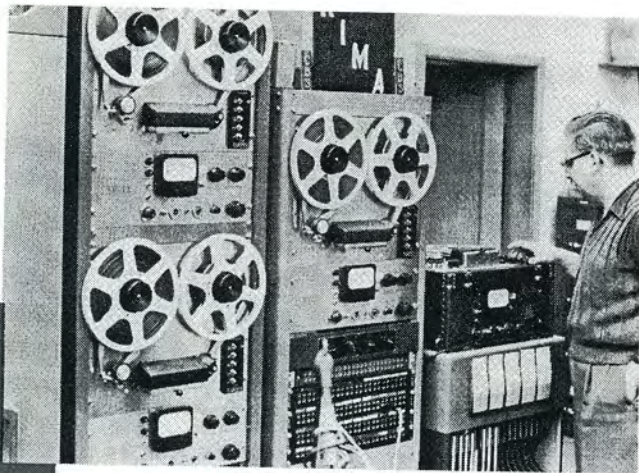
### SERIES 400



**QUALITY PERFORMANCE**

**EASY OPERATION**

**VERSATILITY**



Dependable and accurate recording and reproduction covering the full audible range of sound are combined with low maintenance cost and ease of operation by the Ampex Series "400" tape recorders. This ability to permanently record and faithfully play back at will any music, speech or other sound makes the tape recorder a vital piece of equipment in many fields. The "400" Series was developed originally from the Ampex "300" Series recorders, acknowledged the ultimate in high-fidelity recording and was designed to achieve greater versatility in a wider variety of applications while maintaining a comparable quality of performance.

## AMPEX ADVANTAGES

### Quality of Performance for Critical Users

The wide dynamic range over the entire audible frequency spectrum achieved by Ampex allows the user to enjoy the realism of live performances. Ampex can record the full crashing brilliance of a symphonic fortissimo, yet, when the delicacy of a single solo instrument is recorded, it is not lost in a confusion of noise. This demonstrates the high signal-to-noise ratio, lack of wow and flutter and the low level of harmonic distortion found in an Ampex.

### Ease of Use

Even inexperienced operators can quickly learn to realize the full versatility of an Ampex recorder. Simplified pushbutton controls make all phases of the operation extremely easy, while clearly labeled switches and meters let the operator exercise full control over the electronic processes at all times.

### Precision Engineering

Thousands of hours of sustained heavy-duty performance with minimum time out for maintenance and repairs, continuously prove the quality of Ampex design and construction. An Ampex will quickly pay for itself by reducing costly maintenance and eliminating needless repair. All Ampex machines operate within NARTB specifications, the **one established standard** in the tape recording field.

## APPLICATIONS

### Radio Broadcast Stations

In transcribing programs, announcements and commercials, the fidelity, reliability and timing accuracy of an Ampex recorder are positive benefits for any AM or FM station. Ampex portable models are particularly suitable for making field recordings at local events, schools, businesses and farms. In addition, Ampex durability achieves substantial savings by virtually eliminating "down time" and minimizing service and maintenance.

### High-Fidelity Music Systems for the Home

All the aesthetic values and emotional appeals of the original music are captured and played back by Ampex magnetic tapes with a fullness and realism unequaled by any other recording means. That Ampex "400" machines are ideally suited for use in this field is shown by a constantly increasing demand for these high-fidelity recorders.

### Rehearsal Aid for Musical Performers

Numerous Ampex machines are owned by noted musicians, symphony orchestras, dance bands, conservatories and schools. Sitting in as an "audience" to the immediate playback of the rehearsal assures a closer approach to perfection in the final performance.

### Language, Speech and Dramatics Instruction

In schools, colleges and universities, recording and playback of speech affords an excellent means for self-criticism and improvement. The outstanding fidelity of an Ampex is invaluable in giving a "true-to-life" playback of spoken words.

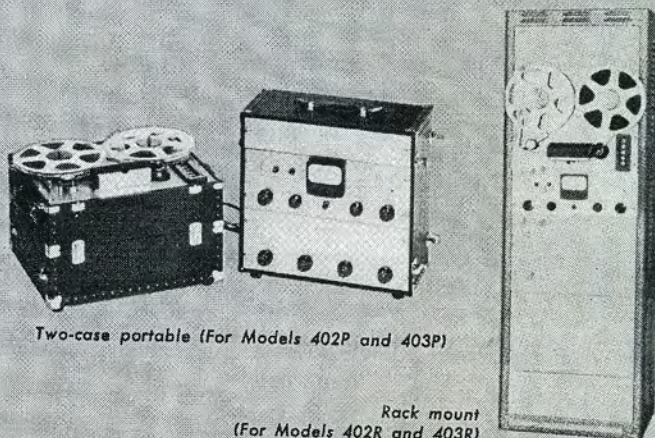
### Medical Research and Instruction

Ampex recorders can permanently record a variety of widely divergent events, such as typical sounds of heart disorders or psychiatric interviews. These recordings can be built up into useful "libraries" from which demonstrations and comparisons can be made at any time, either for personal study or for lectures before groups.

### Research

Study of noises or vibrations is of particular interest in the designing of automobiles, trucks, buses, railroad equipment, airplanes and accessory components. For utmost realism, Ampex stereophonic recorders provide three-dimensional sound recordings. Tests made out in the field can now be studied, compared and analyzed under ideal laboratory conditions.

## MODELS



Two-case portable (For Models 402P and 403P)

Rack mount  
(For Models 402R and 403R)

## AMPEX DESIGN FEATURES

- **Tape Drive**

Precision of program timing and freedom from flutter and wow are functions of the stability of tape motion. To insure accuracy of this motion, a hysteresis synchronous motor drives the capstan. A constant tension system and a high inertia reel idler minimize tape stretch, smooth out longitudinal vibrations and maintain constant tape-to-head contact. A second motor drives the take-up reel during Record, Playback and Fast Forward. It is also used for power during Rewind.

- **Magnetic Heads**

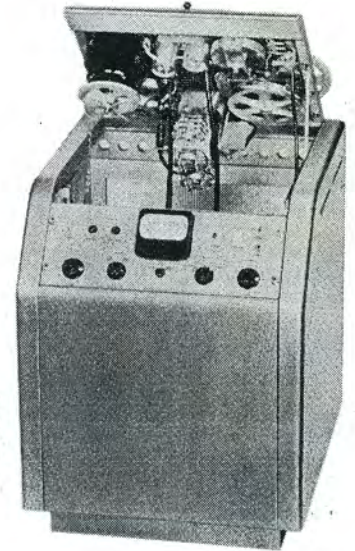
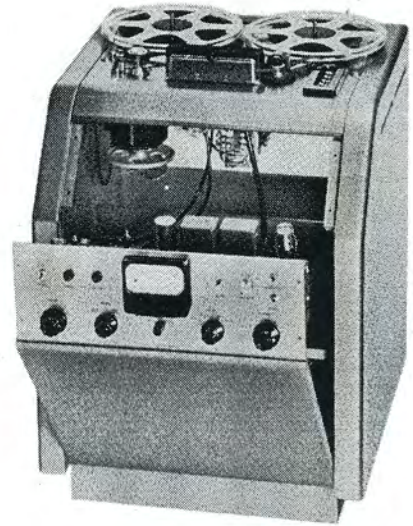
Extremely high frequency response and, to a lesser extent, low noise level are a result of the unique Ampex design of the record and playback heads. Mu-metal shielding protects against the effect of stray fields, while precision lapping of gap surfaces is responsible for sustained uniformity of head characteristics regardless of wear. Recently an Ampex head assembly was returned to the factory after more than 11,000 hours of known use. It was still found to be within specifications for new heads and moreover there were several thousand more hours of potential service remaining.

- **Electronic Circuits**

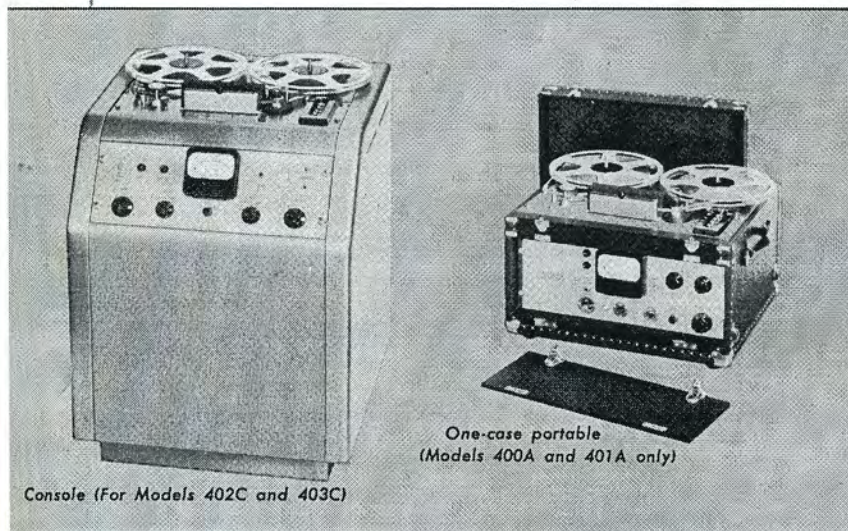
The high signal-to-noise ratio of the electronic circuits in Ampex recorders is higher than that of currently used tapes. To achieve this, the head circuits use no transformers; head leads have low capacitance and minimum surface to intercept stray fields; preamplifier tubes are DC heated to decrease hum; and all amplifier components are carefully laid out.

- **Accessibility for Maintenance and Inspection**

Ampex "402" and "403" recorders have been designed for accessibility to a maximum number of test points while the machine is in operation. This feature is particularly notable in the console models which have slide-out front panels and tip-over electronic chassis. On both the console and two-case portable models, the top-plate lifts exposing the drive mechanism. Models 400A and 401A single-case portables feature condensed packaging where maximum portability is essential.

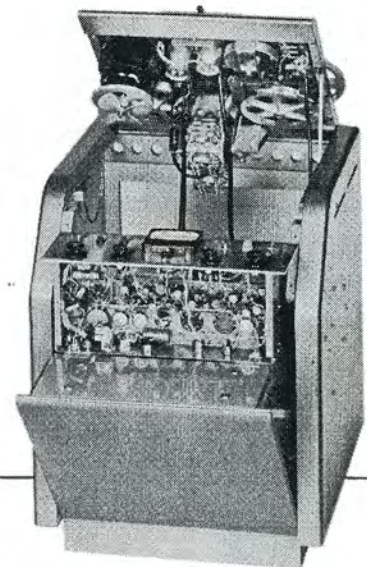


*Console models showing  
slide-out front panel,  
hinged top-plate  
and tip-over electronics*



*Console (For Models 402C and 403C)*

*One-case portable  
(Models 400A and 401A only)*



# GENERAL PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

## TAPE SPEEDS

7½ and 15 inches per second.  
Motor speed change and equalization switches are conveniently located.

## FREQUENCY RESPONSES

At 15 inches  $\pm 2$  db 30 – 15,000 cycles.  
At 7½ inches  $\pm 4$  db 30 – 15,000 cycles,  
 $\pm 2$  db 40 – 10,000 cycles.

## SIGNAL-TO-NOISE RATIO

Over 65 db unweighted noise to maximum recording level. Over 55 db as defined by NARTB standards. (By NARTB definition the signal-to-noise ratio is the ratio of peak recording level to the total unweighted playback noise when erasing a signal of peak recording level and in the absence of a new signal). Thus, bias, erase and playback amplifier noises are included. All frequencies between 30 and 15,000 cycles are measured. The peak recording level is defined as that level at which the overall (input to output) total rms harmonic distortion does not exceed 3% when measured on a 400 cycle tone.

## FLUTTER AND WOW

At 15 inches well under 0.2% rms measuring all flutter components from 0 to 300 cycles using a tone of 3,000 cycles; at 7½ inches per second under 0.25%.

## STARTING TIME

Instantaneous. The tape accelerates to full speed in less than 1/10 second as the capstan drive operates continuously when power is on.

## STOPPING TIME

When playing at 15 inches per second tape travel is less than 2 inches after stop button is pressed.

## PLAYBACK TIMING ACCURACY

Within  $\pm 3.6$  seconds during a full 30 minute playback.

## PLAYING TIME

32 minutes at 15-inch speed with standard NARTB reel; 64 minutes at 7½-inch speed (on each track). The standard 5 and 7-inch RMA reels can also be used on the tape supply turntable. Models 400A and 402 record on one-half the width of ¼-inch tape in accordance with RMA standards. By turning the reel over, the second half-track is recorded thus doubling the program capacity of each reel.

## REWIND TIME

Rewind time for the full 2400-foot NARTB reel is approximately 1½ minutes.

## CONTROLS

Four pushbuttons control the functions of Start (Play), Fast Forward, Rewind and Stop. A fifth pushbutton energizes the record relay which drops out when the machine is stopped. All the functions are relay operated; operation from a remote location is possible.

## SHIELDED HEAD HOUSING

Record and playback heads are completely shielded from stray fields by multi-alloy enclosures.

## INPUT

A switch allows the recorder to accommodate either a microphone level low impedance input or to bridge 600 ohms plus 4 VU line balanced or unbalanced. Minus 70 dbm on the microphone input will produce the recommended record level.

## OUTPUT

Plus 4 VU output into 600 ohms, balanced or unbalanced, will feed a high or low impedance amplifier directly with approximately one volt.

## METERING

The 4-inch VU meter mounted on the front panel provides for:

- Direct monitor of record input signal before or during recording.
- Monitor of recorded output signal from playback head while recording or during playback.
- Reading bias current.
- Reading erase current.

## PHONE MONITORING

A phone monitor jack provides for direct monitoring of record input signal before or during recording and for monitoring of recorded output signal from playback head while recording or during playback. An A-B switch permits direct comparison between the original and recorded program during recording. This switch transfers the VU meter for level comparison and monitoring.

## SIMULTANEOUS MONITORING

Independent record and playback systems allow the tape or the input to be monitored while recording.

## POWER INPUT REQUIREMENT

115 Volts AC; 2 amperes. Recorders available for either 60 or 50-cycle operation.

## EQUALIZATION

Record and playback equalization are such that tapes are recorded in accordance with NARTB standards. Tapes made on any recorder built to NARTB standards may be reproduced on a Series 400 without change.

## ACCESSORY EQUIPMENT

### FOUR CHANNEL MIXER

A four channel high level mixer – preamplifier is available for use in two-case portable versions of Models 402 and 403. Furnished on a 7" panel, 19" wide, with standard commercial rack notching. Catalog No. 3761. (Mounts directly in electronics case of two-case portable).

### PEDESTAL

A pedestal with matching finish is available to raise the Series 400 Console to a top height of 39¼" above the floor level. Catalog No. 3795.

### CASTERS

Where the Series 400 Console requires frequent shifting from one location to another a set of four easy rolling casters is available. These will fit directly to the Console or to the Pedestal. Catalog No. CB-1.

### REMOTE CONTROL BOX

A five-function control box is available. Attachment to the recorder is to the terminal strip provided or by means of a special plug which can be installed as an extra at the factory or in the field. Catalog No. 3766.

**AMPEX**  
CORPORATION

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*Announcing...*

**AMPEX**

**600**

**MAGNETIC TAPE RECORDER**

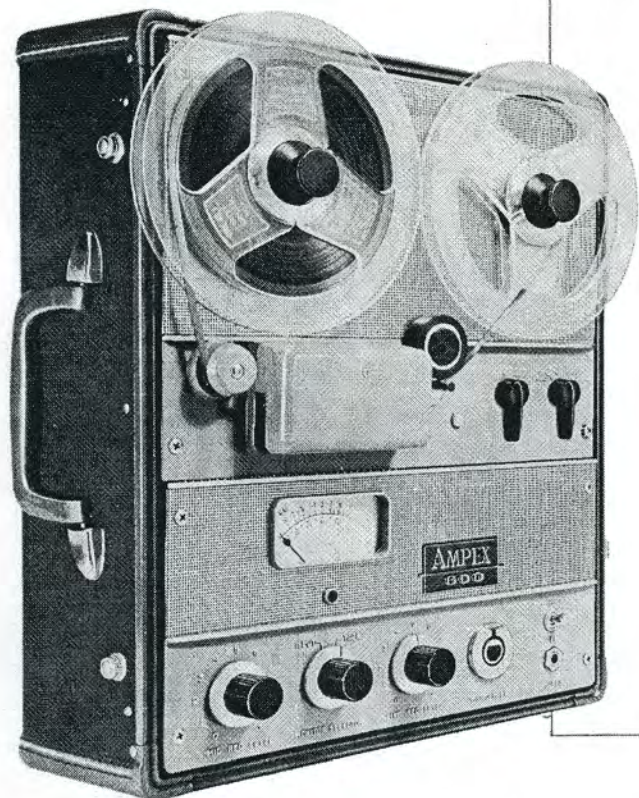


THE PERFECTION  
IN SOUND RECORDING THAT ONLY AN AMPEX CAN PROVIDE  
NOW IN A TRULY PORTABLE SIZE  
AT A NEW LOWER PRICE



# THE **AMPEX** 600 — HIGHEST QUALITY IN THE SMALLEST

## A TRUE AMPEX IN PERFORMANCE



**Ampex Fidelity Assured** . . . Like all Ampex models, specifications for the 600 are conservative ratings, not exaggerated claims. **Each** Model 600 Recorder is factory-tested to equal or exceed its published performance figures.

**Studio Console Performance** . . . At its 7½ ips speed, the Model 600 has performance comparable to the larger Ampex machines in these important characteristics:

- Frequency response 40 to 15,000 cps.
- Signal-to-noise ratio over 55 db.
- Flutter and wow under 0.25%.
- Timing accuracy within  $\pm 3.6$  seconds for its full tape length of 30 minutes.
- Direct-reading meter for record level control.
- 3 separate heads (erase, record and playback) and separate record and playback amplifiers.

## NEW VERSATILITY

### . . . For Broadcast Studios

For outside or in, the Model 600 is a heavy duty, all-purpose machine. It combines high fidelity, accurate timing, durability and freedom from noise to a degree never before available at its price. For stations presently equipped with the larger Ampex machines, the 600 provides matching quality in truly portable equipment.

### . . . For Musicians, Conservatories and Schools

It is the machine for music rehearsals where sound of constant pitch and imperceptible distortion is desired. It can be started and stopped at any place throughout its full tape length and still be in tune with the band, orchestra or soloist.

### . . . For Audio Visual Education

Ampex 600's can be the "master recorders" of the school or school system. They provide quality where quality is needed — in music, and in tapes for recopying, for radio broadcast, for competition or for demonstration. Yet the 600 is rugged, and readily portable from one classroom to another.

### . . . For High Fidelity Enthusiasts

Its matchless Ampex fidelity makes it a possession of envy among "adventurers in recorded sound" and persons who know and appreciate truly fine reproduction of music.



*Never before could so much be recorded so well on a machine so small.*

## PACKAGE

The Ampex 600 is a 28-pound professional tape recorder for highly critical users: broadcast stations, recording studios, high fidelity enthusiasts, educational institutions and others. It has the same performance excellence as its companion console model the Ampex 350. A recording made on the 600, when played back side-by-side with the same recording from the 350, gives the same class of fidelity and equal accuracy of timing and pitch.

### • WITH NEW LOWER PRICE

Model 600 gives proven Ampex quality at a price substantially lower than any previous Ampex equipment. It is lower in price than any comparable recorder of equivalent fidelity.

#### ... Achieved by Greatly Simplified Design

The 600 uses the same quality of components as other Ampex machines, but it is much smaller in size and uses 5 or 7-inch (or smaller) RMA reels. It operates at the one most economical tape speed that achieves the recognized standards of Ampex performance. Through ingenious design and simplification, it has fewer electronic and mechanical parts.

### • WITH NEW PORTABILITY

Weighs less than 28 pounds... The Ampex 600 is the lightest of any truly high fidelity professional tape recorder. It can be carried anywhere in one hand.

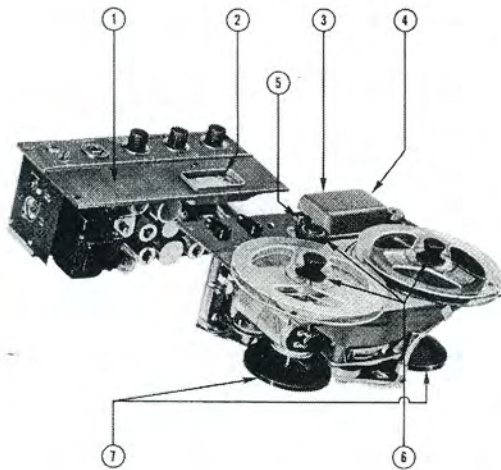
**Rugged!**... The 600 has a special deep-ribbed top-plate casting which is mounted in a rugged Samsonite case. All of its parts are life-tested for rough usage in the field. It withstands the bumps and hazards of transportation by car, bus, truck, train or plane.

#### ... Gives More Hours of Reliable Service per Dollar

This machine will give exceptional service for years of heavy professional use. Vital mechanical parts have been severely life-tested at the equivalent of greater than 10 years operation; lesser parts have been tested for 30,000 to 40,000 operations. Prototype models have been tested by typical users in many fields and their comments and suggestions have been incorporated into the final design.



## NO OTHER PORTABLE RECORDER IS BUILT WITH ...



### SUCH PRECISION AND ALL THESE COMPONENTS

- 1 Separate record and playback amplifiers.
- 2 Direct-reading meter for recording level.
- 3 Separate erase, record and playback heads.
- 4 Magnetic playback head gap width: .00025 inches.
- 5 Tape capstan runs true within .0002 inches (total indicator reading).
- 6 Extremely close tolerances in all bearings and shafts.
- 7 Tape tension controlled to 8 ounces maximum.

LET PERFORMANCE BE YOUR GUIDE — BUY

AMPEX

## OTHER PRACTICAL FEATURES

### EASE OF OPERATION

- "Wrap around" threading—only one hand is needed to thread tape onto machine.
- Tape reaches full speed in less than one second.
- Can go from **play to record (and erase)** position and back again without stopping the tape.

### ACCURATE PROGRAM CONTROL

- Meter indicates quantitative record levels. The exact program level is known at all times. There is no "guesswork" as is the case with flashing lights.
- Independent level controls for microphone and line provide a "built-in" two channel mixer.
- Phone jack permits monitoring input to record head or the playback output of tape while recording.
- Record safety button—prevents unintentional erasures.

### EASY ON TAPE

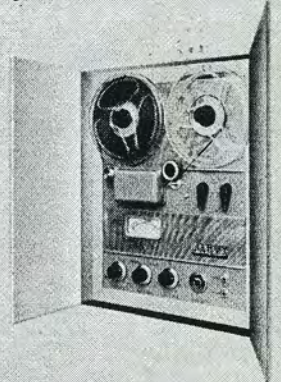
- Low tape tension in all operating modes (8 ounces maximum).
- Interlocking tape-motion controls permit quick change of direction without over-stressing tape.

### EASE OF MAINTENANCE

- "Lift out" accessibility—the mechanical and electronic assemblies can be removed independently.
- The machine may be operated and serviced in a vertical or horizontal position.

### ADAPTABLE TO THE "HI-FI" HOME

- It is easy to adapt the Model 600 to console or "built-in" installation in the home. Its separate mechanical and electronic assemblies can be mounted in any most pleasing manner.





## GENERAL PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

TAPE SPEED	7½ in./sec. full track.
REEL SIZE	7" RMA reel maximum; top may be closed with 5" reels.
FREQUENCY RESPONSE	40 to 15,000 cycles/sec.; down no more than 4 db at 15,000; ± 2 db from 40 to 10,000 cycles/sec.
SIGNAL-TO-NOISE RATIO	Over 55 db at 3% harmonic distortion.
FLUTTER AND WOW	Below 0.25%.
STARTING TIME	Instantaneous (tape accelerates to full play mode in less than one second).
STOPPING TIME	Less than one second.
PLAYING TIME	32 minutes with 7 inch, 1200-foot reel.
FAST FORWARD OR REWIND TIME	90 seconds for full 1200-foot reel.
PLAYBACK TIMING ACCURACY	± 0.2% (± 3.6 seconds in a 30 minute recording).
OPERATING MODES	Play — Record: Selector Switch (safety button must be pressed when going from Play to Record). Fast Forward — Rewind: Selector Switch (Interlocked with Play — Record Switch).
LEVEL CONTROLS	Separate Mixing Controls: Microphone Record Level, and Line Record Level. Professional Meter reads directly all operating levels.
RECORD INPUTS	Microphone: Accommodates high impedance microphone (may be modified to low impedance microphone input by adding accessory transformer). Line: 0.5 volt required for program record level (1% distortion).
PLAYBACK OUTPUT	1.25 volts into 10,000 ohm load at program level.
MONITORING	Phone jack permits monitoring the input to the record head or the playback output of the tape while recording. This is done with a Monitor Selector Knob which is turned to "Input" or "Tape."
AMPLIFIERS	Separate record, playback, microphone and line input amplifiers are used. Amplifier distortion at any operating level is negligible.
HEAD HOUSING	Separate erase, record and playback heads are contained in a single head housing.
POWER REQUIREMENTS	117 volts, 60 cycles; .52 amperes, 61 watts.
DIMENSIONS	Transport top area: 9 <sup>5</sup> / <sub>16</sub> " x 12½". Electronic top area: 6 <sup>7</sup> / <sub>8</sub> " x 12¼". Depth below top plate: 5". Overall size, including carrying case: 8" x 13¼" x 16½".
WEIGHT	Less than 28 pounds.
ACCESSORIES	Low Impedance Microphone Transformer Kit: Catalog No. 9359.

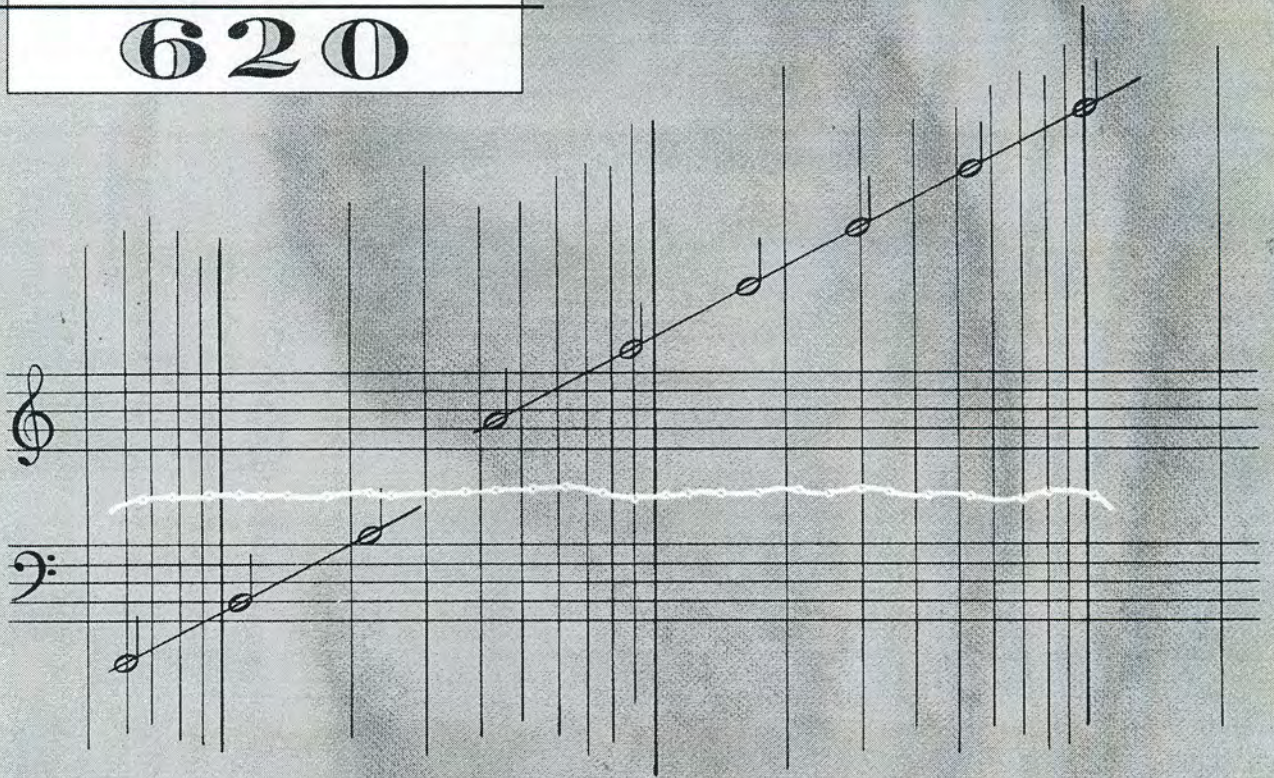


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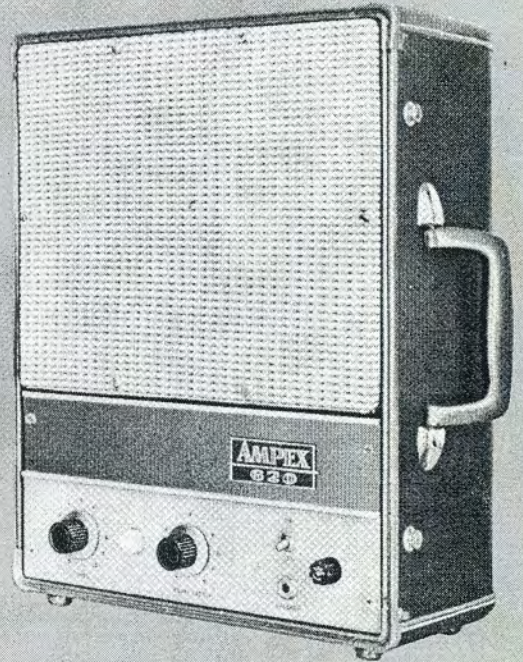
## 620



**SOUND FOR THE GOLDEN EAR**  
*from a speaker the size of an overnight case*

### AMPEX 620 AMPLIFIER-SPEAKER

IT HAS FLAT ACOUSTIC RESPONSE! . . . thus one of the ultimate ideals in sound reproduction has become a reality. By standard measuring techniques in air the Ampex 620 gives response that is free from irregularities over the entire 65 to 10,000 cycle range, with substantial response present above and below. To achieve this at all would be engineering triumph enough. But that this is accomplished in a portable unit of this size is something that must be heard to be believed.



# AMPEX

## 620

for the **GOLDEN EAR**

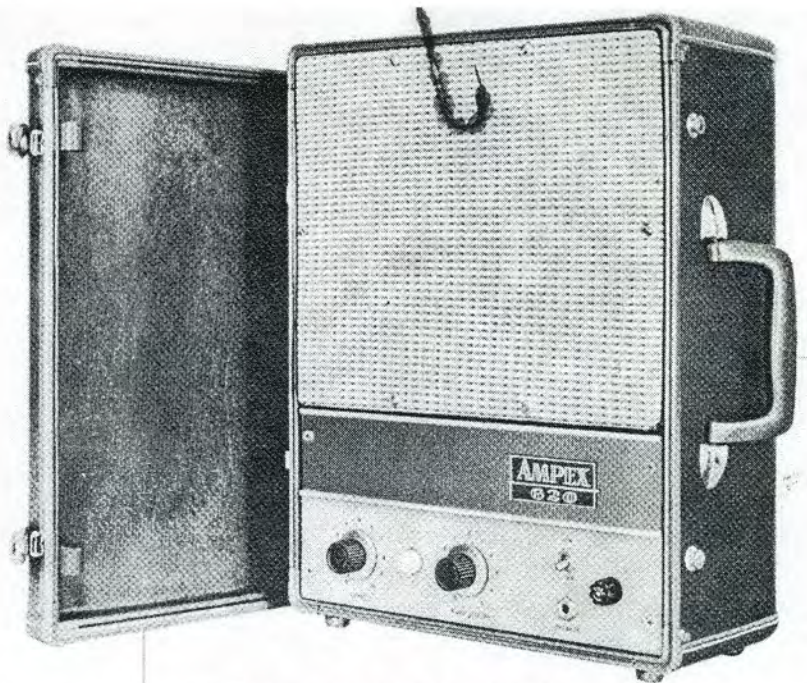
In a private demonstration an Ampex 620 was heard by one of the country's best known symphony conductors. A tape recording was played. It began with a brief spoken description of the 620. Then there was a short orchestral selection. The distinguished musician's face lighted up with spontaneous enthusiasm. The complimentary things he later said were hardly necessary. The things his face had said were testimonial enough.

### NEW STRENGTH IN THE WEAKEST LINK

In the chain of sound reproduction equipment, the Ampex 620 provides strength where strength has been needed. Speakers have always been the weak link. They have been plagued by "peaks and valleys" tending to overemphasize some frequencies and lose others. The fact that the Ampex 620 puts out actual sound that is uniform from 65 to 10,000 cycles is revolutionary. Bass is full but not boomy. Highs are brilliant and undistorted. Even when using its full 10 watts, the 620's output is remarkably free of harmonic and intermodulation distortion. To the listener the effect is startling realism.

### A SIZE THAT'S A GREAT SURPRISE

Imagine taking your high fidelity reproducing system over to a friend's home for the evening or across the country as luggage. This is the new mobility that the Ampex 620 gives to high fidelity sound reproduction. The Ampex 620 disproves the theory that a speaker must necessarily be large to have power, clarity and extended frequency range. Performance of the Ampex 620 is the result of a completely integrated design. The loudspeaker unit, enclosure, amplifier and reciprocal network were each designed with great care to operate with each of the other components. Together they achieve a near perfect mutual compensation. (A more detailed technical explanation is given on the back page.)



## THE AMPEX 620 AMPLIFIER-SPEAKER

### FIDELITY

Speaker output is uniform from 65 to 10,000 cycles and has useful range above and below these frequencies. Harmonic and intermodulation distortion are very low.

### POWER

Amplifier output is 10 watts with less than 1% harmonic distortion. Volume is more than ample for homes and completely adequate for conference halls, classrooms, small auditoriums.

### PORTABILITY

Total weight is only 25 pounds. Dimensions are 13 x 16 x 8 inches. Case is sturdy Samsonite and the entire unit is of shockproof design to withstand normal travel handling.

### VERSATILITY

The Ampex 620 can amplify from tape recorder, turntable, record changer, AM-FM tuner or pre-amplified microphone. It is equally desirable as a semi-fixed home installation or as a portable. Its handsome Arizona brown case looks good in any surroundings.

### ADAPTABILITY

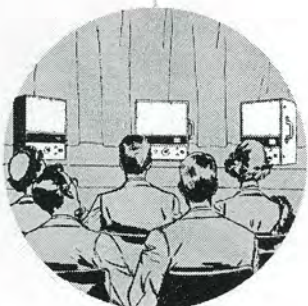
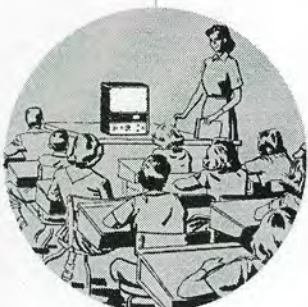
An external speaker jack is provided. When in use, it bypasses the internal speaker and its reciprocal network, letting the Ampex 620 be used as an all-purpose 10 watt amplifier. Amplifier frequency response is 20 to 20,000 cycles  $\pm 1/2$  db.



## AMPEX 600 - 620 ultra-fidelity combination

The perfect sound source for the Ampex 620 Amplifier-Speaker is its matching companion piece, the Ampex 600 Tape Recorder. Likewise a separate speaker unit like the 620 is the only kind that can do justice to the 600's performance. The two were designed for each other. Both are portable. Both are remarkably versatile. And both have fidelity that surpasses any comparable unit.

The Ampex 600 can put onto tape almost any conceivable combination of music, speech or sounds. Whether taken from live sources, recordings or broadcasts, these sounds will lose no perceptible quality in being taped. The Ampex 600 and 620 together can go anywhere. And together they can reproduce any program of music and speech with startling fidelity.



## APPLICATIONS UNLIMITED

**For the home** the Ampex 620 provides a higher quality of reproduction than has ever before been available at moderate cost. Your radio tuner, phonograph, TV or tape recorder will all sound better through the 620. It makes minimum space demands and can be moved from room to room as desired.

**For the audiophile** the Ampex 620 is the backbone of a "walking Hi-Fi system." It provides greater fidelity than most speaker consoles of far greater size — particularly if used with its companion piece the Ampex 600 Tape Recorder. The 620's 10 watt amplifier can serve any purpose.

**For lectures and sales shows**, the Ampex 620 is a sound system that can travel. It assures the highest possible quality of sound and provides complete independence from locally available (and usually inadequate) facilities.

**For the sound engineer** the Ampex 620 is an ideal means for checking room acoustics and sound equipment performance. Quality of the 620 is more than ample to reveal the character of other portions of the sound system.

**For the custom music shop** the Ampex 620 is a ready means to demonstrate high fidelity music reproduction from discs or tape in the home or premises of prospective customers.

**For musicians and ensemble groups** the Ampex 620 and its companion, the Ampex 600 Tape Recorder, are invaluable aids to practice, rehearsal and teaching. They let performers hear themselves exactly as the audience hears them.

**For schools** the Ampex 620 makes it feasible to use high quality professional tape recorders such as the Ampex 600. They can serve for band, orchestra and gleeclub rehearsal, giving quality of music reproduction that no small recorder has ever before provided.

**For music appreciation classes** the Ampex 620 has power and fidelity that let every member of the class hear music at its best. The 620 is rugged and easily moved from room to room.

**For broadcasters and recording studios** the Ampex 620 is an efficient monitoring system either inside or out, and is a perfect means for demonstrating program material to prospective advertisers at their own locations.

**For stereophonic sound** the Ampex 620 makes mobile use and demonstration feasible. Since two, three or more amplifier-speaker units are a basic requirement, the compactness of multiple 620's results in a great saving in weight and bulk.

MODEL

620

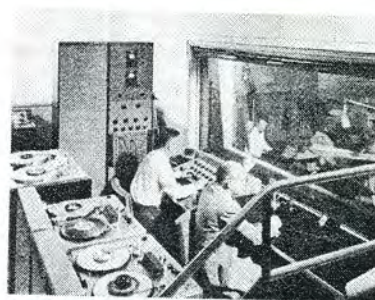
## AMPLIFIER-SPEAKER

### WHY A GREAT SPEAKER SHOULD COME FROM AMPEX

"Necessity is the mother of invention" and nowhere else has the need been greater. Ampex builds the finest recording machines in use today. They make master tapes for today's fine Lp records. They record the big radio shows. They are used by every major broadcast network. And they can record sound as true to life as the human ear can perceive. But no loud-speaker in existence can reproduce this sound with equal perfection. The recent Ampex 600 Tape Recorder demands still more. It performs like the big studio Ampexes, but it weighs only 28 pounds. An

ideal speaker would have to match the Ampex 600 in portability as well as fidelity. No existing one has come close. Those with quality were big. Bigness was assumed to be essential. Ampex challenged the assumption.

The Ampex 620 Amplifier-Speaker was the result. It achieves a uniformity of response that is an ultimate aim of even the largest speakers. Ampex engineers met the challenge. They made a speaker as small as their Model 600 tape recorder. And it approached its fidelity as well.



Ampex Recorders making master tapes at Capitol Records, Inc.

### HOW FIDELITY AND PORTABILITY WERE COMBINED

Performance of the Ampex 620 is achieved by a carefully integrated design of all components. Each was specially built for the 620.

Heart of the Ampex 620 is an 8-inch speaker of special design. It was developed by Ampex engineers to utilize a high degree of bass and treble boost without undue harmonic or intermodulation distortion. Notable features are longer voice coil travel, large

magnet size and flexible diaphragm mounting. All are unusual for any speaker, and particularly for one of this size.

The 10-watt power amplifier is of push-pull design. It is a conventional high fidelity type but is unusual for its fast transient overload recovery. In conjunction with the amplifier is a "reciprocal network." It forms an accurate upside down version of the speaker and

enclosure characteristics. Since the speaker is designed to utilize the boost from this network, the result is a uniform response curve that is virtually perfect. (The network is bypassed when the amplifier is used for an external speaker.)

Two-thirds of the portable case forms the speaker enclosure. Portability dictated these dimensions as a beginning point of the Ampex 620 design. Speaker and reciprocal network were designed to be acoustically correct with this enclosure only.

### MODEL 620

OVERALL FREQUENCY RESPONSE (in air)

AMPLIFIER FREQUENCY RESPONSE

POWER OUTPUT  
SIGNAL-TO-NOISE RATIO  
CONTROLS AND CONNECTIONS

EQUALIZATION

EXTERNAL SPEAKER FEED

INPUT IMPEDANCE  
OUTPUT IMPEDANCE  
POWER REQUIREMENT  
WEIGHT  
DIMENSIONS

### GENERAL PERFORMANCE CHARACTERISTICS AND SPECIFICATIONS

65 to 10,000 cycles/sec. essentially flat. The 620 also has substantial response beyond these limits.

\*Response curve established by a test microphone in free field on axis with unit radiating into semi-infinite space of  $2\pi$  steradians solid angle. Actual use will approximate this condition when the 620 is placed in a good acoustical environment. Tests were made with 7 component multitones of quarter octave overall width.

20 to 20,000 cycles/sec.  $\pm 1/2$  db.

10 watts amplifier power with less than 1% harmonic distortion. Speaker can use full power.

Amplifier noise (including hum) is 70 db below rated output.

Level control, equalization control, power switch and on-off indicator light are provided. Cable for A.C. power is furnished and also an A.C. convenience outlet is built in. Audio input connector is of the concentric pin type. External speaker connection is a headphone type jack.

Single control on front panel gives a level tilt to speaker output, boosting the bass and attenuating the treble or vice versa. Maximum bass boost is 6 db relative to treble. Maximum treble boost is 6 db relative to bass.

Use of the external speaker jack automatically cuts out the 620's speaker and reciprocal network. Hence, flat amplifier output is fed to the external speaker.

20,000 ohms.

12 ohms to external speaker.

117 volts, 50 or 60 cycles, 0.5 amps, 55 watts.

25 pounds.

13 x 16 x 8 inches.

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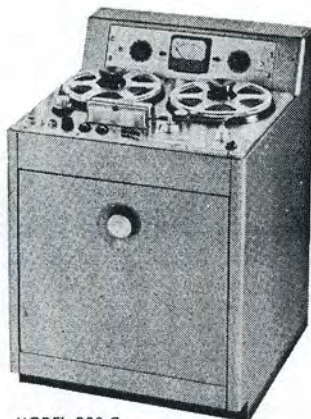
NOTE: All prices contained herein are F.O.B. Redwood City, California, and are subject to change without notice.



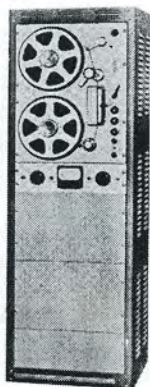
**SERIES 300**

**AUDIO MAGNETIC TAPE RECORDERS (For 115 Volts A.C.)**

USER'S NET PRICES



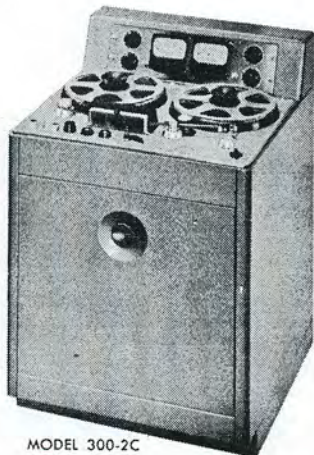
MODEL 300-C



MODEL 300-R



MODEL 300-S



MODEL 300-2C

**MODEL 300-C CONSOLE RECORDER**

Price includes power supply; record and playback amplifiers; separate erase, record and playback heads; two standard 10 1/2" NARTB reels and meter control panel for matching or bridging input\*.

TAPE SPEEDS: 7 1/2 and 15 in/sec.

FREQUENCY RESPONSE:

±2db—30 to 15,000 cycles at 15 in/sec.

±4db—30 to 15,000 cycles at 7 1/2 in/sec.

±2db—40 to 10,000 cycles at 7 1/2 in/sec.

SIGNAL-TO-NOISE RATIO:

Over 60 db by NARTB standards

FLUTTER AND WOW:

Under .1% at 15 in/sec.

Under .2% at 7 1/2 in/sec.

TIMING ACCURACY: ±3.6 sec. in 30-minutes.

Complete specifications are available from your Ampex distributor.

Order by these catalog numbers:

For 60 cycles with bridging input — 4408C

For 60 cycles with matching input — 4409C

For 50 cycles with bridging input — 4423C

For 50 cycles with matching input — 4424C

\$

1860.00

**MODEL 300-R RACK TYPE RECORDER**

This model is designed for mounting in standard 19-inch relay racks. Components and specifications are the same as those of Model 300-C.

Order by these catalog numbers:

For 60 cycles with bridging input — 4408R

For 60 cycles with matching input — 4409R

For 50 cycles with bridging input — 4423R

For 50 cycles with matching input — 4424R

1775.00

LESS RACK

**MODEL 300-S TWO CASE PORTABLE RECORDER**

This model is mounted in two portable cases. Components and specifications are the same as those of Model 300-C.

Order by these catalog numbers:

For 60 cycles with bridging input — 4408S

For 60 cycles with matching input — 4409S

For 50 cycles with bridging input — 4423S

For 50 cycles with matching input — 4424S

1875.00

**MODEL 300-2C STEREOPHONIC RECORDER IN CONSOLE CABINET**

Price includes two power supplies; two record and playback amplifiers; full track erase and dual heads; two standard 10 1/2" NARTB reels and dual meter control panel for matching or bridging input\*.

TAPE SPEEDS: 7 1/2 and 15 in/sec.

FREQUENCY RESPONSE:

±2db—50 to 15,000 cycles at 15 in/sec.

±4db—40 to 15,000 cycles at 7 1/2 in/sec.

±2db—50 to 10,000 cycles at 7 1/2 in/sec.

SIGNAL-TO-NOISE RATIO:

Over 60 db by NARTB standards.

FLUTTER AND WOW:

Under .1% at 15 in/sec.

Under .2% at 7 1/2 in/sec.

TIMING ACCURACY: ±3.6 sec. in 30-minutes.

Complete specifications are available from your Ampex distributor.

Order by Model No. 300-2C, specifying bridging or matching input and 50 or 60 cycle power source.

3185.00

**MODEL 300-2R RACK TYPE STEREOPHONIC RECORDER**

This model is designed for mounting in standard 19-inch relay racks. Components and specifications are the same as those of Model 300-2C.

Order by Model No. 300-2R, specifying bridging or matching input and 50 or 60 cycle power source.

3010.00

LESS RACK

**MODEL 301**

Same as Model 300, except for tape speed as follows: TAPE SPEED: 15 and 30 in/sec.

For performance specifications consult your Ampex distributor.

Order by catalog number, specifying bridging or matching input\* and 50 or 60 cycle power source.

Console—Catalog No. 1121-C

Rack type—Catalog No. 1121-R

Portable—Catalog No. 1121-S

1985.00

1900.00

LESS RACK

2000.00

**MODEL 305**

Same as Model 300, except for tape speed as follows: TAPE SPEED: 7 1/2, 15 and 30 in/sec.

For performance specifications consult your Ampex distributor.

Order by catalog number, specifying bridging or matching input\* and 50 or 60 cycle power source.

Console—Catalog No. 1841-C

Rack Type—Catalog No. 1841-R

Portable—Catalog No. 1841-S

2110.00

2025.00

LESS RACK

2125.00

Machines of the 300 series are also available at tape speeds listed below. Consult your Ampex distributor for complete specifications, and delivery information.

1 1/2 and 3 3/4 in/sec.

3 3/4 and 7 1/2 in/sec.

1 1/2, 3 3/4 and 7 1/2 in/sec.

3 3/4, 7 1/2 and 15 in/sec.

375.00

ADDITIONAL

550.00

ADDITIONAL

**\*NOTE:**

If meter control panel is not required on any series 300 machine, so specify, and deduct the following amounts from the list prices above:

Single recording models

Stereophonic models

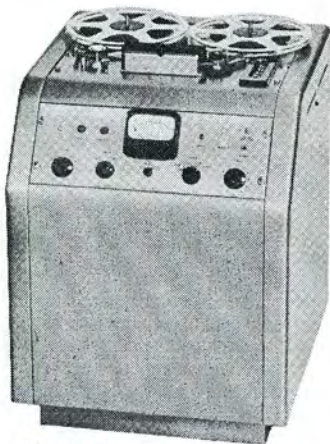
125.00

410.00

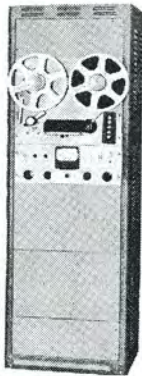
**SERIES 400**

**AUDIO MAGNETIC TAPE RECORDERS** (For 115 Volts A.C.)

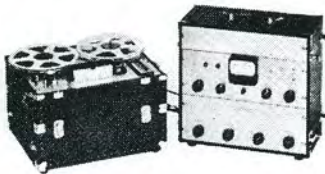
USER'S NET PRICES



MODEL 403-C



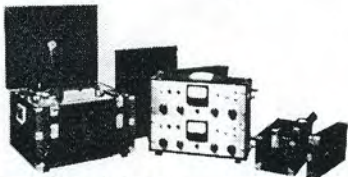
MODEL 403-R



MODEL 403-P (Mixer not included in price)



MODEL 401-A



MODEL 403-2S

**MODEL 403-C CONSOLE RECORDER**

Price includes power supply; record and playback amplifiers; separate erase, record and playback heads; meter control panel; two standard 10 1/2" NARTB reels; input selector for microphone or line and internal output line termination.

TAPE SPEEDS: 7 1/2 and 15 in/sec.

FREQUENCY RESPONSE:

±2db—30 to 15,000 cycles at 15 in/sec.

±4db—30 to 15,000 cycles at 7 1/2 in/sec.

±2db—40 to 10,000 cycles at 7 1/2 in/sec.

TIMING ACCURACY: ±3.6 seconds for a 30-minute recording.

Complete specifications are available from your Ampex distributor.

For 60 cycles order catalog No. 3675

SIGNAL-TO-NOISE RATIO:

Over 55 db by NARTB standards.

FLUTTER AND WOW:

Under .2% at 15 in/sec.

Under .25% at 7 1/2 in/sec.

Under .25% at 7 1/2 in/sec.

For 50 cycles order catalog No. 3675-1

\$

995.00

**MODEL 402-C CONSOLE RECORDER**

Same as Model 403 except for half-track erase, record and playback heads.

For 60 cycles order catalog No. 3672

For 50 cycles order catalog No. 3672-1

995.00

**MODEL 403-R RACK TYPE RECORDER**

This model is designed for mounting in standard 19-inch relay racks. Components and specifications are the same as Model 403-C console.

For 60 cycles order catalog No. 3676

For 50 cycles order catalog No. 3676-1

975.00  
LESS RACK

**MODEL 402-R RACK TYPE RECORDER**

This model is the same as the 403-R except for use of half-track erase, record and playback heads.

For 60 cycles order catalog No. 3673

For 50 cycles order catalog No. 3673-1

975.00  
LESS RACK

**MODEL 403-P TWO CASE PORTABLE RECORDER**

Specifications and components are the same as the Model 403-C console. The top plate assembly is in one portable case. The power supply and amplifiers are in a second case. This electronics case is furnished in two sizes—small to include only the power supply and amplifiers or large to include the power supply and amplifiers and space for a four-channel mixer, Cat. No. 3671. The necessary interconnecting cables are furnished.

For 60 cycles with large electronics case order catalog No. 3677

Same with small electronics case order catalog No. 4125

For 50 cycles with large electronics case order catalog No. 3677-1

Same with small electronics case order catalog No. 4125-1

1045.00

**MODEL 402-P TWO CASE PORTABLE RECORDER**

Same as Model 403-P except for half-track erase, record and playback heads.

For 60 cycles with large electronics case order catalog No. 3674

Same with small electronics case order catalog No. 4124

For 50 cycles with large electronics case order catalog No. 3674-1

Same with small electronics case order catalog No. 4124-1

1045.00

**MODEL 401-A SINGLE CASE PORTABLE RECORDER**

Specifications and components of this recorder are the same as the Model 403. The electronic layout has been modified to permit mounting in a single portable case.

For 60 cycles order catalog No. 1996

For 50 cycles order catalog No. 3379

985.00

**MODEL 400-A SINGLE CASE PORTABLE RECORDER**

Same as Model 401-A except for use of half-track erase, record and playback heads.

For 60 cycles order catalog No. 1048

For 50 cycles order catalog No. 3377

985.00

**MODEL 403-2S PORTABLE STEREOGRAPHIC RECORDER**

Components are the same as the Model 403-C except that the unit is mounted in three portable cases — one for the top plate assembly, one for the two sets of amplifiers and one for the two power supplies necessary for stereographic work. Full track erase and dual track record and playback heads are provided. All interconnecting cables are furnished.

For 60 cycles order catalog No. 4043

For 50 cycles order catalog No. 4043-1

1575.00

**MODEL 403-2R RACK TYPE STEREOGRAPHIC RECORDER**

Specifications and components of this model are the same as the Model 403-2S. It is designed for mounting in standard 19-inch relay racks.

For 60 cycles order catalog No. 4042

For 50 cycles order catalog No. 4042-1

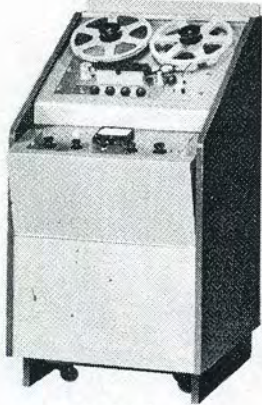
1475.00  
LESS RACK

**NOTE:** Any 400 series recorder can be modified for 15 and 30 in/sec. tape speed at added cost of \$150. Starting time is increased to approximately 4 seconds at both speeds.

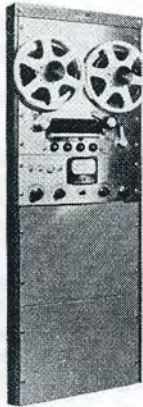
 No. 1734	<b>MODEL 380 SPEEDLOCK CONTROL TRACK GENERATOR</b> for motion picture synchronization. Catalog No. 1734 Carrying case, Catalog No. 2359	\$ 275.00 30.00	 No. 3936	<b>CARRYING CASE</b> for Power Supplies (2) As used with Stereophonic Recorder. Catalog No. 3936	\$ 21.00
 No. 1643	<b>MODEL 380 DIFFERENTIAL PLAYBACK UNIT</b> for motion picture synchronization. MOUNTING: For standard 19-inch relay racks. Catalog No. 1643	1325.00 LESS RACK	 No. 825	<b>CASTERS</b> Kit of (4) for Console Models 402-403 includes Mounting Block, Ballbearing casters, screws. Catalog No. 3963 (Factory installed)	7.50 15.00
 No. 2188	<b>MODEL 380 POWER AMPLIFIER</b> for motion picture synchronization. MOUNTING: For standard 19-inch relay racks. Catalog No. 2188	500.00 LESS RACK	 No. 841	<b>PLEXIGLASS DUST COVER</b> for Series 300 recorders. Catalog No. 825	60.00
 No. 543	<b>MODEL 385 THREE CHANNEL MIXER</b> for Series 300 recorders with individual microphone pre-amplifiers. MOUNTING: For rack mount or portable recorder. Catalog No. 543	435.00	 No. 475	<b>MODEL 375 PRECISION 60 CYCLE POWER SUPPLY</b> to furnish operating current for 300 and 400 series recorders in locations where the regular power frequency is unreliable. Catalog No. 841	600.00
 No. 3761	<b>FOUR CHANNEL MIXER</b> for use with Models 402 and 403, includes individual microphone pre-amplifiers. For rack mount or portable machines only. Does not include enclosure as it is intended for use with large electronics case supplied with Models 403-P and 402-P or on rack. Catalog No. 3761	250.00	 No. 3766	<b>COMPLETE REPLACEMENT HEAD</b> for Series 300 and 400 standard audio recorders. (Credit of \$100 is issued on receipt of replaced head.) Catalog No. 475	175.00
 No. 565	<b>CONSOLE CABINET</b> for Model 300 Recorders including Cooling Fan Assembly. Catalog No. 565	197.00	 No. 704	<b>REMOTE CONTROL UNIT</b> for Models 400-A, 401-A, 402 and 403; wired and ready to operate (includes 30 ft. of seven conductor cable and necessary plugs). Catalog No. 3766 Additional Wire per ft.	60.00 .15
 No. 3663	<b>CONSOLE CABINET</b> for Model 402-403 Recorders. Catalog No. 3663	140.00	 No. 3766-1	<b>REMOTE CONTROL UNIT</b> on flat plate for mounting in studio console, not wired, no cable or connections included. Catalog No. 3766-1	25.00
 No. 1193	<b>PORTABLE CASE</b> for Model 400-A or 401-A. Catalog No. 1193	65.00	 No. 3692	<b>HEAD DEMAGNETIZER</b> Catalog No. 704	7.50
 No. 3663	<b>MECHANICAL TOP PLATE CASE</b> for 2 Case Portable Recorder or Stereophonic Top Plate. Catalog No. 3692	65.00	 No. 3693	<b>STANDARD ALIGNMENT TAPE</b> for 15 IPS Recorders (used to set level-check Frequency Response — align Head). Catalog No. 4494	11.00
 No. 1193	<b>ELECTRONIC CASE</b> for 2 Case Portable Recorder. Includes space for Four-Channel Mixer. Also used for Electronics of Model 403-2S Stereophonic Recorder. Catalog No. 3693	50.00	 No. 4402	<b>REEL HOLD DOWN KNOB</b> for Rack Mounted Units. For all recorders except Series 300 machines having serial numbers below 1600. Catalog No. 4402 For Series 300 machines with serial numbers below 1600. Catalog No. 534D	6.75 EACH 6.75 EACH
	<b>PEDESTAL</b> for series 400 Consoles to raise height to 39 3/4 in. Catalog No. 3795	20.00	 No. 1917	<b>REEL EDITING KNOBS</b> Catalog No. 1917	3.50 EACH

# SERIES 350

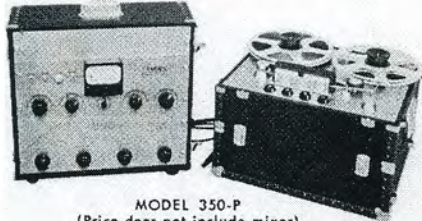
EFFECTIVE OCTOBER 4, 1953



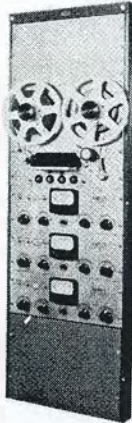
MODEL 350-C



MODEL 350-R



MODEL 350-P  
(Price does not include mixer)



MODEL 350-3R

## AUDIO MAGNETIC TAPE RECORDERS (For 115 Volts A.C.)

USER'S NET PRICES

**MODEL 350-C CONSOLE RECORDER (Full track)** Price includes power supply; record and playback amplifiers; separate erase, record and playback heads; integral meter control panel; two standard 10½" NARTB reels; and input for microphone or line.  
**TAPE SPEEDS:** 7½ and 15 in/sec. or 3¾ and 7½ in/sec.  
**SIGNAL-TO-NOISE RATIO:** At 7½ and 15 in/sec. over 60 db referred to 3% harmonic distortion at 400 cps.; at 3¾ in/sec. over 50 db.  
**FREQUENCY RESPONSE:**  
 ±2 db from 30 to 15,000 cycles at 15 in/sec.  
 ±2 db from 40 to 10,000 cycles at 7½ in/sec.  
 ±4 db from 30 to 15,000 cycles at 7½ in/sec.  
 ±2 db from 50 to 7,500 cycles at 3¾ in/sec.  
**FLUTTER AND WOW:** (Peak values)  
 Well under 0.2% at 15 in/sec.  
 Well under 0.25% at 7½ in/sec.  
 Well under 0.3% at 3¾ in/sec.  
**TIMING ACCURACY:** ±3.6 seconds in 30 minutes.  
 Complete specifications are available from your Ampex distributor.  
**IN ORDERING, SPECIFY:** Tape speeds (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

\$

1195.00

**MODEL 350-C CONSOLE RECORDER (Half track)** Same as full track recorder except that it incorporates half-track erase, record and playback heads. Signal-to-noise ratio is over 55 db at 7½ and 15 in/sec. referred to 3% harmonic distortion at 400 cps.; at 3¾ in/sec. over 50 db.  
**IN ORDERING, SPECIFY:** Half track model, tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1195.00

**MODEL 350-R RACK TYPE RECORDER (Full track)** This model is designed for mounting on a standard 19-inch relay rack. Components and specifications are the same as the 350-C full track console recorder.  
**IN ORDERING, SPECIFY:** Tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1095.00  
LESS RACK

**MODEL 350-R RACK TYPE RECORDER (Half track)** Same as the 350-R full track except for half-track erase, record and playback heads. Signal-to-noise ratio is over 55 db at 7½ and 15 in/sec. referred to 3% harmonic distortion at 400 cps.; at 3¾ in/sec. over 50 db.  
**IN ORDERING, SPECIFY:** Half track model, tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1095.00  
LESS RACK

**MODEL 350-P TWO CASE PORTABLE RECORDER (Full track)** This model is mounted in two portable cases. Components and specifications are the same as the 350-C full track console recorder.  
**IN ORDERING, SPECIFY:** Tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1175.00

**MODEL 350-P TWO CASE PORTABLE RECORDER (Half track)** Same as the 350-P full track except for half-track erase, record and playback heads. Signal-to-noise ratio is over 55 db at 7½ and 15 in/sec. referred to 3% harmonic distortion at 400 cps.; at 3¾ in/sec. over 50 db.  
**IN ORDERING, SPECIFY:** Half track model, tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1175.00

**MODEL 350-2P PORTABLE STEREOPHONIC (2 track)** Specifications and components are the same as the Model 350-C except for dual track record and playback heads and inclusion of two power supplies, two record amplifiers and two playback amplifiers. Signal-to-noise ratio is approximately 55 db referred to 3% harmonic distortion at 400 cps. (measured on either track with the other track unmodulated). Three portable cases are provided, one for the top plate assembly, one for the two sets of amplifiers and one for power supplies. All interconnecting cables are furnished.  
**IN ORDERING, SPECIFY:** Tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1775.00

**MODEL 350-2R RACK TYPE STEREOPHONIC (2 track)** This model is designed for mounting on a standard 19-inch relay rack. Components and specifications are the same as the 350-2P portable stereophonic.  
**IN ORDERING, SPECIFY:** Tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

1695.00  
LESS RACK

**MODEL 350-3P PORTABLE STEREOPHONIC (3 track)** Specifications and components are similar to the Model 350-2P except that this model has three-track record heads, three-track playback heads, three sets of amplifiers and three power supplies. It is mounted in three portable cases. Signal-to-noise ratio is 52 db referred to 3% harmonic distortion at 400 cps. (measured on any one track with the other tracks unmodulated). All interconnecting cables are furnished.  
**IN ORDERING, SPECIFY:** Tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

2285.00

**MODEL 350-3R RACK TYPE STEREOPHONIC (3 track)** This model is designed for mounting on a standard 19-inch relay rack. Components and specifications are the same as the 350-3P portable three track stereophonic.  
**IN ORDERING, SPECIFY:** Tape speed (7½ and 15 in/sec. or 3¾ and 7½ in/sec.) and power supply frequency (60 or 50 cycle).

2175.00  
LESS RACK

**NOTE:** Any 350 Series recorder can be modified for 15 and 30 in/sec. tape speed at an added cost of

# REPRODUCERS

EFFECTIVE OCTOBER 4, 1953



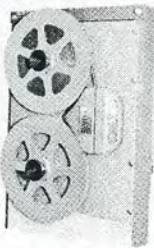
MODEL 350-C REPRODUCER



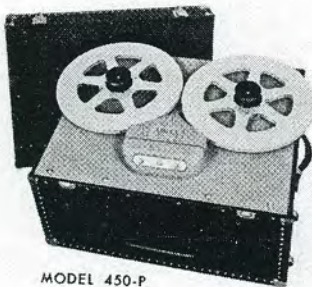
MODEL 450-T



MODEL 450-C



MODEL 450-R



MODEL 450-P

## AUDIO MAGNETIC TAPE REPRODUCERS (For 115 Volts A.C.)

	USER'S NET PRICES
<p><b>MODEL 350-C CONSOLE REPRODUCER (Full track)</b> Price includes power supply, playback amplifier, playback head and two standard 10½" NARTB reels. Output is at line level (+4 VU). Output level is screwdriver adjusted.</p> <p><b>TAPE SPEEDS:</b> 7½ and 15 in./sec. only.</p> <p>Complete specifications are available from your Ampex distributor.</p> <p><b>IN ORDERING, SPECIFY:</b> Power supply frequency (60 or 50 cycle).</p> <p><b>OTHER SPECIFICATIONS:</b> Same as the Model 350 full track recorders.</p>	<p>\$</p> <p>850.00</p>
<p><b>MODEL 350-C CONSOLE REPRODUCER (Half track)</b> Same as the full track reproducer except that it incorporates a half-track playback head. Signal-to-noise ratio is over 55 db referred to 3% harmonic distortion at 400 cps.</p> <p><b>IN ORDERING, SPECIFY:</b> Half track model and power supply frequency (60 or 50 cycle).</p>	<p>850.00</p>
<p><b>MODEL 350-R RACK TYPE REPRODUCER (Full track)</b> This model is designed for mounting on a standard 19-inch relay rack. Components and specifications are the same as the 350-C full track console reproducer.</p> <p><b>IN ORDERING, SPECIFY:</b> Power supply frequency (60 or 50 cycle).</p>	<p>825.00 LESS RACK</p>
<p><b>MODEL 350-R RACK TYPE REPRODUCER (Half track)</b> Same as the full track reproducer except that it uses a half-track playback head. Signal-to-noise ratio is over 55 db referred to 3% harmonic distortion at 400 cps.</p> <p><b>IN ORDERING, SPECIFY:</b> Half track model and power supply frequency (60 or 50 cycle).</p>	<p>825.00 LESS RACK</p>
<p><b>MODEL 450-T TABLE TOP CONSOLE REPRODUCER</b> (Can be converted to full height console by adding a cabinet base, Ampex Cat. No. 5945.) Price includes power supply, playback amplifier, two 14-inch reels with NARTB hubs and control unit (automatic or manual). This model uses 8-inch, 10½-inch or 14-inch NARTB reels. It has two half-track playback heads and plays in both forward and reverse directions without turning over the reels. Maximum unrepeatable playing time is over 8 hours at 3¾ in./sec. tape speed or over 4 hours at 7½ in./sec. tape speed.</p> <p><b>TAPE SPEED (Single speed):</b> 3¾ in./sec. (or 7½ in./sec. on special order).</p> <p><b>FREQUENCY RESPONSE:</b> ±2 db from 50 to 7,500 cycles at 3¾ in./sec. ±2 db from 50 to 10,000 cycles at 7½ in./sec. ±4 db from 50 to 15,000 cycles at 7½ in./sec.</p> <p><b>IN ORDERING, SPECIFY:</b> Controls (Automatic or manual), tape speed (3¾ in./sec. or 7½ in./sec.) and power supply frequency (60 or 50 cycle).</p> <p>3¾ in./sec., Automatic . . . . .</p> <p>7½ in./sec., Automatic . . . . .</p> <p>3¾ in./sec., Manual . . . . .</p> <p>7½ in./sec., Manual . . . . .</p>	<p>795.00</p> <p>820.00</p> <p>710.00</p> <p>735.00</p>
<p><b>MODEL 450-C FULL HEIGHT CONSOLE REPRODUCER</b> Same as Model 450-T except that the cabinet is full standing height.</p> <p><b>IN ORDERING, SPECIFY:</b> Controls (Automatic or manual), tape speed (3¾ in./sec. or 7½ in./sec.) and power supply frequency (60 or 50 cycle).</p> <p>3¾ in./sec., Automatic . . . . .</p> <p>7½ in./sec., Automatic . . . . .</p> <p>3¾ in./sec., Manual . . . . .</p> <p>7½ in./sec., Manual . . . . .</p>	<p>890.00</p> <p>915.00</p> <p>795.00</p> <p>820.00</p>
<p><b>MODEL 450-R RACK TYPE REPRODUCER</b> This model is designed for mounting on a standard 19-inch relay rack. Components and specifications are the same as Model 450-T. Price includes all necessary connecting cables.</p> <p><b>IN ORDERING, SPECIFY:</b> Controls (Automatic or manual), tape speed (3¾ in./sec. or 7½ in./sec.) and power supply frequency (60 or 50 cycle).</p> <p>3¾ in./sec., Automatic . . . . . LESS RACK</p> <p>7½ in./sec., Automatic . . . . . LESS RACK</p> <p>3¾ in./sec., Manual . . . . . LESS RACK</p> <p>7½ in./sec., Manual . . . . . LESS RACK</p>	<p>675.00</p> <p>700.00</p> <p>585.00</p> <p>610.00</p>
<p><b>MODEL 450-P SINGLE CASE PORTABLE REPRODUCER</b> This model is mounted in a single portable case. Components and specifications are the same as Model 450-T.</p> <p><b>IN ORDERING, SPECIFY:</b> Controls (Automatic or manual), tape speed (3¾ in./sec. or 7½ in./sec.) and power supply frequency (60 or 50 cycle).</p> <p>3¾ in./sec., Automatic . . . . .</p> <p>7½ in./sec., Automatic . . . . .</p> <p>3¾ in./sec., Manual . . . . .</p> <p>7½ in./sec., Manual . . . . .</p>	<p>750.00</p> <p>775.00</p> <p>660.00</p> <p>685.00</p>