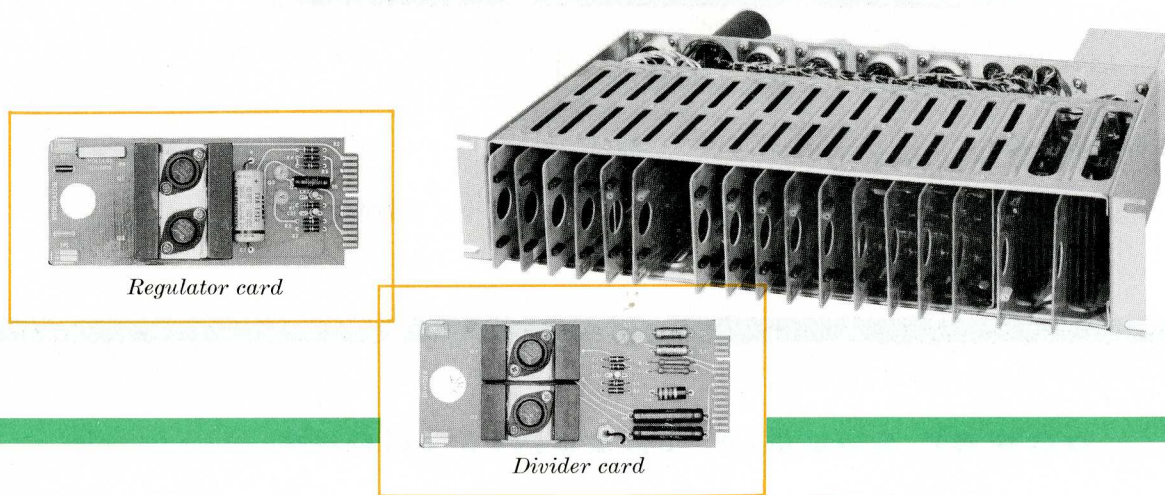


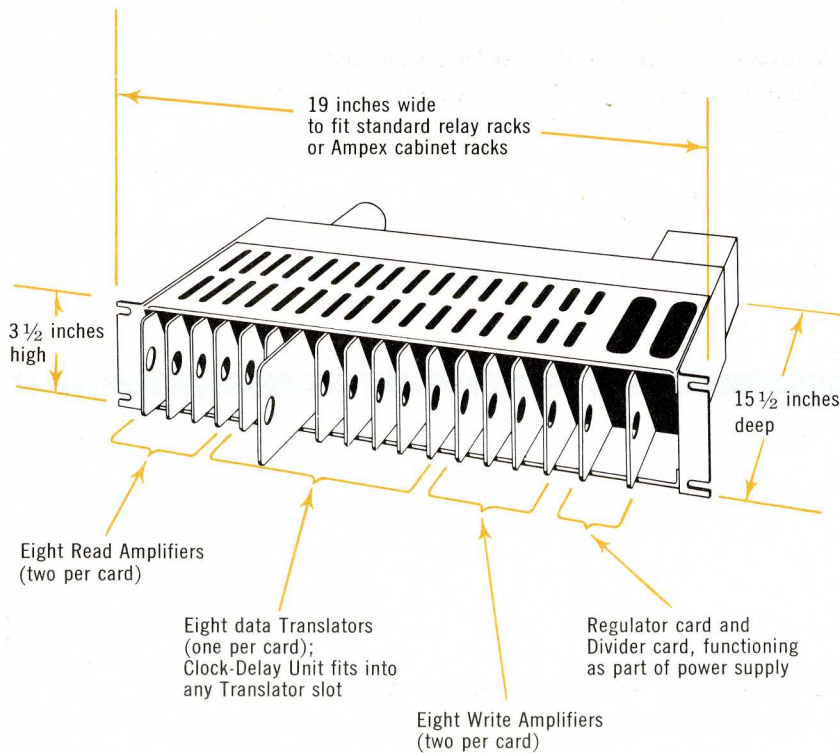
CARD-RACK / POWER-SUPPLY ASSEMBLY

This unit provides housing, power and interconnection for Write Amplifiers, Read Amplifiers, Translators and a Clock-Delay Unit, handling up to eight digital read/write tracks. All necessary functions are provided to link the input source and tape handler during *write* and the tape handler and digital receiving equipment during *read*.



Regulator card

Divider card



Housing

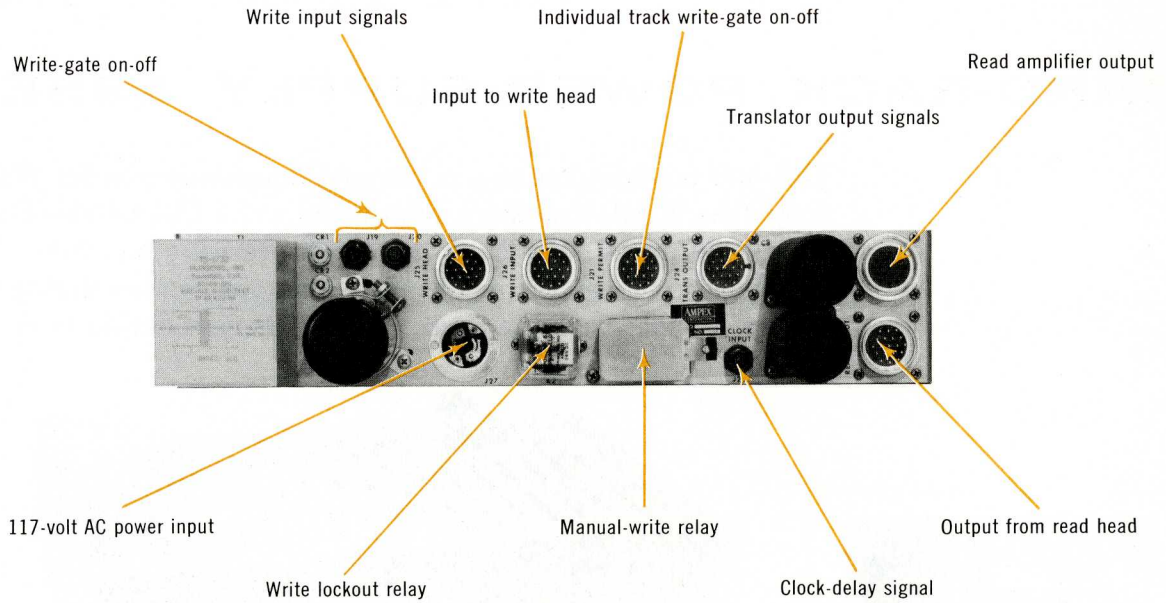
All etched-circuit-card assemblies fit into individual slots in the rack. Multi-terminal receptacles make all necessary electrical connections with each card. Forced-air cooling is assisted by louvers in top and bottom of the housing.

Power Supply

The power supply consists of three parts. A rectifier on the back of the Card Rack converts 117-volt ($\pm 10\%$) AC power 48 to 500 cps to approximately 35 volts DC. A Regulator card and a Divider card respectively reduce the power to a regulated 24 volts and divide it into +12 volts and -12 volts. Power is sufficient for any combination of plug-in cards accommodated by the Card Rack.

Inputs, Outputs and Other Functions

All power, signal and control connectors are on the back of the Card Rack. Control connectors for manual and automatic operating are included. A write-gate connector provides for receipt of separate write commands for each amplifier. A clock-delay input provides for use of an external-clock signal to synchronize the pulses in each alpha-numeric character. Protection of valuable files during *read* is provided by the write lockout relay which prevents the *write* function except when intentionally energized. With 14- or 16-track tapes, two card racks are used.



power supply specifications

Input	Voltage: 105 to 130 volts AC Frequency: 50 to 60 cps Power: 150 watts
Output	Voltage: +12 and -12 volts DC, regulated. Current: 1 amp, 0 to $\pm 12v$. 1.5 amp total load for 24-volt supply. Ripple: less than 10 millivolts rms.
Internal impedance	Less than 0.1 ohm.
Overload protection	Automatic current overload reset.

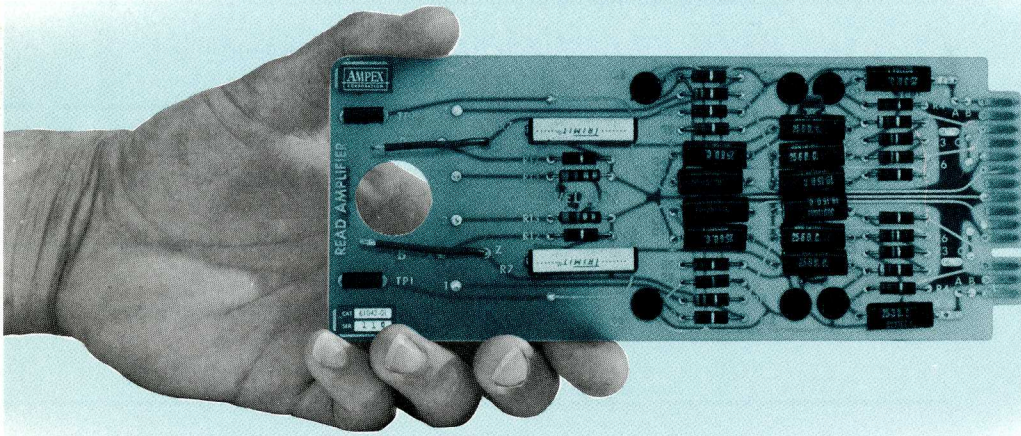
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Ampex Digital Tape System



READ AMPLIFIERS

The Ampex Digital Read Amplifier receives and amplifies—but does not shape—digital data pulses reproduced from magnetic tape. All-transistor design gives extreme reliability over a long operating life. Two amplifiers occupy a card 3 1/4 by 8 inches. Up to eight amplifiers (two per card) normally occupy four slots in an Ampex Digital Card-Rack/Power-Supply Assembly.

Input

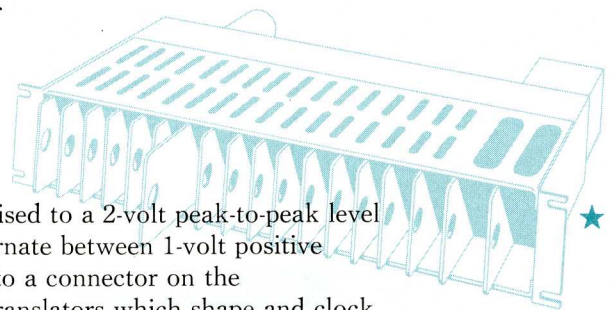
Digital data recorded on magnetic tape is in the form of sharp reversals of magnetic saturation. The read head differentiates these reversals into positive and negative pulses which the read amplifier receives at levels from 2 to 20 millivolts, varying roughly in proportion to tape speeds from 30 to 150 ips. A combination of fixed resistors and a variable resistor provides adjustment for use at various head-output levels.

How the Amplifier Functions

The read amplifier operates as two stages of linear amplification. Negative feedback provides stability and linearity.

Output

The output signal is exactly like the input, but raised to a 2-volt peak-to-peak level into 600 ohms. The pulses are unshaped and alternate between 1-volt positive and 1-volt negative. Read-amplifier output is fed to a connector on the Card-Rack/Power-Supply and into the Ampex Translators which shape and clock the pulses (unless a comparable function is provided elsewhere in the system).



★ Amplifiers mount in
Card-Rack/Power-Supply Assembly

specifications

**Input from head
(unbalanced)**

2 millivolts peak-to-peak to 20 millivolts peak-to-peak.

**Repetition rates
(amplifier only)**

Up to 100,000 bits per second.

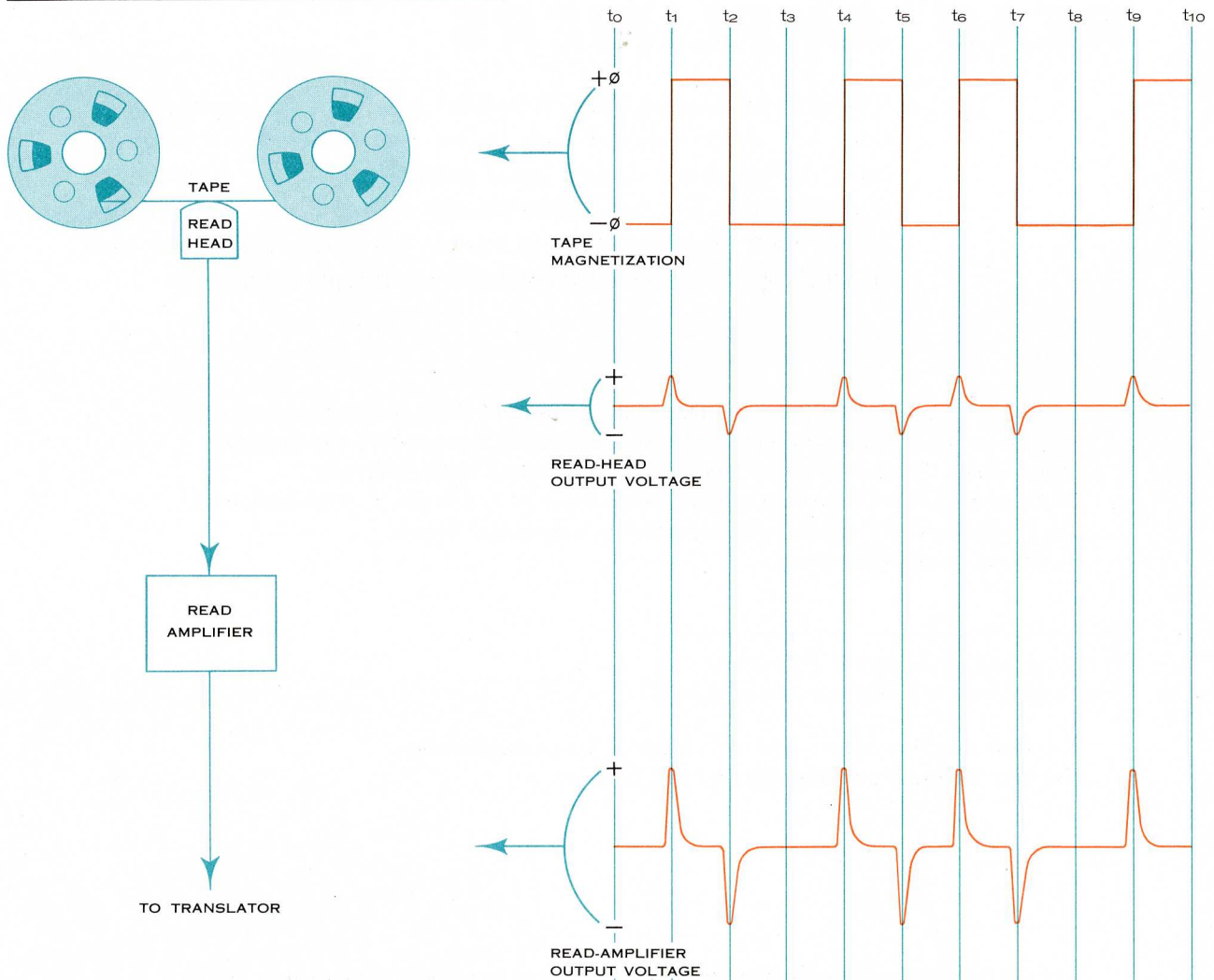
Output

2 volts peak-to-peak into 600 ohms (1-volt peak in plus or minus direction for individual pulses).

**Housing, connection
and power supply**

Furnished by the Ampex Digital Card-Rack/Power-Supply Assembly. Four two-amplifier cards fit assigned slots.

READ AMPLIFIER



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WRITE AMPLIFIERS



The Ampex Digital Write Amplifier receives and amplifies digital information from an external source and records it on magnetic tape through a write (record) head. High reliability over a long operating life is assured by the all-transistor design. A 3¼-by 8-inch card carries two amplifiers so that four slots in an Ampex Digital Card-Rack/Power-Supply Assembly will accommodate up to eight amplifiers.

Input

Three different forms of input are acceptable—positive pulses, negative pulses and alternating levels of DC voltage. Each form requires a different Write Amplifier, and the type of input must be specified when ordering or inquiring about Ampex Digital Tape Systems.

How the Amplifier Functions

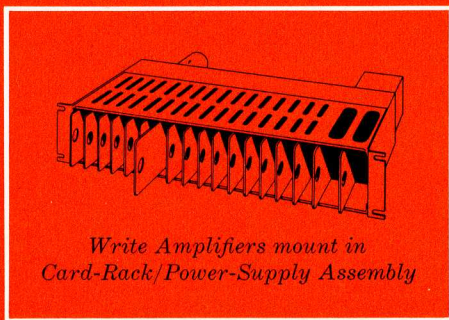
Input signals actuate the trigger circuit. The output of the trigger circuit is passed or rejected by the Write Permit Gate. Information passed by the Gate activates the driver circuit which, in turn, causes the output circuit to feed an alternately positive and negative current to the Write Head. The resultant head flux records the signals on the tape in the form of a series of saturation reversals.

Write Permit Gate

Information on a tape is destroyed if fresh data is recorded over it. An automatically or manually controlled gating signal to the Write Permit Gate prevents such unintentional erasure. A +10-volt input to the gate acts as an "ON" signal to permit writing; a 0-volt input to the gate acts as an "OFF" signal, stopping current flow to the Write Head.

Output

DC current at alternately positive and negative levels.



*Write Amplifiers mount in
Card-Rack/Power-Supply Assembly*

specifications

Input

Positive pulse	+1.5-volts minimum, +15-volts maximum.
Negative pulse	-1.5-volts minimum, -15-volts maximum.
Alternating levels of DC voltage	-1.5-volts minimum, -15-volts maximum.

Input rise time

1 microsecond or less.

Positive or negative input pulse length

0.5 microsecond minimum at 50% amplitude point.

Input repetition rate

Up to 100,000 bits per second.

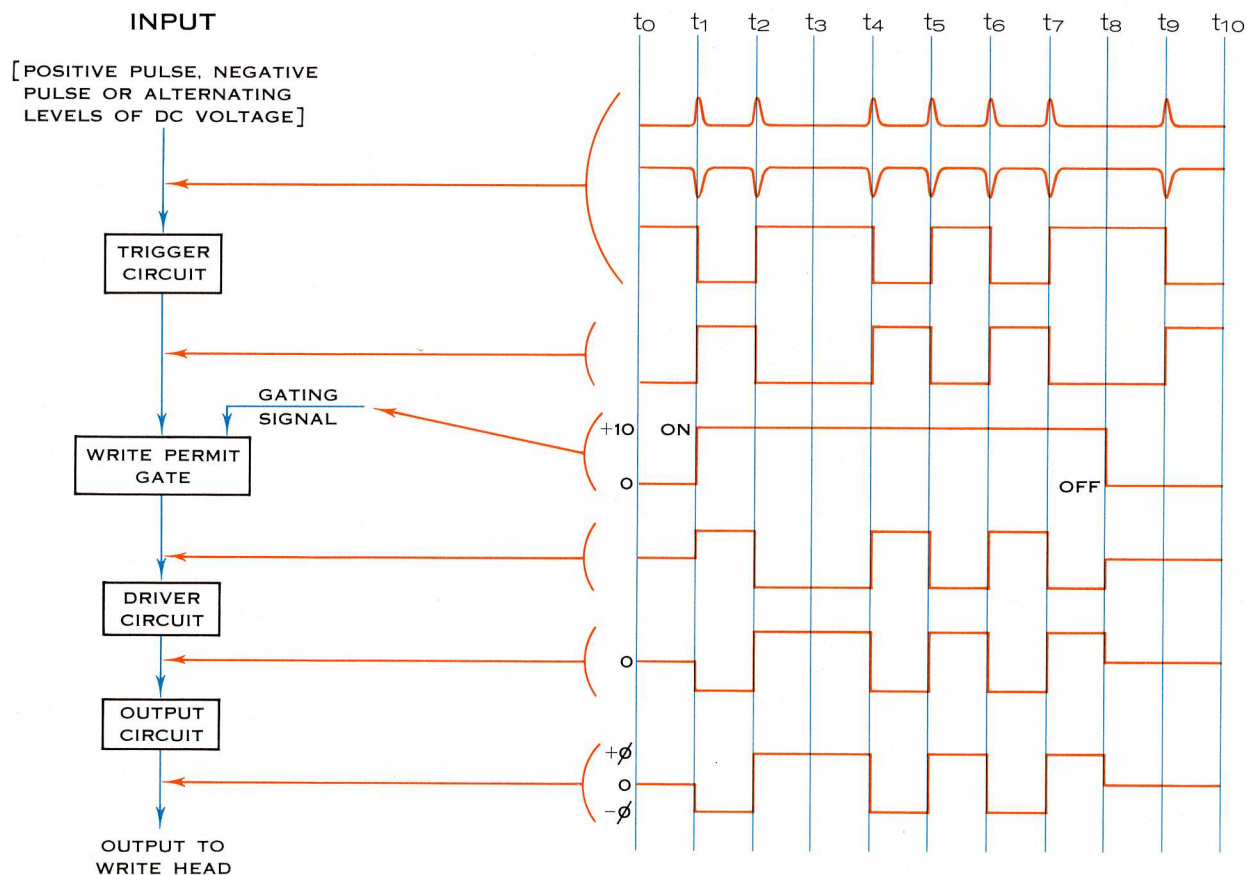
Output

DC current at alternately positive and negative levels.

Housing, connection and power supply

Furnished by the Ampex Digital Card-Rack/Power-Supply Assembly. Four two-amplifier cards fit assigned slots.

WRITE AMPLIFIER



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Ampex Digital Tape System

OUTPUT TRANSLATORS

PULSE TYPE

The Translator is the second of two steps between the reading of a digital tape and output to the receiving equipment (computer, printer, plotter, or other device operating on a digital input). The Translator inverts, shapes and clocks pulses received from the Read Amplifier. Clocking is optional. One Translator occupies a single 3 1/4- by 8-inch card. Eight cards occupy individual slots in an Ampex Digital Card-Rack/Power-Supply Assembly. All-transistor design provides extreme reliability over a long operating life.

Input

The Translator receives unshaped pulses, alternately plus-and-minus, of one-volt peak from the Ampex Read Amplifier.

How the Translator Functions

Input is amplified and positive pulses are inverted. Two negative-pulse inputs actuate two trigger circuits, each of which generates a positive-pulse output. The two trigger-circuit outputs are joined and further amplified in the next stage, which is followed by an emitter-follower unlocked-pulse-output circuit.

Unlocked Pulse Output

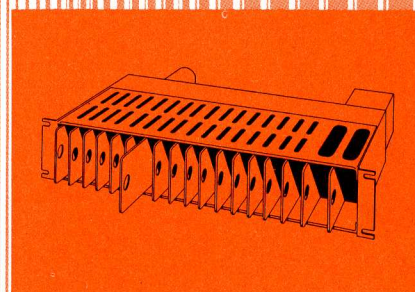
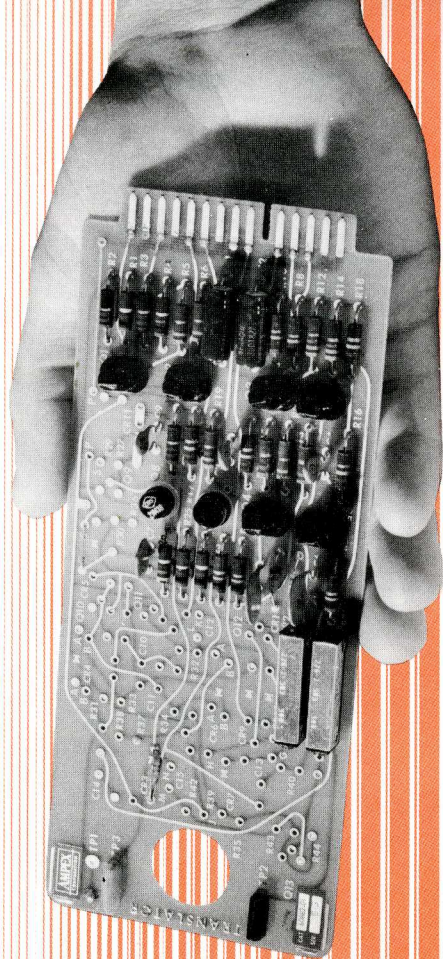
Translator output is a series of positive pulses of 1-microsecond rise time and a few microseconds duration. Pulse amplitude is 7½ volts minimum across 600 ohms.

Clocked Pulse Section

A clocked pulse section is an available option occupying a portion of the translator card. Its purpose is to act as a pulse-delay buffer enabling each pulse to be discharged simultaneously with corresponding pulses on the other tracks. An input signal from the Clock-Delay Unit trips a flip-flop circuit, releasing momentarily stored pulses. The flip-flop is reset by the next pulse. Clock-delay input is a 10-volt positive pulse into a 10,000-ohm load.

Clocked Pulse Output

This is an emitter-follower output identical with the unlocked-pulse output, except that the clocked-pulse output is synchronized with outputs of the other tape tracks.

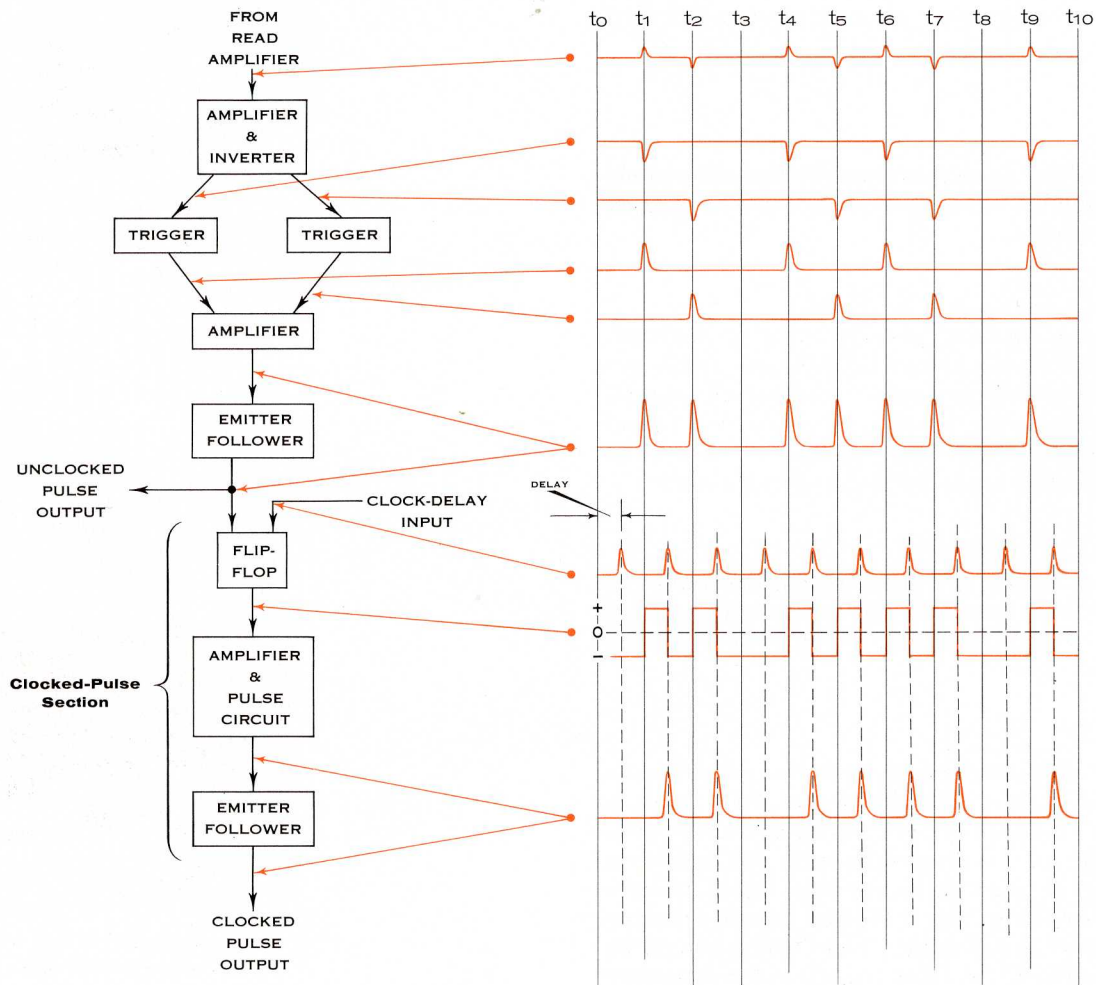


*Translators mount in
Card-Rack/Power-Supply Assembly*

specifications

Translator input	1 volt peak (2 volts peak-to-peak) into 1000 ohms.
Outputs (clocked and/or unclocked)	+7½ volts (minimum) into 600-ohm load, rise time less than 1 microsecond, pulse width at 50% level 5 microseconds max.
Clock-delay input	10-volt positive pulse into 10,000-ohm load with rise time of less than 2 microseconds and pulse width at 50% level of less than 5 microseconds.
Housing, connection and power supply	Furnished by the Ampex Digital Card-Rack/Power-Supply Assembly. Eight Translator cards fit assigned slots.

TRANSLATOR—PULSE TYPE



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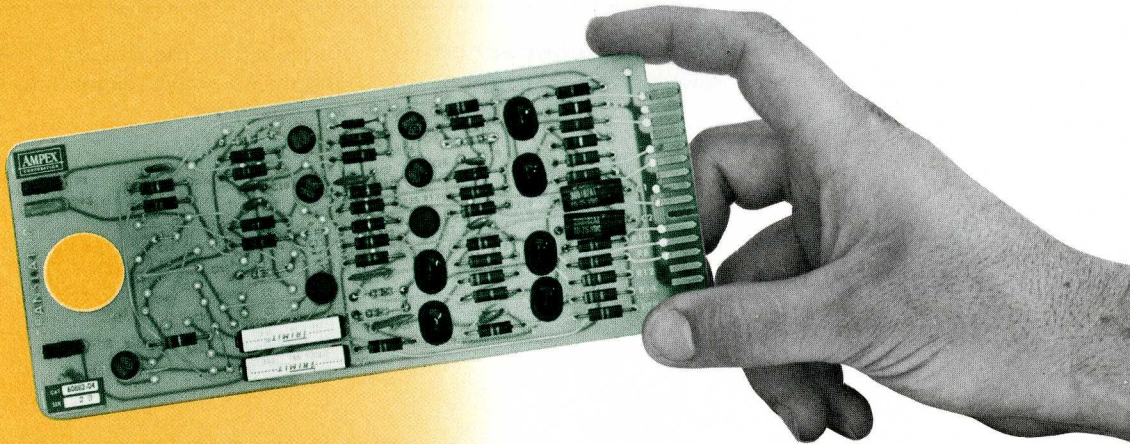
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OUTPUT TRANSLATORS

FLIP-FLOP TYPE

The Translator is the second of two steps between the reading of a digital tape and output to the receiving equipment (computer, printer, plotter, or other device operating on a digital input). The Translator inverts, shapes and clocks pulses received from the Read Amplifier, converting them to flip-flop output form. Clocking is optional. One Translator occupies a single 3 1/4 by 8-inch card. Eight cards occupy individual slots in an Ampex Digital Card-Rack/Power-Supply Assembly. All-transistor design provides extreme reliability over a long operating life.

Ampex Digital Tape System



Input

The Translator receives unshaped, alternately plus-and-minus pulses of one-volt peak from the Ampex Read Amplifier.

How the Translator Functions

Input is amplified and positive pulses are inverted. Two negative-pulse outputs actuate two trigger-circuits, each of which generates a positive-pulse output. The two trigger-circuit outputs are joined, further amplified, and used to trigger a flip-flop (Eccles-Jordan Binary type) circuit.

Unclocked Flip-Flop Output

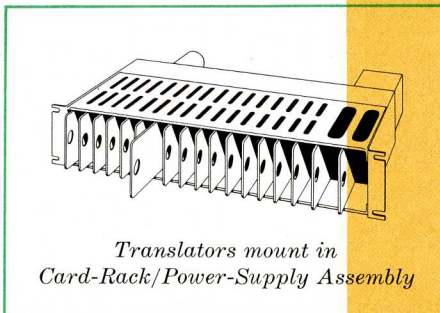
Translator output alternates between $+7\frac{1}{2}$ volts (minimum) and $-7\frac{1}{2}$ volts (minimum), each change in polarity marking the occasion of a pulse from the digital read head.

Clocked Flip-Flop Section

A clocked flip-flop section is an available option occupying a portion of the translator card. It acts as a delay buffer, enabling each change of output polarity to occur simultaneously with corresponding changes on other tracks. A timing signal from the Clock-Delay Unit trips the flip-flop circuit after it is set by a pulse from the tape. Clock-Delay input is a 10-volt positive pulse into a 10,000-ohm load.

Clocked Flip-Flop Output

Output rises to $+7\frac{1}{2}$ volts (minimum) in synchronism with the tape pulse, and reverses polarity upon the clock-delay signal.



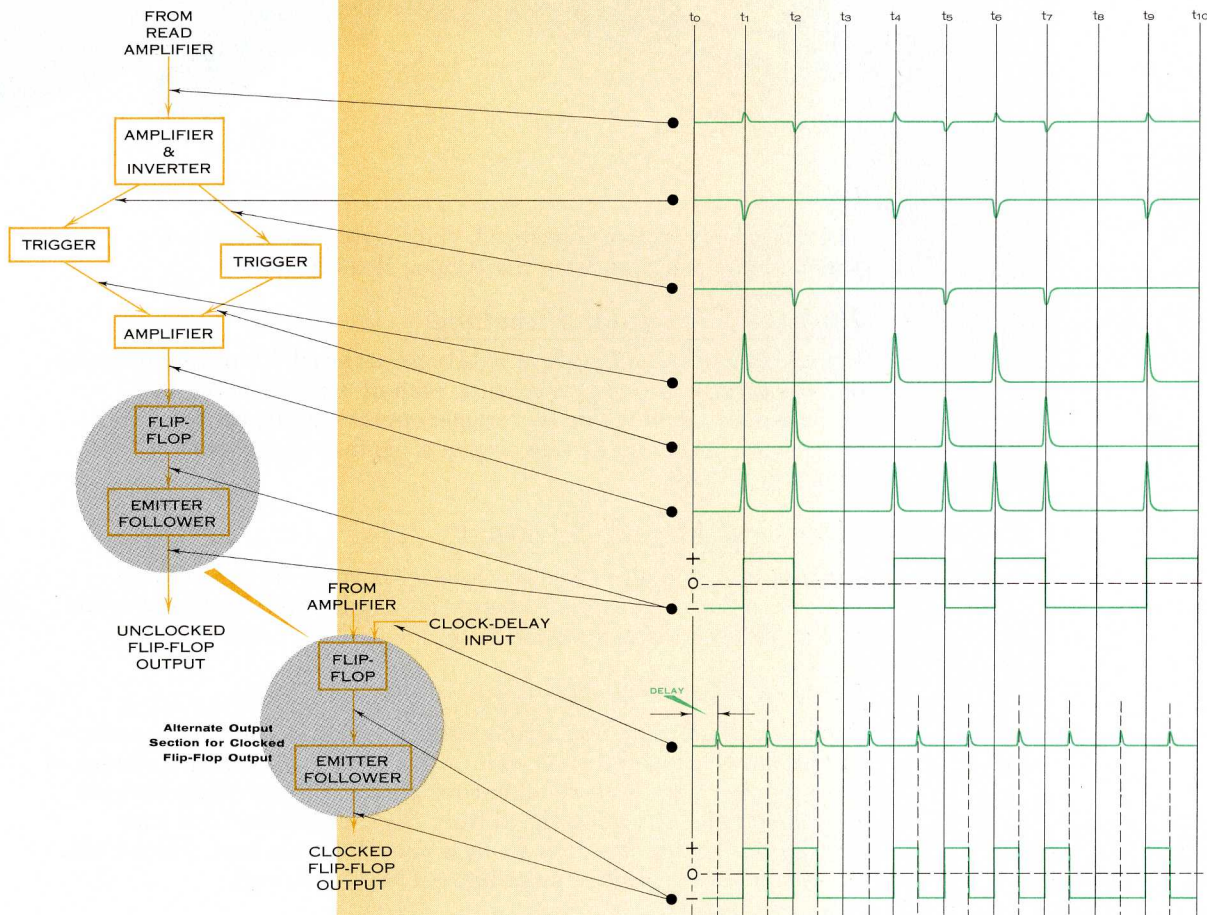
Translators mount in
Card-Rack/Power-Supply Assembly

specifications

Translator input	1 volt peak (2 volts peak-to-peak) into 1000 ohms.
Outputs (clocked and/or unclocked)	+7½ volts (minimum) into 600-ohm load, rise time less than 1 microsecond, pulse width at 50% level 5 microseconds max.
Clock-delay input	10-volt positive pulse into 10,000-ohm load with rise time of less than 2 microseconds and pulse width at 50% level of less than 5 microseconds.
Housing, connection and power supply	Furnished by the Ampex Digital Card-Rack/Power-Supply Assembly. Eight Translator cards fit assigned slots.

translator

FLIP-FLOP TYPE



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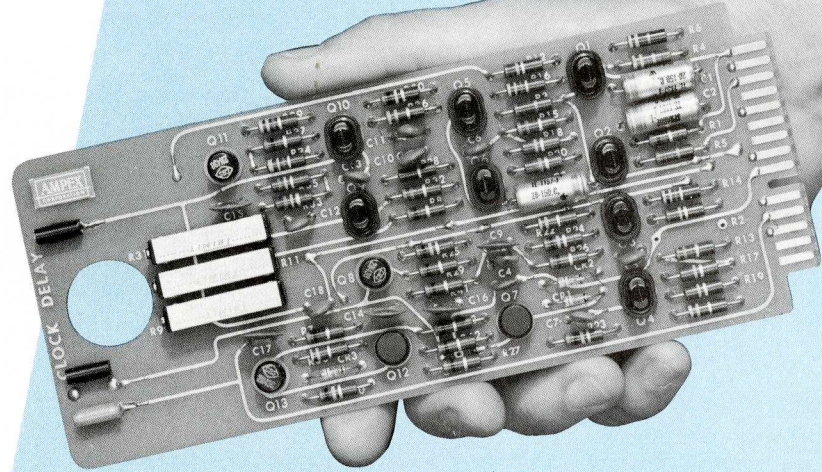
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Ampex Digital Tape System

CLOCK DELAY UNITS

Clock Delay Units assure that all digital bits recorded on the magnetic tape in a given character frame are "read" from the tape as being in the same frame. Use of an Ampex Clock Delay Unit is optional, since some applications require no clock delay and others provide a signal from outside the Ampex Digital System to synchronize directly the outputs from the Translators. Outputs from as many as sixteen tracks on the magnetic tape can be synchronized by a single Unit, so that only one is required per Ampex Digital Tape System. One Unit is accommodated on a single 3¼ - by 8-inch card which is housed in an Ampex Digital Card-Rack/Power-Supply Assembly.



Input

Units are wired to accept one or the other of the following inputs:
2-volts, peak-to-peak, from the Read Amplifier.

This input, which is unshaped and alternately plus-and-minus, is provided by clocked signals on a special track on the magnetic tape. The signals are originated by a clock generator.

10-volts, zero-to-peak, from the Output Translators.

This is a series of positive pulses originating at the Translators. Each pulse is initiated by the first digital bit to reach the Translators from each character frame.

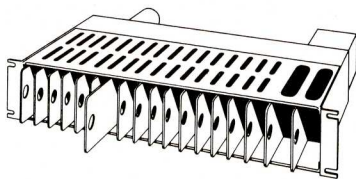
The type of input must be specified when ordering or inquiring about Ampex Digital Tape Systems equipped with Clock Delay Units.

Output

Output to the Translators is a 10-volt positive pulse into a 10,000-ohm load.

How the Clock Delay Unit Functions

When the Unit is actuated by input from the Read Amplifier, the input is amplified and positive pulses are inverted so that negative pulses go to each of the two trigger circuits. The trigger outputs are joined and amplified before going to a 1-shot multivibrator. (When the Clock Delay Unit is actuated by pulses from the Output Translators or from an external source, the pulses are fed directly into the 1-shot multivibrator.) Each input pulse triggers the multivibrator which then automatically emits an output signal after a brief delay. This signal causes the Output Translators to discharge simultaneously all the bits in a given character frame. Delay Units are adjustable for different delay times, by means of a potentiometer, to permit handling a variety of packing densities.



*Clock Delay Unit mounts in
Card-Rack/Power-Supply Assembly*

specifications

Input from Read Amplifier

1-volt peak (2 volts, peak-to-peak) into 600 ohms.

Input from Translators

10-volts minimum positive pulse into 600-ohm load with rise time of less than two microseconds and a pulse width at 50% level of less than 5 microseconds.

Output

10-volt positive pulse into 10,000-ohm load with rise time of less than 2 microseconds and a pulse width at 50% level of less than 5 microseconds.

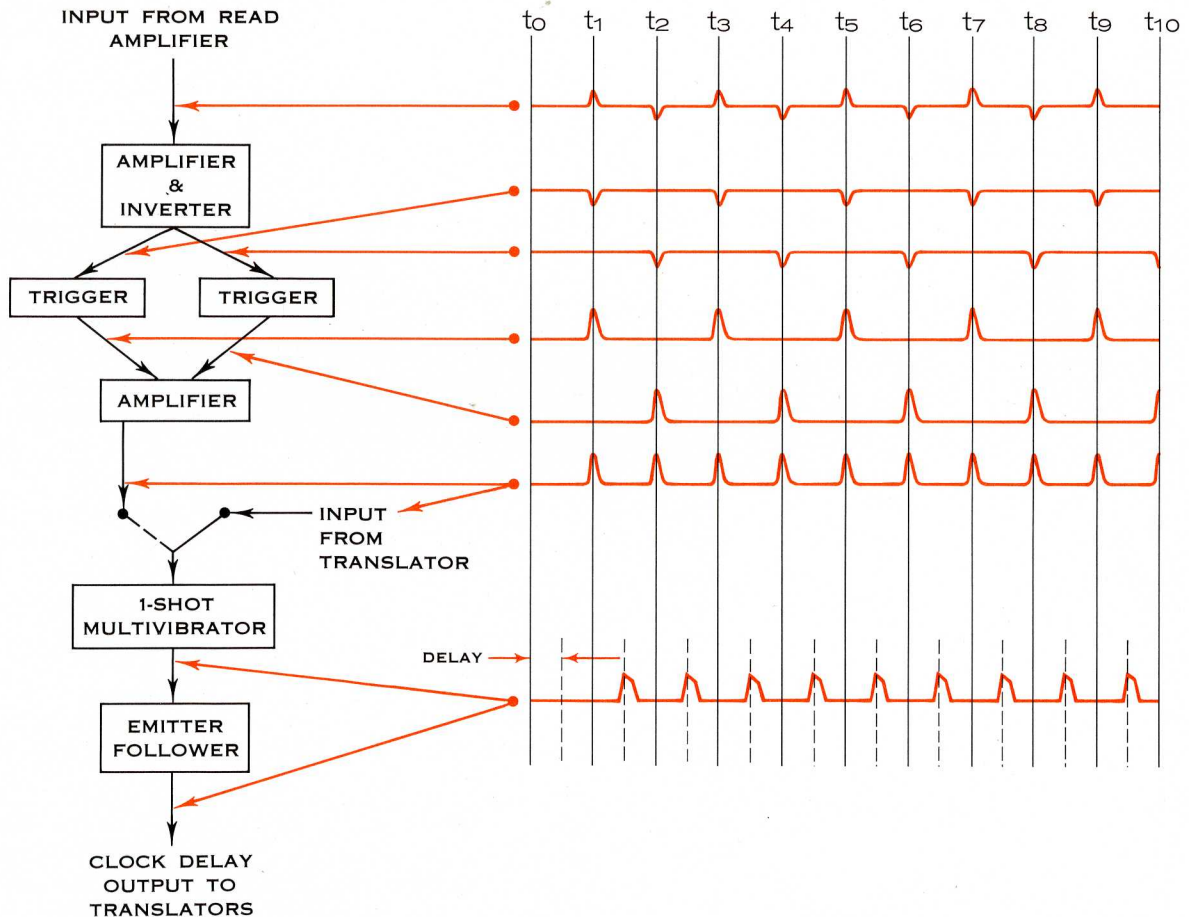
Time delay range

Standard Units are adjustable for delays permitting 100 to 300 bits-per-inch packing densities at 150 ips tape speed.

Housing, connection and power supply

Furnished by the Ampex Digital Card-Rack/Power-Supply Assembly.

CLOCK DELAY UNIT



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