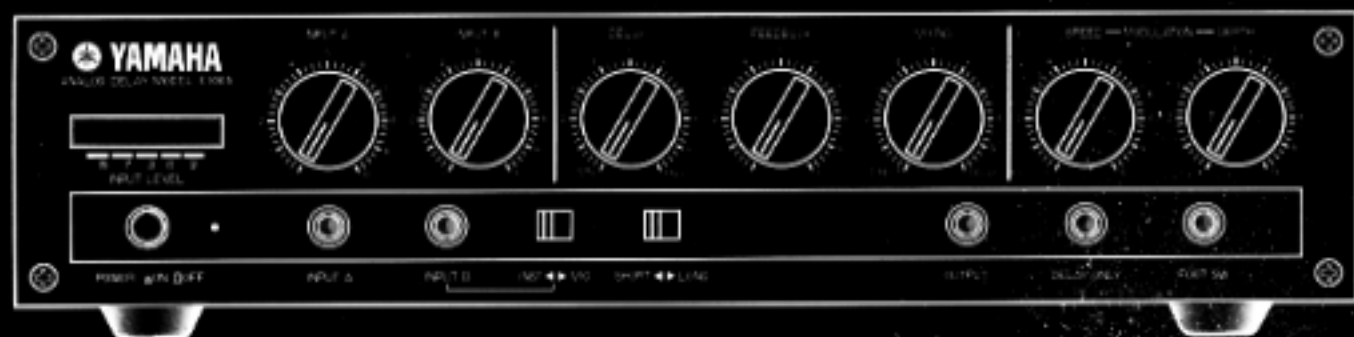


YAMAHA

SOUND REINFORCEMENT ANALOG DELAY

E1005

OWNER'S MANUAL



This instruction manual was prepared to assist you in getting the most out of your E1005. While you may already have begun using the unit, we urge you to read this manual thoroughly, and to re-read it as you become more familiar with the E1005's features and functions.

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

The E1005 Analog Delay Line provides variable time delay up to a full 400 milliseconds. The unit is equipped with both a mic input and a switchable mic/instrument input, each with its own input level control. A bar type input level display makes it easy to adjust the levels for low distortion and noise. The unit is equipped with controls that enable it to create chorus, double-tracking, flanging, and other special effects. A foot switch jack enables musicians to conveniently turn the effects On and Off. One output carries an adjustable blend of direct and delayed signal, enabling the E1005 to be used without an external mixer. A second output carries delayed signal only for stereo synthesis, pure delay, and other effects. Guitarists, keyboard players, and others will enjoy the way the E1005 creates echo and related effects without the mechanical disadvantages of older tape-loop echo machines. A very high input impedance ensures that the delay line will not load high impedance instrument pickups, so regardless of the delay settings, the direct sound will retain its full frequency response.

All controls are clearly labeled and are recessed to avoid inadvertent changes in settings (recessed controls are also safer in shipping and cartage). Unlike devices designed strictly for the studio, the E1005's input and output jacks are front panel mounted so patch cables can be kept shorter in musical instrument amplification systems.

What is an analog delay line? It is a device that provides echo and related effects by slowing down audio signals--a more capable space-age alternative to older tape-loop echo machines. The term "analog" means that the audio signal retains its original voltage levels throughout the electronics; this differs from "digital" delay lines, where the signal is converted and stored as binary numbers.

CONTENTS

INTRODUCTION	1
GENERAL SPECIFICATIONS	2
BRIEF OPERATING INSTRUCTIONS	
FRONT PANEL	3
REAR PANEL	4
PRECAUTIONS	4
SETUP	5
APPLICATIONS	7
BLOCK DIAGRAM	9
WARRANTY & SERVICE	10

GENERAL SPECIFICATIONS

DELAY TIME (Continuously variable within each range)	Short range, 4 msec. to 9msec. Long range, 65 msec. to 400 msec.
FEEDBACK MODULATION	Variable, from none to 100%. Sinusoidal variation of delay time relative to set delay. SPEED (frequency) from 0.5 to 10Hz. DEPTH from 0 to 10% @ short range, or from 0 to 30% @ long range.
OUTPUT (Mixing & Direct)	FREQUENCY RESPONSE: 20Hz ~ 20kHz $+1_{-3}$ dB, -20dB input level. TOTAL HARMONIC DISTORTION: Less than 0.3%, 20Hz - 20kHz, @-10dB* output into 10k Ω . INTERMODULATION DISTORTION: Less than 1%, using frequencies of 70Hz & 7kHz, mixed 4:1, @-10dB* output into 10k Ω . NOISE **: -110dBm equivalent input noise, -80dB* output noise with Input A volume at maximum, Input B at minimum.
DELAY OUTPUT	TOTAL HARMONIC DISTORTION: Less than 3%, @-10dB* output into 10k Ω . INTERMODULATION DISTORTION: Less than 5%, using frequencies of 70Hz & 7kHz, mixed 4:1, @-10dB* output into 10k Ω . NOISE **: -80dB* output noise either delay range.
INDICATORS	POWER ON: LED turns ON when Power is ON. INPUT LEVEL: 5-segment LED display shows peak input level in dB(relative). Calibrated in steps of +2, 0, -3, -7, -15dB.
POWER REQUIREMENTS	120 V AC (nominal, $\pm 10\%$), 60Hz, 12 watts.
DIMENSIONS	3-2/3" high x 15-1/2" wide x 8-1/3" deep (95 x 396 x 213mm), including feet.
NET WEIGHT	8 pounds (3.6 kg).

INPUT CHARACTERISTICS

CONNECTION	ACTUAL LOAD IMPEDANCE	FOR USE WITH NOMINAL	SENSITIVITY	INPUT LEVEL	
				NOMINAL	MAX. BEFORE CLIP
INPUT A	25k Ω	150 to 5k Ω MICROPHONE	-50dB	-50dB	-22dB
INPUT B INST.	500k Ω	5k Ω LINE & INSTRUMENT	-30dB	-30dB	-2dB
INPUT B MIC.	25k Ω	150 to 5k Ω MICROPHONE	-50dB	-50dB	-22dB

Terminals: Phone Jack (Unbalanced)

OUTPUT CHARACTERISTICS

CONNECTION	ACTUAL SOURCE IMPEDANCE	FOR USE WITH NOMINAL	OUTPUT LEVEL	
			NOMINAL	MAX. BEFORE CLIP
OUTPUT	250 Ω	10k Ω	-20dB	-3dB
DELAY ONLY	250 Ω	10k Ω	-20dB	-3dB

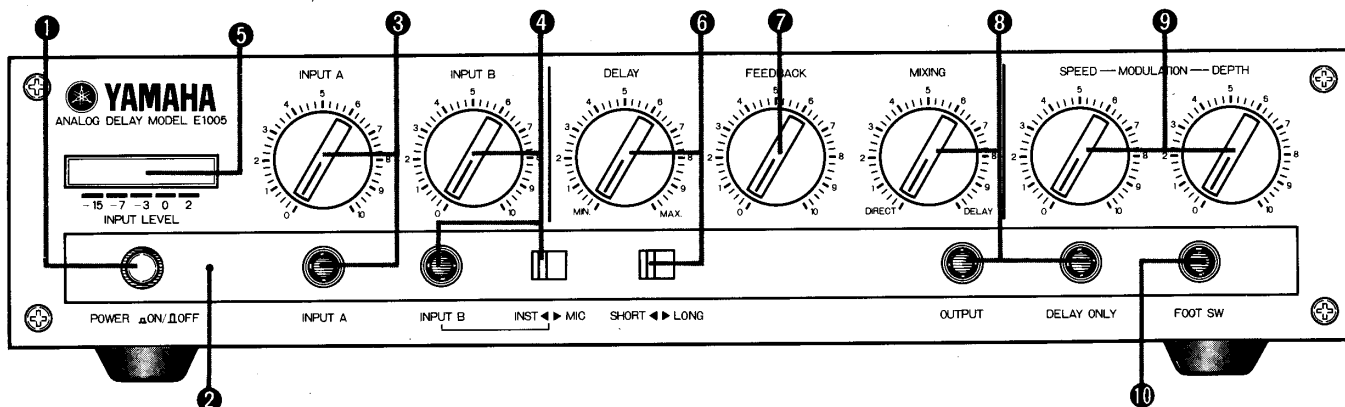
* 0dB is referenced to 0.775 Vr.m.s.

** Compensated with -6dB/octave filter @ 12.47kHz.

Specifications are subject to change without notice.

Terminals: Phone Jack (Unbalanced)

BRIEF OPERATING INSTRUCTIONS



1 Power Switch

Press this latching pushbutton once to turn the E1005 AC Power ON, and again to turn it OFF.

2 Power Indicator

This LED (Light Emitting Diode) is illuminated whenever the AC power is switched ON.

3 Input A (Includes Input Jack and Level Control)

Input A is an unbalanced standard phone jack with a nominal -50dB sensitivity, suitable for low impedance microphones of 150 ohms to 5 kohms. The Input A level control adjusts the mic preamp gain for optimum interface with various mics and for different loudness levels.

4 Input B (Includes Input Jack, Level Control and Inst-Mic Switch)

Input B is an unbalanced standard phone jack with switchable sensitivity and impedance. When the adjacent Inst-Mic switch is in "Mic" position, the Input B jack and Level control have the same mic input characteristics as Input A. When the switch is in "Inst" position, the sensitivity changes to nominal -30dB , suitable for high impedance instrument pickups, preamplified musical instruments, and low level tape recorder or mixer line outputs. Both the A and B inputs may be used simultaneously; the settings of the Input A and Input B level controls then determine the relative balance of the two sound sources.

5 Input Level Display

The display monitors the signal level after the E1005 Input level controls, and has 5 LED's which indicate peak values from -15dB to $+2\text{dB}$. Ideally, the Input level controls should be set so that the display peaks at 0dB , with average levels around -15dB to -7dB .

6 Delay Switch and Control

The Short-Long switch selects either of two ranges of delay time, 4 to 9 milliseconds (Short) or 65 to 400 milliseconds (Long). The adjacent Delay control enables the actual delay time to be continuously varied from the minimum to the maximum within the selected range.

7 Feedback

This control adjusts the proportion of delayed sound from the E1005 output that is mixed back into the E1005 delay circuitry. Increasing the amount of feedback lengthens the duration of an echo, and adds sustain to other effects as well. If Feedback is set high enough, oscillation (howl or run-away echo) can occur. This undesirable condition can be remedied by lowering the Feedback setting.

8 Output (Includes Mixing Control, Output Jack and Delay Only Output)

The E1005 has two output jacks, "Output" and "Delay Only". Both are unbalanced phone jacks with nominal -20dB level, and are designed for connection to high impedance circuits such as instrument amps, mixer inputs, power amplifiers, etc. The Mixing control adjusts the Output jack for any desired ratio of direct and delayed sound. Full counterclockwise rotation of the Mixing control yields all direct sound; as the control is rotated clockwise, more delayed sound is added until the Output jack carries all delayed sound. The adjacent Delay Only Output jack is not affected by the Mixing control; it always carries 100% delayed sound.

⑨ Modulation Controls (Includes Speed and Depth)

Within a given delay range, the actual delay time can be varied manually with the Delay control, or it can be varied automatically with these Modulation Speed and Depth controls. Modulation is useful for chorus, vibrato, flanging, phasing, and similar effects.

The Depth knob sets the amount of deviation in delay time. When you switch from the short to the long delay range, the maximum depth is increased.

The Speed knob sets the rapidity of the deviation in delay time (the speed of the effect).

⑩ Foot Switch jack

This standard phone jack is provided for use with a guitar-type foot switch. The switch turns all delay effects On and Off (delay time, feedback and modulation), but it does nothing to the direct sound, regardless of front panel settings. A foot switch is handy for initiating an echo effect at the end of a vocal or instrumental phrase, for abruptly ending an effect on a precise cue, etc.

REAR PANEL

Fuse

This 0.5 amp fuse (for nominal 120 VAC mains) protects the delay line by preventing excess current flow in the AC side of the power supply.

AC Power Cord

This 2-wire AC power cord may be plugged into nominal 120 VAC mains ($\pm 10\%$), 60Hz only (U.S. and Canadian models). The unit draws 12 watts.

PRECAUTIONS

1. BEFORE TURNING ON the E1005, set its FEEDBACK control to minimum (full counterclockwise). This avoids any potential howling which could damage speakers.
2. It is a SAFE practice to lower the volume of your amplifier or mixer when first turning ON the E1005. Also, begin with the E1005 INPUT control(s) at a low settings and gradually turn it up until the Input Level display peaks at about 0dB. Then adjust the amplifier volume as desired.
3. USE CAUTION whenever connecting the E1005 output to its input; mixing and/or feedback can be achieved without special connections by using the controls provided.
4. NEVER connect the output of a power amplifier or a guitar amplifier speaker output to the E1005 inputs; they are designed for mic, instrument or line level signals only. (Exception; a guitar amp output may be used if it is connected via a suitable direct box, one including an attenuation pad to lower the signal to mic or line levels.)
5. DO NOT connect power supplies, batteries, or apply DC voltages to any E1005 inputs or outputs.
6. NEVER use abrasives or spray-on chemical solvents to clean the E1005. Mild detergents applied to soft cloths are preferred.
7. IF RUNAWAY FEEDBACK (HOWLING) SHOULD OCCUR, IMMEDIATELY TURN DOWN THE E1005 FEEDBACK CONTROL.

SETUP

HINTS FOR QUICK SETUP

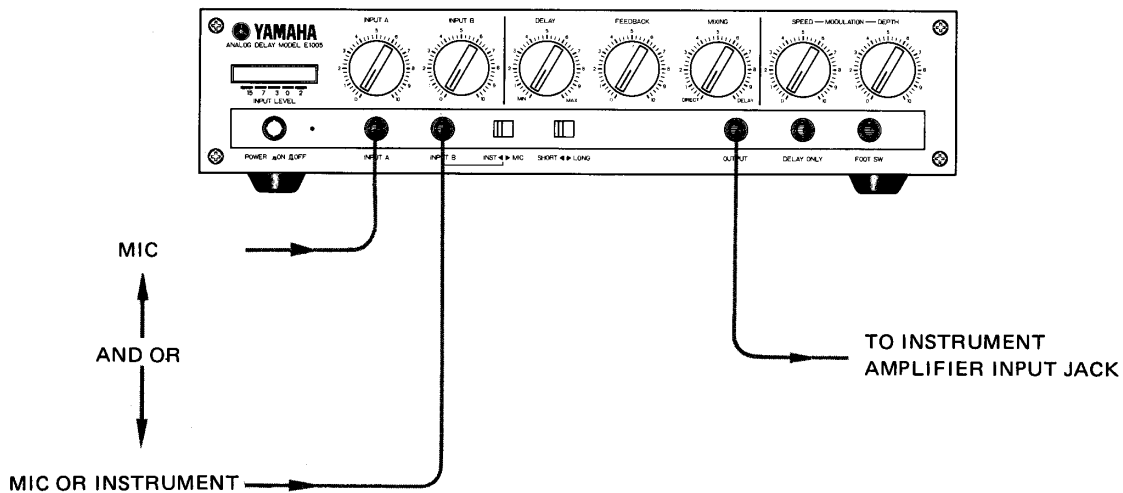
Plug the cable from your microphone into the Input A or Input B jack (switched to Mic position); instrument or mixer effects outputs can only be connected to Input B (switched to Inst position). Connect a cable from the E1005's Output jack (generally not the "Delay Only" output) into the input jack of your amplifier, mixer, tape machine, etc. Then set up the E1005 for the desired effect, referring to the diagrams on page 5 of this manual.

If you don't hear any sound right away, check the E1005 Power switch and Input level control(s), and make sure that the display is active during louder passages. Be sure the input and output cables are connected properly. Also, check the AC power cord and outlet.

TYPICAL HOOKUPS

The following illustrations are typical applications of the E1005. Suggested control settings for obtaining various effects are illustrated in Figure on page 7.

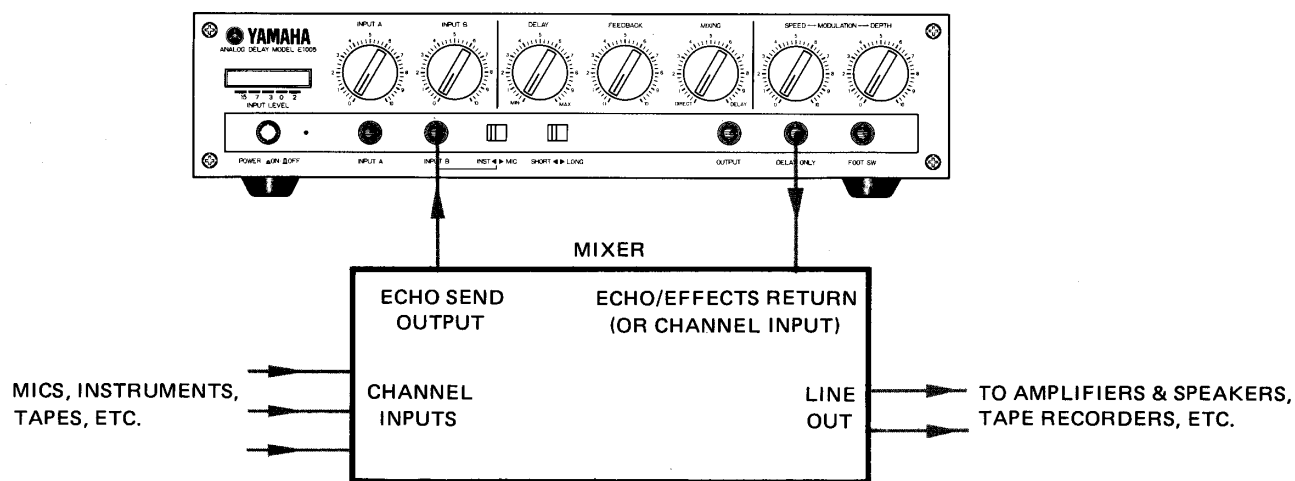
BASIC SETUP 1. Basic setup for using a microphone, an instrument, both a mic and an instrument, or two microphones to feed the E1005 input(s), and connecting the E1005 Output to an instrument amplifier. (Note that in this setup, the E1005 Mixing control should be set for the desired ratio of direct and delayed signal.)



CONNECTIONS AND BASIC CONTROL SETTINGS

Signal Source	Input A Control	Input B Control	Mic/Inst Sw.
1 microphone (use Input A)	as required	#0	no effect
1 instrument (use Input B)	#0	as required	Inst
2 microphones (use Input A & Input B)	as required for mic "A"	as required for mic "B"	Mic
1 microphone (use Input A) & 1 instrument (use Input B)	as required for mic level using only	as required for instrument level	Inst

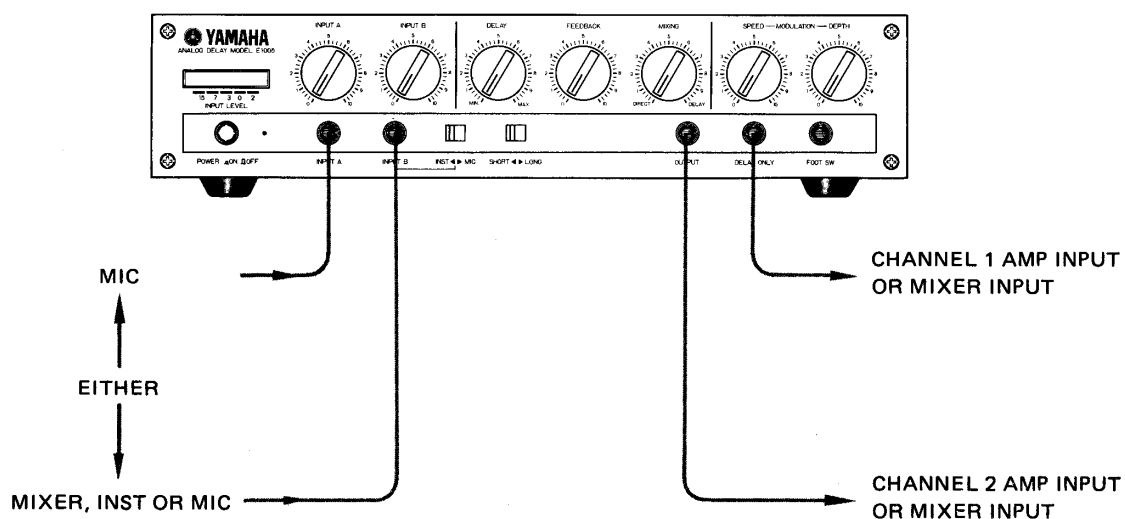
BASIC SETUP 2. Basic setup for using the E1005 between the echo send output and the echo return input of a mixer or mixing console. (Note that in this setup, the E1005 Mixing control has no effect since the Delay Only output is used. Direct and delayed signals are blended, as desired, using the echo/effects return circuitry in the mixer.)



CONNECTIONS AND BASIC CONTROL SETTINGS

Signal Source	Input A Control	Input B Control	Mic/Inst Sw.
Mixer echo/ effects output (Use Input B)	#0	as required for proper display level	Inst

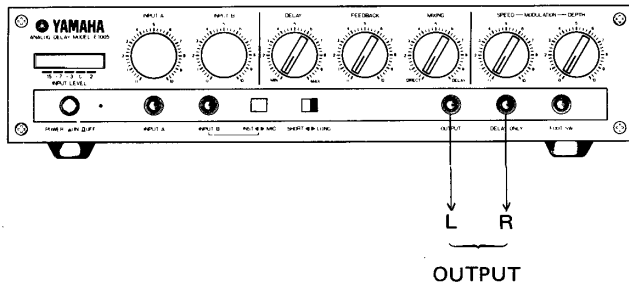
SPECIAL SETUP 3. Special setup for using the E1005 to create stereo from a mono source. The E1005 outputs feed either two instrument amplifiers, or a stereo mixer with two echo/effects returns (or two of the mixer's input channels). Both the E1005's Output and Delay Only Output jacks are used. (For more information on connections and basic control settings, refer to the charts in BASIC SETUP 1 and 2.)



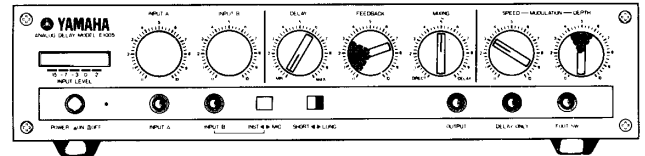
APPLICATIONS

CONTROL SETTINGS AND CONNECTIONS FOR VARIOUS EFFECTS.

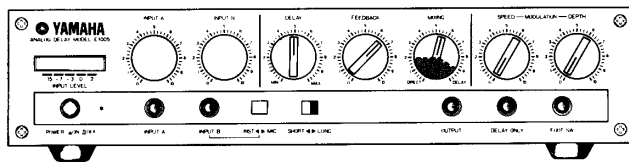
STEREO FROM A MONO SOURCE



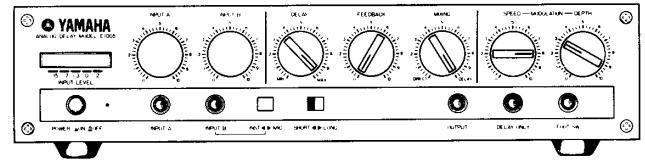
AUTOMATIC DOUBLE TRACKING



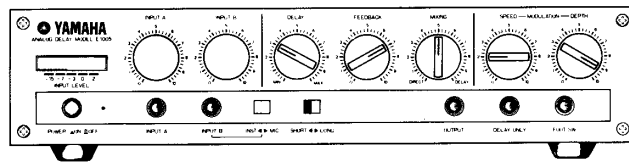
ECHO/REVERB



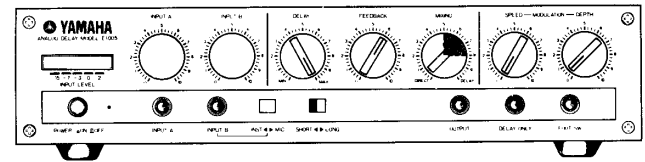
VIBRATO



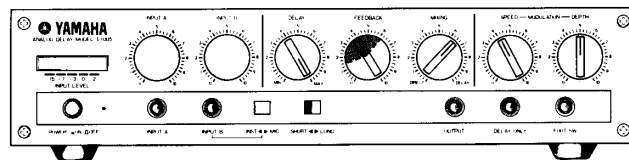
FLANGING



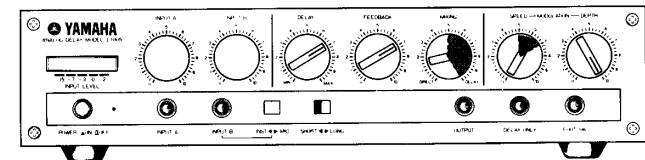
MACHINE VOICE



CHORUS



ROTARY SPEAKER



Stereo From a Mono Source

Delay the sound to one of two speakers using the E1005 in long delay range, at about the minimum delay setting. The delay is long enough to spread the image and enhance the ambience. This type of stereo spread is not recommended when the program is also being combined to a mono signal, since phase cancellations might be objectionable in the combined signal.

Automatic Double Tracking

True double tracking can be obtained by overdubbing the exact same instrumental or vocal part on a second track of the tape. The sound achieved is never in perfect unison due to minor variations in pitch and time. Double tracking is a very desirable and useful effect (also known as chorusing), especially for enriching the sound of vocals, strings, and other instruments.

The E1005 creates this effect automatically in real time, allowing you to precisely control the variables (pitch and time deviations). The delay is set in the long range, at minimum setting, and is automatically increased and decreased by the E1005's built-in Modulation controls (Speed and Depth).

Echo and Reverb Effects

"Echo" and "reverb" are often confused with one another, and there is some overlap in their definitions. Generally speaking, "echo" consists of one or more distinct, delayed sound images with recognizable attacks. "Reverb" also consists of multiple delayed sound images, but they smear together and have no discretely discernable attacks.

To get a single echo from the E1005, set the Feedback control at zero, and adjust the time delay as desired. For multiple echoes, turn up the Feedback control. If the input program has little or no sharp musical attacks (i.e., legato string lines or melodic vocal backups), then the multiple echoes with a long delay time can sound like a reverb. When there are more sharp attacks and decays in the program material, the effect will seem more repetitive.

Vibrato

Vibrato, while it is a pitch change function, may be created with the E1005 analog delay line. The E1005 can thus add vibrato to voice or instruments which could not easily achieve the effect acoustically, or it can increase the amount of natural vibrato.

You can use the E1005 to vary the pitch manually by moving the Delay time control back and forth, or you can set the unit for automatic pitch variation by means of the Modulation Speed and Depth controls.

Flanging

The E1005 creates flanging effects automatically and repeatably. The effect is obtained by setting the unit for a Short delay time, using Modulation, and Mixing the direct and delayed sounds together; the varying delay signal interacts with the direct signal to create changing phase cancellations that sweep across the various overtones.

Machine Voice and Vocoder Type Effects

The E1005 can make normal voice or instrumental parts sound like they are coming from a hollow cavity or tunnel. This is done by setting the unit for a short delay, and by Mixing the direct and delayed sound. This is similar to flanging, but there is no Modulation so the result is a hollow-sounding comb filter. If the Delay time is increased slightly and Feedback is added, then more of a tunnel-like sound (flutter-echo) is obtained.

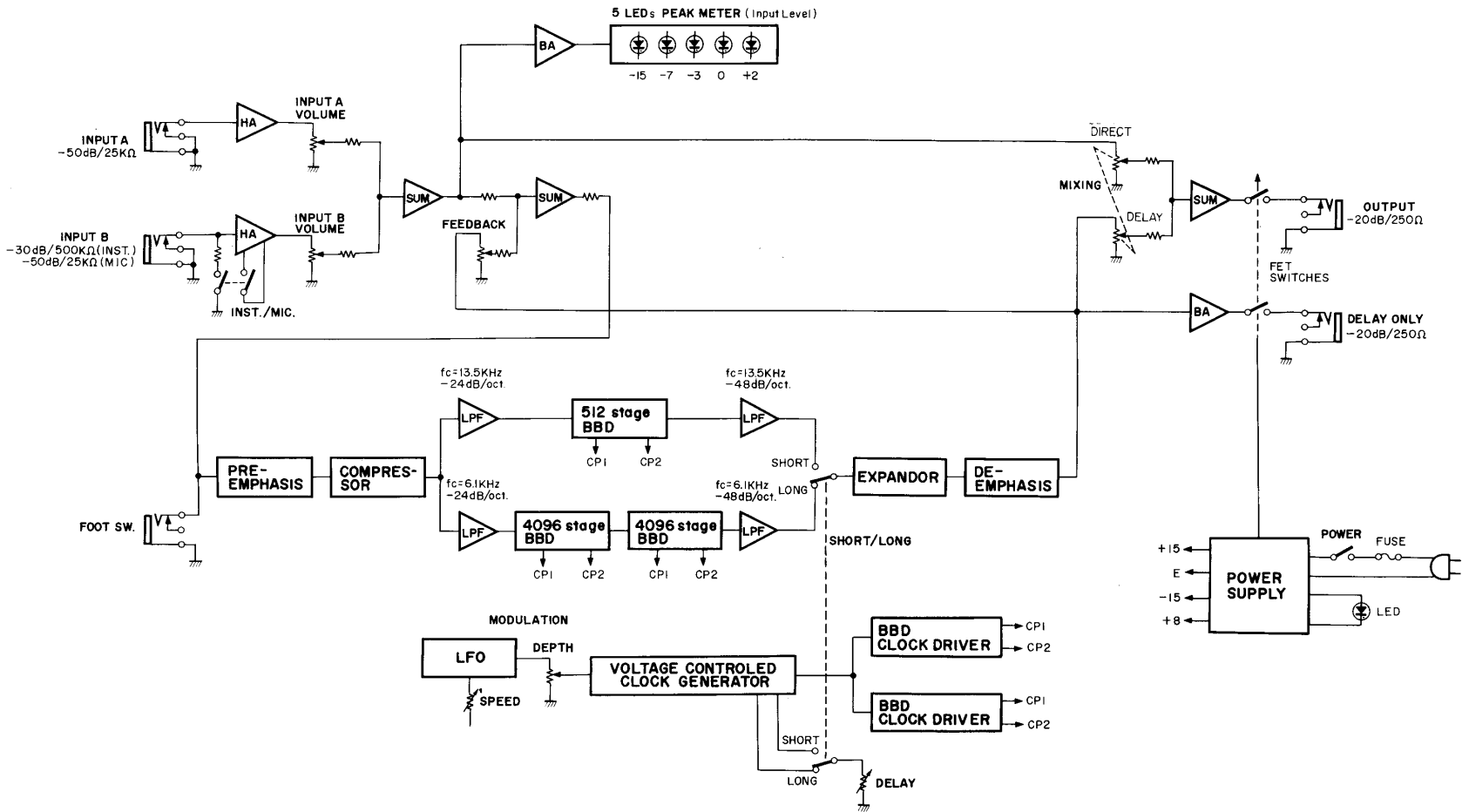
Rhythmic Effects

Unusual rhythmic effects can be obtained by setting the E1005 for a particular delay, usually long, and playing against it. Thus, there is a direct interaction between the performer and the sound equipment. Whole musical pieces can be built around this interactive principle, e.g., rounds and canons.

Pitch Bend with Feedback

In contrast to vibrato, which is a gradual and linear variation in pitch, it is possible to obtain sequenced changes in pitch by using the Long delay range, Feedback, and gradually changing the Delay time (manually or with the Modulation controls). A similar effect is obtained by moving the Delay control up or down and then holding the new setting; the pitch will increase or decrease, then hold at the new pitch until the delay dies out or a new sound is introduced.

BLOCK DIAGRAM



WARRANTY & SERVICE

WARNING: There are no user-serviceable parts in your E1005. Refer servicing to qualified Yamaha service technicians.

The Warranty Registration Card delivered with the E1005 should be completed and returned to the factory at the time of purchase. Retain the Warranty ID card for your records. In the event warranty service is required, please contact your Yamaha dealer. If you need assistance in locating a Yamaha dealer, contact Yamaha Combo Product Service at the address given below.

YAMAHA ANALOG DELAY LINE PRODUCT WARRANTY

LIMITED ONE YEAR WARRANTY

Each E1005 Analog Delay Line is designed and manufactured to provide a high level of performance. Yamaha International Corp. believes in the craftsmanship that goes into Yamaha products. Please read this Warranty to familiarize yourself with its terms.

Yamaha desires that every new Yamaha product owner understand this Warranty; therefore, should you have any questions, ask your authorized dealer or write directly to Yamaha.

CONDITIONS OF WARRANTY

If, during the one (1) year period from the date of original purchase your product is found by Yamaha to have a defect in material or workmanship, Yamaha and/or its authorized service center will repair defects without charge for material or labor. In the event Yamaha determines that the defect cannot be repaired, then Yamaha will replace the defective product with an identical Product or one which is reasonably equivalent.

WHERE PERMITTED BY LAW, YAMAHA INTERNATIONAL CORPORATION'S LIABILITY SHALL BE LIMITED TO THAT SET FORTH IN THIS WARRANTY AND YAMAHA SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING INJURY TO PERSONS OR PROPERTY. YAMAHA INTERNATIONAL CORPORATION MAKES NO OTHER WARRANTY OF ANY KIND EXPRESSED OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE OBLIGATIONS AND TIME LIMITS STATED IN THIS WARRANTY ARE HEREBY DISCLAIMED BY YAMAHA INTERNATIONAL CORPORATION AND EXCLUDED FROM THIS WARRANTY.

OWNER'S RESPONSIBILITY

In order for Yamaha to provide proper warranty service, it is necessary that the purchaser of the product assume certain responsibilities.

1. Send to Yamaha the Warranty Registration Card within ten (10) days of purchase.
2. Be prepared to present the Warranty Card or proof of purchase to avoid undue difficulties in determining eligibility for warranty protection.
3. Notify your Authorized Yamaha DEALER of any defects within ten (10) days of discovery.
4. Return your Yamaha product to your Authorized Dealer in order that he may inspect and approve warranty service which shall be completed within a reasonable period of time.

WARRANTY SHALL NOT EXTEND TO:

1. Products subjected to abnormal strain, neglect, abuse, modification or accidental damage.
2. The result of normal wear.
3. Products whose trademark, name, or identification number has been changed or removed.
4. Products purchased from anyone other than an Authorized Yamaha Dealer.

This warranty is limited to the 50 states of the USA. If you plan to use the E1005 Analog Delay Line outside the USA, please contact Yamaha Combo Product Service at the address given below.

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