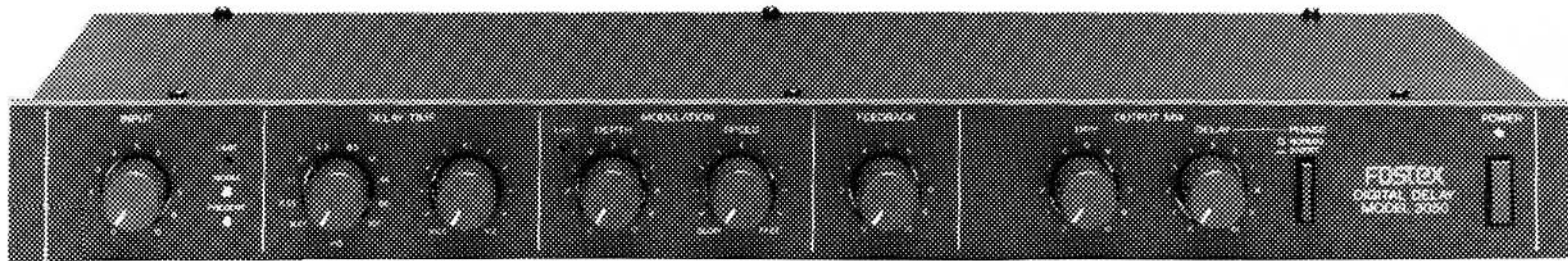


Model 3050

DIGITAL DELAY UNIT

Owner's Manual



Fostex[®]

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SAFETY INSTRUCTIONS

WARNING

“READ BEFORE OPERATING”

1. Read Instructions—All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instructions—The safety and operating instructions should be retained for future reference.
3. Heed Warnings—All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions—All operating and use instructions should be followed.
5. Water and Moisture—The appliance should not be used near water—for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. Ventilation—The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
7. Heat—The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
8. Power Sources—The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
9. Power-Cord Protection—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
10. Cleaning—The appliance should be cleaned only as recommended by the manufacturer.
11. Nonuse Periods—The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
12. Object and Liquid Entry—Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
13. Damage Requiring Service—The appliance should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the enclosure damaged.
14. Servicing—The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

WARNING: To avoid possible electric shock hazard, do not expose this appliance to rain or moisture. There are no user serviceable parts inside. Refer servicing to qualified service personnel.

Figure 1. Model 3050 front panel features.

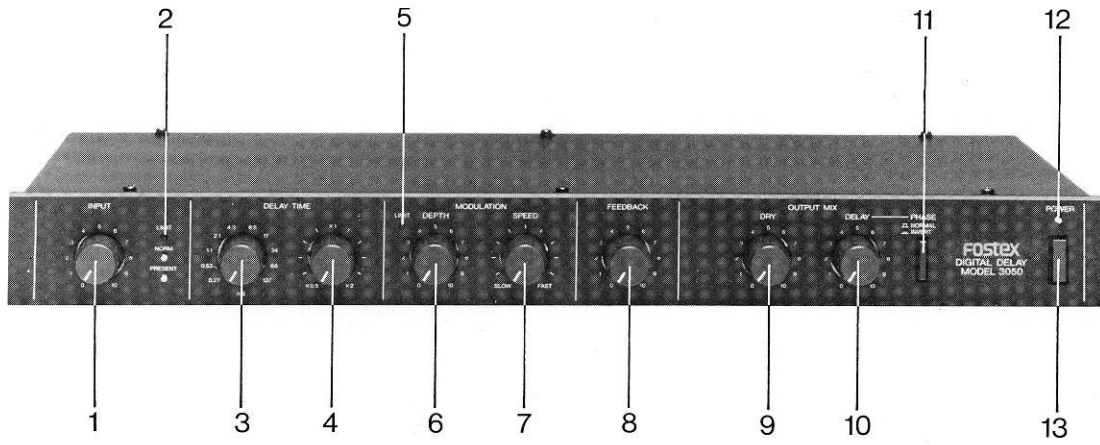
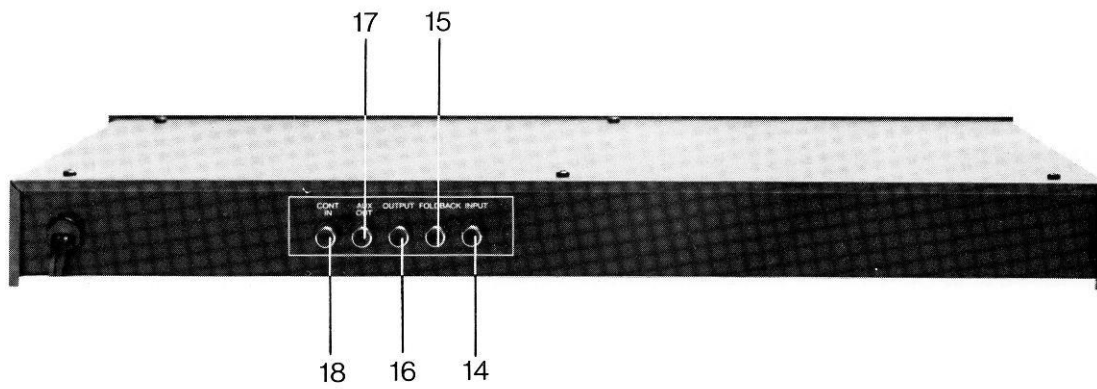


Figure 2. Model 3050 rear panel features.



SECTION 1 INTRODUCTION

The Postex Model 3050 Digital Delay Unit is an Audio Delay Line capable of wide application as a flanger, chorus effecter, echo effecter, etc. It features a constant frequency range and good S/N by the noise reduction circuit, throughout the entire delay time setting.

Numerous effects can be created by this unit alone as it contains a feedback circuit and a modulating oscillator.

It also has an input for external control of delay time, making it possible to externally set delay time by a DC voltage or modulate delay time with the LFO and envelope generator of a music synthesizer.

SECTION 2 FRONT PANEL CONTROLS

[1] INPUT LEVEL

The control for matching the input signal level to that required by the digital delay circuit.

[2] INPUT LEVEL INDICATOR

Indicates condition of signal level set by above [1].

The LIMIT LED indicates functioning of the limiter circuit when there is an excessively high input signal.

[3] DELAY TIME: RANGE

Delay time range is set up by this ten position switch.

[4] DELAY TIME: MULTI

The delay time value set by above control [3] can be continuously varied from 1/2 through 2 times.

[5] MODULATION LIMIT INDICATOR

This indicator will light up when delay time drops or exceeds the 1/2 through 2 times range due to the overall effect of [4] and [6] setting and the external control voltage. When lit, delay time will not change any further.

[6] MODULATION - DEPTH

Modulation is the sweeping of delay time with the value set by [3] and [4] as the center. The depth of this modulation is controlled by this knob.

[7] MODULATION - SPEED

The modulation frequency is set by this knob.

[8] FEEDBACK

Controls the amount of delayed signal feedback when it is returned again to the delay circuit.

[9] OUTPUT MIX: DRY

Controls output level of the unprocessed signal.

[10] OUTPUT MIX: DELAY

The output of this Unit is a mixture of the DRY (original) signal and the DELAY signal. Level of each signal is independently controlled by [9] and [10].

[11] DELAY PHASE SWITCH

For inverting phase of the delayed signal to be applied to the feedback and output mixing circuits.

[12] Power ON indicator

[13] Power switch

SECTION 3 REAR PANEL JACKS

[14] INPUT JACK

Pin jack for the input signal.

[15] FOLDBACK JACK

Wired in parallel with the above [14] jack, this jack allows access to the branched input signal.

[16] OUTPUT

An output signal mixed by [9] and [10] is obtained here.

[17] AUX OUT

Wired in parallel with above [16], the same signal is obtained here.

[18] CONT IN

Delay time can be controlled from 1/2 through 2 times by an external voltage applied here.

SECTION 4 OPERATION

Please read this section while referring to the block diagram. Numers [1], [2], ... correspond with those in explanation of the front panel controls.

4.1 Input connections and level adjusting

Apply an audio signal to the rear panel INPUT jack. As the FOLDBACK jack is wired in parallel with the INPUT jack, the audio input can be branched to other equipment from this FOLDBACK jack.

If the INPUT control knob is set at maximum, it will match the standard level of -20dBV (0.1V). As this INPUT control is located at the entrance of the input circuit, a higher input level can be controlled to prevent saturation of the input stage.

4.2 When input is overloaded

The Unit contains a limiter circuit to prevent harmful clipping in the A/D converter when the input is overloaded. When this limiter goes into operation, the red LIMIT indicator [2] is lighted. After lighting of this LED, there is 10 dB headroom before clipping occurs in the input stage. When clipping occurs, distortion will suddenly increase.

For operation under best condition, constant care must be taken in establishing the input level. Good S/N can be obtained when the level is set as high as possible without letting the LIMIT LED light up too frequently.

Level changes of an actual music signal is normally very great. Due to the characteristic of the compressor circuit used for noise reduction, there is instantaneous limiting at the rising point of sound where the LIMIT LED is lit but this has only slight effect on actual listening conditions.

4.3 Setting of delay time

Delay time (mS), as set by the DELAY TIME - RANGE knob [3], will be the direct reading of the knob pointer when the DELAY TIME - MULTI knob [4] is set at X1. The multiplication factor for knob [3] can be varied continuously from 1/2 through 2 times of the knob [3] setting as the center value.

By combined effect of knobs [3] and [4], minimum delay is 0.13mS and maximum delay 273mS.

4.4 Modulation

As the DEPTH knob [6] is advanced, delay time is swept up and down with the delay time set by the aforementioned knobs [3] and [4] as the center value. Frequency of the LFO for the sweep is adjusted by SPEED knob [7]. Maximum depth of modulation is 4 times (1/2 through 2 times against delay time set by RANGE knob [3]). Knob [4] must be set at X1 for maximum depth.

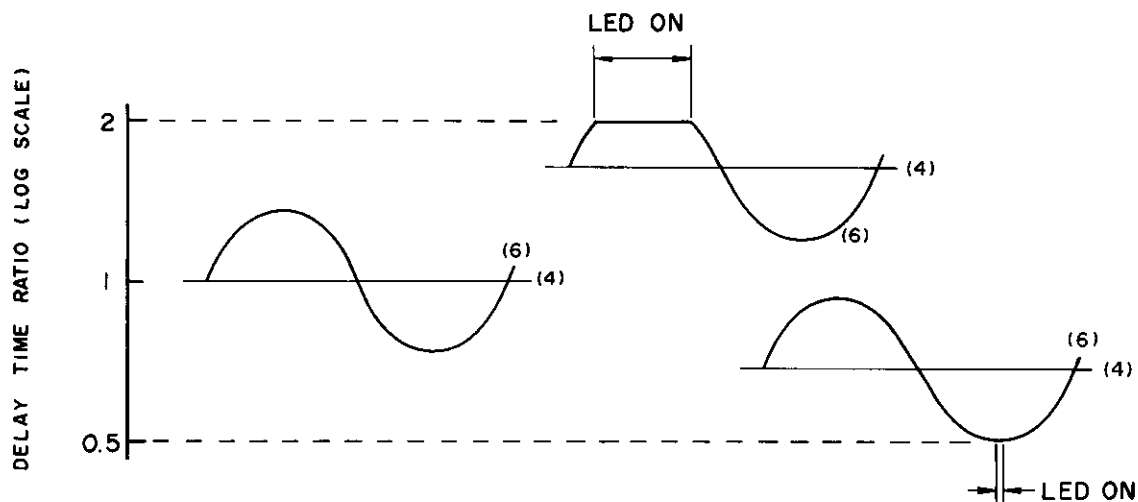
4.5 External delay time control

Delay time can be controlled by a voltage applied to the CONT IN jack [18] on the rear panel. When this external voltage is zero, delay time is directly as established by knobs [3], [4] and [6] but delay time is multiplied by 1.15 for each one volt increase of the external voltage. On the other hand, multiplication will be $1/1.15 = 0.87$ times for each one volt decrease. Multiplication will be 2 times for a 5 volt increase and 4 times for a 10 volt increase.

4.6 Notes on range of continuously variable delay time

As shown in the block diagram, the DC voltage set by the delay time MULTI knob, the LFO signal controlled by the modulation DEPTH knob and the external control voltage are simply summed and applied to the anti-log VCO (Voltage Controlled Oscillator) to control it. The VCO output establishes the fundamental timing of the control logic circuit. The delay time is inversely proportional to the VCO frequency. The delay time control limit from 1/2 through 2 times is derived from the sum of the above three voltages. In other words, the frequency (delay time) will not go below or above this range even though a voltage exceeding this range is applied to the VCO.

Figure 3.

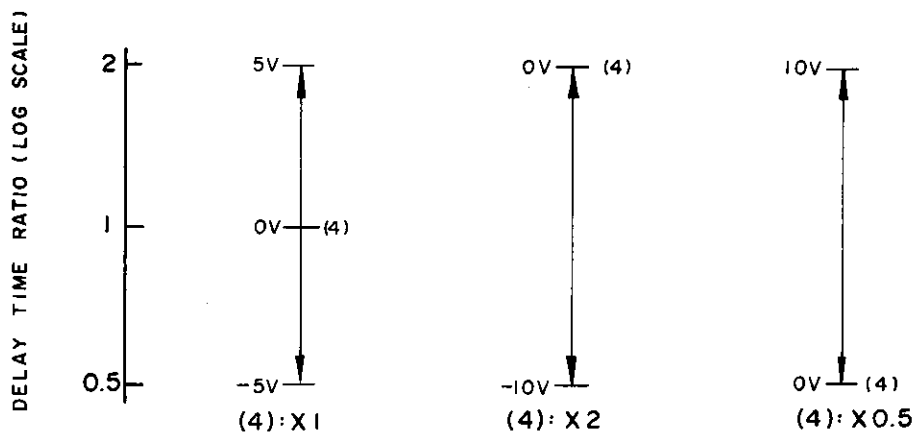


For instance, with the external voltage at 0 V and the modulation DEPTH [6] set at a certain point, the actual delay time will be as in above schematic in relation to position of the delay time MULTI [4]. The modulation LIMIT LED [5] will be lit to warn that multiplication has reached the limit of 1/2 or 2 times.

As shown by the extreme right curve, a short duration ON of the LED does not pose any problem in practical use.

The relation between external voltage and delay time is shown below (when modulation DEPTH [6] is at 0).

Figure 4.



4.7 Feedback

The amount of delay circuit sound signal output to be returned to the delay circuit input, is controlled by this FEEDBACK knob [8].

The actual delay circuit input signals are the sum of the external input and the feedback signal. Therefore, there is a point of excess input to the delay circuit as the FEEDBACK knob is rotated CW. This condition is also shown by the level indicator [2] as it indicates the condition after this summing. If the input level is in excess, lower it by the INPUT knob [1].

The signal level will increase at each round of the feedback loop as gain will be larger than 1 if the FEEDBACK knob is set at maximum (10). The gain, however, will drop temporarily when it reaches the limiting area.

4.8 Output connections and level adjustment

Exactly the same signals are obtained at OUTPUT jack [16] and AUX OUT jack [17].

The output signal is a mixture of the signal from the point immediately after the input control pot (DRY) and the delay circuit output signal (DELAY).

Output levels of the DRY and DELAY signals are respectively controlled by knobs [9] and [10]. The nominal output will be -10dBV (0.3V) when either one of knobs [9] or [10] is set at zero and the other at maximum.

With the output level set as above and the INPUT pot [1] set at 10 dB below maximum (approx. scale 7), the input vs output levels of this Unit will be 1:1.

If the DELAY - PHASE button is depressed, phase of the delay circuit output signal applied to the output mixing circuit and feedback circuit will be inverted.

4.9 Examples of application

In the following explanations, it is presumed that the INPUT control pot [1] and OUTPUT MIX - DELAY pot [10] are set at the best point for the equipments connected to the Unit. It must be noted, however, that the input may be overloaded if FEEDBACK [8] is raised, and the output go too high if the OUTPUT MIX - DRY [9] is raised.

Except when using the Unit as a flanger or adding vibrato to the sound, whether you raise [9] or not is your choice.

a) Echo

Set the front panel controls as follows:

[3] DELAT TIME - RANGE	Higher than 34mS
[4] DELAY TIME - MULTI	Variable
[6] MODULATION - DEPTH	"0"
[8] FEEDBACK	Variable
[11] DELAY - PHASE	NORMAL

Only one echo is obtained with FEEDBACK [8] at "0" but advancing the pot results in multiple echoes.

b) Chorus/doubling

Set the front panel controls as follows:

[3] DELAY TIME - RANGE	8.5 ~ 34mS
[4] DELAY TIME - MULTI	Variable
[6] MODULATION - DEPTH	Variable
[7] MODULATION - SPEED	Variable
[8] FEEDBACK	"0"
[11] DELAY - PHASE	NORMAL

Pitch of the sound is changed when delay time is continuously varied. Using this effect, if a song with a slight change in pitch is heard together with the original song, one singer could have the effect of two performers. Also, when this effect is applied to sounds from an instrument, it could add depth, particularly to a continuous note. The shift in pitch is increased if any one of the three factors - delay time, DEPTH, or SPEED - is increased. In addition, if delay is set to the larger value within the above setting, not only shift in pitch but shift in time can also be heard.

c) Flanger

Set the front panel controls as follows:

[3] DELAY TIME - RANGE	Less than 4.3 mS
[4] DELAY TIME - MULTI	X1
[6] MODULATION - DEPTH	9 ~ 10
[7] MODULATION - SPEED	Variable
[8] FEEDBACK	Variable

[9] OUTPUT MIX - DRY	Same setting as OUTPUT MIX - DELAY
[11] PHASE	NORMAL or INVERT

If a delayed signal is mixed with the original sound in 1:1 ratio, numerous dips will occur in the frequency response. The effect of shifting these dips over the frequency response by sweeping the delay time is called flanging.

If a shorter delay time within the above setting is selected, it will successively affect only the higher frequencies.

In order to obtain maximum sweep, MULTI [4] is set at X1. The sweep cycle can readily be confirmed if DEPTH control [6] is set such that the MODULATION - LIMIT LED [5] is instantaneously lit at each end of the sweep.

If FEEDBACK [8] is successively raised, dips and peaks upon the frequency characteristic will be exaggerated. the OUTPUT MIX - DRY [9] must be set at exactly the same position with DELAY [10]. However, when FEEDBACK [8] is raised, in some cases better results can be obtained if the DRY knob [9] is slightly lower than the setting of DELAY [10].

When the DELAY - PHASE button is set to INVERT, positions of the dips and peaks upon the frequency characteristic will be inverted. In such negative flanging, the lower the frequency of the signal, the more larger is the amount of constant cancelling, and therefore, the effect will be as if the lower region were cut. This effect is promoted by using shorter delay times.

d) Vibrato

Set the front panel controls as follows:

[3] DELAY TIME - RANGE	2.1 ~ 8.5mS
[4] DELAY TIME - MULTI	Variable
[6] MODULATION - DEPTH	Variable
[7] MODULATION - SPEED	Between 12 ~ 4 o'clock
[8] FEEDBACK	"0"
[9] OUTPUT MIX - DRY	"0"

Vibrato is a timewise variation of the pitch. By using this Delay Unit, musical instruments which originally cannot apply vibrato can be made to sound with vibrato. Same as in the case of the previous b) Chorus, shift in pitch is successively greater with progressive increase of DELAY

TIME, MODULATION - DEPTH and MODULATION - SPEED.

e) External control of delay time

From among the various effects mentioned above, in examples where the internal LFO is used (to set DEPTH at other than "0") this can be replaced by an externally applied voltage. In such a case, DEPTH is set at "0". It must be noted that there is no gain control for this input.

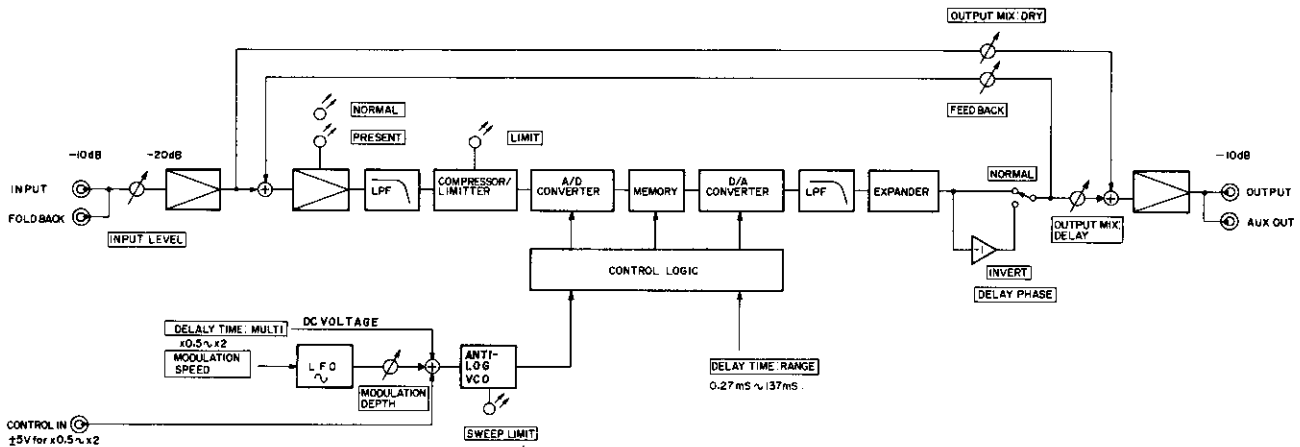
A 10V p-p voltage is required for control over the entire range (1/2 through 2 times). If the LFO such as in a music synthesizer with a voltage of $\pm 5V$ is to be used, MULTI must be set at X1. If an envelope generator with a typical 0 ~ 10V output is used, MULTI is set at 1/2.

SECTION 5 SPECIFICATIONS

Delay time	0.13 msec ~ 270 msec Range select : 0.27 msec ~ 137 msec, selectable in 10 steps. Multiplication : X1/2 ~ X2, continuously adjustable.
Delay time modulation	Frequency : 0.1 Hz ~ 30 Hz Width : 1 : 4 (max.) Modulation can be controlled by feeding a control signal into the CONT IN jack.
Frequency response	20Hz ~ 20KHz, $\pm 1dB$ (dry) 30Hz ~ 10KHz, $\pm 2dB$ (delay)
Range	80dB
T.H.D.	0.5%
Nominal input level	-10dBV (0.3V)
Input impedance	15K Ω
Nominal output level	-10dBV (0.3V)
Output load impedance	10K Ω or more

Level indication	3 point indication : LIMIT/NORM/PRESENT
Format	8 bits with X1/2dB analog compressor and X2dB expander.
Power requirements	100/120/220/240 V AC, 50/60Hz, 12W 120 V AC, 60Hz, 12W 220 V AC, 50Hz, 12W 240 V AC, 50Hz, 12W
Dimensions	430 (W) X 44 (H) X 210 (D) mm (17" X 1-3/4" X 8-1/4")
Weight	3Kg. (6-3/4 lbs.)

SECTION 6 BLOCK DIAGRAM



INDICATOR "ON" LEVEL AT INPUT JACK WITH 10dB ATTENUATION BY INPUT LEVEL

LIMIT -1dB
NORMAL -16dB
PRESENT -26dB

Fostex

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