

X100P.com's

STOC-FX

***World's First
Professional Grade VoIP
FXS to FXO Converter***



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STOC-FX

World's First Professional Grade VoIP
FXS to FXO Converter

Compatible with All FXS Ports of Digium Asterisk VoIP PBX

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X100P.com's STOC-FX Operation Manual v1.1

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Introduction

X100P.com's STOC-FX is the World's First Professional Grade FXS to FXO Converter designed for All VoIP ATAs on the market.

STOC-FX Converts and Enhances any ordinary FXS port VoIP ATA (Analog Phone Adapter) into a Full Featured, Failover and Forwarding FXS + FXO device. With the STOC-FX enhancement, making VoIP call is no longer limited to home or office location. Now you can make or receive VoIP calls intelligently while away from home or office (e.g. from a cell phone or payphone).

Designed from the ground up with flexibility in mind, STOC-FX is highly configurable through its programming menu and works with any VoIP ATAs on the market. STOC-FX supports predefined auto dialing number or user can input dialing number at runtime. Line access password can be enabled or disabled according to user's preference and Caller ID White List feature enables privileged caller to bypass line access password with convenience.

STOC-FX implements a number of advanced features to safeguard your phone lines or VoIP ATA from staying off-hook indefinitely.

Product Features:

- Convert any VoIP ATAs with a common FXS port into an Intelligent FXO port device.
- All functionalities works in both calling directions.
- Extend the reach of VoIP Calls to local phone network (e.g. other local phone numbers, local cell phones, etc).
- Integrate VoIP ATAs into existing legacy phone systems
- Maintain High ROI (Return of Investment) for your VoIP equipment
- Works with Worldwide Busy Tone signals: Configurable Busy Tone Frequency and On / Off duration
- Busy Tone Collision Handling
- Programmable and Highly Flexible
- Administrator and Line Access Passwords
- **Caller ID White List:** Identify privileged users by Caller ID to bypass Line Access authentication.
- Support **Bellcore / FSK** and **DTMF Caller ID** specifications
- Call Progress Detection by Voice Activity (**VAD**)
- Call Progress Detection by User Key Activity (**UAD**)
- Manual or Preset Dialing numbers
- Assembly Language Core: Efficient and Stable
- All features work for both landline and VoIP
- Built-in pass-thru ports.
- Tested and compatible with popular VoIP ATAs on the market
- Universal Voltage Power Adapter Included.

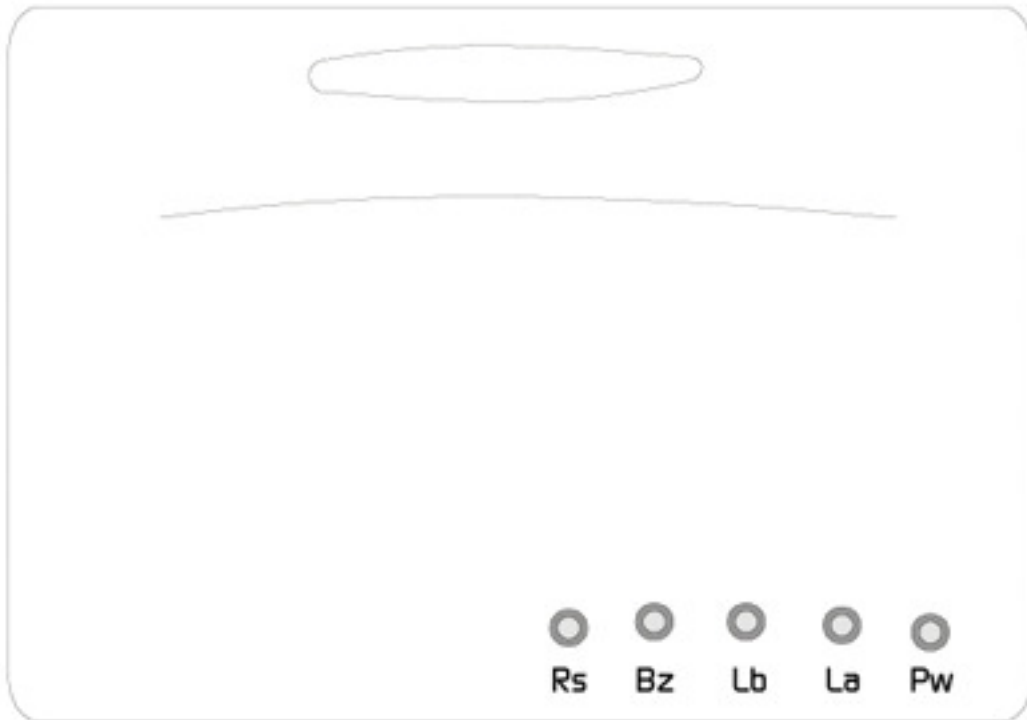


Figure 1

Table 1

Rs	Reset Pin
Bz	Busy Tone Detection Status LED
Lb	Line B Status LED
La	Line A Status LED
Pw	Power Status LED

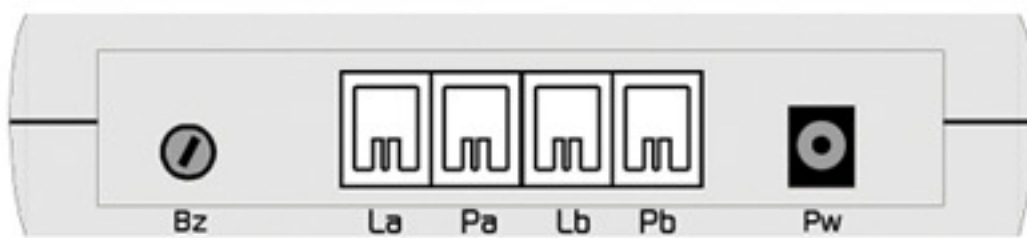


Figure 2

Table 2

Bz	Busy Tone Detection Adjustment Knob
La	Line A FXO Port (Connects to PSTN or VoIP ATA FXS Port)
Pa	Line A Pass through Port (Connects to phone headset)
Lb	Line B FXO Port (Connects to PSTN or VoIP ATA FXS Port)
Pb	Line B Pass through Port (Connects to phone headset)
Pw	Power Adapter Connector

STOC-FX Initial Setup and Connection

1. Make sure the existing VoIP ATA is accepting VoIP Calls

Make a VoIP Call from the network to the VoIP ATA. Pick up the call and in turn disconnect the VoIP call from the network side. Confirm a busy tone generated by VoIP ATA is heard in the phone headset. Hang up the phone again and make sure the VoIP line is reset.

2. Disconnect the phone set from the FXS port of VoIP ATA

You will need the phone again in Step #4 to monitor the busy tone during busy tone detection adjustment.

3. Connect “La” port of STOC-FX to the FXS port of VoIP ATA

Connect the “La” port of STOC-FX (Figure 2) to the FXS port of VoIP ATA. This would effectively let STOC-FX handle incoming calls from the VoIP ATA.

4. Connect the phone set to “Pa” port of STOC-FX

Reconnect the phone from Step #2 to the “Pa” port of STOC-FX (Figure 2) and Power up STOC-FX (Blue “Pw” Status LED = Flashes, Figure 1)

5. Make VoIP call again and let STOC-FX picks up

Make another VoIP call from the network to the VoIP ATA. STOC-FX will pick up the incoming VoIP call in about FIVE (5) seconds (Green “La” Status LED = On, Figure 1)

6. Pick up the phone set after STOC-FX picks up the VoIP call

After STOC-FX picks up the incoming VoIP call, pick up the phone headset connected to “Pa” port (Figure 2) and get ready for Busy Tone Detection Adjustment.

7. Disconnect the VoIP Call and start Busy Tone Adjustment

Hang up the VoIP call from the network side and the busy tone generated by the VoIP ATA is heard again from the phone headset. By using a small, slotted tip screwdriver, turn and adjust the “Bz” Busy Tone Adjustment knob (Figure 2) *slowly* until the Red “Bz” status LED (Figure 1) flashes in a way that matches the busy tone on / off frequency heard in the phone headset. Some patience is needed during the knob adjustment step. By default, STOC-FX will hang up after SIXTY (60) seconds of inactivity upon phone line pick up. So you will have 60s to make the adjustment.

8. Successful Busy Tone Detection Adjustment

Upon successful Busy Tone Detection Adjustment, STOC-FX’s “Bz” Status LED (Figure 1) will flash in red matching the busy tone frequency generated by the VoIP ATA. By default, STOC-FX will hang up the line after FIVE (5) busy tone is detected.

9. Connect PSTN to STOC-FX

Connect a PSTN line (Ordinary Phone Network Line) to “Lb” port of STOC-FX (Figure 2). Optionally, connect another phone set to “Pb” port of STOC-FX (Figure 2) would enable the use of the PSTN line when the line is not in used by STOC-FX.

** Unsuccessful Busy Tone Detection Adjustment

Repeat Step 5 to 8 if the Busy Tone Detection Adjustment is unsuccessful. Again, patience is needed during the knob adjustment step and this initial setup is only required once. ***Please Be Patience!***

More About Busy Tone Detection

STOC-FX is flexibly designed to handle detection of different busy tones used in different countries around the world. To archive this flexibility, we separated Busy Tone setup into THREE (3) parameters:

1. Busy Tone Frequency
2. Busy Tone “On” duration of the temporal pattern
3. Busy Tone “Off” duration of the temporal pattern

The above THREE parameters are setup by the following respectively:

1. Busy Tone Detection Adjustment Knob (A hardware knob on the body of STOC-FX, see “BZ” in Figure 2.) . To setup, please see: **STOC-FX Initial Setup and Connection (P.5)**
2. Setup command “021xx#” in the programming menu.
3. Setup command “022xx#” in the programming menu.

To help users to setup the Busy Tone On and Off pattern, we have included the following table for **International Telephony Busy Tone Signal Reference**. Please note, other countries that are not listed here are * **ALSO SUPPORTED** * by STOC-FX’s flexible design.

Although we strive to provide the most updated information available, we cannot guarantee its accuracy for all countries. Most countries have regulatory authorities that provide the latest specifications and compliance information. Please consult your local regulatory authorities if you find the information incorrect for your specific region. We at X100P.com would be glad to receive any correction of this information. We will then update this manual ASAP in favors of all STOC-FX users’ benefit.

Country	Busy Tone On	Busy Tone Off	021xx# Setup Value	022xx# Setup Value
Australia	0.4sec	0.4sec	40	40
Belgium	0.15sec	0.15sec	15	15
China	0.3sec	0.3sec	30	30
France	0.5sec	0.5sec	* 50	* 50
Germany	0.5sec	0.5sec	* 50	* 50
Hong Kong	0.5sec	0.5sec	* 50	* 50
Israel	0.5sec	0.5sec	* 50	* 50
Italy	0.5sec	0.5sec	* 50	* 50
Japan	0.5sec	0.5sec	* 50	* 50
The Netherlands	0.5sec	0.5sec	* 50	* 50
Norway	0.5sec	0.5sec	* 50	* 50
Singapore	0.75sec	0.75sec	75	75
South Korea	0.5sec	0.5sec	* 50	* 50
Sweden	0.25sec	0.25sec	25	25
Switzerland	0.5sec	0.5sec	* 50	* 50
Taiwan	0.5sec	0.5sec	* 50	* 50
United States	0.5sec	0.5sec	* 50	* 50
United Kingdom	0.4sec	0.4sec	40	40

* **STOC-FX Factory Default Value**

STOC-FX Simple Example Usage (Factory Default)

Incoming call from VoIP

1. Incoming VoIP call originating from the network to the VoIP ATA is picked up after FIVE (5) seconds by STOC-FX.
2. STOC-FX waits for line access password of Line A starting with (#) (Reads: Pound) Default: #123456
3. Password authenticated and PSTN line is connected to VoIP line
4. PSTN line dial tone is available to make call

Incoming call from the PSTN

1. Incoming call originating from the PSTN phone network to STOC-FX is picked up after FIVE (5) seconds.
2. STOC-FX waits for line access password of Line B starting with (#) (Reads: Pound) Default: #123456
3. Password authenticated and VoIP line is connected to PSTN line
4. VoIP line dial tone is available to make calls

STOC-FX Advanced Example Usage (Requires Programming)

Incoming call from VoIP with Caller White List Checking and Predefined Auto Dialing Number

1. Incoming VoIP call originating from the network to the VoIP ATA is picked up after FIVE (5) seconds by STOC-FX.
2. STOC-FX validates Caller ID information passed by the VoIP ATA against White List. (hint: use Asterisk "SetCallerID" command)
3. Line access password is bypassed and the predefined Auto Dialing Number is called with the PSTN line.
4. PSTN line is connected to VoIP line.

Incoming call from PSTN with Caller White List Checking and Predefined Auto Dialing Number

1. Incoming call originating from the PSTN phone network to STOC-FX is picked up after FIVE (5) seconds.
2. STOC-FX validates Caller ID information passed by the PSTN line against Caller White List (e.g. Caller ID number of user's cell phone)
3. Line access password is bypassed and the predefined Auto Dialing Number is called with the VoIP line.
4. VoIP line is connected to PSTN line

Programming the STOC-FX

The programming menu is accessed by calling either Line A or Line B of STOC-FX and inputting the programming password (Default: *#123456).

* Please note, programming password starts with (*#) and Line access password starts with (#).

It is recommended to call STOC-FX for programming from the PSTN because DTMF tones sending from PSTN tends to be more accurate.

Once inside the programming menu, the following programming commands can be issued. Upon successful command execution, STOC-FX will response with ONE (1) Beep tone. And for un-successful command execution or command failure, TWO (2) Beep Tones will be responded. All commands are ending with (#) sign.

System Setup Commands List

“xx” indicates user-definable numeric values.

Command	Description	Default	Min	Max	Unit
**#	Hang up explicitly after Finishing Programming				
0000#	Restore Factory Default				
013xx#	Call Pickup Delay	5	01	60	Seconds
014xx#	Call Progress Detection by User Key Activity (<i>UAD</i>)	00	30	99	Seconds
016xx#	Line Flash Timeout	10	01	99	Seconds
017xx#	Call Progress Detection by Voice Activity (<i>VAD</i>)	00	30	99	Seconds
018xx#	Programming Password Input Trial	03	01	99	Counts
019xx#	Line Access Password Input Trial	03	01	99	Counts
020xx#	No Response Timeout	60	05	60	Seconds
021xx#	Busy Tone On Duration	50	01	99	Millisec x 10
022xx#	Busy Tone Off Duration	50	01	99	Millisec x 10
023xx#	Busy Tone Detection Count	05	01	30	Counts
031#	Disable Pickup Beep Prompt	Disabled			
032#	Enable Pickup Beep Prompt	Disabled			
09xxxxxx#	Setup Programming Password	123456	Password Length must be SIX (6) digits		
13xxxxxx#	Setup Line A to Line B access password	123456	Password Length must be SIX (6) digits		
23xxxxxx#	Setup Line B to Line A access password	123456	Password Length must be SIX (6) digits		

Line Feature Setup Commands List

Command	Description	Default	Remarks
161#	Enable White List Caller Only on Line A	Disabled	
162#	Disable White List Caller Only on Line A	Disabled	
163#	Enable Line A No Answer	Disabled	Invalid if Line B No Answer is Enabled
164#	Disable Line A No Answer	Disabled	
165#	Enable Line A access Password Bypass	Disabled	
166#	Disable Line A access Password Bypass	Disabled	
261#	Enable White List Caller Only on Line B	Disabled	
262#	Disable White List Caller Only on Line B	Disabled	
263#	Enable Line B No Answer	Disabled	Invalid if Line A No Answer is Enabled
264#	Disable Line B No Answer	Disabled	
265#	Enable Line B access Password Bypass	Disabled	
266#	Disable Line B access Password Bypass	Disabled	

Caller ID White List Setup Commands List

“xx” indicates user-definable numeric values.

“M” indicates 0-9 positions on the Caller ID White List. A total of 10 Caller ID White List numbers can be set for **each** line.

Command	Description	Max Length
11Mxxx...xxx#	Setup Line A incoming Caller White List Number at Position M	15
14M#	Clear Line A incoming Caller White List Number at Position M	
1400#	Clear All Line A incoming Caller White List Numbers	
21Mxxx...xxx#	Setup Line B incoming Caller White List Number at Position M	15
24M#	Clear Line B incoming Caller White List Number at Position M	
2400#	Clear All Line B incoming Caller White List Numbers	

Auto Calling Number Commands List

Command	Description	Max Length
12xxx...xxx#	Setup Line A to Line B Predefined Auto Calling Number	30
15#	Clear Line A to Line B Predefined Auto Calling Number, User can input calling number at runtime after getting dial tone from Line B	
22xxx...xxx#	Setup Line B to Line A Predefined Auto Calling Number	30
25#	Clear Line B to Line A Predefined Auto Calling Number, User can input calling number at runtime after getting dial tone from Line A	

Setup Tips

1. Use VoIP ATA for Busy Tone Detection Adjustment. Since busy tone generated by VoIP ATAs are generally more accurate, consistent and provide a continuous busy tone. It is a better choice for Busy Tone detection than PSTN line busy tones.
2. Busy tone detection light sometimes will flash one or two more times than the Busy Tone Count setting. This is due to the first busy tone detected right after hang up might sometimes be “half-tone”.
3. If a system setting is set out-of-range, the setting will fall back to its nearest min or max. For example, if Busy Tone Detection Count is set out of range (ie. Less than 1 or more than 20), the count setting will fall back to system minimum and maximum (ie. Set 0 yields 1, setting 30 yields 20)
4. Some noises during VoIP calls could be falsely detected by STOC-FX as Busy Tone. In such case call interrupt might happen. To overcome the noises during VoIP being detected as Busy Tone, try increasing the Busy Detection Counts.
5. After Busy Tone Detection is set to detect the busy tone from the VoIP ATA, user must be careful and use (**#) to exit programming menu when calling from the PSTN landline to program STOC-FX. Otherwise STOC-FX will leave the line off hook until programming menu timeout (60secs, fixed)
6. To ensure accurate Caller ID detection for the White List, it is recommended to set the Call Pickup count to more than FIVE (5+) in situations that Caller ID is crucial.
7. To Reset STOC-FX to Factory Default, press the “Rz” Reset Pin (Figure 1) and hold for 5 seconds.

Tested with STOC-FX

STOC-FX supports any VoIP ATAs and any VoIP devices with a FXS port on the market. The following VoIP ATAs and Telephony Cards has been tested with STOC-FX in X100P.com's lab.

1. Cisco Systems ATA 186
2. Digium IAXy S101i
3. Digium TDM400P (FXS Port)
4. Sipura SPA-1000
5. Sipura SPA-2000
6. Sipura SPA-3000 (FXS Port)
7. X100P.com's S100-FX v2.0

FAQ:

1. What is mean by STOC-FX? How do you pronounce it?

A: STOC-FX comes from **FXS To FXO Converter** with "FX" at the end. Pronounced as "STOCK" "AFF" "AXE".

2. When I disable password for a line and try to access the programming menu after hearing the second line dial tone, sometimes STOC-FX does not get into programming menu properly and only give me a flash.

A: This is due to Call Pick Up timer is set too short. Try setting it to at least 5s (i.e. 01305#)

3. What is the Caller ID length supported?

A: STOC-FX support 15 digits Caller ID internally but most Caller ID standard is 12 digits long.

4. Why do all time-based settings seem to be inaccurate?

A: Due to CPU timer dependencies, all time-based settings are subjected to an absolute error of about 100ms. It would become noticeable only when the time-based setting is set high (e.g. A setting with 30 seconds value may result in up to 33 seconds in practice). This is completely normal and is neither a design flaw nor a sign of defective unit.

Document Changlog:

v1.1	1 st Nov, 2006	Added Section: More About Busy Tone Detection Added Picture: Product Picture on Front Page Correction: Call Pickup Delay default should be 5s Amend: Minor changes in wordings
v1.0	1 st Sept, 2006	First Public Release
v0.9		Internal Engineering Release