Vortex Fett Real-Time Voice Effects Amplifier
Operating Instructions
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This document explains how to setup your Fett voice amp, operate it correctly, and use all the features available on the unit.

This package includes:
1) Programmed Fett voice effects board
2) Battery harness
3) On/off power switch
4) AC wall adapter power supply
5) 1/8" mono pushbutton cable
6) 1/8" stereo output cable

You will also need the following if not included in your package:
1) Amplified speaker (Radio Shack #277-1008C)
2) Microphone with boom (Radio Shack #33-3012) or tie-clip mic (Radio Shack #33-3013)
3) OPTIONAL: Two stereo splitters (Radio Shack #274-375B) for dual-comm setup

OVERVIEW

The voice board will run off any DC power supply from 6V-18V. You can use the supplied battery harness. The board will also run off two 9V batteries if you want. Use alkaline batteries or lithium batteries for added life. You can also use a 6AA battery pack for extended trooping sessions. *When the batteries are getting low, you will start to hear a high-pitched whine emanating from the speaker.* This is your cue that the batteries need replacing soon!

Depending on your order, you also might have aluminum standoffs included in your package. They are for the 4 holes in the corner of the sound board. If you want to mount the sound board in an area where it needs to "stand up" some, you can remove the 4 rubber stoppers on the bottom of the sound board and use these standoffs with the screws to mount the board.

NOTE: Handle your board as you would any piece of delicate electronics! Do not get it wet and do not handle it without grounding yourself first! Even a static shock can destroy the delicate components on the board. I suggest when installing the board, insulate it with non-static foam, hot glue, or other material. Handle the board around its edges when moving it. We are not responsible for boards that are rendered useless by improper handling.

The fett voice amp has 3 main operating modes:

1) Output level selection mode
2) Anti-feedback training setup mode
3) Normal operating mode

Each will be discussed in detail. The unit contains very sophisticated software that requires you to follow the setup procedures in order to get the best performance from the voice amp. PLEASE READ!!!

MODE 1: OUTPUT LEVEL SELECTION MODE

When the unit first powers up by switching the on switch, it selects its output mode. There are 2 modes, mic level output and line level output. The default mode is mic level output, which is compatible with the small amplified speaker (Radio Shack model #277-1008C).

Mic output mode: This is the default output mode. You do not have to do anything special, just power up the unit and this mode is auto selected. This means that the output signal is matched for speakers or other output sources that expect a mic-level input, for example, like the amplified speaker or the mic input to a sound card.

Line output mode: This mode is used if you want to connect the amp output to a home stereo, computer sound card line-in jack, or other line-in source. To get into this mode, hold down the remote pushbutton and then turn the unit on. The unit should respond by blinking the red LED (light) twice. You can now let go of the pushbutton. The unit is now set to work with line-level outputs. NOTE: This mode is not remembered, so it has to be done each time the unit is powered up.

MODE 2: ANTI-FEEDBACK TRAINING MODE

The training mode is needed to initialize the feedback canceller. Every time you power up the box, the training mode is automatically rerun. Why? The feedback canceller operates when the unit is on so that the inherent howling that happens when the microphone and speaker come into proximity is attenuated. This howling is called feedback and is caused by the output of the speaker feeding back into the microphone and causing havoc in the form of nasty sounds and howling. Devices that attack this feedback in order to control it are called feedback cancellers.

The training mode adapts to specific feedback paths that it encounters upon powerup. *You will have up to 4 feedback paths that you can train the unit to combat.* This means that you can attenuate up to 4 "howling" positions in your costume setup. This should allow you to gain more speaker volume than you would with no feedback canceller running.

Training mode example

For example, if you are in full costume and run the training mode, the unit adapts to 4 particular feedback paths that are unique to the placement of the speaker and mic, as well as the acoustical chamber of your helmet. You can train the unit with your helmet off (1st path), put your helmet back on and train the unit again (2nd path), turn your head to the right with your helmet on (3rd path), and turn your head to the left with your helmet on (4th path).

If you change the feedback path anytime while the unit is still on, and you have not trained the unit for that particular path, then howling can still occur! For example, if you train the 4 feedback paths with your helmet on, then take off your helmet, this new feedback path changes dramatically and howling may occur since the unit was first setup for your costume with the helmet on. For this reason, the unit re-adapts every time power is applied to the unit in case you change the environment in which the unit is operating. Each time you move your head, the spatial configuration between the mic and speaker has changed, which can create a brand new feedback path. So, you can see that you cannot eliminate all feedback paths, but you can combat a specific spatial area to eliminate feedback in that focused area.

Rule of Thumb

The rule of thumb is: The closer the mic and speaker are, the worse this feedback is. Even if you eliminate feedback in this extreme case, the slightest movement of your head will cause a new feedback path. As the speaker and mic are separated, you will have more "leeway" in your head movement before feedback ensues.

So, separating the mic and speaker as much as possible is beneficial and should allow you to turn up the speaker to a reasonable level without feedback ensuing, as well as giving you a good amount of head movement before a new feedback path crops up. Remember, feedback is always there, it is just a matter of how much you can attenuate it. Feedback is also directly proportional to volume, so the more you turn up your speaker, the more feedback you will experience.

Inactivating one or more of the 4 feedback cancellers

This feedback algorithm allows for up to 4 feedback paths to be trained. For example, if you only wanted to train for 2 paths, then once the 2nd path is trained, you can skip past the other 2 paths by turning off your microphone and pressing the remote button twice. This will deactivate the last 2 feedback cancellers.

NOTE: If you have the mic off during training, then the end result after pressing the remote button 4 times is that all the feedback cancellers will be inactive during normal operating mode. So, your voice amp will work as if it did not have a feedback canceller running (like a normal mic/speaker setup). This can be useful if you are using your voice amp to record computer wav files, etc.

Getting through the training mode

When you power on the unit, the unit goes into a training mode for the feedback cancellers. This mode always comes on and is essential for the feedback canceller to operate correctly using the voice amp. When the unit powers up, you will hear a unique beeping sound that tells you that the unit is in the training mode and is standing by for your commands.

To complete the training mode, you must follow the below steps:

1) Make sure the unit is off. Place the speaker and microphone in their final positions on your body/suit and continue suiting up. If you are using the unit with a helmet, finish mounting the speaker and microphone and then put on your helmet.
2) Turn on your microphone and speaker. The unit should beep at you, telling you that it is waiting to be trained for feedback path 1. Try not to be in a noisy area and do not make any extra noise while this training is going on. **NOTE: Do not talk into the microphone during the training!**
3) When you are in a position to train for the 1st feedback path, turn up your speaker until you hear the notorious howling coming from the speaker. This is the normal feedback you would experience with your setup.
4) When you hear the howling feedback, press the remote button. You will hear a "dit-dit" beeping sound and the feedback noise should go away. This tells you the unit attacked that feedback path and is ready for the next one. (NOTE: A new howling sound might occur right after this, and this is known as the secondary feedback path. If you back off the speaker volume alittle bit after attacking the first feedback path, the howling should go away.)
5) Repeat steps #3-4 for up to 4 feedback paths.
6) When you are done with the 4th feedback path, the unit will make another unique beeping sound, telling you the training is over and the unit is now in normal operating mode.
7) The training mode is complete, and you can now talk and use the unit normally.
8) You should be able to turn up the speaker to a reasonable level now (3/4 of the way is usually good). If you start to hear a howling noise, this means you are creating a feedback path that you have not trained, and you must back off the volume in order to be at a "safe" volume level.

Troubleshooting

Once you exit the training mode, if feedback ensues, you need to do one of the following things:
1) Turn down the volume on the speaker until feedback disappears
2) Place the speaker farther away from the mic and rerun the training mode.
3) Move the speaker and mic to a more strategic location to lessen the feedback, which entails some trial and error.

If you have followed the above procedures, you will most likely hear feedback if you have turned the speaker up too loud and the mic and speaker are in a spatial configuration that causes so much feedback that the voice amp cannot cancel it all. This is not a trivial thing to solve!! When you have a helmet on and encase the speaker in a cavity, the feedback is much more severe than if you were to just place a speaker and mic in free air. So**, placement is everything in this situation**. In my experience, if you the expose the speaker to free air and do not enclose it in a chest piece, etc., then the feedback is less severe and the unit can operate well.

MODE 3: NORMAL OPERATING MODE

Once the training mode is exited, the voice amp stays in normal operating mode. When you talk, the unit will transform your voice into a fett automatically.

Fett Voice Effect

The unit will always transform your voice into a "fett-like" sound. If you lower your voice and make it sort of throaty, or raspy sounding, then the voice effect sounds much closer to Fett as heard in ESB. You will find that by fine tuning your own voice, you can achieve the spirit of Fett's speech much more readily. Nothing can automatically turn your voice into Fett, but if you study his speech patterns, talking speed, and word emphasis in the movies, you too can achieve a near perfect effect that is indistinguishable to most people. Perfecting these intricacies will transform your voice effect from good to great!

Sound Effects

In normal operating mode, the remote button takes on a different role. When you press the button, it will play one of 2 blaster sounds, and a 3rd sound is the Fett ambient sound that is heard in ESB during the Falcon chase. The sound is chosen based on how long you press the button:

Sound Effect	Hold button down for (seconds)
Normal blaster sound	Less than ½ sec
ESB blaster sound	½ sec to 1 sec
Looping Fett ambient sound	1 sec to 1 ½ sec

The above table determines the sound to be played. For example, holding the button down less than ½ second will play out the normal blaster sound. Holding the button down for greater than ½ sec, but less than 1 sec will play out the ESB blaster sound, etc.

To get the looping Fett ambient sound to play, hold down the button greater than 1 sec then release. The sound will loop forever until you press the button again for more than 1 sec. So, this allows you to turn the looping sound on and off using the button. *Note: The mic is shutoff during the looping ambient sound, so any talking with not go out to the speaker.* This special looping sound is good if you do not want your voice to be heard by others, but want Fett's ambient sound playing out for demonstration or intimidation!

Dual-communication setup

Your modified fett voice is played out of the right channel only. So, you can use a stereo cable is you want since the right channel is the default channel on a stereo cable. The left channel passes through voice and audio unmodified. So, you can hook as many speakers to the right channel as you want to give your fett voice more presence (but remember, this also complicates feedback issues!!). If you want to setup an "outside-to-inside" speaker system, you can use the left channel to connect another microphone (which would be placed outside on your armor somewhere) to a

speaker or headset inside your helmet. This allows you to have a dual channel system where you speak to outsiders in your fett voice and when they talk to you, it is sent to the speaker in your helmet so conversation is more understandable. **You can find the stereo splitters at Radio Shack, #274-375B, to split the L and R channels for this setup**

Mic placement issues

For the tie-clip mic (Radio Shack #33-3013), I have found it best to place it right under your lower lip. This gives you maximum sensitivity and loudness. Experimentation will give the best results. If you use the boom mic (#33-3012), the headset is more comfortable and can be worn under your helmet. The boom mic also has a unidirectional mic, which will help reduce feedback. The tie-clip mic has an omnidirectional mic, which gives better voice pickup but increases potential feedback.

Here is the channel mapping of the right and left channels.

Input channel	Voice board processing	Output channel
Right	Fett voice or sound effects	Right
Left	Unmodified audio	Left

MOUNTING THE UNIT

If you are using the voice amp with a standard set of armor, you can put the board anywhere you see fit. Try and keep the unit away from water, sweat, or condensation, as these are not good for any set of electronics!!

If you have a backplate like in a stormtrooper, you can mount the board there. Or you can mount it in a soft pouch. Below are a couple examples used in trooper armor to give you some ideas for your Fett costume.
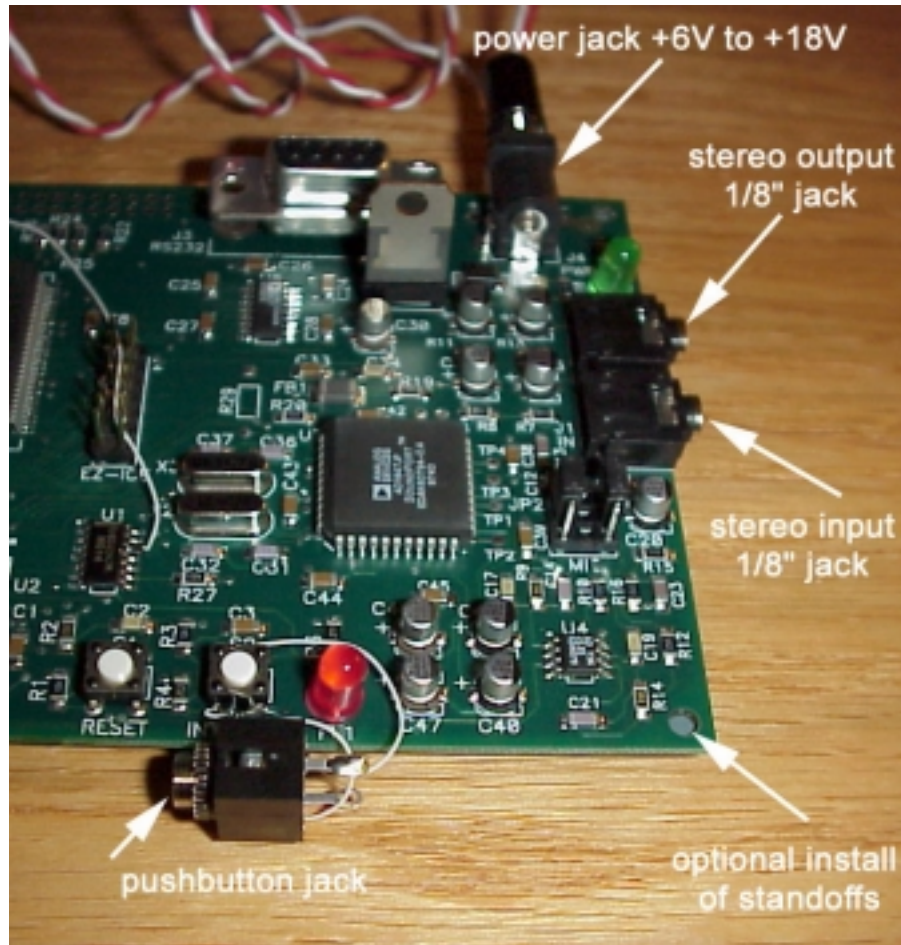

Fett Voice Effects Amp, © 1998-2001, J.M. Shima

Pouch installation:

Components can be easily removed from pouch to change batteries - they are all velcroed to a sheet of plastic

Velcro used to attach components to plastic sheet

Blaster Sounds button
(long cable provided)

Headset On/Off switch

Amplifier On/Off switch and volume

Vortex On/Off switch

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SUMMARY OF INPUT/OUTPUT JACKS

Here is a brief description of the jacks on the voice amp.

Power jack: Used to turn the unit on and off. Unit can be used with batteries or supplied DC adapter.

Pushbutton jack: Used to hook up a remote pushbutton, which is linked to the pushbutton on the unit.

Stereo output jack: Hook up to output source – amplified speaker(s), sound card, etc.

Stereo input jack: Input jack to connect external microphone. (this is a stereo mic jack).

Any questions, you can email me at: shima@hyperdynelabs.com if you are having difficulties setting up the unit. Good luck and enjoy!!!!