Changing Piezo Drive Card's Fast Slow Compensation

Dynamics of an ASI Piezo Top-plate and Piezo Objective Mover (FPOMs) vary depending on piezo travel and sample weight they are subjected to. Heavier payload (500grams and above) and longer piezo travel range(300um and above) tend to make the stage more unstable or prone to ringing. These piezo stages need a slower error compensator on the piezo drive card to work optimally.

Since 2014 , all ASI Piezo Drive cards (ADEPT) come with two error compensators, a "Fast" (meant for 150um range piezos with payloads upto 1kg) and a "Slow" (meant for 300um range and above piezos with payloads upto 1kg).
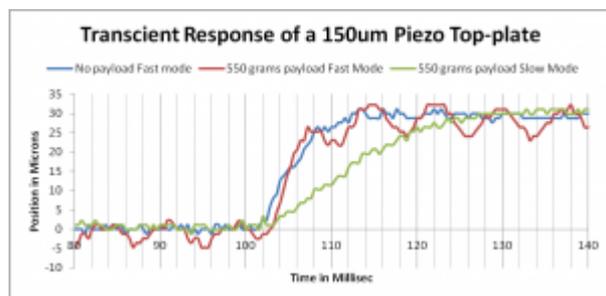

Figure 1: Shows Transient response of a 150um Piezo Top-plate with varying payload and modes

Above Graph is the transient response of a 150um Piezo doing 30um Step Move.

- Without payload and in fast mode, piezo is able to finish the move in 10millisec without any extra ringing.
- However with 550 grams payload , Piezo is now ringing.
- When Drive card is put in Slow mode, time needed to finish the move increased from 10millisec to 20millisec , however no ringing is seen.

This document carries instructions on how to put the ADEPT card in Fast or Slow Mode. Depending on how old your system is you will be able to change the compensation either by issuing serial command or opening the controller and move a jumper.

Identifying Your ADEPT Card

Query the Controller with the serial command PZINFO, and the Controller replies back with something like this.

```
PZINFO
Axis: P
Voltages @ Pos1>
 HV   : 148 V
 Sout : 5 V
 PZout: 39 V
I2C Check> DAC[OK] SWITCH[OK] DigPot[OK]
ADEPT Rev 1
```

```
DigPot> SGoffset: 177 Gain: 60
Closed Loop
TG-1000 IN
HV ENABLE
FAST MODE
SG Offset [OK] 102
```

If your controller's reply has ADEPT Rev 1 , you are in luck, your controller has an ADEPT Rev M or above card , you will be able to change the compensation with just serial commands.

Issues the serial commands PZ Z- to put the Drive card in "Slow mode" and PZ Z+ to put the card in fast mode. If you are satisfied with the performance , you can save the setting to non volatile memory by issuing the serial command SS Z. If your don't have a preferred serial terminal program and you are on a MS2000 controller, try ASI Console.

If your PZINFO reply , instead has ADEPT Rev 0 or anything like that at all , you have an older system. If it's a ADEPT Rev L2 card compensation can be changed by opening the controller and changing the jumper.

If you have an older revision of ADEPT card, it lacks the Fast Slow feature. Contact ASI and ask for an upgrade.

Accessing the Piezo Drive Card

STEP 1: Turn off the power and remove all cables attached to the controller.

STEP 2: Remove the six case screws located on the back top and bottom front of the controller (to avoid stripping screws when removing bottom screws, apply pressure to keep the top and bottom covers together while removing/inserting screws).
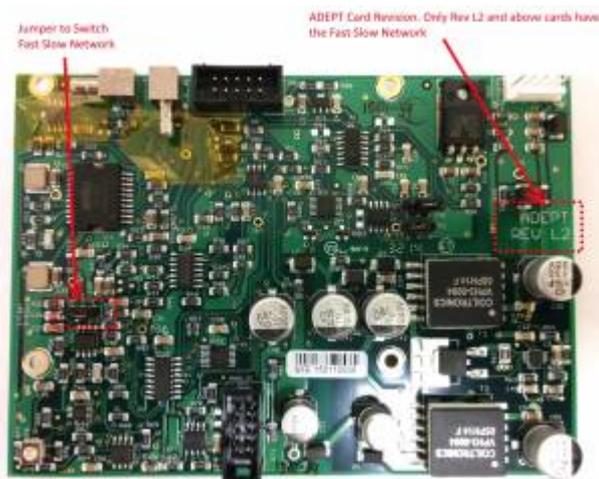
How to Change Fast Slow Compensation

Figure 2: Show ADEPT cards Rev and jumper location
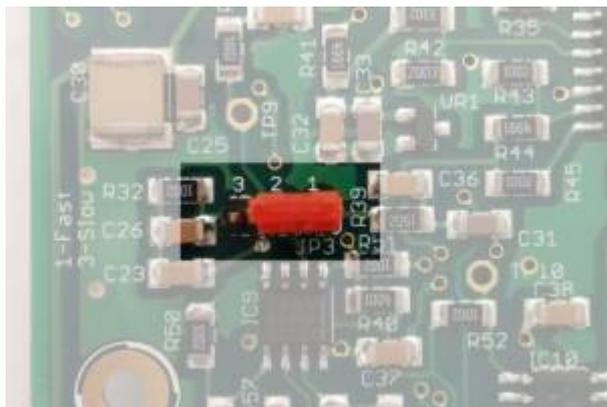
Jumper Pins 1& 2 to put piezo on Fast

Figure 3: Jumper Pins 1& 2 to put piezo on Fast

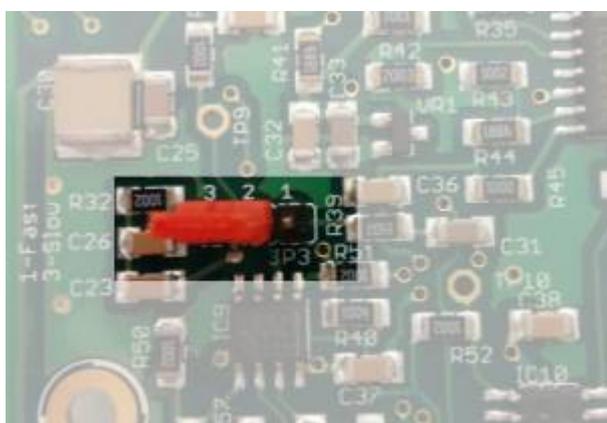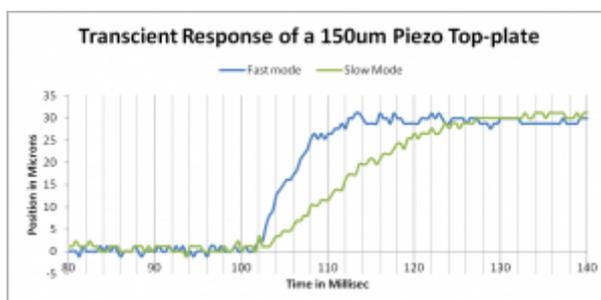Jumper Pins 2&3 to put Piezo on Slower Compensation network

Figure 4:Jumper Pins 2&3 to put Piezo on Slower Compensation network

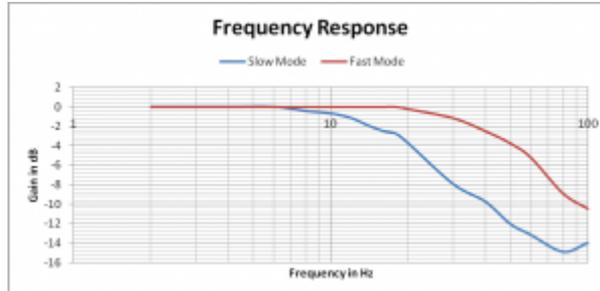# Change in Piezo's Performance between Fast and Slow Network

Transient Response

The Above graph is of a 150um piezo top-plate doing a 30um step move in Fast and Slow mode. 10-90% move time is around 10millisec in fast mode, and around 20millisec in slow mode.

Frequency Response

In this test a sine wave of 2 Volt peak to peak and 5Vrms of varying frequency is applied thru external input and the response of the top-plate was observed on sensor out. This is used to determine what the maximum possible input frequency is.

[tech note](), [piezo]()