

This Application Note is pertinent to our Unidrive SP, Commander SK, Affinity, Mentor/Quantum MP and DigitAx Drive Families

## Inverting the Sense of Speed Command Signals

On occasion certain processes require the motor speed to respond to the inverse of the speed command signal. Normally the greater the command magnitude, the faster the motor is to run. This application note will outline a couple of methods of accomplishing the inverse whereby the greater the command the slower the drive runs the motor.

This note will use screenshots taken from CTSoft and CTScope

The screenshots illustrated in this App Note were taken from CTSoft, our free Configuration Software. To obtain your free copy click on the links below.

[\*\*CTSoft\*\*](#)

[\*\*Computer Cables to utilize CTSoft\*\*](#)

[\*\*CTScope\*\*](#)

## Method 1

If the input signal is a 4-20mA or 0-20mA signal one would simply set the analog input mode to the inverted condition ie 20-4 or 20-0

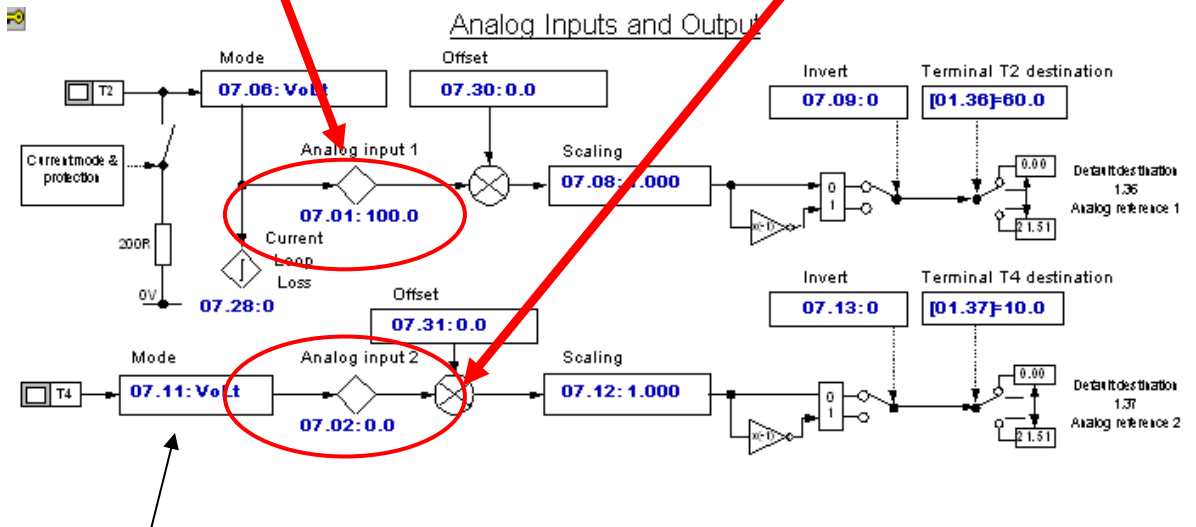
When 20mA is being supplied the drive will make the motor run at minimum speed.

## Method 2

This method will use the facilities of the Variable Selectors of menu 12. This method simply uses the subtract function. However, before that, we need to pick up the voltage reference signal wherever it is being connected to the drive. Show below is the Commander SK standard Analog Inputs.

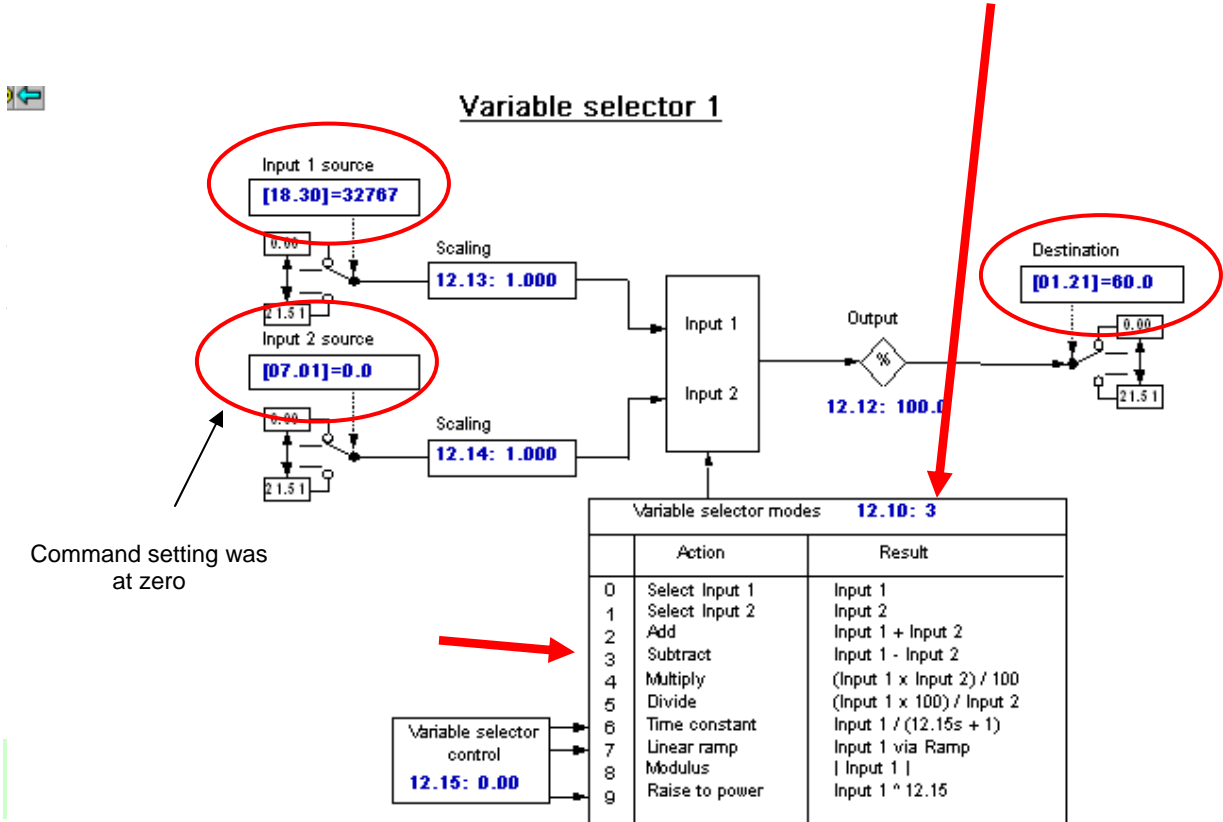
If the voltage signal is coming into T2 - refer to #7.01  
( Signal shown here was at 10v )

If the voltage signal is coming into T4 - refer to #7.02



If T4 is selected as the command input, the mode #7.11 must be changed to Volt.

This method will use the facilities of the Variable Selectors of menu 12. This method simply uses the subtract function to accomplish the inversion.



I elected to set Input 1 Source to a free drive register in menu 18. I chose #18.30 and set it to a value of 32767 which is the maximum range of that register. The Variable Selector will treat that value as 100%.

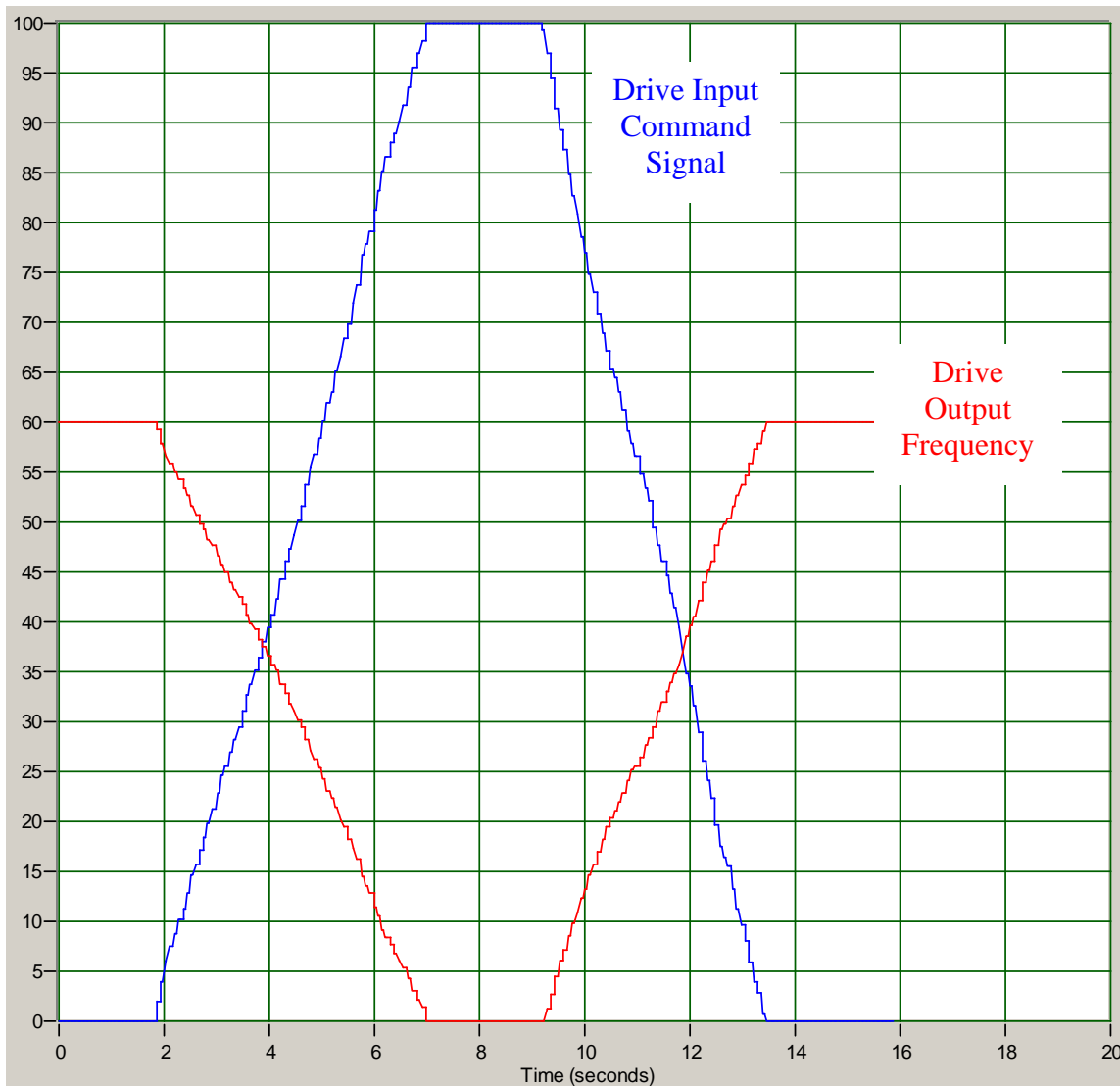
Source 2 is set to #7.01- our voltage input command where 10v = 100%. As can be seen with 0v being applied #7.01=0.0 and when subtracted from 100% = 100%. The result of all this is being sent to #1.21 which is Preset 1. Note that it is translated or scaled to 60Hz which is the value of the Max Frequency- #0.02.

So now if the drive reference selector ( #0.05 ) is set to Pr, the drive should respond in an inverse fashion as illustrated on the following page.

**Remember** – that a **Reset** is required to make destination register re-assignments to become affective

Below is a screenshot of the result taken using CTScope. The Blue trace is the speed command signal #7.01 ( changed by hand ) and the Red trace is the actual drive output frequency #5.01 where 60Hz is max. One can readily see the inversion characteristic-

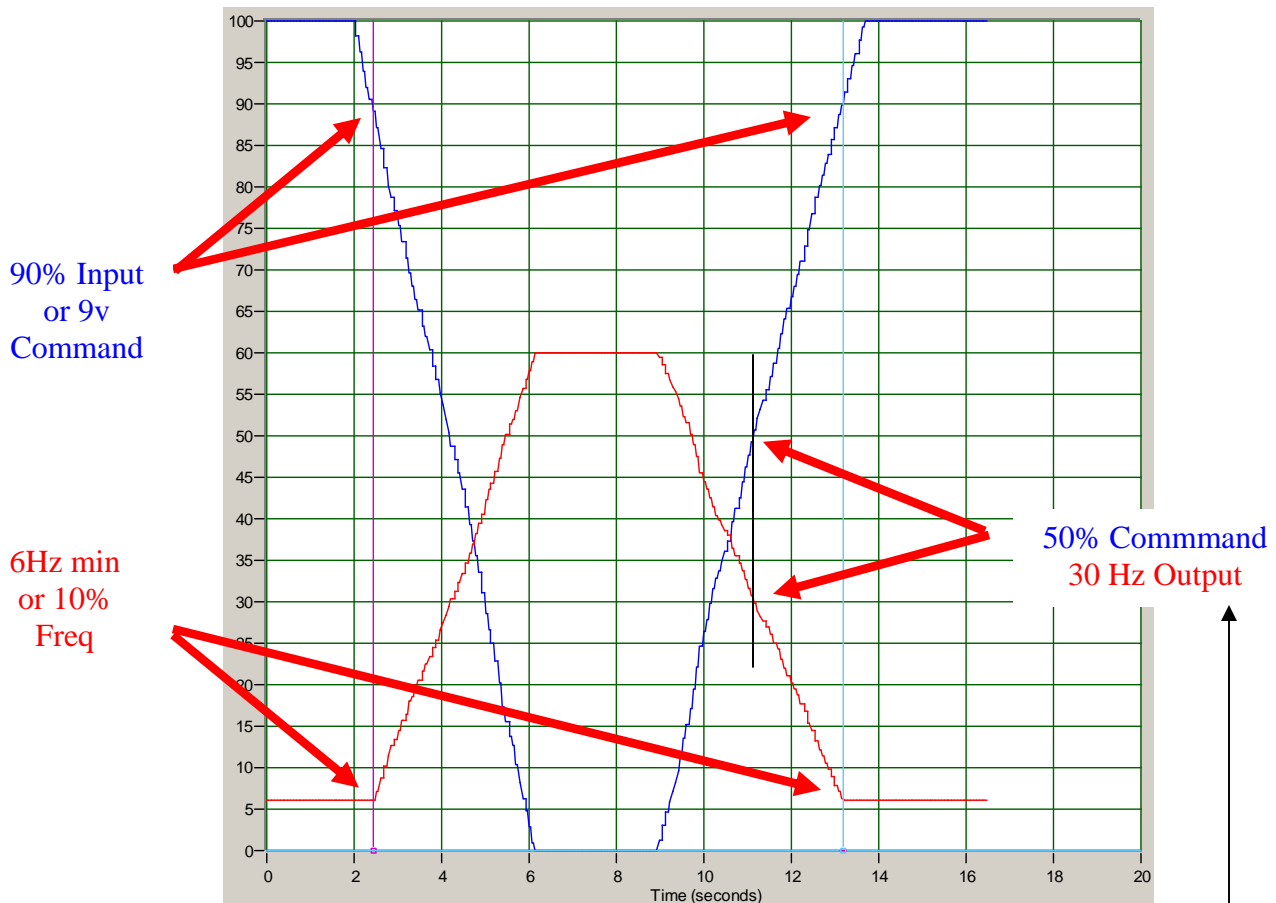
0 input = maximum speed    100% input = 0 speed



To obtain your free copy of CTScope click → [CTScope](#)

## What about a Minimum Speed ?

When using this method simply set #0.01 to the desired minimum frequency. When using the Preset Speeds as a reference source in this manner there will be a deadband above the minimum frequency speed- remember things are inverted. For instance, if one were to set a minimum frequency of 6Hz (10% of maximum assuming #0.02= 60Hz ) , there would be no action from a voltage input above 90%. Once the voltage input exceeds the minimum of 10% ( 9v on the input) the drive would stop responding from the input signal and be at the 6Hz minimum. See Scope shot below.



Also, if the command signal becomes 5v or 50%, the drive would be running at 30Hz.

## For Commander SK

To perform the setup as described previously without using CTSoft, you would set

Pr71= 18.30  
Pr72= 12.08  
Pr73= 12.09  
Pr74= 12.10  
Pr75= 12.11  
Pr61= 32767  
Pr62=18.30  
Pr63= 7.01  
Pr64= 3  
Pr65= 1.21

**Remember** – that a **Stop/Reset** is required to make destination register re-assignments to become affective

**It should be noted that this scheme will work for Closed Loop modes where Motor RPM is the setpoint vs frequency. This example was using an Open Loop drive.**

Questions ?? Ask the Author:

**Author:** Ray McGranor      e-mail : <mailto:ray.mcgranor@emerson.com>  
(716)-774-0093