



Figure 26

- Release the Motor Brake button

Note: If you press all three buttons at once, all brakes will engage

If you are using the Stagehand to control a hoist, this procedure must be executed every night to insure that all equipment is operating in a safe, reliable manner. If you are not using the Stagehand to control a hoist, it may be convenient to manually release the safety brakes at times, but it is not required.

Auto-Tuning

The Mitsubishi A700 Variable Frequency Drive (VFD) inside the Stagehand Pro is responsible for precisely providing power to the motor to keep it moving at the pace demanded by the motion controller. For instance, if you write a cue to run a Pushstick winch at 24"/sec, the motion controller sends a small signal to the VFD describing the desired speed, and then the VFD is in charge of controlling the motor rotation accurately. In order for the VFD to have the best possible control of motor speed, it needs some knowledge of the motor's electrical character. Depending on the motor and the scenery load, auto-tuning can have a dramatic effect on machine performance. Jerky movements can become silky-smooth and low-speed movements that struggled appear effortless after auto-tuning.

The Mitsubishi A700, like many VFD's, has a built-in "auto-tuning" procedure which electrically probes the motor to give the VFD a better understanding of the motor it is tasked with controlling. This procedure should be run every time you connect the Stagehand to a different motor since different motors have different electrical properties. The operation typically takes less than a minute and does not move the motor shaft substantially, but will release the motor brake so the drive can sense the motor's reaction to applied power.

The Stagehand Pro uses the Mitsubishi A700's internal PLC to insure safe operation of the redundant brake circuits. This PLC feature must be turned off in order run the "auto-tuning" procedure. Once the brake-checking program is stopped, the Stagehand Pro notices that there is a problem in the brake circuit and disallows any

action to take place on the VFD, including “auto-tuning”. To override the fault condition and allow the auto-tuning procedure to run, you must press and hold the Brake Test button and the Forward button on the Stagehand Pro. These details may sound a little confusing, but in practice the procedure is simple if you follow these steps:

- Turn off PLC mode using the VFD keypad:
 - Enter the Parameter Setting mode by pressing the MODE button on the VFD keypad until the display reads P. XXX (where XXX is any number from 0 – 999).



Figure 27

- Scroll the wheel to find parameter P 414.



Figure 28

- Press the SET button to adjust the parameter.
- Make a note of the current setting. It is either 1 or 2. You will need to restore this parameter after the tuning is done.
- Scroll down to the value 0 to turn off the PLC program.



Figure 29

- Press the SET button to accept the new value.
- Restart the VFD by either cycling power to the Stagehand, or by pressing the Emergency Stop button on the Showstopper and release it. Activating the Emergency Stop circuit will remove power from the VFD.
- Set the following parameters on the VFD keypad using the same process outlined above:
 - Set Parameter 9 equal to the rated current of the motor.
 - Set Parameter 71 equal to 3. This is the setting for a general purpose motor.
 - Set Parameter 81 equal to the number of motor poles appropriate for the base rpm of the motor (2 for 3600 rpm, 4 for 1800 rpm, 6 for 1200 rpm). All of Creative Conners's machines use 4-pole motors.
 - Set Parameter 83 equal to the rated voltage of the motor.
 - Set Parameter 96 equal to 1. This will execute auto-tuning without moving the motor.
- Press the MODE button until the keypad displays a 1 without flashing. On Stagehands manufactured before 06/2015 you will need to press the mode button twice. On Stagehands manufactured after 06/2015 you will need to press the mode button thrice. Older Stagehands use the Mitsubishi A700 drive, new Stagehands use the Mitsubishi A800.
- Press and hold the Brake Test button.
- While holding the Brake Test button, press and hold the Forward button on the Stagehand motion controller (not the VFD keypad).

- You must press both buttons for about a minute while the VFD performs the auto-tuning procedure. The keypad will display 2 while running the tuning procedure. The motor will make some very odd noises during auto-tuning, it sounds like the motor is chirping in various rhythms. This is normal.
- If the auto-tuning completes successfully, the VFD keypad will display 3. If there was an error another number will be shown. Consult the Mitsubishi A700 manual for more details on the error. The explanation can be found starting on page 190.
- Once auto-tuning is complete, you must restart the PLC program in the VFD:
 - Enter the Parameter Setting mode by pressing the MODE button on the VFD keypad until the display reads P. XXX (where XXX is any number from 0 – 999).
 - Scroll the wheel to find parameter P. 414.
 - Press the SET button to adjust the parameter.
 - Scroll down to the value 1 or 2 to turn on the PLC program. **NOTE: You must restore the same value that was originally used. Mitsubishi A700 models use a value of 1, Mitsubishi A800 models use a value of 2.**
 - Press the SET button to accept the new value.
- Restart the VFD by either cycling power to the Stagehand, or by pressing the Emergency Stop button on the Showstopper and release it. Activating the Emergency Stop circuit will remove power from the VFD.
- After the VFD turns on, confirm the **P.RUN** light on the VFD keypad is illuminated and **not** flashing. This indicates that the brake logic is functioning correctly.

With the auto-tuning complete, and the PLC program restarted you can return the Stagehand to normal operation.

Understanding the Status Display

The two-line alphanumeric display on the Stagehand Pro motion controller uses OLED technology to make it easy to read backstage without a distracting backlight. It also has excellent viewing angles making it easier for you and other operators to see status information at a glance. The Stagehand is primarily used through our Spikemark software, but it is handy to have some bits of information displayed on the Stagehand's faceplate for those times that you are working onstage near the machinery and not sitting in front of a computer running Spikemark. Also during shop setup, load-in, and strike you may not have Spikemark running and need to manually operate the Stagehand. The following list explains the information that you can glean from the Stagehand display.

Network Connectivity

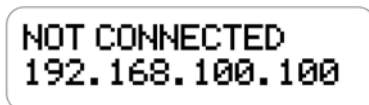


Figure 30

When sitting idle, the Stagehand will display its IP address on the bottom line and whether the Stagehand is actively connected to Spikemark. **Connected** means that the Stagehand has an active connection with a Spikemark computer, **Disconnected** means that the Stagehand is not actively communicating with Spikemark.