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1. SCOPE

This document describes the changes to the Magnus VLF MCE firmware that comes with Controlled Release version 1.0. This firmware release consists of MCE Main Firmware Version 1.08.05.

Common acronyms used in this document are defined in Appendix A.

2. FORMATTING CONVENTIONS

The formatting conventions used in this document are as follows:

- All NVS parameters are in italics, like the following: *mh LoadPos*.
- Commands to be typed into the diagnostic terminal are in bold as well as the diagnostic command responses, like the following: **load**.

3. UPGRADE PROCEDURE

To upgrade the MCE firmware, please perform the following steps:

1. Service Shell 2.5 SP2 must already be installed. **This firmware cannot be downloaded without this version of Service Shell!**
2. Type **set mhauto** and save the results (see section 4.1)
3. Download the new MCE firmware, preferably using the standard FirmwareUpgrade script.

4. NVS

4.1 gc

Parameters to fully support 'Creo portrait' mode.

Group	Parameter	Default	High	Low	Units
Gc	MaxPortraitRotation	2500	10000	0	urads

The maximum portrait rotation allowed. Calculated rotation values greater than this result in an error.

Gc	PortraitRotationAdjust	0	500	-500	urads

Pin combination specific rotation adjustments to be used with portrait mode.

4.2 mhauto

Parameters to fully support automatic devices.

Group	Parameter	Default	High	Low	Units
mhauto	FetcherGain	5	5	0	

The maximum output of the fetcher stepper driver. This should not be adjusted in normal operation.

mhauto	FetcherSPM	1.25	10	0	steps/mm

The number of steps that the fetcher stepper must take to move 1 millimeter. This is dependant on the hardware and should not be adjusted in normal operation.

mhauto	FetcherMSR	4	32	1	uteps/step

The fetcher stepper micro step rate. This should not be adjusted in normal operation.

mhauto	LoadTableGain	2.8	3	0	

The maximum output of the load table stepper driver. This should not be adjusted in normal operation.

mhauto	LoadTableSPM	1.667	10	0	steps/mm

The number of steps that the load table stepper must take to move 1 millimeter. This is dependant on the hardware and should not be adjusted in normal operation.

mhauto	LoadTableMSR	4	32	1	uteps/step

The load table stepper micro step rate. This should not be adjusted in normal operation.

mhauto	UnloadTableGain	2.8	3	0	

The maximum output of the unload table stepper driver. This should not be adjusted in normal operation.

mhauto	UnloadTableSPM	1.667	10	0	steps/mm

The number of steps that the unload table stepper must take, to move 1 millimeter. This is dependant on the hardware and should not be adjusted in normal operation.

mhauto	UnloadTableMSR	4	32	1	uteps/step

The unload table stepper micro step rate. This should not be adjusted in normal operation.

mhauto	EjectorGain	5	5	0	

The maximum output of the ejector stepper driver. This should not be adjusted in normal operation.

mhauto	EjectorSPM	1.25	10	0	steps/mm

The number of steps that the ejector stepper must take to move 1 millimeter. This is dependant on the hardware and should not be adjusted in normal operation.

mhauto	EjectorMSR	4	32	1	uteps/step

The ejector stepper micro step rate. This should not be adjusted in normal operation.

mhauto	SSBinLevel	0	1000000	0	mm

The current slipsheet bin level (i.e. the total length of all the slipsheets in the slipsheet bin).

mhauto	LTDistSensorToLEC[1-3]	216.838	1000	0	mm

The distance from the load table plate length sensors to the LEC. This differs from the ‘set mh DistSensorToLEC’ by the fact that this measure is determined by a rising edge of the sensor… in essence it is the distance from the LEC to the other side of the sensor.

mhauto	LoadTablePreloadDistance	0	0	-10	mm

The distance the load table moves to preload the plate against the registration pins (should be negative, i.e. toward the clamps).

mhauto	EjectorEngineCenterPos	1350	2500	500	mm

The ejector position such that it is ready to eject a plate off the drum centerline.

mhauto	FetcherEngineCenterPos	2613	3500	1500	mm

The fetcher position such that it is ready to drop a plate on the drum centerline.

mhauto	FetcherAwayParkPos	3822	4800	2800	mm

The position that the fetcher moves to, to get out of the way when loading very large plates. Also used for rough calibration during device initialization.

mhauto	TotalMCUMotorRunTime	0	MAX	0	seconds

The total time that the MCU motor has been running since its last lubrication cycle.

mhauto	MediaOnFetcher	0	1	0	

A flag to tell the firmware that there should be/was media on the fetcher.

mhauto	MediaOnLoadTable	0	1	0	

A flag to tell the firmware that there should be/was media on the load table.

mhauto	MediaOnUnloadTable	0	1	0	

A flag to tell the firmware that there should be/was media on the unload table.

mhauto	MediaOnEjector	0	1	0	

A flag to tell the firmware that there should be/was media on the ejector.

mhauto	SSDropOffPosition1	370	700	0	mm/s

The position where the fetcher lowers the wedgemaster to dispose of a slipsheet.

mhauto	SSDropOffPosition2	460	700	0	mm/s

The position where the fetcher moves to, to deposit the slipsheet under the batwing for disposal.

mhauto	HardwareConfig	0	MAX	0	

The specific device hardware configuration.

mhauto	SSGrabDistance1	14	50	0	mm/s

The 1st distance the fetcher moves to achieve good wedgemaster vacuum.

mhauto	SSGrabDistance2	-14	0	-50	mm/s

The 2nd distance the fetcher moves to achieve good wedgemaster vacuum.

4.3 mhmedia

This group is entirely new in this version so what follows is a complete list and description of all the new NVS parameters, and how to configure them. This is the most visible change between 1.08.05 and any previous version of firmware that may be installed. If these parameters are not configured properly (currently only needed for automatic devices), the device will not work, and will fail with the following error:

```
*** Command Failed: 40738

   [The specified media is not configured for media handling]
```

The *mhmedia* group is a means for saving Magnus VLF media specific picker and fetcher parameters. They are matched to the device medias by the *name* (the *name* must be an exact match). There are 16 *mhmedia* slots to match the 16 device media slots (note: it is impossible to use more than 16 medias on Magnus VLF).

To properly configure these parameters, you must do the following:

1. Prior to installation of this firmware, type **set mhauto** and save the results. The new *mhmedia* parameters have been moved from *mhauto* and will therefore not show up in mhauto once you download the new firmware.
2. Download the firmware.
3. For each device media:
    a. Set the *mhmedia x name* to match the device media
    b. Set the rest of the parameters to what they were under *mhauto*. (some of the new *mhmedia* parameters were not copied from *mhauto*. These are the portrait parameters (denoted with a 'P' suffix). These parameters apply to portrait orientation media and should initially be configured the same as the non-portrait versions.

Group	Parameter	Default	High	Low	Units
mhmedia	Name				

The media name. This is used to match mhmedia parameters with the device medias.

mhmedia	PlenumSSSensorThresh	350	1023	0	

The plenum slipsheet sensor threshold. This is a media dependant value that signals the transition from plate to slipsheet.

mhmedia	SeparatorOnTime	2000	60000	0	ms

The amount of time that the separator is on after the picker has been lowered to grab a plate, but before the plate is lifted.

mhmedia	SeparatorOnTimeP	2000	60000	0	ms

Same as above but for media in portrait orientation.

mhmedia	PickerMotionCount	6	100	0	

The number of ticks that the picker moves with the separators on while lifting and separating the slipsheet.

mhmedia	PickerMotionCountP	6	100	0	

Same as above but for media in portrait orientation.

mhmedia	PickerLiftCycles	1	10	1	

The number of times the picker moves up and down past the separators to aid in slipsheet removal.

mhmedia	PickerLiftCyclesP	1	10	1	

Same as above but for media in portrait orientation.

mhmedia	SSDropDelay	0	60	0	seconds

The time that the fetcher waits for a slipsheet to drop from the bottom of a lifted plate, before attempting to grab it.

mhmedia	FetcherSSVacOnThresh	100	1023	0	

The wedgemaster vacuum level that signals the transition from vacuum on to vacuum on with slipsheet (anything above the threshold means slipsheet vacuum achieved).

mhmedia	FetcherSSVacOffThresh	20	1023	0	

The wedgemaster vacuum level that signals the transition from vacuum on to vacuum off (anything below the threshold means slipsheet vacuum off).

mhmedia	SSHandlingVelocity	100	700	5	mm/s

The fetcher speed that is used whenever the fetcher is handling slipsheets.

5. KNOWN PROBLEMS

5.1 Release Sequences Need Improvement

In the vast majority of cases, pressing the ‘release’ button and properly following the prompts will result in full machine recovery, however, with a device as complicated as the Magnus VLF there will be situations that are not dealt with properly, and will require firmware improvements.

5.2 Limited Range For Bay Stackshhift

The device can only handle +25 mm of plate stack shift in the bays (towards the drum). This will be increased to 50 for later versions. If a site is seeing this problem often, a workaround is to bias the plate stack toward the front of the cassette (operator side) slightly to improve the margin.

6. BUG FIXES

6.1 Manual Device Support

This build fixes the timing bug in the power up sequence. It also eliminates the POST error due to the lack of Z-Stage electronics on most manual devices.

6.2 Small Drum TEC Getclamp Park Error

This build eliminates the intermittent problem on small drum devices where the machine would fail to pick up the clamps from the park position. This build also changes the naming convention for the park position to make it more understandable and consistent. The command **tec getclamp truepark** has become **tec getclamp park**, and the command **tec getclamp park** has become **tec getclamp servicepark**. The park position is the correct position to actuate the clamps when they are pushed up snug to the park position pins. The servicepark position is the position that is 2 mm away from the park position pins.

7. DEVICE CONFIGURATION PROCEDURES

7.1 Setting Up a Model (Head/Drum Type)

The config command is used to determine the model type. For customers with small drum devices, it is advisable to configure the model properly to prevent operators from loading media that is too large for the machine to handle.

1. **access dev**
2. **config <password> <model code>**

Available Models:

MCEDM	Magnus VLF Default Model (Premium)
MVLF_LE	Magnus VLF (Large Drum) Entry Model (Performance)
MVLF_SE	Magnus VLF (Small Drum) Entry Model (Performance)
MVLF_L	Magnus VLF (Large Drum) (Premium)
MVLF_S	Magnus VLF (Small Drum) (Premium)

7.2 Configuring the Device Options

7.2.1 Manual vs. Automatic.

For autoloading devices (MCU or CL), the following option must be enabled, if the option is not enabled, the firmware assumes a manual device:

option autoloader enable

7.2.2 Multi-Cassette Unit (MCU) vs. Continuous Load (CL).

For an MCU device, the following option must be enabled, if the option is not enabled, the firmware assumes a CL device (note: the MCU option requires that the Autoloader option be already enabled):

option mcu enable

7.2.3 Large drum vs. Small Drum.

For large drum devices, the following option must be enabled, if the option is not enabled, the firmware assumes a small drum:

option largedrum enable

7.2.4 Portrait mode.

If the device supports 'portrait mode' (dual edge detects used to calculate rotation), the following option must be enabled:

option portrait enable

NOTE: Portrait mode is not the same as portrait orientation. The device will be able to handle and image media in portrait orientation without the portrait option set.

7.2.5 Dual plate.

For dual plate (six pin) devices, the following option must be enabled, if the option is not enabled, the firmware assumes a single plate (four pin) device:

option dual-plate enable

7.2.6 Machine orientation.

For right-to-left machines (as determined by the flow of media through the device from the MCU to the side processor eject when standing in front of the machine), the following option must be enabled, if the option is not enabled, the firmware assumes a left-to-right device:

option righttoleft enable

7.2.7 Zstage.

If the device has a Z-stage installed and the customer wishes to use it, the following option must be enabled:

option zstage enable

7.2.8 Rotator.

If the device has a rotator installed and the customer wishes to use it, the following option must be enabled:

option rotator enable

7.2.9 101 degree load angle.

If the device has the 101 degree load hardware installed the following option must be enabled:

option 101degreeload enable

7.2.10 Processor interface.

If the device has the processor interface installed and the customer wishes to use it, the following option must be enabled:

option processorinterface enable

8. DEVICE CALIBRATION PROCEDURES

8.1 Load Calibrate

The load calibrate command is used to calibrate the engine. This includes calibrating the backbone positions, the balance weights, and the load table plate length sensors:

1. Accurately measure the mainscan size of the plate to be used for the calibration.
2. type **load calibrate manual <mscan> <sscan>** where mscan is the measured mainscan size of the media (the subscan size of the media does not have to be accurately represented).
3. Follow the load instructions (Manual vs. Automatic dependant) when prompted by the device.

APPENDIX A: COMMON ACRONYMS

MCE	Master Control Electronics
CTP	Computer to Plate
NVS	Non-Volatile-Storage
PDB	Power Distribution Board
GENINE	Generic I/O Node Electronics Board
POST	Power-On Self Test
BBR	Boot-block Recovery
PC	Print Console
TH2	Thermal 2 Head
WS	Workstation
LE	Leading Edge
LEC	Leading Edge Clamp
TE	Trailing Edge
TEC	Trailing Edge Clamp
CAN	Controller Area Network – network protocol for electronics boards
RAM	Random Access Memory
BBRAM	Battery Backup RAM
MCU	Multi Cassette Unit
CL	Continuous Load
SSR	Slipsheet Remover
LT	Load table
UT	Unload table

APPENDIX B: NVS BACKUP/RESTORE AND LOADING FIRMWARE

Service Shell is required to load new firmware, and to backup or restore NVS parameters. A script has been written to simplify these tasks.

As part of the Service Shell install, a script named FirmwareUpgrade.spt is copied to the Device scripts folder. A document describing how to configure Service Shell and how to use the script is also included in the d:\ServiceShell\scripts\device folder. Service Shell is installed on every workstation before it leaves the factory, so this document will be present on every workstation.

Inside Service Shell, left-click on the Scripts icon, then left-click on the Device group. Double-click on FirmwareUpgrade.spt to start the script. It is very important to use this script for the upgrade to make sure a full NVS backup is performed.

IMPORTANT: BEFORE UPGRADING THE FIRMWARE OF ANY RECORDER MACHINE YOU MUST BACKUP THE CONTENTS OF THE CURRENT NVS MEMORY IN CASE IT BECOMES NECESSARY TO REVERT TO THE PREVIOUSLY INSTALLED VERSION OF FIRMWARE!

APPENDIX C: BBRAM VS. FLASH PARAMETERS IN MCE MACHINES

There are two separate types of NVS parameters that are accessed by the MCE firmware. Most parameters are stored in BBRAM (Battery Backup RAM). For parameters that are not expected change frequently are stored in FLASH. Both sets of parameters must be backed up to fully capture the state of the machine; and both sets of parameters must be loaded onto a new board to restore the machine to its previous state. The FirmwareUpgrade.spt script automatically creates two separate files, one for each type of NVS, and expects both files when restoring parameters.

NVS parameters in general provide the following:

- Storage for machine-dependent parameters that must remain intact between power cycles.
- Storage for "state variables" that allow a machine to resume where it left off if power is cycled during loading or imaging.

All parameters are saved immediately as soon as they are changed.

When firmware is upgraded on a device, any new parameters will automatically be set to their default value. If a more complicated upgrade procedure is required, a script will be created to perform this upgrade, and this script will be released with the firmware.