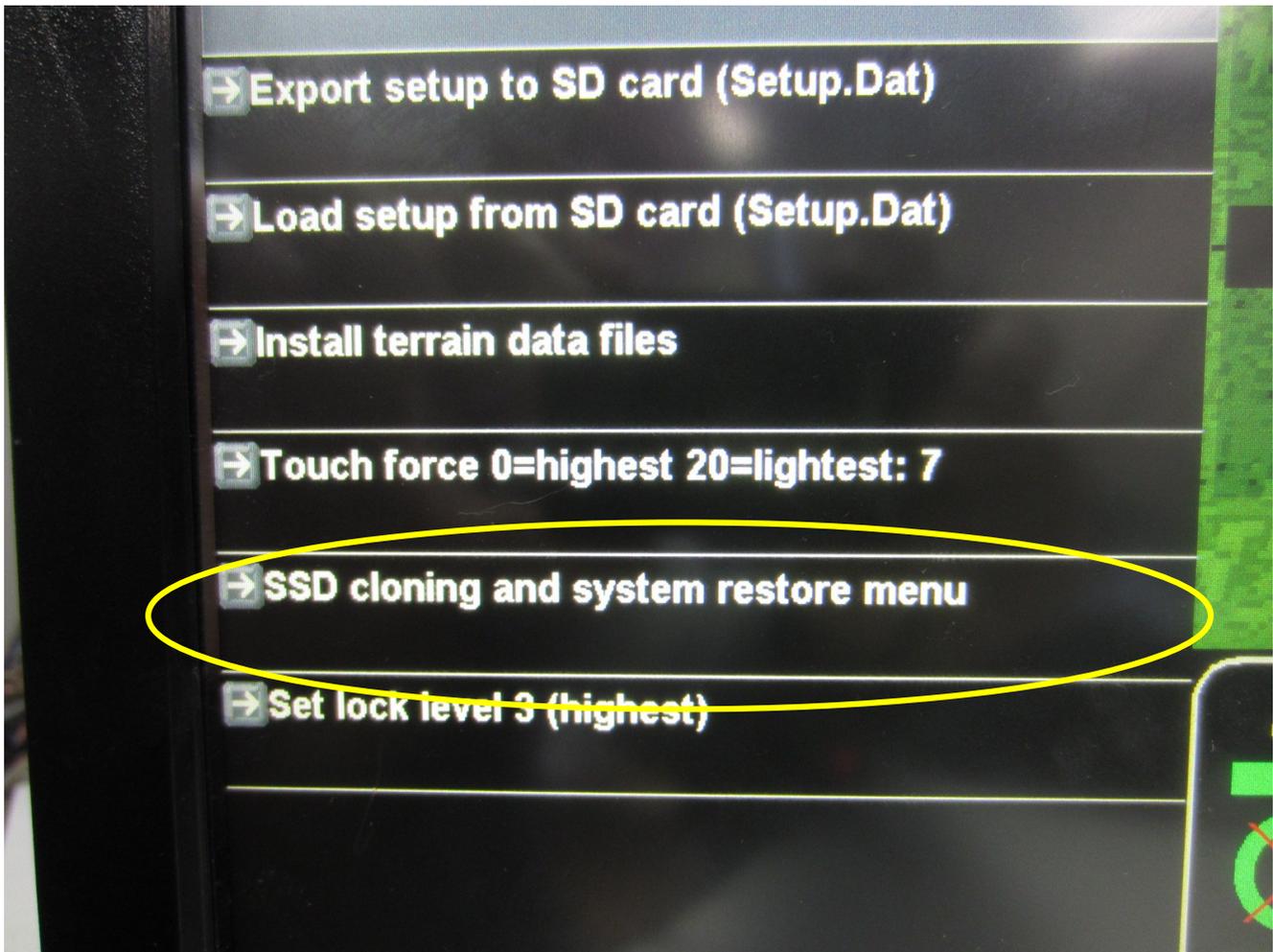# IEFIS G3 SSD backup/cloning and system restore

General

The G3 iEFIS from version 1.0.2.2 onwards contains comprehensive tools for cloning and system restore. Using these tools you can:

a) Create an exact copy of your internal SSD drive at any time to make a backup of your system. This backup can be used to restore your system or create clones of your system.

b) Copy EFIS files from an SD card that has been prepared to add files to your existing installation.

The system cloning and restore functions are located in the "System basic setup functions" menu. They are not available in the screen designer and simulator.

About the internal SSD drive

Your EFIS uses a standard SDHC micro card to hold the system – this consists of three files: EXP3.BIN is your actual EFIS firmware and the Flightops operating system combined into a single file. SETUP.DAT contains your current EFIS setup and MLO is the boot loader. This is a

small program the processor loads on startup – MLO then installs your EXP3.BIN file and hands over execution. MLO also does a lot of initial work to get the system initialized, configure memories and displays. It also is responsible for copying your firmware upgrades from SD card to internal SSD on startup (if there is an upgrade on your SD card).

Your internal SD card (called SSD) has to be formatted in a specific way for the processor to recognize it. It needs to be formatted using a partition table in a specific way – this is not a standard format for an SD card so normal PC utilities cannot format such a card. This card is formatted at MGL avionics in the correct way.
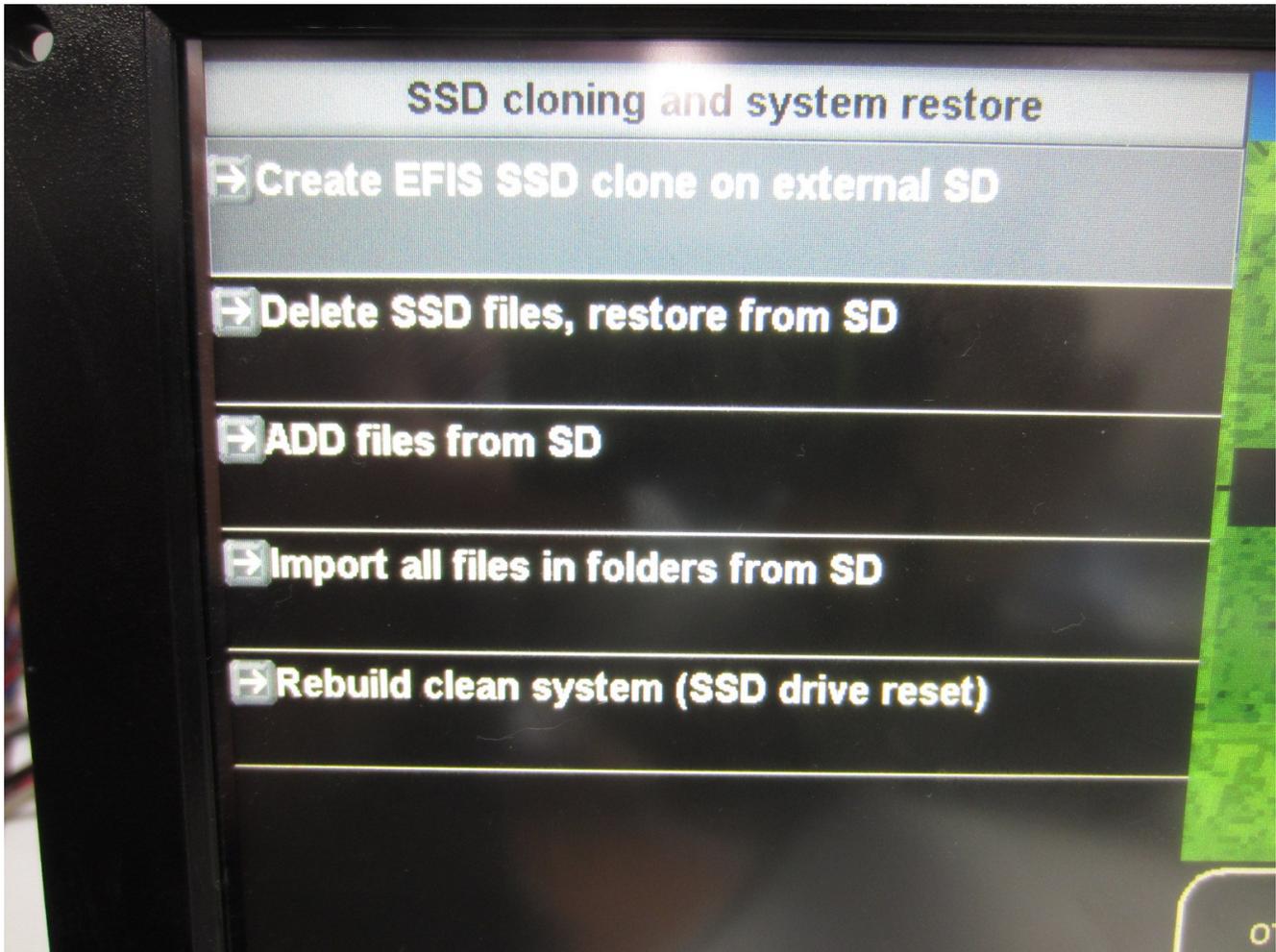
Create EFIS SSD clone on external SD

This function requires that you insert a SD card into your external SD card slot. The size of the SD card must be equal to or larger than the internal SSD. At time of writing the size is 16GBytes. If you attempt to use a smaller card, the system will fail with an error to that effect.

This cloning function will format your external SD card in the correct way and then proceed to create an exact copy of your internal SSD drive on your external SD card. This copy is done using low level sector by sector copying so you get an exact mirror of the current SSD state. Depending on the amount of data on your internal SD card, this process will take 10 minutes or longer and this time is mostly dependent on the write speed of your external SD card.

Once completed, the external SD card can theoretically be inserted into the internal SD card holder of your G3 CPU and the system should boot.

If you insert this card into another EFIS your may have issues caused by the SETUP.DAT file that has not been created for that system. Items like your touch screen calibration may be invalid and the system may even fail if you use the SD card on another type of iEFIS. This can be avoided if you delete the SETUP.DAT file – the new system will then simply create a new one with default values – you will have to calibrate the touch screen.

The cloned SD card can be read and written to in a PC. It is compatible with the FAT32 filesystem even though the EFIS uses it a bit differently. Please take care if you write to the cloned SD card using another operating system. Copy and use only files that have filenames that are no longer than 30 characters in length and have a single three letter extension. Do not create any folders using another operating system as this can interfere with the way FlightOps uses the SSD drive leading to loss of function or reliability (FlightOps uses a form of journaling to assist with keeping your file system reliable in case of power failures – unexpected changes to the file system caused by other systems can cause trouble. It is always safe to copy files (provided file names comply) or delete files.

Note: If your SSD file system is damaged, cloning it will not fix it – it will simply copy the damaged file system onto your external SD card.

Delete SSD files, restore from SD

This function is used to restore from a cloned SD card to a working system where you do not want to alter the SETUP.DAT file.

This function will delete all files contained in folders in your SSD with the exception of the "FLTLOG.DAT" file in your "LOGS" folder. Your MLO, EXP3.BIN and SETUP.DAT file and any other file you have in your root folder (there should not be any) will not be touched.

This function will then copy all files from equivalent folder names from the external SD card to the internal SSD, again skipping FLTLOG.DAT.

You can optionally use the "Load setup from SD card" function to copy all setups except private ones (like touch screen calibration etc) – provided the SD card contains the SETUP.DAT file in then root folder.

This function is usually the best one to use to copy an existing EFIS system to another system using the cloned SSD card.

ADD files from SD

This function works just like the one above but no files are deleted. Existing files with the same name are replaced.

This function is useful to copy a subset of normal EFIS files from a specially prepared SD card. For example you may prepare an SD card with navidata or map folder contents for simple distribution to another system.

Note that your SSD system files will not be touched, this function does not affect your root folder.

Rebuild clean system (SSD drive reset)

This function is step one of a two step process. It is used if you have a bootable system (from internal SSD) but the file system is corrupted for any reason.

This system will first copy the MLO, EXP3.BIN and SETUP.DAT files from the internal SSD to internal memory. Then the internal SSD is completely rebuilt (formatted). After this the normal EFIS folders are recreated and the three files saved to memory earlier are written back to the SSD.

This function is quite fast and only takes a second or so.

You are then prompted to restart the system.

After this you should have a basic system but will have no data files (navdata, maps, terrain etc).

Import all files in folders from SD

This function is step 2 of the system rebuilding process. It should be run after you have performed the above "Rebuild clean system" and you have a backup (cloned SSD card or any other SD card that has the EFIS folders and required files).

This function copies all files in EFIS folders to the internal SSD. This function does not delete any files – there would not be any to delete if used after step one of the system rebuild process.

Tips

The restore functions copy files from the SD card. It is not necessary that the external SD card conforms to the format requirements of the internal SSD.

This means you can easily copy a system that you have created using the Screen designer and simulator – simply copy all folders in your projects "Flash" folder to an SD card (so the folder names are visible from the SD card root) and use any of the restore functions as suits you best (likely the "Delete SSD files, restore from SD" function).

Cautions

System cloning and restore functions should never be used in flight. These are lengthy operations that can take 15 to 30 minutes depending on the amount of data to copy. Also, the system will partially shut down essential functions during these operations.

Do not allow Windows or another operating system to write to a cloned SD card – this can change some file system structure details that may render your SD clone usable should you want to use it to replace an internal SSD card. The clone contains information other operating systems cannot understand (but do not have to understand).

You can safely read a cloned SD card using another operating system.

When things go wrong

You should create a working clone of your system as soon as possible and keep this safe. It is a valuable aid in rebuilding a system should this be required.

Some of the functions may result in a system that no longer works, in particular if these are executed on an already compromised system or if they are not allowed to complete (power interruption etc).

Some of these functions (all those that copy large amounts of data) can take a while to complete – please ensure that your power supply will not fail halfway through the process and leave the system in an undefined state. It will usually recover but it is good practice to avoid issues from the start.

Loss of MLO

The file MLO (Memory Loader) forms part of the native boot process that gets your system up and running. If this file cannot be executed for whatever reason (missing file, bad SSD format) then all you will see on startup is a black screen.

Should this happen, place your cloned SSD card in the external SD card slot. If your cloned card has the correct format (it is a proper clone made by the tools provided in the EFIS) then your system will boot straight from your cloned card.
Use the "Rebuild clean system (SSD drive reset)" to format the internal SSD drive, then after restart (still with the external boot) use the file manager to copy MLO, EXP3.BIN and SETUP.DAT to the internal SSD drive. Remove your external SD card and restart. Your system should not boot and you can use the remaining functions to restore your files.

It is possible that your MLO file exists but is corrupted. In this case the processor will find it and try to execute it. This may fail and you have a crashed system. In this case there will not be a boot from the external SD card.
In this case you need to remove the rear panel and remove the SSD card, format it in a PC (any format) or replace it with a new one (please use 16GByte or 32GByte cards from Verbatim only). After this it should be able to do an external boot as described.

Note: If your internal SSD card if readable and contains the MLO file but there is no loadable EXP3.BIN file, then you cannot boot from the external SD card. You will be presented with a message on the screen showing the reason a system cannot be started. This is normally resolved by simply placing a working EXP3.BIN file on the external SD card and allowing MLO to copy the file to the internal SSD card. Should this fail you may have a damaged internal SSD card in which case you need to replace it using the procedures shown here (format a blank SD card, use it as internal card and boot from external card and do the system rebuild as explained here).

In case your internal SSD drive does have a working MLO but cannot load the EFIS system you can use a little trick to load the system from the external SD card. Simply rename your EXP3.BIN file on the external SD card to EXP3.EXB. If MLO finds this file on your external SD card it will load it.

Notes on SETUP.DAT

Never copy the SETUP.DAT file from an external SD card to an internal SSD drive **OF ANOTHER EFIS.**
The SETUP.DAT files contain some "private" settings like touch screen calibration and also settings that are related to the type of EFIS.

You may copy the SETUP.DAT file to the **<u>same</u>** EFIS it was created on.

You may import a SETP.DAT file from another or the same EFIS using the functions provided in the "System basic setup functions" Menu.