Checksum Calculation with TaskLink

How a checksum is calculated is not standardized in the industry, and two different checksum values for the same job does not always mean there is a programming error.

What is a checksum for?

Checksums are used to verify that the data file programmed to the Integrated Circuit (device) was programmed without error, such as errors in transmission. This is done by comparing the checksum of the data file in the programmer to the checksum of the data file on the device. Checksums verify that the data file programmed to the device is exactly what you intended.

Why do checksums differ from one company's programming system to another company's?

Because there are no industry standards, each company calculates checksums differently, and those differences mean there may be different checksums. Basically, you need to know how each company calculates checksums in order to compare and confirm this information.

How does Data I/O calculate checksums?

Data I/O has no proprietary method of calculating a checksum. TaskLink (and FlashCORE programmers) add data by the Checksum Method specified in the TaskLink Task: • 8 Bit, • 16 Bit, • 32 Bit,
 • Device Width, or • 32 Bit CRC).
For specific calculations for each method, see our App Note "*Data I/O Checksum Calculation Methods*" on our FTP site > FCNotes > Footnotes (http://ftp.dataio.com/FCNotes/Footnote/)

The 32 Bit CRC formula Data I/O uses is no secret. In fact the polynomial used in Data I/O's implementation is the same used in PKZip and other common utilities.

Assuming the Checksum Method and 32 Bit CRC polynomials are identical in both Data I/O and another programming system, Data I/O's checksum can differ from the other system because of four additional factors:

1. The optional *Special Data Sectors* has been included in the checksum (set in TaskLink's Edit Task dialog > Data tab). The default = Do not include.
2. The optional *Sector Protect Information* has been included in the checksum (set in TaskLink's Edit Task dialog > Data tab). The default = Do not include.
3. A specific *Automatic RAM Fill* [for unused device locations] has been set (in TaskLink's Edit Task dialog > File IO tab) (Default = unprogrammed state for the device, usually FF).
4. There may be differences in the range and arrangement of the device area memory map.

Job Creation

During TaskLink job creation, the checksum is defined by the user selections previously mentioned.

When Loading a Job

When programmers load the job image, the Checksum Method specified in the TaskLink Task is used. The FC programmers validate the checksum. Additionally, the programmers calculate and store (page-per-page and overall) a 32 Bit CRC checksum.

Can I Discover the Checksum without a Programmer?

Yes. If TaskLink is available in the Engineering or R&D Department, for example, a job can be created and the checksum can be computed. (That same job can then be sent to manufacturing.)

Follow these steps:

1. Open TaskLink.
2. Set the Programming System to the desired programmer (FlashPAK, RoadRunner, or FLX500).
3. Ensure that Display Checksum when job load operation is complete is checked. It is in System menu > Options > General tab.
4. Specify a local job destination in the System > Options > Communication tab. This is usually a PCMCIA Card drive. If you don't have a card drive, you can just type C: into the PCMCIA drive field.
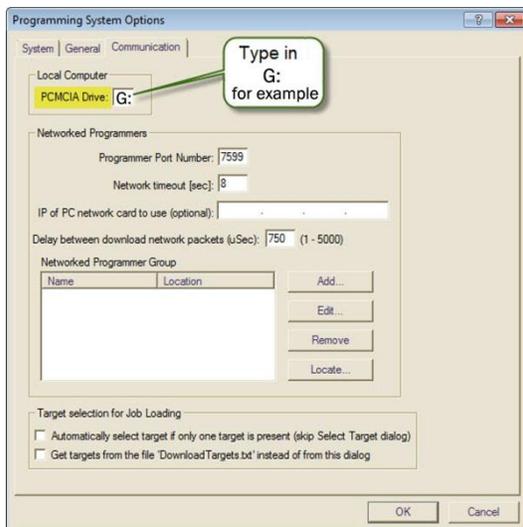
Figure 1: Enter a PC Card drive letter or C: for your local PC.

5. Create a Task (selecting a data file, checksum method, and all options that you want), and save it (by clicking OK in the Edit Task dialog).
6. With your task selected, click Load.
7. Click OK (for the drive letter).
8. Click OK to the Process Devices dialog. (Entering a Pass Limit and Session ID is optional.)
9. Click Yes (either to continue, or if it asks to create a files system). The job loads.
10. Click Close after the Device Footnotes dialog displays.
11. The checksum is displayed in the next dialog as shown below.
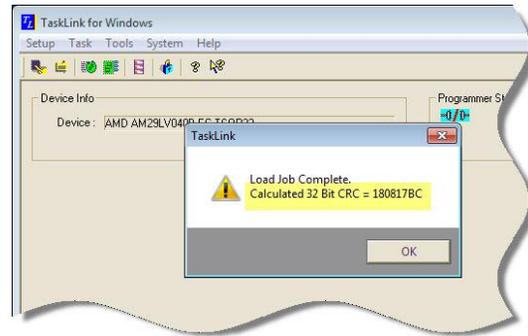
Figure 2: The checksum is displayed in a TaskLink dialog after 'Loading' the task.

NOTE: The next time you Load the job to a PC-card, you can set TaskLink to confirm that the checksum is the same by entering the checksum just displayed into the Expected Task Checksum field on Edit Task dialog > Data tab.

NOTE: You can send the same task (now referred to as a job) to Manufacturing for use on the same programmer type selected in the task (FlashPAK, RoadRunner, or FLX500). If you did not load the job to a PC-card, the job is in C:\FDRROOT. Compress and send the whole FDRROOT folder. (Okay to first remove other jobs from the Jobs folder.)

Data I/O's Connected Strategy

Of special note is that Data I/O programmers have a 'Connected Strategy' where your IP can move from engineering programmers to test to production with the same TaskLink job, which means the same checksum.

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