Flash loader Bet El

**Technical**

**F28069F Memory arrangement**

Flash start at 0x3d8000

Goes in 8x16k = 0x20000 (almost) till 0x3f7ff8 (last sector has 37ff8 till 0x3f8000-1 is password)

|  |  |  |
| --- | --- | --- |
| Start address | Length |  |
| 0x3D8000 | 16K | Boot starts |
| 0x3DC000 | 0x200 | Sector 2 allocation for app management code |
| 0x3DC200 | 15.5K | Sector 2: start code of user |
| 0x3E0000 | 16K | Sector 3 |
| 0x3E4000 |  |  |
| 0x3E8000 |  |  |
| 0x3EC000 |  |  |
| 0x3F0000 | 16K | Sector 7 |
| 0x3F4000 | 16K-8 | Sector 8 |
| 0x3F7ff0 | 8 | Flash burn key |

The sector at address 0x3DC000 has the following structure:

|  |  |  |
| --- | --- | --- |
| 0x000 | 0x40 | In the beginning God created the heaven and the earth. |
| 0x40 | End address of code |  |
| 0x42 | Adler-32 Checksum |  |
| …. | Place for serial number , product type, etc. |  |

**Questions**

What is the quartz frequency in use? What is the PLL setting?

Any use of flash protection key?

Want to burn manufacturer, model , HW revision, SN?

BE code should generate intel Hex files?

Is it possible to power off if downloading fails?

CAN baud rate 250K not to disrupt vehicle, propriety 11bit-preamble protocol?

What is the protocol of “Go to Boot” message?

Code shall always be extended to a 128word boundary

Loader to be delivered as MSI.

Scrambling of loadable code required?

Assumptions:

* Nothing bad happens if PWM pins are set as inputs, correctly pulled to disable PWMs
* I can take the PLL setting of the loadable project so that PLL setting of the boot and of the operational SW are similar.

BE deliver:

* Schematics of CPU connections including quartz connection
* A working circuit with DSP
* A buildable project to be loaded (.cmd file and some other things need be changed )
* In their project: program a function that calls GoToBurner(); before that BE must assure no PWM is active
* PCAN

**User interface**

The user interface shall enable:

* Get a generic boot build hex file and modify it so as to include
  + Production data such as serial number and model code
  + Adler-32 checksum so that the boot can verify itself
* Scrambling of an Intel hex file to generate .scr file
  + Adding to it statistics and Adler-32 checksum so that the boot can verify it
* Accepting and verifying an .scr file for binary code restoration
* Using the PCAN to read from the boot the management information
* Use PCAN to download and verify a program into flash

**Quality and reliability**

The Boot shall test for:

* Each firmware record shall be protected by checksum
* Each burned record shall be verified
* The entire firmware shall be checked by Adler-32 checksum
* The entry point / statistics sector will be erased first and burnt last.

Test failures may lead to embedded software hangs; yet no operational software shall be erroneously invoked, and following power recycling firmware downloading may be re-attempted.

**Acceptance criteria**

**FAT:** Tested before delivery at contractor’s site

**SAT**: Tests designed and arranged by customer at its site.

* Interface looks and feels as agreed
* (FAT) Downloading the target work by the procedure with lone target, target wakes up correctly
* (FAT) powering down within downloading or sending faulty records: FW loading should fail but may be restored without connecting JTAG.
* (FAT) Word Documentation comprehensible by customer.
* (SAT) Customer succeeds in building executables in its facilities.
* (SAT) Downloading the target work by the procedure with other on line J1939 entities, target wakes up correctly and does not disturb J1939 flow

**Payments:**

Payment sum is according to the table of costs below, payable in ILS. The milestones are:

10% Down payment

50% Demonstration on local machine

40% Acceptance of MSI and documentation, approval of integration at customer site, or if customer did not complete SAT in one month following delivery.

Payment will be made Net EOM 30 by the stated milestones.

Receipts dated to end of month shall be honored till the 5th of the next month.

**Terms and relations**

No CFE is expected other than a target board and one PCAN unit.

The payments detailed below shall constitute the entire fee. The payments include 1 year warranty to any bug. price is fixed regardless of actual work deviations to any side. No Employer–employee relationship is expected.

The work till delivery for integration should complete in 2.5-month ARO. For each week delay the customer may deduce 5% of the fees, down to a maximum of 50% cut. Such deduction is not a contract termination.

The contractor shall not be held responsible for any unintentional damage to customer’s equipment, nor to any consequential damages.

On non-delivery or failure or incompleteness of any kind of the deliverables, the customer’s extreme remedy is a complete payment return. No compensation shall be asked or sued above this limit.

Works, including demonstration on local machine, shall be by remote conference.

Integrations shall be made as much as possible remotely, but if personal meeting or special equipment are required, it will be done at Bet-El facilities, Zichron Yaakov. Any insurance required for such visits is the customer’s responsibility.

Unforeseen customer fair requests up to 15Hr value shall be honored with no additional cost. Greater unforeseen issues should be fairly discussed subject to the hourly rates below.

The contractor may use qualified engineers or programmers (at least a relevant B.Sc. or equivalent, at least 3 years of active programming experience) to participate in any part of the project.

This contract is governed by the laws of Israel, jurisdiction Tel Aviv.

**Unplanned termination**

Customer is entitled to cancel the work anytime. However, deducing claims of negligence on the part of the contractor, all the work done till cancellation is payable by the hourly rate of the calculation below. However no completed mission shall be charged more than stated in the table below.

If Contractor fails to deliver because of issues beyond control (e.g. Force majeure), or if delay fines exceeded 50% of the project’s cost, the decision how to act is left to the customer, who may ask up to complete refund.

If customer defers payment more than 30 days, it will be considered as project cancellation on the part of the customer.

**Deliverables**

All the deliverables (visual C# and embedded codes) shall be delivered to the customer as buildable projects with basic documentation. No executables shall be delivered.

Firmware downloading protocols shall be fully documented in WORD.

Downloading of the boot SW to the target will be fully documented.

Customer is expected to verify the builds by building the deliverables in its own facilities using Visual Studio C# 2022 and TI CCS 12.x or later.

**Rights**

The customer may use the deliverables in any manner. This includes making any modifications and distributions, using freely as is or modified in other projects. Reference to the contractor is not required.

The delivery does not restrict the contractor from reusing any component of the delivery for other business, as long as this does not imply any constraints on the customer.

**Confidentiality**

The project is not restricted. It does not apply special IP.

Standard commercial confidentiality holds. In special, the contractor is ready to sign NDA for any customer code in possession. The contractor does not require NDA on the customer’s side.

**Limits of delivery**

* The deliverable is NOT a safety software. Deliverables are not committed to any software standard.
* The work and delivery assumed one type of target. Adjustment for other target types may be proposed for additional fee.
* The work assumes clean communication. On faulty or noisy or congested communication lines, firmware loading may fail. However, it will be still possible to restart downloading.
* Bug correction or environment upgrade, as well as support beyond the 1-year warranty are payable as shall be fairly agreed.
* Military-style documentation (SRS, SDD, IRS, STP, SDP, STD/R etc..) may be delivered for additional fee.
* BIT shall be kept minimal for as specified above. Additional BIT functions (e.g. RAM/Flash integrity, as well as BIT coverage analysis) may be delivered for extra fee.
* No reliability or coverage analysis shall be done. Static analysis may be done for extra fee.
* The budget below does not cover tutoring customer’s workers more than required for operation. A short course for work internals may be ordered for additional fee.
* Production data stored at the statistics sector may be lost, unless allocated its own flash sector.
* The limitation of 2msec between consecutive messages can cause excessive loading time, since when the loading PC “goes to sleep” for at least 2msec between messages, it will not necessarily wake up immediately after the 2msec elapsed.
* If on warranty time the contractor is requested to support following misuse or bugs inserted by customer’s modifications, the work will be payable by the hourly rate stated below.
* Support shall be on a best-effort basis, fixes delivered within reasonable time. No hard time limit.
* Intermediate tools and test harnesses are not deliverable.
* Travels other than to Zichron Yaakov shall be compensated.

**Table of costs**

|  |  |  |
| --- | --- | --- |
| Assignment | Budget hours. | Expenses |
| Learn 28069   * Flash * Boot * CAN controller (older generation) | 25 | - |
| Initialization per CPU wiring, quartz ,… writing CAN driver | 15 |  |
| Modify BE project:  - Command file modification, including DATA\_SECTION for statistics  - Preparation for stand-alone debugging  - Contents of “GoToBurner” function (passing all PWM to floating inputs, killing CLA, jump to burner)  - Generating hex file  - Writing post processor to hex file to fill voids, and include code statistics and checksums. | 12 |  |
| Write boot loader for 28069 | 50 |  |
| SW design Documentation and reviews | 20 |  |
| PCAN CAN drivers | 20 |  |
| Write loader application C# | 50 |  |
| Testing and debugging, locally | 30 |  |
| Testing and debugging, with customer | 20 |  |
| Work till delivery | 242 |  |
| 15% Unforeseen, warranty and support 1 year | 36 |  |
| Total | 278Hr |  |

Hour: 220ILS, total 61160ILS + VAT as applicable.