# Introduction

### 1.1 Purpose

The purpose of this document is to document testing done on SVI FF Firmware release3. It also gives as the information about the statistical report of TFS bug report and status of project as well. This document must be evaluated well before product technical release.

### 1.2 Scope

The testing covers all parameters in Resource block, Transducer block, AI, AO, DI, DO, PID blocks, including verification to bug which created for all changeset done in last few years in Project Firmware-SVI II AP FF, FW SVI FF Releases, Firmware-SVI3 FF

The scope of testing covers the following V&V activities:

* Functionality V&V testing.
* Manro Test Case Review
* Bug Verification
* Task Verification

### 1.3 Requirements

Please refer to Appendix 4.1 - All SVIFF Firmware Testing List.xlsx, SVIFF FW TEST CASES List.xlsx

Firmware test should cover all following checkpoints:

1. Parameters of all Block
2. All parameters read/write from NI Configurator including RB, TB, AI, AO, DI, DO, PID, etc,.
3. Each feature performs correctly in each function block application
4. Menus and Methods
5. Local UI support configuration via menu and method correctly
6. Device functionality
7. Each switch on board work as expected.

### 1.4 Document Terminology and Acronyms

|  |  |
| --- | --- |
| FBAP | Function Block Application |
| DD | Device Description |
| NI Configurator | NI-FBUS Configurator  Used for read/write parameter for FF device, setup function application |
| FDI | Field Device Integration  FDI was jointly developed by leading process industry foundations including FieldComm Group, FDT Group, PROFIBUS & PROFINET International, and the OPC Foundation. |
| FF | Foundation Fieldbus |
| QA | Quality Assurance |
| SFEC | Shanghai F&PT Engineering Center |
| TFS | Team Foundation Server  A version control and bug report track system in project development and software test. |
| V&V | Validation and Verification |

### 1.5 References

* All SVIFF RB/TB Parameters and methods full list
* SVIFF FW TEST CASES List.xlsx
* SVI FF release3 fixed bugs in TFS
* SVI FF release3 known issue in TFS

# Environmental Report

### 2.1 Human Resources

The following table will give the organization and responsibility of the team involved in validation and verification.

|  |  |
| --- | --- |
| Resource | Role & Responsibility |
| Ark Khasin | Developer, take care of project management and bug fixing. |
| Helen Hu | QA, take care of test execution and bug fixing. |

Table 1: Roles & Responsibilities of SVI FF Firmware V&V team

### 2.2 Hardware/Software Resources

The real test environment is as below:

* SVI FF Rev3 positioner w/ a air to open 35 35212 23.8sq inch Camflex II setup
* National Instruments Communication manager, Utility, Configurator
* ValVue 3 and SVIFF DTM

# Validation and Verification Summary

### 3.1 Requirements and Functionality V&V Testing

The requirements and functionality testing were done by Ark and Vison before new code check in. All requirements are based on those changesets after the changeset 85858 till 95910 in TFS history of following branches:

* $/FW SVI FF Releases/Release3/FD-SW
* $/FW SVI FF Releases/Release3/FIRMWARE

# Appendix

### 4.1 All SVIFF Parameters and Firmware Test Case full list:



### 4.2 SVI FF Firmware release 3 fixed bugs or bug report or task or PBI in TFS:

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|  |  |  |
| --- | --- | --- |
| ID | Title | State |
| 20312 | \* FF -- FF release 1 branch - Incomplete initial documentation on open bugs | Closed |
| 20323 | STATUS\_OPTs selection for the Function Blocks is incorrect | Closed |
| 21445 | Setting BAL\_TIME, RESET or RATE kills SVI FF | Closed |
| 24450 | \*FF FP -- Incorrect diagnostic of channels conflict | Closed |
| 24464 | \*FF FP -- ROM test -- Action on failure detection may not be delayed | Closed |
| 25184 | UC45: TB Init Time is 2000000s and target mode is Manual as default. | Closed |
| 26099 | \*FF -- APP -- Setpoint presentation in local UI may be incorrect | Closed |
| 27546 | \*SVI FF R3 folder missing | Closed |
| 28942 | \*FF -- APP -- Redundant write of autotune results to NVMEM | Closed |
| 51825 | Wrong unit - Cycle Counter Alert A & B | Closed |
| 52198 | Autotune & Auto Find Stops methods + Percent Complete | Closed |
| 52480 | Premature setting of FW activation control record | Closed |
| 53973 | RB Restart defaults fails watchdog | Closed |
| 54066 | Add SPC-42 lockup monitoring | Done |
| 54067 | On rare occasions, FW download fails with E\_RESOURCES error | Closed |
| 54068 | Update FFP NVMEM layout number | Done |
| 54070 | Reduce APP task instrumentation CPU load | Done |
| 54110 | Pass-through: Task profiling is not visible in xml or html | Closed |
| 54112 | Provide "hart" access to self-test min/max times of NVMEM and flash selftest roundtrip | Done |
| 54126 | There are retries and reinits in IPC | Closed |
| 61923 | UI button lock should be an enumeration | Done |
| 63706 | Need to undo C60992 (failing Physical Layer test). This opens us up to NULL derefernce and memory corruption | Closed |
| 63917 | Incorrect read of data collection trigger | Closed |
| 63950 | Standalone data collection shall not interrupt a process using the diagnostic buffer | Done |
| 64001 | Diagnostic buffer header shall include a consecutive number | Done |
| 64002 | PST and standalone data collection shall by triggered automatically only in TB AUTO mode | Done |
| 64014 | New Firmware Activation failure to translate APP NVMEM sends FFP in endless restart loop | Closed |
| 64015 | Write lock causes failure of new firmware activation | Closed |
| 64016 | Placeholder process causes failure of new firmware activation | Closed |
| 64089 | Firmware Download actually failed in ValVue3 | Closed |
| 64090 | unknown device error appear when reading Data\_Config\_Perm after PST | Closed |
| 64096 | Duplicate mutex acquisition in nvram.c | Closed |
| 67423 | TB.COMPLETE\_STATUS "New current diagnostic signature" comes up on PST completion | Closed |
| 67658 | PST configuration errors | Closed |
| 70170 | SVIFF FW->SVI FF device can run PST procedure even without air supply | Closed |
| 70196 | SVIFF - Data collection doesn't stop properly | Closed |
| 70217 | Skip count does not work in current version C87193 | Closed |
| 70219 | In some cases Max Count does not work as expected | Closed |
| 70235 | Watchdog trap in FFP | Closed |
| 70236 | Standalone data collection may be triggered with TB not in AUTO mode | Closed |
| 70239 | Wrong data alignment bugs | Closed |
| 71358 | Data collection with Temporary config can't be stopped | Closed |
| 71366 | Can't write PST pause (dwell) time individually | Closed |
| 71367 | PST abort monitor on pilot and actuator pressure is not functional | Closed |
| 71372 | PST doesn't collect data (anymore) | Closed |
| 71489 | Runing step test procedure affects number of sample of auto data collection | Closed |
| 71546 | Extended signature may be clobbered between completion and saving to NVMEM | Closed |
| 71548 | Can't save Extended signature two times in a row | Closed |
| 77507 | "Replace stops" doesn't clear fault "Fnd Stops Failed" | Closed |
| 77572 | FRAM thrashing in FFP CPU | Closed |
| 79646 | The last point of PST test often falls down to a negative value especially when the collected data is odd number | Closed |
| 79647 | PST ramp time may be too short | Closed |
| 80586 | SVI FF Save Signature test data Question | Closed |
| 80599 | Provide high halfword of sample period in the diagnostic buffer header | Done |
| 80882 | Sometimes running signature test couldn't end. | Closed |
| 80958 | Interrupts may be enabled within a critical section | Closed |
| 81269 | Two-way Signature having different behaviors | Closed |
| 81600 | With AO connected, TB/APP transition to AUTO mode is not bumpless | Closed |
| 81601 | Long time waiting to fail on missing IPC | Closed |
| 81611 | Open-loop actual ramp speed is slower than promised in configuration | Closed |
| 81697 | Incorrect retrieval from HART buffer | Closed |
| 81722 | Saving a signature as Baseline is indicated with a wrong status | Closed |
| 81911 | Write lock handling is incorrect | Closed |
| 82295 | Autotune fails where it succeeds in Rev. 2 | Closed |
| 82320 | \*FF FP -- Incorrect diagnostic of channels conflict | Closed |
| 82519 | Indication of data collection is currently collecting data interferes with autotune | Closed |
| 82675 | Diagnostic test implementation shall support multi-leg run driven by host software | Done |
| 82709 | 【FF Rev3】the Historic Alert of Travel Accumulation A and B are always same as the Alert, even it is triggered in history. | Closed |
| 82727 | Missing autotune completion code for failure to stabilize the valve | Closed |
| 82790 | On upgrade R2->R3, APP starts in failsafe | Closed |
| 82799 | \* FF FF -- activation of R3 after upgrade from R2 has these faults | Closed |
| 83015 | Double acting signature from 102% to -2% returns unexpected result | Closed |
| 85870 | FW upgrade creates several uninitialized records "01/01/1972" in alert log | Closed |
| 86075 | RB.RESTART=Restore TB to Factory cause device to go into failsafe | Closed |
| 86091 | Incorrect software reset sequence in APP | Closed |
| 86092 | Spurious "Setpoint timeout" fault on reset | Closed |
| 86093 | Setpoint receipt monitoring shall monitor only the receipt of setpoint, regardless of STATUS | Done |
| 86657 | a signature test can be completed, but cannot be saved to device current | Closed |
| 86839 | Instructions inserted between writing low and high bytes of PWM (control output) | Closed |
| 86840 | Open loop signature may end prematurely | Closed |
| 86900 | Signature test, the number of points are incorrect for the first direction in the header, there is one point's shift | Closed |
| 87024 | Incomplete documenting of autotune completion codes | Closed |
| 87223 | Missing status bit for new PST data | Closed |
| 87224 | PST guarding the diagnostic buffer prevents FINAL\_VALUE propagation when TB is in AUTO. | Closed |
| 87244 | DTM's composite processes experience valve movement between steps | Closed |
| 87444 | Potentially garbled UI display displaying FF data + Wrong DD labels for UI options | Closed |
| 87459 | PST cannot be triggered if PST is set as "triggered on AI Below threshold" | Closed |
| 87462 | PST will be continuously triggered when Analog Input is above the threshold | Closed |
| 87468 | A PST process that has been triggered should not be cancelled if AI value changed and is less or more than trigger threshold during the PST process. | Closed |
| 87470 | Large overshoot in step test sequence, also uneven across position ranges | Closed |
| 87537 | Automatic creation of factory defaults on firmware upgrade R2->R3 doesn't work | Closed |
| 87587 | Incorrect treatment of TB.READBACK\_SELECT | Closed |
| 87616 | \* FF FF -- reconsider after get into FSTATE , how timer count down happen , should only manually switch AO mode to OOS? | Closed |
| 88085 | A fix for 87244 broke incremental change of manual setpoint in local UI | Closed |
| 88209 | \*FF FFP --Open loop one way signature test out of expected | Closed |
| 88214 | \*FF FFP --Can't set "Ramp\_Time" to "50s" and Ramp\_Rate" to "2%/s" in Open loop both ways signature test | Closed |
| 88215 | \*FF FFP --Open loop both ways signature test out of expected | Closed |
| 88216 | \*FF FFP --Can't Put "Ramp\_Rate" is "0.2%/s" in Open loop both ways signature test | Closed |
| 88224 | \*FF FFP --PST\_PATTERN is 1 or 2 when the pattern is Down-Pause-Up-Pause-Down | Closed |
| 88290 | \*FF FFP -- TB.Temperature\_Extremes.Temperature\_Max\_Lifetime is 31.97, can it be changed by restart to factory default? | Closed |
| 88339 | FINAL\_VALUE\_x shall track working setpoint under certain circumstances (see Description) | Done |
| 88608 | FINAL\_VALUE Doesn't work in MAN when it switch from OOS to MAN | Closed |
| 88745 | On rare occasions, FFP CPU locks up on new firmware activation | Closed |
| 88746 | Erroneous tempcomp calculation | Closed |
| 88759 | PST procedure is always cancelled by device in latest FW96279 | Closed |
| 88769 | PST abort on deviations shall only be available in AUTO mode of TB. | Done |
| 88903 | SUSFF- some parameter can't save value in MEM | Closed |
| 89099 | The data point drops down to "0%" when I use data collection to capture IP current data. | Closed |
| 89240 | RB block, Index 14 subIndex 1, the last option does not display correctly | Closed |
| 89248 | Travel\_accumulation\_alert.alert\_point and Travel\_accumulation\_alert.deadband always changes when enabling/disabling the alert. | Closed |
| 89363 | TB.Setpoint Timeout Alert State work incorrectly | Closed |
| 89367 | Document SVI FF R3 communications performance | Done |
| 89378 | On certain occasions, FW activation fails with APP switching flash bank and fails NVM, and FFP stays in the previous bank | Closed |
| 89502 | Handling of buffer for Data Collection Data under certain case is incorrect ( by DTM) | Closed |
| 89512 | The header of Data buffer is not correct when running a data collection on SVI FF RC2 build | Closed |
| 89513 | Fail to load baseline data and custom data from SVI FF REV03 device which version is RC2 | Closed |
| 89596 | Tune data can't be saved to factory default under certain case | Closed |

### 4.3 SVI FF Firmware release 3 known issue in TFS:

|  |  |  |
| --- | --- | --- |
| ID | Title | State |
| 28298 | \*FF -- APP -- Address multiple problems with autotune | Deferred |
| 28941 | \*FF -- APP -- Autotune results are not repeatable | Deferred |
| 88825 | Up/Downgrade between C96310 and C85858 breaks NV memory | Deferred |
| 89241 | Display Name and Actual Name in TB.UI Custom Configuration are inconsistent | Deferred |
| 89329 | Quality: BLK\_ERR\_DESC bits are defined in several places | Deferred |
| 89542 | FW Activation Fail while PST Process is Running | Deferred |
| 89595 | Some Alert can' reset to enable after did quick default in Restart | Deferred |

# Manro Test Case Review

|  |  |  |  |
| --- | --- | --- | --- |
| index | SVIFF Verison 3 test case | Check Result | Review Comment |
| 1 | Diagnostics Testings.xlsx | √ | Step 16 missing complete condition |
| 2 | Robustness Testing - Internal Watchdog.xlsx | √ | no comment |
| 3 | Functional testing - Units.xlsx | √ | it is better use Pressure unit in title |
| 4 | Functional Testing.xlsx | √ | step 9,10 failed in last sheet"find stop" to see if need to revise case |
| 5 | Low-level IPC - Update from same or different R3.xlsx | √ | as title describes , it is better to have both upgrade and downgrade test |
| 6 | Functional Testing - XD\_FSTATE.xlsx | √ | as comment, should FBAP test is taken into test XD\_FSTATE |
| 7 | Functional testing - Static Revision.xlsx | √ | disctinct TB.ST\_REV with RB.ST\_REV and some incremental value might be incorrect |
| 8 | High level IPC testing - Parameters consistency.xlsx | √ | it is better add check for two FF dynamic variable, and related UI configuration test |
| 9 | High level IPC testing - Large Parameters.xlsx | √ | no comment , just follow up test requirement added in document |
| 10 | Low-level IPC - Fresh device.xlsx | √ | no comment |
| 11 | Low-level IPC - Update from R2.xlsx | √ | add advanced key |
| 12 | Low Level IPC - Error Recovery - Failure of IPC.xlsx | √ | need more details for failure of IPC |
| 13 | Low Level IPC - Errors in Periodic Traffic and Manual Recovery.xlsx | √ | no comment |
| 14 | Low Level IPC - Error Recovery - Manual Recovery.xlsx | √ | typo can't be read |
| 15 | Robustness Testing - Flash failure - RAM glitch.xlsx | √ | advise to use SA not DTM as testing tool |
| 16 | Robustness Testing - Permanent flash failure.xlsx | √ | redesign step 14 and step 15 |
| 17 | Robustness Testing - NV Memory Instrumentation.xlsx | √ | retest it |
| 18 | Functional testing - Failed state.xlsx | √ | advise to revise step to cover test requirement |
| 19 | Functional testing - extremes.xlsx | √ | no comment |
| 20 | Functional Testing - Functionality.xlsx | √ | how to compare test result 200 times |
| 21 | Functional Testing - Local UI - Find Stops.xlsx | √ | not only AUTO STOP but also MAN STOP should be tested, SA is good enough as only tool to help check raw position |
| 22 | Functional testing - Autotune.xlsx | √ | Is it a DD test item? It should take block mode into steps |
| 23 | Functional Testing - TB Advanced persistence.xlsx | √ | no comment |
| 24 | Functional testing - default values.xlsx | √ | default , factory default and quick default should be combined into this document together |
| 25 | Robustness Testing - External watchdog.xlsx | √ | no comment |
| 26 | Alarms Testing - case FD\_SIMULATE.xlsx | √ | it is better revise it and use Configurator for testing |
| 27 | Alarms Testing - Case Alert Mapping.xlsx | √ | it is better revise it and use Configurator for testing |
| 28 | Alarm Testing - Case STATIC Revision increase.xlsx | √ | need to revise |
| 29 | Functional Testing - DO FB - Discrete Control.xlsx | √ | no comment |
| 30 | Functional Testing - DO FB - Numeric Control.xlsx | √ | need to revise for how DO FB work under DINT control |
| 31 | Robustness Testing - NV Memory Reinitialization.xlsx | √ | need a retest |
| 32 | Low-level IPC - Performance.xlsx | √ | no comment |
| 33 | Diagnostics Testings-N.xlsx | √ | almost same as 1st document |
| 34 | Functional Testing - more.xlsx | √ | failed step need to reivse |
| 35 | Robustness Testing - Setpoint Timeout.xlsx | √ | need to revise test case |
| 36 | Functional Testing - Find Stops(revised partly).xlsx | √ | no comment |
| 37 | Alarms testing - Case WRITE\_LOCK - Advanced options.xlsx | √ | it is a wrong test case if as title it checks WRITE\_LOCK |
| 38 | Functional Testing - Physical analog input.xlsx | √ | no comment |

Link: https://bakerhughes-my.sharepoint.com/personal/vladimir\_kostadinov\_bakerhughes\_com/\_layouts/15/onedrive.aspx?id=%2Fpersonal%2Fvladimir%5Fkostadinov%5Fbakerhughes%5Fcom%2FDocuments%2FSVI%20FF%20Version%203%2FTestCases%2FSVI%20FF%20%20tests&ga=1