

SOUL Acceptance Review Lien List:  
Update for the Handover Review  
March 5, 2024

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## 1. Introduction

In September, 2023, the open RIX from the four SOUL acceptance reviews were compiled into a single list of 45 items. Of these 45 items, 25 pertain to documentation, 9 to troubleshooting, 5 to software, 3 to calibration, and 3 to other<sup>1</sup>. Between September 2023 and early March 2024, LBT worked with the SOUL team to resolve and close as many liens as possible. Of the 45 liens, 36 are closed, 4 need clarification, 3 are outside the scope, and 3 are open. The spreadsheet that was used to track progress can be found [here](#).

## 2. Status

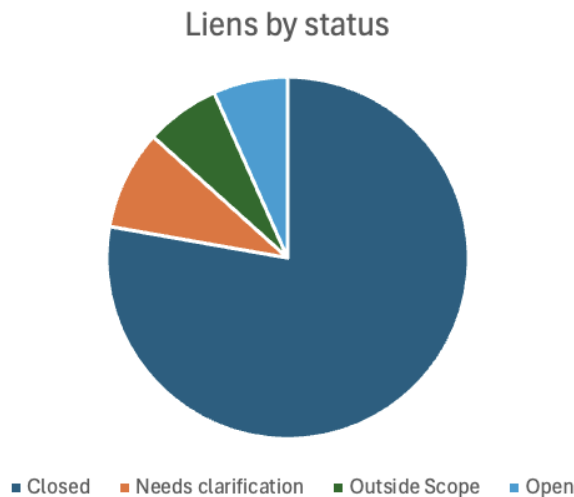


Figure 1. Status of the 45 liens.

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<sup>1</sup> Other = one investigation, one training, and one improvement

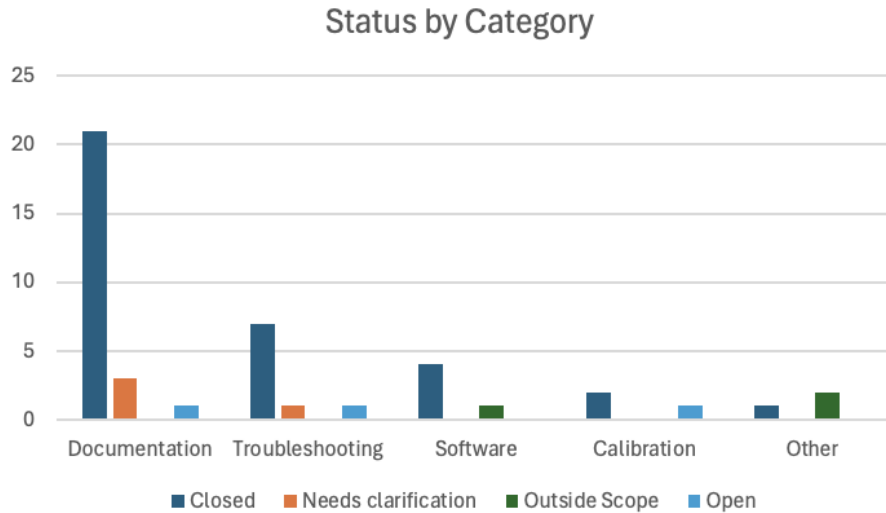


Figure 2. Status of the 45 liens by category.

Status totals by category are as follows:

- a. Status of Documentation Liens
  - i. 26 total.
  - ii. 21 closed; one open; 3 need clarification; zero outside scope.
  - iii. See appendix A.
- b. Status of Troubleshooting Liens
  - i. 9 total.
  - ii. 7 closed, one open, one needs clarification; zero outside scope.
  - iii. see appendix B.
- c. Status of Software Liens
  - i. 5 total.
  - ii. 4 closed, zero open, zero need clarification, one outside scope.
  - iii. See appendix C.
- d. Status of Calibration Liens
  - i. 3 total.
  - ii. 2 closed; one open; zero need clarification; zero outside scope.
  - iii. See appendix D.
- e. Status of Other Liens
  - i. 3 total.
  - ii. One closed; zero open; zero need clarification; 2 outside scope.
  - iii. See appendix E.

### 3. Liens that require further action

The liens which are either open or require clarification are given in tables 1 and 2.

<b>ID</b>	<b>Type</b>	<b>Desc</b>	<b>Est. TTC</b>	<b>Lead</b>
L_01C	Troubleshoot	Negative Intensity	3 months	Fabrizio/JCG
L_02	Calibration	Strehl Calculation	1 month	Enrico
L_04	Documentation	Observational Constraints	2 months	AOS or AI (?)

Table 1. Open Liens.

<b>ID</b>	<b>Type</b>	<b>Desc</b>	<b>Reference</b>
CR_DX_LBTI_087	Documentation	Revise/remove "Old" sections	Appendix A(n)
CR_DX_LBTI_096	Documentation	Bad frame impact on center pupil	Appendix A(q)
DOC_SX_LUCI_001	Documentation	Documentation from LUCI SX	Appendix A(v)
L_01D	Troubleshoot	Not Live	Appendix B(c)

Table 2. Liens that require clarification.

#### 4. Resulting actions on LBT

Many of the liens include actions on LBT. For example, there are 34 open actions assigned to LBTO on the “SOUL Manual” tab of rixRegisterSX-LUCI google spreadsheet.<sup>2</sup>

Following are two more examples:

- a. Include software change in a stable release and confirm log file location change (see CR\_DX\_LBTI\_083)
- b. Confirm instructions are adequate and post them on the AO web pages (see CR\_DX\_LBTI\_098)

A complete and prioritized list of LBT actions will be compiled after the handover review, but, for now, the LBT action list is outside the scope of this report.

#### A. Notes from checking documentation liens

- a. L\_04
  - i. Recommendation: Open.
  - ii. Notes: Operational constraints not yet documented.
- b. N\_01
  - i. Recommendation: OK to close.
  - ii. Notes: User’s manual was provided.
- c. N\_02
  - i. Recommendation: OK to close.
  - ii. Notes: User procedures were provided.
- d. CR\_DX\_LUCI\_105
  - i. Recommendation: OK to close.
  - ii. Notes: SOUL team recommends improving the flat to fix the low signal problem seen in some subapertures.

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<sup>2</sup> As per comments provided 23feb2024 by the SOUL team.

- e. CR\_DX\_LUCI\_113
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed D01 ref and spot checked others.
- f. CR\_DX\_LUCI\_121
  - i. Recommendation: OK to close.
  - ii. Notes: Checked caption
- g. CR\_DX\_LUCI\_126
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed appendix C (includes "DBfiller configuration")
- h. CR\_DX\_LUCI\_127
  - i. Recommendation: OK to close.
  - ii. Notes: List of documented upgrades generated (see Appendix G).
- i. CR\_DX\_LBTI\_054
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed modification record is up to date.
- j. CR\_DX\_LBTI\_057
  - i. Recommendation: OK to close.
  - ii. Notes: Checked figure 32 + assumptions
- k. CR\_DX\_LBTI\_058
  - i. Recommendation: OK to close.
  - ii. Notes: Checked figure 32 + assumptions
- l. CR\_DX\_LBTI\_062
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed new figures in sect 13.2.2 and 13.2.3
- m. CR\_DX\_LBTI\_0NN
  - i. Recommendation: OK to close.
  - ii. Notes: Spot checked minor fixes.
- n. CR\_DX\_LBTI\_087
  - i. Recommendation: Needs clarification
  - ii. Notes: Full text of RIX is "Can the important parts of Sections #7, 9, 10 (thereis no section #8) be placed in the relevant sections above and Sections #7, 9, 10 [OLD Report] be removed?" and refers to Notes-7 as the section number. The sections 7,8,9 are still labeled "[OLD Report]").
- o. CR\_DX\_LBTI\_091
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed section 18.6 in D11
- p. CR\_DX\_LBTI\_093
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed section 7.5.4
- q. CR\_DX\_LBTI\_096
  - i. Recommendation: Needs clarification
  - ii. Notes: Full text of RIX is "If there is an OCAM bad frames during the center pupils and the user needs to rebin, a new preset needs to be sent. The modulation override is not recognized after rebinning and an error will be received. Either add a note here or in troubleshooting? or can something be added to the remaining through WFSArb to accommodate this case? The 623

mode ACE table is typically only in place when operating in the blinding regime" Can this be closed (as suggested by SOUL team) because SOUL team is waiting on LBT to "verify and document"? Can this be fixed via documentation as originally suggested by LBT?

- r. VM\_DX\_LBTI\_31
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed page numbering now starts correctly.
- s. VM\_DX\_LBTI\_37
  - i. Recommendation: OK to close
  - ii. Notes: Still "werther" (should be "whether"), but this typo fix is too small to track. It will be handled via a personal communication.
- t. VM\_DX\_LBTI\_40
  - i. Recommendation: OK to close.
  - ii. Notes: Spot checked a few env vars.
- u. VM\_DX\_LBTI\_42
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed section 2 title.
- v. DOC\_SX\_LUCI\_001
  - i. Recommendation: Needs clarification
  - ii. Notes: Although SOUL team has marked all as closed, some are pending action from LBT. Should we close this, since the SOUL team portion is complete? Does LBT agree with indication of LBT next action on all of those items?
- w. CR\_DX\_LUCI\_108
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed order of magnitude now correct (1670000 instead of 167000).
- x. CR\_DX\_LUCI\_111
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed change made in table 11.
- y. CR\_DX\_LUCI\_112
  - i. Recommendation: OK to close.
  - ii. Notes: Confirmed pupil info in 16.5.1.

## B. Notes from checking troubleshooting liens

- a. L\_01A
  - i. Recommendation: OK to close.
  - ii. Notes: As of the writing the firmware fix looks good.
- b. L\_01C
  - i. Recommendation: Open.
  - ii. Notes: Now called "zero pixel". In progress. See JCG 3/1 email for the latest status.
- c. L\_01D
  - i. Recommendation: Needs clarification.

- ii. Notes: This is now the same as “not live.” SOUL team says they are waiting for input from LBT.
- d. CR\_DX\_LBTI\_098
  - i. Recommendation: OK to close.
  - ii. Notes: SOUL team has provided [instructions in email](#). At LBT: Confirm instructions are adequate and post them on the AO web pages.
- e. L\_01B
  - i. Recommendation: OK to close.
  - ii. Notes: Zero slopes work-around proven over several months of on-sky use.
- f. VM\_DX\_LBTI\_39
  - i. Recommendation: OK to close.
  - ii. Notes: Duplicate.
- g. CR\_DX\_LBTI\_064
  - i. Recommendation: OK to close.
  - ii. Notes: FLI provided a report.
- h. CR\_DX\_LBTI\_075
  - i. Recommendation: OK to close.
  - ii. Notes: Duplicate

### C. Notes from checking software liens

- a. CR\_DX\_LBTI\_083
  - i. Recommendation: OK to close.
  - ii. Notes: SOUL team has implemented the change and produced a GitHub pull request. At LBT: include in a stable release and confirm log file location change.
- b. CR\_DX\_LUCI\_119
  - i. Recommendation: Outside scope.
  - ii. Notes: Tasks specific to LUCI spectroscopy are outside scope.
- c. CR\_DX\_LBTI\_086
  - i. Recommendation: OK to close.
  - ii. Notes: Same as VM\_DX\_LBTI\_40
- d. VM\_DX\_LBTI\_30
  - i. Recommendation: OK to close.
  - ii. Notes: Software is on GitHub.
- e. Notes: CR\_DX\_LUCI\_117
  - i. Recommendation: OK to close.
  - ii. Notes: Deprecated by L\_05.

### D. Notes from checking calibration liens

- a. L\_02:
  - i. Recommendation: Open.
  - ii. Notes: SOUL team working on Strehl calculation.
- b. L\_05
  - i. Recommendation: OK to close.

- ii. Notes: Calibration completed
- c. L\_06
  - i. Recommendation: OK to close.
  - ii. Notes: Calibration completed

## E. Notes from checking other liens

- a. CR\_DX\_LUCI\_115:
  - i. Recommendation: Outside scope
  - ii. Notes: Tasks specific to LUCI spectroscopy are outside scope.
- b. VM\_DX\_LUCI\_047:
  - i. Recommendation: Outside scope
  - ii. Notes: Extended sources improved performance is outside scoop (Added to minor improvements, see Appendix G).
- c. CR\_DX\_LUCI\_053:
  - i. Recommendation: OK to close.
  - ii. Notes: Training took place.

## F. Short description for each ID

- a. CR\_DX\_LBTI\_054: Update modification record to reflect changes made for DX review.
- b. CR\_DX\_LBTI\_057: Update fig. 32 of D04 with same axis range of S-LBTI-SX one.
- c. CR\_DX\_LBTI\_058: Update fig. 32 with new SR from slopes in D04
- d. CR\_DX\_LBTI\_062: Show plots of S-LBTI perf Vs seeing in Comm Report
- e. CR\_DX\_LBTI\_064: Get a negative frames report from FLI
- f. CR\_DX\_LBTI\_075: Provide update on O2k.01 Slope 0 issue
- g. CR\_DX\_LBTI\_083: Change the log file location (needs a change to the auxloop code)
- h. CR\_DX\_LBTI\_086: Change all the absolute paths to paths using environment variables
- i. CR\_DX\_LBTI\_087: Fix numbering in the doc
- j. CR\_DX\_LBTI\_091: Add the shift pupil procedure to the User Procedures Manual
- k. CR\_DX\_LBTI\_093: Document results of binocular flux test
- l. CR\_DX\_LBTI\_096: Debug OCAM bad frame impact on center pupil procedure
- m. CR\_DX\_LBTI\_098: Bin4 delay
- n. CR\_DX\_LBTI\_0NN: 13 minor document fixes: RIX 71-73, 76-82, 84-85, 87
- o. CR\_DX\_LUCI\_105: Re subaperture threshold: Clarify the text in CR 7.1.4
- p. CR\_DX\_LUCI\_108: Correct refMagFlux value.
- q. CR\_DX\_LUCI\_111: LUCI equivalent to LBTI blinded reconstructor question + doc fix
- r. CR\_DX\_LUCI\_112: Document updated pupils following bin4 delay fix
- s. CR\_DX\_LUCI\_113: Fix reference in D04
- t. CR\_DX\_LUCI\_115: Make improvements needed for LUCI spectroscopy

- u. CR\_DX\_LUCI\_117: Use actual values for LUCI dichroic band pass in computations
- v. CR\_DX\_LUCI\_119: Improve the repeatability of stage positioning on dithering
- w. CR\_DX\_LUCI\_121: Provide the units for camera lens control in Figure 3
- x. CR\_DX\_LUCI\_126: Provide the list of the variables for new telemetry channels
- y. CR\_DX\_LUCI\_127: Document the list of recommended minor upgrades
- z. DOC\_SX\_LUCI\_001: Approx. 100 (!) open documentation RIX from SX LUCI review
- aa. L\_01A: Ocam issue #1 = Zero Slopes firmware fix
- bb. L\_01B: Ocam issue #2 = Zero Slopes work-around
- cc. L\_01C: Ocam issue #3 = Negative Intensity
- dd. L\_01D: Ocam issue #4 = Other items in JP "zoology" list
- ee. L\_02: Measure the Strehl ratio at H-band on LMIRCam
- ff. L\_04: Review operational constraints
- gg. L\_05: Perform flux calibration on sky
- hh. L\_06: Produce the reconstructor for handling blinded subapertures
- ii. L\_08: Investigate noise in the pupil interdistance measurement
- jj. N\_01: Produce an updated user manual
- kk. N\_02: Production of an updated user procedure
- ll. VM\_DX\_LBTI\_30: Create a Github PR for reset\_gopt\* scripts
- mm. VM\_DX\_LBTI\_31: Fix page numbering in T10
- nn. VM\_DX\_LBTI\_37: Fix spelling T11 sect 3 p3
- oo. VM\_DX\_LBTI\_39: Implement and test permanent fix for the slopes 0 error
- pp. VM\_DX\_LBTI\_40: Replace absolute paths with environment variables in T12
- qq. VM\_DX\_LBTI\_42: Clarify the matter in the paragraph text of T12 sec 2
- rr. VM\_DX\_LUCI\_047: Quantify consequences of resolved source as AO reference
- ss. VM\_DX\_LUCI\_053: Share the AO simulations tools

## G. Minor improvements<sup>3</sup>

- a. PSF stabilization on LUCI (LUT) for spectroscopy
- b. Gain analysis vs seeing and mag
- c. LBTI - high seeing mode
- d. Optimization of faint end: sky background for WFS
- e. ADC correction on the WFS
- f. r0, tau0 estimated from AO telemetry (auxiliary loops)
- g. Modal Gain Machine
- h. Modal optical gain
- i. Misregistration monitor
- j. Low wind effect
- k. IM in partial correction
- l. No modulation PYR
- m. PSF reconstruction
- n. PSF model

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<sup>3</sup> Snapshot as of this writing. The official list that will evolve with time is [here](#).



- o. Optimize loop parameters for extended AO ref
- p. OVMS feed forward for tip-tilt correction.