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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ELECTRONICS, INC.,
Petitioner

v.

ATI TECHNOLOGIES ULC,
Patent Owner

Case IPR2015-00325
Patent 7,742,053

DECLARATION OF CALVIN WATSON

Mail Stop "Patent Boar"
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

ATI 2105
LG v. ATI
IPR2015-00325

[redacted]

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[redacted]

I, Calvin Watson, declare as follows:

I. BACKGROUND AND INTRODUCTION

1. I am a technical specialist and patent agent at Advanced Micro Devices, Inc. ("AMD"). My responsibilities include, among other things, supporting the AMD law department on various intellectual-property matters.

2. I understand that the above-captioned case involves U.S. Patent Number 7,742,053 ("'053 Patent"). I understand that the '053 Patent is currently assigned to ATI Technologies ULC ("ATI").

3. I understand that ATI merged with AMD in 2006. I understand that ATI's documents are now managed on AMD's database system, known as Perforce, which is the same system that ATI used before the merger with AMD. From my responsibilities at AMD, I am familiar with creating, editing, maintaining, and retrieving files in Perforce.

4. For this case, I have helped retrieve documents, source code, folder histories, document logs, and other files from Perforce. Each of these files were kept in the ordinary course of AMD/ATI's business.

5. In this declaration, I provide an overview of Perforce and the types of files that ATI engineers saved in Perforce. *See infra* Part II. I also authenticate the

following Exhibits, which I understand are being submitted in this case. *See infra* Part III. The Exhibits are true and correct copies of the documents, source code, folder histories, and document logs I helped retrieve from AMD's document database. The original documents, source code, folder histories, and document logs remain in AMD's possession, custody, and control.

Exhibit Number	Reference
2007	R400 Sequencer Specification (Version 0.1)
2008	**INTENTIONALLY LEFT BLANK**
2009	R400 Sequencer Specification (Version 0.3)
2010	R400 Sequencer Specification (Version 0.4)
2011	R400 Sequencer Specification (Version 0.5)
2012	R400 Sequencer Specification (Version 0.6)
2013	R400 Sequencer Specification (Version 0.7)
2014	R400 Sequencer Specification (Version 0.8)
2015	R400 Sequencer Specification (Version 0.9)
2016	R400 Sequencer Specification (Version 1.0)
2017	R400 Sequencer Specification (Version 1.1)
2018	R400 Sequencer Specification (Version 1.2)
2019	**INTENTIONALLY LEFT BLANK**
2020	R400 Sequencer Specification (Version 1.4)
2021	R400 Sequencer Specification (Version 1.5)
2022	R400 Sequencer Specification (Version 1.6)
2023	R400 Sequencer Specification (Version 1.7)
2024	R400 Sequencer Specification (Version 1.8)

[redacted]

2025	R400 Sequencer Specification (Version 1.9)
2026	R400 Sequencer Specification (Version 1.10)
2027	R400 Sequencer Specification (Version 1.11)
2028	R400 Sequencer Specification (Version 2.0)
2029	R400 Sequencer Specification (Version 2.1)
2030	R400 Sequencer Specification (Version 2.2)
2031	R400 Sequencer Specification (Version 2.3)
2032	R400 Sequencer Specification (Version 2.4)
2033	R400 Sequencer Specification (Version 2.5)
2034	R400 Sequencer Specification (Version 2.6)
2035	R400 Sequencer Specification (Version 2.7)
2036	R400 Sequencer Specification (Version 2.8)
2037	R400 Sequencer Specification (Version 2.9)
2038	R400 Sequencer Specification (Version 2.10)
2039	R400 Sequencer Specification (Version 2.11)
2040	R400 Architecture Proposal (Version 0.1)
2041	R400 Top Level Specification (Version 0.2)
2042	R400 Shader Processor (Version 0.1)
2043	R400 Sequencer Specification Log (Versions 0.1 to 1.2)
2044	R400 Sequencer Specification Log (Versions 1.4 to 2.11)
2045	R400 Architecture Proposal Log
2046	R400 Top Level Specification Log
2047	R400 Shader Processor Log
2048	R400 Sequencer Emulator Folder History
2049	R400 Sequencer Parts Folder History
2050	R400 Document Library Folder History

[redacted]

2051	R400 Architecture Folder History
2052	R400 GFX Testing Folder History
2053	Peter Pellerite Program Review Slides (12/13/01)
2054	Andy Gruber Program Review Slides (12/13/01)
2055	Joe Cox Program Review Slides (12/13/01)
2056	Mark Fowler Program Review Slides (12/13/01)
2057	Peter Pellerite Program Review Slides (1/17/02)
2058	Mark Fowler Program Review Slides (3/22/02)
2059	Joe Cox Program Review Slides (3/22/02)
2060	Peter Pellerite Program Review Slides (3/22/02)
2061	Mark Fowler Program Review Slides (5/30/02)
2062	Peter Pellerite Program Review Slides (5/30/02)
2063	Joe Cox & Christeen Gray Program Review Slides (8/30/02)
2064	Ken Correll Program Review Slides (8/30/02)
2065	Mark Fowler Program Review Slides (8/30/02)
2066	Peter Pellerite Program Review Slides (8/30/02)
2067	Ken Correll Program Review Slides (10/10/02)
2068	Mark Fowler Program Review Slides (10/10/02)
2069	Peter Pellerite Program Review Slides (10/10/02)
2070	Ken Correll Program Review Slides (11/12/02)
2071	Peter Pellerite Program Review Slides (11/12/02)
2072	RTL Code File: sq.v
2073	RTL Code File: sq_thread_buff.v
2074	RTL Code File: sq_thread_arb.v
2075	RTL Code File: sq_ctl_flow_seq.v
2076	RTL Code File: sq_instruction_store.v

[redacted]

2077	RTL Code File: sq_target_instr_fetch.v
2078	RTL Code File: sq_tex_instr_queue.v
2079	RTL Code File: sq_tex_instr_seq.v
2080	RTL Code File: sq_ais_output.v
2081	RTL Code File: sq_alu_instr_queue.v
2082	RTL Code File: sq_alu_instr_seq.v
2083	RTL Code File: sp.v
2084	RTL Code File: vector.v
2085	RTL Code File: macc_gpr.v
2086	RTL Code File: macc.v
2087	RTL Code File: tp.v
2088	Emulator Code File: sq_block_model.cpp
2089	Emulator Code File: user_block_model.h
2090	Emulator Code File: arbiter.cpp
2091	Emulator Code File: arbiter.h
2092	Emulator Code File: sq_alu.cpp
2093	Emulator Code File: sq_alu.h
2094	Emulator Code File: gpr_manager.cpp
2095	Emulator Code File: gpr_manager.h
2096	Emulator Code File: instruction_store.cpp
2097	Emulator Code File: instruction_store.h
2098	Emulator Code File: reg_file.cpp
2099	Emulator Code File: reg_file.h
2100	Emulator Code File: tp.cpp
2101	Emulator Code File: tp.h
2102	Emulator Code File: sq_tp.h

[redacted]

2103	Emulator Code File: tp_block_model.cpp
2104	Emulator Code File: user_block_model.h
2107	R400 Shader Pipe Parts Folder History
2108	RTL Code File: input_tp.v

II. PERFORCE

6. AMD and former ATI engineers used shared-file repositories for documents, source code, and other files. The system that manages the repositories is called Perforce. As part of my responsibilities within the AMD law department, I understand how Perforce works and the types of documents that have been saved in Perforce with respect to this case.

A. Overview of How Perforce Works

7. Perforce allows many users to connect to shared-file repositories. Each shared-file repository is called a depot. Files are organized in a depot using a file tree hierarchy. Any user with a permission to access the files can do so.

8. Perforce maintains time stamped logs, user permissions, and whether files are checked out. This information is stored in a separate database. The information stored in this database is referred to as metadata.

9. Users do not work directly on depot files. When a user checks out files, the files are saved to the user's individual workspace according to the same file hierarchy in the depot. The user works on the files on his or her workspace.

[redacted]

When the user is finished editing the files, the user checks in the files. Perforce then accesses the files on the user's workspace and syncs the depot according to the user's changes.

10. Perforce is a revision-control repository. This means that the system saves every revision of every file under Perforce control. When a user uploads an edited file, Perforce saves the file as a new version under the folder tree hierarchy. This type of system is particularly useful during development. For example, a version-control system allows a user to revert to a previous version of code. A user can therefore freely edit code while ensuring that the previous version is maintained.

B. Technical Specifications Saved in Perforce

11. Some of the Exhibits, which I authenticate below, are technical specification. These documents are maintained in Perforce's depot files and are kept in the regular course of business.

12. A sample of a specification cover page is shown below.

[redacted]

	ORIGINATE DATE	EDIT DATE	DOCUMENT-REV. NUM.	PAGE
	7 May, 2001	8 September, 20153 September, 201513	GEN-CXXXXX-REVA	1 of 16

Author: Laurent Lefebvre

Issue To:	**Copy No:**

R400 Sequencer Specification

SEQ

Version 0.32

Overview: This is an architectural specification for the R400 Sequencer block (SEQ). It provides an overview of the required capabilities and expected uses of the block. It also describes the block interfaces, internal sub-blocks, and provides internal state diagrams.

AUTOMATICALLY UPDATED FIELDS:
Document Location: C:\perforce\r400\arch\doc\gfx\RE\R400_Sequencer.doc
Current Intranet Search Title: R400 Sequencer Specification

Ex. 2009, p. 1.

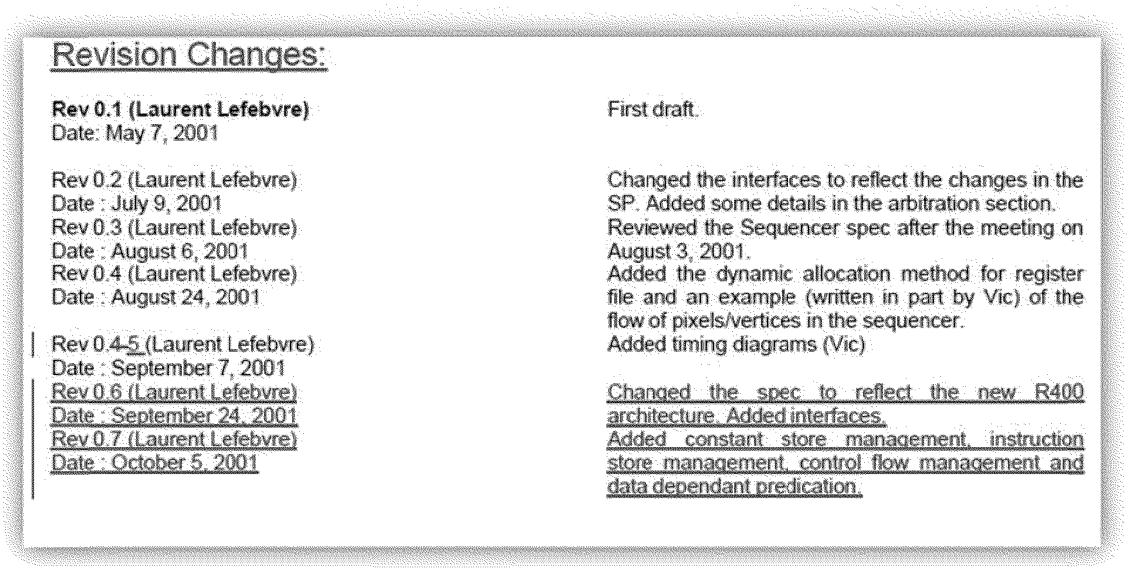
13. The author of the document manually enters the specification's title, version number, author, and overview. Each field appears on the cover page.

14. The cover page header includes the ORIGINATE DATE and the EDIT DATE. The ORIGINATE DATE is intended to be the date the original document (e.g., the first version within the depot folder) was created. The EDIT DATE is intended to be the date the document was last edited. The EDIT DATE is auto-populated using a macro, and this macro cannot be disabled. So every time

[redacted]

the document is opened, the EDIT DATE changes. This macro is a revision-control feature of Perforce. Further, both the EDIT DATE and the ORIGINATE DATE can be manually changed.

15. It is the regular practice of AMD (and its predecessor ATI) to record the date that a technical specification or testing record was edited. The record is kept on the document itself, as shown in a sample below.



Revision Changes:

Rev 0.1 (Laurent Lefebvre) Date: May 7, 2001	First draft.
Rev 0.2 (Laurent Lefebvre) Date : July 9, 2001	Changed the interfaces to reflect the changes in the SP. Added some details in the arbitration section.
Rev 0.3 (Laurent Lefebvre) Date : August 6, 2001	Reviewed the Sequencer spec after the meeting on August 3, 2001.
Rev 0.4 (Laurent Lefebvre) Date : August 24, 2001	Added the dynamic allocation method for register file and an example (written in part by Vic) of the flow of pixels/vertices in the sequencer. Added timing diagrams (Vic)
Rev 0.4-5 (Laurent Lefebvre) Date : September 7, 2001	
Rev 0.6 (Laurent Lefebvre) Date : September 24, 2001	Changed the spec to reflect the new R400 architecture. Added interfaces.
Rev 0.7 (Laurent Lefebvre) Date : October 5, 2001	Added constant store management, instruction store management, control flow management and data dependant predication.

See, e.g., Ex. 2013, p. 4.

C. Document Logs and Folder Histories Saved in Perforce

16. Some of the Exhibits, which I authenticate below, are document logs and folder histories. Document logs and folder histories are metadata files. These metadata files contain information relating to revision history of the depot files

[redacted]

(e.g., technical specifications) maintained in Perforce. Through document logs and folder histories, Perforce allows administrators to track edits, track who made the edits, and track when the edits were made. Metadata files are kept in the regular course of business.

17. In Perforce, there are two types of metadata files: (1) document logs; and (2) folder histories.

18. Document logs track each revision to the depot files. Each depot file has a corresponding document log. So, each document log tells the revision history of its corresponding file.

19. Perforce maintains certain information in document logs. For example, Perforce automatically saves the date a document was changed and the workspace that made the change. Further, for any edited file a user uploads to the system, the user is prompted to enter a description of the file or a brief description of the changes made to the file.

20. A sample document log is shown below. In this sample, seven revisions were uploaded. Various users uploaded the revisions on various dates.

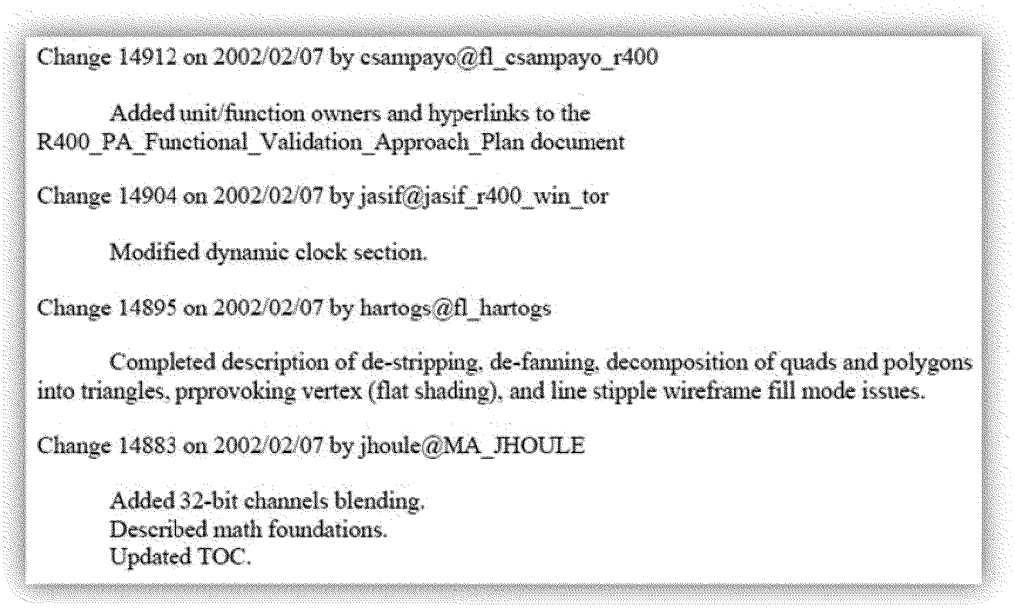
[redacted]

```
//depot/r400/arch/doc/chip/R400 Top Level Spec.DOC
... #7 change 3995 edit on 2001/07/05 by pmitchel@pmitchel_iris (binary+l)

        change file type to prevent simultaneous open for edit

... #6 change 3091 edit on 2001/05/24 by lseiler@ma_lseiler (binary)

        Updated RB and MC block diagrams

... #5 change 2950 edit on 2001/05/17 by smorein@smorein_r400 (binary)

        updated spec, finally checked in

... #4 change 2359 edit on 2001/04/26 by llefebvr@llefebvre_laptop_r400 (binary)

        updated top level spec to match RE and SC specs

... #3 change 2347 edit on 2001/04/25 by lseiler@ma_lseiler (binary)

        Added text about the RB and MC plus descriptions of some RB features

... #2 change 2314 edit on 2001/04/23 by smorein@smorein_r400 (binary)

        Updated area to new area estimate, post texture path changes
        checked in top level spec for larry to add to it

... #1 change 1741 add on 2001/03/15 by smorein@smorein_r400 (binary)

        adding first real version of top level spec.
```

Ex. 2046, p. 1.

21. Folder histories list the same information as the document logs. The difference is that a folder history compiles all the document log files saved within the folder. The information in the folder history file is organized by date. A sample of a folder history file is shown below.

[redacted]



Change 14912 on 2002/02/07 by csampayo@fl_csampayo_r400

Added unit/function owners and hyperlinks to the R400_PA_Functional_Validation_Approach_Plan document

Change 14904 on 2002/02/07 by jasif@jasif_r400_win_tor

Modified dynamic clock section.

Change 14895 on 2002/02/07 by hartogs@fl_hartogs

Completed description of de-stripping, de-fanning, decomposition of quads and polygons into triangles, prprovoking vertex (flat shading), and line stipple wireframe fill mode issues.

Change 14883 on 2002/02/07 by jhoule@MA_JHOULE

Added 32-bit channels blending.
Described math foundations.
Updated TOC.

Ex. 2050, p. 377.

III. AUTHENTICATION OF EXHIBITS

22. As part of my responsibilities within the AMD law department, I retrieved Exhibits 2007 through 2104, 2107, and 2108. My responsibilities include, among other things, supporting the AMD law department on various intellectual-property matters. I am authenticating these Exhibits. The exhibits include: (1) technical specifications; (2) source code files; (3) PowerPoint presentations; and (4) metadata, which include file histories and document logs.

A. Authentication of Technical Specifications

23. Exhibits 2007 through 2042 are technical specification documents. I downloaded these documents directly from the Perforce database. The "date" for

[redacted]

each of these documents can come from one of three places: (1) the document itself; (2) the corresponding document log in Perforce; or (3) the submit date shown on the Perforce interface.

24. The date kept on the document itself is occasionally different than the corresponding document log date and the submit date shown in Perforce. The dates can differ, for example, if the user had a document checked out for several days (intentionally or inadvertently). The dates can also differ when a user works on a version over several days. But the submit date, whether through the document logs or the Perforce interface, is the last date any revisions were made.

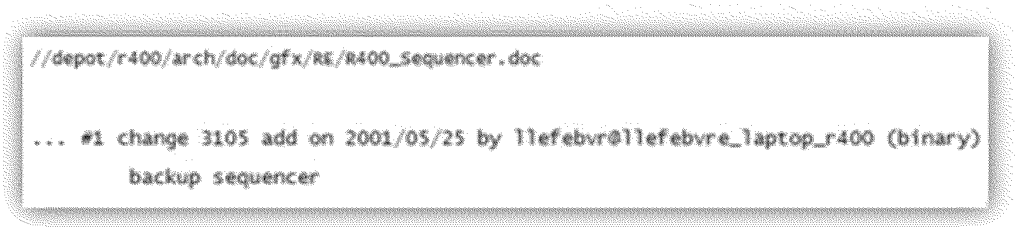
25. I discuss Exhibits 2007 through 2042 below.

1. Exhibit 2007—R400 Sequencer Specification (Version 0.1)

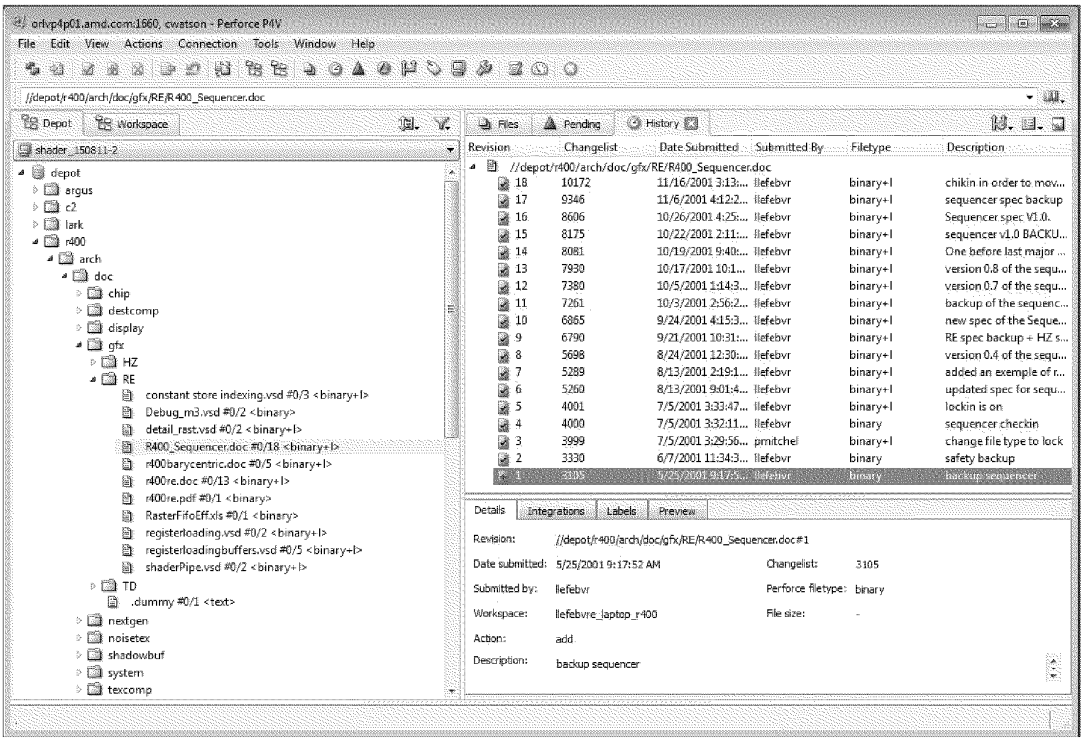
26. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre created this document on May 7, 2001. *See* Ex. 2007, p. 2.

[redacted]

27. This document's corresponding file log shows that Laurent Lefebvre checked in this document on May 25, 2001 under the file name R400_Sequencer.doc. Ex. 2043, pp. 1, 2.

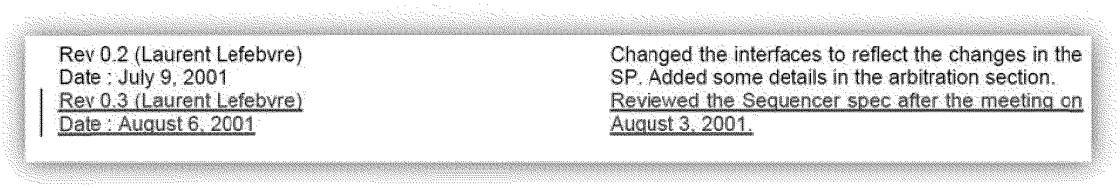


28. In the Perforce database, Exhibit 2007 is the first revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is May 25, 2001.



2. R400 Sequencer Specification (Version 0.2)

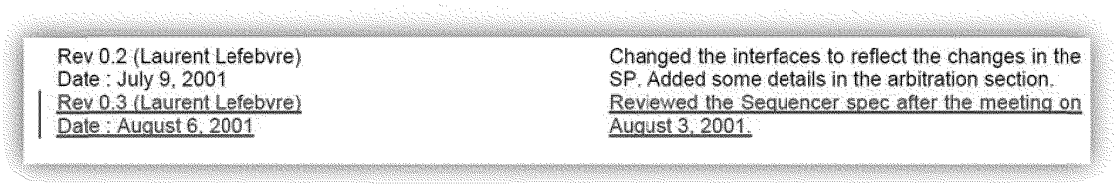
29. I looked for Version 0.2 of the Sequencer Specification in Perforce. I did not locate Version 0.2. Version 0.2 is noted in Version 0.3 as revised on July 9, 2001. *See* Ex. 2009, p. 2.



[redacted]

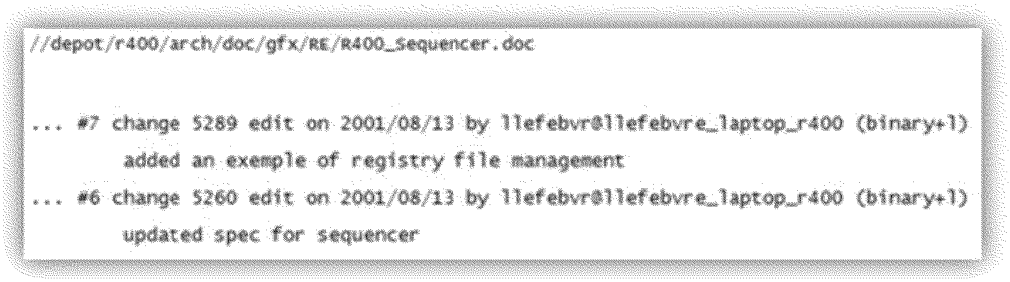
3. Exhibit 2009—R400 Sequencer Specification (Version 0.3)

30. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on August 6, 2001. *See* Ex. 2009, p. 2.



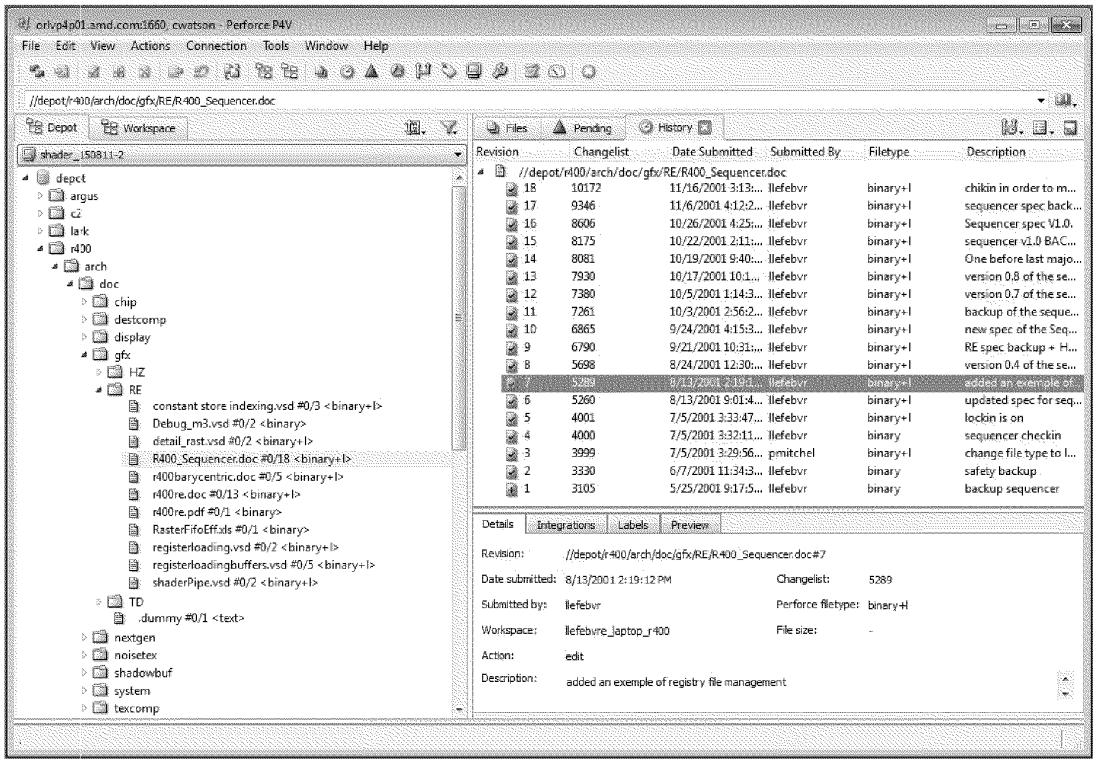
Rev 0.2 (Laurent Lefebvre) Date : July 9, 2001	Changed the interfaces to reflect the changes in the SP. Added some details in the arbitration section.
Rev 0.3 (Laurent Lefebvre) Date : August 6, 2001	Reviewed the Sequencer spec after the meeting on August 3, 2001.

31. This document's corresponding file log shows that Laurent Lefebvre checked in this document on August 13, 2001. Ex. 2043, pp. 1, 2.



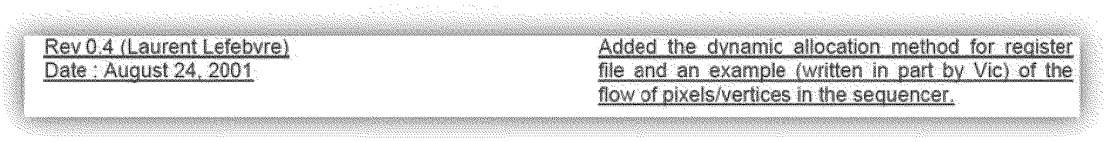
```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #7 change 5289 edit on 2001/08/13 by llefebvr@llefebvre_laptop_r400 (binary+l)
        added an exemple of registry file management
... #6 change 5260 edit on 2001/08/13 by llefebvr@llefebvre_laptop_r400 (binary+l)
        updated spec for sequencer
```

32. In the Perforce database, Exhibit 2009 is the seventh revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is August 13, 2001.



4. Exhibit 2010—R400 Sequencer Specification (Version 0.4)

33. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on August 24, 2001. *See* Ex. 2010, p. 3.

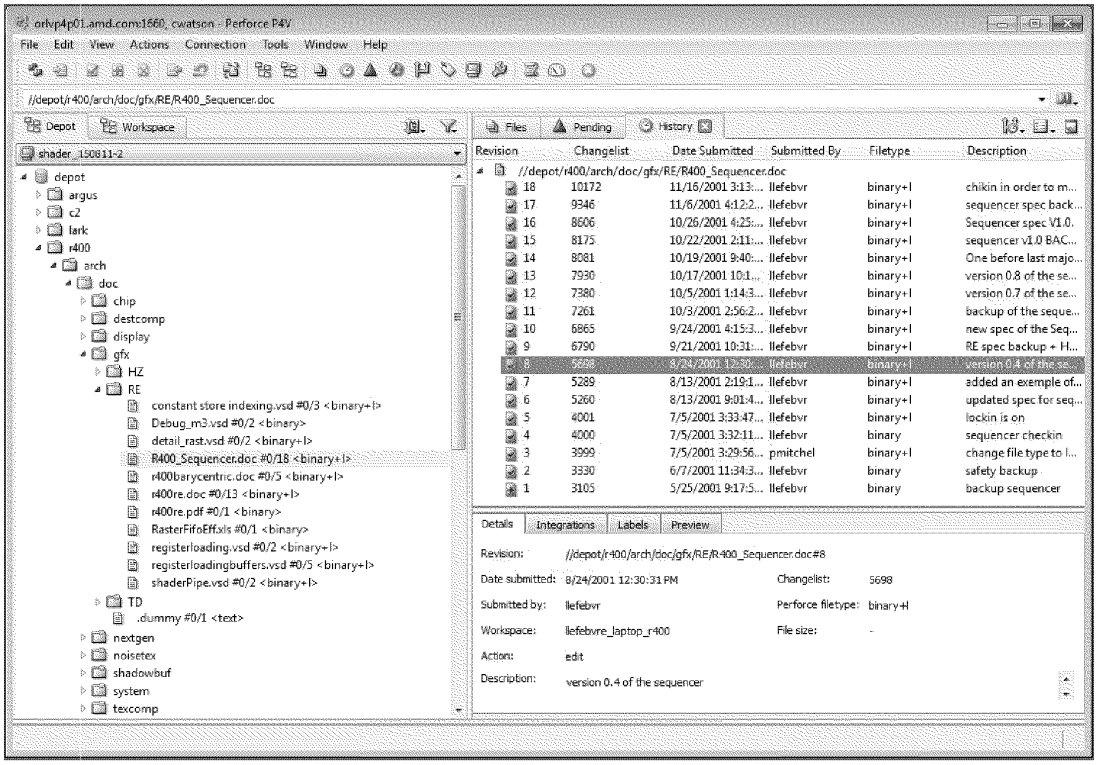


34. This document's corresponding file log shows that Laurent Lefebvre checked in this document on August 24, 2001. Ex. 2043, pp. 1-2.

[redacted]

```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #8 change 5698 edit on 2001/08/24 by llefebvr@llefebvre_laptop_r400 (binary+l)
       version 0.4 of the sequencer
```

35. In the Perforce database, Exhibit 2010 is the eighth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is August 24, 2001.

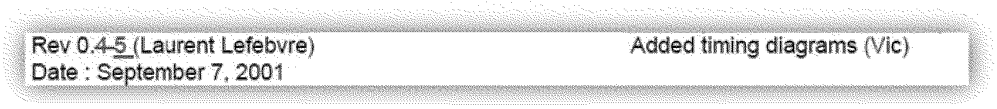


5. Exhibit 2011—R400 Sequencer Specification (Version 0.5)

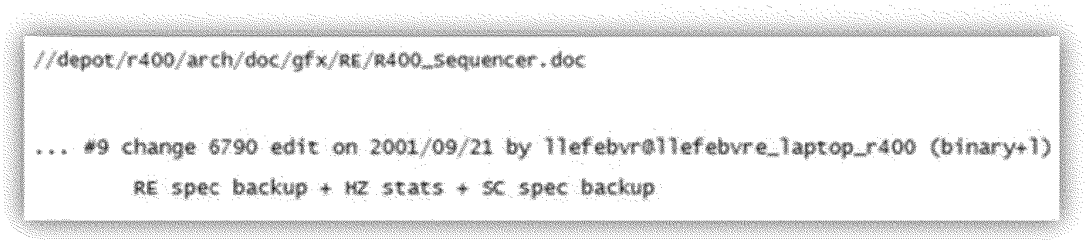
36. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that

[redacted]

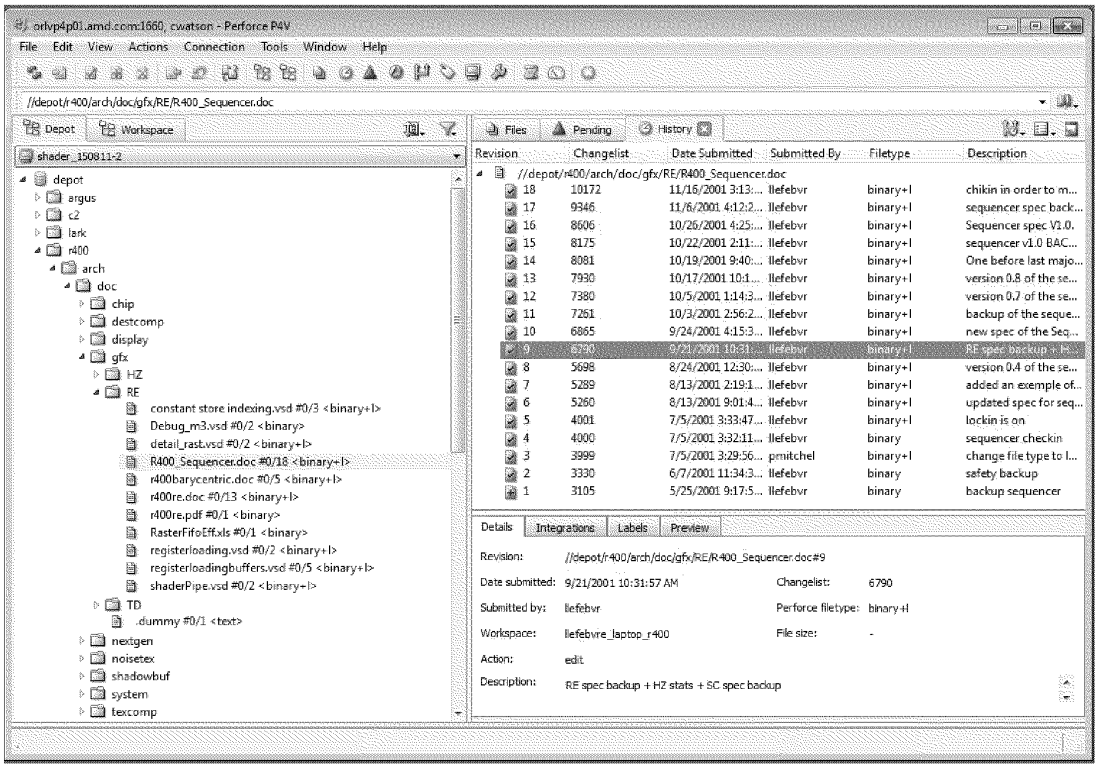
Laurent Lefebvre revised this document on September 7, 2001. *See* Ex. 2011, p. 3; Ex. 2012, p. 3 (editing "0.4" to "0.5").



37. This document's corresponding file log shows that Laurent Lefebvre checked in this document on September 21, 2001. Ex. 2043, p. 1.

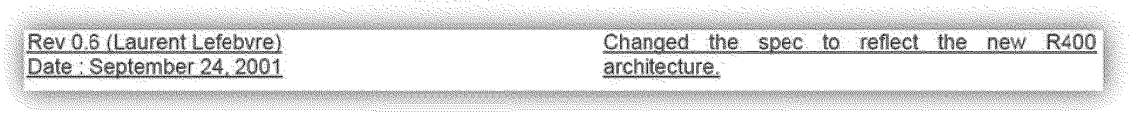


38. In the Perforce database, Exhibit 2011 is the ninth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is September 21, 2001.



6. *Exhibit 2012—R400 Sequencer Specification (Version 0.6)*

39. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. It appears that Laurent Lefebvre revised this document on September 24, 2001. *See* Ex. 2012, p. 3.

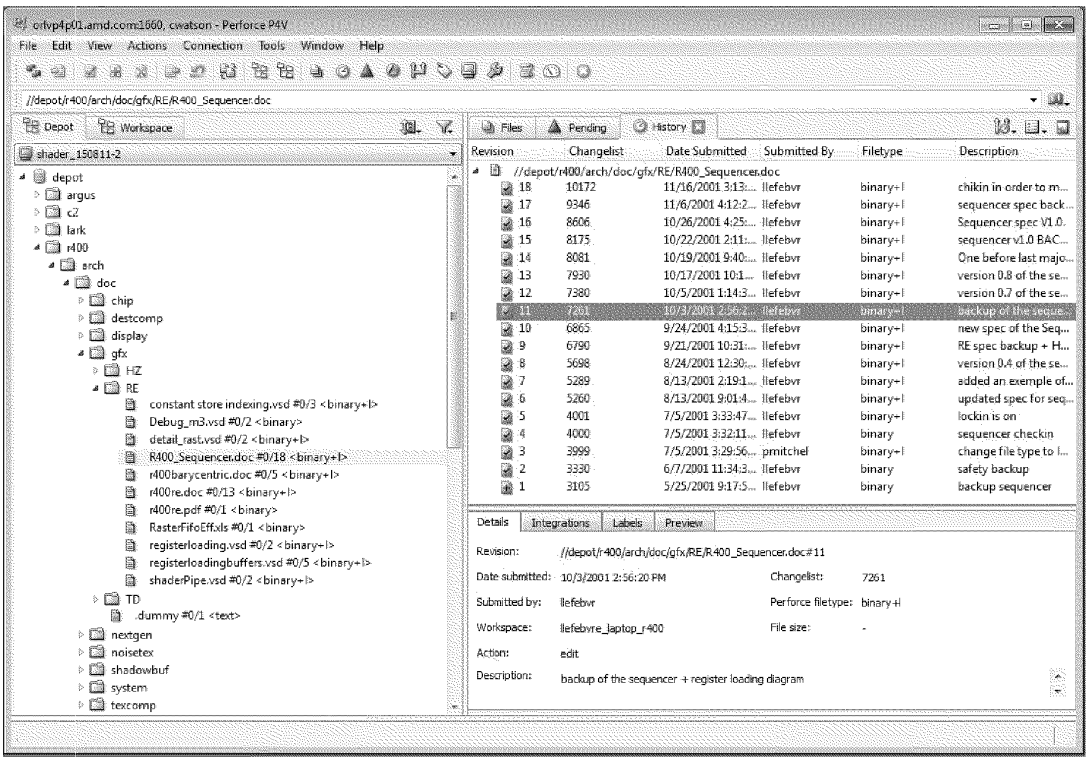


40. This document's corresponding file log shows that Laurent Lefebvre checked in this document on September 24, 2001 and October 3, 2001. Ex. 2043, p. 1.

[redacted]

```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #11 change 7261 edit on 2001/10/03 by llefebvr@llefebvre_laptop_r400 (binary+l)
        backup of the sequencer + register loading diagram
... #10 change 6865 edit on 2001/09/24 by llefebvr@llefebvre_laptop_r400 (binary+l)
        new spec of the Sequencer.
```

41. In the Perforce database, Exhibit 2012 is the eleventh revision of the R400 Sequencer Specification. As shown in the screenshot below, submit date for this revision is October 3, 2001.



[redacted]

7. Exhibit 2013—R400 Sequencer Specification (Version 0.7)

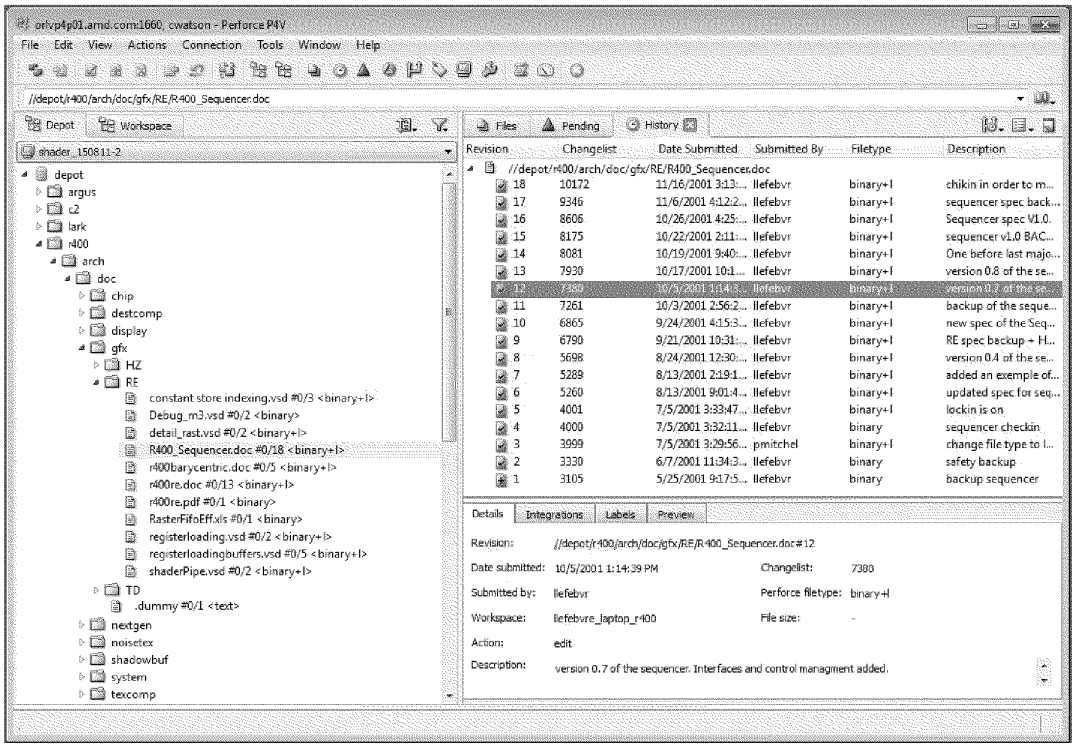
42. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on October 5, 2001. *See* Ex. 2013, p. 4.

Rev 0.7 (Laurent Lefebvre) Date : October 5, 2001	Added constant store management, instruction store management, control flow management and data dependant predication.

43. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 5, 2001. Ex. 2043, p. 1.

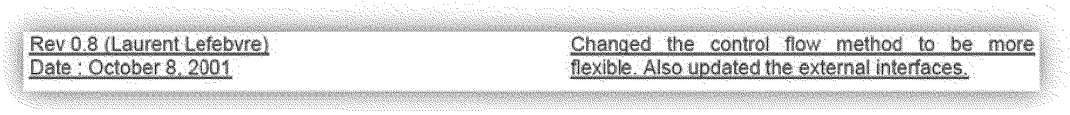
```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #12 change 7380 edit on 2001/10/05 by llefebvr@llefebvre_laptop_r400 (binary+l)
        version 0.7 of the sequencer. Interfaces and control managment added.
```

44. In the Perforce database, Exhibit 2013 is the twelfth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 5, 2001.



8. Exhibit 2014—R400 Sequencer Specification (Version 0.8)

45. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on October 8, 2001. *See* Ex. 2014, p. 3.



46. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 17, 2001. Ex. 2043, p. 1.

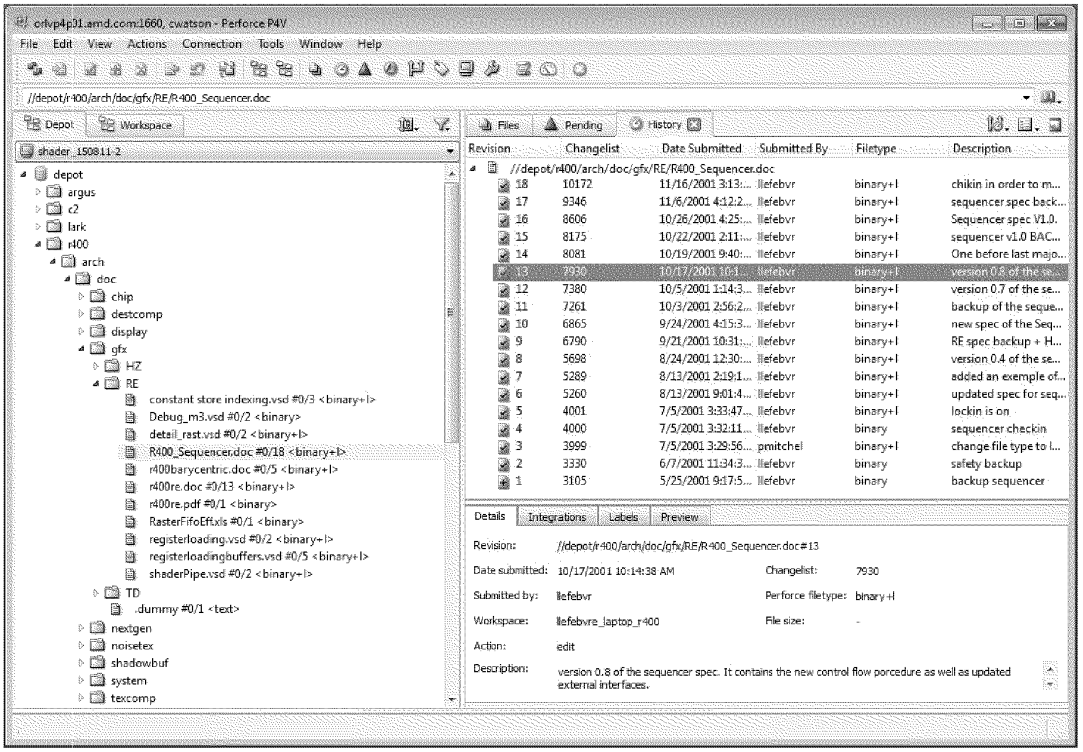
[redacted]

//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #13 change 7930 edit on 2001/10/17 by llefebvr@llefebvre_laptop_r400 (binary+l)

version 0.8 of the sequencer spec. It contains the new control flow porcedure as well as updated external interfaces.

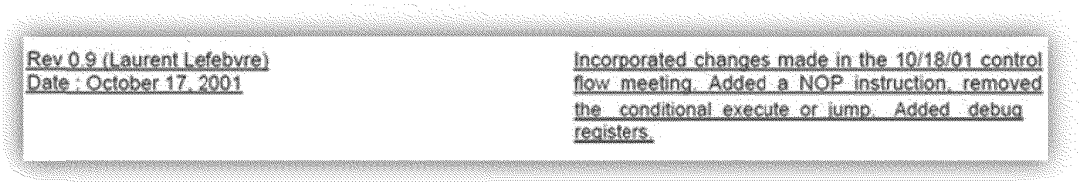
47. In the Perforce database, Exhibit 2014 is the thirteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 17, 2001.



[redacted]

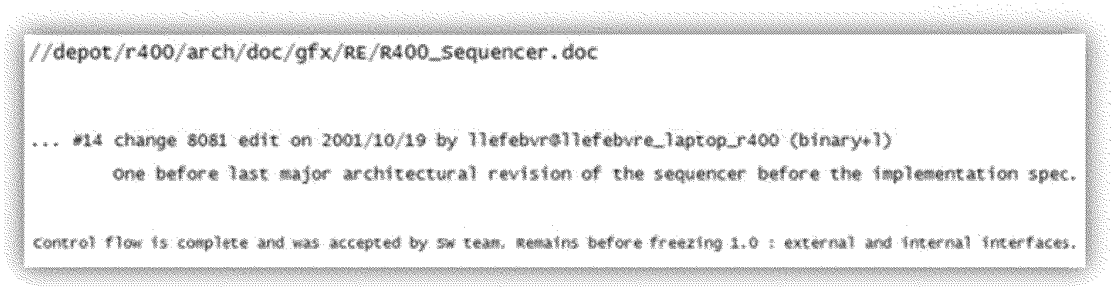
9. Exhibit 2015—R400 Sequencer Specification (Version 0.9)

48. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on October 17, 2001. *See* Ex. 2015, pp. 2-3.



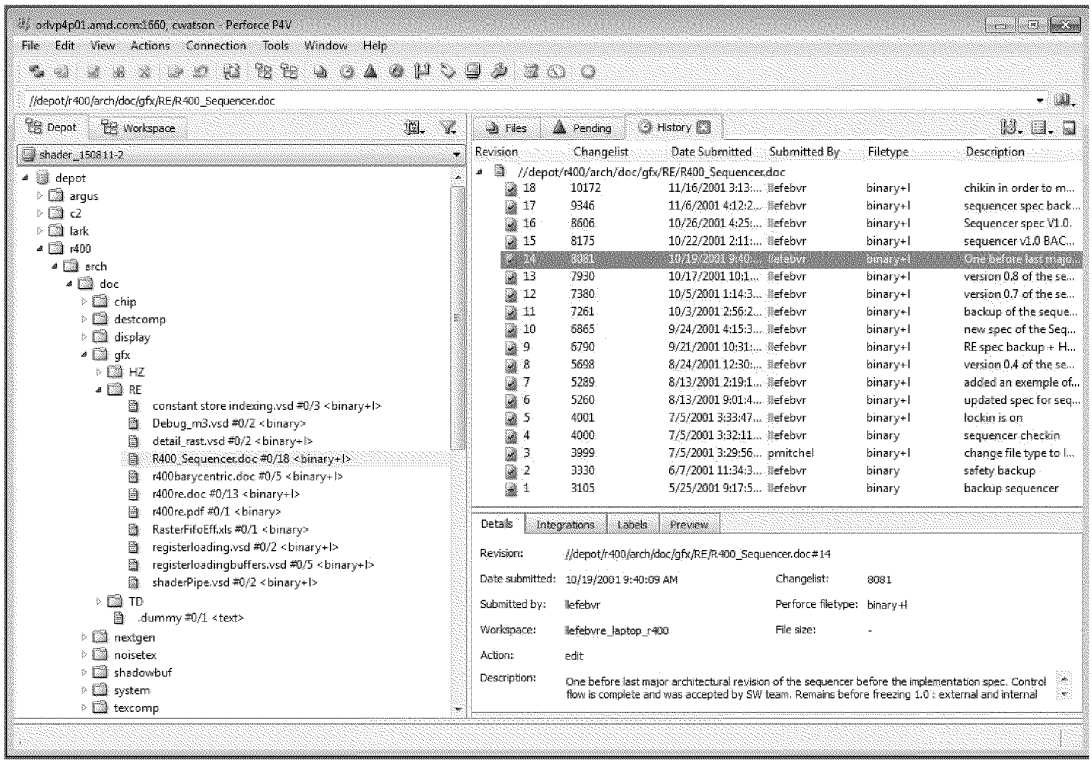
Rev 0.9 (Laurent Lefebvre) Date : October 17, 2001	Incorporated changes made in the 10/18/01 control flow meeting. Added a NOP instruction, removed the conditional execute or jump. Added debug registers.

49. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 19, 2001. Ex. 2043, p. 1.



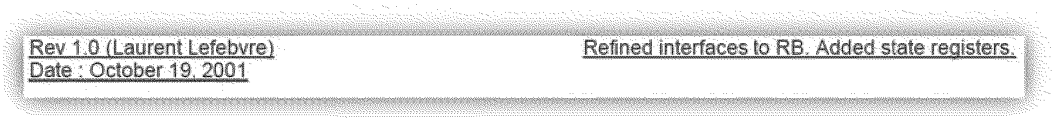
```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #14 change 8081 edit on 2001/10/19 by llefebvr@llefebvre_laptop_r400 (binary+l)
        One before last major architectural revision of the sequencer before the implementation spec.

control flow is complete and was accepted by SW team. Remains before freezing 1.0 : external and internal interfaces.
```

50. In the Perforce database, Exhibit 2015 is the fourteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 19, 2001.



10. Exhibit 2016—R400 Sequencer Specification (Version 1.0)

51. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on October 19, 2001. *See* Ex. 2016, p. 3.

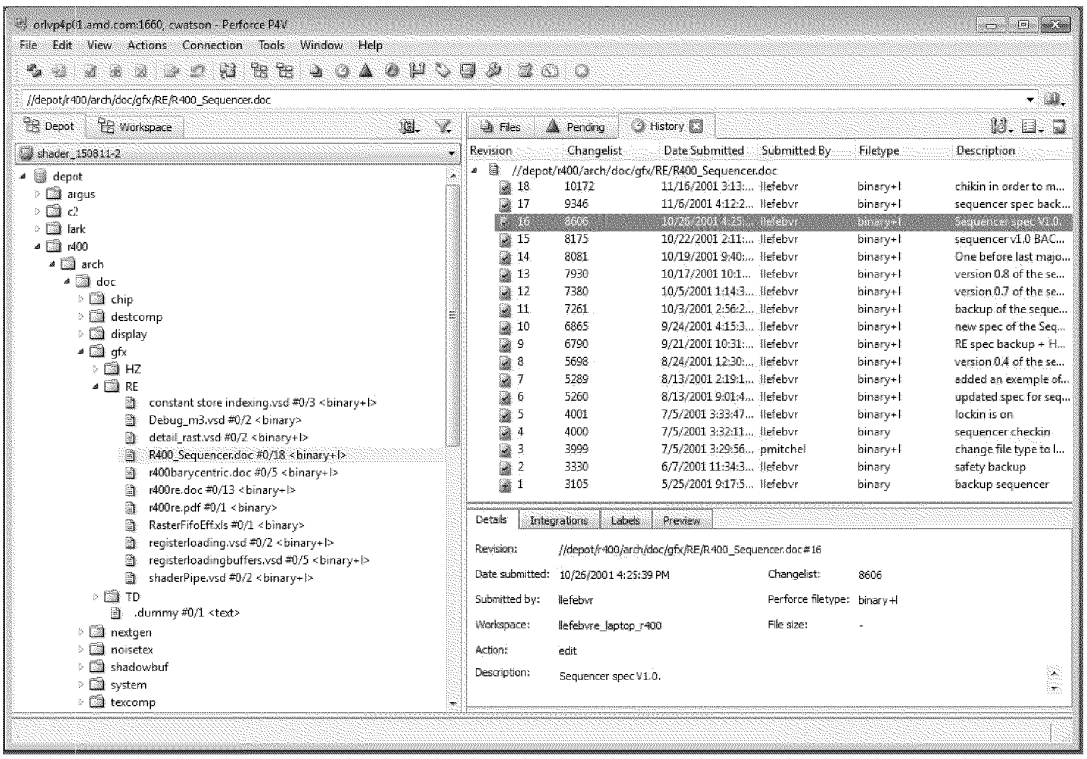


52. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 22, 2001 and October 26, 2001. Ex. 2043, p. 1.

[redacted]

```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #16 change 8606 edit on 2001/10/26 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Sequencer spec V1.0.
... #15 change 8175 edit on 2001/10/22 by llefebvr@llefebvre_laptop_r400 (binary+l)
        sequencer v1.0 BACKUP ONLY not yet complete.
```

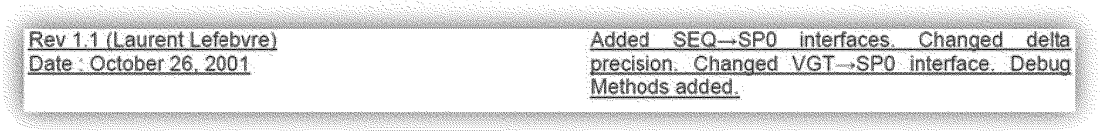
53. In the Perforce database, Exhibit 2016 is the sixteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 26, 2001.



[redacted]

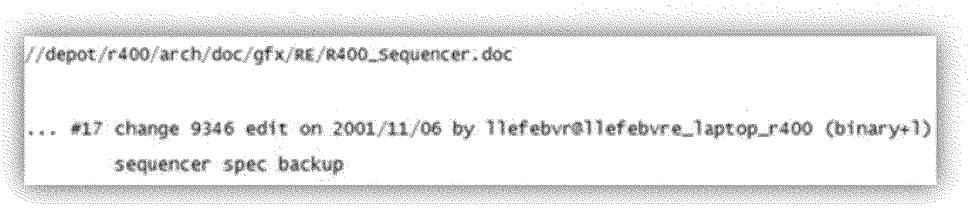
11. Exhibit 2017—R400 Sequencer Specification (Version 1.1)

54. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on October 26, 2001. *See* Ex. 2017, p. 4.



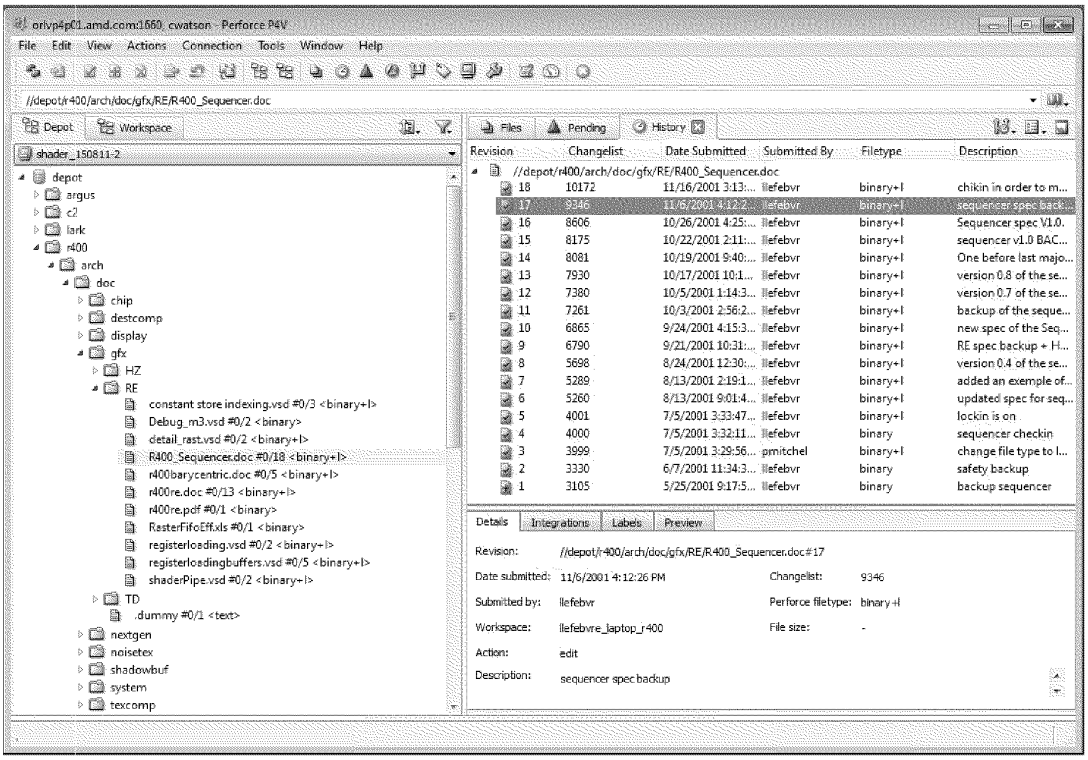
Rev 1.1 (Laurent Lefebvre) Date : October 26, 2001	Added SEQ→SP0 interfaces. Changed delta precision. Changed VGT→SP0 interface. Debug Methods added.

55. This document's corresponding file log shows that Laurent Lefebvre checked in this document on November 6, 2001. Ex. 2043, p. 1.



```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc

... #17 change 9346 edit on 2001/11/06 by llefebvr@llefebvre_laptop_r400 (binary+l)
        sequencer spec backup
```

56. In the Perforce database, Exhibit 2017 is the seventeenth revision of the R400 Sequencer Specification. As shown in the screenshot below, submit date for this revision is November 6, 2001.



12. Exhibit 2018—R400 Sequencer Specification (Version 1.2)

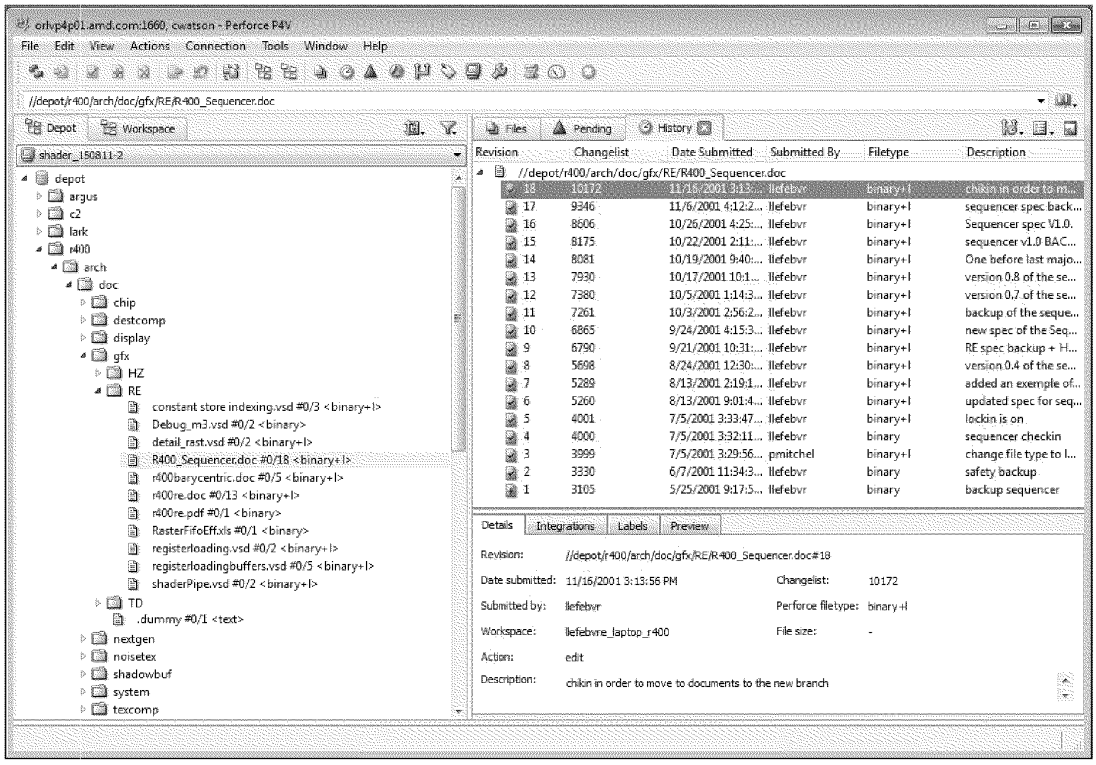
57. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/arch/doc/gfx/RE/. From this document, it appears that Laurent Lefebvre revised this document on November 16, 2001. *See* Ex. 2018, p. 3.

58. This document's corresponding file log shows that Laurent Lefebvre checked in this document on November 16, 2001. Ex. 2043, p. 1.

[redacted]

```
//depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc
... #18 change 10172 edit on 2001/11/16 by llefebvr@llefebvre_laptop_r400 (binary+l)

        chikin in order to move to documents to the new branch
```

59. In the Perforce database, Exhibit 2018 is the eighteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is November 16, 2001.

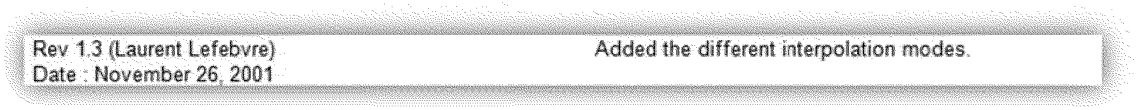


13. R400 Sequencer Specification (Version 1.3)

60. I looked for Version 1.3 of the Sequencer Specification in Perforce. I did not locate Version 1.3. Version 1.3 is noted in Version 1.4 as revised on

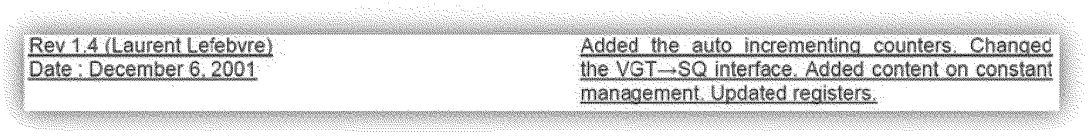
[redacted]

November 26, 2001. *See* Ex. 2020, p. 5.

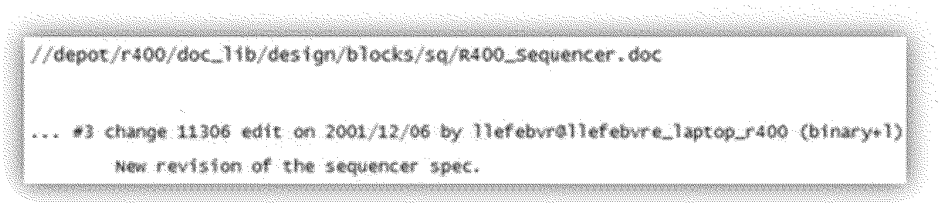


14. Exhibit 2020—R400 Sequencer Specification (Version 1.4)

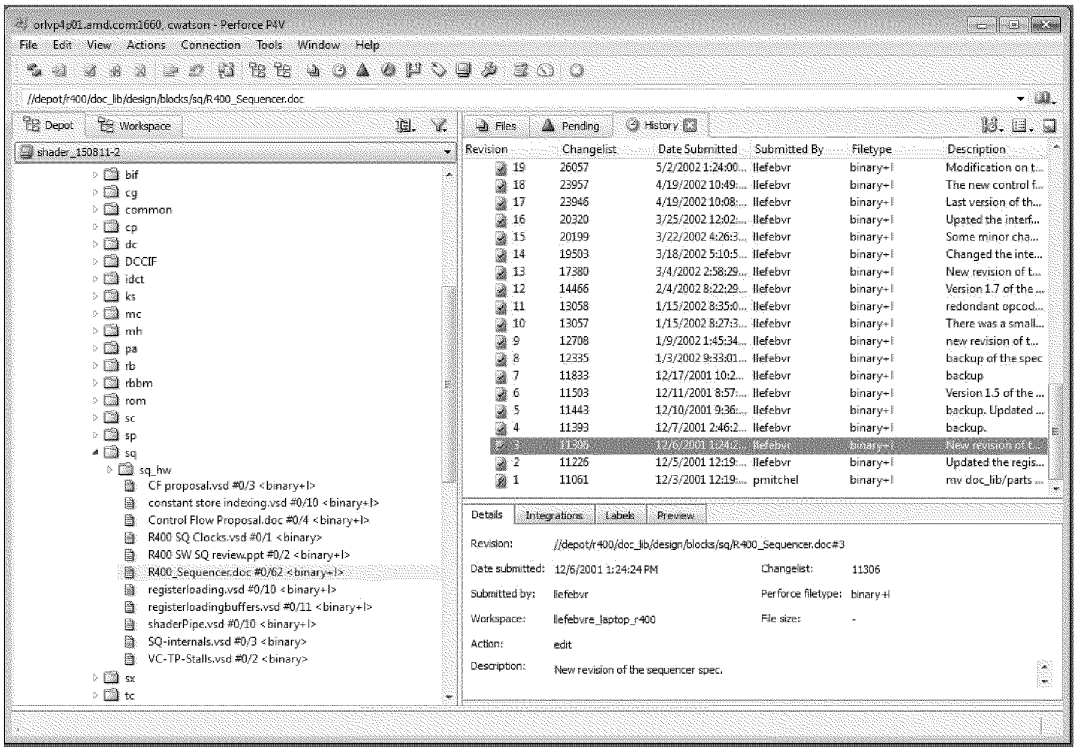
61. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on December 6, 2001. *See* Ex. 2020, p. 5.



62. This document's corresponding file log shows that Laurent Lefebvre checked in this document on December 6, 2001. Ex. 2044, pp. 1, 6.



63. In the Perforce database, Exhibit 2020 is the third revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is December 6, 2001.



15. Exhibit 2021—R400 Sequencer Specification (Version 1.5)

64. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on December 11, 2001. *See* Ex. 2021, p. 7.

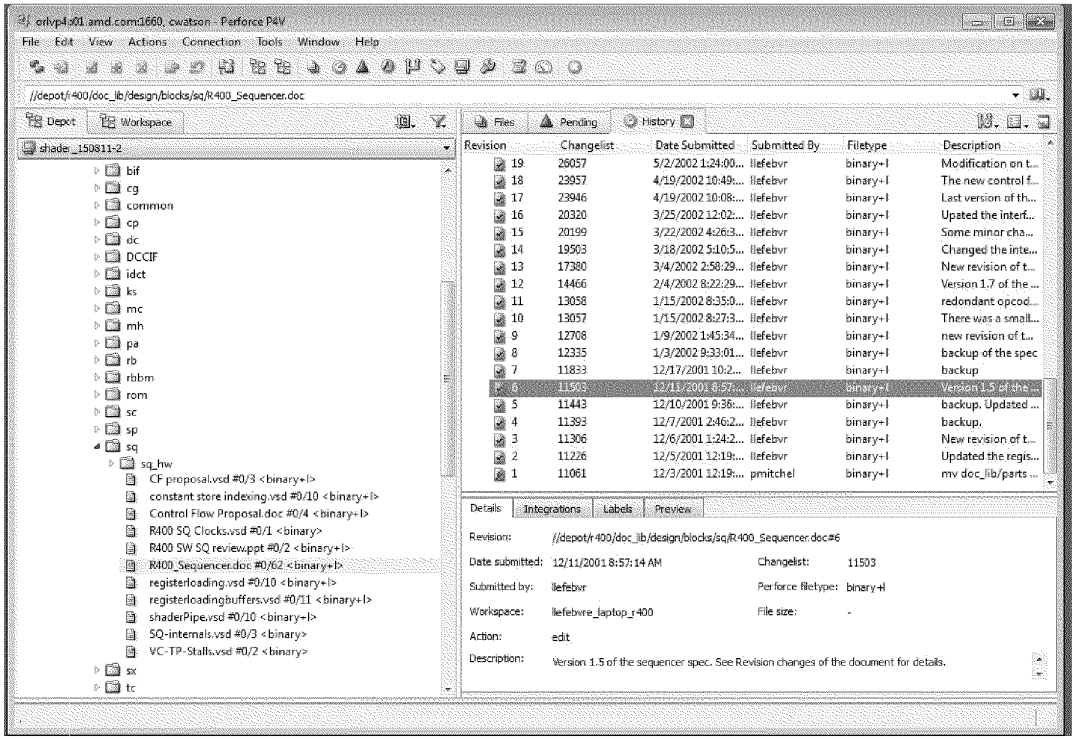
Rev 1.5 (Laurent Lefebvre) Date : December 11, 2001	Removed from the spec all interfaces that weren't directly tied to the SQ. Added explanations on constant management. Added PA→SQ synchronization fields and explanation.

65. This document's corresponding file log shows that Laurent Lefebvre checked in this document on December 11, 2001. Ex. 2044, pp. 1, 6.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #6 change 11503 edit on 2001/12/11 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Version 1.5 of the sequencer spec. See Revision changes of the document for details.
```

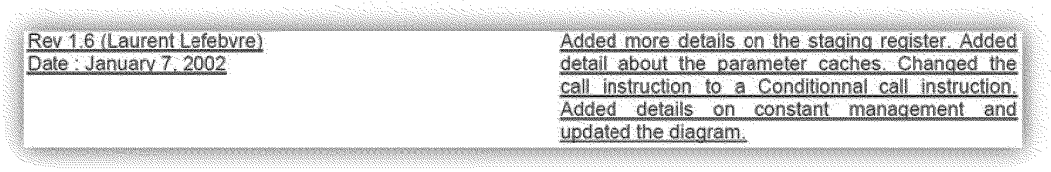
66. In the Perforce database, Exhibit 2021 is the sixth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is December 11, 2001.



[redacted]

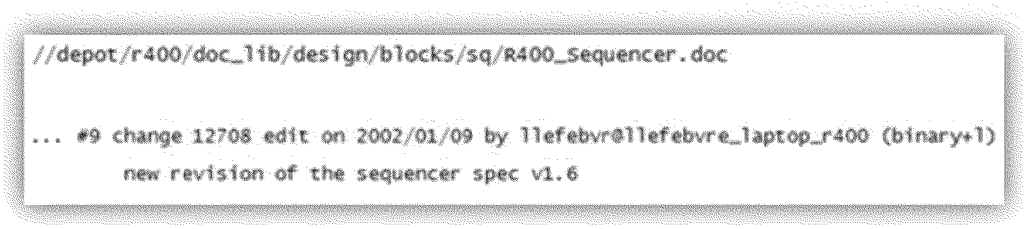
16. Exhibit 2022—R400 Sequencer Specification (Version 1.6)

67. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on January 7, 2002. *See* Ex. 2022, p. 5.



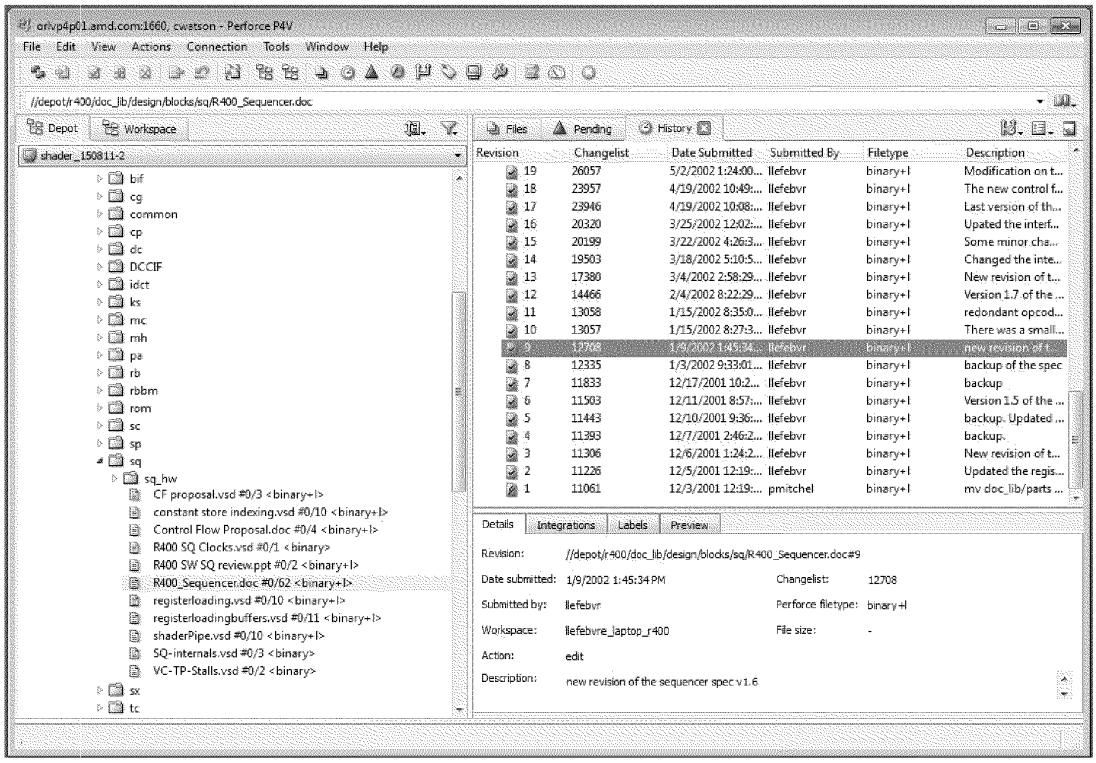
Rev 1.6 (Laurent Lefebvre) Date : January 7, 2002	Added more details on the staging register. Added detail about the parameter caches. Changed the call instruction to a Conditionnal call instruction. Added details on constant management and updated the diagram.

68. This document's corresponding file log shows that Laurent Lefebvre checked in this document on January 9, 2002. Ex. 2044, pp. 1, 5-6.



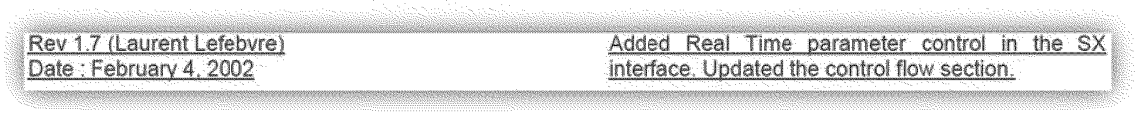
```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #9 change 12708 edit on 2002/01/09 by llefebvr@llefebvre_laptop_r400 (binary+l)
        new revision of the sequencer spec v1.6
```

69. In the Perforce database, Exhibit 2022 is the ninth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is January 9, 2002.



17. Exhibit 2023—R400 Sequencer Specification (Version 1.7)

70. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on February 4, 2002. *See* Ex. 2023, p. 6.

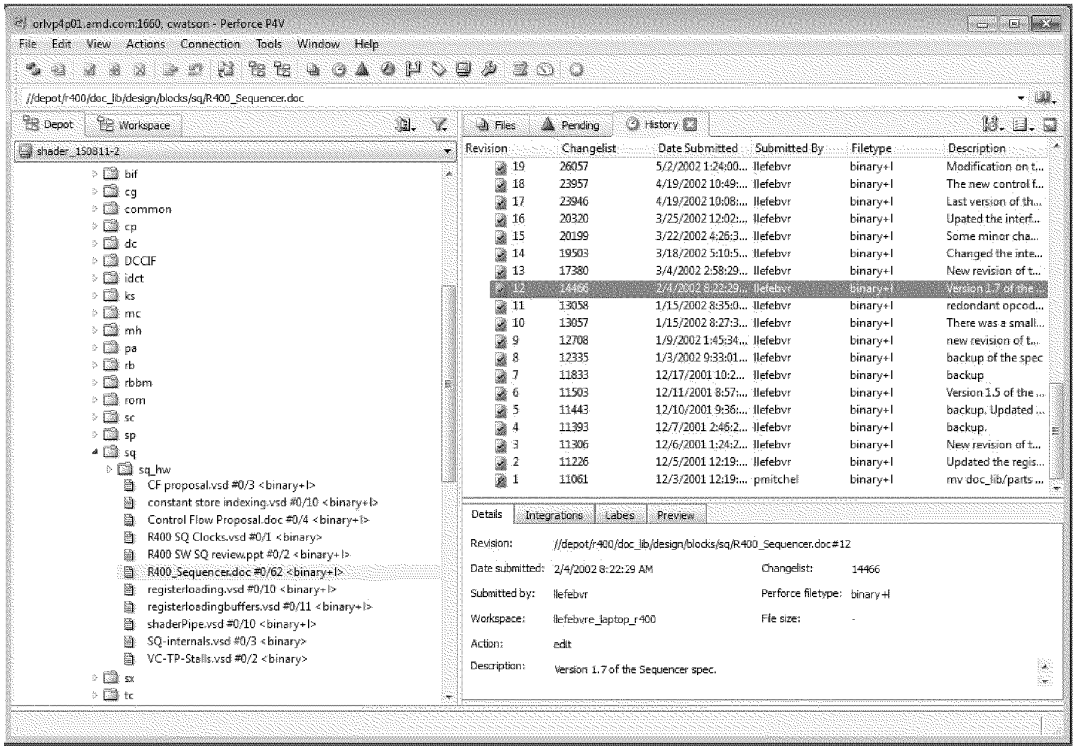


71. This document's corresponding file log shows that Laurent Lefebvre checked in this document on February 4, 2002. Ex. 2044, pp. 1, 5.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #12 change 14466 edit on 2002/02/04 by llefebvr@llefebvre_laptop_r400 (binary+l)
        version 1.7 of the Sequencer spec.
```

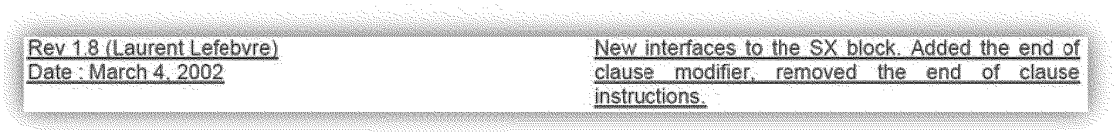
72. In the Perforce database, Exhibit 2023 is the twelfth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is February 4, 2002.



[redacted]

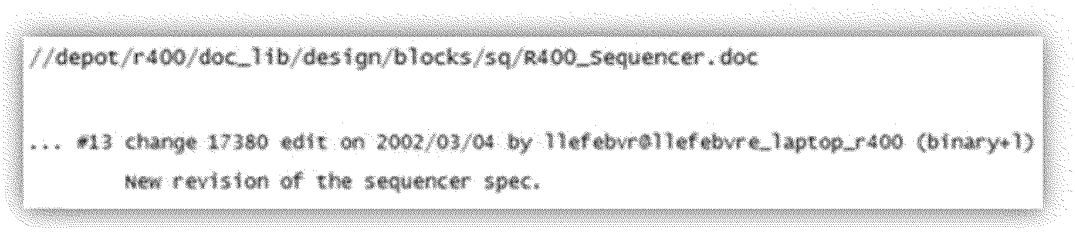
18. Exhibit 2024—R400 Sequencer Specification (Version 1.8)

73. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on March 4, 2002. *See* Ex. 2024, p. 5.



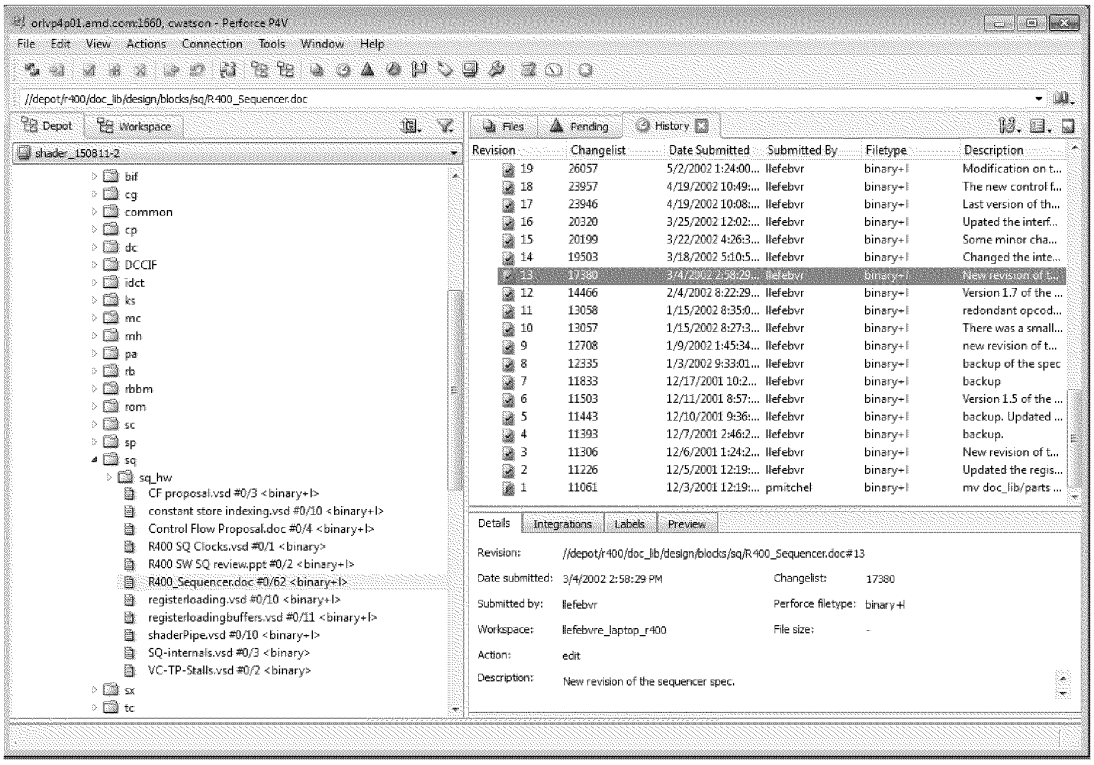
Rev 1.8 (Laurent Lefebvre) Date : March 4, 2002	New interfaces to the SX block. Added the end of clause modifier, removed the end of clause instructions.

74. This document's corresponding file log shows that Laurent Lefebvre checked in this document on March 4, 2002. Ex. 2044, pp. 1, 5.



```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #13 change 17380 edit on 2002/03/04 by llefebvr@llefebvre_laptop_r400 (binary+l)
        New revision of the sequencer spec.
```

75. In the Perforce database, Exhibit 2024 is the thirteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is March 4, 2002.



19. Exhibit 2025—R400 Sequencer Specification (Version 1.9)

76. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on March 18, 2002. *See* Ex. 2025, p. 7; Ex. 2026, p. 7 (adding a March 18, 2002 revision date).

[redacted]

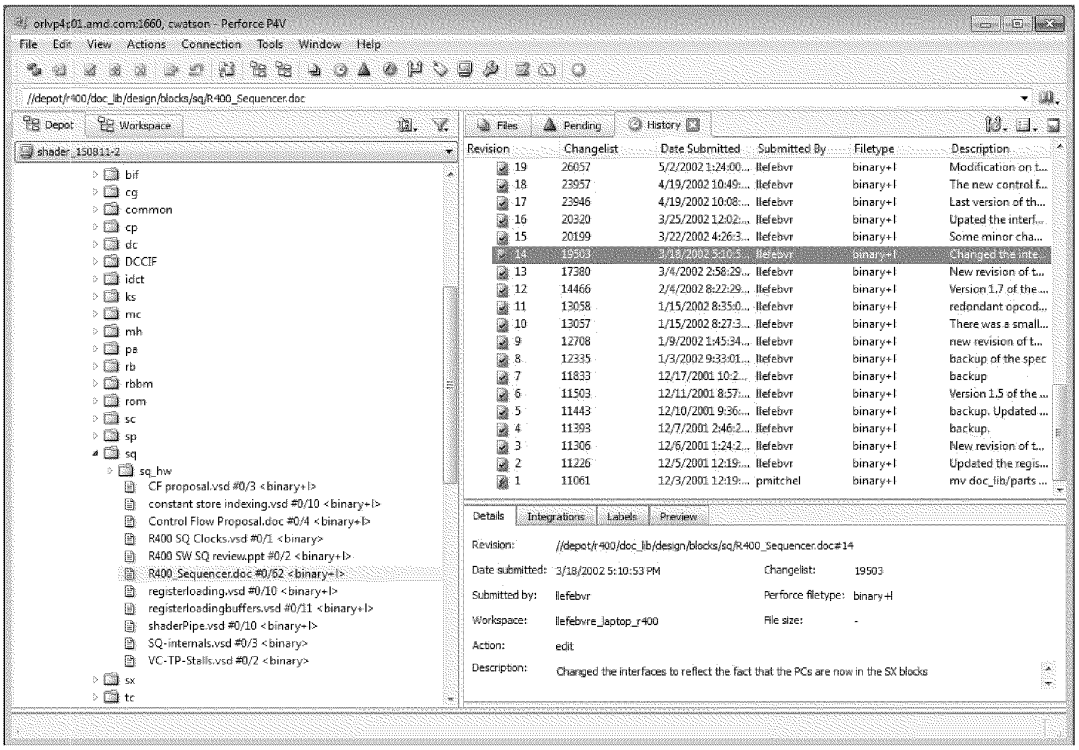
Rev 1.9 (Laurent Lefebvre) Date :	Rearangement of the CF instruction bits in order to ensure byte alignement

Rev 1.9 (Laurent Lefebvre) Date : March 18, 2002	Rearangement of the CF instruction bits in order to ensure byte alignement.

77. This document's corresponding file log shows that Laurent Lefebvre checked in this document on March 18, 2002. Ex. 2044, pp. 1, 5.

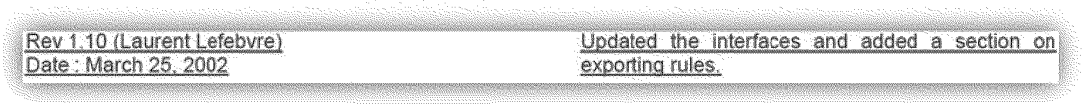
```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc


... #14 change 19503 edit on 2002/03/18 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Changed the interfaces to reflect the fact that the PCs are now in the SX blocks
```

78. In the Perforce database, Exhibit 2025 is the fourteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is March 18, 2002.



20. Exhibit 2026—R400 Sequencer Specification (Version 1.10)

79. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on March 25, 2002. *See* Ex. 2026, p. 7.

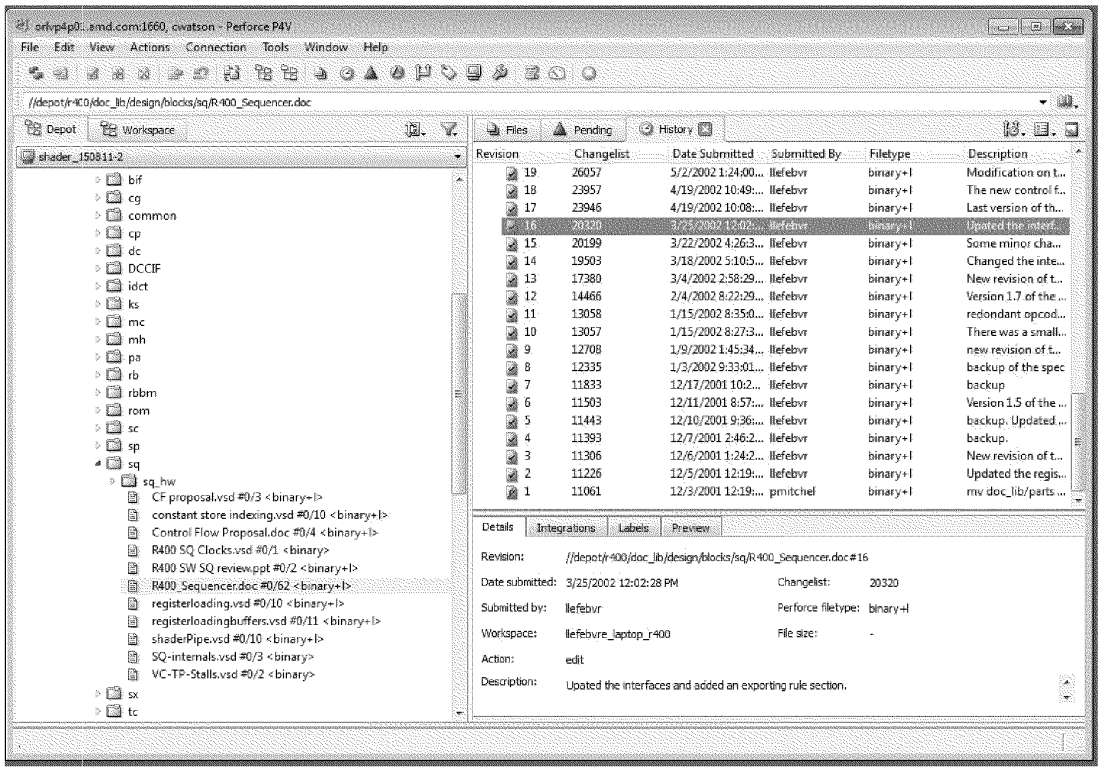


80. This document's corresponding file log shows that Laurent Lefebvre checked in this document on March 25, 2002. Ex. 2044, pp. 1, 5.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #16 change 20320 edit on 2002/03/25 by llefebvr@llefebvre_laptop_r400 (binary+l)
        upated the interfaces and added an exporting rule section.
```

81. In the Perforce database, Exhibit 2026 is the sixteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is March 25, 2002.



21. Exhibit 2027—R400 Sequencer Specification (Version 1.11)

82. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears

that Laurent Lefebvre revised this document on April 19, 2002. *See* Ex. 2027, p. 7; Ex. 2028, p. 5 (adding a April 19, 2002 revision date).

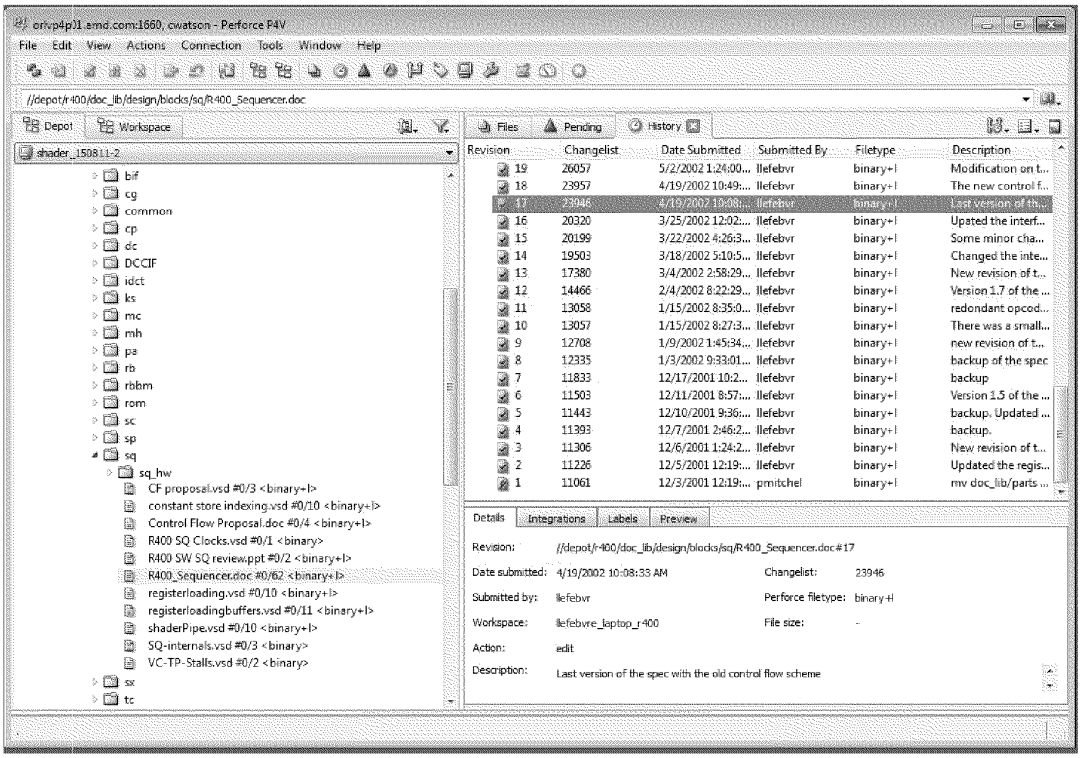
Rev 1.11 (Laurent Lefebvre) Date :	Added CP state report interface. Last version of the spec with the old control flow scheme

Rev 1.11 (Laurent Lefebvre) Date : April 19, 2002	Added CP state report interface. Last version of the spec with the old control flow scheme

83. This document's corresponding file log shows that Laurent Lefebvre checked in this document on April 19, 2002. Ex. 2044, pp. 1, 5.

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #17 change 23946 edit on 2002/04/19 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Last version of the spec with the old control flow scheme
```

84. In the Perforce database, Exhibit 2027 is the seventeenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is April 19, 2002.



22. Exhibit 2028—R400 Sequencer Specification (Version 2.0)

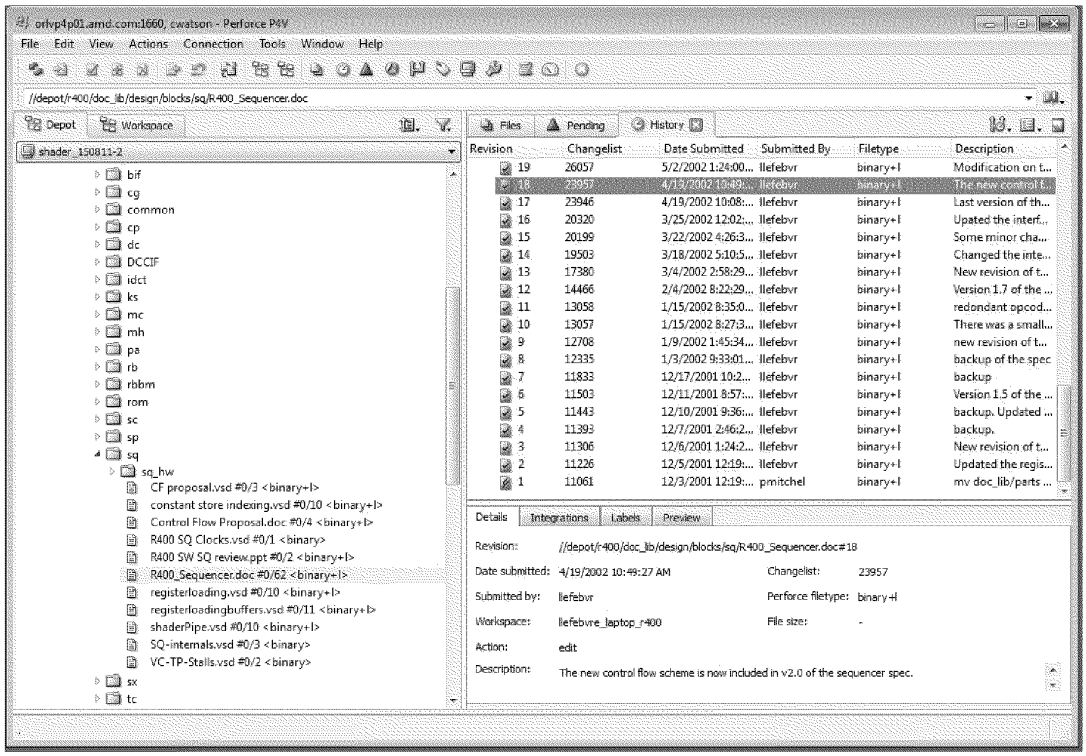
85. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on April 19, 2002. *See* Ex. 2028, p. 5.

86. This document's corresponding file log shows that Laurent Lefebvre checked in this document on April 19, 2002. Ex. 2044, pp. 1, 5.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #18 change 23957 edit on 2002/04/19 by llefebvr@llefebvre_laptop_r400 (binary+l)
        The new control flow scheme is now included in v2.0 of the sequencer spec.
```

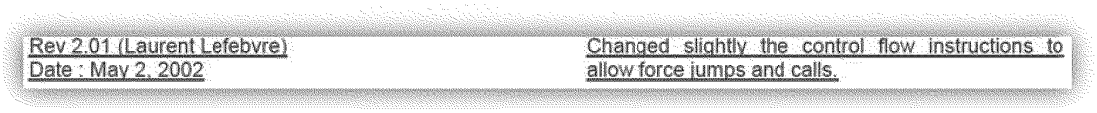
87. In the Perforce database, Exhibit 2028 is the eighteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is April 19, 2002.



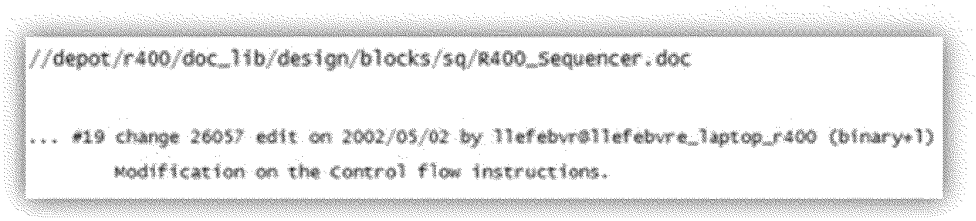
[redacted]

23. Exhibit 2029—R400 Sequencer Specification (Version 2.1)

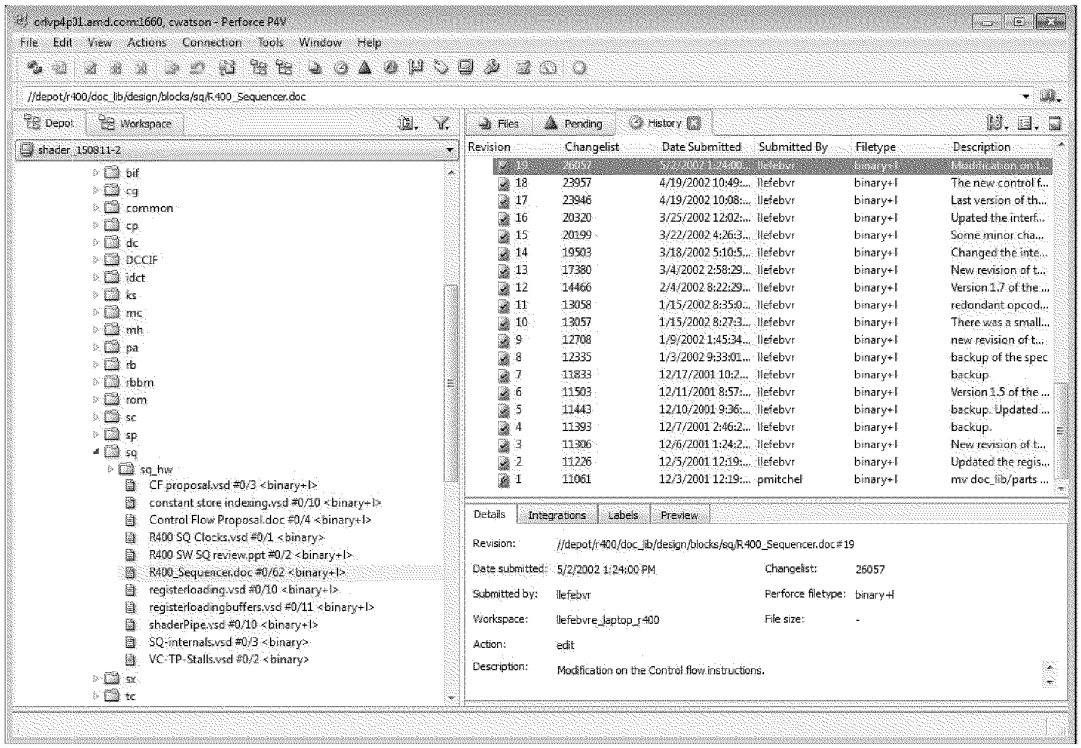
88. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on May 2, 2002. *See* Ex. 2029, p. 8.



89. This document's corresponding file log shows that Laurent Lefebvre checked in this document on May 2, 2002. Ex. 2044, pp. 1, 5.



90. In the Perforce database, Exhibit 2029 is the nineteenth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is May 2, 2002.



24. Exhibit 2030—R400 Sequencer Specification (Version 2.2)

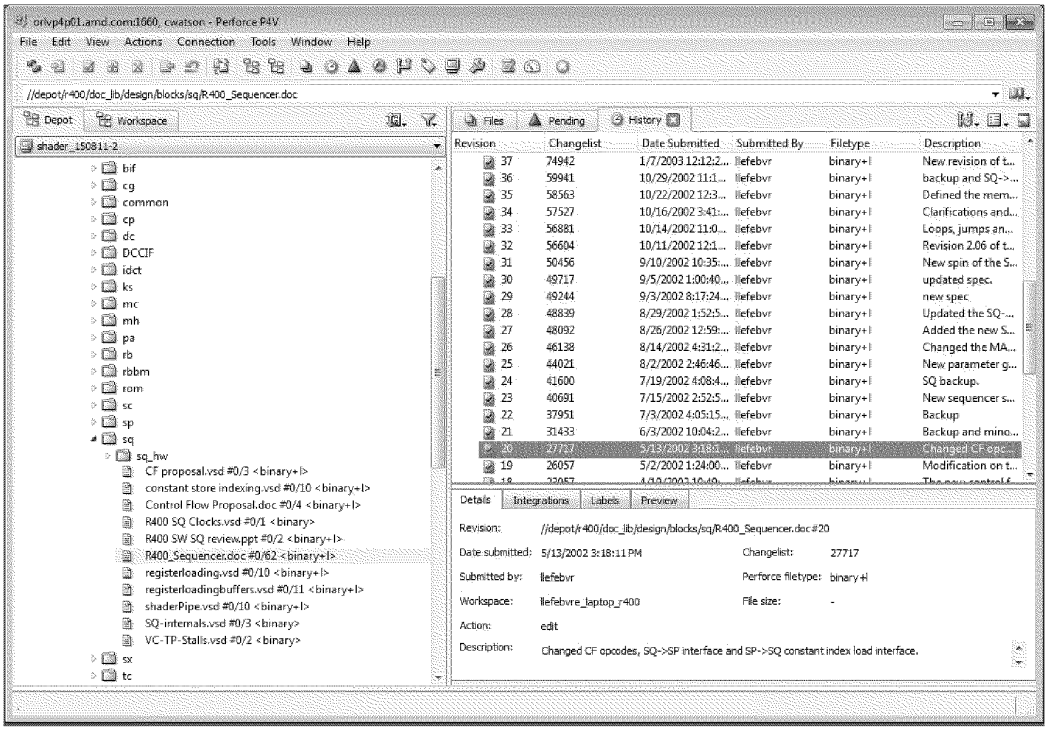
91. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on May 13, 2002. *See* Ex. 2030, p. 6.

Rev 2.02 (Laurent Lefebvre) Date : May 13, 2002	Updated the Opcodes. Added type field to the constant/pred interface. Added Last field to the SQ→SP instruction load interface.

92. This document's corresponding file log shows that Laurent Lefebvre checked in the document May 13, 2002. Ex. 2044, pp. 1, 5.

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #20 change 27717 edit on 2002/05/13 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Changed CF opcodes, SQ->SP interface and SP->SQ constant index load interface.
```

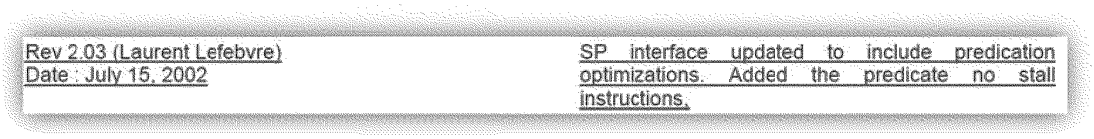
93. In the Perforce database, Exhibit 2030 is the twentieth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is May 13, 2002.



[redacted]

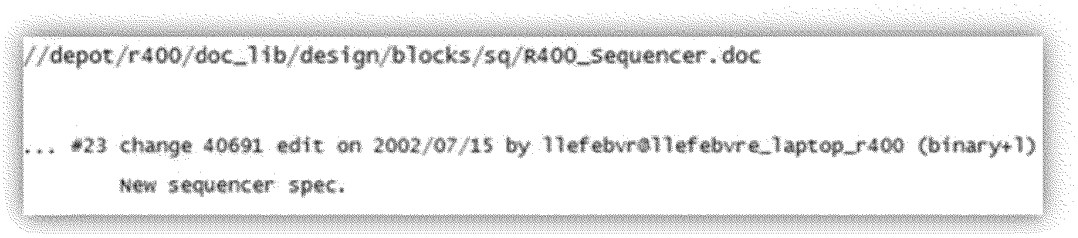
25. Exhibit 2031—R400 Sequencer Specification (Version 2.3)

94. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on July 15, 2002. *See* Ex. 2031, p. 8.



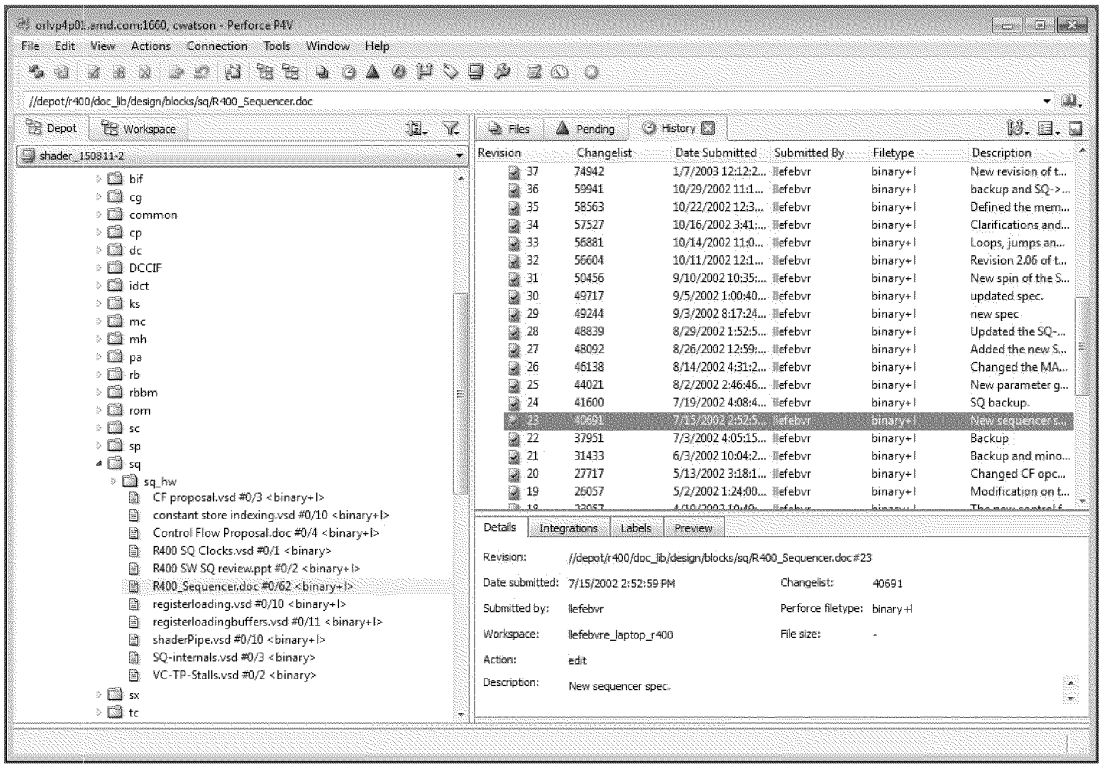
Rev 2.03 (Laurent Lefebvre) Date : July 15, 2002	SP interface updated to include predication optimizations. Added the predicate no stall instructions.

95. This document's corresponding file log shows that Laurent Lefebvre checked in this document on July 15, 2002. Ex. 2044, pp. 1, 4.



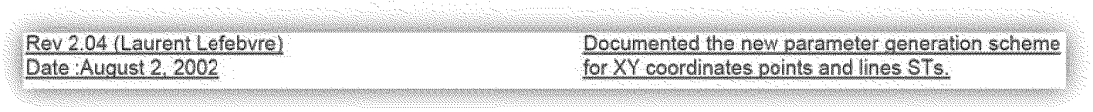
```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #23 change 40691 edit on 2002/07/15 by llefebvr@llefebvre_laptop_r400 (binary+l)
        New sequencer spec.
```

96. In the Perforce database, Exhibit 2031 is the twenty-third revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is July 15, 2002.



26. Exhibit 2032—R400 Sequencer Specification (Version 2.4)

97. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on August 2, 2002. *See* Ex. 2032, p. 6.

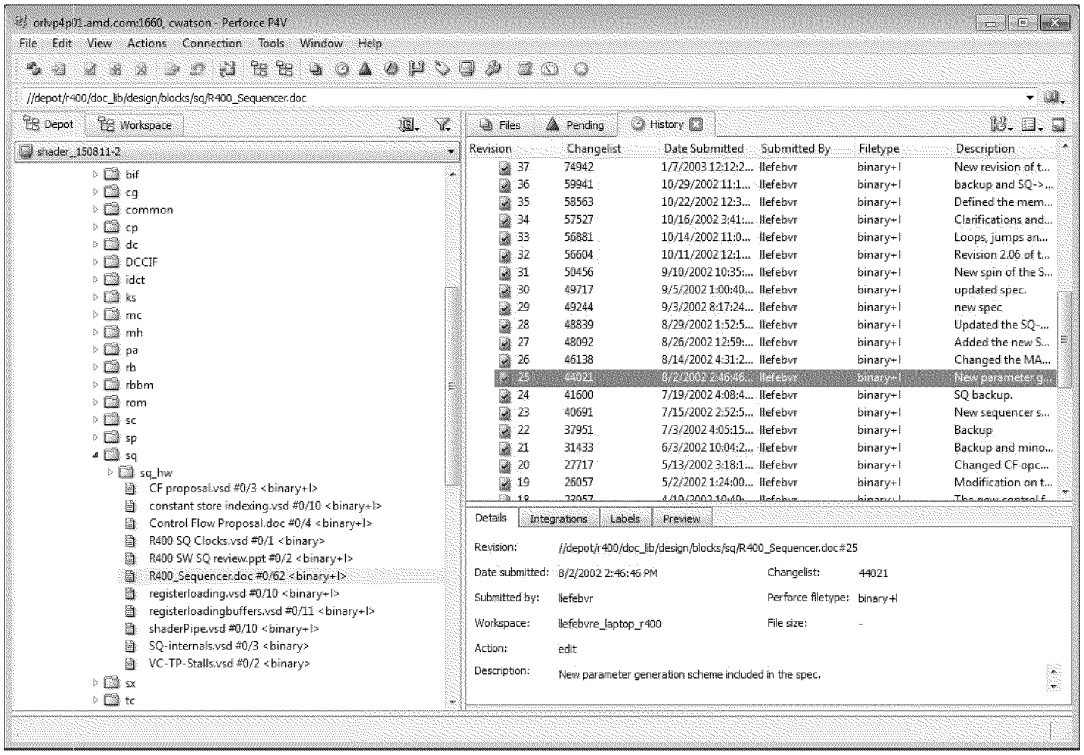


98. This document's corresponding file log shows that Laurent Lefebvre checked in this document on August 2, 2002. Ex. 2044, pp. 1, 4.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #25 change 44021 edit on 2002/08/02 by llefebvr@llefebvre_laptop_r400 (binary+l)
        New parameter generation scheme included in the spec.
```

99. In the Perforce database, Exhibit 2032 is the twenty-fifth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is August 2, 2002.

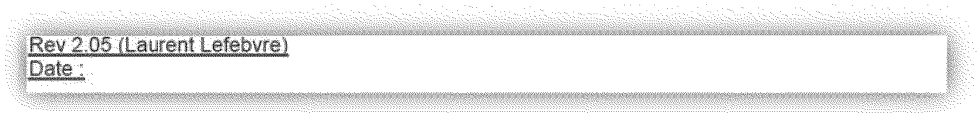


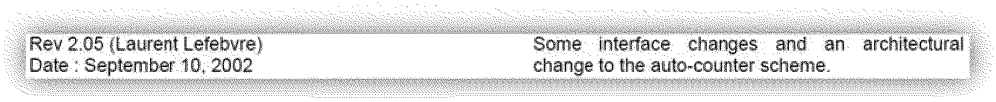
27. Exhibit 2033—R400 Sequencer Specification (Version 2.5)

100. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears

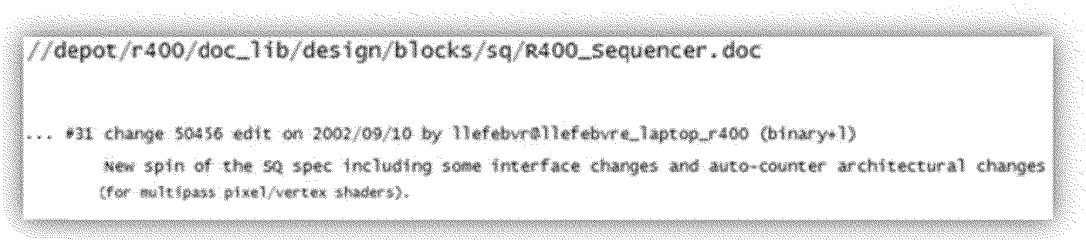
[redacted]

that Laurent Lefebvre revised this document on September 10, 2002. *See* Ex. 2033, p. 8; Ex. 2034, p. 6 (showing a September 10, 2002 revision date).

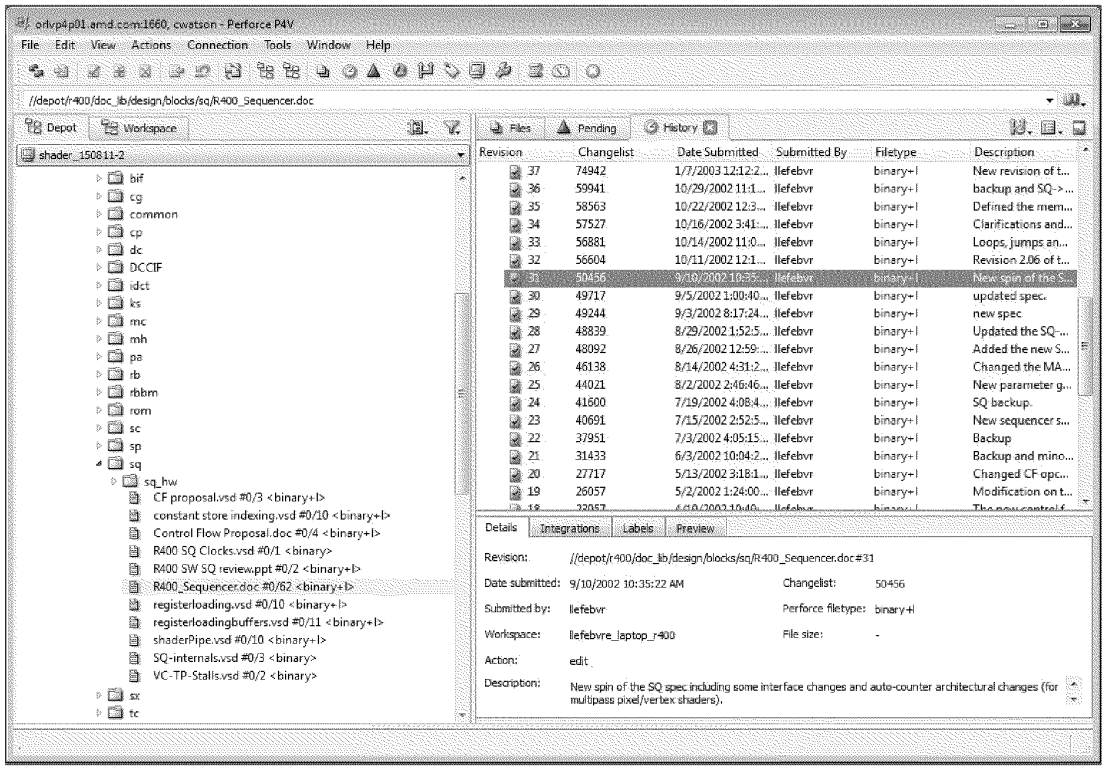




101. This document's corresponding file log shows that Laurent Lefebvre checked in this document on September 10, 2002. Ex. 2044, pp. 1, 3.



102. In the Perforce database, Exhibit 2033 is the thirty-first revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is September 10, 2002.



28. Exhibit 2034—R400 Sequencer Specification (Version 2.6)

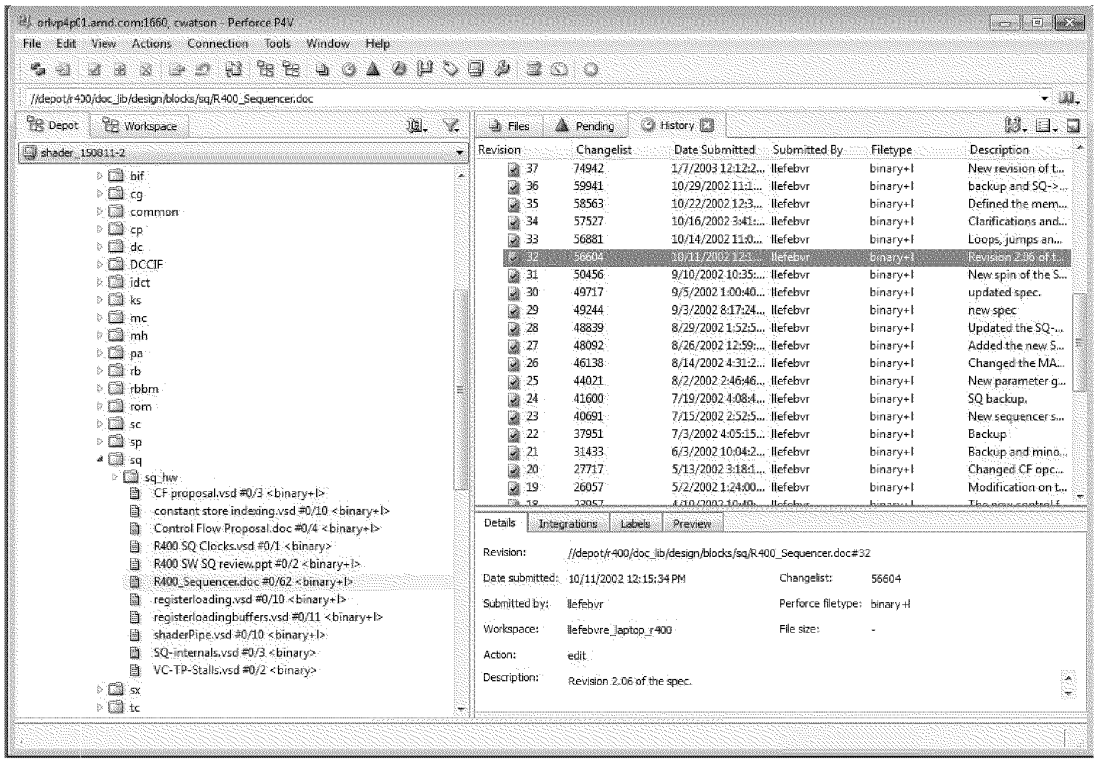
103. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on October 11, 2002. *See* Ex. 2034, p. 6.

104. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 11, 2002. Ex. 2044, pp. 1, 3.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #32 change 56604 edit on 2002/10/11 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Revision 2.06 of the spec.
```

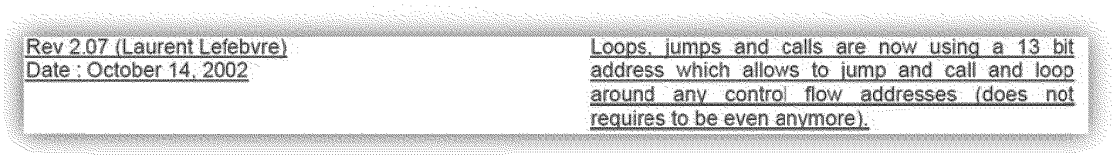
105. In the Perforce database, Exhibit 2034 is the thirty-second revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 11, 2002.



29. Exhibit 2035—R400 Sequencer Specification (Version 2.7)

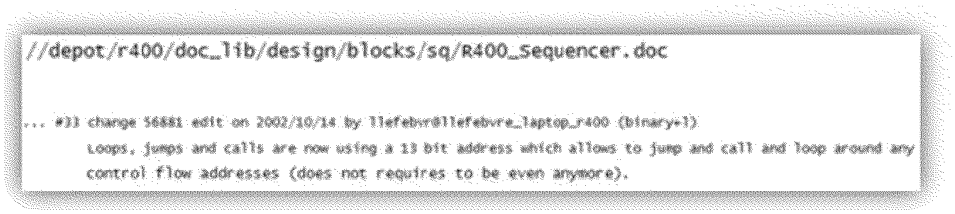
106. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears

that Laurent Lefebvre revised this document on October 14, 2002. *See* Ex. 2035, p. 6.



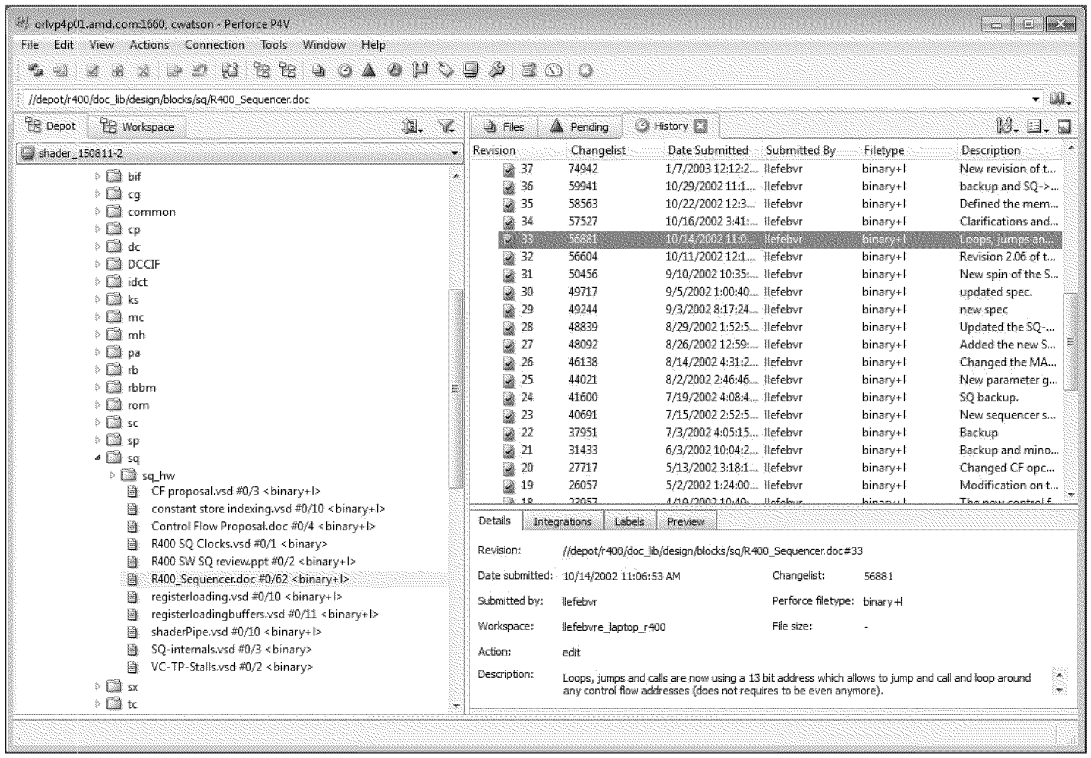
Rev 2.07 (Laurent Lefebvre) Date : October 14, 2002	Loops, jumps and calls are now using a 13 bit address which allows to jump and call and loop around any control flow addresses (does not requires to be even anymore).

107. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 14, 2002. Ex. 2044, pp. 1, 3.



```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc


... #33 change 56881 edit on 2002/10/14 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Loops, jumps and calls are now using a 13 bit address which allows to jump and call and loop around any
        control flow addresses (does not requires to be even anymore).
```

108. In the Perforce database, Exhibit 2035 is the thirty-third revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 14, 2002.



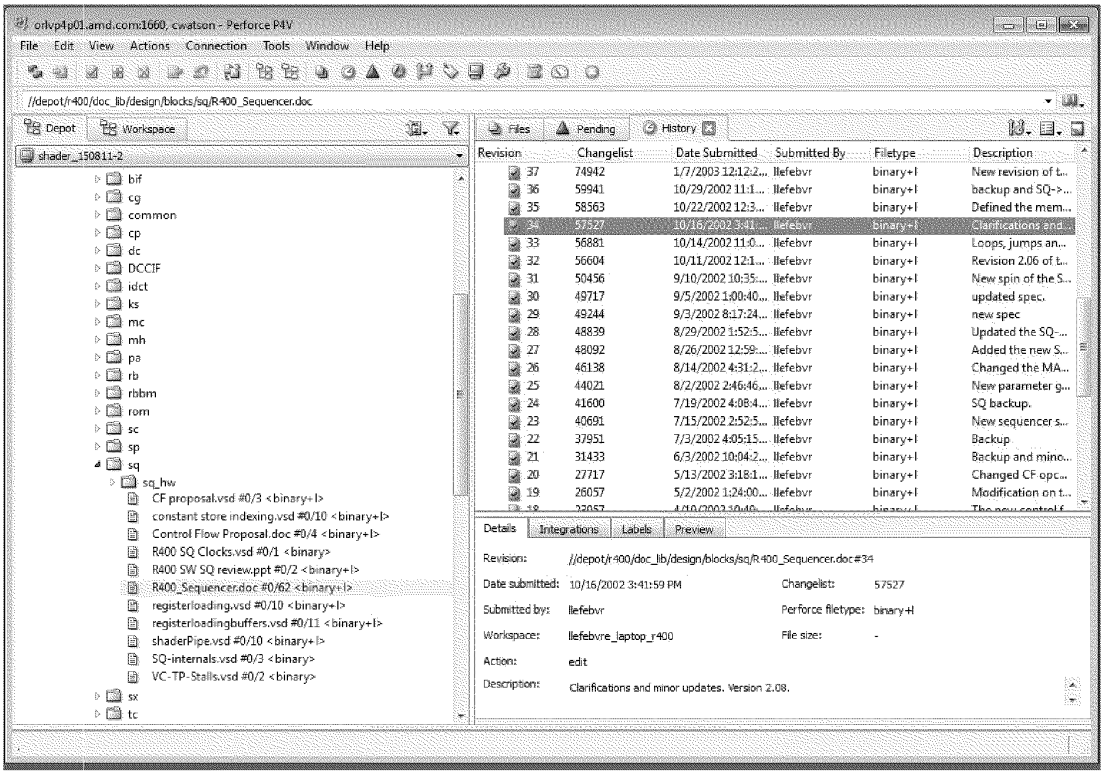
30. Exhibit 2036—R400 Sequencer Specification (Version 2.8)

109. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on October 16, 2002. *See* Ex. 2036, p. 6.

110. This document's corresponding file log shows that Laurent Lefebvre checked in this document on October 16, 2002. Ex. 2044, pp. 1, 3.

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #34 change 57527 edit on 2002/10/16 by llefebvr@llefebvre_laptop_r400 (binary+l)
        clarifications and minor updates. Version 2.08.
```

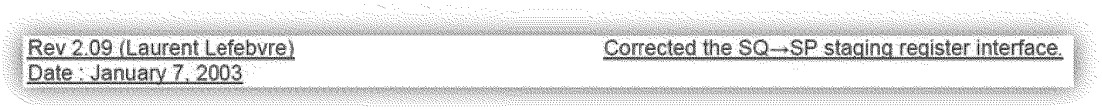
111. In the Perforce database, Exhibit 2036 is the thirty-fourth revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is October 16, 2002.



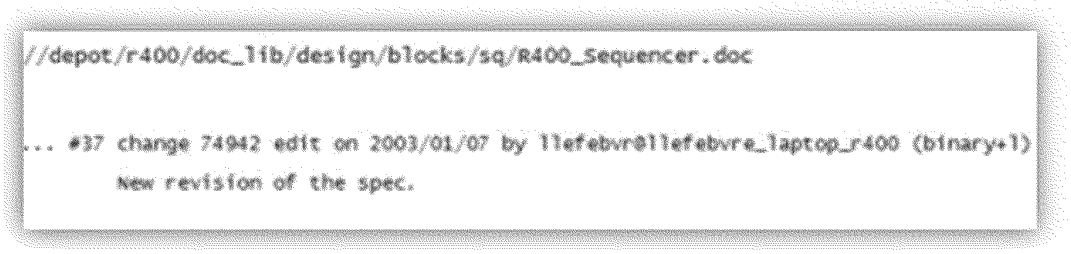
[redacted]

31. Exhibit 2037—R400 Sequencer Specification (Version 2.9)

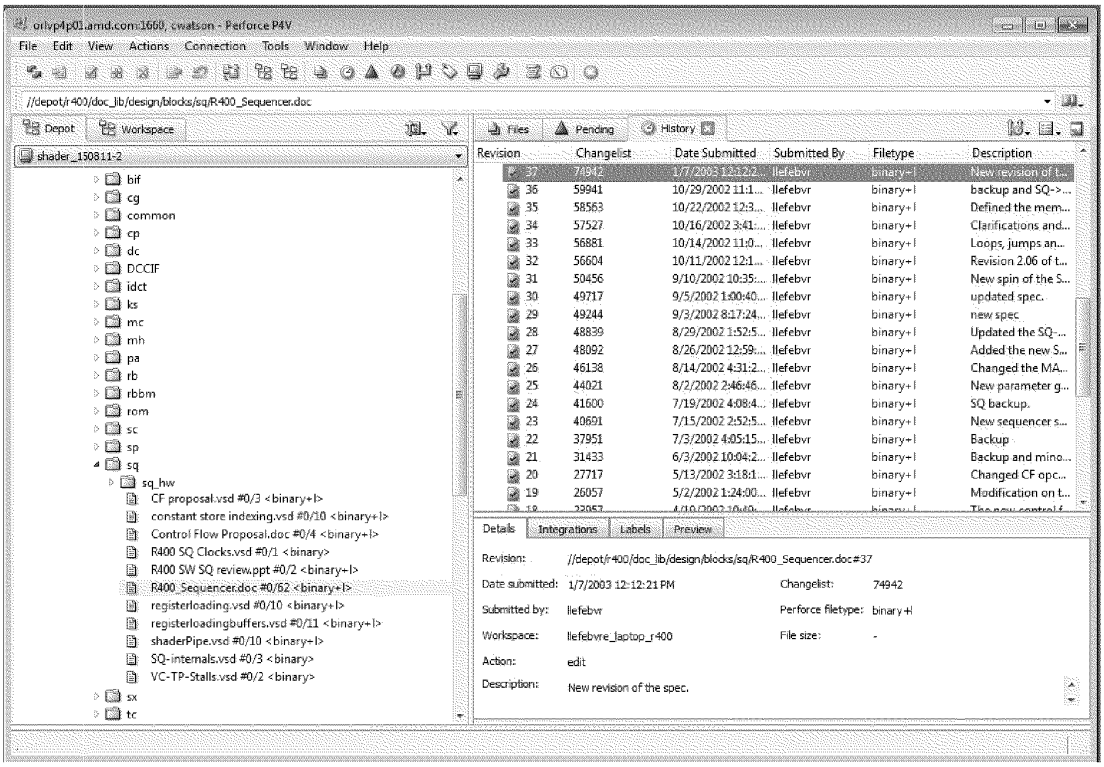
112. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on January 7, 2003. *See* Ex. 2037, p. 7.



113. This document's corresponding file log shows that Laurent Lefebvre checked in this document on January 7, 2003. Ex. 2044, pp. 1, 3.



114. In the Perforce database, Exhibit 2037 is the thirty-seventh revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is January 7, 2003.



32. Exhibit 2038—R400 Sequencer Specification (Version 2.10)

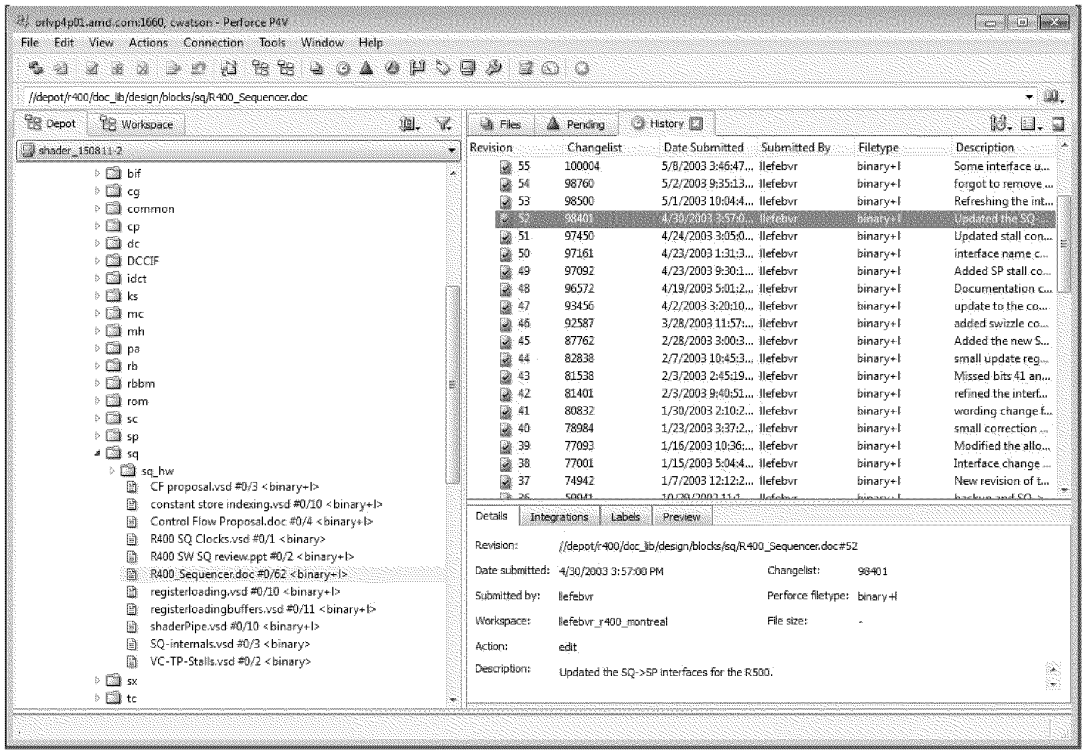
115. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on April 8, 2003. *See* Ex. 2038, p. 6.

116. This document's corresponding file log shows that Laurent Lefebvre checked in the document several times from April 19, 2003 to April 30, 2003. Ex. 2044, pp. 1-2.

[redacted]

```
//depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc

... #52 change 98401 edit on 2003/04/30 by llefebvr@llefebvr_r400_montreal (binary+l)
        Updated the SQ->SP interfaces for the R500.
... #51 change 97450 edit on 2003/04/24 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Updated stall conditions.
        Made swizzle changes.
        Added more R500 specifics.
... #50 change 97161 edit on 2003/04/23 by llefebvr@llefebvre_laptop_r400 (binary+l)
        interface name changes for the SQ->SP fetch swizzles.
... #49 change 97092 edit on 2003/04/23 by llefebvr@llefebvre_laptop_r400 (binary+l)
        Added SP stall conditions to the SQ spec.
... #48 change 96572 edit on 2003/04/19 by llefebvr@llefebvr_r400_montreal (binary+l)
        Documentation changes for R500.
```

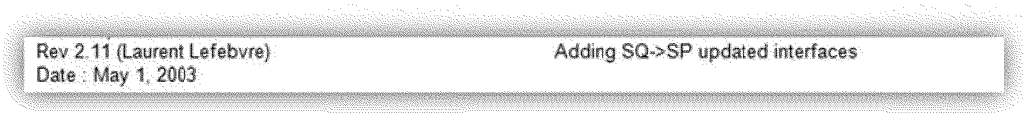
117. In the Perforce database, Exhibit 2038 is the fifty-second revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is April 30, 2003.



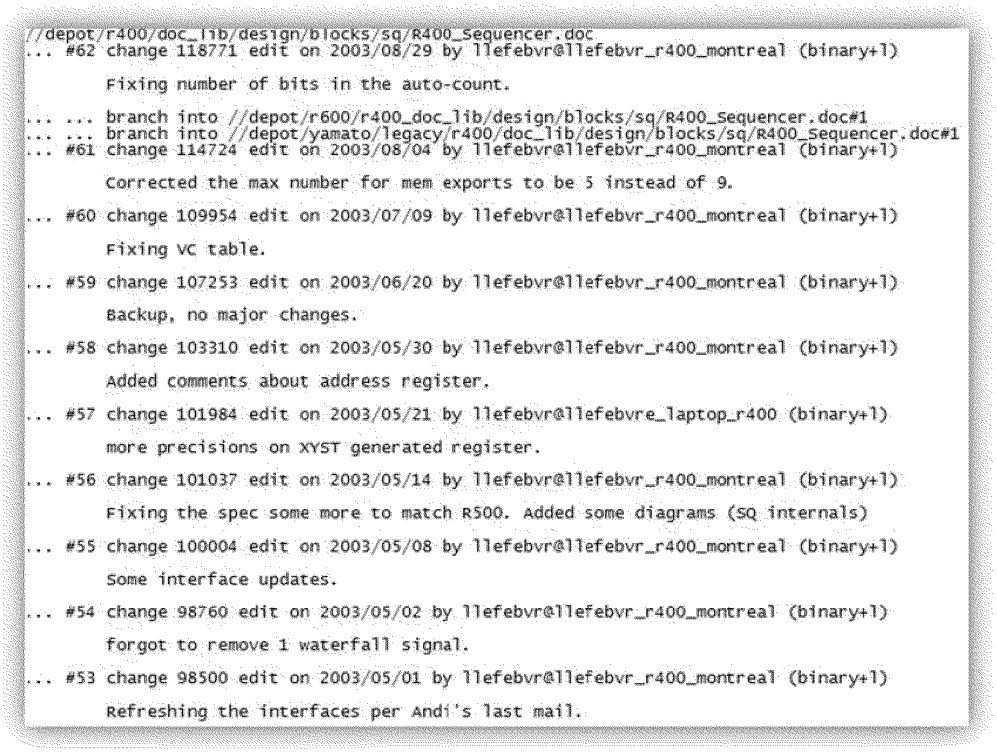
[redacted]

33. Exhibit 2039—R400 Sequencer Specification (Version 2.11)

118. This document was saved as R400_Sequencer.doc at the folder location //depot/r400/doc_lib/design/blocks/sq/. From this document, it appears that Laurent Lefebvre revised this document on May 1, 2003. *See* Ex. 2039, p. 5.

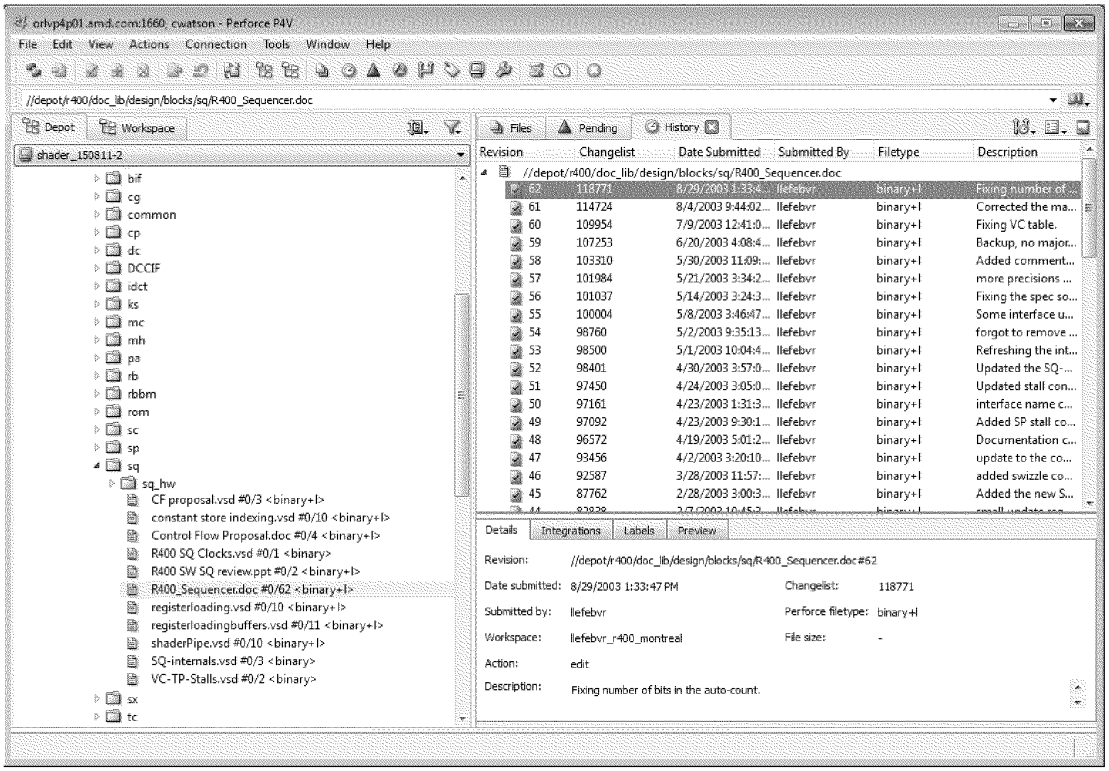


119. This document's corresponding file log shows that Laurent Lefebvre checked in the document several times from May 1, 2003 to August 29, 2003. Ex. 2044, p. 1.



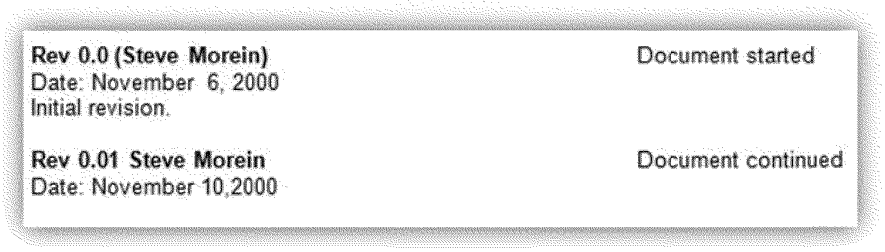
[redacted]

120. In the Perforce database, Exhibit 2039 is the sixty-second revision of the R400 Sequencer Specification. As shown in the screenshot below, the submit date for this revision is August 29, 2003.

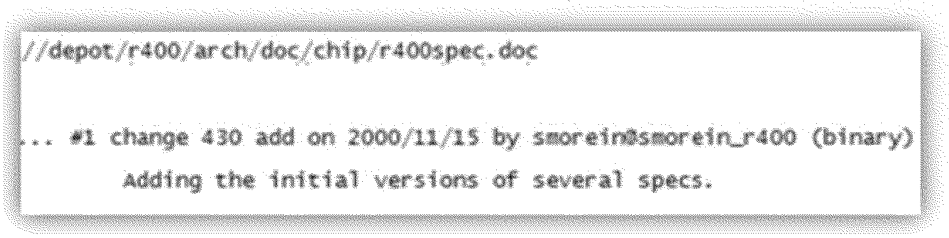


34. Exhibit 2040—R400 Architecture Proposal (Version 0.1)

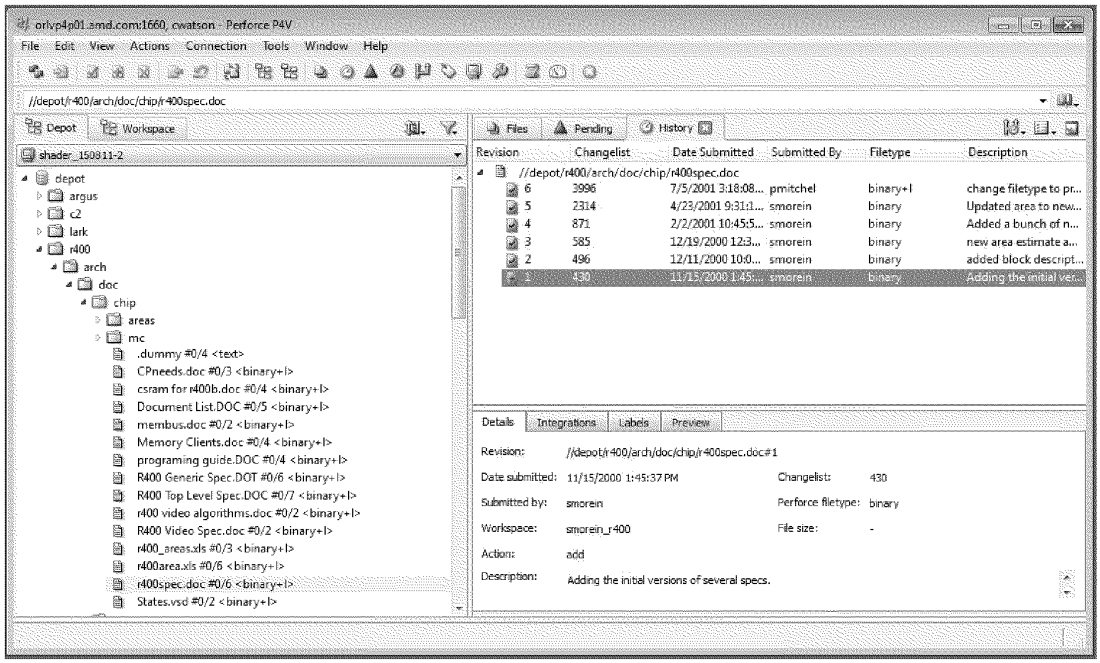
121. This document was saved as r400spec.doc at the folder location //depot/r400/arch/doc/chip/. From this document, it appears that Steve Morein created this document on November 6, 2000. *See* Ex. 2040, p. 4. It also appears that Steve Morein revised the document on November 10, 2000. *See id.*



122. This document's corresponding file log shows that Steve Morein checked in this document on November 15, 2000. Ex. 2045, p. 1.

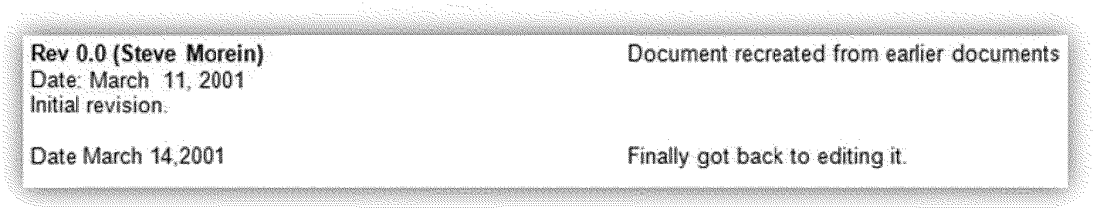


123. In the Perforce database, Exhibit 2040 is the first revision of the R400 Architecture Proposal. As shown in the screenshot below, the submit date for this revision is November 15, 2000.



35. Exhibit 2041—R400 Top Level Specification (Version 0.2)

124. This document was saved as R400 Top Level Spec.doc at the folder location //depot/r400/arch/doc/chip/. From this document, it appears that Steve Morein created this document on March 11, 2001. *See* Ex. 2041, p. 5. It also appears that Steve Morein revised the document on March 14, 2001. *See id.*

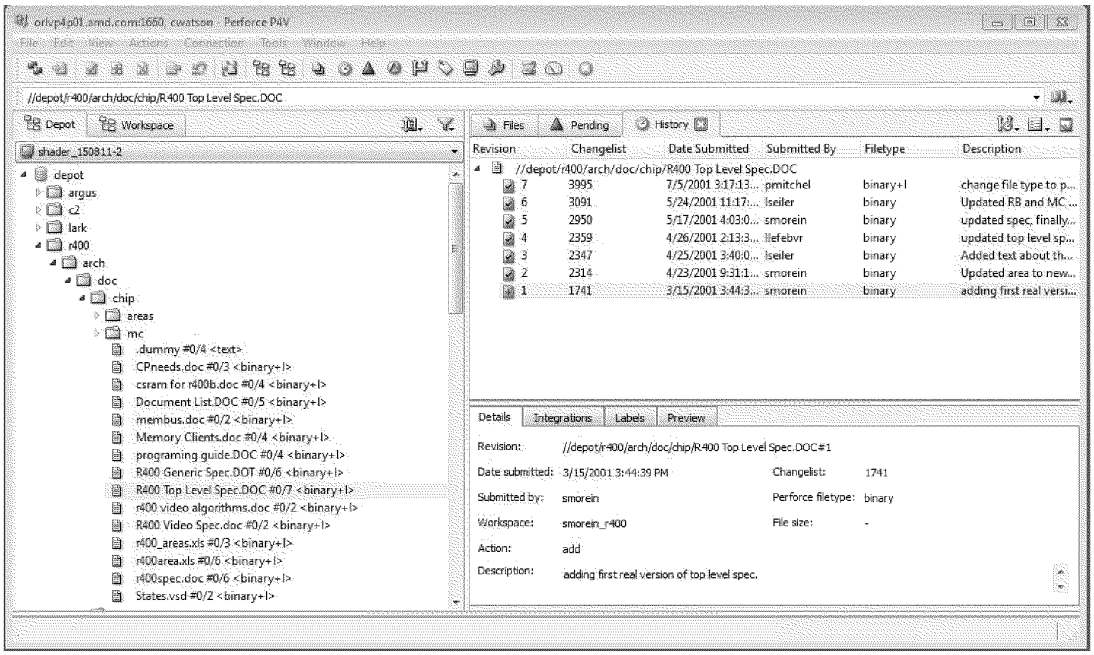


125. This document's corresponding file log shows that Steve Morein checked in this document on March 15, 2001. Ex. 2046, p. 1.

[redacted]

```
//depot/r400/arch/doc/chip/R400 Top Level Spec.DOC

... #1 change 1741 add on 2001/03/15 by smorein@smorein_r400 (binary)
        adding first real version of top level spec.
```

126. In the Perforce database, Exhibit 2041, despite being Version 0.2, is the first revision of the Top Level Specification. As shown in the screenshot below, the submit date for this revision is March 15, 2001.



36. Exhibit 2042—R400 Shader Processor (Version 0.1)

127. This document was saved as Shaders.doc at the folder location //depot/r400/arch/doc/gfx/SP/. From this document, it appears that Andi Skende revised this document on May 9, 2001 and May 10, 2001. *See* Ex. 2042, p. 3.

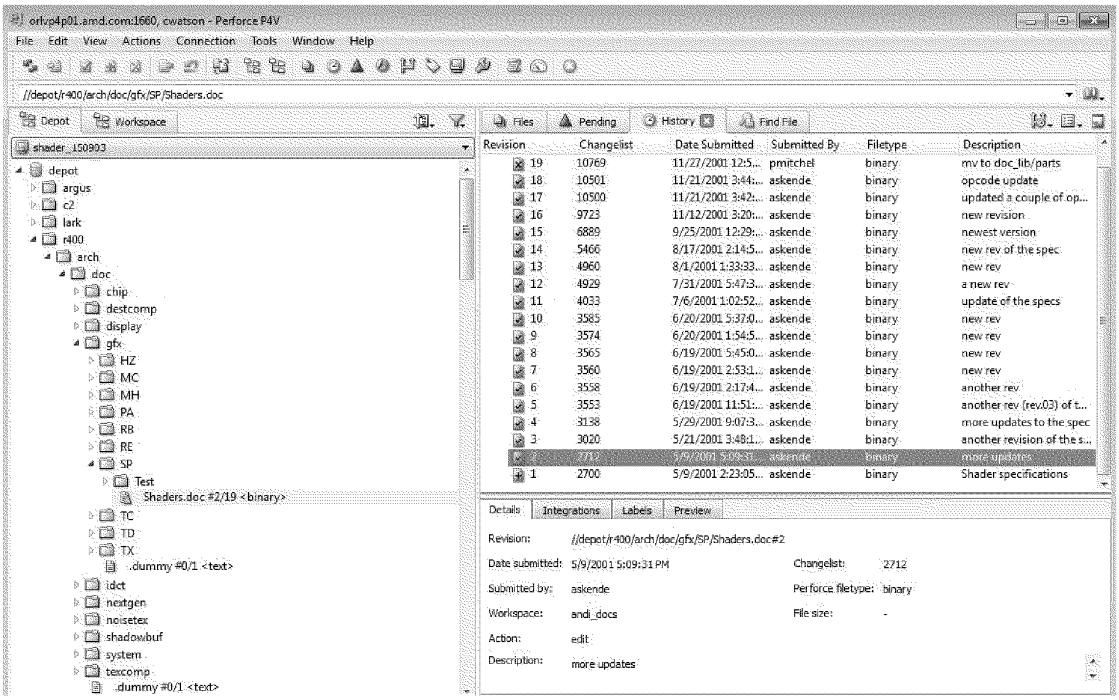
[redacted]

Rev 0.0 (Andi Skende) Date: May 09, 2001 Initial revision.	Document started
Rev 0.1 (Andi Skende) Date: May 09, 2001 Initial revision.	Updated, added the instruction formant, initial block diagrams and preliminary interface description
Rev 0.2 (Andi Skende) Date: May 10, 2001 Initial revision	A more detailed description of the SP ->RB interface as well as RE/Sequencer ->SP interface.

128. This document's corresponding file log shows that Andi Skende checked in the document on May 9, 2001. Ex. 2047, pp. 1, 2.

```
... ... branch from //depot/r400/arch/doc/gfx/SP/Shaders.doc#1,#18
//depot/r400/arch/doc/gfx/SP/Shaders.doc

... #2 change 2712 edit on 2001/05/09 by askende@andi_docs (binary)

        more updates

... #1 change 2700 add on 2001/05/09 by askende@andi_docs (binary)

        Shader specifications
```

129. In the Perforce database, Exhibit 2042, despite being Version 0.1, is the second revision of the Shader Processor within this folder. As shown in the screenshot below, the submit date is May 9, 2001.



B. Authentication of Source Code

130. Exhibits 2072-2087, and 2108 are RTL Verilog files. Exhibits 2088-2104 are C++ emulator code files. I understand that these software code files are the simulation and emulation files from the R400.

131. These software code files are maintained in the Perforce database and kept in the regular course of ATI/AMD's business. I downloaded these files directly from the Perforce database.

132. As a revision-control system, Perforce allows users to view or download a group of files as the files existed on a particular date. For the software code files attached as Exhibits 2072-2104 and 2108, I downloaded these files

[redacted]

according to the files' August 5, 2002 revision date. So, Exhibits 2072-2104 and 2108 are a snapshot of the RTL code and the emulator code as the code files were maintained in Perforce on August 5, 2002. August 5, 2002 is thus the latest date these files were edited.

C. Authentication of PowerPoint Presentations

133. Exhibits 2053-2071 are PowerPoint files. I understand that these PowerPoint files are from program-review meetings that occurred during development of the R400.

134. These PowerPoint files are maintained in the Perforce database and kept in the regular course of ATI/AMD's business. I downloaded these files directly from the Perforce database.

135. These PowerPoint files are organized in Perforce according to the dates the program-review meetings occurred. For example, Exhibit 2057 on its face says that the presentation was on January 17, 2002. Ex. 2057, p. 2. In the Perforce database, the PowerPoint file is saved in the folder location //depot/r400/web/project/Program Reviews/Jan2002_Review. The date on Exhibit 2057 matches the folder titled "Jan2002_Review." The other PowerPoint presentations are saved according to this format.

[redacted]

D. Authentication of Document Logs and File Histories

136. Exhibits 2043 through 2047 are document logs. Exhibits 2048 through 2052 and 2107 are file histories. I downloaded these document logs and file histories directly from the Perforce database. These files are not editable in Perforce.

137. I discuss Exhibits 2043 through 2052 and 2107 below.

1. Exhibit 2043—R400 Sequencer Specification Log (Versions 0.1 to 1.2)

138. Exhibit 2043 is the document log for the Sequencer Specification (Versions 0.1 to 1.2). The Sequencer Specification (Versions 0.1 to 1.2) was stored at //depot/r400/arch/doc/gfx/RE/R400_Sequencer.doc. This document log, submitted as Exhibit 2043, is a complete and accurate revision history of the Sequencer Specification (Versions 0.1 to 1.2).

2. Exhibit 2044—R400 Sequencer Specification Log (Versions 1.3 to 2.11)

139. Exhibit 2044 is the document log for the Sequencer Specification (Versions 1.3 to 2.11). The Sequencer Specification (Versions 1.3 to 2.11) was stored at //depot/r400/doc_lib/design/blocks/sq/R400_Sequencer.doc. This document log, submitted as Exhibit 2044, is a complete and accurate revision history of the Sequencer Specification (Versions 1.3 to 2.11).

[redacted]

3. Exhibit 2045—R400 Architecture Proposal Log

140. Exhibit 2045 is the document log for the R400 Architecture Proposal. The R400 Architecture Proposal was stored at //depot/r400/arch/doc/chip/r400spec.doc. This document log, submitted as Exhibit 2045, is a complete and accurate revision history of the R400 Architecture Proposal.

4. Exhibit 2046—R400 Top Level Specification Log

141. Exhibit 2046 is the document log for the R400 Top Level Specification. The R400 Top Level Specification was stored at //depot/r400/arch/doc/chip/R400 Top Level Spec.doc. This document log, submitted as Exhibit 2046, is a complete and accurate revision history of the R400 Top Level Specification.

5. Exhibit 2047—R400 Shader Processor Log

142. Exhibit 2047 is the document log for the Shader Processor document. The R400 Shader Processor document was stored at //depot/r400/doc_lib/design/blocks/sp/Shaders.doc. This document log, submitted as Exhibit 2047, is a complete and accurate revision history of the R400 Shader Processor document.

[redacted]

6. Exhibit 2048—R400 Sequencer Emulator Folder History

143. Exhibit 2048 is the folder history for the files stored under the folder //depot/r400/ devel/emu_lib/model/gfx/sq/. This folder history, submitted as Exhibit 2048, is a complete and accurate revision history of the files within this folder.

7. Exhibit 2049—R400 Sequencer Parts Folder History

144. Exhibit 2049 is the folder history for the files stored under the folder //depot/r400 /devel/parts_lib/src/gfx/sq/. This folder history, submitted as Exhibit 2049, is a complete and accurate revision history of the files within this folder.

8. Exhibit 2050—R400 Document Library Folder History

145. Exhibit 2050 is the folder history for the files stored under the folder //depot/r400/doc_lib. This folder history, submitted as Exhibit 2050, is a complete and accurate revision history of the files within this folder.

9. Exhibit 2051—R400 Architecture Folder History

146. Exhibit 2051 is the folder history for the files stored under the folder //depot/r400/arch/. This folder history, submitted as Exhibit 2051, is a complete and accurate revision history of the files within this folder.

[redacted]

10. Exhibit 2052—R400 Testing Folder History

147. Exhibit 2052 is the folder history for the files stored under the folder //depot/r400/r400/devel/test_lib/src/chip/gfx/. This folder history, submitted as Exhibit 2052, is a complete and accurate revision history of the files within this folder.

11. Exhibit 2107—R400 Shader Pipe Parts Folder History

148. Exhibit 2107 is the folder history for the files stored under the folder //depot/r400/devel/parts_lib/src/sp/. This folder history, submitted as Exhibit 2107, is a complete and accurate revision history of the files within this folder.

[redacted]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. The statements in this declaration were made with the knowledge that willful false statements and the like are made punishable by fine or imprisonment under Section 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the '053 Patent.

Executed this 8 day of Sept in 2015.

at Austin, Texas

Respectfully submitted,

Calvin Watson

Calvin Watson