IBM 1401 CHM Restoration Project
Meeting #1, January 16, 2004
Notes by K. Tashev, R. Garner

Attendees:
- Dave Babcock, Mike Cheponis, Robert Garner, Grant Saviers, Dag Spicer, Kirsten Tashev

Purpose of Meeting
- Kickoff meeting, arranged by Kirsten, to discuss framework, goals, timeframes, and next steps.

General Roundtable
- In roundtable order, everyone spoke of their thoughts and expectations for the restoration project, background and familiarity with the 1401, involvement and contributions to date, possible role, and planning suggestions.
- Grant and Mike, with their hands-on 1401 experience, extolled the benefits of getting one up and running.
- There was around-the-table enthusiasm for a "1401 operational exhibit", as it will make for an impressive, engaging, and classic visitor experience. A re-born, operating 1401 system, with its dramatic, old-style mechanical peripherals would bring to life the visceral sounds and sights of a 1960's computer room, including:
    - Punch cards speeding by at 800 per minute (13 cards/sec!),
    - A chattering line printer at a swift 600 lines/min (10 lines/sec!), and
    - Whirling reel-to-reel 9" tape drives (10 feet/sec).
- One observation was that the 1401, as the workhorse of the business/EDP industry in the 60's, could attract Museum visitors from new sources (beyond the traditional scientific and engineering backgrounds).
- There was some discussion on how frequently the 1401 and its peripherals could reasonably be operated. The difference was noted between keeping it running "at all costs" (potentially using newly manufactured replacement parts) versus repairing it with only authentic parts (e.g., "new old stock", or perhaps swapping parts with the Museum's existing, less-complete 1401.) Also, how many years could the 1401 realistically be expected to operate and be maintained?
- Robert mentioned that IBM Almaden Research had agreed to underwrite the land and sea transportation charges from Germany.
- It was noted that the 50th anniversary of the IBM 1401 product announcement occurs in Oct. 2009.

Summary of the machine:
- The 1401 was operated in Germany and decommissioned and stored in a personal, enclosed garage in Hamm, Germany about 15 years ago, by its long-time field engineer (FE), Arnold Schweinsberg. It was inspected, photographed, and found

to be in excellent shape in Sept. 2003.   It was manufactured in Stuttgart, but we do not yet know its full history. (The runtime meter shows 88,730 hours, or 10 years.)
- A summary of what has been procured:
    - 1401 Processing Unit
    - 1402 Card Reader / Punch
    - 1403 Chain Line Printer
    - 1406 Core Storage
    - 729 Reel-to-Reel Tape Drives (5)
    - 077 Collator
    - 083 Sorter
    - 129 Card Punch
    - Tape Drive Tester
    - Large set of spare SMS circuit board cards and mechanical parts
    - Schematics, maintenance drawings, documentation.
- Estimated date of arrival in California is early March.

Initial thoughts towards a running machine:
- The German field engineer, Arnold Schweinsberg, asked if he could travel to the Museum to help get the 1401 and its peripherals up and operating. The Museum agreed and the budget includes per diem fees for Arnold and his son, Rolf. (Both capable English speakers.)
- There was consensus that it will be necessary to find and recruit local, ex-1401 field engineers to assist with ongoing maintenance.
- Suggestion was made to contact Paul Pierce, who owns a 1401 in Seattle.
- We'll need to develop a test and bring-up plan, including the initial test of parts and subsystems.   The peripherals will require adroit mechanical skills. (For instance, the 1403 print chain moves at 7.5 feet a second! Also, rubber captains on tape drives disintegrate with age and may need to be reformed, including "vulcanization.")

Power Conversion
- This 1401 was designed for European 380 V, three-phase, (220 V single-phase), 50-Hz power.
- Estimated max total power consumption is 15 - 20 kW (70 - 100 A at 208V).
- Grant has explored options for converting to our 208 V, 3-phase, (120 V single-phase) 60-Hz power. As the 1401 peripherals contain mechanical components that assume a 50-Hz line cycle, this is a critical item to address. Options for converting power include:
    - Procure an electrical motor generator set. Grant has a quote from a vendor. Lead-time is 3 months, cost estimate $8K.
    - Procure a UPS battery unit.
    - Procure a switching "inverter". Quality of AC may be an issue.

- Convert or adjust mechanical devices for 60-Hz and, if 1401 power supplies were so designed, re-configure/re-jumper them for 208V/60-Hz. (This option appears least likely for motors. For instance, the runtime meter is a 50-Hz device.)
- A hybrid solution: Motors and necessary mechanical devices are operated at 50-Hz, and 3-phase power supplies are re-configured for 208V/60-Hz.

Placement and Layout:
- Current plan is to locate system in the raised-floor, 1st-floor, server room. This location is near the end of current visible storage area tours.
- Grant & Mike outlined a 1401 machine room layout. Our layout will need to take into account how to best position an operational system for the visitor experience. The layout will also need to take into account cable and power restrictions.

Exhibit/Program Ideas:
- Will need to begin considering applications or demo programs that we could run that will be interesting to visitors.
- Would be great to have something that a visitor could take away with them (e.g., printout, card, etc.)
- Will want to schedule a workshop on operating and programming 1401.

Initial plan for labor requirements, including long-term support:
- Project leader (R. Garner).
- Restoration Team
- Operators
- On-going Maintenance/FE
- Trained Docents
- Exhibits
- Software & Documentation Preservation, Web Presence

Schedule/Project Outline:
- Create a bring-up, maintenance, and exhibit plan,
- Establish the team, and
- Establish web site including links to online resources. (2-3 months)
- Inventory parts, subsystems, software, documentation (2-3 months)
- Subsystem and system bring-up (3-6 months)

Next Steps:
- RG – Search for 1401 Field Engineers, others with 1401 experience (including the local IBM retirees, Paul Pierce, etc.), and volunteers in general.
- GS – Continue to investigate and report on a power conversion solution.
- MC – Setup a 1401 web site and mailing list. (using www.1401.org ?)

- RG – Draft a project plan with input from members and set-up the next meeting (Wednesday afternoons are a good meeting time for the current group.)
- RG – Identify person to be responsible for initial server room layout, using IBM system planning documents and drawings of our server room (from M. Falarski).
- RG – Work with Mike to establish plan for preparing server room and receiving and unpacking 1401 shipping crates.