

# MEETING OR CONTACT REPORT

Date of Report: July 10, 1959

|   |                           |
|---|---------------------------|
| Organization & Location:<br>San Jose Laboratory<br>San Jose, California | Date: June 29, 1959       |
|   | Reported By: H. G. Kolsky |
| Project:<br><br>STRETCH DISK FILE, etc.                                 | Department: 910           |
|   | Follow-up Date:           |

**PERSONNEL PARTICIPATING:**  
(Place asterisk next to those on distribution list. Other distribution show at end of report)

Visitors: \*Mr. S. W. Dunwell - Poughkeepsie  
\*Mr. D. V. Newton - White Plains  
\*Mr. H. G. Kolsky - Poughkeepsie ✓

San Jose: (Not all present at one time)

|                      |                |
|----------------------|----------------|
| *Mr. D. L. Stevens   | Mr. D. Johnson |
| Mr. J. M. Taylor     | Mr. Wilson     |
| Mr. T. Noyes         | Mr. G. Nielson |
| Mr. R. Golub         | Dr. Bennett    |
| Mr. R. Boeninghansen | Dr. Martin     |
| Mr. J. Parker        |                |

## I Purpose of visit

The purpose of the visit was to gather information concerning the present status of the various San Jose projects, especially those which are of interest to the Data Systems Division. There were a series of short presentations at each of the projects visited.

## II Account of Meeting

ADF (Advanced Disk File) and the STRETCH Disk File. (Mr. Golub)

The advanced disk file is in final stages of design. The STRETCH disk uses the same design with the following exceptions:

The ADF is using a newer "Z bar" frame and an internal drive shaft motor with a belt and pulley drive which permits changing the speed of the disk (e.g. to fit 7090). The same comb and reading heads are used for both but the ADF can read from but one head at a time. Some of the statistics of the files are:

|                                    | <u>ADF</u> | <u>ST File</u> |
|------------------------------------|------------|----------------|
| No. reading heads                  | 40         | 40             |
| No. wires from heads to amplifiers | 35         | 165            |
| No. read/write amplifiers          | 1          | 40             |
| No. of disk faces                  | 132        | 132            |
| No. of tracks per face             | 250        | 256            |
| No. bits per inch (max. )          | 500        | 460            |

The disk controls take 1 slide, the Ecc buffers 1 slide, and the Skew registers 1 slide.

The problem of Skew makes the STRETCH disk considerably more expensive than it would otherwise be. Skew in this case means the bits being read in parallel do not necessarily arrive at the receiving register at the same time. The causes of Skew are:

1. Head probe tolerance.
2. Electric amplifier tolerance.
3. Intangibles (vibration, heat expansion, etc.)

The Head tolerance problem is more serious for the ADF which must rely on echo checks rather than ECC for its error detection. Also the ADF must allow for the physical replacement of a head without losing the information written. The tolerance is considered plus or minus 1.5 mils. A single read/write probe on each head is being considered for the STRETCH disk which would reduce this head tolerance considerably. Echo checking and the head replacement requirement would be removed.

Using faster amplifiers can cut #2 above to the point where it is not serious. They have a delay of about 1.2u sec each. The total Skew for the STRETCH disk will be more than one bit but it may not be as many as 3 bits. The exact value will be known in a few weeks. About 3 1/2 man months work will be required to do the deskewing as well as about \$30,000 development funds. Mr. Dunwell explained the STRETCH Commercial Program plans and stated that the probable requirements for STRETCH disks would be 3 in 1960 and 10 or more in 1961. The requirements may be considerably larger when the 7090 is considered.

### III Two Million Character Random Access File.

This is a small disk file system which will have many of the advantages of tape. The file itself is removable by loosening one screw and lifting off. The disk runs at 900 rpm. There are 20 read/write heads. The file has 10 disks (20 surfaces) with 100 tracks per surface. Maximum access time is 0.5 sec. There was some discussion of a binary version of the file.

### Million Character File.

This file uses a "drum" whose surface is a plastic band. There are 50 read/write heads planned. Each head services 10 tracks on the drum. One of the file's main advantages is its low access time: 7 milliseconds max. Future developments

may bring this to 5 milliseconds.

A binary version of the File will have either 32 heads with 16 tracks each or 64 heads with 8 tracks each.

The choice will be made after additional tests have been performed.

V VLCM Project.

Mr. Don Johnson described the VLCM device for us. This is an unusual storage device which can selectively pluck strips of tape out of storage bins on a random access basis. The development of a number of the individual components are well under way. Target date for completion is mid-1960. Present Plans call for 10 bins of tape and 100 positions. There are 36 tracks spaced at 20 mils apart on each strip. Density is 50 bits per inch. The heads are 25 per inch apart.

VI File Processor.

Mr. Wilson and Mr. Nielson gave us a very good description of the File Processor, The Card Processor, and the scientific version of The File Processor. The Card processor has a ten character instruction format consisting of:

OP    P Modifier    M Modifier    N Modifier    From Address    To Address

The modifiers include such functions as masking, field lengths from and to, etc. Provisions are made to be able to handle bits within characters by using masks. The programming uses the suppression type procedure similar to that of the 604.

A larger version of the file processor is planned with 12 characters per instruction. It would also have indexing and other advanced features.

Some representative times are:

20 microsecond core cycle.

8 memory cycles to index an instruction.

A 10 character by 10 character product takes 7.4 millisecond.

The "change adder" goes at 3 times mem cycle rate.

Estimates of component counts are: 3200 diodes and 1650 transistors.

The small scientific computer will have paper tape input. Estimated development completion--January 1960. Estimated announcement--March '60. Rental: \$2500.

There was some discussion of the relative merits of the small scientific computer and CADET.

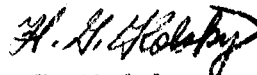
VII 609 Accounting Machine.

Mr. Al Schugart showed us the 609 model and discussed some of its features.

VIII Other Developments.

Several devices in early stages of development were discussed by Drs. Bennett and Martin. These are included in a program called "Basic Development." Areas being investigated are:

1. Electroluminescence
2. Photo Conductors
3. Magnetic Sensing Equipment (non-mechanical)
4. Read only memories
5. Kalvar films, etc.



H. G. Kolsky  
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HGK:jah

cc: Mr. R. E. Merwin  
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Mr. E. W. Coffin  
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