Department of Education
Poughkeepsie, New York
April 3, 1959

MEMORANDUM

SUBJECT: STRETCH Concepts Course

Enclosed you will find one copy of the STRETCH Concepts Course and some example problems furnished by Mr. J. Stone of the Eastern Region. The example problems may not be 100% perfect, however, we do hope you can find some use for them. If you have had the opportunity to write some programs which you feel might be of some interest to the rest of the STRETCH Class, please send them to my attention.

Once again we are reminded of the confidential nature of the STRETCH program and the assurance that we do not compromise IBM's position. Therefore, in presenting this course we should comply with Mr. D. V. Newton's confidential memorandum of March 23, 1959.

L. D. McEwing
Education Planning

LDM:jmd

EDUCATION GUIDE

STRETCH CONCEPTS COURSE

Course Description: The course is designed to present the overall concept why STRETCH exist, what are its configurations and mode of operation.

Course Length: One or two days.

Pre-requisite: Experience with large scale stored program machines.

Course Code: I - 9504

PREFACE

The material contained herein is an Education Guide for use in preparing a course on the STRETCH System. It should be noted that the material is in a guide form rather than a detailed teaching outline. It is recognized that each instructor prefers to write his own detailed teaching outline which is tailored to his method of presentation.

The sequence in which the subjects are listed is not necessarily the best for all situations. However, a STRETCH Concept Course should include all of the subjects listed. In presenting this material a judicious effort should be made to have a systems presentation rather than a hardware presentation.

The items marked with double asterisks (**)cannot be discussed at this time and when the time arrives that they can be presented, you will be notified by D. Newton, D. P. Headquarters, White Plains.

STRETCH CONCEPT COURSE

Reference No.

I. Introduction

A. Why STRETCH? 1.0

1. Large jobs not otherwise feasible

2. Many small jobs with low unit cost

B. Design objectives

1. Performance

2. Generality

C. Schematic of STRETCH System 1.1
(Emphasize it as a general purpose machine.)

II. Memory 2.0

A. Size

1. 2^{24} addressable bits

2. Words - 2^{18} - 64 bits - parallel transmission

3. 8 non-addressable bits per word for checking 2.1

a. Single error correction

b. Double error detection

B. Format

1. Data representation

a. bits and bytes 2.2

b. fixed point

1. VFL

2. Binary

3. Decimal

c. alphabetic

1. VFL

2. Variable code structure

d. Floating Point

2. Instruction format 2.3

a. Half word instructions

1. Speed

2. Space

b. Full word instruction

1. Function versatility

2. Multi-function

3. Control word format 2.4

** a. Indexing (Do not discuss refill)

b. I/O control

C. Special purpose registers (word 0-31) 2.5

1. Zero

2. Interruption registers

3. Arithmetic

4. Indexing system

III. Modifier Concept (Explain) 3.0

A. Branching modifiers

1. On-off

2. Leave - invert

3. Leave - set off

4. Multiple modifier

5. Indicator branching

B. Arithmetic modifiers 3/1

1. Floating or fixed point

2. Normalized end unnormalized

3. Decimal and binary

4. Positive, negative or absolute

5. To accumulator or to memory

6. Immediate

IV. Interruption system. The interrupt concept should be fully explained. 4.0

A. Permanently masked indicators

B. Programmed masked

C. Permanently unmasked

D. Latch and temporary indicators

V. Arithmetic

A. Floating Point 5.0

1. Operation of exponent and fraction

2. Universal accumulator

3. Noisy mode

4. Flag bits 5.1

5. Exponent range indicators

6. Multiple precision

B. VFL 5.2

1. Byte size

2. Offset

3. Field length

C. Connectives (Editing functions) 5.3

1. Sixteen logical operations

2. Give examples (i.e., personnel accounting)

3. All ones count

4. Left zeros count

5. Zero test

D. Automatic conversion (Do not discuss explicitly how the instruction is executed.)

1. Decimal to binary

2. Binary to decimal

VI. Index Arithmetic 6.0

1. Effective address - value field

2. Counting - count field

** 3. Initialization - refill

** 4. Progressive indexing

** 5. RENAME

6. Multiple indexing - load value with sum

7. Indirect addressing

8. Chaining

VII. Instruction Lookahead 7.0

VIII. Exchange concept 8.0

A. Organization

1. Basic exchange

a. channels

b. data words

2. High speed exchange

B. Operation 8.1

1. Control words

a. chaining mode

b. skip mode

c. multiple record mode

2. Exchange interrupt

3. Compatibility to I/O units

IX. I/O Devices 9.0

A. Basic exchange

** 1. Program defined console

2. Card reader

3. Card punch

4. Printer

5. Magnetic tape (low and high density)

B. High speed exchange 9.1

1. High speed disk file

a. Memory size

b. Memory organization

c. Data transmission rate

d. Roll feature

REFERENCE INDEX

		Pages
1.0	Mr. F. Brooks speech - attached	------
	Stretch Manual	1.1 - 1.4
1.1	Stretch Manual	1.23
2.0	Stretch Manual	1.5
2.2	"Processing Data in Bits & Pieces" by F. Brooks C. A. Blaauw, W. Buchholz TR00.01000.674 January 27, 1959	------
2.3	Stretch Manual	1.8 - 1.9
2.4	Indexing and Control Word Techniques by G. A. Blaauw 2/5/59	
2.5	Stretch Manual	1.6, A-2
3.0	Stretch Manual	1.16
3.1	Stretch Manual	1.11
4.0	"A Program Controlled Program Interruption - System" by F. B. Brooks Stretch Manual	1.20 - 1.21
5.0	Stretch Manual	1.12
5.1	Stretch Manual	2.2 - 2.3
5.2	Stretch Manual and "Processing Data in Bits and Pieces"	1.12 - 1.14 8 - 9
5.3	Stretch Manual	1.14
6.0	Stretch Manual "Indexing and Control Word Techniques" by G. A. Blaauw	1.15
7.0	Stretch Manual	1.9
8.0	Stretch Manual	1.7
8.1	"Indexing and Control Word Techniques" by G. A. Blaauw	
9.0	Stretch Manual	1.7
9.1	Paper on High Speed Magnetic Disks dated 1/27/59	
10.0	Stretch Manual	1.21 - 1.22
11.0	Strap Manual	
12.0	Class Notes by E. Law	