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5 November 1958

REPORT ON HARVEST PLANNING

By MPRO-03

Declassified by D. Janosek,
Deputy Associate Director for Policy and Records
on 13 Oct 2010 and by M. B.



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Discussion on HARVEST Planning

I. INTRODUCTION

- A. This discussion concerning the HARVEST System which is scheduled for arrival in September, 1960, was prepared for the purpose of aiding MPRO in its planning for Fiscal Years 1960-61. It is apparent that the installation of this system will greatly affect the processing capabilities of MPRO due to the tremendous increase in processing specus and techniques which will be made possible using this system. This increase in processing capability will greatly affect the need of the continued operation of certain rectal equipment and Agency-owned equipment.
- B. Briefly, the following discussion supports the elimination of the EDPM 704 and 705 equipment from the rental budget and the retirement of the ATLAS I and ATLAS II equipment and other equipment such as CICERO, MILLIE, DEMONS, ETC. The personnel (programming, operating and engineering) released as a result of cancellation and retirement of equipment will be sufficient to sustain the HARVEST System.
- C. An equipment planning calendar is provided at the end of this report for providing clarity to the discussion and for use as a Suide in planning for effective utilization of Agency equipment.
- D. The considerations which follow have been divided into two parts -(1) Equipment and Fiscal Planning and (2) Personnel Planning.





AQUIPMENT AND FISCAL PLANNING

- Present Processing Requirement
 - The following statements concerning production statistics are presented to clarify the conclusion reached in estimating HARVEST efficiency to absorb our current workload.
 - a. The EDFM 705's have been operating as follows (based on a b-wk period):

(1). Production

6/5

(2). Checkout

12%

(3). Lost Time

17%

(4). Maintenance

4%

(5). Iale

0%

(a). Overtime

OK

- b. The production processing time for four EDFM 705's was computed to be 84% of a 450 hour week. This yields 404 production hours per week.
- The production problems for the EDPM (05 were estimated as follows:
 - (1). 50% on sorting # 50,000 records per hour.
 - (2). 50% on other tape bound problems @ 150,000 records per hour.
- The EDFM 704's have been operating as follows (pased on a 10-wk period):

(1). Production

02.4%

(2). Checkout

19.4%

(5). Lost Time

4. 29

(4). Maintenance

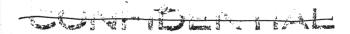
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(5). Tale

U.11%

(v). Overtime

(25% of weekend time)



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- e. The production processing time of the three EDPM 704's was computed to be 65.7% of a 350 hour week plus 25% of 144 available weekend hours. This yields 250 hours of production processing per week.
- f. The ATLAS equipment has been operating as follows; (based on a 10-month period)

		ATLAS I	ATLAS II
(1).	Production	59.3%	78.5%
(2).	Checkout	3.14	6.4%
(3).	Lost Time	12.0%	5,0%
(4).	Maintenance	16.6%	10.0%
(5).	Idle	3.1%	0.0%

- g. ATLAS I production processing time was computed to be 75% of a 160 hour week or 120 production hours per week.
- h. ATLAS II production processing time was computed to be 83.0% of a 240 hour week or 201 production hours per week.
- i. An estimate of HARVEST versus ATLAS II processing ability is 100 to 1. Versus ATLAS I, 300 to 1.
- j. A conservative estimate of HARVEST versus EDPM 704 processing ability is 30 to 1.
- card-to-tape and TAMPA operating statistics. The current eard input is a 1.5 million cards per week. The current TAMPA conversion is a .3 million 160 position records per week.



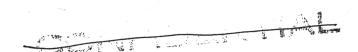
- 1. The amount of intermediate processing performed was determined by substracting output results from possible processing volume.
- m. The output requirement was determined from printer and punch use figures. The current printer output is 6.814 million printed items per week. The current punch output is .004 million cards per week.
- n. The record size used in computing times was 30 positions except on TAMPA where a 100 position record size was used.
- The amount of HARVEST time necessary to absorb the current KDPM 704, EDPM 705 and ATLAS equipment processing based on the above statements would be 37.0 hours per week.

The time breaks down in detail as follows:

- a. J.o hours to read 1.3 million card-to-tage and TAMPA records.
- b. 20. hours to write 5.9 million punch and printer items per weak.
- c. 3.6 hours to sort 10 million records.
- 1.0 hours to process 40 million intermediate records using the TRACTOR Tape System.
- e. 3.5 hours to complete EDFM 704 type processing.
- f. .4 hours to complete ATLAS I processing.
- g. 2.0 hours to complete the ATLAN II processing.

-4-

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- 3. The above represents the worst case for the HARVEST System. The imput-output time wasn't assumed to overlap. There was no reduction given for the ability to program jobs rather than steps as is now done on EDFM 705 type processing. The internal supervisory system will have the ability of controlling the HARVEST System so that more than a single problem can be in the state of processing within the same period of time. Programs will be written to sultiplex the input-output operations, so that this time can be reduced considerably.
- 4. The HARVEST System will give us a minimum of ! times our present EDFM 704 and 705 computing capacity if we can learn to use it correctly.
- B. Fiscal Year 1960 Requirements
 - 1. The estimated computer hours for processing the Analytic Offices' requirements for 1960 is 10,303 EDFM 704 hours and 25,032 EDFM 705 hours. This represents a 31% increase over the available five-day week EDFM 704 time and a 27% increase over the EDFM 705 time. These same estimates are to be used for Fiscal Year 1961.
- C. On-line Rental Aquipment Requirement
 - 1. The following list contains the estimated amount of on-line rental equipment which is required for the HARVEST System in Fiscal Year 1961. The prices are best success based on present prices and equipment improvements.

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No.	Name		Primary Shift	Total 3 Shifts
1	Card Reader - 1000 CFM	(F	\$1800	\$3240
1	Card Reader Control	3	1000	1300
1	Printer - GOO LPM	3	1500	5,00
1	Printer Control	e.	1000	1300
1	Inquiry	1.3	300	540
12	729-III Dual Density	3	1100	23760
8	Tape Control Unit	14	2350	33840
1	Punch - 250 CPM	4.2	600	1080
1	Punch Control	1993	1000	1300
				\$70560

The rental for the on-line equipment would be for three-quarters of TY 1901 since HARVEST is scheduled for September 1900.

D. Off-line Rental Equipment Requirement

- at present to meet Fiscal Year 1961 requirements. We are presently printing at 66% capacity, punching at 11% capacity and loading cards-to-tape at 37% capacity. These figures are based on 100 available hours (three-shift operation) per week for each peripheral unit. The card loading and punching functions can be performed on-line on the HARVEST System. These equipments should be released with the EDFM 705 Systems.
- 2. Some of the present low-speed printing units should be replaced by an equivalent capacity of high speed printers. Facility for handling low volume printing jobs would still be required.

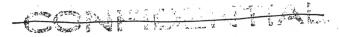
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E. TRACTOR Tapes

- 1. The six storage units in the TRACTOR Tape System have a minimum capacity of 240 TRACTOR tape cartridges. A proposed schedule for delivery of these cartridges follows:
 - a. 50 cartridges on delivery of the HARVEST System in September, 1960.
 - b. 30 cartridges per month for the remainder of Fiscal Year 1961.
- 2. The above figures would give us full minimum capacity seven months after delivery of the System and a total of 320 cartridges by the end of Fiscal Year ol.
- 3. IBM has not given any estimate of the price of one TRACTOR tape cartridge. R/D has estimated the cost at \$300 per cartridge. At this price, our TRACTOR tape budget for Fiscal Year 1961 would be \$216,000.

 TRACTOR tape budget for Fiscal Year 1960 is \$40,000.
- eighty-position records using a block size of 2048 words. This is equivalent to forty 729-III tapes with a real capacity of 32,000 records each. The bookkeeping on the TRACTOR Tape System would prohibit us from packing this number of reals on a single TRACTOR cartridge. In actual processing we could expect approximately 10 jobs per cartridge which represents jobs requiring 15 reals of 727 tape. We could expect at least a 200 real per month reduction in our 1/2 inch tape requirement. Our present monthly level of the 1/2 inch magnetic tapes is 600 reals per month.





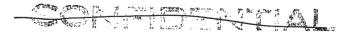
F. Funding Recommendations

- 1. The O/M funds in the FARMER Fiscal Program dated 8 May 1958 should be revised in accordance with the following:
 - a. Item 5b, Data Conversion Equipment, on the Fiscal Program should be deleted. The cost of this conversion is exorbitant for the operation performed. It will require 5 minutes on the 729-III as compared to 3 seconds on the TRACTOR tape drive for the conversion of one reel of 729-III tape. It is doubtful that normal processing would require the full weight of the Basic Exchange. The conversion can be performed on-line without seriously affecting the efficient utilization of the HARVEST System. These funds should be held in reserve for additional components which might be required. The addition of a high speed disk unit, low speed exchange, and possibly Swift tape drives should be considered. The first two components could absorb the 650 operation as well as strengthening the entire HARVEST System. These units will be studied and estimated prices will be obtained from IBM. Also the addition of three automatic cartridge handling units to the TRACTOR Tape System in Fiscal Year 1962 should be considered. This would require \$250,000.
 - Item 5c, Additional Memories, needs some type of immediate action.

 This money was budgeted for Fiscal Year 1961 due to IBM's inability to deliver additional memories with the HARVEST System.

 Recently, ANEQ was informed that additional 2 microsecond memory





System. MPRO should firstly commit funds and contract for two additional 2 microsecond memories in Fiscal Year 1960. The price for each will be approximately \$1,000,000.

c. Item 5d, TRACTOR Tape, in Fiscal Year 1961 should be increased to the amount previously indicated (\$216,000) in this report.

(See II.E.3 above)

III. PERSONNEL PLANNING

A. Personnel Requirements

- 1. The personnel requirement for putting HARVEST into operation can be broken into five functional parts—system's programming planning, production programming, data preparation, operations and engineering. The acquisition of the personnel for the staffing according to the above functional parts will be explained under III.B.
 - a. System's Planning. Initially, it will be necessary to establish a system's planning group to handle such problems as
 - (1) Automatic Coding
 - (2) Autometic Operations
 - (3) Tape Identification
 - (4) Memory Use
 - (5) TRACTOR Tape System Use
 - (6) Debugging Techniques (Simulation and Desk Checking)
 - (7) Multiprogramming
 - (8) Data Preparation and Handling
 - (9) Training

It is very necessary that solutions to the above problems be obtained in order that production type programming can be initiated at the appropriate time. It is extremely important that the selection of personnel be made from the most talented of the experienced MPRO programmers since effective utilization of HARVEST will depend for the most part on the solutions derived by the System's Planning Group.

This group will determine how programs will be written and how the HARVEST System will be utilized. It is estimated that 20 programmers will be required for this group.

Programming Group will be required to re-program for HARVEST those programs which are currently on existing equipment, that will be cancelled in the case of rental equipment and retired in the case of Agency-owned equipment. There will be a requirement for reprogramming those problems which can be sufficiently improved upon by being processed on HARVEST. It is expected too that many new problems will be planned and programmed for HARVEST processing prior to its arrival and that this effort will require considerable effort. This programming Group. This group should consist of 30-50 trained programmers who must be available at least one year in advance of the arrival of the HARVEST System. This group would continue to grow until a complement of 90 programmers is reached.

In order for this Group to properly assume its responsibilities, an up-to-date program priority list based on economic considerations and problem life should be prepared for their guidance. After the initial programming requirements have been fulfilled, it is expected that the size of the group can be



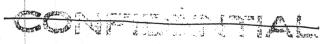


reduced because of the increased experience of the programmers, the improved programming system on HARVEST and the elimination or reduction of duplication of programming effort. The reduction of the group size could probably begin in Fiscal Year 1962.

c. Bata Preparation. The HARVEST System will permit processing that is beyond the capabilities of existing equipment. The manual data preparation personnel requirement is going to be dependent on the improvements made by NSA in the fields of automatic recording, conversion and editing. The efficiency of the HARVEST System will depend on the automatic recording, conversion and editing devices. One type of equipment to date which treats this problem is the FIORIDA Series. The STORK project and other fielded format systems will greatly increase our data conversion capacity when they become a reality. The trend in communications towards automatic systems instead of manual systems will aid us in handling large volumes of data provided we keep up with the conversion problem.

At present, we have peaks and troughs in our keypunching workload. No continuing backlog exists. We are keypunching at 85% capability due to this uneven workload.

Fiscal Year 1960 requirements indicate a 27% increase in EDFM 705 processing and a 31% increase in EDFM 704 processing, over current production processing.



These figures are undoubtedly high but can probably be used as actual requirements for Fiscal Year 1901. No increase in manual preparation is unticipated. The increase in cata to be processed will probably come from the field and through automatic conversion equipment.

d. Operations. It is felt that the programming for the operation of the HARVEST System should be the responsibility of a single division; however, it is recognized that certain organizational changes within MPRO would be required if this were to be the case. The operations personnel for the equipment in the system should consist of the following:

(1). Operations Chief 1
(2). Asst. Operations Chiefs 2

(3). Production Control Specialists 7

(%). Shift Personnel (One-shift)

Shift Super. 1

Main Frame Supvr. 1

Prod. Cont. Spec. 2

Main Frame Oper.

Peri. Equip. Oper. 3 11

21 Total

e. Engineering. MPRO-45 has indicated that there will be a requirement for four engineers and ten technicians to perform the maintenance on the HARVEST System.

- B. Personnel Acquisition
 - was to reduce the rental budget for Agency processing equipment, it is reasonable to assume that the personnal can be obtained through reassignment of MFRO programming and operating personnel. The phasing-out of the taking-off-rental of non-Agency equipment and the retirement of some Agency-owned equipment should permit a reasonably smooth transition to HARVEST. Although it is expected that HARVEST programmers will be selected from all MFRO programmers, the current strength of only EDFM 704 and 705 personnel is sufficient to staff the System's Planning Group, the Production Programming Group and the Operation Group (assuming a three-shift operation).

	EDPM 704	EDPM 705	Totals
Programming Supervisors	Ÿ	L	11
Programmers	53	52	120
Operations Supervisors	5	14	6
Main Frame Operators	12	39	51
Peripheral Equipment Operators	0	17	17
Production Control	1	5	
			501

- C. Personnel Training
 - period will be required to train the personnel for the System's Planning Group, the Production Programming Group and the Operations Group. It is estimated that a three-month period would be required to develop the training program. (This could be a joint MPRO/RED project.) Each training course would last four months except for the first two sessions which would last only three months. An additional month will be required for the later sessions due to the additional material to be covered which would be available at that time. Not more than four hours per day should be devoted to the HARVEST programmer training until such time as the writing of test programs starts.
 - 2. Assuming that the two-year period for training could commence on 1 November 1956, the training schedule would appear as follows:

Session	Date	Length	Hours/Day	Number of Trainees
*1.	Nov 58 - Jan 5	7 mo.	3	O
2.	Feb 59 - Apr 5	y 3 ma.	4	20
3.	May 59 - Jul 5	59 3 mo.	4	30
4.	Aug 59 - No / 5	59 4 mo.	4	30
5.	Dec 59 - Mar	O 14 BO.	14	30
0.	Apr 60 - Jul	50 4 mo.	4	30
*/ *	Aug 60 - Mov	50 4 mo.	1.	30

*This session is set aside for the development of the training program.

3. This training schedule would reflect on the EDPM 704, EDFM 705 and HARVEST Groups as indicated in the table below. There was an assumption in arriving at these figures that an equal number of programmers from the EDFM 704 and EDFM 705 Groups were in each of the training sessions and that an equal number of each type were selected for the HARVEST Group. The figures below indicate, there will be personnel trained for HARVEST programming in addition to

those from the EDPM 704 and 705 groups.

Date	HARVEST Group Size	EDFM 704 Group Size	EDPM 70's Group Size	Programmers Trained
Feb 59	0	65	ου	0
May 59	10	00	61	20
Aug. 59	30	50	51	50
Dec 59	50	40	41	50
Apr 60	70	30	31	110
Aug 60	<i>></i> 0	20	21	140
Dec 60	110	10	11	170

4. The programming training would be provided by two MPRO instructors.
There would be a requirement for one classroom from 1 February 1959
through 30 April 1959 and two classrooms for the duration of the
program.



- The data proparation personnel would not require any special HARVEST braining.
- operations personnel would be necessary and the training should commence in May 1000. This would be a four-hour/day training class to acquaint the operations personnel with the programming system and the operational aspects of the HARVEST components. (Supervisory personnel would be given programming training as well as operational training.) Approximately one-third of the operational personnel must be available by September 1960 for single-shift operation, one-third by January 1961 for two-shift operation and one-third by June 1961 for three-shift operation.
- ten technicians to perform maintenance on the HARVEST System would occur prior to the delivery of the system and partially at the contractor's site. The engineers would require one year of training and the technicians would require from six months to one year's training. Any additional maintenance personnel would be trained during the six-months contractor maintenance period at NSA.

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IV. CONCLUSION

The goal of the plan advanced in this discussion is to put into operation a system which is capable of absorbing the workload placed on MPRO by the Analytic Officies at the earliest possible date. In addition to satisfying the workload requirement, HARVEST will provide additional capacity to meet future workload increases and will reduce the MPRO EDPM rental budget. The estimated savings is \$3,318,990 based upon Fiscal Years 1959-1962 comparison as shown in the attached budget estimates.

Close cooperation and support of MPRO organizations and the Analytic Offices is necessary for the successful realization of the goal set.

NAULPHENT PLANNING CALENDAR

W FY 1959 FY 1960 FY 1960 FY 1961 FY 1962 AND THANG JASOND THANG TH	
APPROX. &	\$19,548 \$1,655 \$1,655 \$65,700 \$1,680 \$1,680 \$1,980 \$1,816 \$1,816 \$1,876 \$1,8
	HEDOCK HEDOCK HEDOCK HEDOCK HEDOCK 650 ATLAS I SER 1 ATLAS I SER 2 ROD ROT 705-111 ATLAS II SER 1 MAIDEN FORM HALE SKINHER CLIP PIN ATLAS II SER 2 HARVEST 704-1 704-2 (32K) 705-1 704-3 (32K)



ESTIMATED EDFN RENTAL BUDGET

	APPROX MONT				mana acido a
	RENTAL	FY 1959	FY 1960	FY 1961	FY 1962
SLED II 050 ROB ROY	\$20,290 21,655 5,940	\$ 182,610 129,930 23,760	\$ 243,480 259,860 71,280	\$ 243,430 259,860 71,280	\$ 243,430 259,860 71,280
705-3 705-III MAIDEN FORM CLIP PIN	48,413 65,700 6,880 4,680	53 0, 956	96,826 591,300 41,260 18,720	788,400 82,500 56,160	197,100 82,500 56,160
HARVEST 704-1 705-2 704-2 705-1 704-3 705-4	70,560 39,796 51,816 67,608 61,876 68,598 56,879	477,576 621,792 311,296 742,512 823,176 682,548	477,576 621,792 811,296 742,512 823,176 682,548	705,600 238,788 310,896 608,472 556,884 823,176 682,548	gho, 720 ·
		\$5.076.156	\$5,481,646	\$5,428,104	\$1,757,160



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