

A
Study of
Printing and Photography Division
Maintenance Programs

Systems Staff



August 1979

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A Study of Printing and Photography Division Maintenance Programs

Purpose

The purpose of this study is to present an updated overview of equipment and facilities maintenance, as currently experienced within Printing and Photography Division (P&PD) environs. The study will address four aspects of maintenance: Part I will examine internal maintenance, as performed by the Maintenance Staff and Division personnel; Part II looks at equipment preventive and repair maintenance services, as provided by contractors; Part III addresses aspects of GSA facilities maintenance and limitations. Recommendations for change or alternative suggestions will be found in the final section of the study, Part IV. The study will not attempt to relate the complex history of maintenance within the Division except where specifically relevant. Quite obviously, it has been an evolutionary program, in terms of personalities, direction, relative success and, in particular, the acquisition of increasingly more sophisticated equipment. It suffices to say that, in all probability, equipment maintenance has always been less than ideal (understaffed, underaccomplished) but the fact remains that, overall, the Division has continued to fulfill its mission very successfully over the years, regardless of real or imagined shortcomings in maintenance performance. Remarkably few people have done an exceptional job in maintaining Division production, relative to building and equipment maintenance.



PART I

DIVISION INTERNAL MAINTENANCE

Part I - Division Internal Maintenance

A. Establishing the Data Base

After planning ways and means of gathering significant information with which to accomplish this study, fact finding began on 1 February by requesting the Maintenance Staff to document their daily activities in some detail, for a three month period (61 working days). In addition, Branch and Staff Chiefs were tasked to gather specific data on contractor's maintenance performance during the same time frame. (Samples of the two data collection forms constitute Attachment A.) Upon completion of the three month data collection, summary statistics were developed and will be presented in company with associated narrative.

Table Number One provides basic statistics as compiled from input data gathered during the 61 day test period. It should be noted that, throughout this study, the use of the word "task" is more synonymous with "report" than with the implication of a single, totally complete accomplishment. A task represents the preparation of a single report and, over the test period, there were numerous occasions when the same job was reported on, during its period of accomplishment (spanning several days), by a number of task (or report) submissions. The amount of hours reported was reduced to the nearest tenth of an hour after they were originally reported in minutes. The 61 work day period provided the possibility of reporting on 1952 work hours. (Overtime, reported during this period, was of no consequence.) During this period 231.5 hours of the total were accounted for as annual, sick or administrative leave. Approximately 215 hours were unaccounted for when input data was summarized, leaving a balance 1469.3 hours (75.3 percent of total possible time) upon which to evaluate Maintenance Staff activities. It is believed that this percent of data input provides an adequate cross-section of their daily work.

Table One is divided in two categories: physical services performed by the Maintenance Staff within component locations and administrative activities (usually spare parts acquisition) performed by the Staff, for individual components, within the Staff's shop. Table One provides general insight as to how the Staff's time was spent, in terms of distribution of effort throughout the Division.

Table One

Basic Summary of 61 Day Test Period

	<u>Services In Component</u>		<u>Maintenance Administrative</u>	
	<u>Hours</u>	<u>Tasks</u>	<u>Hours</u>	<u>Tasks</u>
Offset Photo	50.3	47	1.5	2
Composing (MPP)	79.2	49	9.9	10
Composing (ETECS)	78.8	30	1.2	2
Plate Room	58	27	3.8	5
Press Branch	126.4	80	14.8	18
Bindery Branch	102.4	46	4.8	5
SPP	175.2	106	7.6	8
Photography Branch	362.5	226	33.1	33
Miscellaneous	26.9	22	-	-
GSA	65.8	55	-	-
Maintenance Shop*	31.7	23	235.4	196
TOTAL	1157.2	711	312.1	279

TOTAL HOURS: 1469.3

TOTAL TASKS: 990

AVERAGE TIME PER TASK IN COMPONENT: 1.6

AVERAGE TIME PER TASK, MAINTENANCE ADMINISTRATIVE: 1.1

* Further delineated and discussed in Table Five.

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While the balance of Part I examines details of this work distribution, it should be noted that the Photography Branch (PB) consumed more than 26 percent of the Staff's reported hours and tasks which translates to the use of a full man-year in internal maintenance support requirements. PB is also a large user of external service contracts and, additionally, performs a significant quantity of equipment maintenance using its own personnel resources. With the CMR identifying PB as having more than 1.64 million dollars worth of equipment, their maintenance requirements are extensive - and quite possibly worth the attention of a full-time maintenance position. Beyond the recorded work of the Maintenance Staff in PB there is an example of an unaccomplished task here which may exist in other forms, in other components. In November 1978, PB took delivery of more than \$14,000 worth of remote sensing equipment which requires installation by the Maintenance Staff. The Digitec System was acquired in the interests of improving quality control and reducing labor and materials waste. This equipment is, of this writing, still in its packing cases. The expenditure of considerable labor and knowledge is required; it apparently has not been available to date.

As former C/PB, I can attest to the fact that the practice of more equipment maintenance in this Branch would pay dividends and curtail time lost to failed hardware. When equipment fails time is lost to both the failure and the awaiting of an available Maintenance Staffer.

B. Distribution of Services

Table Two provides a detailed delineation of hours and tasks spent by the Maintenance Staff within component locations. The reporting forms which provided the input and basis for this table are considerably more definitive in describing the work accomplished; Table Two serves to consolidate these inputs into eight categories which are, for the most part, self-explanatory. (The last category, "adjust/check", is somewhat general in nature. As the name implies, some equipment was returned to an operational state by observing, adjusting, testing and operating. No electro/mechanical repairs were required. In other cases, the production employee did not understand the equipment's operation well enough to achieve a successful startup. The term "troubleshoot" was often used on the reporting form and this implied, in some instances, the necessity of studying an unfamiliar item before corrective action could be taken.)

Hours/tasks performed within the Maintenance Shop and for GSA have been omitted from Table Two as they are addressed elsewhere in the Study. Under the column identified as "component",

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Table Two
 Maintenance Services Performed in Component Locations

Component	Preventive Maintenance		Electrical Repairs		Mechanical Repairs		Plumbing Repairs		Equipment Removal/Relocation		Equipment Installation		Parts Fabrication		Adjust/Check		Total		Percent of Hours in Component
	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	
Offset Photography	-	-	26.7	21	9	10	9	8	1.5	2	-	-	2.5	3	-	-	48.7	44	4.6%
Composing (MPP)	-	-	9.4	8	17.8	14	.5	1	9.7	5	1.3	2	26.3	9	14.3	10	79.3	49	7.5%
Composing (E/TECS)	-	-	9	5	12.4	7	-	-	.6	1	12	5	43.9	10	1	2	78.9	30	7.5%
Plate Room	1	1	1.3	2	9.7	9	4	2	13.5	3	20.3	5	6.8	3	1.5	2	58.1	27	5.5%
Press Branch	1	1	23.9	18	52.5	37	.5	1	7	1	-	-	25.7	11	15.8	11	126.4	80	11.9%
Bindery Branch	14.3	2	5	5	32	22	-	-	2	2	-	-	48	13	1.1	2	102.4	46	9.7%
SPP	21	6	20	12	88.8	57	-	-	1.9	3	.8	1	1.5	1	41.3	26	175.3	106	16.6%
Photography Branch	-	-	71.6	53	135.9	72	52.9	42	13.6	6	14.5	5	32.1	13	41.9	35	362.5	226	34.1%
Miscellaneous	-	-	6.3	5	5.5	7	-	-	9.4	8	-	-	2.8	1	3	1	27	22	2.6%
TOTAL	37.3	10	173.2	129	363.6	235	66.9	54	59.2	31	48.9	18	189.6	64	119.9	89	1058.6	630	
Time Per Task	3.7		1.3		1.5		1.2		1.9		2.7		3		1.3		1.7 Average		

appears the word "Miscellaneous". This covers total services (27 hours, 22 tasks) provided for PPG, Badge Office, DDS&T, OGCR, G&VAS and senior P&PD management. As less than 1.9% of the Maintenance Staff's effort, this stat is treated as a good-will effort rather than one requiring immediate corrective action. Roughly half of the tasks were performed for the two identified P&PD elements.

Again, the Photography Branch appears as the major user of time. Some time will subsequently be saved, under the SPP heading, as a result of consolidation. The time per task average, 1.7 hours, may become useful in future programming or time allocation projections of staffing requirements. Most significant of all data in this table is the minimum expenditure of time identified with preventive maintenance. This problem is discussed in some detail subsequently.

Table Three examines the expenditure of hours and tasks among components, by specific Maintenance personnel. It appears that the workhours were relatively evenly distributed; tasks were less evenly divided but there is a direct correlation between the time per task and percentage of tasks performed. The accuracy and attention to details of preparing reporting forms has an effect upon these statistics. Again, the Maintenance Staff did not report upon 24.7 percent of their work time on board. Table Four, a breakdown of who performed what type of work, is companion to Table Three.

Examination of the data in Table Four does not produce any surprises, in terms of distributing types of work among Maintenance Staff personnel. As would be expected, mechanical repairs consume more time than other categories (excepting Maintenance Administration, as discussed later). Electrical, mechanical, plumbing repairs and parts fabrication represent employee skills; the percentage figure in parenthesis, under the hours used by each employee, represent their respective portion of the total expended for that category (skill). While L.D. appears to perform more electrical repairs than others, D.K. leads in mechanical repairs, L.D. leads in plumbing repairs and J.M. appears to spend more time in fabricating parts than others, there is no definitive pattern of employee skill specialization; the sampling may be too small to make specific assumptions. While each Staffer may indeed have his speciality, the total workload seems reasonably well distributed. The most apparent fact established in this table is the minimal amount of time allocated to preventive maintenance.

Table Three

Distribution of Maintenance Personnel Services, by Components
 (Includes Within Component Services and Associated
 Administrative Time/Tasks)

Component	L.D.		D.K.		D.S.		J.M.	
	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks
Offset Photography	31.6	29	4	5	9	8	7.3	7
Composing (MPP)	23.5	13	27.9	22	9.1	8	28.6	16
Composing (ETECS)	8.1	5	8.4	7	29.8	10	33.8	10
Plate Room	12	13	14.1	6	28.3	9	7.5	4
Press Branch	4.3	8	32.9	20	88.3	54	15.7	16
Bindery Branch	-	-	28.4	16	47	22	31.8	13
SPP	105.3	74	22	10	24	13	30.5	17
Photography Branch	124.8	107	182.7	98	60.6	34	27.5	20
Miscellaneous	12.4	6	10.5	11	2.5	3	1.5	2
GSA	3.1	4	23.8	22	9.8	9	29.3	20
Maintenance Shop*	79.2	103	64.3	51	8.9	14	114.9	50
TOTAL	404.3	362	419	268	317.3	184	328.4	176
Time Per Task in Hrs.		1.1		1.6		1.7		1.7
Percent of 1469 Hrs.		27.5		28.5		21.6		22.4
Percent of 990 Tasks		36.6		27		18.6		17.8

* See Table Five

Table Four
 Distribution of Maintenance Personnel
 Services, by Type of Work

	L.D.		D.K.		D.S.		J.M.		TOTAL	
	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks
Preventive Maintenance	22	8	8.3	2	7	1	-	-	37.3	11
Electrical Repairs	74.1 (41.2%)	61	34.5 (19.2%)	30	52 (28.9%)	33	19.3 (10.7%)	12	179.9	136
Mechanical Repairs	95.7 (25.5%)	89	147.4 (39.2%)	73	93.7 (25%)	58	38.8 (10.3%)	24	375.6	244
Plumbing Repairs	31.5 (47.1%)	24	18.2 (27.2%)	15	11.5 (17.2%)	9	5.7 (8.5%)	6	66.9	54
Equipment Removal/ Relocation	14.8	9	9.1	9	18.8	5	16.5	9	59.2	32
Equipment Installation	5.8	4	16.3	5	23.5	5	3.3	4	48.9	18
Parts Fabrication	19.8	11	41.9	15	58.6	23	82.5	21	202.8	70
Equipment Adjust/Check	49.3	34	38.9	32	25.6	19	7.8	7	121.6	92
Maintenance Admin.*	91.3	122	104.4	87	26.6	31	154.5	93	376.8	333
TOTAL	404.3	362	419	268	317.3	184	328.4	176	1469	990

* See Table Five

C. Activities Within the Maintenance Shop

Some 219 reports and 267 hours were identified with duties performed within the Maintenance Shop itself. More than 18 percent of the total reported time was devoted to these duties, which are identified and defined in Table Five. The shop contains about 75 items of electrical and mechanical test and parts fabrication equipment which support repairs throughout the Division - all or part of which requires periodic maintenance. The shop is also headquarters for parts identification, acquisition and storage; spare or replacement parts management requires the time and attention of all Staff personnel. As with others working in a technical world, these personnel require occasional training, especially when working in an environment of rapidly changing technology. Training in this context, can mean both self training and the instructing of other personnel who use the equipment. Maintenance Staff formal training appears to have been very limited, dating back to 1970. Since that time four people have attended eight maintenance related courses, of which five are directly applicable to four of more than 600 P&PD equipment items. Ten one-day equipment or engineering expositions were attended, several correspondence courses completed and only three OTR courses were attended, of which one was not job related.

The inference here is that repair efficiency would improve if time were allocated to acquiring maintenance training by the manufacturer, on a greater variety of P&PD equipment. In addition, OTR does offer supervisory and management courses which, in turn, might effect improved time and materials management. Surely there must be organizations and associations in the field of maintenance, to which membership and attendance would be beneficial.

Table Five also indicates the use of 30 hours for "running errands". Unless a maintenance specialist is required on the vendor's premises to inspect parts or supplies, errands should be performed by those personnel earning considerably less than an average of \$13.26 per hour.

D. Repair and Preventive Maintenance

So as to establish an appreciation for the size and magnitude of P&PD's maintenance program, the Division's CMR was evaluated on a page-by-page, line-by-line item basis. In evaluating this CMR, it was recognized that:

- 1) some equipment line items have since been PTI'd;
- 2) other items are maintained via contract;
- 3) there are a number of CMR listings which are not, in all probability, repairable through inhouse facilities. (If inoperable, these items would be "farmed out" for repairs

Table Five
In House Maintenance Tasks

	L.D.		D.K.		D.S.		J.M.		TOTAL	
	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks	Hours	Tasks
Electrical Repairs <u>1/</u>	4.3	5	2	2	-	-	.3	1	6.6	8
Mechanical Repairs <u>1/</u>	6.6	4	5.4	5	-	-	-	-	12	9
Parts Fabrication <u>2/</u>	-	-	5.5	4	1.6	1	6	1	13.1	6
Training <u>3/</u>	-	-	9	6	.5	1	44	11	53.5	18
Shop Maintenance <u>4/</u>	3.3	5	7.7	5	1	1	.8	2	12.8	13
Admin/Clerical <u>5/</u>	40.5	66	14.9	9	1	1	59.5	27	115.9	103
Attend Meetings <u>6/</u>	7	13	7.7	13	4.3	9	4.3	8	23.3	43
Errands <u>7/</u>	<u>17.5</u>	<u>11</u>	<u>12</u>	<u>7</u>	<u>.5</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>30</u>	<u>19</u>
TOTAL	79.2	104	64.2	51	8.9	14	114.9	50	267.2*	219**
Average Time/Task	.8		1.3		.6		2.3		1.2	

* % of 1469 hours: 18.2%

** % of 990 tasks: 22.1%

Footnotes/definitions:

- 1/ Electrical and mechanical repairs are defined as repairs required of and performed on Maintenance Shop equipment.
- 2/ Parts fabrication represent parts made for the shop but also include some parts made for other P&PD Components.
- 3/ Training includes time allocated to "required reading" and personal instruction on administrative guidance. J.M. took an OTR training course, requiring 30 hours.
- 4/ Shop maintenance includes time spent in shop cleaning, parts inventory and warehousing, other housekeeping chores.
- 5/ Admin/Clerical includes answering the phones, preparing and coordinating parts orders, preparing weekly activity reports, writing FRs and other assorted office type duties.
- 6/ Time devoted to attending meetings represents mostly staff meetings. There were several instances of meetings devoted to planning for a new project.
- 7/ Errand time was spent in physically acquiring spare parts and needed supplies throughout the D.C. area, delivering these parts to the use site.

or simply replaced.) In addition, it is quite obvious that the CMR does not identify all P&PD repairable items since it is limited to listing equipment valued in excess of \$200 and items of personal appeal nature.

Nonetheless, the CMR does form a reference framework for equipment items requiring both internal repair and preventive maintenance. In a somewhat arbitrary manner, each applicable equipment line item was designated as repairable only or repairable and eligible for preventive maintenance. In simplest terms 616 line items were identified as internally repairable; in addition, 175 of these items require some form of preventive maintenance. These 616 items have a CMR listed dollar value of \$2,961,111. Table Six provides a listing of component equipment maintenance requirements plus the total dollar values, of all their holdings, as derived from the CMR.

The logistics of Table Six, by adding PM tasks to repair tasks, suggest that four maintenance personnel have responsibility or relationship for approximately 195 equipment items per person. This figure is tempered by those equipment items rarely needing repair and equipment that is repaired by component personnel. Nonetheless, based upon relevant averages determined in Table Two and theoretical estimates of annual PM and repair requirements, it is quite conceivable that five work-years can maintain P&PD equipment items more adequately than is accomplished today with four personnel. Since the Maintenance Staff is already in search of an apprentice and the need has been identified for multiple shift coverage, five personnel, working under a structured form of time and task management, should be able to increase their support, particularly in servicing maintenance requirements.

At this juncture it may be of value to speak specifically of preventive maintenance (PM). As the words imply, this form of maintenance is required or accomplished so as to substantially reduce repair maintenance and its attendant unscheduled downtime. It should be applied to critical, often one-of-a kind equipment items containing a large number of moving parts that require lubrication, adjustment, cleaning or short life parts replacement. PM may be accomplished by equipment operators and/or maintenance personnel, depending upon the complexity of tasks involved. In theory (and within reason) the more PM performed, the less the need for interruptive repair maintenance. In identifying 175 line items in the CMR that require PM, the figure is considered conservative - and illusive. Ideally, many more items could be PM'ed; realistically, the actual quantity (and quality) of PM work is difficult to estimate. It is known, for example, that continuous film and paper processors refuse to operate

Table Six

Distribution of Equipment requiring Internal Repair and Preventive Maintenance, by Component (Through CMR 1/ Analysis)

<u>Component</u>	<u>Equipment Items Requiring Repair Maintenance</u>	<u>Equipment Items Requiring Repair and Preventive Maintenance</u>	<u>CMR Dollar Value Summary (All Items)</u>
Systems Staff	3	-	8,608.00
Special Printing Plant <u>2/</u>	27	14	335,346.00
Offset Photo Branch	39	7	266,765.00
Photography Branch	356	66	1,638,809.00
Supply and Services Staff	62	6	425,404.00
Press Branch	32	21	565,419.00
Composing Branch	27	6	1,348,244.00
Bindery Branch	53	51	374,053.00
Graphics and Visual Aids Staff	17	4	29,262.00
TOTAL	616	175	4,991,910.00

1/ CMR dated August, 1978; equipment since added, PTI'd

2/ SPP equipment integrated with Press, Offset, Bindery, 1 July 1979; several equipment items PTI'd.

successfully without frequent PM. On the otherhand, photographic rollhead printers receive only the most cursory PM by their operators and continue to function until they fail, even though a periodic professional PM may have prevented or curtailed repair maintenance. These examples are typical of many other items of production equipment.* The bottom line is that, with limited personnel resources, timely, formal comprehensive PM is not performed on all equipment within the Division that is deserving of such care; the practiced philosophy of "fix it when and if it breaks" has been relatively effective when examined as a general course of action. Nonetheless, the development of a more aggressive and positive division-wide PM program will improve responsiveness and product consistency while reducing waste in time and materials.

E. Staffing for Equipment Maintenance

The 61 day delineation of tasks performed by the Maintenance Staff, upon analysis, reveals that this four man work force performed a wide variety of services for an even wider variety of requestors. The sometimes deprecative appellation of jack-of-all trades is, in this case, most complimentary; the Division, simply put, would be in an assorted quantity of difficulties without their responsiveness in exercising their skills and knowledge. The possibility (always) exists that the P&P Building would be untenable without their talents.

As is known, maintenance accomplishment is not limited to four specialists. Each Division component has personnel who are qualified, over a broad spectrum of skills levels, to perform repair and preventive maintenance. In some instances, these people are more knowledgeable and capable in performing repairs on selected equipment items than are members of the maintenance crew. In this context, the Maintenance Staff personnel are generalists, within the maintenance speciality and the Division maintenance workload is effectively supplemented, complemented and, in essence, more or less accomplished by a combination of staff generalists, and branch specialists. Unfortunately, Branch production can suffer when Branch personnel turn their efforts to equipment repair - but this move is, upon many occasions, the most expedient method of getting the machine repaired or PM'ed and returned to the production sequence. Unless there is a radical turn in Maintenance Staff personnel allocation, the

* Most equipment manufacturers, especially those who sell the more expensive and complex gear, provide recommended equipment check lists and PM schedules, based upon time and/or machine cycles. The PM requirements for each device are not difficult to identify and implement.

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use of component repair talent will probably be continued and should be improved.

The consolidation of SPP and MPP both simplifies and complicates maintenance. Under consolidation, fewer equipment items are required, there is less lost time in reaching inoperable machines and more knowledgeable repair personnel are available in the same plant. On the otherhand, equipment is used more extensively over a full three shift, seven day schedule and the pressures for improved throughput will increase. The need for more full-time, qualified maintenance personnel who can adequately cover an expanded workweek is essential.

Finally, in rounding out this portion of the study, the Government Printing Office was queried as to the ways and means of maintenance within their facility. The details of these findings may be reviewed in Attachment B. In sum, GPO's maintenance program is much broader in scope, larger in staffing and facilities, better organized in operating procedures and virtually free of GSA encumbrances. Their personnel recruiting and pay scale systems are currently undergoing change.

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PART II
CONTRACT MAINTENANCE

Part II Contract Maintenance

A. Maintenance Contracts in Effect

Contract maintenance information was derived from two primary sources: the maintenance contracts currently in effect in P&PD and the Contract Maintenance Service Reports turned in by the branches during the course of this study. Table Seven identifies 17 maintenance contracts in effect with P&PD. An additional 11 repair contracts are used mostly for parts purchases but also serve as back-up maintenance service contracts that may be called in when necessary. These 17 maintenance contracts cover 146 separate pieces of equipment. The FY-80 budgeted amount for these contracts is \$455,264, whereas FY-79 has budgeted \$409,318 for similar coverage. The difference between the \$409,318 budgeted for FY-79 and the \$358,019 obligated through July is that final quarter obligations are not yet available. Also, where budgeted amounts will obviously exceed obligations, contracts are deobligated in the final quarter of the fiscal year and funds will be allocated to other contracts where needed. Table Seven also identifies the equipment covered and type of service (on call or scheduled) together with response times.

The Parts and Repair Contracts portion of Table Seven is not directed to specific pieces of equipment (except for the Washington Printing contract for Davidson press support, and the GAF Ozalid contract) but identifies contracts used for parts acquisition. These contracts are also relied upon for back-up service and repair personnel when the P&PD workload exceeds that which the Maintenance Staff can reasonably cover. The Parts and Repair contracts listed in the table have a total budgeted amount of \$28,500 for FY-80. Parts are usually picked up by Maintenance Staff personnel when needed and service is usually available upon the same or next day following a telcon request.

Table Eight shows the breakdown of contract support by branch, the number of pieces of equipment covered and the respective value of the contracts. As indicated in the tables, most of the contract maintenance support is for copier and computer-based equipment for which P&PD does not have the staff, equipment, or facilities to support at present.

Table Seven

Summary of Maintenance Contracts for FY-79, FY-80

A. Maintenance and Service Contracts

	<u>Branch Locations</u>	<u>No. of Units</u>	<u>FY 1980 Budgeted Amount</u>	<u>FY 1979 Budgeted Amount</u>	<u>FY 1979 Obligated Through July</u>	<u>FY 1978 Obligated</u>	<u>Type of Service/Response</u>	<u>Equipment</u>	
1	A.B. Dick <u>1/</u>	Press	0	Cancelled	5,200	3,758.00	4,269.00	Monthly P.M.	3 Presses
2	AM Bruning	Photo	2	7,000	6,100	4,575.00	3,456.00	Weekly P.M.	Diazo Duplicator
3	Atex Inc.	Comp	64	82,164 <u>6/</u>	53,000 <u>6/</u>	29,396.00	41,273.00	On Call	CPUs, VDTs, etc.
4	Autologic	Comp	2	40,000	37,000	27,675.00	31,253.00	On Call	APS - 4 & 5
5	Bell & Howell <u>1/</u>	Photo	1	2,000	2,000	1,500.00	750.00	On Call	Envelope Stuffer
6	Compugraphic	G&VAS	1	1,000	800	580.00	462.00	Quarterly P.M.	Display Typesetter
7	ECRM	Comp	2	8,000	8,505	2,912.00	4,413.00	On Call	OCR Scanner
8	Itek	Press	2	4,000	3,500	2,430.00	900.00	On Call	Platemakers
9	Itek	G&VAS	1	500	400	171.00	1,200.00	On Call	Enlarging Artwork Originals
10	Kodak	Photo	1	5,000	5,000	671.00	2,798.00	On Call	Neg. analyzer (VCNA)
11	Kodak	Photo	2	500	500	365.00	2,460.00	Bi-yearly P.M.	Kodak color printer & Data converter
12	Pako Service	Photo	3	1,000	800	373.00	3,800.00	On Call	Film processors
13	Savin Corp.	Agency	10	6,869 <u>2/</u>	6,480	6,480.00	- <u>3/</u>	On Call	10 Agency owned copiers
14	Terminal Data Corp.	Photo	1	7,620	7,620	5,715.00	5,750.00	Monthly	Documate II camera
15	Vari-Tech	Comp	1	500	312	312.00	51.00	6 P.M. yearly	Verityper
16	Werres Co.	SS	5	5,000	4,102	3,077.00	3,662.00	Monthly P.M.	Supply & Services forklifts
17	Xerox Corp.	Agency	<u>48</u>	<u>284,111</u> <u>2/</u>	<u>268,029</u>	<u>268,029.00</u>	<u>72,005.00</u> <u>4/</u>	On Call	48 Agency owned copiers
	Total		146	455,264	409,348	358,019.00	178,494.00		

Table Seven

Summary of Maintenance Contracts for FY-79, FY-80

B. Parts and Repair Contracts

	<u>Branch Locations</u>	<u>No. of Units</u>	<u>FY 1980 Budgeted Amount</u>	<u>FY 1979 Budgeted Amount</u>	<u>FY 1979 Obligated Through July</u>	<u>FY 1978 Obligated</u>	<u>Type of Service/Response</u>	<u>Equipment</u>	
1	A.B. Dick <u>1/</u>	Press	-	Cancelled	200	0	0	On Call	Duplicators
2	AM <u>1/</u>	Press	-	500	300	0	57.00	On Call	Presses PTI'd
3	Bureau of Census	Maint	-	500	2,000	0	0	As Needed	Misc. design & fabricate <u>5/</u>
4	Dominion	Maint	-	500	500	434.00	808.00	On Call	Electric supplies
5	GAF	Photo	1	500	200	0	0	On Call	Ozalid
6	Harrigan Roller	Press	-	8,000	7,000	5,269.00	5,902.00	On Call	Press rollers
7	Machinist Inc.	Press	-	10,000	8,000	3,574.00	8,000.00	On Call	Press parts & engineering
8	Refrigeration Supply	Maint	-	1,000	300	233.00	825.00	On Call	Tools & refrigerant
9	Specialties Inc.	Maint	-	1,000	700	443.00	540.00	On Call	Parts, bearings, tools
10	Wash. Printing	Press	5	5,000	2,000	3,839.00	4,000.00	On Call	Davidson parts
11	W.W. Grainger	Press	-	<u>1,500</u>	<u>900</u>	<u>723.00</u>	<u>1,424.00</u>	On Call	Parts & bearings
	Total		6	28,500	22,100	14,515.00	21,561.00		

1/ Maintenance contracts cancelled for FY-80.

2/ Based on estimated 6 percent increase for copiers over FY-79 costs.

3/ No Savin machines were owned in FY-78.

4/ Only 14 Xerox machines were Agency owned in FY-78.

5/ On contract for design and fabrication of parts which are beyond capabilities of P&PD Maintenance shop.

6/ The FY-80 ATEX contract was increased by \$4,591. on 6 August 1979 to \$86,655. At the same time the FY-79 contract was increased to \$61,600.

Table Eight
Contract Coverage by Branch

Branch	Composing	Photo	Press	Supply	G&VAS	Systems Staff
Contracts	4	6	2	1	2	2
Items Covered	69	10	5	5	2	58
Total Value	130,664	23,120	10,000	5,000	1,500	275,509

The greatest dollar value maintenance contract items are P&PD owned copiers. This category is composed of 58 machines, 10 Savin (two model types) and 48 Xerox (6 model types). The total FY-79 maintenance cost for this equipment is \$275,509 and projected FY-80 costs are \$292,040. These maintenance costs include replacement parts. P&PD does not presently have the trained personnel to support copier maintenance, however, in view of the large dollar outlay for copier maintenance contracts it would appear to be a candidate area for possible P&PD Maintenance Staff support if personnel could be acquired and trained.

The four contracts for support of Composing Branch equipment are for the Autologic APS 4 and 5 Phototypesetters, the Atex system equipment, the ECRM optical character readers and a Vari-type typewriter. Similarly, the equipment under maintenance contract in the Photography Branch (Kodak data converter and color printer, TDC microfiche camera, Bruning diazo duplicator and collator, the Bell and Howell envelope stuffer and the Kodak negative analyzer and data compensator) are all complex electrical devices that require service-by-personnel having highly specialized training on these machines.* While the technical expertise necessary for in-house support of these systems could conceivably be within the capabilities of P&PD maintenance personnel (as is done at GPO), the present staffing and T.O. ceiling has not, to date, permitted additional personnel and training necessary to implement this type of maintenance.

* All Datagraphix COM equipment is rented; corrective and preventive maintenance is accomplished under terms of the rental contract.

B. Results of Contract Maintenance Service Reports

During the course of this study 83 Contract Service reports were turned in by the Branches. The component breakdown was: Composing, 27; SPP, 26; Photography, 25; and G&VAS, 6. All of the Composing contract calls were for support of the Atex system except for two Autologic phototypesetters and one ECRM scanner report. Twenty of the 26 SPP reports were for repairs on their Xerox machines (10 for the 9200, 6 for the 7000, and 4 for the 9400). The remaining 6 SPP contract service calls were all for the A.B. Dick 360 duplicators. In the Photography Branch 23 of 25 maintenance calls were for micrographics equipment: Datagraphix Auto-Com, 10; Datagraphix 4560 COM, 5; Documate II camera, 3; Quantor diazo duplicator, 3 and two for the Bruning diazo duplicator. Two calls requested service on a Hope color film processor. The remaining 6 requests were from Graphics and Visual Aids Staff, of which 5 were for the color Xerox machine and one was for the Itek camera.

Contractor response times ran from 15 minutes to 7 days (a contractor claimed to have lost a service request). Most response times were within one to three hours with virtually all requests answered on the same or next working day. Of the 83 Contract Service Reports collected, 19 were for preventive maintenance and 64 were repair maintenance calls. Only Datagraphix, Xerox, A.B. Dick, and Atex Versatex performed regular preventive maintenance (PM) as called for in contracts. Bruning and ECRM did not perform scheduled PM but included it in with the service calls. The most common causes of maintenance requests were paper jams in the Xerox machines and equipment failures due to complex electronic circuit failures in composing and micrographics apparatus.

C. Forthcoming contracts

An additional maintenance contract will be established to support the MIS system now being installed in P&P Building. RLG warranties the software for one year, after which a maintenance contract will be developed for future support. The computer language portion of the software (Unibase) is covered by warranty for 5 years. The hardware portion of the MIS system consists of 22 separate items, all of which will be maintained by DEC through a shared contract no. GS-00C-01227 which covers all PDP 11/34 computer systems in the Agency.

D. Conclusions

Overall, the maintenance contracts seem to be a necessary method of assuring equipment operation in areas where present Maintenance Staff capabilities and experience cannot provide coverage. However, maintenance contracts may, upon occasion, be considered as a rather poor solution to providing this coverage because P&PD Maintenance Staff

personnel have a lack of control over the contract maintenance performance. Overall the quality of maintenance performed by all contractors is considered less than desirable. Repairs are accomplished hurriedly but usually not thoroughly with the result that equipment frequently soon fails because of the same problem that was not properly repaired. When inexperienced or marginal repairmen perform ineffective repairs (as occurred under the cancelled A.B. Dick contract) the only course open to P&PD is to re-request that the maintenance be performed and hope that another repairman is sent. In some instances (such as with the ECRM contract) the local repairman does not get support from his company, which delays repairs being made. When service response times are considered, valuable production time can be and is lost while awaiting contract maintenance.

Inasmuch as the maintenance contracts to support electronic and computer equipment total \$150,000 (\$130,000 Composing Branch and \$20,000 Photography Branch), the acquisition of these skills by the Maintenance Staff could substantially offset these costs or allow the contract coverage to be reduced, as is the practice within the Government Printing Office. As referenced elsewhere in this Study, the Maintenance Staff would require augmentation in both personnel and skills.



PART III

LIMITATIONS IN GSA SUPPORT

Part III - Limitations in GSA Support

A. Major Problems

GSA services support for the Printing and Photography Building invariably ranges from very slow for the most critical problems to nonexistent for a number of normal duties. Only the most urgent problems and projects of long-standing were addressed by GSA during the reporting period involved in this study. In this category were five major problems:

1. Two of the three front doors of the P&P Building had faulty hinges and were unusable for much of January through April, presenting a safety problem that was not corrected for four months. Failure to acquire replacement parts in a timely manner was one cause of the delay.

2. During the weekend of 10 - 11 February, faulty air handling equipment allowed the ambient air temperature to drop below 32°, causing the sprinkler system pipes to freeze and rupture in the front corridor of P&P Building. This situation was allowed to develop despite repeated calls to GSA by the FPO on duty in the building. Building damage was not severe, but a number of workhours were lost by P&PD personnel in reacting rapidly to a series of leaks. Delays in replacing damaged plumbing caused the sprinkler system to be out of order until the last week of March (over six weeks).

3. The sprinkler system failure finally required replacement of damaged ceiling tiles in first floor halls and downstairs. The replacement of this obsolete ceiling tile had been requested two years earlier but the order had been "lost" by GSA. Ceiling tile replacement is now nearing completion in the building, some five months after a portion was removed following the sprinkler failure.

4. On 5 March, a broken water valve in GSA room G-5 caused a 4-hour interruption of hot water in the Main Printing Plant. This created temperature control problems for photographic film processors and production delays in Composing Branch. (This is a typical example in a long history of critical water system failures in the building.)

5. Another long term project (several years) involved a request to replace a door frame between the microfilm processing room and a corridor. This jammed door involved both safety and security considerations. Finally, after the wall was breached and the entire door and frame removed, a piece of plywood barricaded the opening for several weeks until new masonry and a replacement door filled the opening.

B. Safety-related Problems

A second category of GSA maintenance shortcomings concerns safety-related problems. In this regard reports have been submitted by the P&PD safety officer concerning the sidewalks in front of the Printing and Photography Building. Two other safety related requests have gone unanswered of which one had potentially serious consequences:

1. An unfulfilled request, submitted to Space Maintenance & Facilities Branch (SM&FB) on 11 November 1977, for the construction of a parking barricade in the P&PD parking lot (while proposed to avoid damage to the P&PD Building), could have prevented a personal injury in April, when a man was caught between a truck and the loading dock.

2. Another request to SM&FB, also requesting repairs to the parking apron at the P&PD loading dock, was submitted on 13 October 1978 but is still awaiting action.

C. HVAC Problems in Printing and Photography Building

Perhaps the single, most persistent GSA related problem in P&P Building is the continuing failure of the entire HVAC system. Poor pressure balance and temperature controls operation have resulted in an uneven distribution of heating, air conditioning and humidity throughout the building. These utilities are essential to both printing and photographic production operations, in terms of exercising quality control procedures. In addition, personnel have alternately complained of being too hot or too cold and these problems have been verified upon many occasions when temperatures exceeded even the most liberal heating/cooling specifications. Twenty-five degree temperature differences within the building, summer and winter, are not uncommon. The volume of air exiting supply ducts varies from zero to gale force. On many occasions the air handlers draw outside air through building doors when the air intake system fails. This creates a dirt problem and a safety hazard.

The history of HVAC problems date back to the beginning of building occupancy. In twelve years of building use the third system of humidity control is, at best, only partially successful. Hot/cold air mixing boxes, through inadequate maintenance, fail to maintain temperature. Air filtering systems have failed repeatedly. GSA engineers, knowledgeable in the use of HVAC controls and equipment, have been transferred without training replacements. Main control systems have been left to degenerate without repairs or maintenance.

A study of the Printing and Photography Building's HVAC systems was conducted by an outside contractor three years ago. Headquarters Engineering Branch has also evaluated the system. However, the data collected was insufficient to form the basis for the major renovations thought to be necessary for the system. As a result, a new architectural and engineering contract has been let to H.D. Nottingham Associates of McLean. They will re-study P&P Building's HVAC System, the color lab renovation project, and the feasibility of installing a small boiler in P&P Building in lieu of dependency on the main power plant. This study is intended to provide an update of current requirements necessary for an effective HVAC System. Beyond a need for environmentally conditioning printing paper stock, there is also an HVAC-associated problem in the Press Room resulting from accumulated dust on the ceiling fixtures that may present an explosive hazard if humidity control is not maintained. This dust circulates throughout the building and is an identified airborne contaminant in the Photography Branch.

D. Major Problems Affecting Individual Branches

Major problems of less than emergency proportions compose one of the largest categories of GSA shortcomings. These are particular problems relating to specific work areas and are exemplified in the following:

1. The absence of periodic cleaning of ceiling ducts and light fixtures which would otherwise improve lighting and reduce airborne contaminants in Press, Photography and Bindery Branches.
2. The need for a dropped ceiling in the Press Branch which would alleviate the problem of dust accumulation.
3. Painting of walls and ceilings in the Offset Photography, Press, and Bindery of the building. Some original paint is now 12 years old.

4. Roof leaks are reported in both Offset Photography and Bindery Branches for which repair requests were made in February 1977. In fact, roof leaks throughout the plant have been reported with some frequency, of which the most serious have been patched on a one-for-one basis. One leak, in fact, has not been patched; GSA has, instead, installed a catch basin and drain line rather than cure the problem at its source.

5. A persistent plumbing problem has existed for more than a year in the men's room, Photography Branch. Repeated attempts by GSA to remedy a urinal that does not operate properly have only resulted in temporary repairs. A vacuum breaker in this room has never functioned correctly, resulting in a continually wet floor. At the same time the commodes have also suffered intermittent breakages. Satisfactory permanent repairs have thus far eluded the efforts of GSA.

6. Insect control has been a persistent problem in the snack bar which in turn affects Photography Branch and other building areas. Over the past year, GSA's monthly spraying for roaches and fruit flies proved largely ineffective. Repeated complaints earlier this year brought a promise of twice-weekly spraying from GSA; this schedule has subsequently broken down and spraying has once again become irregular. The last spraying was on 18 June and the insect problem still exists. A professional approach to the problem is obviously required.

E. GSA Response to Major Space Renovations

The last of the major problems with GSA performance of duties involves the response to office and production space renovations. P&PD renovation projects currently awaiting action are:

1. The Photography Branch Color Lab renovation project has been in the works for two years with no reconstruction in sight. Changes in costs, equipment and requirements now require alterations in the plan before it can be implemented. Planning for these changes has consumed an extensive quantity of work hours, drawn from P&PD resources, which now appear to be a waste of time due to age.

2. Another renovation project involves the reconfiguration of P&PD main administrative offices for which plans were submitted to the Architectural Design Staff and Headquarters Engineering Branch in February 1979.

The project has a GSA project number now and is in their projects queue. Rumor suggests that actual work will not begin until 1980.

3. A recent history of GSA service requests is reviewed in Table Nine.

F. Deficiencies in Routine Upkeep

The remaining GSA deficiencies in the P&P Building can be categorized as routine upkeep and maintenance jobs throughout the plant. These duties include replacing lights and cleaning fixtures which, along with janitorial services* (cleaning carpets, polishing floors, and emptying trash), form the most common and widespread class of complaints emanating from production areas. In some Division components, production quality is directly related to dust control, of which floor maintenance is a contributing factor. A year ago a major effort was undertaken to simply get building windows washed. There are many water valves, faucets, drains and restroom connections throughout the building which lack the maintenance necessary to keep this plumbing operational and avoid an uncalculated amount of waste. Table Ten shows the result of surveying branches and staffs for reports on GSA shortcomings.

The long standing problem with GSA trash pick-up at the P&PD loading dock has only recently shown signs of improvement. A form of trash compactor has been installed which permits building users to dispose of waste at any time, rather than at the signal of the contractor's arrival. There has been little time in which to gain experience with the device but, at this writing, it is an improvement. About the same time that the compactor arrived, the elevating ramp in the loading dock failed. GSA did not respond to its repair; P&PD acquired replacement parts and installed them.

A tour through GSA's equipment room (G-5, P&P Bldg.) disclosed a number of additional shortcomings which have plant-wide impact. In this area P&PD maintenance personnel have responsibility only for replacing hot and chilled water filters and air filters on air compressors. HVAC system controls in G-5 are supposed to be maintained by GSA. Problems with chilled water shut off are less frequent since a new valve was installed to furnish a constant supply of chilled water to the computer room in Composing. The pumps for hot water (usually a winter

* Credit must be given to the GSA charforce who, by and large, make an honest effort to maintain floor surfaces and restroom cleanliness as effectively as possible, given their limited resources. They are simply understaffed relative to the total requirement.

Table Nine

Work Requests Submitted to LSD

Current Work Requests

<u>P&PD Work Order No.</u>	<u>Date Requested</u>	<u>Work to be Done</u>	<u>LSD Work Order No.</u>
001-79	03 Oct. 78	Remove sign holder and electrical outlet	Done Feb. 79
002-79	03 Oct. 78	Repair macadam apron at loading dock	79-0271 79-0410
003-79	24 Oct. 78	Renovation of S&SS office	79-0347
004-79	08 Nov. 78	Audio amplifier for Maintenance shop phone	Done Mar. 79
005-79	16 Jan. 79	Construct forms cabinet for Composing Branch	79-0849
006-79	16 Jan. 79	Isolation transformer for Composing Branch	79-0853
007-79	16 Jan. 79	New suspended ceiling	79-0850
008-79	17 Jan. 79	Repaint health room	79-0822 Done Apr. 79
009-79	17 Jan. 79	Install wall sink in health room	79-0822 Done Apr. 79
010-79	17 Jan. 79	Install wall phone in health room	79-0822 Done Apr. 79
013-79	30 Apr. 79	Install two circuits (Bindery)	Done June 79
014-79	03 May 79	Paint 154A and 159 Production Planning	In Process
015-79	03 May 79	Install intercom (7G-30 -- GJ-56)	In Process
016-79	03 May 79	Install new sliding doors Photo Branch	In Process
017-79	03 May 79	30 feet of pipe Press Room	In Process
018-79	11 May 79	Clean carpet Offset Photo Branch	In Process

<u>P&PD Work Order No.</u>	<u>Date Requested</u>	<u>Work to be Done</u>	<u>Work Order No.</u>
019-79	22 May 79	Exhaust ducts for Plateroom	In Process
020-79	04 Jun. 79	Install 50 AMP service in Layout	In Process
021-79	12 Jun. 79	Reconfiguration GJ-56	In Process
022-79	12 Jul. 79	Construct ramp - Loading Dock	In Process
023-79	12 Jul. 79	Dock reconfiguration	In Process

Outstanding Work Requests

<u>Date Requested</u>	<u>Work to be Done</u>	<u>LSD Work Order No.</u>
04 Feb. 77	Request for Roof and Flashing Repair	77-1137
11 Nov. 77	Parking Barricade at Loading Dock	78-0677
08 Feb. 78	Repair Roof Leaks	78-1314
08 Aug. 78	Reconfigure Administrative Offices	78-2781
14 Aug. 78	Replace door Rm. G16	Done Jul. 79

Table Ten

Branch Reports on GSA Problems

	Office Areas	Composing ³ Branch	Offset Photography Branch	Press Branch	Bindery Branch	Photography Branch	Supply and Services Staff	Lunch Room and Corridor Areas	TOTAL
HVAC ¹	X	X	X	X	X	X	X	X	8
Lights ²	X	X	X	X	X	X	X	X	8
Duct Cleaning				X	X				2
Painting			X	X	X				3
Minor Repair ⁴					X				1
Floor Maintenance	X	X	X	X	X	X	X	X	8
Roof Leak			X		X				2
Renovations	X					X	X		3
Insect Control						X		X	2
Plumbing	X		X			X			3
TOTAL	5	3	6	5	7	6	4	4	40

- 1 HVAC problems exist throughout the building
- 2 Maintenance Staff replaces lights throughout building
- 3 Composing area renovation recently completed and no problems have developed
- 4 Door safety plates and hold-open devices in Bindery

problem) have posed recurring difficulties. Improper setting of the pre-heat temperature for the air handlers allowed the HVAC system to freeze which, in turn, resulted in the previously mentioned sprinkler system problem. A major fault appears related to the control gauges which are relied upon to regulate and control the HVAC system. The filters on the gauge lines which remove oil and water are not checked and replaced by GSA, with the result that some gauges are fouled and do not read accurately and control properly. About the only apparent activity GSA performs in the equipment room is the nightly manual relieving of compressed air tanks (there are automatic valves for this purpose but they are inoperative). No other maintenance is performed in this room by GSA unless a piece of equipment fails and they are called upon to provide repairs.

G. Impact on P&PD Maintenance Staff

Out of necessity many GSA routine tasks are accomplished through the efforts of P&PD's Maintenance Staff, the performance of which adds to their workload. They are not technically responsible for the accomplishment of these tasks. This staff has undertaken GSA work, in the interest of expediency and the continuance of production, since the building was occupied. In a negative sense, the Staff's dedication to maintaining equipment and facilities, through a do-it-yourself approach, did not surface building problems adequately during the first ten years of occupancy. Failing to receive GSA support when needed, the Staff quickly learned to make emergency repairs so that support elements external to P&PD believed (or so they said) that building utilities were operating as designed and without difficulty. In turn, little if any preventive maintenance was accomplished during the early years and utilities equipment deteriorated accordingly. Consequently, the P&PD Maintenance Staff became operationally familiar with all types of utilities equipment in GSA machine room spaces and elsewhere in the building so as to fix essential equipment, identify the causes of problems that only GSA could repair and surface the need for preventive maintenance in this area. Again, lack of GSA engineering interest, concern and response, during the building's relatively short life, has reduced utilities performance to a marginal level.

Over the three month period during which Maintenance Staff Services Reports were collected, 5.5% of all reported tasks performed by P&PD Maintenance Staff personnel are identified as GSA related duties. This effort was composed of 55 separate reports which required 66 manhours devoted to supporting or accomplishing essential GSA responsibilities.

Table Eleven gives a breakdown of tasks and manhours spent on GSA jobs.

Table Eleven

GSA Time and Task Expenditures, as Performed by
S&SS Maintenance Personnel

<u>Personnel</u>	<u>No. of Tasks</u>	<u>No. of Hours Requested</u>
L.D.	4	3.1
D.K.	22	23.8
D.S.	9	9.8
J.M.	20	29.3
TOTAL	55	66

Examples of GSA tasks that have been performed by P&PD Maintenance Staff employees include: changing light bulbs, cleaning clogged plumbing and installing electrical wiring. Since the first of the year, service requests have been submitted to GSA through HEB and SM&FB. This has resulted in improved service from GSA (possibly because P&PD Building problems are more widely known than in the past). Submission of requests via this channel also serves to document P&PD claims when conflicts arise as to when GSA received a work order. Over the past year there has been a general improvement by GSA in response to trouble calls from P&PD. Response to "housekeeping" calls (trash pick up and light changing) is less than desirable, and GSA still seems to be fumbling with major building systems (HVAC, steam and chilled water systems).

PART IV

RECOMMENDATIONS FOR CHANGE

Recommendations for Change in Maintenance Staff Operations

(Reference Part I)

A. Preface:

In view of the excellent record of achievement established by four Maintenance Staff incumbents, it is difficult to criticize their efforts and recommend changes without examining the entire maintenance picture. While the following recommendations reflect proposals for change in the Staff's internal affairs, these changes, in their entirety, cannot be taken out of context in terms of the entire study. Contract and GSA support, together with the potential for exercising recommended changes in these areas, will impact future Maintenance Staff operations, particularly in the area of staffing. Notwithstanding, the text of Part I suggests the following commentary.

B. Recommendations:

1. The 61 day test period established a record of Staffer's activities. A similar, simplified ongoing record should be maintained, if only to document a machine history of repairs. The Maintenance Staff Services Report appeared to request an adequate amount of data which could be input and stored in the MIS system. This report has been modified for database input (see Attachment C). Maintenance accomplishment, as identified on this record, could be compared to a database listing of preventive maintenance requirements and schedules.

2. As suggested above, there is a need to establish preventive maintenance requirements and schedules for approximately 175 equipment items. Agreement should be reached on responsibilities for PM, between Branch and Maintenance Staff. If and when the existing Staff is augmented, equipment PM should be increased so as to reduce repairs and equipment down time. A record of equipment PM should be maintained and periodically reviewed by the supervisor. Equipment histories that reflect an extensive documentation of problems should be earmarked for replacement.

3. As the largest single component user of Maintenance Staff services, the Photography Branch, based upon statistical reporting and analysis, needs a full time maintenance position for both repair and preventive maintenance. This position should be filled by an individual especially qualified in photographic production systems. (This Study did not include an investigation of the amount of maintenance time compiled by component personnel but it is known that they take time from the production schedule to work on equipment. Photography Branch can ill afford time away from production - especially when COM work is relocated to Headquarters.)

4. The Maintenance Staff, in coordination with Photography Branch, should schedule installation of the Digitec remote sensing system as it will save time and materials. Other P&PD components should be surveyed periodically for projects awaiting similar action.

5. The Study developed time allocation statistics (subject to further refinement) which will give the S&SS supervisor a yardstick for scheduling the work of his personnel. Table Two provides these estimates. Multiples of these time frames may be used for a single job since the averages are task oriented and several separate tasks did, upon occasion, represent a single job.

6. Though not a major issue, there was some evidence surfaced to the effect that the Maintenance Staff answered "false alarms". Production personnel did not understand their equipment well enough to make necessary adjustments which would have precluded a repair request. (This problem has also been known to apply to contracted maintenance.) In these cases production personnel should consult their associates and supervisors to confirm the need for maintenance or contractor support, prior to calling for external assistance.

7. Reference is made to the performing of services for components external to P&PD, by our Maintenance personnel. As the study indicates, this is not a serious problem. There are occasions when assistance and support are justified; the Maintenance supervisor is

certainly capable of determining the need and subsequent response. (The Badge Office may be an exception - in the past they have taken no corrective action to resolve problems encountered with ID cameras. Contractor support rather than P&PD services should be acquired for this apparatus.)

8. In a four man shop, the question of developing skill specialization (mechanical, electrical, plumbing, etc.) does not appear to be practical. Versatility in these areas is currently the key to adequate support. Today's and tomorrow's equipment, however, is becoming more sophisticated from an electronic standpoint, requiring repairs performed by electronic specialists - either internal or contracted. P&PD will soon be operating nearly 50 computer terminals, for example. With some degree of specialized study and experience, these terminals can be serviced from within. Other faulty electronic equipment might be brought back on line, prior to seeking external assistance, if a mid-level knowledge of the equipment can be applied to its cure. It is recommended that one Staffer become proficient in understanding and servicing solid state circuitry, as a personal training objective.

9. The foregoing leads to a recommendation for increased Maintenance Staff training. Records indicate that little formal training has occurred in the past; the current state of the art, throughout P&PD, suggests that OJT will not keep up with equipment repair requirements. The Staff should seek out and attend maintenance courses sponsored by vendors, manufacturers and maintenance associations. They should identify and program for OTR courses considered relevant to their needs.

10. There does not appear to be significant problems relative to equipment spare parts management. The Shop, in various ways, rises to the need for and installation of spares effectively. They cannot possibly stock every replacement part and must sometimes suffer the delay of these acquisitions (but should not use their own time running errands to acquire parts). A recommendation suggests that they acquire manufacturer's spare parts lists (on, particularly, new equipment arrivals) so that they can either stock necessary and/or expendable parts or expeditiously and correctly identify emergency needs at the time of order placement.

11. With reference to Table Five, the collective Staff reported the spending of a fourth of a work year on administrative/clerical duties. Obviously, at this time, they cannot afford a full time clerk to perform many of the tasks that they identified; this need may become more apparent in the future, should the Staff be expanded in scope and personnel. Currently, the manager must provide judgement on the clerical workload and determine its method of accomplishment.

(Note: Individual parts of this Study are suggestive of or recommend outright the adding of personnel to Maintenance Staff's roster. In an effort to bring these fragmented references together, the reader will find a simplified summary of this aspect of the Study at the end of Part IV.)

Recommendations for Change in the Contract
Maintenance Program

(Reference Part II)

A. Preface:

1. Because of staffing and training limitations P&PD has had to rely heavily on contract maintenance to support certain equipment operations in the division. The maintenance service performed through contractors has occasionally proven less than desirable both in quality and response time. It is felt that, with proper staffing and expanded training, many contract maintenance services can be accomplished by P&PD maintenance personnel, thereby reducing contract costs and improving services.

B. Recommendations:

1. It is recommended that formalized training on new equipment be acquired (film processors and the web press, for example) which will permit the Maintenance Staff to fulfill to the maximum their maintenance functions without resorting to contract maintenance. The introduction of an apprentice slot will offer a means to enhance Maintenance Staff job skills and permit maintenance coverage of the night shift.

2. Since one of the largest maintenance costs is for complex electronic equipment it would appear that major contract savings could be realized if P&PD Maintenance Staff personnel could better support the repair of this equipment. Whether this effort could be provided through training for the present staff or whether it would require an additional person, primarily dedicated to support of these systems, would depend on the depth and scope of coverage desired. If the Maintenance Staff electronics specialist could perform all maintenance on this equipment, the maintenance contracts could be reduced to parts and repair contracts (as is the case with Washington Printing support of the Davidson presses). This could substantially reduce the \$150,000 cost of maintenance contracts for these services and provide much more timely service, thereby reducing equipment down time.

3. The largest cost category of maintenance contracts are those associated with Agency owned copiers. While the technical maintenance of copier equipment could be accomplished by training Maintenance Staff personnel, the number (58) and diverse locations of copiers in the Agency would require the hiring of copier specialists to accomplish the task. The FY-80 projected cost of \$292,000, to be spent for maintenance on Agency-owned copiers, suggests that substantial savings could be realized if maintenance could be performed by P&PD personnel. It is believed that two copier specialists (for whom vendor training is available) could care for the 58 copiers and provide a part of their time to other P&PD maintenance interests. A BPA type of contract would have to be negotiated for copier spare parts. (This recommendation is not complete without the further examination of possible intentions to purchase more copiers in the near term.)

4. A number of maintenance contract changes are suggested with reference to Table Seven.

a. The contracts already recommended for non-renewal by Supply and Services Staff reflect a change in contract requirements no longer required because the associated equipment has been PTI'ed (AM duplicators) or because the Maintenance Staff can more effectively supply maintenance support for the machines (A.B. Dick duplicators and Bell and Howell envelope stuffer).

b. The contract with Washington Printing Supplies (no. 80-D-204208-000) to support the Davidson duplicators should be reviewed and changed to reflect their replacement with a web press in 1980.

c. The possibility of combining the two Kodak maintenance contracts (nos. 80-D125206-000 and 80-D-204008) into a single contract should be investigated as both are served from the same Kodak source. If this could be accomplished it would halve paperwork associated with these contracts.

5. In situations where contract maintenance performance is less than desired (e.g. poor response times, ineffective repairs resultant from inexperienced repairmen, lack of vendor support to local repairmen) and are beyond P&PD's power to change, the poor service should serve as an indicator

of areas in which Maintenance Staff training should be applied so that these maintenance tasks can be assumed by P&PD personnel. This would lead to increased Maintenance Staff capabilities in needed skills and reduce P&PD's dependence upon unreliable contract service.

6. In order to better identify P&PD maintenance contract needs, each Branch Chief should be primarily responsible for contract requirements in their areas, This should include preliminary contract negotiation, monitoring contract performance, and determining future needs and recommendations for cancellations. Branch Chief recommendations should be verified by Maintenance Staff experiences. The Chief, Supply and Services Staff, should coordinate requirements, review budgetary considerations and submit formal contract requests to Procurement Division.

7. Future maintenance contracts should be acquired only in instances where P&PD Maintenance Shop personnel cannot perform the needed service. The number of present contracts should be reduced through the training of Maintenance personnel who can acquire the necessary skills to perform the services presently performed under contract. This should receive attention and direction from the Chief, Supply and Services Staff, who can plan training, time management, skill development and the documenting of Maintenance Staff activities and machine histories. He should establish an MBO in which objectives identify specific areas of improvement within in-house maintenance accomplishment.

Recommendations for Change in GSA Support
(Reference Part III)

A. Preface:

This portion of the study is virtually self-explanatory in terms of recommending that GSA provide more support to P&PD than has been evidenced in the past. Complaints about GSA services, response times, engineering capabilities and physical plant maintenance are, undoubtedly, as commonplace in all GSA controlled buildings as they are in this building. Furthermore, it is presumed that this paper is one of many in which a request for improved support may well fall upon deaf ears, as far as GSA is concerned. On the otherhand, if P&PD's mission is vital and is to continue without interruption from facility failures, a new approach to building problem solving must be undertaken, else production may one day grind to a halt.

B. Recommendations:

1. Use the expertise of competent engineering firms who will evaluate present building utility systems and recommend appropriate changes (which should be subject to scrutiny prior to implementation). Utility systems worthy of investigation include:

a. HVAC apparatus, controls, distribution systems and operation, vis-a-vis specific component requirements.

b. As related to HVAC, determine means and methods of assuring proper humidity control in component work areas.

c. As related to HVAC, recommend improvements in controlling building air cleanliness, assuring the use of positive air pressures to avoid external contaminants and the exhausting of noxious fumes and internally generated airborne contaminants.

d. Study building requirements for hot, cold and chilled water as to adequacy, the need for backup systems and the installation of appropriate sensors to forewarn building users of impending losses in temperature and pressure.

e. Evaluate the working environment as to its compliance with the latest OSHA standards. Identify the means to meet or exceed these standards where relevant.

f. Prepare a schedule of preventive maintenance procedures for all building utility systems, after replacing apparatus which is no longer functional. Provide periodic checks to verify that this maintenance is being accomplished. If feasible, install remote sensing, monitoring and alarm devices in the building, and readout in HEB and/or GSA's building manager's office.

2. Contract the services of a competent roofing company who can effect necessary long term repairs to the entire roof.

3. Again, using a private sector specialist, evaluate loading dock renovation requirements. Redesign, repair and renovate so as to modernize, provide efficiency and assure safety for those using the area.

4. GSA should develop a schedule for and implement action on housekeeping chores: the cleaning of light fixtures and air supply grilles; replacement of faulty lighting components throughout the building; the replacement of plumbing fixtures or parts which otherwise waste water; the stripping and waxing of floors throughout the building; the elimination of insects and periodic repetition of insect control methods. (Upon submitting a schedule for approval on these activities, P&PD should be provided the authority to monitor implementation and subsequent follow through.)

5. When building project or repair requests are formalized, which involve GSA and LSD response, a feedback acknowledgement of the requirements should include a specific scheduling of the event's accomplishment (Reference Table Nine). This is particularly true of space renovation projects. If forecasted scheduling must be altered at a later date, feedback should be provided on the rescheduled event.

6. Consider the employment of a fulltime, versatile, competent GSA engineer to be quartered here eight hours a day. The alternative would be to add our own engineer to P&PD's Maintenance Staff, thus acquiring a personal touch and reaction to the building's welfare.

7. To recommend that the P&PD Maintenance Staff divest themselves of all GSA responsibilities and duties would appear foolhardy, in light of their experience and ability to respond to building emergencies. Such a recommendation would, however, be tendered if GSA could not improve their response on the problems identified above. If P&PD maintenance were ever to be structured in the manner GPO enjoys (reference Attachment B), competent building maintenance could be accomplished through the use of P&PD managed personnel.

8. A meeting of all key personnel, involved in the colorlab renovations project, should be convened to determine the project's status. In particular, the existing plan may be obsolete. Current A&E efforts should be examined and a positive schedule, action item list developed if the project is to continue.

Summary of Maintenance Staff Personnel
Augmentation, as Recommended in Separate
Parts of the Study

1. Existing staffing complement:..... 4
2. Apprentice position (to provide night shift coverage)..... 1
3. Full time, single shift position in Photography Branch..... 1
4. Copier maintenance (dual responsibility for copiers and other P&PD printing equipment)..... 2
5. Full time, single shift building engineer (if acceptable, in lieu of substantial increase in GSA support)..... ?
6. Electronics specialist (additional position not required if this specialty can be acquired within personnel listed above)..... ?
7. Clerical/MIS data input position (recommended if a Maintenance Staff of eight personnel is acquired)..... ?

ATTACHMENTS

MAINTENANCE STAFF SERVICES REPORT

Date: _____

JIM DARYL DON LARRY ABSENT

BRIEF TASK DESCRIPTION _____

MACHINE NAME _____ SERIAL NO. IF MORE THAN ONE _____

TIME EXPENDED (IN MINUTES) _____ APPROX. VALUE OF PARTS (IF OVER \$10) _____

SPECIAL NOTES: _____

SERVICES PERFORMED: PREVENTIVE MAINTENANCE REPAIR MAINTENANCE
 ELECTRICAL MECHANICAL PLUMBING EQUIPMENT RELOCATION EQUIPMENT INSTALLATION
 PARTS FABRICATION OTHER: _____

LOCATION: OFFSET PHOTO COMPOSING BR. PLATE ROOM PRESS BR. BINDERY BR. PHOTOG BR. SPP
 GSA SPACES OTHER: _____

CONTRACT MAINTENANCE SERVICE REPORT

COMPANY _____ EQUIPMENT _____

SERIAL NO. (IF MORE THAN ONE) _____ DATE/TIME SERVICE REQUESTED _____

DATE/TIME SERVICE RESPONSE INITIATED _____ (IF CONTRACTUAL PM, ENTER DATE) _____

IF WARRANTY RESPONSE, CHECK BOX

BRIEF DESCRIPTION OF PROBLEM: _____

MACHINE DOWN TIME (IN WORKING HOURS) _____
IDENTIFY SIGNIFICANT RESULTS: FOR EXAMPLE, TECHNICIAN'S CAPABILITY (IF ADVERSE), MAJOR PARTS FAILURES, COSTLY REPLACEMENT PARTS AND/OR LABOR (IN DOLLARS), EFFECT UPON PRODUCTION, ETC. _____

SUPERVISOR'S SIGNATURE

DATE

~~ADMINISTRATIVE - INTERNAL USE ONLY~~

An Overview of Maintenance as Practiced Within
The Government Printing Office (GPO)

A. Organization and Scope of Operations

A visit to GPO to review their maintenance programs revealed a number of similarities with P&PD maintenance operations, as well as surfacing major differences. Organizationally, GPO maintenance is identified with the Building Division which has separate Engineering, Machine, Carpentry, Plumbing, Electric, Sheetmetal and Electric Shops. There are also shops for welding and a garage for vehicle maintenance and forklift repairs. The scope of maintenance coverage for GPO is total; thus, there is no separate distinction for support of non-printing functions such as P&PD's support of Badge Office equipment or other non-Division areas. All printing and building maintenance is performed by GPO personnel and the only occasion in which they interface with GSA is to acquire elevator inspection (actual elevator repairs are performed by GPO maintenance shops). Because of the all-inclusive nature of maintenance activities performed in GPO they could not provide a quantity figure for line items of printing equipment supported or its corresponding dollar value.

B. In-House Support and Lack of Contract Maintenance

A tour through the GPO machine shop revealed the great number and variety of machines that are used to support the wide scope of operations in the plant. Lathes, milling machines, grinders and blade sharpeners (for paper cutters) as well as a welding shop and separate shops for electrical and other types of support make the GPO virtually self-sufficient in maintenance support. Because of this in-house depth of coverage GPO does not rely on external contracts for maintenance and repair of equipment. Their shops also perform all equipment installations. Support for the phototypesetters in the Electronic Photocomposition Division is not supplied from the building maintenance staff but is supported internally from the division and does not use maintenance contracts.

C. Staffing and Parts Control

GPO maintenance services have a personnel strength of 489 (including an industrial cleaning staff of 178). These services cover three shift operations 24 hours a day seven days a week. A regular preventive maintenance program is in effect. Most preventive maintenance is scheduled for the second shift (minimum production period). The machine shop schedules five or six men, of a complement of 67, to perform regular PM and two more men are on-call for PM calls per shift. Staffing work documentation is maintained using a mini-computer based system called Probe installed by Data Pathing Incorporated. In addition to job tracking, this MIS system records employee time and attendance, as well as a continuing history of equipment information. The parts inventory is maintained by the Stores Division which uses a computer based control system to reorder parts when minimum stock levels are reached. As the maintenance shops do not operate petty cash funds all supplies must be ordered through the Stores Division. This has led to some delays when local emergency parts purchases must wait on a purchase order being "walked through" the system. Selection of new equipment acquisitions are determined by the needs of the operating branches. Purchases are put out on bids by the Purchasing Office based on the stated requirements of the branches, without input from the maintenance shops. However, after the new equipment manufacturer is selected, Building Engineering and other maintenance shop personnel are consulted on any modification of new equipment that may be necessary for its intended installation and operation in the GPO.

D. Personnel and Training

Maintenance personnel are specialized by tradecraft (Machinists, Electricians, Carpenters, etc.) but are generalists within this trade. For example, journeymen machinists work on all machinery in the plant and can operate all equipment in their shop. In the past, vacancies in the maintenance shops were filled through apprenticeship programs; these programs are now being phased out and future personnel will be recruited from outside GPO. A training program for apprentices consists of both classroom theory in the particular trade, basic background training in English and Math, and on-the-job training in the shops. The maintenance training programs are conducted by an apprenticeship training staff that makes up the curriculum for the respective trades and grades and records the apprentice's progress. Additional training is provided when new equipment is purchased (usually by the manufacturer).

Machine shop paperwork is performed by the two working foremen and their two assistants. This effort is supported by a clerk typist. Because parts purchase is accomplished through the GPO Stores Division no maintenance shop employees are used to pick up supplies; a laborer from Stores Division runs these errands. Pay scales for the Machine Shop have traditionally been based on the printers compositor pay scale. Recently, however, the Machine Shop has broken away from this scale and will use new, independent hourly rates in the future. No independent wage changes have actually occurred since the break.

E. Summary

The maintenance organizations developed by GPO are well suited to their needs. The size and unique character of the GPO (a Federal Office devoted solely to supporting the printing needs of the Government) demands that they have the in-house maintenance capability to insure continued operation. With a personnel strength of 489 available for maintenance services, the GPO maintains separate tradecraft shops for maintenance support. The large size of the Maintenance Staff also allows internal training classes to be supported and conducted at the GPO for maintenance trainees. Overall, the maintenance efforts at GPO effectively support primary printing functions of their organization. Some elements of the GPO maintenance operations that might be applicable to P&PD are: 1) an expanded training program; 2) the addition of a clerical to the Maintenance Staff for parts ordering, MIS inputting and parts pick-up; and 3) implementation of formal preventive maintenance procedures for selected equipment.

Suggested MIS Data Input Format for the Recording of
Maintenance Services and Equipment Histories

MAINTENANCE STAFF SERVICES, FY-80

=====

LOCATION: --- OFF=040 COMP=080 PRES=070 BIND=090 SS=10
S&SS=050 PHD=050 SVAS=100 SSA=910 OTHER=000

MECHANIC: --- TIME SPENT (MIN.): --- DAY: --- MO: --- YR: ---

EQUIP. DESCRIPTION: ----- S/N: -----

TASK DESCRIPTION: -----

SERVICES: - - - - -
PREV.MAINT.=1 REPAIR MAINT.=2 ELECTRICAL=3
MECHANICAL=4 PLUMBING=5 EQUIP.RELOCATION=6
EQUIP.INSTAL.=7 PARTS FAB.=8 ADJ/CHK=9

TO EXIT MENU: LEAVE MENU BLANK AND HIT ENTER KEY

The above format requires input as follows:

1. "Location" requires only the entry of a three digit number (denoting component).
2. "Mechanic" identifies the repairman's initials.
3. "Time Spent" requires, in minutes, the amount of time used in completing the task.
4. "Day", "Mo", and "Year" identifies the date of action.
5. "Equip. Description" and "S/N" denote the item being serviced. (The S/N could be used alone if unique enough to identify a single equipment item.)
6. "Task Description" provides a free text area to describe the problem.
7. "Services" requires the entry of one or more numbers which identify the type of repair employed.

The maintenance technician would be furnished with hardcopy versions of the format, to be completed as he accomplishes his assignments. The data input clerk will transcribe relevant information from hardcopy to the database. Information can subsequently be retrieved and compiled against any data field of interest. It would be possible, for example, for the preventive maintenance reference and its associated date to be checked periodically against a preplanned schedule of equipment PM. Specific equipment histories could be easily ascertained by querying records compiled against an item's serial number, as another example.