NASA TECHNICAL MEMORANDUM

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NASA TM-78,424

AN AUTOMATED LIBRARY FINANCIAL MANAGEMENT SYSTEM

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An Automated Library Financial Management System

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Abstract

Management's demand for immediate and accurate financial accountability prompted the development of a computerized library acquisition system for control of informational materials acquired at NASA Ames Research Center. The system monitors the acquisition and receival of both library and individual researchers' orders and supplies detailed financial, statistical, and bibliographic information. The resulting financial accountability has enhanced the Library's credibility with Center Management and has permitted economic analysis with long-range planning and prudent use of the available budget. This paper details the system, its applicability for other libraries, and the future availability of its program.

Introduction

Ames Research Center is a field laboratory of the National Aeronautics and Space Administration where scientists and engineers, assisted by technicians and other supporting personnel, create new technology. Ames has two libraries with specialized collections that provide comprehensive reference and information retrieval services. The library Technical Processing Facility (TPF) provides acquisition and cataloging services for the collections of both libraries and is also responsible for the acquisition and accounting records for expenditures on published materials acquired for use in the laboratories and offices of individual researchers. In addition, the TPF staff acquires, distributes, and maintains the accounts for reprints of papers and articles written by Ames' researchers. Because dissemination of information about new technology developments is an integral part of the research programs at Ames, the publication rate is high. The number of reprints acquired at times equals the amount of publications purchased for use by the individual researchers.

To accommodate these various functions, a somewhat unusual library organization structure has evolved (Figure 1). All technical processing functions are provided by an on-site support services contractor, Technology Development Corporation (TDC). A computerized acquisition control system has been developed by TDC and the Ames Computer Center to meet the needs of Ames' management for on-the-spot accounting of all expenditures of the various research groups within the organization. The reports generated by the TPF provide input to an accounting system, used through Ames, that tracks organization-related expenditures.

Although it is customary that a library be delegated responsibility for total publication acquisitions, it is unusual that it be assigned responsibility for budgetary control over other departments. The library at Ames acts as a controller over the publication budgets for all the Directorates. Frequent, periodic accounting of publication expenditures and budgetary status by organizational unit, which can be related to specific projects, is required.

Credibility in today's business environment rests heavily on the ability of the library manager to track rising costs, to accurately forecast publication market trends, and to report the effects those trends will have on the libraries future budget needs. Using such information wisely in planning necessary expenditures and making the reductions required by rising costs is one part of the manager's responsibility. Another of his major responsibilities is keeping administrators informed of cost and other problems associated with providing the collections and services necessary for the continued research development. Providing financial management with current and accurate accounting information that relates to the accounting systems in operation throughout the organization is a direct and effective means of communication.

Before the library financial management system was developed at Ames, it was difficult for the library to provide anything better than a rough approximation of the status of its accounts; ascertaining the total amount of outstanding or open orders was virtually impossible. To supply even those approximations required a complete shutdown of ordering and the work of at least three staff members for several days. Obviously,

the inaccuracy of the data and the delays that were incurred were received unfavorably by management and were disruptive of library routines.

System Development

The need for the development of a computerized acquisition system was evident and the decision to program it to be compatible with the general accounting system was wise. Ideally, the flexibility of an interactive on-line system would have been preferable because it would have offered more possibility for interfacing with the cataloging and public service functions. However, such a system would not have been possible for a number of years; because the developmental costs of the present system were quite low, the decision was made to proceed with its implementation.

The following areas were given priority in selecting criteria for system development. The system should:

1. Accommodate the data elements necessary to create the bibliographic and financial record.

2. Be programmed for flexibility so that access by any data element or field would be possible.

3. Be compatible with the general accounting system. Lighten the burden of manual recordkeeping.

Financial information was entered first because financial accountability was the most pressing need. When the financial information had been entered and verified and the programs were operating reliably, the bibliographic information was added. Once this second phase was operating well, additional changes to the programs were made to obtain more

meaningful information and to streamline operations. The data transmittal forms were then revised to add other data elements that were needed.

This gradual implementation schedule gave the staff of TPF time to become acquainted with each phase of the project before further changes were made. We believe that this approach minimized some of the adjustment problems that frequently accompany the transition to an automated system.

Entering the Data

The acquisition staff enters data into the system on in-house data transmittal sheets that are processed by batch mode. The transmittal sheets are color coded for "New Order," "Receivals," and "Adjustments" (Figure 2). The TPF staff completes the data transmittal sheets on a daily basis as materials are ordered and received or as adjustments are made. The sheets may be taken to keypunching on a daily or weekly basis. All keypunching and error corrections are made by personnel at Ames' Computer Center.

Most of the data elements are filled in at the time the material is ordered; included are bibliographic and order information. When the material is received, additional information is added, such as price and date received. Adjustments can be made to both open and closed orders.

For the usual processing schedule, data transmittal sheets are taken to keypunching once a week. The cards are keypunched and a preliminary run is made on the same night. If there are errors in the run, corrections are made the next day and a second run is made the following night. If the processing schedule is unusually heavy (e.g., at journal renewal

time) the keypunching can be done each day. The turnaround time between submitting the data and the final reports is three working days.

The system has a number of built-in error conditions that prevent the most commonly made errors. A partial list of error conditions follows:

Invalid date	Quantity results in a minus
Fiscal year log not unique	Invalid transaction, order completed
Invalid item type	Invalid action code
Invalid quantity	Quantity received exceeds quantity
Invalid estimated cost	ordered
Invalid payment type	Cost not within 30% ± estimated cost
Invalid organizational code	Invalid vendor

The presence of these error conditions and the validation against organizational code and vendor code tables automatically causes an error message to print; a remarkably clean file is the result.

Reports

The system automatically produces the following reports at the end of the weekly, biweekly, and monthly cycles.

Library Materials Acquisition Log (Master File): At the end of every other biweekly period, or about once a month, the Computer Center produces a master record of all transactions to date. The report is arranged numerically by fiscal year and purchase order number and shows the status of all open and closed orders. The acquisition staff keeps a copy in the TPF area as master record and the reference staff uses a second copy in the public service area for use in answering inquiries about orders (Figure 3).

Packet report: Copies of the invoices and this report which lists and totals the invoices are submitted to Ames for reimbursement. The accompanying Packet Report provides a list of those items treated in the invoice packet. The entries are arranged alphabetically by vendor, numerically by invoice number within each vendor, and numerically by purchase order number within each invoice. Credit memos and returned checks are interfiled with invoices but show a minus dollar amount to indicate that money has been returned. Subtotals by invoice and by vendor act as a cross check for invoice accuracy and as an aid in the check writing process. This report also includes a summary sheet that itemizes expenditures by job order account number (Figure 4).

Biweekly Report: All transactions made in a biweekly period are shown and summarized in a biweekly financial accounting report. This summary tracks the estimated dollar amount for outstanding orders and the total actual expenditures for received orders in both the previous years and the present budget year. This report is then fed into the general accounting system (Figures 5 and 6).

Monthly Report: This is a financial accounting by individual organizational unit. It indicates expenditures by type of material and enables the researchers to relate the cost of library materials and publications to projects (Figure 7).

Special Reports: At the end of the fiscal and calendar years, it is often useful to gather data that reflect the level of effort during the year. Through mini-programs designed upon request, the system allows us to collect information such as the following:

1. Vendor reports that show the number of orders and dollars spent with each vendor as well as turnaround time between order and receival dates.

2. Journal subscription reports that list all journal orders alphabetically by title with both estimated and actual costs. This allows us to measure journal price increases from year to year and to evaluate the validity of our estimates.

3. Average price by item type reports that give a total and an average of our yearly expenditures by type of material.

These few examples of special reports we have requested in the past are representative of the versatility of an automated system in manipulating data and providing additional reports as the need arises. Figure 8 is a flow chart of the acquisitions and accounting processes.

Conclusions

All departments of the Technical Processing Facility and some of the public service functions have benefited from implementation of the automated system. The establishment of processing schedules and deadlines that affected both Cataloging and the Serials Department has greatly improved the overall workflow.

Elimination of the manual log, which contained most of the information transferred into the new system, was the most celebrated event. The log was arranged numerically by purchase order number and took up seven large and cumbersome ledgers. The log was the only source from which statistical and financial reports could be compiled and the compilation required hours.

Use of an automated system required standardization of forms and standard arrangement of the manual files. The improvement in the accuracy

of acquisitions records has resulted in better service to library users through faster claiming and reordering, and because of fewer conflicts with invoicing and returned materials. In addition to these technical improvements, the improved financial accountability has enhanced the library's credibility with management and has facilitated economic analyses for long-range planning and prudent use of the available budget.

The system was programmed to meet the specific needs of the Ames Research Center Library and its value to Ames has been proved. Application has been made by the Computer Center for the program to be made available through COSMIC if other librarians are interested.

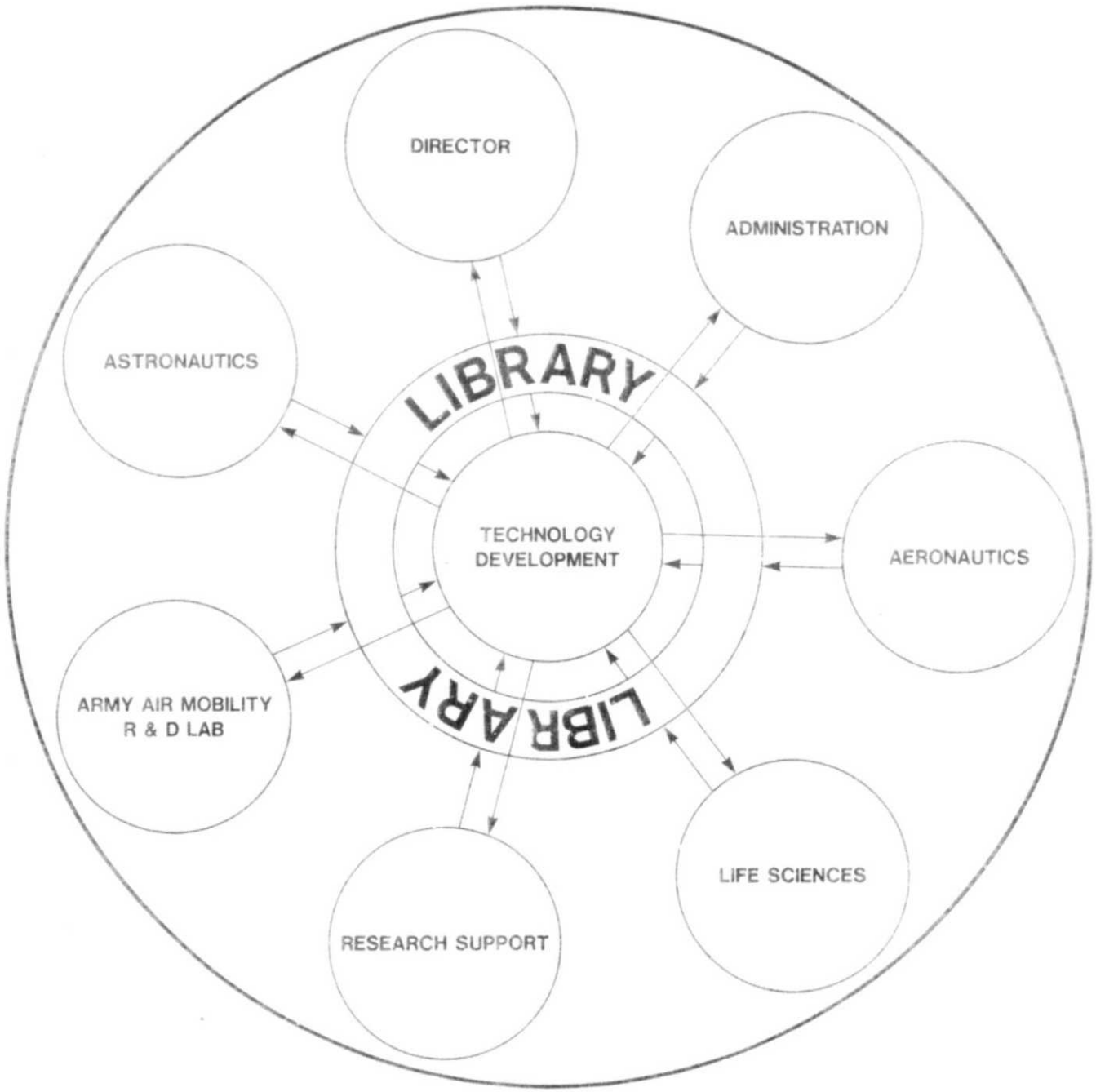

Figure 1. Organizational Structure.

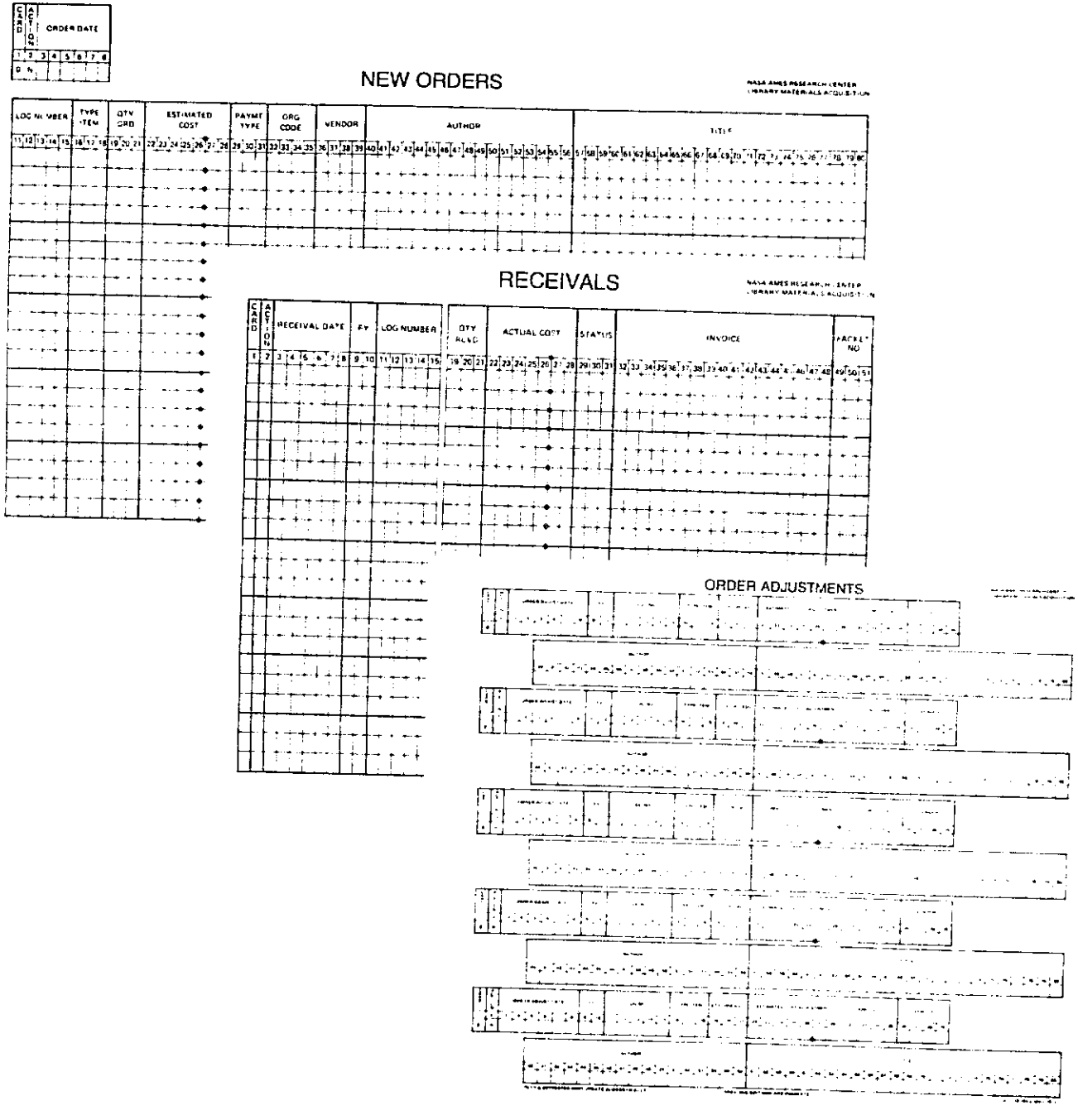

Figure 2. Data Transmittal Forms.

FY	LOG NO	ORD-DT	TYPE	QTY ORD	ESTIMATED COST	PMT TYP	ORG CD	REC-DT	STAT	QTY RCVD	ACT COST	VEND	AUTHOR / TITLE	FLAG	JOB CRD
77	23749	111276	SO	001	78.80		ATL	111976		001	78.80	BAK	BOOKS IN PRINT 1976	1	K1048
77	23750	111276	BK	001	12.50		ATL	111976		001	13.55	STEV	BUER / DYNAMICAL CHARACTER OF	1	K1048
			ADJUSTMENT		1.05										
77	23751	111276	BK	001	15.00		ATL	111976		001	15.00	STEV	MINKOFF / FROZEN FREE RADICALS	1	K1048
77	23752	111276	SO	001	25.00		ATL	111976		001	25.00	IEEE	ELECTRICAL ENG FOR THIS	1	K1048
77	23753	111276	SO	001	10.00		ATL	111976		001	10.00	IEEE	PROD LIABILITY PREVENTIO	1	K1048
77	23754	111276	SO	001	54.00		ATLL	111976		001	54.00	NYAS	7TH INTERNTL CONF ON SAR	1	K1048
77	23755	111276	SO	001	50.00		ATL	111976		001	54.40	TC	ANN REG OF GRANT SUPPORT	1	K1048
			ADJUSTMENT		4.40										
77	23756	111276	SO	001	50.00		ATLL	111976		001	54.45	TC	ANN REG OF GRANT SUPPORT	1	K1048
			ADJUSTMENT		4.45										
77	23757	111276	SO	001	15.00		ATLL	111976	ORE	001	59.25	PHB	BIBLIOTHECA ANATOMICA 13	1	K1048
			ADJUSTMENT		44.25										
77	23758	111276	SO	001	76.85		ATL	121776		001	76.85	TC	ADV IN INSTRUMENTATION	1	K1048
77	23759	111276	SO	001	85.00		ATLL	120376	ORE	001	55.75	TC	HNDBK OF CLINICAL NEUROL	1	K1048
			ADJUSTMENT		29.25-										
77	23760	111276	SO	001	60.00		ATL	0		000	.00	TC	INTERNTL ASTRONOMICAL UN		K1048
77	23761	111276	SO	001	25.C		ATL	112676		001	23.00	BKN	U.S CIVIL AIRCRAFT REG	1	K1048
			ADJUSTMENT		.00-										
77	23762	111276	BK	002	11.00		ATL	111676	CAN	000	.00	AAAS	RESEARCH AND DEVELOPMENT	1	K1048
77	23763	111276	BK	001	1.50		SSG	121076		001	1.50	CAL	GEOLOGIC ATLAS OF CALIF	1	K1049
77	23764	111276	BK	001	15.00		DSS	121776		001	15.00	MG	EFFECTS OF EXPOSURE TO	1	K1049
77	23765	111276	BK	001	36.00		LX	123176		001	35.20	NYAS	TYLER / BIOLOGIC EFFECTS OF NONI	1	K1049
			ADJUSTMENT		2.80-										
77	23766	111276	BK	001	175.00		ATL	121776	ORE	001	344.55	PLEN	MASTER THESES IN THE PUR	1	K1048
			ADJUSTMENT		169.55										
77	23767	111576	BK	001	25.00	PRE	ATL	121076	PRE	001	25.00	SLA	UNION LIST OF SERIALS	1	K1048
77	23768	111576	BK	001	3.75		SSA	0		000	.00	UAZ	SMITH / CAT OF NEBULAE IN CRUX		K1049
77	23769	111576	BK	001	24.37		SC	0		000	.00	HEF	WAKE / ADHESION AND THE FORMULA		K1049
77	23770	111576	BK	001	10.50		SSG	122476		001	11.25	TC	GRADSHETYN / TABLES OF INTEGRALS	1	K1049
			ADJUSTMENT		.75										
77	23771	111576	BK	029	17.40		LX	121776	ORE	001	22.93	TC	HEINRICH / EXTREME ENVIRONMENTS		K1049
			ADJUSTMENT		219.50										
77	23772	111576	BK	001	26.00		STS	122476		001	30.58	TC	MERZKIRCH / FLOW VISUALIZATION	1	K1049
			ADJUSTMENT		4.58										
77	23773	111576	BK	001	25.00		SST	011477		001	23.75	TC	AKHIEZER / PLASMA ELECTRODYNAMICS	1	K1049
			ADJUSTMENT		1.25-										
77	23774	111576	BK	001	29.50		LX	0		000	.00	TC	PRESMAN / ELECTROMAGNETIC FIELDS		K1049

Figure 3. Master File.

ORIGINAL PAGE IS OF POOR QUALITY

PROCESS DATE 01-20-77
REPORT DATE CURRENT MASTER

MATA/NET RESEARCH CENTER
MOFFETT FIELD, CA 94035
RECEIVALS
SEQ PKT/VENDOR/INV/LOC

REPORT-ID ATL200G04

DATE	FY	LOG	QTY	COST	STAT	INVOICE	PKT	VENDOR	J/O
011477	77	24459	1	20.00		P077622	183	IEEE	K1048
011477	77	24460	1	20.00		P078841	183	IEEE	K1048
011477	77	24461	1	30.00		P090041	183	IEEE	K1048
011477	77	24462	1	33.00		P083397	183	IEEE	K1048
011477	77	24463	1	16.00		P081630	183	IEEE	K1048
011477	77	24464	1	15.00		P091812	183	IEEE	K1049
011477	77	24465	1	33.00		P083764	183	IEEE	K1049
011477	77	24466		12.00		P082538	183	IEEE	K1048
011477	77	24467	1	30.00		P083712	183	IEEE	K1048
011477	77	24468	1	30.00		P083060	183	IEEE	K1049
011477	77	24469	1	33.00		P083408	183	IEEE	K1049
011477	77	24470	1	15.00		P083774	183	IEEE	K1048
011477	77	24471	1	30.00		P084816	183	IEEE	K1048
011477	77	24044		30.00	DEF		183	IEE	K1048
011477	77	23284	1		DEF		183	IEHE	K1048
011477	76	21337	1		DEF		183	MA	K1049
011477	77	24163	1	140.25		30235	183	MESA	K1049
011477	77	23678	1		DEF		183	MET	K1048
011477	77	23463	1		DEF	6618	183	MIEE	K1048
011477	77	24107	1	15.00		773070	183	MU	K1049
011477	77	24027	1		DEF		183	NAS	K1049
011477	77	24139	1	17.20		952230	183	NAS	K1049
011477	77	24498	1	35.00		24647	183	NYAS	K1048
011477	76	20949	100	74.91		SP850	183	PLEN	K1058
011477	76	18070	1		DEF	11869	183	PLEN	K1049
011477	76	19384	1		DEF	11984	183	PLEN	K1049
011477	77	24254	1	117.00		PP006714	183	PLUE	K1049
011477	77	23941	1		DEF		183	PSC	K1048
011477	77	24027	1		DEF	2107	183	PSC	K1048
011477	76	21114	1	10.00	DEF	25263	183	RSM	K1049
011477	77	24493	1	60.00			183	SHPC	K1049
011477	76	19783	1		DEF		183	STA	K1049
011477	76	21141	1	31.46	DEF	01077958	183	SY	K1048
011477	77	24497	1	39.70		N255714	183	TC	K1049
011477	76	17597	1	19.95		N255963	183	TC	K1048
011477	77	23585	1	31.92		N255969	183	TC	K1048
011477	77	23646	1	5.93	DEF	N255969	183	TC	K1049

Figure 4. Packet Report.

REPORT DATE 02/28/77
PROCESS DATE 03/10/77

NASA-AMES RESEARCH CENTER
MOFFETT FIELD, CA 94035
LIBRARY MATERIALS ACQUISITION AUDIT

PAGE 8
PRODUCT ATL210-P01

CP	ACT	DATE	FY	LOC	TYPE	QTY	AMOUNT	PMT TYPE STAT	ORG CD	ERROR MESSAGE	VENDOR	AUTHOR	TITLE
C	N	021677	77	25001	BK	1	75.00		SSA		TC	WILLIAMS	SPECTROSCOPY V13 PTS A
C	N	021677	77	25001	SC	1	25.30		ATL		TC		NATL TRADE & PROF ASSC
C	N	021677	77	25002	BK	1	62.00		ATL		TC	HERMAN	GEOMETRIC STRUCTURE OF
C	N	021677	77	25003	BK	1	9.95		REF		TC	LANCASTER	TV-TYPEWRITER COOKBOOK
C	N	021677	77	25004	BK	1	49.50		SC		TC	BUCHAPDT	PHOTOCHEMISTRY OF HETE
C	N	021677	77	25005	BK	1	15.00		SSA		UMF	WING	INFRARED SPECTROPHOTOM
C	N	021677	77	25006	BK	6	37.50		SS		NAS		HALOCARBONS: ENVIRONMF
C	N	021677	77	25007	SC	1	25.00		ATL		ACS		ADV IN CHEM V150
C	N	021677	77	25008	BK	1	19.47		LX		ITH		ADDITL CHGS TO 14341-5
C	7	021877	77	25007			.12					K1049	
C	8	021877	77	25008		1	19.59					188	
C	N	021677	77	25009	PNT	300	603.00		STRA		ACS	PARK C	REACTION RATES FOR O3+
C	N	021777	77	25010	RSR	1	20.00		ATL		ASTT	TRANSPORTATION J	C1
C	8	021877	77	25010		1	20.00					188	
C	N	021777	77	25011	RSR	1	24.00		LX		AMEL	ECOLOGICAL MODELL	ING V3 77
C	N	021777	77	25012	RSR	1	36.40		ATL		MC	SIMULATION COUNCI	LS PROCEEDINGS SL V4 7
C	N	021777	77	25013	RSR	1	17.76		ATL		MC	JAPAN SOC FOR AER	ONAUTICAL + SP SCI TRA
C	N	021777	77	25014	PNT	100	710.00		Y		AIAA	HODGES D H	STABILITY OF HINGELESS
C	7	021877	77	25014			30.00-					K1058	
C	8	021877	77	25014		100	680.00					188	
C	N	021777	77	25015	PNT	250	138.76		SST		AC	NOLT I G	BRIGTNESS TEMPERATURES
C	N	021777	77	25016	PNT	50		03A	SST		AC	TECH OPEN R	PHYS PROP OF PARTICLES
C	N	021777	77	25017	PNT	200	88.00		SC		AEY	LERNER N P	ISOTHERMAL DEGRADATION
C	N	021777	77	25018	PNT	100	625.00		SST		AIAA	HUNG C M	NUMERICAL SIMULATION
C	7	021877	77	25013			30.00-					K1058	
C	8	021877	77	25018		100	595.00					188	
C	N	021777	77	25019	PNT	700	2,558.25		SC		TECH	KOURTIDES D A	THERMOCHEMICAL CHARACT
C	N	021777	77	25020	PNT	300	488.25		SC		TECH	HILADO C J	TOXICITY STUDIES OF PO
C	N	021777	77	25021	PNT	300	238.25		SC		TECH	HILADO C J	REL TOX OF PYROLYSIS P
C	N	021777	77	25022	PNT	300	488.25		SC		TECH	HILADO C J	REL TOX OF PYRO OF ELA
C	N	021777	77	25023	PNT	300	645.30		SC		TECH	HILADO C J	REL TOX OF PYRO OF POL
C	N	021777	77	25024	BK	1	167.46		ATL		CC		CARD COPY JAN 76
C	8	021877	77	25024		1	167.46					188	
C	7	021777	77	25025			250.00					K1049	

Figure 5. Biweekly Report.

REPORT DATE 12/20/76
PROCESS DATE 12/29/76

NASA-AMES RESEARCH CENTER
MOFFET FIELD, CA 94035
LIBRARY ACQUISITIONS BUDGET STATUS

PAGE 1
PRODUCT ATL210-R02

JO	WHEN OBLIG	-CURRENT-REPORTING-PERIOD- OBLIGATED	OBLIG ADJ	NET CHG OBLIG	ACCRD	-FISCAL-YEAR-TO-DATE- OBLIGATED	OBLIG ADJ	PRES TOTAL OBLIG	FY BUDGET	UNOBLIG BUDGET	ACCRD	UNCOSTED OBLIG
LIBRARY	CY	4,653	356	5,009	4,318	32,184	434	32,618	260,000	227,381	21,692	10,925
	PY		443	443	1,108	153,415	9,182	162,597	153,415	9,182-	124,751	37,846
	TOTAL	4,653	800	5,453	5,426	185,599	9,616	195,216	413,415	218,199	146,443	48,772
BRANCH	CY	2,855	152	3,007	2,846	15,191	278	15,469	95,000	79,530	9,435	6,033
	PY		167	167	1,011	61,603	222-	61,380	61,603	222	42,651	18,729
	TOTAL	2,855	320	3,175	3,857	76,794	55	76,849	156,603	79,753	52,086	24,762
REPRINTS	CY	8,025	15-	8,010	1,699	24,107	55-	24,052	63,000	38,947	6,954	17,097
	PY		151	151	3,864	39,082	386-	38,695	39,082	386	25,286	13,409
	TOTAL	8,025	136	8,161	5,563	63,189	441-	62,747	102,082	39,334	32,241	30,506
K1500	TOTAL	15,534	1,257	16,791	14,847	325,583	9,229	334,813	672,100	337,287	230,772	104,041

FIGURES SHOWN ARE HYPOTHETICAL

Figure 6. Biweekly Financial Summary.

PROCESS DATE 12-24-75
REPORT DATE 11-26-75

NASA/AMES RESEARCH CENTER
MOFFETT FIELD, CA 94035
ORDERS FOR FY '76

REPORT-ID ATL200G05

ORG	ITEM	QTY	COST-COST	
SSG	BIJ	5	52.95	
SSG	PK	52	249.30	
SSG	SC	1	23.33	
		58	325.58	TOTAL SSG
SSO	BSP	6	419.00	
SSO	SC	11	182.60	
		17	601.60	TOTAL SSO
SSS	PK	12	270.85	
SSS	PPT	1	.00	
		13	270.85	TOTAL SSS
SST	BIJ	350	262.50	
SST	PK	17	460.85	
SST	SC	1	15.00	
		368	738.35	TOTAL SST
ST	BSP	3	1,421.00	
ST	SC	5	178.11	
		10	1,599.11	TOTAL ST

Figure 7. Monthly Report.

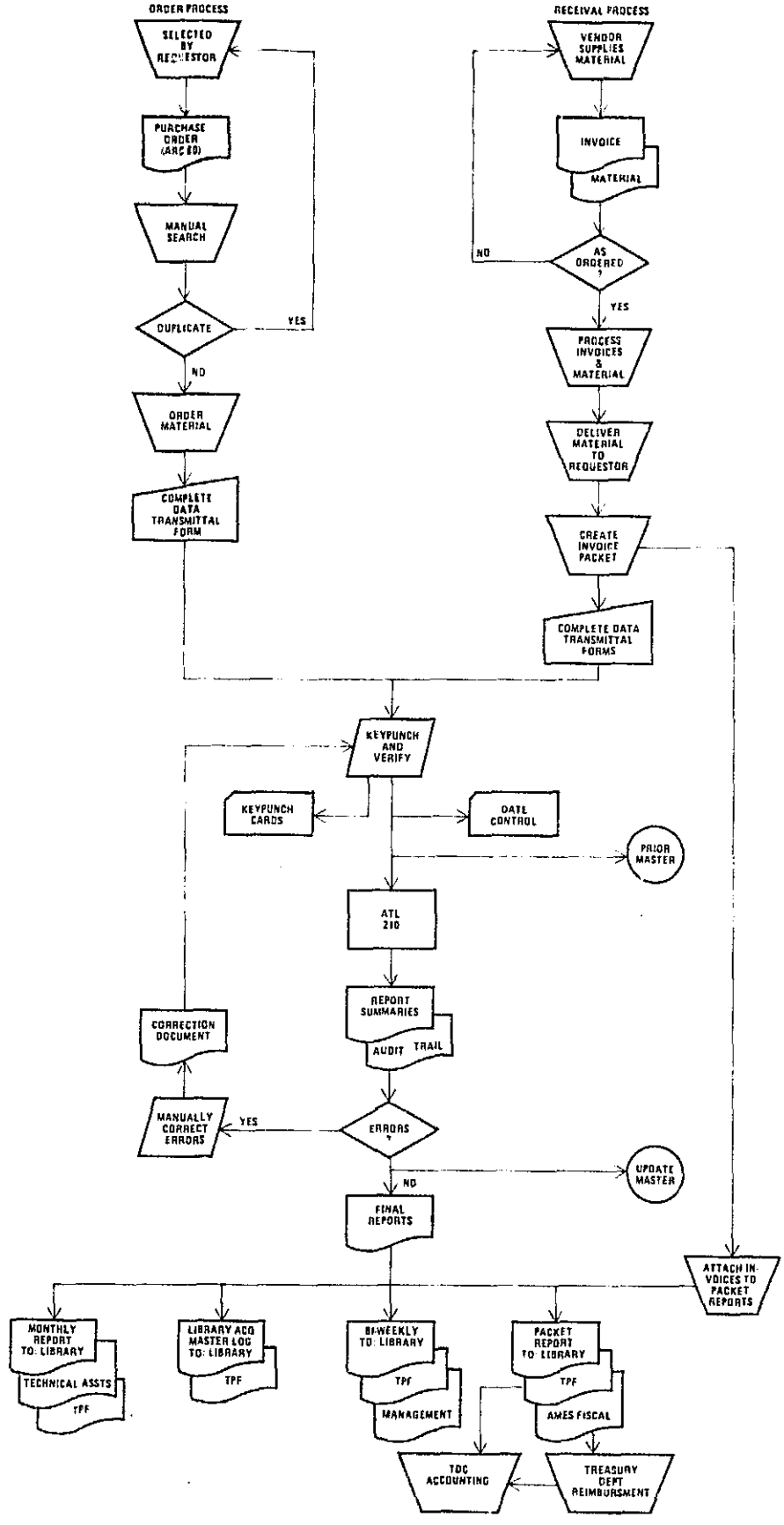

Figure 8. Flow Chart of the Acquisition and Accounting Processes.