VII. User-controlled file back-up

VIII. Check mode selection
A. Auto check writing
   1. Check suppression for selected vendors
   2. User-controlled check numbering
   3. Continuous-form check writing
   4. CHECK REGISTER
B. Manual check writing
   1. Transaction preservation for selected vendors

IX. Year-end vendor and category update routine

X. Software-independent file capacities

Allowing for maximum file capacities as defined in Section Two, the size of the Accounts Payable System is approximately 230 kilobytes—easily containable on a Burroughs hard disk or three-megabyte floppy disk.

Because the system was designed to take advantage of some unique console features on the B-91 computer, it is highly dependent on this or the B-90 model. Minor changes will allow it to run on one of the older B-80 series, however. Extensive syntax changes are required if the system is to be installed in any other make of computer.

In terms of the usefulness of my A/P System for business applica-
tions, virtually any small operation (say, under 50 employees) could use it as it stands now. In fact, the system would probably be easy to learn for anyone who has been using the same accounting ledger book that Mr. Stasny uses (it is my understanding that the book is fairly common), because the expense-category feature of the system is patterned after that book.

If more advanced functions are desired from the system, these can generally be obtained with minimum difficulty. The programs are coded in structured form so that modifications are easier, and the procedural layout of the system as a whole is such that complete new programs can be readily added to it, if necessary. Additionally, file capacities, unaffected by program design, can be increased to sizes limited only by the supporting hardware.
SECTION TWO - SYSTEM LAYOUT

INDEXED FILES (KEY AND DATA FILE PAIRS):

**APVEND**
Vendor information. One vendor (or any other payable account) per record.
Record length: 180 characters
File capacity: 200 records

**APVENDQO**
Stores the transactions: invoices, expense receipts, credit memos. One transaction per record.
Record length: 180
File capacity: 200

**APLINK**
One record for each vendor in APVEND. Holds the transaction number of the last record entered into APTRANS. This file simplifies the retrieval of transaction records belonging to a given vendor.
Record length: 12
File capacity: 200

**APLINKQO**
Descriptions of the categories to which the vendors are assigned. This is a read-only file from the standpoint of the Accounts Payable System.
Record length: 20
File capacity: 50

**APCATFILE**
File count. Contains status information on APTRANS: keeps totals of resale invoices, expenses, and available file space, all of which can be displayed on the Self-Scan. Totals for each of the categories are also kept in this file.
Record length: 12
File capacity: 53

**APCATFLQQ**

SEQUENTIAL FILES:

**APDAILY**
Keeps a record of all additions and deletions occurring within APTRANS. When the record is printed out in the form of an activity list, the file is cleared for re-use.
Record length: 180
File capacity: 100

**APCHKFL**
Stores information for use in writing checks and making deletions from APTRANS.
Record length: 180
File capacity: 200

**APCHKNUM**
Only used in check writing, this file contains the number of the next check to be written.
Record length: 6
File capacity: 1
APCHKMODE Contains a "flag" which sets the mode of the A/P System to either automatic check-writing, or manual. Read-only.
Record length: 3
File capacity: 1

COPYMAC1 A macro file for issuing MCPX system commands from within the A/P System. Used specifically for calling the Burroughs COPY utility to make back-up files.
Record length: 80
File capacity: 1

COPYMAC2 Same as COPYMAC1.
COBOL PROGRAMS:

* indicates Self-Scan/operator dialogue

*APMENU
The master menu and starting point of the Accounts Payable System from which the other programs are called. This program also performs all APVEND file operations.

*APENTRY
Transaction file (APTRANS) operations. Also displays category totals and totals of outstanding transactions.

*APAUDIT
Produces listing of transactions added to or manually deleted from APTRANS. Copies APTRANS, APVEND, APLINK files to back-up disk.
Printed output: DAILY ACTIVITY LISTING

*APLEDGER
Calculates and prints vendor subtotals and grand totals. These totals are compared with those in the file APFLCT, and if differences are found a message is printed out. For due items in APTRANS, this job will write check information to APCHKFL.
Printed output: ACCOUNTS PAYABLE LEDGER

*APCHKWRITER
In auto check mode, checks are written from the information in APCHKFL. Items with checks written for them are deleted from APTRANS, and the file APFLCT is updated accordingly.
Printed output: checks and CHECK REGISTER

In manual mode, nothing is written out but the deletions and file update occur as above.

APVENWRITE
Prints out all information for each record in APVEND.
Printed output: ACCOUNTS PAYABLE VENDOR REPORT

APCATLIST
Prints current totals of all categories in APCATFILE.
Printed output: ACCOUNTS PAYABLE CATEGORY LISTING

*APVUPDATE
An end-of-the-year job that readies the vendor and category files for the upcoming year and prints the category totals for the past year.
Printed output: ACCOUNTS PAYABLE CATEGORY LISTING
BURROUGHS UTILITY PROGRAMS:

FS      File Squash. For reclaiming space occupied by deleted records in indexed files.
SORT    Creates keyfiles for indexed files.
COPY    Called by APAUDIT to create back-up files.
**FILE/PROGRAM CROSS-REFERENCE:**

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<th>APAUDIT</th>
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SECTION THREE - OPERATION GUIDE

Insure that a valid date has been entered into MCPX as it powers up (the date is used by two of the A/P programs). To begin the A/P System, execute "APMENU" and this program will cause the Self-Scan to display:

ACCOUNTS PAYABLE MASTER MENU

************************************

ENTER RESPONSES THROUGH LIGHTED PROGRAM KEYS.
ENTER DATA INPUT WITH OCK-1 OR OCK-2.

MAKE A SELECTION:

1 - ADD/CHANGE/DISPLAY AN INVOICE OR CREDIT MEMO
3 - ADD/CHANGE/PRINT A VENDOR RECORD
5 - PRINT DAILY ACTIVITY LIST AND COPY FILES TO BACKUP
7 - CALCULATE A/P AND PRINT LEDGER
9 - PRINT CHECKS AND CHECK REGISTER
11 - PRINT CURRENT CATEGORY TOTALS
24 - CALL IT A DAY. END ACCOUNTS PAYABLE PROGRAM

TO EXIT FROM ANY ROUTINE IN THE PROGRAM, PRESS PK-24.

An "OCK" (Operation Control Key) is one of the data entry keys marked with vertical lines. The "PK's" (Program Keys) are each associated with a console light and are numbered 1 through 24. The A/P System relies primarily on the PK as a source of operator input, considerably reducing key punching time. In the menu above, the numbers on the left represent PKs; their lights will turn on while the rest remain off. The selections are purposely not adjacent so as to help prevent accidental misses.

Note that PK-24 is common throughout the A/P programs in that it is an exit key. Even during data entry, if PK-24 is depressed while its light is on, the entry routine is terminated and the data that was being entered is ignored. If a record was being altered at the time PK-24 is depressed, it is returned to its former state.

The following outline demonstrates the usage of the PKs of the master menu in a typical A/P System procedure. Following the outline, each PK is discussed in detail; as a reference, a PK number appearing at the top of the page shows which function of the master menu that page is concerned with.
Procedural Outline

I  The system installed and brought up, the user selects PK-3 of the master menu to add vendor records. Once APVEND is built, a vendor report is printed out to double check the entries.

II PK-1 is selected next to enter invoices and credit memos into the transaction file APTRANS. File capacity is monitored regularly.

III At the end of each day of data entry, PK-5 is selected from the menu to print a daily activity list, and the back-up floppy disk is loaded to make copies of the files. NOTE: The user had previously entered the proper COPY commands into the files COPYMAC1 and COPYMAC2, using AMEND or a similar utility.

IV The pay off period is at hand; PK-7 causes the ACCOUNTS PAYABLE LEDGER to be printed out, and no error messages appear at the bottom of it.

V All due amounts shown in the ledger appear correct and the decision is made to write the checks. PK-9 starts the operation. Following the checks, the check register is written, and after this a file purge is initiated which clears APTRANS of all due invoices that were shown on the ledger. If the ledger had shown something that had to be changed, then after the change was made, the ledger job would have to be run again before running the check-writing job. The check-writing job is always run after a successful ledger print-out even if checks are not to be written by the system (it being in manual mode), because this is how APTRANS is cleared for re-use.

NOTE: Check mode is set by using a utility to access the file APCHKMODE, and entering the word "YES", which causes automatic check writing. Any other three-character entry sets the mode to manual.

VI The printing of category totals--PK-11 of the master menu--is run at the user's convenience since it does not affect the operation of the other jobs.
PK-1 - ADD/CHANGE/DISPLAY AN INVOICE OR CREDIT MEMO

The program APENTRY begins with this menu:

A/P TRANSACTION OPERATIONS

PK-1: ADD AN INVOICE OR CREDIT MEMO
PK-3: CHANGE OR DELETE AN INVOICE OR CREDIT MEMO
PK-5: DISPLAY A VENDOR'S INVOICES AND MEMOS
PK-7: FILE STATUS
PK-24: EXIT

SELECT OPERATION BY PRESSING A PROGRAM SELECTION KEY
(PRESSING PK-24 AT ANY POINT IN THE PROGRAM WILL BYPASS
THE CURRENT OPERATION AND RETURN YOU TO THE PREVIOUS MENU)

Of the programs in the A/P System this one will see the most
usage because it handles all APTRANS file operations. The respective
functions of each of the PK selections from this menu will be taken
in turn.

PK-1

The following example will illustrate the process of adding a
transaction to APTRANS.

Suppose, as a Gizmo dealer, we place an order with Deluxe Whole-
sale Products for ten Gizmos. The Gizmos arrive with the invoice
9052 dated 5-3-81. The cost to us is $100.00, but a ten per cent
discount is available if we pay within 30 days. The shipping cost
is $5.00.

The first prompt is

VENDOR CODE:

Our reply is

010050

This is the vendor code we assigned to Deluxe Wholesale Products
when we added it to APVEND.

prompt: OUR INVOICE OR MEMO NUMBER:

reply: 009052

Assuming our policy is to use their invoice number. Since the trans-
action number is 12 characters long, and the first six are the vendor
number, then the trailing six can be any set of characters that will
uniquely identify that transaction. It would be desirable to estab-
lish a standard of coding so that the original can be easily traced,
if necessary.

prompt: CHOOSE ONE:

1 - MERCHANDISE-FOR-RESALE INVOICE
3 - EXPENSE
5 - CREDIT MEMO

reply: (press PK-1)
If an OCK is pressed, the default is as if PK-1 were chosen.
Credit memo in the A/P System applies only to resale vendors.
Any credit memos received from an expense vendor should be deducted
from that vendor's next expense invoice before adding it to APTRANS.

prompt: HAS THIS ITEM BEEN PAID, OR IS IT STILL DUE?
1 - DUE
3 - PAID

reply: (press PK-1)

Our example invoice is due. Had it already been paid, we would have
chosen PK-3, and the invoice would eventually appear on the A/P
Ledger with a "PAID" status.

prompt: ENTER INVOICE OR MEMO DATE:
MM/DD/YY

reply: 05/03/81

It is important that the date is entered correctly if the invoice
offers a time-dependant discount, because the system uses the date
to determine if the discount is still available at the time the
ledger is printed. However, if the transaction has no discount,
then the date is used only as part of the description.

prompt: ENTER THEIR INVOICE # (IF ANY):

reply: 9052

Eight characters can be accommodated here which serve as part of the
record's description. Unlike "OUR INVOICE" number, this number is
not used by the A/P System. Since the number has already been en-
tered once, we really needn't enter it again, but do anyway.

prompt: ENTER DESCRIPTION OF INVOICE OR MEMO:

reply: TEN GIZMOS @ $10.00 EACH

This field will accept a maximum of 40 characters.

prompt: DOES THIS INVOICE OFFER A DISCOUNT?
1 = YES
3 = NO

reply: (press PK-1)

Choosing "NO" will bypass the following prompts pertaining to discounts.

prompt: CHOOSE A FORMAT FOR ENTERING DISCOUNT:
1 - PERCENT/DAYS
3 - LUMP SUM

reply: (press PK-1)
"LUMP SUM" should be selected if there is no time limit involved, in which case the total amount of the discount would be entered and not a percentage.

prompt: ENTER 2 DIGIT PERCENT:

reply: 10

For 10%. Note that for percentages smaller than ten a leading zero is needed in the entry.

prompt: ENTER NUMBER OF DAYS DISCOUNT IS IN EFFECT (2 DIGITS):

reply: 30

prompt: ENTER NET AMOUNT OF PURCHASE (NOT INCLUDING FREIGHT):
(No POINTS, LEADING ZEROES, OR LEADING SPACES)

reply: 10000

Always include cents. An entry of 100 would be accepted as one dollar.

Had we selected "NO" for the prompt which had earlier asked us if the invoice offered a discount, then the very next prompt would have asked us for the "TOTAL AMOUNT OF PURCHASE". Our reply would have been 10500; this amount includes the freight. The reason we don't include freight for the amount of purchase of discounted items is because the program calculates the discount based on the percentage and the net amount of purchase.

For non-discounted items the prompting ends with the amount of purchase. For discounted items, it ends with freight:

prompt: ENTER COST OF FREIGHT:

reply: 500

After the last entry, the record is added to the file. Invoices with discounts, like our example, will have the discount calculated; if today's date is not more than the number of days allowed on the invoice beyond the date on the invoice, then the discount will be deducted from the amount due.

Once added, the record is displayed on the Self-Scan for our examination just as if PK-3 had been selected from the A/P transaction operations menu. Study the following explanation to see how our example would be displayed.

PK-3

Entering the 12-character vendor/invoice code will bring up a record for display on the Self-Scan. A transaction record that has just been added will automatically be displayed.
VENDOR NUMBER 010050
TRANSACTION NUMBER 009052

RESALE INVOICE 05/03/81 13 - NOT SAVED 15 - DUE
ENTERED 05/10/81
1 - DESCRIPTION ............. 9052 TEN GIZMOS @ $10.00 EACH
3 - NET DUE ................. $100.00
5 - DISCOUNT, PERCENT ...... 10
5 - DISCOUNT, # DAYS ........ 30
7 - DISCOUNT TOTAL ........ $10.00
9 - FREIGHT ................. $5.00
11 - TOTAL .................. $95.00

DISCOUNT AVAILABLE

NUMBER AT LEFT IS PK TO PRESS WHEN CHANGING THAT FIELD
TO DELETE THIS RECORD, PRESS PK-22
TO EXIT, PRESS PK-24

Use caution when changing the numeric fields, as this will change the final total.
"NOT SAVED" means that this record will be processed by APLEDGER (the program that produces the ledger) -- i.e., it will be included in the check calculations and/or marked for deletion from APTRANS. Changing this status to "SAVED", by pushing PK-13, will cause APLEDGER to preserve it in APTRANS and suppress check output for it, if any, although the record will still be included in the accounts payable calculations under the "SAVED" status.

Take note that any record of a vendor that is saved will cause all records for that vendor to be saved. But all records are automatically "NOT SAVED" at the time they are added to APTRANS.

The alternative to "DUE" in the display above is "PAID". Paid records are deleted by APLEDGER and cannot be saved. Due records that are not saved are not deleted until the job APCHKWRITER has run, and this applies to both manual and auto check writing modes.

The following shows what the Self-Scan will display for records that do not offer a discount.

VENDOR NUMBER 010050
TRANSACTION NUMBER 009052

RESALE INVOICE 05/03/81 13 - NOT SAVED 15 - DUE
ENTERED 05/10/81
1 - DESCRIPTION ............. 9052 TEN GIZMOS @ $10.00 EACH
11 - TOTAL .................. $105.00

NUMBER AT LEFT IS PK TO PRESS WHEN CHANGING THAT FIELD
TO DELETE THIS RECORD, PRESS PK-22
TO EXIT, PRESS PK-24

The alternatives for "RESALE INVOICE" are "CREDIT MEMO" and "EXPENSE".

Another message that may appear just below the total is "NO DISCOUNT--TIME EXPIRED", which means just that. The discount period is checked every time the record is displayed, and again when the
A/P Ledger is written. Once the time has expired, the discount is lost and cannot be recovered unless the record is deleted and re-added.

One other message is "DISCOUNT MAY BE AVAILABLE--CHECK ORIGINAL INVOICE". Specifically this means that the record included a discount but the validity of it is in question because the invoice date was entered incorrectly. In such a case no discount is taken.

If PK-22 is pushed while a record is displayed in the above format, a message will appear asking if the record shown is, in fact, the right one to be deleted. Only a "YES" response will accomplish the deletion. Once this is done, the record is permanently removed from APTRANS, but it does make a final appearance in print when the DAILY ACTIVITY LISTING is written.

Some care must be taken when deleting a record that offers a discount, or any record for that matter whose total (due) amount has changed since the record was first added to APTRANS. A problem may occur with the file APFLCT, which keeps totals of all the records added to APTRANS. When a record is deleted its total is subtracted from APFLCT. If that amount has changed since the record was added, then the total in APFLCT will not match the total produced by APLEDGER when it adds all the records in APTRANS; such a mismatch will cause a message to be printed at the bottom of the ledger. The reason for the mismatch should be found out and the condition corrected before A/P operations continue. The utility AMEND is probably the easiest way to change the APFLCT total.

Another way the APFLCT total can be thrown off is by deleting a record that is "SAVED"; such a record is not subtracted from APFLCT. This is one means of deliberately manipulating APFLCT, but the safer method is through the utility AMEND.

PK-5

Entering the vendor code will cause the display of each record in APTRANS for that vendor, beginning with the last one added. The records are displayed one at a time in a format similar to the one shown under PK-3 above, except that no changes can be made to the records. This function provides a means of locating a transaction whose number has been forgotten or lost.

By pressing PK-1 or an OCK the records are displayed until exhausted or until PK-24 is pressed.

PK-7

The disk file APFLCT contains the information used in this display operation. A typical display would look something like...

FILE STATUS: 100 ENTRYS 50 DELETIONS 50 AVAILABLE SPACES
FILE TOTALS... RESALE INVOICES: $2000.00 EXPENSES: $345.25

TO SEE TOTALS OF A CATEGORY, ENTER ITS 2-DIGIT NUMBER
OR PK-24 TO RETURN TO MENU
ENTER CATEGORY #:

File capacity is 200 records. According to the information shown, 50 more records can still be added to APTRANS. An attempt to add more than this will cause an error. If APLEDGER and APCHKWRITER
are run periodically without allowing APTRANS to reach capacity, then the file should never run short of space.

Another feature of this display is to show category totals, which accumulate throughout the year, by entering the desired category number. See the discussion under PK-3 of this section for more information on categories.
PK-3 - ADD/CHANGE/PRINT A VENDOR RECORD

Vendor operations are actually a part of the program APMENU. Control is from this menu:

VENDOR FILE OPERATIONS

1 - DISPLAY/CHANGE/DELETE A VENDOR RECORD
3 - ADD A VENDOR RECORD
5 - PRINT ALL VENDOR RECORDS
7 - YEAR-END CATEGORY FILE REPORT AND VENDOR FILE UPDATE
24 - RETURN TO MASTER MENU

The function of each PK from this menu is explained below.

PK-1
prompt: ENTER VENDOR CODE AND PRESS OCK-1:
reply: 010050

This would be the six-character code we have already assigned to a vendor record while adding it to APVEND. The computer returns with a display of that record...

RECORD REQUESTED FOR DISPLAY:
1 - CODE.............010050 17 - CATEGORY....01 RESALE MERCH
3 - NAME.............DELUXE WHOLESALE PRODUCTS
5 - ADDRESS...........13345 HIGHWAY 7
6 - CITY.............LOS ANGELES, CA 61403
7 - PHONE...........2134445610
PURCHASES:
9 - THIS YEAR....... $245.90
11 - LAST YEAR.......$1,050.00
13 - LAST ACTIVITY..05/10/81
15 - OTHER INFO.....800 ORDER #: 413-5520

TO CHANGE A FIELD PRESS THE APPROPRIATE PK
TO DELETE THIS RECORD PRESS PK-20
TO EXIT, PRESS PK-24

A vendor record cannot be deleted not can its code be changed until all of its transaction records are cleared from APTRANS.

PK-3

The vendor code, six characters in length, is asked for first and must be unique within APVEND. If it is not, a message is displayed, otherwise the add process continues.

The prompt "ENTER CATEGORY (01-50):" requires a two-digit number within the range indicated. The number is used as an index to the category file APCATBL, which holds the descriptions of the categories, and to the display file APFLCT, which holds the total for each of these categories.

The index for the category in the above example is 01, and the category is RESALE MERCH.
"LAST ACTIVITY" is taken from the date entered into MCPX when it is powered up.
"PURCHASES THIS YEAR" requires an entry that has no decimal point or dollar sign, and no leading spaces or leading zeroes. The correct entry for $100.00 is 10000.
Both "LAST ACTIVITY" and "PURCHASES THIS YEAR" are kept current automatically by the program APENTRY.

PK-5
APVENWRITE writes out the ACCOUNTS PAYABLE VENDOR REPORT. All information in each vendor record is printed by vendor code sequence. This program does not alter any files and can be run at any time.
To get an alphabetical listing of the records by vendor name, take the following steps.

1. Power off the A/P System and change APVEND to APVEND.X.
2. Issue this command:
   SORT FILE IN APVENDQQ (DISK) OUT APVEND (KEYFILE) KEY (13 20)
   INDEX DUPLICATES
3. Execute APVENWRITE and wait until it finishes writing.
4. Change APVEND (which is now the alpha keyfile) to VEND.ALPHA or some other name.
5. Change APVEND.X back to APVEND.

The last step is crucial to the A/P System.
Whenever additions are made to APVEND, it will be necessary to repeat the above steps to get an updated alpha listing.
The SORT in step 2 does not sort the records themselves, but it does create a new keyfile with the name APVEND, which is what is used by APVENWRITE to produce the ordered list. The keys consist of the first ten characters of the vendor name, beginning on half-byte 13 of the record for a length of 20 half-bytes. Each key will serve as an index to a record in data file APVENDQQ; this means that by knowing its key, a record can be selected at random from the data file. The parameter "DUPLICATES" allows duplicate keys; a vendor with two categories, for example, could appear twice in APVENDQQ, providing each entry has a unique vendor code.

PK-7
APVUPDATE is run at the end of each year. It updates the vendor file by accessing every vendor record and moving purchases-this-year to purchases-last-year and zeroing out purchases-this-year.
In addition, an ACCOUNTS PAYABLE CATEGORY LISTING is printed, showing all category totals at the year's end. Each category in APFLTCT is then zeroed out.
PK-5 - PRINT DAILY ACTIVITY LIST AND COPY FILES TO BACKUP

APAUDIT serves two purposes. The first is to make backup copies of the A/P System's critical files APTRANS, APVEND, and APLINK; this requires a second disk drive and disk, usually a mini.

As the program executes it zips the Burroughs COPY utility with the commands "COPY *COPYMAC1" and "COPY *COPYMAC2". The two modifiable star files contain the remainder of the COPY commands. The Burroughs utility AMEND can be used to insert the name of the backup disk into these files (also known as macro files).

The second purpose of APAUDIT is to write out the DAILY ACTIVITY LISTING. The content of this print-out comes from APDAILY, a sequential file that contains a copy of every record which has been added to or deleted from APTRANS. The records are written to APDAILY by APENTRY, and APAUDIT erases them after it has produced the hard copy. APAUDIT should be run frequently enough to insure that APDAILY does not exceed its capacity of 100 records.

Each transaction record of APDAILY is given a single line in the DAILY ACTIVITY LISTING except for those that offer a discount. Discounted records show a gross total, which is the total amount of that transaction without the discount.

The right column of the listing, "STATUS", is blank for all due records that have been added. "CASH-ADD" labels a record that has already been paid and is added to the file. Other status labels:

DELETED - a resale invoice, expense, or credit memo that has been manually deleted (that is, by the operator)

CHANGED - like DELETED, except that the total of the record has been tampered with and possibly changed since the record was added. This potentially could cause an "error" message to appear when the A/P Ledger is written.

CASH-DEL and CASH-CHG - for paid records, the equivalent of DELETED and CHANGED.
PK-7 - CALCULATE A/P AND PRINT LEDGER

APLEDGER is responsible for calculating all due accounts payable and presenting them in the report ACCOUNTS PAYABLE LEDGER. From this ledger the user sees what is owed and what is paid and to whom checks will be written, should that option be used. The program also writes information to the sequential file APCHKFL to be later used by the job APCHKWRITER.

When APLEDGER is executed, it first checks to see if APCHKFL is empty, which will be the case if APCHKWRITER was run following the last APLEDGER job. If the file is not empty, this message results:

CHECK FILE HAS NOT BEEN CLEARED SINCE LAST RUN.
CHOOSE ONE OF THE FOLLOWING:
P K-1 - CANCEL THIS JOB
PK-3 - CONTINUE AND CLEAR CHECK FILE
PK-5 - CONTINUE AND ADD TO CHECK FILE

In normal operation PK-3 is the correct choice. For example, if APLEDGER had to be run twice in a row because of errors in the first run, then the desirable thing to do is clear the bad information out of APCHKFL before starting the second run.

The ACCOUNTS PAYABLE LEDGER print-out shows first the vendor's name and address, followed by all the transactions in APTRANS belonging to that vendor. Transactions shown with a "PAID" status are deleted as they are written out. Those with a "SAVE" status are totalled separately and are not included in the "TOTAL DUE VENDOR". A record that has a "SAVE" status will not allow any records with the same vendor code to be deleted; and if the auto check-writing mode is used, no check will be written for the vendor with that code.

At the end of the ledger are the file totals. As these totals are written, an error detection routine compares total expenses, total resale debits and the number of records processed, with the equivalent totals in the file APFLCT used for display purposes by the program APENTRY. If the respective totals in the two files are not equal, then those of APFLCT which do not match are printed at the bottom of the ledger.

A record whose amount has been changed since the record was added can cause a mismatch of APLEDGER and APFLCT totals. Using the DAILY ACTIVITY LISTING as a cross-reference with the A/P Ledger is one way of finding a changed record.
PK-9 - PRINT CHECKS AND CHECK REGISTER

The mode of APCHKWRITER is established by the contents of the one-record file, APCHKMODE. If it contains the word "YES" then APCHKWRITER will write checks. Any other three-byte entry is interpreted as manual mode.

In the auto check mode, the program first displays...

THIS JOB WILL WRITE CHECKS AND THE CHECK REGISTER
BASED ON THE INFORMATION SHOWN IN THE A/P LEDGER.
VENDORS WITH SAVED ITEMS WILL NOT HAVE CHECKS
WRITTEN FOR THEM.

TO SUPPRESS A CHECK FOR ANY ADDITIONAL VENDORS (UP TO 20
MORE) PRESS PK-1.
TO BEGIN CHECK WRITING PRESS PK-3.
TO CANCEL JOB PRESS PK-24.

If PK-1 is selected, then each vendor code must be entered with
OCK-1; PK-24 is pressed after they've all been entered. If there
are more than 20, then immediately following the 20th entry, the
program will move on to the check-writing routine.

The check-writing routine is introduced with...

CHECKS ARE READY TO BE WRITTEN.
WHEN CHECK FORMS ARE READY PRESS OCK-1,
OR CHOOSE ONE:
PK-1 - WRITE A TEST CHECK TO ALIGN FORMS
PK-24 - CANCEL JOB

The print head is positioned at the first available line of the
check voucher (or apron). As many test checks as necessary can
be written with fill characters to preview line positioning; the
print head will always return to the position it started at for the
last test check.

The check voucher can accommodate a fixed number of entries.
If this number is exceeded, the entries are continued on the next
voucher and the check in between is voided. After the checks are
written the standard forms must be replaced for the CHECK REGISTER.

In manual mode, APCHKWRITER will display as it begins...

CHECK-WRITER IS IN MANUAL MODE; NO PRINTOUTS WILL BE PRODUCED.
TRANS. FILE WILL BE UPDATED BY DELETING DUE INVOICE ITEMS.

TO SAVE ANY RECORDS FROM DELETION, PRESS PK-1.
TO BEGIN FILE UPDATE, PRESS PK-3.
TO CANCEL JOB PRESS PK-24.

To save vendor transaction records from deletion, the vendor
codes are entered in the same manner as described above. Records
that are saved will appear in the next A/P Ledger, but each will
maintain a due status.

In both manual and auto check modes, as the program continues
it will display on the Self-Scan:

....TRANSACTION FILE PURGE BEGINS...DO NOT INTERRUPT
This routine, which may vary in the length of time it takes to complete, deletes the records from ATRANS that have not been saved.
Next appears...

FILE PURGE COMPLETE. NOW ZIPPING FILE SQUASH.
...WHEN SYSTEM SAYS "WAITING ATRANS DK DUPLICATE FILE",
Enter "RM ATRANS"

The MCPX system will display that it has initiated a SORT to reconstruct the keyfile ATRANS for the data file ATRANSQQ which has just been compressed ("squashed") to remove deleted records from it. The new keyfile will also have the name ATRANS and so the old one will have to be removed by using the MCPX intrinsic command RM. Caution: do not attempt to remove ATRANS until the system says it is "WAITING".

Once the old keyfile is removed, the job will continue to completion and return to the A/P master menu.
PK-11 - PRINT CURRENT CATEGORY TOTALS

The job APCATLIST produces the ACCOUNTS PAYABLE CATEGORY LISTING. As no files are altered by this program, it can be run at any convenient time for the purpose of monitoring expenditures by category.
ERROR RECOVERY

There are two types of error messages. One is generated from within the Accounts Payable System and is recognizable by the pound-signs that accompany it. For example:

#TRANSPFILE ERROR#

Or, a simpler example:

#PROGRAM ERROR#

The word "ERROR" will always be present in the message, although the remainder of the text may be different than from these examples.

The other type of error message makes its appearance among the MCPX system messages; it will include an error code, the name of the program that caused the error, a brief description of the error, and it will usually end with the request "DS OR DP" (discontinue or dump). The operator is required to obey the request; however, sometimes the MCPX system makes no request and simply announces "PROGRAM ABORTED", automatically cancelling the job.

File Boundary Violation

The most likely cause of an error in an A/P System program is writing too many records to a file. If the error happens during APENTRY (while adding transactions), then a check must be made of the files APDAILY, which can handle up to 100 transaction additions before back-up, and ATRANS, whose capacity is 200 records, deletions included. APDAILY is cleared out by running APAUDIT—the back-up and daily listing job. ATRANS must be cleared by running APLEDGER followed by APCHKWRITER (regardless of whether checks are written by the system or not).

An error affecting ATRANS will also affect APFLCT, the display file for APENTRY. If, after recovery from an error, the file's display figures are wrong, they can be corrected by using the utility AMEND to modify the data file APFLCTQQ.

Another indexed file that could possibly run out of space is APVEND, which can hold 200 vendor records. If this file is suspected of containing an appreciable number of deletions, then the A/P System should be powered off and APVEND squashed using the utility FS. But since APVEND is not that likely to contain very many deletions, a more reasonable cure would be to lengthen it using the Burroughs utility CREATE with the EXTEND feature. Any file, in fact, can be enlarged by this method.

Program Corruption

Program corruption means that the object code of a program that is stored on disk has somehow been changed and can no longer do everything that it was originally intended to do. For example, a disk stored carelessly near an electric field can have a portion of its platter magnetically altered by that field. Or a disk drive can go bad and be unable to read properly. These are both hardware errors, and generally hardware errors are detected by the operating system, MCPX, at the time it is powered up. Just to be certain,
however, a comparison test can be made using a back-up copy of the program in question and the Burroughs utility COMPARE.

To make the comparison, the disk with the A/P System on it is powered down and another disk with COMPARE and the back-up program is loaded in a separate disk drive; the second disk is used as the MCPX system disk. The next step is to execute the utility, comparing the back-up copy with the suspected copy. Differences between the programs will be written on the console printer, and examination of this print-out should show if the suspected program is actually bad.

Note that a difference of disk or file names within the programs does not make one of them bad. These names may vary simply because different disks are involved, and each program is adapted to run on its own disk.

**Logic Error**

A logic error is known to the programmer as a "bug". If other potential causes of an error have been investigated and ruled out, then a bug may be present, and it will be necessary to enlist the aid of a programmer to "walk through" the source listing of the program and try to find this bug. It can be of great help to the programmer to know exactly what operator/computer activity took place just prior to the error.

Once corrections are made, the source code is compiled to produce a new copy of the program. As a precaution, the old copy of the program should be preserved on a back-up disk at least until the new copy has had sufficient time to prove itself.
POWER FAILURE RECOVERY

If either the computer or disk drive should completely lose power while a program is running, in most cases it will be possible to restart the program and continue where it left off after the A/P System has been brought back up. If after attempting to rerun the program an inexplicable file error occurs, then one or more of the disk files was probably damaged by the power failure and it will be necessary to copy the back-up files to the system disk and repeat the day's operations.

To copy the back-up files, load the back-up disk and power off the A/P System. Issue the command

COPY APSYSBU/APVEND <BOTH> TO APVEND

Substitute the name of the back-up disk for "APSYSBU". Repeat this command for the files APLINK and APTRANS. The word "BOTH" is used to copy both index and data files for an indexed pair.

If APLEDGER is in operation when the power failure happens, the proper procedure to select as the program is restarted is "CONTINUE AND CLEAR THE CHECK FILE".

If APCHKWRITER is interrupted while it is writing checks, it can be restarted without rerunning APLEDGER. However, if APCHKWRITER is writing the check register or performing the file purge when the power fails, then APLEDGER and APCHKWRITER both will have to be rerun.