9M08A

FLOATING POINT ADD AND SUBTRACT DIAGNOSTIC PROGRAM SIMULATING RESULTS WITH NON FLOATING POINT INSTRUCTIONS

A. UNIT TESTED

1. PURPOSE OF TEST

TO AID THE CUSTOMER ENGINEER IN LOCATING MACHINE TROUBLES DUE TO FAILURE IN THE EXECUTION OF FLOATING POINT ADD AND SUBTRACT INSTRUCTIONS.

TO BE USED TOGETHER WITH 9M05 IN GIVING A MORE COMPLETE COVERAGE OF FLOATING POINT ADD AND SUBTRACT INSTRUCTIONS.

2. METHOD OF TEST

A. TO DETERMINE BY MEANS OF NONFLOATING POINT INSTRUCTIONS WHAT THE CORRECT END RESULT OF A PARTICULAR PROBLEM SHOULD BE IF EXECUTED IN FLOATING POINT.

THESE RESULTS ARE COMPARED AGAINST THE END RESULTS OF THE SAME PROBLEM WORKED BY USE OF THE FLOATING POINT INSTRUCTION UNDER TEST.

IF THE TWO DO NOT COMPARE AS EQUAL, THE SAME PROBLEMA IS AGAIN WORKED BY MEANS OF NONFLOATING POINT INSTRUCTION. WE THUS DETERMINE, AND PRINT OUT, CORRECT MACHINE CONDITIONS WHICH SHOULD BE PRESENT AT THE END OF EACH MACHINE CYCLE DURING THE EXECUTION OF THE PROBLEM IN FLOATING POINT.

AFTER PRINT OUT, A HALT WILL OCCUR. AT THIS TIME, THE MACHINE CYCLE KEY MAY BE USED TO OBSERVE THE VALUES WHICH APPEAR WITH THE CRRECT CYCLIC MACHINE VALUES PREVIOUSLY PRINTED.

IF AT ANY POINT THERE IS A DISAGREEMENT BETWEEN THE TWO, THE ERROR MAY BE ANALYZED MORE READILY THAN WOULD BE POSSIBLE FROM HAVING SEEN ONLY THE FINAL RESULT WHICH WAS DEVELOPED OVER SEVERAL MACHINE CYCLES.

B. AREA OF MACHINE REQUIRED

1. MF, CF, CR, AND PR.
2. STORAGE LOCATIONS 0000-7777

C. PROGRAM CONTROL

1. DECK	000	HIGH END LOADER
	001-067	PROGRAM DECK
	068	TRA CARD TO 0030
	069-075	6 PRINT IMAGE CARDS

076-077 TWO BLANK CARDS

2. SENSE SWITCH CONTROL

SSW 1 UP	TEST SSW 2
SSW 1 DN	TEST SSW 2
SSW 2 UP	TEST FAD IF SSW 1 UP TEST FSB IF SSW 1 DN
SSW 2 DN	TEST UFA IF SSW 1 UP TEST UFS IF SSW 1 DN
SSW 3 UP	USE RANDOM NO. TEST DATA FOR EACH TEST PASS
SSW 3 DN	STOP. ENTER SPECIAL DATA
SSW 4 UP	NO EFFECT
SSW 4 DN	TEST DATA REMAINS CONSTANT UNTIL ERROR OCCURS
SSW 5 UP	CONTINUE TEST
SSW 5 DN	ENTER TIGHT SCOPE LOOP AFTER PRINT AND KEY USE
SSW 6 UP	PRINT ONLY ON ERROR
SSW 6 DN	FORCE PRINT OUT WITHOUT ERROR

3. SENSE LIGHT CONTROL

SL 1 ON	INDICATES ERROR AND PRINTS OUT
SL 2+3 OFF	TESTING FAD
SL 2 ON AND 3 OFF	TESTING FSB
SL 3 ON AND 2 OFF	TESTING UFA
SL 2+3 ON	TESTING UFS
SL 4 ON	INDICATES TRAP

D. NORMAL STOPS WHEN SSW 3 DN

1. 0050	ENTER ACC TEST NUMBER INTO KEYS.
2. 0054	ENTER SR TEST NUMBER INTO KEYS.

E. ERROR STOPS AFTER PRINT OUT

1. 1400	FAD STOP FOR MACHINE CYCLE KEY USE
2. 1372	UFA STOP FOR MACHINE CYCLE KEY USE
3. 1362	FSB STOP FOR MACHINE CYCLE KEY USE
4. 1354	UFS STOP FOR MACHINE CYCLE KEY USE

F. PRINTOUT

THIS PROGRAM DOES NOT USE 9DEPR, BUT HAS ITS OWN PRINT ROUTINE.

PRINTOUTS OCCUR ON ERROR. A PRINTOUT MAY BE FORCED AT ANY TIME BY SETTING SSW 6 DOWN. AN ACTUAL PRINTOUT FOR EACH TYPE OF TEST FOLLOWS THE COMMENT SECTION. THE NUMBER APPEARING IN THE CYCLE COLUMN IS IN DECIMAL, BUT ALL OTHER VALUES ARE IN OCTAL.

THE TC COLUMN MAY APPEAR BLANK DURING SOME CYCLES, BUT ACTUALLY INDICATES THAT THE TC VALUE HAS NOT CHANGED FROM THE LAST PRINTED VALUE.

IDENTIFICATION OF THE MORE ABBREVIATED COLUMNS IN THE PRINTOUT ARE--

SC	SHIFT COUNTER
TC	TALLY COUNTER
T1	CONTROL TRIGGER T1
T2	CONTROL TRIGGER T2
T3	CONTROL TRIGGER T3
QC	Q CARRY TRIGGER
9C	NINE CARRY TRIGGER
90	NINE OVERFLOW TRIGGER

A + SIGN	INDICATES AN ON STATUS AT THE END OF THE CYCLE
A - SIGN	INDICATES AN OFF STATUS AT THE END OF THE CYCLE
AN *	INDICATES THAT THE TRIGGER SHOULD HAVE COME ON DURING THE CYCLE BUT SHOULD BE TURNED OFF BEFORE THE END OF THE CYCLE

ALL OTHER VALUES REFLECT MACHINE CONDITIONS AT THE END OF THE CYCLE SPECIFIED.

BITS IN ACCUMULATOR Q AND P WILL BE SHOWN AS Q AND/OR P PRECEEDING ACC VALUE.

THE ERROR RESULT WHICH APPEARS AT THE END OF THE PRINTOUT REFLECTS THE MACHINE CONDITION AT THE END OF THE PROBLEM WORKED BY FLOATING POINT INSTRUCTIONS.

THE SPILL CODE NUMBER REFERS TO BITS 15, 16, AND 17 OF LOCATION ZERO ON TRAP. THESE BITS ARE USED TO INDICATE THE CAUSE AND TYPE OF OVERFLOW OR UNDERFLOW. SEE ELECTRONIC OPERATION MANUAL OR PROGRAMMERS REFERENCE MANUAL.

G. MACHINE CYCLE KEY OPERATION

AFTER PRINTOUT, YOU MAY OBSERVE THE CYCLIC MACHINE VALUES WHILE EXECUTING THE PROBLEM UNDER TEST.

TO DO THIS PUT MACHINE IN MANUAL, PRESS START, AND DEPRESS THE MACHINE CYCLE KEY ONE TO GET OUT OF THE HPR ER TIME WHICH IMMEDIATELY PRECEDES THE FLOATING POINT TEST INSTRUCTION.

FOR EACH ADDITIONAL DEPRESSION THE MACHINE SHOULD DISPLAY VALUES AS INDICATED BY THE PRINTOUT AND COMPARISON OF MACHINE VERSUS PRINTED VALUES MAY BE MADE AT THIS TIME.

IT SHOULD BE OBVIOUS FROM PRIOR TROUBLESHOOTING EXPERIENCE THAT IN MOST CASES THE FIRST DIFFERENCE BETWEEN CORRECT PRINTED VALUES AND DISPLAYED MACHINE VALUES SHOULD BE THE POINT TO DIG IN TO THE PROBLEM OF DETERMINING WHICH MACHINE LOGIC FAILED. IN MOST CASES, CORRELATION OF MACHINE FUNCTIONS, AS OBSERVED BY KEYING THROUGH THE INSTRUCTION AND FOLLOWING ELECTRONICS OPERATIONS VOLUME 1, WILL PROVIDE A LOGICAL CLUE TO FAILING MACHINE AREAS.

IT SHOULD BE NOTED THAT IF AN INTERMITTENT TROBLE EXISTS, IT MAY BE

POSSIBILE THAT NO ERROR CONDITION WILL BE DETECTED DURING COMPARISON OF MACHINE VALUES TO PRINTED VALUES.

H. PROGRAM FEATURES-

1. MANUAL DATA ENTRY--

ANY SET OF DATA SO DESIRED MAY BE ENTERED MANUALLY AND TESTED BY THE USE OF SENSE SWITCH THREE. WHEN SWITCH 3 IS PUT DOWN, IF SWITCH FOUR IS UP, A HALT WILL OCCUR AT WHICH TIME THE MACHINE SHOULD BE PUT IN MANUAL AND THE ACC DATA ENTERED INTO THE KEYS. RETURNING THE MACHINE TO AUTOMATIC AND STARTING WILL CAUSE A SECOND HALT WHERE THE SR DATA CAN BE ENTERED IN THE SAME MANNER. IF IT IS DESIRED TO KEEP THE ENTERED DATA CONSTANT UNTIL AN ERROR OCCURS, SWITCH FOUR MAY BE PUT DOWN AT THIS POINT.

2. SCOPE LOOP--

USE MAY BE MADE OF SENSE SWITCH FIVE TO CAUSE THE PROGRAM TO ENTER A TIGHT LOOP WHICH MAY BE USED FOR SCOPING PURPOSES. THE LOOP WILL BE ENTERED ONLY AFTER A PRINTOUT AND AFTER MACHINE CYCLE KEY USE HAS BEEN MADE IF SWITCH FIVE IS DOWN AND WILL REPETITIVELY EXECUTE THE SAME TEST PROBLEM WHICH WAS PRINTED OUT. EXIT FROM THE LOOP TO THE MAIN PROGRAM MAY BE ACCOMPLISHED BY RAISING SWITCH FIVE.

3. FORCED PRINTOUT--

IF IT IS DESIRED TO SEE THE CYCLIC RESULT OF ANY PARTICULAR PROBLEM UNDER TEST WITHOUT HAVING TO WAIT FOR AN ERROR CONDITION TO CAUSE ENTRY TO THE PRINT ROUTINE, SWITCH 6 MAY BE PUT DOWN AND PRINTOUT WILL RESULT. A HALT WILL OCCUR AT ONE OF THE LISTED ERROR STOPS. IF IT IS NOT DESIRED TO COMPARE CYCLIC MACHINE VALUES AT THIS TIME PUSH THE START KEY TWICE TO CONTINUE.

4. POST RESTART-

NO POST RESTART IS PROVIDED SINCE TRAP CONDITIONS ARE STORED AT ZERO. THE NORMAL RETURN FOR NEW DATA IS TO LOCATION 40. A MANUAL TRA TO 40 IS THE CORRECT THING TO DO IF YOU GET HUNG UP IN ANY WAY AND WANT TO START OVER AGAIN.

5. NUMBER OF PASSES INTERROGATION--

IT IS POSSIBLE TO DETERMINE AT ANY GIVEN TIME THE NUMBER OF PASSES THE PROGRAM HAD MADE BY DISPLAYING STORAGE LOCATION 2363. THIS WILL BE THE NUMBER OF TIMES NEW TEST DATA HAS BEEN SELECTED AND USED IN THE TEST. REPETITIVE PASSES USING THE SAME DATA ARE NOT COUNTED.

I. COMMENTS--

TEST DATA USED IS DERIVED FROM A RANDOM NUMBER GENERATOR WHICH STORES NUMBER AT ADDRESSES 2720 TO 7777. AFTER THESE HAVE BEEN EXHAUSTED A NEW SET OF RANDOM NUMBERS ARE GENERATED SO THAT REGARDLESS OF HOW LONG THE PROGRAM RUNS IT CONTINUES TO USE NEW TEST DATA. BY THIS METHOD EVERY

POSSIBLE DATA CONFIGURATION IS TESTED COVERING THE WIDEST POSSIBLE RANGE OF PROBLEM CONDITIONS.

THE NUMBER OF PASSES THROUGH THE PROGRAM IS NOT LIMITED, BUT WILL CONTINUE TO RUN AS LONG AS DESIRED AT THE RATE OF APPROXIMATELY 5800 PASSES PER MINUTE. IT IS RECOMMENDED THAT THE PROGRAM BE ALLOWED TO RUN SEVERAL MINUTES FOR MAXIMUM EFFECTIVENESS IN LOCATING A MACHINE MALFUNCTION.

IT IS INTENDED THAT ALL NONFLOATING POINT INSTRUCTIONS BE THOROUGHLY TESTED BY USE OF OTHER DIAGNOSTIC PROGRAMS AND THAT IT BE REASONABLE SURE THAT THE AREA OF MALFUNCTION LIES WITHIN FLOATING POINT CONTROL LINES OR LOGIC BEFORE RESORTING TO THE USE OF THIS PROGRAM. REASON FOR THIS STATEMENT LIES IN THE FACT THAT MANY NONFLOATING POINT INSTRUCTIONS ARE USED TO DIRECTLY DETERMINE THE VALIDITY OF THE FLOATING POINT INSTRUCTION UNDER TEST. IT SHOULD BE OBVIOUS THEN THAT ITS INDISCRIMINATE USE MIGHT VERY WELL SERVE TO CONFUSE RATHER THAN AID THE USERS.

BIASING-

IF IT IS DESIRED TO RUN THIS PROGRAM UNDER BIAS CONDITIONS, IT SHOULD BE REMEMBERED THAT ITS CORRECT OPERATION DEPENDS UPON THE PROPER EXECUTION OF NUMEROUS FIXED POINT INSTRUCTIONS. THEREFORE BIAS LIMITS SHOULD NOT BE EXTENDED TO THE POINT OF CAUSING FIXED POINT FAILURES, BUT KEPT SAFELY WITHIN THESE LIMITS.

TRAP PROBLEMS-

ON SEVERAL TIMED RUNS, USING PRESENT RANDOM NUMBER DATA GENERATOR, IT WAS FOUND THAT A TRAPPING CONDITION OCCURED ONCE IN APPROXIMATELY EVERY 75 PROBLEMS WORKED.

TRAPPING PROBLEMS MAY BE FOUND ON EITHER INSTRUCTION BY MANUALLY LOWERING AND RAISING SSW 4 UNTIL SL 4 COMES ON. WHEN SL 4 COMES ON, LEAVE SSW 4 DN AND USE AS DESIRED-FOR CONTINUOUS RUN ON TRAP, FOR SCOPING ON TRAP, OF FOR FORCED PRINT OUT FOR EXAMINATION AND ETC.

BE SURE THAT SL 4 DOES NOT GO OFF WHEN LOWERING AND RAISING SSW 4. IF SL 4 GOES OFF, YOU RAISED SS4 ENOUGH TO LOSE TRAP PROBLEM AND BRING IN ANOTHER PROBLEM. WHEN THIS HAPPENS, LOOK FOR ANOTHER AND BE MORE CAREFUL.

RUNNING AND OPERATION

1. LOAD PROGRAM WITH CORRECT SSW SETTING
2. EXCEPTIONS- NORMAL RUNNING WILL BE WITH SSW 6 UP. REMEMBER THAT PLACING SSW 6 DN GIVES A FORCE PRINT OUT WITHOUT ERROR. WITH SSW 6 UP PROGRAM WILL CONTINUE TO RUN UNTIL AN ERROR OCCURS.

   NEXT PROGRAM - MAY BE CALLED IN BY RESETTING OR CLEARING AND PUSHING LOAD CARDS.

   TO START ANEW-MANUALLY TRA TO 40, SET IN AUTOMATIC, AND PUSH START.

3. ON ERROR - YOU WILL PRINT. AFTER PRINT, PROGRAM STOPS. THEN --

A. TO USE CYCLE KEY -

1. GET PRINT OUT AND EXAMINE FOR ERROR
2. MOVE TO CONSOLE
3. PUT MANUAL DOWN
4. PUSH START
5. TAKE CYCLE KEY-DEPRESS ONCE.
6. DEPRESS CYCLE KEY AGAIN AND COMPARE MACHINE VALUES TO PRINT. COMPARE ON SC VALUES EQUAL. REMEMBER, YOUR PRINT OUT IS IN FIXED POINT AND YOUR CYCLE KEY IS IN FLOATING POINT.
   CONTINUE THIS, MOVING ON THROUGH TO THE LAST CYCLE. WATCH FOR ERRORS.
7. TRIGGERS MAY BE TABBED FOR A FASTER CHECK OF THEIR STATUS.

B. TO SCOPE AFTER CYCLE KEY USE -

1. STOP CYCLE KEY OPERATION ON REACHING NEXT HPR INSTRUCTION. WATCH FOR P/S LIGHT TO COME ON.
2. SET SSW 5 DN
3. PUT IN AUTOMATIC
4. PUSH START

C. TO LEAVE SCOPE LOOP AND GET NEW DATA FOR NEX PASS -

1. SET SENSE SWITCHES FOR DESIRED INSTRUCTION AND OPERATION.
2. LIFT SSW 5.

D. TO LEAVE SCOPE LOOP AND GET SAME DATA FOR NEXT PASS -

1. PUT IN MANUAL
2. SET SSW 4 DN
3. LIFT SSW 5
4. CHECK SSW SETTING FOR DESIRED INSTRUCTION.
5. MAKE MANUAL TRA TO 1330
6. PUT IN AUTOMATIC
7. PUSH START

E. TO NOT SCOPE AFTER CYCLE KEY USE-AND GET NEW DATA -

1. CHECK SSW SETTING FOR DESIRED INSTRUCTION AND OPERATION
2. LIFT MANUAL
2. LEFT MANUAL
3. PUSH START

F. TO NOT SCOPE AFTER CYCLE KEY USE-AND KEEP SAME DATA -

1. CHECK SSW SETTING FOR DESIRED INSTRUCTION AND OPERATION
2. SET SSW 4 DN
3. MANUALLY TRA TO 1330
4. LIFT MANUAL
4. LEFT MANUAL

5. PUSH START

A1. TO NOT USE CYCLE KEY AFTER ERROR PRINT-AND CONTINUE-TO NEW DATA -

1. PUSH START TWICE

A2. TO NOT USE CYCLE KEY AFTER ERROR PRINT-AND KEEP SAME DATA -

1. PUT SSW 4 DN
2. MANUALLY TRA TO 1330
3. LIFT MANUAL AND PUSH START

SPECIAL NOTE:

If trouble should be encountered while performing UFA and UFS instructions, be sure that EC 245677 has been installed. This change corrects the logical error found by this program.

The program will perform correctly for FAD and FSB without this change, but will not run free of errors on UFA and UFS dur to certain problems bringing up step five output line on systems 2. 08. 34 whith tries to cause an MQ and ACC left shit.

If EC 245677 is not installed, tube MF1 J28 07 (CF) may be pulled to keep step five output line down while running UFA and UFS. By doing this the program will run correctly and any errors obtained on UFA and UFS now will be due to soe other machine bugs. They may be troubleshot with tube out since the other half of tube is for operation panel keys to storage register circuits.

File Attachments: Source Cards Deck
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*      TRAP ENTRY

                  00010         ORG 8

00010  0601 00 0 02247  T10     STO ERRAC       SAVE S, 1-35 ON TRAP
00011  0771 00 0 00002          ARS 2
00012 -0320 00 0 02230          ANA PTH
00013  0601 00 0 02252          STO ERRQP
00014  0044 00 0 00000          PAI             QP TO SI 1 AND 2
00015  0760 00 0 00144          SLN 4           TRAP FLAG ON
00016 -0500 00 0 00000          CAL
00017  0400 00 0 02365          ADD W1
00020  0621 00 0 00021          STA *+1         REENTRY
00021  0020 00 0 00000          TRA

                  00030         ORG 24

00030  0600 00 0 00000          STZ

*      READ IN PRINT IMAGE HEADINGS

00031  0762 00 0 01321  E       RCDA
00032  0540 00 0 02207          RCHA PRHD
00033  0060 00 0 00033          TCOA *          WAIT

*      ADJUST TO FILL REMAINING STORAGE WITH RANDOM NUMBERS

00034  0500 00 0 02716          CLA RA1         L 7767
00035  0402 00 0 02715          SUB RA          L
00036  0601 00 0 02717          STO R
00037  0020 00 0 00074          TRA E2A         TO GENERAT R.N.

*      NORMAL RETURN FOR NEXT SET OF DATA
*      TURN ALL SENSE LIGHTS OFF

00040  0760 00 0 00140  E3      SLF
00041  0500 00 0 01265          CLA F16         L STO ERRAC
00042  0601 00 0 00010          STO T10         RESTORE AFTER SCOPE LOOP

*      ADJUST COUNT

00043  0500 00 0 02363          CLA COUNT
00044  0400 00 0 02365          ADD W1
00045  0601 00 0 02363          STO COUNT       L 1

*      USE PROGRAMMED DATA OR ENTER MANUALLY DESIRED DATA
*      TEST SSW 3 FOR DESIRED TEST DATA

00046  0760 00 0 00163          SWT 3
00047  0020 00 0 00107          TRA R3          USE RANDOM NUMBERS

*      WHEN SSW 3 IS DOWN, PROGRAM STOPS TO ALLOW ENTRY
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*      OF ANY DESIRED PROBLEM.  FIRST STOP AT LOCATION 47
*      TO ENTER ACC LOAD INTO MQ.  PUSH START.  NEXT
*      STOP AT 55 TO ENTER SR LOAD INTO MQ.

00050  0420 00 0 00000         HPR            LOAD ACC NUMBER INTO MQ
00051  0760 00 0 00004         ENK
00052 -0600 00 0 02240         STQ ACC
00053 -0600 00 0 02231         STQ TN1A

00054  0420 00 0 00000         HPR            LOAD SR NUMBER INTO MQ
00055  0760 00 0 00004         ENK
00056 -0600 00 0 02237         STQ SR
00057 -0600 00 0 02232         STQ TN2A
00060  0020 00 0 00122         TRA E4

*      ADJUST RANDOM NUMBER PRIMES

00061  0560 00 0 02727  E2     LDQ RN+7       L RANDOM NUMBER
00062 -0773 00 0 00005         RQL 5
00063  0601 00 0 02727         STO RN+7

00064  0560 00 0 02720         LDQ RN         L RANDOM NUMBER
00065 -0773 00 0 00017         RQL 15
00066 -0600 00 0 02720         STQ RN

00067  0560 00 0 02723         LDQ RN+3       L RANDOM NUMBER
00070 -0773 00 0 00007         RQL 7
00071 -0600 00 0 02723         STQ RN+3

00072  0500 00 0 00077         CLA R2A        ADJUST INSTRUCTION
00073  0621 00 0 00115         STA R3A        AT L R3A

*      GENERATE RANDOM NUMBERS TO FILL REMAINING STORAGE

00074 -0500 00 0 02727  E2A    CAL RN+7       L RANDOM NUMBER PRIME
00075  0534 00 4 02717         LXA R,4
00076  0401 00 4 07767  R2     ADM 4087,4
00077  0602 00 4 07777  R2A    SLW 4095,4
00100  2 00001 4 00076         TIX R2,4,1
00101  0600 00 0 02240         STZ ACC
00102  0534 00 4 02717         LXA R,4
00103  0600 00 0 02231         STZ TN1A
00104  0600 00 0 02237         STZ SR
00105  0600 00 0 02232         STZ TN2A
00106  0020 00 0 00122         TRA E4

*      SAVE ACC AND SR LOAD FR0 PROBLEM UNDER TEST

00107  0500 00 4 07767  R3     CLA 4087,4
00110  0601 00 0 02231         STO TN1A       ACC LOAD SAVE
00111  0601 00 0 02240         STO ACC        ACC LOAD SAVE
00112  0500 00 0 00115         CLA R3A
00113  0402 00 0 02365         SUB W1         L 1
00114  0621 00 0 00115         STA R3A        ADJUST ADDRESS

00115  0500 00 0 07777  R3A    CLA 4095
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00116  0601 00 0 02232         STO TN2A       SR LOAD SAVE
00117  0601 00 0 02237         STO SR         SR LOAD SAVE
00120  2 00001 4 00122         TIX E4,4,1

*      ADJUST RANDOM NUMBER PRIMES FOR NEW TEST DATA

00121  0020 00 0 00061         TRA E2

*      SELECT THE CORRECT INSTRUCTION TO BE TESTED
*      FAD, FSB, UFA, OR UFS
*      RETURN HERE WHEN KEEPING SAME DATA
*      SSW 4 DOWN AND NO ERRORS

00122  0760 00 0 00161  E4     SWT 1          TEST SSW 1
00123  0020 00 0 00125         TRA E5         FAD OR UFA
00124  0760 00 0 00142         SLN 2          FSB TURN SL 2 ON

00125  0760 00 0 00162  E5     SWT 2          TEST SSW 2
00126  0020 00 0 00130         TRA E6         FAD OR FSB
00127  0760 00 0 00143         SLN 3          UFA OR UFS SL 3 ON

*      ADJUST CONSTANTS FOR I TIME ON ENTERING TEST

*      ENTER HERE FROM SSW 6 INTERROGATION FOR FORCED PRINT-OUT

00130  0500 00 0 02411  E6     CLA W1111      L ALL ONES
00131  0601 00 0 02241         STO MQ

00132  0500 00 0 02225         CLA FOR        L-ALL ZEROS
00133  0601 00 0 02265         STO NOV1       -ALL ZEROS
00134  0601 00 0 02245         STO Q1         -ALL ZEROS
00135  0601 00 0 02262         STO T33
00136  0601 00 0 02261         STO T22

00137  0600 00 0 02263         STZ T11
00140  0600 00 0 02344         STZ CACC
00141  0600 00 0 02255         STZ NIN1

*      TEST SL ONE-ON FOR ERROR AND FORCE PRINT OUT

00142 -0760 00 0 00141         SLT 1
00143  0020 00 0 00146         TRA A1         OFF-GO TO E TIME
00144  0760 00 0 00141         SLN 1          ON-TURN BACK ON
00145  0020 00 0 01500         TRA P1         AND GO TO PRINT

*      BEGIN E TIME

*      IS THIS ADDITION OR SUBTRACTION

00146 -0760 00 0 00142  A1     SLT 2
00147  0020 00 0 00154         TRA A2A        ADD

00150  0760 00 0 00142         SLN 2          SUB TURN SL 2 ON AGAIN

*      SET SR MINUS FOR SUB
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00151  0500 00 0 02237         CLA SR
00152  0760 00 0 00002         CHS            CHANGE SIGN
00153  0601 00 0 02237         STO SR

*      TRANSFER CONTROL AT LOCATION C1 FOR CORRECT RETURN AFTER PRINT

00154  0500 00 0 02302  A2A    CLA K15        L TRA A3
00155  0621 00 0 02047         STA C1

*      E TO MASTER IMAGE

00156  0500 00 0 02274         CLA K9         L +1000000000000
00157 -0602 00 0 02425         ORS M+8
00160 -0602 00 0 02443         ORS M+22
00161  0767 00 0 00001         ALS 1          +2000000000000
00162 -0602 00 0 02433         ORS M+14

00163  0500 00 0 02242         CLA TC         L 2
00164 -0602 00 0 02435         ORS M+16

00165  0500 00 0 02225         CLA FOR        L-ALL ZEROS
00166  0601 00 0 02255         STO NIN1
00167  0600 00 0 02262         STZ T33

*      TEST SL ONE-ONE FOR ERROR AND FORCE PRINT OUT

00170 -0760 00 0 00141         SLT 1
00171  0020 00 0 00174         TRA A3         OFF-OK
00172  0760 00 0 00141         SLN 1          ON-TURN BACK ON
00173  0020 00 0 01611         TRA P3         AND GO TO PRINT

*      ER TIME STEP 1

*      COMPARE ACC TO SR

00174  0500 00 0 02237  A3     CLA SR
00175  0760 00 0 00003         SSP            SET SIGN PLUS
00176  0771 00 0 00033         ARS 27         SAVE
00177  0601 00 0 02413         STO WV1        CHARACTERISTIC

00200  0500 00 0 02240         CLA ACC
00201  0760 00 0 00003         SSP            SET SIGN PLUS
00202  0771 00 0 00033         ARS 27         SHIFT CHAR TO RIGHT

00203  0340 00 0 02413         CAS WV1
00204  0020 00 0 00211         TRA A4         SR LESS THAN ACC

00205  0761 00 0 00000         NOP            SR EQUAL ACC
00206  0500 00 0 02364         CLA W0         SR MORE THAN ACC
00207  0601 00 0 02245         STO Q1         Q CARRY
00210  0020 00 0 00215         TRA A5

*      EXCHANGE CONTENTS OF SR AND ACC

00211  0500 00 0 02237  A4     CLA SR         SR TO
00212  0601 00 0 02240         STO ACC        ACC AND
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00213  0500 00 0 02231         CLA TN1A       ACC TO
00214  0601 00 0 02237         STO SR         SR

*      PART 2 AND 3 OF STEP 1 ER TIME

*      COMPUTE DIFFERENCE OF THE CHARACTERISTICS

00215  0500 00 0 02240  A5     CLA ACC
00216  0760 00 0 00003         SSP
00217  0760 00 0 00006         COM            SET FOR SUBTRACTION
00220  0771 00 0 00033         ARS 27         SHIFT CHAR TO RIGHT
00221  0601 00 0 02413         STO WV1        SAVE CHAR

00222  0500 00 0 02237         CLA SR
00223  0760 00 0 00003         SSP
00224  0771 00 0 00033         ARS 27         SHIFT CHAR TO RIGHT
00225  0400 00 0 02413         ADD WV1        SUB ACC CHAR FROM SR
00226  0400 00 0 02365         ADD W1         L 1
00227  0601 00 0 02413         STO WV1        SAVE DIFFERENCE

*      TEST FOR Q CARRY

00230  0767 00 0 00031         ALS 25         Q CARRY INTO P BIT
00231 -0760 00 0 00001         PBT
00232  0020 00 0 00235         TRA A5L        NO Q CARRY
00233  0500 00 0 02364         CLA W0         L ZERO
00234  0601 00 0 02245         STO Q1         SAVE Q CARRY CONDITION

*      PLACE DIFFERENCE IN SHIFT COUNTER

00235  0500 00 0 02413  A5L    CLA WV1        SHIFT OUT Q CARRY
00236  0767 00 0 00035         ALS 29         Q AND P BITS OUT
00237  0771 00 0 00035         ARS 29         SHIFT COUNTER VALUE
00240  0601 00 0 02243         STO SC         SAVE

*      IS DIFFERENCE IN CHARACTERISTICS GREATER THAN 77 OCTAL

00241  0340 00 0 02332         CAS K77        L 77
00242  0020 00 0 00245         TRA GTR        CHAR GREATER THAN 77
00243  0020 00 0 00254         TRA CLMQ       CHAR EQUAL TO 77
00244  0020 00 0 00254         TRA CLMQ       CHAR LESS THAN 77

*      RESET ACC AND SHIFT COUNTER TO ZERO

00245  0500 00 0 02364  GTR    CLA W0         L 0
00246  0601 00 0 02243         STO SC         RESET SHIFT COUNTER
00247  0600 00 0 02240         STZ ACC
00250  0500 00 0 02237         CLA SR
00251  0120 00 0 00254         TPL CLMQ
00252  0500 00 0 02225         CLA FOR
00253  0601 00 0 02240         STO ACC        RESET ACC

*      CLEAR MQ

00254  0600 00 0 02241  CLMQ   STZ MQ
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00255  0500 00 0 02240         CLA ACC
00256 -0320 00 0 02360         ANA FMASK
00257  0771 00 0 00002         ARS 2
00260  0601 00 0 02344         STO CACC

*      STEP TALLY COUNTER

00261  0500 00 0 02242         CLA TC          STEP
00262 -0602 00 0 02433         ORS M+14        TALLY COUNTER

*      GIVE MQ THE SAME SIGN AS THE ACC

00263  0500 00 0 02240         CLA ACC         MQ
00264  0560 00 0 02241         LDQ MQ          SIGN
00265  0765 00 0 00000         LRS             LIKE
00266 -0600 00 0 02241         STQ MQ          ACC

*      TRANSFER CONTROL AT LOCATION C1 FOR CORRECT RETURN AFTER PRINT

00267  0500 00 0 02320         CLA K29         L TRA A8
00270  0621 00 0 02047         STA C1

*      TEST SL ONE-ON FOR ERROR AND FORCE PRINT OUT

00271 -0760 00 0 00141         SLT 1
00272  0020 00 0 00275         TRA A8          OFF-OK
00273  0760 00 0 00141         SLN 1           ON-TURN BACK ON
00274  0020 00 0 01442         TRA P3A         AND GO TO PRINT

*      ER TIME, SECOND STEP
*      USED TO EQUALIZE CHARACTERISTIC IN PREPARATION FOR
*      ADDITION AND A CHECK FOR A NON-ZERO MQ


*      SHIFT 12 PLACES TO COINCIDE WITH 12 MICRO-SECOND
*      MACHINE CYCLE

00275  0500 00 0 02243  A8     CLA SC          SHIFT COUNTER VALUE
00276  0601 00 0 02210         STO TEMP
00277  0402 00 0 02374         SUB W12         L DEC 12
00300 -0120 00 0 00355         TMI A9          SC LESS THAN 12
00301  0601 00 0 02243         STO SC          SAVE DIFFERENCE WHEN
                                               SC 12 OR MORE

*      SHIFT F ACC AND MQ RT N PLACES

00302  0500 00 0 02241  A11    CLA MQ          PLACE MQ FRACTION
00303  0765 00 0 00033         LRS 27          INTO SHIFT POSITION
00304  0601 00 0 02306         STO K19         SAVE

00305  0500 00 0 02240         CLA ACC         PLACE ACC FRACTION
00306  0767 00 0 00012         ALS 10          INTO SHIFT POSITION
00307  0771 00 0 00012         ARS 10

00310  0765 00 0 00014  A10    LRS 12          SHIFT ACC AND
00311  0601 00 0 02414         STO WV2         MQ RT 12 PLACES
```

```
                                                AND SAVE

00312  0500 00 0 02240         CLA ACC         CLEAR ACC
00313  0771 00 0 00033         ARS 27          OF FRACTION
00314  0767 00 0 00033         ALS 27          SHIFT CHAR BACK
00315  0601 00 0 02240         STO ACC         9-35 CLEARED
00316  0500 00 0 02414         CLA WV2

*      ADJUST ACC WITH CORRECT FRACTION AFTER
*      EACH FULL 12 MICROSECOND MACHINE CYCLE
*      AND SHIFT OF 12 PLACES WHEN NEEDED

00317 -0602 00 0 02240         ORS ACC         ADJUST ACC
00320  0760 00 0 00000         CLM             CLEAR ACC SAVE SIGN

*      ADJUST MQ AFTER EACH 12 MICROSECOND MACHINE CYCLE
*      AND SHIFT OF 12 PLACES WHEN NEEDED

00321  0765 00 0 00010         LRS 8           CORRECTLY POSITION MQ
00322 -0600 00 0 02241         STQ MQ
00323  0500 00 0 02241         CLA MQ
00324 -0320 00 0 02361         ANA CMASK
00325  0100 00 0 00327         TZE *+2

*      MQ 9 INPUT TURN T2 ON

00326  0600 00 0 02261         STZ T22         SAVE T2 STATUS


*      ADJUST ADDRESSES OF SHIFT INSTRUCTIONS

00327  0500 00 0 02374         CLA W12         DEC 12 OCT 14
00330  0621 00 0 00310         STA A10
00331  0621 00 0 02327         STA K37

*      TRANSFER CONTROL AT LOC C1 FOR CORRECT RETURN AFTER PRINT
*      ADJUST ADDRESS AT A12A FOR CORRECT TRANSFER WHEN SL 1 OFF

00332  0500 00 0 02320         CLA K29         L TRA A8
00333  0621 00 0 02047         STA C1
00334  0621 00 0 00367         STA A12A

*      TRANSFER TO A9B IS MADE WHEN SC VALUE IS MORE THAN 12
*      WHEN SC IS LESS THAN 12 THE INSTRUCTION AT A9A
*      IS ADJUSTED TO A NOP INSTRUCTION

00335  0020 00 0 00354  A9A    TRA A9B

*      TRANSFER CONTROL AT LOC C1 FOR CORRECT RETURN AFTER PRINT

*      IF EVEN, PRINT ANOTHER CYCLE FOR ALL
*      FP INSTRUCTION TESTS

00336  0500 00 0 02210         CLA TEMP
00337  0100 00 0 00347         TZE ODD
00340  0760 00 0 00006         COM             SWITCH POLARITY
```

```
00341  0760 00 0 00001         LBT            NO LOW BIT TEST
00342  0020 00 0 00347  ODD1   TRA ODD
00343  0500 00 0 00342  EVEN   CLA ODD1
00344  0621 00 0 02047         STA C1
00345  0621 00 0 00367         STA A12A
00346  0020 00 0 00354         TRA A9B

00347  0500 00 0 02273  ODD    CLA K8         L TRA A13
00350  0621 00 0 02047         STA C1         TRA CNTRL AT C1
00351  0621 00 0 00367         STA A12A       TRA CNTRL AT A12A

*      STEP TALLY COUNTER

00352  0500 00 0 02242         CLA TC
00353 -0602 00 0 02431         ORS M+12       STEP TC

00354  0020 00 0 00366  A9B    TRA A12        TO TEST SL 1

*      ENTER HERE WHEN SHIFT COUNTER VALUE IS LESS THAN 12


*      ADJUST ADDRESSES OF SHIFT INSTRUCTIONS WHEN SC LESS THAN 12

00355  0500 00 0 02243  A9     CLA SC         L OF NUMBER OF SHIFTS
00356  0621 00 0 00310         STA A10
00357  0621 00 0 02327         STA K37        ADJUSTMENT FOR SHIFT
                                              WHEN LESS THAN 12
00360  0500 00 0 02414         CLA WV2

*      RESET SHIFT COUNTER VALUE

00361  0500 00 0 02364         CLA W0         L 0
00362  0601 00 0 02243         STO SC

*      SHIFT COUNTER VALUE LESS THAN 12 PLACE NOP INST IN A9A

00363  0500 00 0 02400         CLA W101       L NOP INST
00364  0601 00 0 00335         STO A9A        STO NOP
00365  0020 00 0 00302         TRA A11        MAKE PASS SC LESS THAN 12

*      TEST SL 1 - ON FOR ERROR AND FORCE PRINT OUT

00366 -0760 00 0 00141  A12    SLT 1          TEST SL 1
00367  0020 00 0 00372  A12A   TRA A13        OFF
00370  0760 00 0 00141         SLN 1          WAS ON TURN BACK ON
00371  0020 00 0 01442         TRA P3A        AND GO TO PRINT

*      RESTORE TRA INSTRUCTION AT LOCATION A9A

00372  0500 00 0 02377  A13    CLA W100       L TRA A9B
00373  0601 00 0 00335         STO A9A


*      ER TIME THIRD STEP

*      MQ ZERO TEST
```

```
00374  0500 00 0 02241         CLA MQ
00375 -0100 00 0 00400         TNZ A14        MQ NOT ZERO

*      TURN T2 OFF MQ ZERO

00376  0500 00 0 02225         CLA FOR        L -ALL ZEROS
00377  0601 00 0 02261         STO T22        SAVE T2 STATUS


*      CHECK SIGNS OF ACC AND SR, ARE THEY ALIKE

00400  0500 00 0 02240  A14    CLA ACC
00401  0560 00 0 02237         LDQ SR
00402 -0120 00 0 00405         TMI F1A        ACC- CHECK SR

00403  0162 00 0 00535         TQP F2         ACC+ AND SR+
00404  0020 00 0 00407         TRA F1B        ACC+ AND SR-
00405  0162 00 0 00407  F1A    TQP F1B        ACC- AND SR+
00406  0020 00 0 00535         TRA F2         ACC- AND SR-

*      SIGNS UNLIKE. SUBTRACT SR AND ACC FRACTIONS

00407  0500 00 0 02237  F1B    CLA SR
00410  0767 00 0 00012         ALS 10         Q,P,1-8 OUT
00411  0771 00 0 00012         ARS 10         9-35 BACK TO POSITION
00412  0602 00 0 02303         SLW K16        SAVE FRACTION

00413  0500 00 0 02240         CLA ACC
00414  0560 00 0 02240         LDQ ACC
00415  0767 00 0 00012         ALS 10         Q,P,1-8 OUT
00416  0760 00 0 00006         COM            COM 9-35
00417  0771 00 0 00012         ARS 10         9-35 COMP BACK TO POS
00420  0760 00 0 00003         SSP            SET SIGN OF ACC PLUS
00421  0400 00 0 02303         ADD K16        SR FRACTION

*      CHECK FOR 9 CARRY

00422  0767 00 0 00010         ALS 8          SHIFT 8 TO P
00423 -0760 00 0 00001         PBT            P BIT TEST FOR 9 CARRY
00424  0020 00 0 00522         TRA F1BB       NO 9 CARRY
00425  0767 00 0 00002         ALS 2          THERE WAS A 9 CARRY
00426  0771 00 0 00012         ARS 10
00427  0763 00 0 00000         LLS
                                              MOVE IT OUT, P AND Q
00430  0601 00 0 02240         STO ACC

00431  0500 00 0 02261         CLA T22        L T2 FLAG
00432  0120 00 0 00441         TPL F11B       TRA WHEN T2 ON
00433  0600 00 0 02241         STZ MQ
00434  0500 00 0 02240         CLA ACC        T2 OFF
00435  0760 00 0 00003         SSP
00436  0400 00 0 02365         ADD W1         L 1
00437  0763 00 0 00000         LLS
00440  0601 00 0 02240         STO ACC        9 CARRY TO 35
```

```
00441  0500 00 0 02237  F11B   CLA SR
00442 -0320 00 0 02360         ANA FMASK      MASK OUT FR ACC
00443 -0602 00 0 02240         ORS ACC
00444  0771 00 0 00002         ARS 2
00445  0601 00 0 02344         STO CACC


*      T2 ON, MOVE MQ TO SR, HOLD SR S

00446  0500 00 0 02364         CLA W0         L 0
00447  0601 00 0 02265         STO NOV1       9 CARRY

00450  0500 00 0 02254         CLA NIN        L 10
00451 -0602 00 0 02420         ORS M+3
00452 -0602 00 0 02430         ORS M+11
00453  0500 00 0 02261         CLA T22
00454 -0120 00 0 00502         TMI T2FF       T2 OFF


*      T2 ON WITH 9 CARRY F SR GREATER F ACC
*      MOVE MQ TO ACC FOR COMPLEMENTING
*      SAVE ACC IN SR.

*      ORIGINAL ACC AND SR SIGNS SAVED

00455  0500 00 0 02240         CLA ACC        S-35
00456  0601 00 0 02210         STO TEMP       SAVE

00457  0500 00 0 02237         CLA SR         S-35
00460 -0120 00 0 00465         TMI SRM        CHECK SIGN
00461  0500 00 0 02240         CLA ACC
00462  0760 00 0 00003         SSP            SAVE SR SIGN
00463  0601 00 0 02237         STO SR
00464  0020 00 0 00470         TRA ACCK

00465  0500 00 0 02240  SRM    CLA ACC
00466 -0760 00 0 00003         SSM            SAVE SR SIGN
00467  0601 00 0 02237         STO SR

00470  0500 00 0 02210  ACCK   CLA TEMP       L ACC
00471 -0120 00 0 00476         TMI ACCM
00472  0500 00 0 02241         CLA MQ
00473  0760 00 0 00003         SSP            SAVE ACC SIGN
00474  0601 00 0 02240         STO ACC
00475  0020 00 0 00646         TRA 3MG

00476  0500 00 0 02241  ACCM   CLA MQ
00477 -0760 00 0 00003         SSM            SAVE ACC SIGN
00500  0601 00 0 02240         STO ACC

*      READY TO STEP TALLY COUNTER

00501  0020 00 0 00646         TRA 3MG        MERGE FOR TC STEP


*      9CARRY WITH T2 OFF F SR GREATER THAN F ACC
```

```
*      TRUE FORM, MQ EQUAL ZERO, SIGNS INCORRECT
*      INVERT ACC AND MQ SIGNS

00502  0500 00 0 02240  T2FF   CLA ACC        S-35
00503 -0120 00 0 00512         TMI *+7
00504 -0760 00 0 00003         SSM            PLUS TO MINUS
00505  0601 00 0 02240         STO ACC        STORE WITH NEW SIGN
00506  0500 00 0 02241         CLA MQ
00507 -0760 00 0 00003         SSM
00510  0601 00 0 02241         STO MQ
00511  0020 00 0 00516         TRA INST

00512  0760 00 0 00003         SSP            ACC AND MQ
00513  0601 00 0 02240         STO ACC        MINUS TO PLUS
00514  0560 00 0 02364         LDQ W0
00515 -0600 00 0 02241         STQ MQ

*      TEST INST. IF UFA/UFS END OP
*      SENSE LIGHT 3 ON IF UFA/UFS

00516 -0760 00 0 00143  INST   SLT 3          TEST SL 3
00517  0020 00 0 00646         TRA 3MG        MERGE TO STEP TC
00520  0760 00 0 00143         SLN 3
00521  0020 00 0 00636         TRA NNMG       UFA/UFS

*      NO 9 CARRY SIGNS UNLIKE
*      RECOMPLEMENT ACC

00522  0771 00 0 00010  F1BB   ARS 8          SHIFT ACC BACK
00523  0760 00 0 00006         COM            RECOMPLEMENT
00524 -0320 00 0 02361         ANA CMASK
00525  0763 00 0 00000         LLS
00526  0601 00 0 02240         STO ACC        AND SAVE

00527  0500 00 0 02237         CLA SR
00530 -0320 00 0 02360         ANA FMASK
00531 -0602 00 0 02240         ORS ACC
00532  0771 00 0 00002         ARS 2
00533  0601 00 0 02344         STO CACC
00534  0020 00 0 00516         TRA INST       TEST INST


*      SIGNS WERE ALIKE
*      ADD SR AND ACC FRACTIONS

00535  0767 00 0 00012  F2     ALS 10         SHIFT CHAR. OUT
00536  0771 00 0 00002         ARS 2          BAC TO 1 FROM Q
00537  0602 00 0 02303         SLW K16
00540  0560 00 0 02240         LDQ ACC
00541  0500 00 0 02240         CLA ACC
00542  0765 00 0 00000         LRS
00543 -0320 00 0 02361         ANA CMASK
00544  0401 00 0 02237         ADM SR
00545  0771 00 0 00002         ARS 2
00546  0601 00 0 02344         STO CACC
```

```
00547 -0500 00 0 02237         CAL SR
00550  0767 00 0 00012         ALS 10          SHIFT CHAR. OUT
00551  0771 00 0 00002         ARS 2           BACK TO 1 FROM Q
00552  0400 00 0 02303         ADD K16

*      TEST FOR 9 CARRY INTO P BIT

00553 -0760 00 0 00001         PBT             DID 9 CARRY OCCUR
00554  0020 00 0 00622         TRA F2A         NO
00555  0771 00 0 00010         ARS 8           YES. SHIFT INTO F POS.
00556  0763 00 0 00000         LLS
00557  0601 00 0 02303         STO K16         SAVE

*      SHIFT FRACTION ACC AND MQ RIGHT ONE

00560  0560 00 0 02241         LDQ MQ
00561  0765 00 0 00001         LRS 1           SHIFT RIGHT ONE
00562  0601 00 0 02304         STO K17         SAVE

00563  0560 00 0 02241         LDQ MQ
00564  0763 00 0 00000         LLS
00565  0771 00 0 00033         ARS 27          SHIFT ACC 9-35 RT
00566  0767 00 0 00033         ALS 27          SHIFT CHAR BACK
00567  0601 00 0 02304         STO K17

00570  0500 00 0 02241         CLA MQ
00571  0765 00 0 00033         LRS 27
00572  0500 00 0 02303         CLA K16
00573  0765 00 0 00001         LRS 1           ACC 35 TO MQ
00574  0601 00 0 02240         STO ACC         F ACC AND SIGN

00575  0500 00 0 02364         CLA W0
00576  0763 00 0 00033         LLS 27
00577 -0602 00 0 02304         ORS K17

00600  0500 00 0 02304         CLA K17
00601  0601 00 0 02241         STO MQ
00602  0760 00 0 00000         CLM
00603  0560 00 0 02237         LDQ SR
00604  0763 00 0 00010         LLS 8
00605  0760 00 0 00003         SSP
00606  0400 00 0 02365         ADD W1          ONE TO ACC 9

00607  0767 00 0 00033         ALS 27
00610  0601 00 0 02304         STO K17

00611 -0320 00 0 02360  F2AB   ANA FMASK
00612 -0602 00 0 02240         ORS ACC
00613  0500 00 0 02264         CLA NOV
00614 -0602 00 0 02420         ORS M+3
00615 -0602 00 0 02430         ORS M+11
00616  0500 00 0 02254         CLA NIN         L 10
00617 -0602 00 0 02420         ORS M+3
00620 -0602 00 0 02430         ORS M+11
00621  0020 00 0 00632         TRA F3          TEST FOR UFA/UFS
```

```
*      NO 9 CARRY. SHIFT INTO FRACTION POSITION

00622  0771 00 0 00010  F2A    ARS 8          SHIFT INTO FR POS
00623  0763 00 0 00000         LLS
00624  0601 00 0 02240         STO ACC
00625  0760 00 0 00000         CLM
00626  0560 00 0 02237         LDQ SR
00627  0763 00 0 00010         LLS 8
00630  0767 00 0 00033         ALS 27
00631 -0602 00 0 02240         ORS ACC        CONTENTS ACC

*      TEST SL 3 TO SEE IF WE ARE WORKING WITH
*      NORMALIZED OR UNNORMALIZED INSTRUCTIONS

00632 -0760 00 0 00143  F3     SLT 3          TEST SL 3
00633  0020 00 0 00646         TRA 3MG        OFF. ON TO FAD/FSB
00634  0760 00 0 00143         SLN 3          ON. TURN BACK ON
00635  0020 00 0 00636         TRA NNMG       NOT NORMALIZING.

*      STEP TC

00636  0500 00 0 02242  NNMG   CLA TC
00637 -0602 00 0 02427         ORS M+10

*      TRANSFER CONTROL AT C1 FOR CORRECT RETURN AFTER PRINT

00640  0500 00 0 02330         CLA K38        L TRA G
00641  0621 00 0 02047         STA C1

*      TEST SL 1 FOR ERROR

00642 -0760 00 0 00141         SLT 1
00643  0020 00 0 01144         TRA G          OFF
00644  0760 00 0 00141         SLN 1          ON, TURN BACK ON
00645  0020 00 0 01442         TRA P3A        AND GO TO PRINT

*      MERGE TO STEP TC

00646  0500 00 0 02242  3MG    CLA TC
00647 -0602 00 0 02427         ORS M+10

*      TEST SL 1 FOR ERROR

00650 -0760 00 0 00141         SLT 1
00651  0020 00 0 00656         TRA F5         OFF GO TO STEP 4
00652  0760 00 0 00141         SLN 1          ON. TURN BACK ON
00653  0500 00 0 02307         CLA K20        L TRA TO F5
00654  0621 00 0 02047         STA C1
00655  0020 00 0 01442         TRA P3A        GO TO PRINT


*      ER TIME 4TH STEP


*      ER TIME STEP 4
*      USED TO ZERO-TEST THE ACC OR TO COMPLEMNT THE MQ
```

```
00656  0500 00 0 02261  F5     CLA T22        TEST T2
00657  0120 00 0 00710         TPL F8         T2 ON

*      T2 OFF, MQ EQUAL ZERO. ZERO TEST ACC

00660  0500 00 0 02225         CLA FOR        L -ALL ZEROS
00661  0601 00 0 02262         STO T33
00662  0500 00 0 02240         CLA ACC
00663  0767 00 0 00012         ALS 10
00664  0100 00 0 00666         TZE F7         ACC ZERO
00665  0020 00 0 00710         TRA F8         ACC NOT ZERO

*      TURN T1 OFF

00666  0500 00 0 02225  F7     CLA FOR        L -ALL ZEROS
00667  0601 00 0 02263         STO T11

00670  0500 00 0 02254         CLA NIN
00671 -0602 00 0 02420         ORS M+3        ADJUST
00672 -0602 00 0 02430         ORS M+11       PRINT
00673  0500 00 0 02240         CLA ACC

*      RESET ACC Q-35

00674  0760 00 0 00000         CLM
00675  0601 00 0 02240         STO ACC

00676  0500 00 0 02241         CLA MQ         CLEAR
00677  0767 00 0 00012         ALS 10         1-8
00700  0771 00 0 00012         ARS 10
00701  0601 00 0 02241         STO MQ
00702  0500 00 0 02315         CLA K26        L TRA G
00703  0621 00 0 02047         STA C1

*      TEST SL 1 FOR ERROR

00704 -0760 00 0 00141         SLT 1
00705  0020 00 0 01144         TRA G          OK
00706  0760 00 0 00141         SLN 1          ON, TURN BACK ON
00707  0020 00 0 01442         TRA P3A        AND GO TO PRINT


*      CHECK SIGNS OF ACC AND SR. ARE THEY ALIKE

00710  0500 00 0 02242  F8     CLA TC         ADJUST
00711 -0602 00 0 02425         ORS M+8        FOR PRINT

00712  0500 00 0 02240         CLA ACC
00713  0560 00 0 02237         LDQ SR
00714 -0120 00 0 00717         TMI F8A        ACC -
00715  0162 00 0 00765         TQP F88B       ACC + MQ + LIKE
00716  0020 00 0 00721         TRA F8C        ACC + MQ - UNLIKE
00717  0162 00 0 00721  F8A    TQP F8C        ACC - MQ + UNLIKE
00720  0020 00 0 00765         TRA F88B       ACC - MQ - LIKE
```

```
00721  0500 00 0 02265  F8C    CLA NOV1
00722  0120 00 0 00724         TPL *+2
00723  0020 00 0 00765         TRA F88B       OFF

00724  0500 00 0 02240         CLA ACC        PORTION OF SUM IN MQ
00725  0767 00 0 00012         ALS 10         MQ SHIFTED TO ACC
00726  0760 00 0 00006         COM            ACC CONTENTS IN SR
00727  0771 00 0 00012         ARS 10         CARRY OUT OF ADD 9
00730  0765 00 0 00000         LRS
00731  0760 00 0 00003         SSP
00732  0400 00 0 02365         ADD W1         MUST BE ADDED TO MQ 35
00733  0763 00 0 00000         LLS
00734  0601 00 0 02240         STO ACC        ACC NORMALIZED

*      EXCHANGE ACC AND SR

00735  0500 00 0 02237         CLA SR         S-35
00736  0601 00 0 02210         STO TEMP       SAVE
00737 -0120 00 0 00744         TMI SRMS       CHECK SIGN
00740  0500 00 0 02240         CLA ACC        ACC
00741  0760 00 0 00003         SSP            TO
00742  0601 00 0 02237         STO SR         SR
00743  0020 00 0 00747         TRA ACX

00744  0500 00 0 02240  SRMS   CLA ACC        ACC
00745 -0760 00 0 00003         SSM            TO
00746  0601 00 0 02237         STO SR         SR

00747  0500 00 0 02240  ACX    CLA ACC
00750 -0120 00 0 00755         TMI ACMS       CHECK SIGN
00751  0500 00 0 02210         CLA TEMP
00752  0760 00 0 00003         SSP            SR
00753  0601 00 0 02240         STO ACC        TO
00754  0020 00 0 00760         TRA SRMQ
                                              ACC
00755  0500 00 0 02210  ACMS   CLA TEMP       SR
00756 -0760 00 0 00003         SSM
00757  0601 00 0 02240         STO ACC        ACC

*      RETURN MQ AND ADJUST ACC SIGN

00760  0500 00 0 02237  SRMQ   CLA SR
00761  0601 00 0 02241         STO MQ

00762  0500 00 0 02240         CLA ACC
00763  0760 00 0 00002         CHS
00764  0601 00 0 02240         STO ACC

00765  0500 00 0 02334  F88B   CLA K377       L 377
00766  0601 00 0 02243         STO SC         SET SC TO ALL ONES

00767  0500 00 0 02225         CLA FOR        TURN
00770  0601 00 0 02261         STO T22        T2 OFF

*      TEST ACC 9, ZERO OR ONE
```

```
00771  0500 00 0 02240         CLA ACC        S-35
00772  0767 00 0 00011         ALS 9          9 TO P
00773 -0760 00 0 00001         PBT            P BIT TEST
00774  0020 00 0 00776         TRA F8D        NO BIT IN 9

*      TURN T3 ON

00775  0020 00 0 01001         TRA F8E        BIT IN 9
00776  0500 00 0 02225  F8D    CLA FOR        L - ALL ZEROS
00777  0601 00 0 02262         STO T33
01000  0020 00 0 01003         TRA F8B
01001  0600 00 0 02262  F8E    STZ T33        T3 ON
01002  0600 00 0 02261         STZ T22

01003  0500 00 0 02242  F8B    CLA TC         STEP
01004 -0602 00 0 02425         ORS M+8        TALLY COUNTER

*      TRANSFER CONTROL AT C1

01005  0500 00 0 02311         CLA K22        L TRA F9
01006  0621 00 0 02047         STA C1

01007  0621 00 0 01017         STA N4+1
01010 -0760 00 0 00143         SLT 3
01011  0020 00 0 01016         TRA N4
01012  0760 00 0 00143         SLN 3
01013  0500 00 0 02330         CLA K38        L TRA G
01014  0621 00 0 02047         STA C1
01015  0621 00 0 01017         STA N4+1

*      TEST SL 1 FOR ERROR

01016 -0760 00 0 00141  N4     SLT 1
01017  0020 00 0 01022         TRA F9         OFF
01020  0760 00 0 00141         SLN 1          ON, TURN BACK ON
01021  0020 00 0 01442         TRA P3A        AND GO TO PRINT


*      ER TIME STEP 5
*      ADJUST SUM IN ACC AND MQ


*      TEST T3, ON OR OFF

01022  0500 00 0 02262  F9     CLA T33
01023  0120 00 0 01131         TPL F9K        T3 ON

01024  0774 00 1 00014  F9A    AXT 12,1
01025  0500 00 0 02241         CLA MQ
01026 -0320 00 0 02361         ANA CMASK      MASK OUT CHAR
01027  0767 00 0 00010         ALS 8          ACC 9 TO 1
01030  0131 00 0 00000         XCA            EXCHANGE MQ AND ACC
01031  0500 00 0 02240         CLA ACC
01032 -0320 00 0 02361         ANA CMASK      MASK OUT CHAR

01033  0763 00 0 00001  F9B    LLS 1
```

```
01034  0601 00 0 02210         STO TEMP       SHIFTED ACC FR
01035  0044 00 0 00000         PAI

01036  0500 00 0 02241         CLA MQ
01037  0767 00 0 00001         ALS 1
01040  0601 00 0 02241         STO MQ

01041 -0054 00  000400         LFT 400        TEST FOR 9 OFF
01042  0020 00 0 01053         TRA F9D        THRU  ACC 9 EQUAL 1

01043  0500 00 0 02243         CLA SC         L SHIFT COUNTER
01044  0402 00 0 02365         SUB W1         L 1  REDUCE SC
01045  0601 00 0 02243         STO SC

01046  0500 00 0 02210         CLA TEMP       ACC FR SHIFTED
01047  2 00001 1 01033         TIX F9B,1,1    FINISH 12 SHIFTS

01050  0500 00 0 02400         CLA W101       L NOP
01051  0601 00 0 01077         STO F9H        XFER CONTROL
01052  0020 00 0 01060         TRA F9D+5

01053  0500 00 0 02243  F9D    CLA SC
01054  0402 00 0 02365         SUB W1         L 1
01055  0601 00 0 02243         STO SC
01056  0500 00 0 02337         CLA KTRA       L TRA F9J
01057  0601 00 0 01077         STO F9H        XFER CONTROL

01060  0500 00 0 02240         CLA ACC
01061  0765 00 0 00000         LRS            SAVE SIGN
01062 -0320 00 0 02360         ANA FMASK      SAVE CHAR AC
01063  0763 00 0 00000         LLS            GET SIGN
01064  0601 00 0 02240         STO ACC        CHAR ACC + SIGN

01065  0500 00 0 02210         CLA TEMP       FRAC ACC SHIFTED
01066 -0602 00 0 02240         ORS ACC        PUT WITH CHAR
01067  0500 00 0 02241         CLA MQ
01070  0765 00 0 00000         LRS            SAVE SIGN
01071 -0320 00 0 02360         ANA FMASK      SAVE CHAR
01072  0763 00 0 00000         LLS            GET SIGN
01073  0601 00 0 02241         STO MQ         STORE CHAR + SIGN

01074  0131 00 0 00000         XCA            MQ TO ACC
01075  0771 00 0 00010         ARS 8          POSITION TO FRAC
01076 -0602 00 0 02241         ORS MQ         PUT WITH CHAR
01077  0761 00 0 00000  F9H    NOP            CONTROL POINT

01100  0500 00 0 02335         CLA KF9A       L PZE F9A
01101  0621 00 0 02047         STA C1         XFER CONTROL
01102  0621 00 0 01141         STA GA         XFER CONTROL
01103  0020 00 0 01140         TRA F9G

01104  0500 00 0 02364  F9J    CLA W0
01105  0601 00 0 02262         STO T33        SET T3 FLAG ON
01106  0500 00 0 02243         CLA SC
01107  0402 00 0 02334         SUB K377       L 377  GET NO SHIFTS
01110  0760 00 0 00001         LBT            TEST FOR ODD NUMBER
```

```
01111  0020 00 0 01135         TRA F9E        EVEN NUMBER

01112  0500 00 0 02240  F9F    CLA ACC
01113  0765 00 0 00000         LRS            SAVE SIGN
01114 -0320 00 0 02361         ANA CMASK      SAVE FRAC
01115  0763 00 0 00000         LLS            GET SIGN
01116  0601 00 0 02240         STO ACC        SAVE FRAC + SIGN
01117  0500 00 0 02243         CLA SC
01120 -0320 00 0 02333         ANA K177       L 177   MASK SC 11
01121  0767 00 0 00031         ALS 25         POSITION
01122  0401 00 0 02344         ADM CACC
01123  0400 00 0 02345         ADD QP18       L BITS IN QP18
01124  0601 00 0 02344         STO CACC       SC + CACC+ QP18
01125  0767 00 0 00002         ALS 2
01126 -0320 00 0 02360         ANA FMASK
01127 -0602 00 0 02240         ORS ACC        PUT CHAR WITH FRAC
01130  0600 00 0 02261         STZ T22

01131  0500 00 0 02315  F9K    CLA K26        L PZE G
01132  0621 00 0 02047         STA C1         XFER CONTROL
01133  0621 00 0 01141         STA GA         XFER CONTROL
01134  0020 00 0 01140         TRA F9G

01135  0500 00 0 02336  F9E    CLA KF9F       L PZE F9F
01136  0621 00 0 02047         STA C1         ZFER CONTROL
01137  0621 00 0 01141         STA GA         XFER CONTROL
01140 -0760 00 0 00141  F9G    SLT 1          TEST SL 1
01141  0020 00 0 01144  GA     TRA G          OFF OK
01142  0760 00 0 00141         SLN 1          ON. TURN BACK ON
01143  0020 00 0 01442         TRA P3A        AND GO TO PRINT

*      BEGIN I TIME NORMALIZED
*      -----------------------

*      COMPUTE SPILL CODE

01144  0500 00 0 02355  G      CLA CAMASK
01145  0320 00 0 02344         ANS CACC
01146  0500 00 0 02344         CLA CACC
01147  0044 00 0 00000         PAI
01150 -0056 00  300000         LNT 300000
01151  0020 00 0 01154         TRA *+3
01152  0442 00 0 02351         OSI M16
01153  0020 00 0 01160         TRA GGA
01154 -0056 00  100000         LNT 100000
01155  0020 00 0 01160         TRA GGA
01156  0442 00 0 02352         OSI M15
01157  0442 00 0 02351         OSI M16
01160  0604 00 0 02251  GGA    STI SIMCOD

*      SET CHAR OF MQ TO 27 DEC LESS THAN CHAR OF ACC

01161  0500 00 0 02263         CLA T11
01162 -0120 00 0 01207         TMI FA11

01163  0500 00 0 02241         CLA MQ
```

```
01164  0767 00 0 00012         ALS 10          SHIFT OUT CHAR
01165  0771 00 0 00012         ARS 10          SHIFT BACK
01166  0601 00 0 02241         STO MQ          SAVE MQ FRAC

01167  0500 00 0 02344         CLA CACC        L ACC CHAR
01170  0400 00 0 02362         ADD COM32       L COMPLEMENT 32 OCT

*      COMPUTE SPILL CODE

01171  0044 00 0 00000         PAI
01172 -0056 00  300000         LNT 300000
01173  0020 00 0 01176         TRA *+3
01174  0442 00 0 02350         OSI M17
01175  0020 00 0 01202         TRA GG
01176 -0056 00  100000         LNT 100000
01177  0020 00 0 01202         TRA GG
01200  0442 00 0 02352         OSI M15
01201  0442 00 0 02350         OSI M17
01202  0767 00 0 00002  GG     ALS 2
01203 -0320 00 0 02360         ANA FMASK       SAVE CHAR ACC- 27
01204 -0602 00 0 02241         ORS MQ          SET WITH FR
01205 -0046 00 0 00000         PIA
01206 -0602 00 0 02251         ORS SIMCOD

01207  0500 00 0 02272   FA11  CLA K7          L TRA ERP
01210  0621 00 0 02047         STA C1          TRANSFER CONTROL

01211  0500 00 0 02324         CLA K34         L 377
01212  0601 00 0 02243         STO SC
01213  0500 00 0 02274         CLA K9
01214 -0602 00 0 02415         ORS M
01215 -0602 00 0 02443         ORS M+22        SET I TO IMAGE
01216  0500 00 0 02325         CLA K35
01217  0601 00 0 02237         STO SR

01220  0500 00 0 02242         CLA TC
01221 -0602 00 0 02435         ORS M+16
01222  0500 00 0 02344         CLA CACC
01223 -0320 00 0 02230         ANA PTH
01224  0601 00 0 02344         STO CACC
01225  0600 00 0 02255         STZ NIN1        9 CARRY ON
01226  0600 00 0 02263         STZ T11         T1 ON
01227  0500 00 0 02225         CLA FOR         L -ALL ZEROS
01230  0601 00 0 02265         STO NOV1
01231  0601 00 0 02262         STO T33
01232  0601 00 0 02245         STO Q1
01233  0601 00 0 02261         STO T22

*      TEST SL 1

01234 -0760 00 0 00141         SLT 1
01235  0020 00 0 01237         TRA F12         GO TO FP VS NON-FP
01236  0020 00 0 01450         TRA P3B         TO PRINT

*      COMPARE FP RESULTS WITH NON-FP RESULTS
```

```
01237  0140 00 0 01240  F12    TOV F12B
01240  0500 00 0 02231  F12B   CLA TN1A
01241  0560 00 0 02411         LDQ W1111

*      TEST SLT 2 FOR ADD OR SUB

01242 -0760 00 0 00142         SLT 2          TEST SL 2
01243  0020 00 0 01256         TRA F14        ADD
01244  0760 00 0 00142         SLN 2          SUB SL 2 BACK ON

*      TEST SLT 3 FOR FSB OR UFS

01245 -0760 00 0 00143         SLT 3          TEST SL 3
01246  0020 00 0 01253         TRA F13        FSB
01247  0760 00 0 00143         SLN 3          UFS SL 3 BACK ON

01250 -0302 00 0 02232         UFS TN2A
01251  0020 00 0 01265         TRA F16        GO TO COMPARE
01252  0020 00 0 01266         TRA F16+1
01253  0302 00 0 02232  F13    FSB TN2A
01254  0020 00 0 01265         TRA F16        GO TO COMPARE
01255  0020 00 0 01266         TRA F16+1

*      TEST FOR FAD OR UFA

01256 -0760 00 0 00143  F14    SLT 3          TEST SL 3
01257  0020 00 0 01264         TRA F15        FAD
01260  0760 00 0 00143         SLN 3          UFA SL 3 BACK ON

01261 -0300 00 0 02232         UFA TN2A
01262  0020 00 0 01265         TRA F16        GO TO COMPARE

01263  0020 00 0 01266         TRA F16+1
01264  0300 00 0 02232  F15    FAD TN2A
01265  0601 00 0 02247  F16    STO ERRAC      ACC ERROR
01266 -0600 00 0 02253         STQ ERRMQ      MQ ERROR

*      TEST OVERFLOW FLAG

01267 -0760 00 0 00144         SLT 4
01270  0020 00 0 01273         TRA *+3
01271  0760 00 0 00144         SLN 4
01272  0020 00 0 01300         TRA F16C
01273  0771 00 0 00002         ARS 2
01274  0600 00 0 00000         STZ
01275 -0320 00 0 02230         ANA PTH
01276  0044 00 0 00000         PAI            Q,+ IF NO TRAP
01277  0601 00 0 02252         STO ERRQP

*      COMPARE ACC RESULTS

01300  0500 00 0 02247  F16C   CLA ERRAC
01301  0340 00 0 02240         CAS ACC
01302  0020 00 0 01335         TRA F18        ERROR TO PRINT
01303  0020 00 0 01305         TRA F17        ACC CORRECT
01304  0020 00 0 01335         TRA F18        ERROR TO PRINT
```

```
*      COMPARE Q AND P BITS

01305  0446 00 0 02344  F17    ONT CACC
01306  0020 00 0 01335         TRA F18        ERROR

*      COMPARE SPILL IDENTIFICATION CODES

01307  0441 00 0 00000         LDI
01310  0600 00 0 00000         STZ
01311  0604 00 0 02250         STI ERRCOD
01312  0500 00 0 02357         CLA SPMSK
01313  0320 00 0 02251         ANS SIMCOD
01314  0446 00 0 02251         ONT SIMCOD
01315  0020 00 0 01335         TRA F18        ERROR

*      COMPARE MQ RESULTS

01316  0500 00 0 02253         CLA ERRMQ
01317  0340 00 0 02241         CAS MQ         COMPARE
01320  0020 00 0 01335         TRA F18        ERROR TO PRINT
01321  0020 00 0 01323         TRA FOV1
01322  0020 00 0 01335         TRA F18        ERROR TO PRINT

*      TEST SSW 6 FOR FORCE PRINT OUT

01323  0760 00 0 00166  FOV1   SWT 6
01324  0020 00 0 01326         TRA F17B       UP
01325  0020 00 0 01335         TRA F18        TO PRINT

*      TEST SSW 4 FOR CHANGE IN TEST DATA

01326  0760 00 0 00164  F17B   SWT 4
01327  0020 00 0 00040         TRA E3         UP USE R.N. TEST DATA
01330  0500 00 0 02231         CLA TN1A       DN NO CHANGE TEST DATA
01331  0601 00 0 02240         STO ACC        RESTORE ACC

01332  0500 00 0 02232         CLA TN2A       RESTORE SR
01333  0601 00 0 02237         STO SR

01334  0020 00 0 00122         TRA E4

*      ADJUST TO ENTER PRINT OUT

01335  0500 00 0 02231  F18    CLA TN1A
01336  0601 00 0 02240         STO ACC        RESTORE ACC

01337  0500 00 0 02232         CLA TN2A
01340  0601 00 0 02237         STO SR         RESTORE SR

*      ERROR CONDITIONS EXIST.  TURN ERROR SENSE LIGHT ON
*      REWORK FROM BEGINNING AND PRINT OUT AFTER EACH
*      MACHINE CYCLE TO LOCATE ERROR CYCLE.

01341  0760 00 0 00141         SLN 1          ERROR SENSE
01342  0020 00 0 00130         TRA E6         REWORK AND PRINT
```

```
*      ENTER HERE AFTER ERROR PRINT-OUT FOR CYCLE KEY USE

01343  0140 00 0 01344  F19    TOV F19B
01344  0560 00 0 02411  F19B   LDQ W1111
01345  0761 00 0 00000         NOP
01346  0500 00 0 02231         CLA TN1A

*      SELECT CORRECT INSTRUCTION UNDER TEST

01347 -0760 00 0 00142         SLT 2          TEST FOR SUB
01350  0020 00 0 01370         TRA F21        ADD
01351 -0760 00 0 00143         SLT 3          TEST FOR FSB OR UFS
01352  0020 00 0 01362         TRA F20        FSB
01353  0760 00 0 00143         SLN 3          UFS 3 BACK ON

*      HALT TO BEGIN MACHINE CYCLE KEY

01354  0420 00 0 00000         HPR

01355 -0302 00 0 02232         UFS TN2A

01356  0420 00 0 00000         HPR

*      TEST SWT 5 TO SCOPE OR CONTINUE

01357  0760 00 0 00165         SWT 5          TEST SWT 5
01360  0020 00 0 00040         TRA E3         UP CONTINUE TEST
01361  0020 00 0 01433         TRA LOOP4      SCOPE LOOP FOR UFS

01362  0420 00 0 00000  F20    HPR

*      BEGIN MACHINE CYCLE KEY FOR FSB

01363  0302 00 0 02232         FSB TN2A

01364  0420 00 0 00000         HPR

01365  0760 00 0 00165         SWT 5          TEST SSW 5
01366  0020 00 0 00040         TRA E3         CONTINUE TEST
01367  0020 00 0 01424         TRA LOOP3      SCOPE LOOP FOR FSB

*      TEST SL 3 TO TEST CORRECT INSTRUCTION

01370 -0760 00 0 00143  F21    SLT 3
01371  0020 00 0 01400         TRA F22

01372  0420 00 0 00000         HPR

*      BEGIN MACHINE CYCLE KEY FOR UFA INSTRUCTION

01373 -0300 00 0 02232         UFA TN2A

01374  0420 00 0 00000         HPR

*      TEST SSW 5 TO SCOPE OR CONTINUE
```

```
01375  0760 00 0 00165         SWT 5
01376  0020 00 0 00040         TRA E3          CONTINUE TEST
01377  0020 00 0 01415         TRA LOOP2       SCOPE LOOP FOR UFA

01400  0420 00 0 00000  F22    HPR

*      BEGIN MACHINE CYCLE KEY FOR FAD INSTRUCTION

01401  0300 00 0 02232         FAD TN2A

01402  0420 00 0 00000         HPR

*      TEST SWT 5 FOR SCOPE OR CONTINUE

01403  0760 00 0 00165         SWT 5
01404  0020 00 0 00040         TRA E3          CONTINUE TEST
01405  0020 00 0 01406         TRA LOOP1       SCOPE LOOP FOR FAD


*      ENTER SCOPING ROUTINES FOR FAD, UFA, FSB, AND UFS

01406  0500 00 0 02340  LOOP1  CLA L11         L TRA TO LOOP1+2
01407  0601 00 0 00010         STO T10
01410  0760 00 0 00165         SWT 5           TEST SSW 5
01411  0020 00 0 00040         TRA E3          CONTINUE TEST
01412  0500 00 0 02231         CLA TN1A        ENTER TIGHT SCOPE LOOP
01413  0300 00 0 02232         FAD TN2A
01414  0020 00 0 01410         TRA LOOP1+2

01415  0500 00 0 02341  LOOP2  CLA L2          L TRA LOOP2+2
01416  0601 00 0 00010         STO T10
01417  0760 00 0 00165         SWT 5           TEST SSW 5
01420  0020 00 0 00040         TRA E3          CONTINUE TEST
01421  0500 00 0 02231         CLA TN1A        ENTER TIGHT SCOPE LOOP
01422 -0300 00 0 02232         UFA TN2A
01423  0020 00 0 01417         TRA LOOP2+2

01424  0500 00 0 02342  LOOP3  CLA L3          L TRA LOOP3+2
01425  0601 00 0 00010         STO T10
01426  0760 00 0 00165         SWT 5           TEST SSW 5
01427  0020 00 0 00040         TRA E3          CONTINUE TEST
01430  0500 00 0 02231         CLA TN1A        ENTER TIGHT SCOPE LOOP
01431  0302 00 0 02232         FSB TN2A
01432  0020 00 0 01426         TRA LOOP3+2

01433  0500 00 0 02343  LOOP4  CLA L4          L TRA LOOP4+2
01434  0601 00 0 00010         STO T10
01435  0760 00 0 00165         SWT 5           TEST SSW 5
01436  0020 00 0 00040         TRA E3          CONTINUE TEST
01437  0500 00 0 02231         CLA TN1A        ENTER TIGHT SCOPE LOOP
01440 -0302 00 0 02232         UFS TN2A
01441  0020 00 0 01435         TRA LOOP4+2

*      MAKE ADJUSTMENTS FOR PRINT OUT
*      ------------------------------
```

```
*      STEP COUNTER FOR CYCLE NUMBER

01442  0500 00 0 02274  P3A    CLA K9         L +1000000000000
01443 -0602 00 0 02425         ORS M+8        ADJUST
01444 -0602 00 0 02443         ORS M+22       MASTER IMAGE
01445  0771 00 0 00001         ARS 1          LOCATIONS
01446 -0602 00 0 02415         ORS M
01447 -0602 00 0 02441         ORS M+20

01450  0500 00 0 02400  P3B    CLA W101       L NOP INST
01451  0601 00 0 01467         STO A2B

01452  0500 00 0 02367         CLA WA2        L 2
01453  0601 00 0 02316         STO K27

01454  0500 00 0 02366         CLA W2         L 2
01455  0400 00 0 02365         ADD W1         L 1
01456  0601 00 0 02366         STO W2
01457  0601 00 0 02304         STO K17

01460  0500 00 0 02364  P3C    CLA W0         L 0
01461  0560 00 0 02304         LDQ K17
01462  0221 00 0 02373         DVP W10        L 12
01463 -0600 00 0 02304         STQ K17
01464  0767 00 0 00001         ALS 1
01465  0734 00 1 00000         PAX 0,1

01466  0500 00 0 02227         CLA PTW        L +2000000000000
01467  0761 00 0 00000  A2B    NOP
01470 -0602 00 1 02437         ORS M+18,1     ADJUST IMAGE

01471  0500 00 0 02305         CLA K18        L INST. ALS 1
01472  0601 00 0 01467         STO A2B        ADJUST INST. AT A2B, 1516

01473  0500 00 0 02316         CLA K27        L 2
01474  0402 00 0 02365         SUB W1         L 1
01475  0601 00 0 02316         STO K27
01476  0100 00 0 01611         TZE P3         TEST FOR ZERO
01477  0020 00 0 01460         TRA P3C        NOT ZERO

*      ADJUST CONTROL WORDS FOR RESET

01500  0500 00 0 02225  P1     CLA FOR
01501  0601 00 0 02245         STO Q1         RESET
01502  0601 00 0 02265         STO NOV1

01503  0534 00 1 02375         LXA W24,1      L 30
01504  0500 00 0 02364         CLA W0         L 0
01505  0601 00 0 02255         STO NIN1       RESET
01506  0601 00 0 02263         STO T11        RESET
01507  0601 00 1 02445  P1A    STO M+24,1     ZERO MASTER IMAGE
01510  2 00001 1 01507         TIX P1A,1,1
01511  0500 00 0 02324         CLA K34        L 377
01512  0601 00 0 02243         STO SC         RESET SHIFT COUNTER
```

```
01513  0500 00 0 02271         CLA K6          L TRA A1
01514  0621 00 0 02047         STA C1          TRANSFER CONTROL

01515  0500 00 0 02242         CLA TC          TC
01516 -0602 00 0 02435         ORS M+16


01517  0500 00 0 02367         CLA WA2         L 2
01520  0601 00 0 02366         STO W2

*      PRINT OUT CORRECT INSTRUCTION HEADING
*      -------------------------------------

*      TEST SENSE LIGHTS 2 AND 3 FOR CORRECT INSTRUCTION

*      TEST SL 2

01521 -0760 00 0 00142         SLT 2
01522  0020 00 0 01534         TRA B1A         UP UFA OR FAD
01523  0760 00 0 00142  B1D    SLN 2           ON UFS OR FSB

*      TEST SLT 3

01524 -0760 00 0 00143         SLT 3
01525  0020 00 0 01544         TRA B1F         OFF FSB
01526  0760 00 0 00143         SLN 3           ON UFS

*      UFS HEADING PRINT OUT

01527  0766 00 0 01361  B1E    WPRA
01530  0760 00 0 01363         SPRA 3
01531  0540 00 0 02213         RCHA PUFS       UFS HEADING
01532  0060 00 0 01532         TCOA *          WAIT
01533  0020 00 0 01555         TRA B1C         TO COL HDG PR OUT

*      TEST SLT 3 WHEN SLT 2 OFF

01534 -0760 00 0 00143  B1A    SLT 3
01535  0020 00 0 01551         TRA B1G         OFF FAD
01536  0760 00 0 00143         SLN 3           ON UFA

*      UFA HEADING PRINT OUT

01537  0766 00 0 01361  B1H    WPRA
01540  0760 00 0 01363         SPRA 3
01541  0540 00 0 02214         RCHA PUFA       UFA HEADING
01542  0060 00 0 01542         TCOA *          WAIT
01543  0020 00 0 01555         TRA B1C         TO COL HDG PR OUT

*      FSB HEADING PRINT OUT

01544  0766 00 0 01361  B1F    WPRA
01545  0760 00 0 01363         SPRA 3
01546  0540 00 0 02215         RCHA PFSB       FSB HEADING
01547  0060 00 0 01547         TCOA *          WAIT
01550  0020 00 0 01555         TRA B1C         TO COL HDG PR OUT
```

```
*      FAD HEADING PRINT OUT

01551  0766 00 0 01361  B1G    WPRA
01552  0760 00 0 01363         SPRA 3
01553  0540 00 0 02216         RCHA PFAD      FAD HEADING
01554  0060 00 0 01554         TCOA *         WAIT

*      COLUMN HEADING PRINT OUT

01555  0766 00 0 01361  B1C    WPRA
01556  0540 00 0 02217         RCHA PCHD      COL HEADING
01557  0060 00 0 01557         TCOA *         WAIT

*      ADJUST MASTER IMAGE

01560  0500 00 0 02274         CLA K9         L
01561 -0602 00 0 02415         ORS M          I TO MASTER IMAGE
01562 -0602 00 0 02443         ORS M+22
01563  0767 00 0 00001         ALS 1
01564 -0602 00 0 02435         ORS M+16       1 TO MASTER IMAGE

*      TEST SLT 2

01565 -0760 00 0 00142         SLT 2
01566  0020 00 0 01577         TRA B2AB       OFF TO UFA OR FAD
01567  0760 00 0 00142         SLN 2          ON TURN BACK ON

*      TEST SLT 3

01570 -0760 00 0 00143         SLT 3
01571  0020 00 0 01575         TRA B2AA       OFF FSB PRINT OUT
01572  0760 00 0 00143         SLN 3          ON UFS PRINT OUT

*      UFS PRINT OUT

01573  0500 00 0 02275         CLA K10        L 2232
01574  0020 00 0 01605         TRA B2AD

*      FSB PRINT OUT

01575  0500 00 0 02276  B2AA   CLA K11        L 2231
01576  0020 00 0 01605         TRA B2AD

*      TEST SLT 3 FOR FAD OR UFA

01577 -0760 00 0 00143  B2AB   SLT 3
01600  0020 00 0 01604         TRA B2AC       OFF FAD PRINT OUT
01601  0760 00 0 00143         SLN 3          ON UFA PRINT OUT


*      UFA PRINT OUT

01602  0500 00 0 02277         CLA K12        L 2230
01603  0020 00 0 01605         TRA B2AD
```

```
*      FAD PRINT OUT

01604  0500 00 0 02300  B2AC   CLA K13        L 2227

*      ENTER HERE FOR ALL PRINT OUTS

01605  0621 00 0 01612  B2AD   STA B2B
01606  0621 00 0 01621         STA B2D
01607  0621 00 0 01634         STA B2E
01610  0621 00 0 01617         STA B4


*      SR BINARY TO OCTAL

01611  0534 00 2 02374  P3     LXA W12,2      L 14
01612  0500 00 0 02237  B2B    CLA SR
01613  0601 00 0 02306         STO K19        SAVE
01614  0120 00 0 01617         TPL B4         SR +

*      SR MINUS

01615  0500 00 0 02267  B2C    CLA K4         L +010000000000
01616 -0602 00 0 02441         ORS M+20       ADJUST MASTER IMAHGE

*      SR PLUS

01617  0500 00 0 02237  B4     CLA SR         BRING SR BACK IN
01620  0765 00 0 00003         LRS 3          3 BITS TO MQ
01621  0601 00 0 02237  B2D    STO SR
01622  0760 00 0 00000         CLM            CLEAR ACC SAVE SIGN
01623  0763 00 0 00003         LLS 3          3 BITS BACK FROM MQ
01624  0767 00 0 00001         ALS 1          SHIFT ACC AGAIN
01625  0734 00 1 00000         PAX 0,1

01626  0500 00 0 02401         CLA W102       L 1000000
01627 -0602 00 1 02437         ORS M+18,1
01630  0767 00 0 00001         ALS 1
01631  0601 00 0 02401         STO W102
01632  2 00001 2 01617         TIX B4,2,1     FINISH ADJUSTMENTS

01633  0500 00 0 02306         CLA K19
01634  0601 00 0 02237  B2E    STO SR         RESTORE SR

01635  0500 00 0 02402         CLA W103       L 1000000
01636  0601 00 0 02401         STO W102       RESTORE W102

01637  0500 00 0 02301         CLA K14        L 2233, LOC SR
01640  0621 00 0 01612         STA B2B        RESTORE
01641  0621 00 0 01617         STA B4         RESTORE
01642  0621 00 0 01621         STA B2D        RESTORE
01643  0621 00 0 01634         STA B2E        RESTORE

01644  0500 00 0 02226         CLA PB1
01645 -0120 00 0 01652         TMI B5A        PB1+

01646  0500 00 0 02270         CLA K5         PB1 + L 200000
```

```
01647  0771 00 0 00001         ARS 1          ADJUST
01650 -0602 00 0 02421         ORS M+4        MASTER
01651 -0602 00 0 02441         ORS M+20       IMAGE

*      ACC BINARY TO OCTAL

01652  0534 00 2 02374  B5A    LXA W12,2      L 14
01653  0500 00 0 02240         CLA ACC        BRING IN ACC
01654  0601 00 0 02306         STO K19        SAVE
01655  0120 00 0 01660         TPL B5         ACC +

*      ACC MINUS

01656  0500 00 0 02270         CLA K5         L 200000
01657 -0602 00 0 02441         ORS M+20       ADJUST MASTER IMAGE

01660  0500 00 0 02240  B5     CLA ACC
01661  0765 00 0 00003         LRS 3          3 BITS TO MQ
01662  0601 00 0 02240         STO ACC        SAVE
01663  0760 00 0 00000         CLM            CLEAR ACC SAVE SIGN
01664  0763 00 0 00003         LLS 3          3 BITS BACK TO ACC
01665  0767 00 0 00001         ALS 1          SHIFT ACC AGAIN
01666  0734 00 1 00000         PAX 0,1

01667  0500 00 0 02403         CLA W104       L 10
01670 -0602 00 1 02437         ORS M+18,1     ADJUST MASTER IMAGE
01671  0767 00 0 00001         ALS 1
01672  0601 00 0 02403         STO W104
01673  2 00001 2 01660         TIX B5,2,1     FINISH ADJUSTMENTS

01674  0500 00 0 02306         CLA K19        RESTORE
01675  0601 00 0 02240         STO ACC        ACC

01676  0500 00 0 02404         CLA W105       L 10
01677  0601 00 0 02403         STO W104       RESTORE W104

01700  0761 00 0 00000  B5B    NOP

*      MQ BINARY TO OCTAL

01701  0534 00 2 02374         LXA W12,2      L 14
01702  0500 00 0 02241         CLA MQ         BRING IN MQ
01703  0601 00 0 02306         STO K19        SAVE
01704  0120 00 0 01710         TPL B6         MQ +

*      MQ MINUS

01705  0500 00 0 02227         CLA PTW        L + 200000000000
01706  0767 00 0 00001         ALS 1          ADJUST
01707 -0602 00 0 02442         ORS M+21       MASTER IMAGE

01710  0500 00 0 02241  B6     CLA MQ
01711  0765 00 0 00003         LRS 3          3 BITS TO MQ
01712  0601 00 0 02241         STO MQ         SAVE
01713  0760 00 0 00000         CLM            CLEAR ACC SAVE SIGN
01714  0763 00 0 00003         LLS 3          3 BITS BACK FROM MQ
```

```
01715  0767 00 0 00001         ALS 1          SHIFT ACC AGAIN
01716  0734 00 1 00000         PAX 0,1
01717  0500 00 0 02405         CLA W106       L 40000000
01720 -0602 00 1 02440         ORS M+19,1     ADJUST MASTER IMAGE
01721  0767 00 0 00001         ALS 1
01722  0601 00 0 02405         STO W106       SAVE
01723  2 00001 2 01710         TIX B6,2,1     FINISH ADJUSTMENTS

01724  0500 00 0 02306         CLA K19        RESTORE
01725  0601 00 0 02241         STO MQ         MQ

01726  0500 00 0 02406         CLA W107       RESTORE
01727  0601 00 0 02405         STO W106       W106

*      SC BINARY TO OCTAL

01730  0534 00 2 02370         LXA W3,2       L 3
01731  0500 00 0 02243         CLA SC         BRING IN SC
01732  0601 00 0 02306         STO K19        SAVE
01733  0500 00 0 02243  B7     CLA SC
01734  0765 00 0 00003         LRS 3          3 BITS TO MQ
01735  0601 00 0 02243         STO SC         SAVE
01736  0760 00 0 00000         CLM            CLEAR ACC
01737  0763 00 0 00003         LLS 3          3 BITS BACK TO ACC
01740  0767 00 0 00001         ALS 1          SHIFT ACC AGAIN
01741  0734 00 1 00000         PAX 0,1
01742  0500 00 0 02407         CLA W110       L 2000000
01743 -0602 00 1 02440         ORS M+19,1     ADJUST MASTER IMAGE
01744  0767 00 0 00001         ALS 1
01745  0601 00 0 02407         STO W110       SAVE
01746  2 00001 2 01733         TIX B7,2,1     FINISH ADJUSTMENTS

01747  0500 00 0 02306         CLA K19        RESTORE
01750  0601 00 0 02243         STO SC         SC

01751  0500 00 0 02410         CLA W111       L 2000000
01752  0601 00 0 02407         STO W110       RESTORE W110

01753  0500 00 0 02245  B9     CLA Q1
01754 -0120 00 0 01760         TMI D1
01755  0500 00 0 02244         CLA Q          L 1000 Q1 PLUS
01756 -0602 00 0 02444         ORS M+23       ADJUST
01757  0020 00 0 01762         TRA D2         MASTER IMAGE

*      CONTINUE MASTER IMAGE ADJUSTMENTS

01760  0500 00 0 02244  D1     CLA Q          L 1000
01761 -0602 00 0 02442         ORS M+21       ADJUST MASTER IMAGE

01762  0500 00 0 02255  D2     CLA NIN1
01763 -0120 00 0 01767         TMI D3         NIN1 MINUS
01764  0500 00 0 02254         CLA NIN        NIN1 PLUS L 10
01765 -0602 00 0 02444         ORS M+23       ADJUST MASTER IMAGE
01766  0020 00 0 01771         TRA D6

01767  0500 00 0 02254  D3     CLA NIN        L 10
```

```
01770 -0602 00 0 02442         ORS M+21       ADJUST MASTER IMAGE

01771  0500 00 0 02263  D6     CLA T11
01772 -0120 00 0 01776         TMI D7         T11 MINUS
01773  0500 00 0 02256         CLA T1         T11 PLUS L 10000
01774 -0602 00 0 02444         ORS M+23       ADJUST MASTER IMAGE
01775  0020 00 0 02000         TRA D7A

01776  0500 00 0 02256  D7     CLA T1         L 10000
01777 -0602 00 0 02442         ORS M+21       ADJUST MASTER IMAGE

02000  0500 00 0 02265  D7A    CLA NOV1
02001 -0120 00 0 02005         TMI D7B        NOV1 MINUS
02002  0500 00 0 02264         CLA NOV        NOV1 PLUS L 1
02003 -0602 00 0 02444         ORS M+23       ADJUST MASTER IMAGE
02004  0020 00 0 02007         TRA D77

02005  0500 00 0 02264  D7B    CLA NOV        L 1
02006 -0602 00 0 02442         ORS M+21       ADJUST MASTER IMAGE

02007  0500 00 0 02261  D77    CLA T22
02010 -0120 00 0 02014         TMI D77A       T2 MINUS
02011  0500 00 0 02257         CLA T2         T2 PLUS L 10,000
02012 -0602 00 0 02444         ORS M+23       ADJUST MASTER IMAGE
02013  0020 00 0 02016         TRA D78

02014  0500 00 0 02257  D77A   CLA T2         T2 MINUS L 10,000
02015 -0602 00 0 02442         ORS M+21       ADJUST MASTER IMAGE

02016  0500 00 0 02262  D78    CLA T33
02017 -0120 00 0 02023         TMI D78A       T3 MINUS
02020  0500 00 0 02260         CLA T3         T3 PLUS L 2,000
02021 -0602 00 0 02444         ORS M+23       ADJUST MASTER IMAGE
02022  0020 00 0 02025         TRA D8

02023  0500 00 0 02260  D78A   CLA T3         T3 MINUS L 2,000
02024 -0602 00 0 02442         ORS M+21       ADJUST MASTER IMAGE


*      PRINT OUT
*      ---------

*      Q AND P STATUS IS NOW IN CACC 1 AND 2
*      SET Q P STATUS TO PRINT IMAGE

02025  0500 00 0 02344  D8     CLA CACC
02026  0771 00 0 00022         ARS 18
02027 -0320 00 0 02356         ANA QPMASK
02030 -0602 00 0 02441         ORS M+20       SET Q P ZONE
02031  0601 00 0 02210         STO TEMP
02032 -0320 00 0 02353         ANA QMASK
02033 -0602 00 0 02417         ORS M+2        SET Q NUMERIC
02034  0500 00 0 02210         CLA TEMP
02035 -0320 00 0 02354         ANA PMASK
02036 -0602 00 0 02421         ORS M+4        SET P ZONE
```

```
02037  0766 00 0 01361         WPRA
02040  0760 00 0 01363         SPRA 3
02041  0540 00 0 02220         RCHA PMGE       MASTER IMAGE
02042  0060 00 0 02042         TCOA *          WAIT

*      ZERO MASTER IMAGE

02043  0534 00 1 02375         LXA W24,1       L 30
02044  0500 00 0 02364         CLA W0          L 0
02045  0601 00 1 02445  D10    STO M+24,1
02046  2 00001 1 02045         TIX D10,1,1
02047  0020 00 0 00000  C1     TRA 0           ADJUSTED TRANSFER

*      ERROR PRINT-OUT ENTRY
*      ADJUST ERROR IMAGE


*      ACC BINARY TO OCTAL

02050  0534 00 2 02374  ERP    LXA W12,2       L 14
02051  0500 00 0 02247         CLA ERRAC       BRING IN ACC
02052  0601 00 0 02306         STO K19         SAVE
02053  0120 00 0 02056         TPL ER          ACC PLUS
02054  0500 00 0 02270         CLA K5          L 400000
02055 -0602 00 0 02661         ORS EP+20       ADJUST MASTER IMAGE

02056  0500 00 0 02247  ER     CLA ERRAC       BRING IN ACC AGAIN
02057  0765 00 0 00003         LRS 3           3 BITS TO MQ
02060  0601 00 0 02247         STO ERRAC       SAVE ACC
02061  0760 00 0 00000         CLM             CLEAR ACC SAVE SIGN
02062  0763 00 0 00003         LLS 3           3 BITS BACK TO ACC
02063  0767 00 0 00001         ALS 1           SHIFT ACC AGAIN
02064  0734 00 1 00000         PAX 0,1

02065  0500 00 0 02403         CLA W104        L 10
02066 -0602 00 1 02657         ORS EP+18,1     ADJUST ERROR IMAGE
02067  0767 00 0 00001         ALS 1
02070  0601 00 0 02403         STO W104
02071  2 00001 2 02056         TIX ER,2,1      FINISH

02072  0500 00 0 02306         CLA K19         RESTORE
02073  0601 00 0 02247         STO ERRAC       ERRAC

02074  0500 00 0 02404         CLA W105        RESTORE
02075  0601 00 0 02403         STO W104        W104


*      MQ BINARY TO OCTAL

02076  0534 00 2 02374         LXA W12,2       L 14
02077  0500 00 0 02253         CLA ERRMQ
02100  0601 00 0 02306         STO K19         SAVE
02101  0120 00 0 02105         TPL ER1         ERR MQ PLUS
02102  0500 00 0 02227         CLA PTW         ERRMQ MINUS L 02 ZEROS
02103  0767 00 0 00001         ALS 1
```

```
02104 -0602 00 0 02662         ORS EP+21      ADJUST ERROR IMAGE

02105  0500 00 0 02253  ER1    CLA ERRMQ
02106  0765 00 0 00003         LRS 3          3 BITS TO MQ
02107  0601 00 0 02253         STO ERRMQ      SAVE ACC
02110  0760 00 0 00000         CLM            CLEAR ACC SAVE SIGN
02111  0763 00 0 00003         LLS 3          3 BITS TO ACC FROM MQ
02112  0767 00 0 00001         ALS 1          SHIFT ACC AGAIN
02113  0734 00 1 00000         PAX 0,1
02114  0500 00 0 02405         CLA W106       L 40000000
02115 -0602 00 1 02660         ORS EP+19,1    ADJUST ERROR IMAGE
02116  0767 00 0 00001         ALS 1
02117  0601 00 0 02405         STO W106       SAVE
02120  2 00001 2 02105         TIX ER1,2,1    FINISH ADJUSTMENTS

*      RESTORE

02121  0500 00 0 02306         CLA K19        RESTORE
02122  0601 00 0 02253         STO ERRMQ      ERRMQ

02123  0500 00 0 02406         CLA W107       L 40000000
02124  0601 00 0 02405         STO W106       RESTORE

*      PRINT OUT ON ERROR

02125  0500 00 0 02252  ERA6   CLA ERRQP
02126  0771 00 0 00022         ARS 18
02127 -0320 00 0 02356         ANA QPMASK
02130 -0602 00 0 02661         ORS EP+20
02131  0601 00 0 02210         STO TEMP
02132 -0320 00 0 02353         ANA QMASK
02133 -0602 00 0 02637         ORS EP+2
02134  0500 00 0 02210         CLA TEMP
02135 -0320 00 0 02354         ANA PMASK
02136 -0602 00 0 02641         ORS EP+4

02137  0766 00 0 01361         WPRA
02140  0760 00 0 01363         SPRA 3
02141  0540 00 0 02221         RCHA PERR      PRINT OUT ON ERROR
02142  0060 00 0 02142         TCOA *

02143  0534 00 1 02375         LXA W24,1
02144  0500 00 1 02665  ER8    CLA EP+24,1
02145  0771 00 0 00022         ARS 18         SHIFT RT HALF OUT
02146  0767 00 0 00022         ALS 18         SHIFT LF HALF BACK
02147  0601 00 1 02665         STO EP+24,1    ADJUST ERROR IMAGE
02150 -2 00001 1 02151         TNX ER7,1,1

*      ZERO ERROR IMAGE

02151  0500 00 0 02364  ER7    CLA W0         L 0
02152  0601 00 1 02665         STO EP+24,1
02153  2 00001 1 02144         TIX ER8,1,1

02154  0500 00 0 02251         CLA SIMCOD
02155  0771 00 0 00022         ARS 18
```

```
02156 -0320 00 0 02371         ANA W7
02157  0767 00 0 00001         ALS 1
02160  0734 00 1 00000         PAX 0,1
02161  0500 00 0 02412         CLA W4000
02162 -0602 00 1 02707         ORS TRAP+18,1

02163  0500 00 0 02250         CLA ERRCOD
02164  0771 00 0 00022         ARS 18
02165 -0320 00 0 02371         ANA W7
02166  0767 00 0 00001         ALS 1
02167  0734 00 1 00000         PAX 0,1
02170  0500 00 0 02412         CLA W4000      BIT IN 24
02171 -0602 00 1 02710         ORS TRAP+19,1

*      PRINT SPILL CONDITIONS

02172  0766 00 0 01361         WPRA
02173  0760 00 0 01363         SPRA 3
02174  0540 00 0 02222         RCHA PTRP
02175  0060 00 0 02175         TCOA *

02176  0766 00 0 01361         WPRA           SPACE PRINTER
02177  0760 00 0 01361         SPRA 1         SKIP TO ONE

02200  0774 00 1 00030         AXT 24,1
02201  0500 00 0 02364         CLA W0
02202  0621 00 1 02715  ER10   STA TRAP+24,1
02203  2 00001 1 02202         TIX ER10,1,1

02204 -0760 00 0 00144         SLT 4
02205  0761 00 0 00000         NOP

02206  0020 00 0 01343         TRA F19

*      CONSTANTS AND IMAGES FOLLOW


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

02207  0002 50 0 02445  PRHD   IOCD M1,0,168
02210 +000000000000      TEMP  OCT 0
02211 +000000000000      TEMP1 OCT 0
02212 +000000000000      TEMP2 OCT 0

02213  0000 30 0 02605   PUFS  IOCD NA1,0,24  UFS HEADING
02214  0000 30 0 02555   PUFA  IOCD LA1,0,24  UFA HEADING
02215  0000 30 0 02475   PFSB  IOCD L1,0,24   FSB HEADING
02216  0000 30 0 02445   PFAD  IOCD M1,0,24   FAD HEADING
02217  0000 30 0 02525   PCHD  IOCD N1,0,24   COL HEADING
02220  0000 30 0 02415   PMGE  IOCD M,0,24    MASTER IMAGE
02221  0000 30 0 02635   PERR  IOCD EP,0,24   ERROR PRINT
02222  0000 30 0 02665   PTRP  IOCD TRAP,0,24 PRINT SPILL
02223 +000000000000      A5B   OCT 0
02224  0020 00 0 00040   E33   TRA E3
02225 -0 00000 0 00000   FOR   FOR
```

```
02226 -0 00000 0 00000   PB1   FOR
02227  2 00000 0 00000   PTW   PTW
02230  3 00000 0 00000  PTH    PTH
02231  0 00000 0 00000   TN1A  PZE            ACC TEST NUMBER
02232  0 00000 0 00000   TN2A  PZE            SR TEST NUMBER
02233  0300 00 0 02232   FAD   FAD TN2A
02234 -0300 00 0 02232   UFA   UFA TN2A
02235  0302 00 0 02232   FSB   FSB TN2A
02236 -0302 00 0 02232   UFS   UFS TN2A
02237 +000000000000      SR    OCT 0
02240 +000000000000      ACC   OCT 0
02241 +000000000000      MQ    OCT 0
02242 +000000000002      TC    OCT 2
02243 +000000000000      SC    OCT 0
02244 +000000000400      Q     OCT 400
02245 -0 00000 0 00000   Q1    FOR
02246 +000000200000      MQV   OCT 200000
02247  0 00000 0 00000   ERRAC PZE
02250  0 00000 0 00000  ERRCOD PZE
02251  0 00000 0 00000  SIMCOD PZE
02252  0 00000 0 00000   ERRQP PZE
02253  0 00000 0 00000   ERRMQ PZE
02254 +000000000010      NIN   OCT 10
02255 -0 00000 0 00000   NIN1  FOR
02256 +000000040000      T1    OCT 40000
02257 +000000010000      T2    OCT 10000
02260 +000000002000      T3    OCT 2000
02261 +000000000000      T22   OCT 0
02262 +000000000000      T33   OCT 0
02263 -0 00000 0 00000   T11   FOR
02264 +000000000001      NOV   OCT 1
02265 -0 00000 0 00000   NOV1  FOR
02266 -0 00000 0 00000   K3    FOR
02267 +010000000000      K4    OCT 10000000000
02270 +000000400000     K5     OCT 400000
02271  0020 00 0 00146   K6    TRA A1
02272  0020 00 0 02050   K7    TRA ERP
02273  0020 00 0 00372   K8    TRA A13
02274 +100000000000      K9    OCT 100000000000 I AND E BIT.
02275  0 00000 0 02236   K10   PZE UFS
02276  0 00000 0 02235   K11   PZE FSB
02277  0 00000 0 02234   K12   PZE UFA
02300  0 00000 0 02233   K13   PZE FAD
02301  0 00000 0 02237   K14   PZE SR
02302  0020 00 0 00174   K15   TRA A3
02303  0 00000 0 00000   K16   PZE            TEMP STORAGE
02304  0 00000 0 00000   K17   PZE            TEMP STORAGE
02305  0767 00 0 00001   K18   ALS 1
02306 +000000000000      K19   OCT 0
02307  0020 00 0 00656   K20   TRA F5
02310  0 00000 0 00061   K21   PZE E2
02311  0020 00 0 01022   K22   TRA F9
02312 +000000000000      K23   OCT 0
02313 +000000000000      K24   OCT 0
02314  0760 00 0 00006   K25   COM
02315  0020 00 0 01144   K26   TRA G
```

```
02316 +000000000002      K27   OCT 2
02317 +000000000006      K28   OCT 6
02320  0020 00 0 00275   K29   TRA A8
02321  0 00000 0 02325   K31   PZE K35
02322  0760 00 0 00006   K32   COM
02323  0 00000 0 01135   K33   PZE F9E
02324 +000000000377      K34   OCT 377
02325  0420 00 0 00000   K35   HPR
02326 +000000000043      K36   DEC 35
02327 +000000000014      K37   DEC 12
02330  0020 00 0 01144   K38   TRA G
02331  0 00000 0 00000   K39   PZE            TEMP STORAGE
02332 +000000000077      K77   OCT 77
02333 +000000000177      K177  OCT 177
02334 +000000000377      K377  OCT 377
02335  0 00000 0 01024   KF9A  PZE F9A
02336  0 00000 0 01112   KF9F  PZE F9F
02337  0020 00 0 01104   KTRA  TRA F9J
02340  0020 00 0 01410   L11   TRA LOOP1+2
02341  0020 00 0 01417  L2     TRA LOOP2+2
02342  0020 00 0 01426  L3     TRA LOOP3+2
02343  0020 00 0 01435  L4     TRA LOOP4+2
02344 +000000000000      CACC  OCT 0
02345 +340200000000      QP18  OCT 340200000000
02346 +000000100000     OVF    OCT 100000
02347 +000000300000     UVF    OCT 300000
02350 +000001000000     M17    OCT 1000000
02351 +000002000000     M16    OCT 2000000
02352 +000004000000     M15    OCT 4000000
02353 +000000200000     QMASK  OCT 200000
02354 +000000100000     PMASK  OCT 100000
02355 +377600000000     CAMASK OCT 377600000000
02356 +000000300000     QPMASK OCT 300000
02357 +000007000000     SPMSK  OCT 7000000
02360 +377000000000      FMASK OCT 377000000000
02361 +000777777777      CMASK OCT 777777777
02362 +371200000000      COM32 OCT 371200000000
02363  0 00000 0 00000   COUNT PZE
02364 +000000000000      W0    OCT 0
02365 +000000000001      W1    OCT 1
02366 +000000000002      W2    OCT 2
02367 +000000000002      WA2   OCT 2
02370 +000000000003      W3    OCT 3
02371 +000000000007      W7    OCT 7
02372 +000000000004      W4    OCT 4
02373 +000000000012      W10   DEC 10
02374 +000000000014      W12   DEC 12
02375 +000000000030      W24   DEC 24
02376 +000000000033      W27   DEC 27
02377  0020 00 0 00354   W100  TRA A9B
02400  0761 00 0 00000   W101  NOP
02401 +000001000000      W102  OCT 1000000
02402 +000001000000      W103  OCT 1000000
02403 +000000000010      W104  OCT 10
02404 +000000000010      W105  OCT 10
02405 +000040000000      W106  OCT 40000000
```

```
02406 +000040000000      W107  OCT 40000000
02407 +000002000000      W110  OCT 2000000
02410 +000002000000      W111  OCT 2000000
02411 -377777777777      W1111 OCT 777777777777
02412 +000000004000     W4000  OCT 4000
02413  0 00000 0 00000   WV1   PZE            TEMP STORAGE
02414  0 00000 0 00000   WV2   PZE            TEMP STORAGE
02415  0 00000 0 00000   M     PZE            MASTER IMAGE
                 02445         BES 23
02445 +000000000000      M1    OCT 0          FAD HEADING
                 02475         BES 23
02475 +000000000000      L1    OCT 0          FSB HEADING
                 02525         BES 23
02525 +000000000000      N1    OCT 0          COLUMN HEADING
                 02555         BES 23
02555 +000000000000      LA1   OCT 0          UFA HEADING
                 02605         BES 23
02605 +000000000000      NA1   OCT 0          UFS HEADING
                 02635         BES 23
02635 +000000000000      EP    OCT 0          ERROR HEADING
                 02665         BES 23
02665 +000000000000     TRAP   OCT 0
                 02715         BES 23
02715  0 00000 0 02720   RA    PZE RN
02716 +000000007767      RA1   OCT 7767
02717  0 00000 0 00000   R     PZE
02720 -126044765051      RN    OCT 526044765051
02721 +134703564071            OCT 134703564071
02722 -117162721736            OCT 517162721736
02723 +062037467555            OCT 062037467555
02724 +364271003657            OCT 364271003657
02725 -331011416132            OCT 731011416132
02726 -305552746526            OCT 705552746526
02727 +033420275432            OCT 033420275432
                 00000         END
```

EOF*