8CU37A

RELIABILITY TEST FOR THE 7080 CPU WITH OPTIONAL CHANNEL OVERLAP

April 24, 1961

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A. PURPOSE

8CU37 is a reliability test to check the 7080 CPU instructions on either an 80K or 160K system.

An optional four channel interrupt program is included in this test for the purpose of testing the mixing of CPU instructions with Automatic Interrupts, Data Word Transfers and Single Character Transfers.

The basic intention of the test is to cover all circuits that are exercised in the normal use of the CPU instructions in either 7080 mode or 705 III mode. Certain specific types of operation are either ignored or avoided in 8CU37. These are:

1. Undefined Operations. An example of an undefined operation is ADM using special characters.

2. Zero Field Length. An example of zero field length is LOD with a storage mark in the first storage position.

3. Forced Errors Of Any Kind.

4. Instruction Variations in 705 I, 705 II, and 705 III 40K modes.

B. METHOD

The method used in 8CU37 is to execute each instruction using variable addresses and variable data. The results are tested and any errors in correct operation are indicated by typeouts. The variable addresses and data are changed for each successive pass of the program.

All available memory outside the program location is used as a work area. Storage locations used are in Banks 0 and 1 for all instructions except LIP and TIP. The test fields used vary in length from 1 to 20 characters for most instructions. TMT, BLM, SND and TCT instructions use fields of up to 100 characters in length. The LSB and USB instructions use a 255 character field.

The format used in 8CU37 is similar to that found in other CPU diagnostic programs. The program is written in the form of short routines, each of which can be looped to repeat an error using the 912 switch. When a routine is looped, all addresses and test fields in the routine are fixed. Each routine contains an error typeout and associated Halt.

The entire program is organized into seven sections which are described as follows:

SECTION 1 HOUSEKEEPING

This section consists of three routines which are for resetting all variables to a starting point when the test is begun either after loading, or after hitting RESET.

The interrupt mode is set in this section and interrupt words 250 and 251 are loaded with program locations. Routines #001 through #003 make up this section.

SECTION 2 GENERATOR

This section creates all variables to be used in testing the CPU instructions. Routines #004 to #021 make up this section.

1. Memory Addresses

   Two basic addresses are generated in this section. Address #1 is used for testing those instructions that require only one memory address. Address #2 is used for the second address in testing instructions such as TMT where a receive location is needed.

   From these two basic addresses, several variations are generated according to the needs of the instructions in the test routines. For example, TMT requires a 4/9 address, so address #1 is modified accordingly.

   All addresses refer to memory locations of from 32200 to the end of memory and are separated from each other by at least 300 spaces.

2. Storage Addresses

   Storage locations are in Banks 0 and 1 for all instructions except TIP and LIP. A variable number is generated for the address of an SPC instruction. Prior to each test instruction, SPC is set to some variable location in Bank 0.

   Most test instructions requiring storage refer to the accumulator. For those instructions using an ASU, an ASU designation is generated with values of 00 to 15.

3. Test Field and Test Numbers

A 100 character general use field is generated for use in testing non-numeric type instructions. This field contains all 7080 defined characters except group mark, record mark and memory storage mark (dilroy). This 100 character field is repeated three times to form one 300 character field.

Three 20 digit numbers are generated. The first two numbers are used as the numeric fields in testing arithmetic instructions. The third number is used as the random basis for all variables except memory addresses.

4. Field Lengths

Two basic lengths of field are generated and designated as Length #1 and #2. Length #1 is the address used in testing the instructions SET, SHR, LNG and RND.

Both length #1 and length #2 are used to define how many characters or numbers will be used in the field addressed by the test instructions. Lengths #1 and #2 will vary from 1 to 20 positions.

For the use of the BLM, TMT and SND instructions, length #1 is multiplied by 5 to obtain a length of field varying from 5 to 100 characters.

5. Miscellaneous Variables

For testing Unsigned ADM in Routine #075, a 100 character field is generated containing all characters and numbers except special characters

For testing TCT in Routine #066, a length of field is generated which varies from 10 to 100 positions.

For testing LIP in Routine #070, an address is generated which will refer to any storage word in Banks 0, 1, 2 or 3. Word sets 25 and 37 are excluded from this address, since they must be reserved for Interrupts 250 and 251 and for the LIP instruction itself.

The first four digits in Test Number 1 are used to form a select address used in testing the TIP and LIP instructions.

A memory storage mark, (dilroy) is generated and placed in a constant area for use in testing the LSB instruction.

The units position of Address #1 is converted into a number of value 1 to 5 for defining the number of characters moved in testing the LFC and UFC instructions.

The end result of Section 2 is a set of addresses, lengths and fields which are all located in one constant area at locations 8080 to 8831 on page 42 of 75 in the program listings.

The routines in the generator of Section 2 are self-checking. As each variable is generated, it is tested for correct operation of the instructions used in generation.

SECTION 3 SET UP

This section consists of Routines #022 to #026, and is necessary for three reasons:

1. A test routine may require both a variable address and a variable ASU designation. For such test routines, the combined address and ASU is loaded and unloaded into the necessary locations in Section 4.

2. A test routine may require a variable ASU designation on a fixed address. ASU bits are therefore added to all necessary addresses at miscellaneous locations throughout the test routines in Section 4.

3. Routines #038 and #039 test the SB instruction based on the variable ASU designation. Depending on what the ASU is, Routines #038 and #039 are set up so that only one is performed during each program pass. In the special case of ASU 08, both #038 and #039 are bypass

SECTION 4 TEST ROUTINES

Routines #030 through #081 make up this section. Each routine tests one of the CPU instructions using the variable addresses, lengths and fields that were generated in Section 2. During each program pass through the test routines all variables remain fixed.

In the majority of the test routines the variable address is pulled from the constant area using indirect addressing. In a few test routines the variable address has been unloaded directly into the routine. This is noted in the program listings by dashes in the instruction addresses. In the remainder of the test routines, the address is fixed.

Each test routine has a 911, 912, 913 and 915 switch for bypassing error typeouts, repeating, halt on error and long typeouts.

Following the last routine #081, is the 914 switch, the pass counter, and the 916 switch. If the 914 switch is on the program will repeat by transferring to Routine #004. Every 1000 passes a pass count typeout will occur to indicate that the program is running properly. The 916 switch is interrogated at this point in the program to start or maintain channel overlap operation if the 916 switch is on.

SECTION 5 CHANNEL INTERRUPT PROGRAM

Each of channels 20, 21, 22 and 23 has an interrupt program to do a write, backspace, read and compare write versus read fields. The write fields are 60 characters long and are different for each channel. Other than the difference in write fields, all four channel programs are similar.

Channel operation will use the first ready tape available on tape addresses #1 through #9. Tape #0 is avoided since it may contain the input program tape. If the tape on a particular channel reaches end of file, it is rewound and the next ready tape is used. If no other tapes are available, than the program will idle in a program loop until rewind is finished, and then testing will continue.

Channel operation is strictly optional in 8CU37. Channels that are not ready will be ignored. When starting operation, the operator must visually verify that all desired channels are in motion.

Associated with channel operation are two program switches. The first entry to a channel interrupt program is by a TIP instruction. All successive entries will use automatic interrupt. One of the two switches is set to transfer, the first time that the 916 switch is turned on. This switch allows only one TIP to each channel to start operation. The other program switch is located at the beginning of test routine #067 and will bypass TIP and LIP tests while channels are in use.

SECTION 6 INTERRUPTS 250 AND 251

1. Interrupt 250

   8CU37 is normally run with the check switches on check-stop. The non-stop switch may be turned on to keep the program running when check triggers come on. Should the operator want to use the non-stop option, interrupt 250 will indicate check triggers by a typeout if they happen to come on in the main program.

2. Interrupt 251

   Manual interrupt 251 is available to the operator to tell where the program is at the time of interrupt. On interrupt 251, there is a typeout giving the total number of passes completed and the routine number. At the beginning of all routines, the routine number is retained in case the program goes to pieces on some error condition such that the routine is never completed (a wild transfer for example). Interrupt 251 will then give the operator the number of the last routine entered but not completed.

SECTION 7 LONG TYPEOUTS

Section 7 is a typeout sub-routine that has one possible entry from each of the test routines #030 through #081. The 915 switch allows entry to this sub-routine when there is a routine failure. For each test routine #030 through #081 there is a long typeout which gives the name of the instruction being tested as well as the variable address being used. Each typeout is tailored to the need of the particular test routine.

The exit from Section 7 is always a transfer back to the 913 switch in the particular test routine that caused a long typeout.

C. AREA OF MACHINE REQUIRED

1. UNITS

7080 CPU with 80K or 160K memory
7621 Tape Control and 729II or 729 IV Tape Units are optional
Tape address must be #1 through #9 - any density.

2. MEMORY LOCATIONS

00000 - 08075	Program Location	8CU37
08080 - 08831	Table of Variables	8CU37
08835 - 17724	Program Location	8CU37
18200 - 18799	Reserved for Load Program	
18800 - 31831	Program Location	8CU37

31940 - End of Memory, Work, area.

D. LOADING PROCEDURES

Card input is from the 714 card reader using the load program 8LD01 with 00 Transfer card 8TR02 behind the 8CU37 program deck.

Tape input is from:

a. A card image tape created off line with 8LD02 load cards.
b. A program input tape as generated by 8TR06.

E. PROGRAM CONTROL

1. Alteration Switches

911 switch on - Bypass Error Typeouts and Halts
912 switch on - Repeat Routine
913 switch on - Halt on Error
914 switch on - Stay in Program

If the 914 switch is off, a transfer is made to 18219 to call in the next diagnostic program from tape.

915 switch on - Long Typeouts on Error
a. In Test Routines of Section 4
b. Typeouts of WR and RD fields in Section 5
c. Typeout of Instruction Counter Location on Interrupt 250

If the 915 switch is off, short typeouts on error will occur.

916 switch on - Start and maintain channel interrupt program.
If the 916 switch is off, all channels are reset.

2. Other Switches

All Check Switches on CHECK-STOP
705-I/II Switch OFF
40K Switch OFF
I/O Interrupt Switch OFF
Non-Stop Switch OFF

At the option of the operator the Non-Stop switch may be turned ON to keep the program running when checks occur. Interrupt 250 will indicate errors by typeouts.

3. Manual Control

a. Interrupt 251 will typeout the total pass count and the number of the last routine entered.

b. A general approach to the use of a failing routine is as follows:

If an error condition is suspected, it is best to run 8CU37 with the 913 switch on so that an error halt will stop the program when an error occurs.

1. Following the halt on error, turn the 912 switch on and START. The routine should repeat the error.
2. Do manual interrupt 251 and START. The routine number typed out should match the routine being looped.
3. Turn the 915 switch on. START to obtain a long typeout.
4. Turn the 915 switch off and Half-Step the program until the failing instruction is identified.
5. The routine can be used for scoping by turning the 911 switch on and starting.

c. On occasion it may be desirable to manually modify a routine to shorten it for scoping purposes by manually storing a transfer to the beginning of a routine. Routine #075 is used as an example:

Suppose ADM is failing in Routine #075. The ADM instruction is at location 18899. The instructions in Routine #075 preceeding ADM are necessary for setting up fields prior to doing the ADM. The rest of the routine following ADM is for checking the results using other instructions. To shorten this routine, store 1Y804 at location 18900 which will transfer to repeat the ADM properly.

d. In general, the generation routines should not be bypassed in an attempt to eliminate one or more variable addresses, lengths, etc., on an arbitrary basis. The following table gives some allowable modifications to the generator routines in Section 2 and the effect of each.

Portion Affected	At Location	Manually Store	Effect
Bypass Rout. #004	021560	11364	Will freeze memory addresses #1 and #2.
Update of Rout. #007	003350 003455	A 1	Will freeze all variables except Memory addresses #1 and #2.
Bypass Rout. #008	002030	12494	Will freeze the 300 character test field.
Change Rout. #007	001830 001905	A A	Will freeze test number 1.
Change Rout. #007	001855 001940	A A	Will freeze test number 2.
Bypass Rout. #017	005025	15299	Will freeze ASU designation.
Bypass Rout. #018	005295	15654	Will freeze SPC setting.
Bypass Section 2	021560	16549	Will freeze all variables by bypassing the generator.

To make one of these modifications store a halt (J) at location 021560 to stop the program, store a transfer (1) at location 021560, manually transfer to 021564, store the bypass as given in the table, and START.

e. Hints on using Channel Interrupt programs under Error Conditions.

When failures occur during channel operation, and are related to what is happening the main program, the first step is to turn the 912 switch on and verify that the error can be repeated. In this situation, the 916 switch has no effect when the 912 switch is on. To drop channel operation and still maintain the 912 loop, use CHANNEL RESET. To restart the channel, do a manual TIP. Using Channel 20 as an example, the TIP should be made to location 21824 for restarting. For restarting multiple channels, it will be necessary to follow each TIP with Half-Step through the next LIP instruction, machine stop to turn off interrupt time, do the second manual TIP, etc. 7080 mode must be on during the channel program.

In each channel program there is a NOP which can be made into a Transfer by storing a 1. This will shorten the channel interrupt program to write only. In channel 20, this NOP is at location 21835. When using this modification it may be desirable to change the transfer address to 21814 (J814) so that tape will rewind at end of file.

For a read only loop, the following procedure can be used. Channel 20 is used to illustrate.

1. Rewind tape and write many error free records using the stored transfer at location 21835.
2. Manually write tape mark and rewind tape.
3. At location 21825, replace the WR instruction with a transfer to location 21874 (1J874).
4. Drop ready on all other tape drives on channel 20.
5. CHANNEL RESET and manually transfer to 21874. If not in the interrupt program, than instead of transfer, do a manual TIP to 21874 and START.

This procedure will read tape only and Rewind when the tape mark is reached. Comparison will fail on reading the tape mark, however if the 911 switch is on, a typeout will be avoided.

F. NORMAL HALTS

HLT 01111

This halt is for the purpose of setting up switches when the program is loaded. START to continue.

HLT 00251

This halt occurs to stop the program after manual interrupt 251, to allow the operator a choice of:

1. START to continue.
2. RESET and START to start program over.
3. Half-Step twice to turn off the interrupt program trigger and then manually transfer to some desired location.

G. ERROR HALTS

HLT 00075

This halt follows the routine number typeout when a routine fails. The example shown is for routine #075. There is a similar halt for all routines #001 through #081. All routine number halts occur only if the 913 switch is on. The 911 switch will bypass the halt.

If the non-stop switch is on when the routine fails, the error halt will cause an interrupt 250. The halt will still be done, however it will be located in the interrupt 250 program.

HLT 00250

This halt occurs when the non-stop switch is on and a check trigger comes on to cause interrupt 250. This halt will occur only if the 913 switch is on, and will be bypassed if the 911 switch is on. This halt is preceded by a typeout which identifies the check trigger which caused interrupt 250.

HLT 002XX0

There are six possible error halts in each channel program. Each of these halts follows an error typeout. Each halt occurs only if the 913 switch is on and the 911 switch is off. These halt are summarized below:

CHAN 20	CHAN 21	CHAN 22	CHAN 23	Reason
2010	2110	2210	2310	Interrupt after WR and not ready
2020	2120	2220	2320	Channel Check on WR
2030	2130	2230	2330	Interrupt after BSP and not ready
2030	2140	2240	2340	Interrupt after RD and not ready
2050	2150	2250	2350	Channel check on RD
2060	2160	2260	2360	WR and RD fields not equal

H. NORMAL TYPEOUTS

ALL CHK SW ON CHK STOP

This typeout occurs, when the program is loaded or reset, to tell the operator to set up switches. It is followed by HLT 01111.

Z XXX

This typeout occurs every 45 seconds when the 914 switch is on and indicates that the program has completed another 1000 passes. XXX is a three digit number which is a multiple of 1000. For example, the typeout Z008 means that 8000 passes have been completed.

INT. 251 ROUT. 075 012345 PASSES

This typeout occurs whenever interrupt 251 is used by the operator. The information given is the total pass count and the last routine entered prior to the manual interrupt. This typeout is followed by HLT 251.

I. ERROR TYPEOUTS

075

This is an example of a typeout that occurs on routine failure if routine #075 failed. There is a similar typeout for all of routines #001 through #081. The typeout is followed by an error halt of the same number if the 913 switch is on. Both the typeout and the halt that follows will be bypassed if the 911 switch is on.

TEST HIGH SPEED TRANSMIT, CHECK WITH CMP
RCV 00 052479
TMT 00 138004

This is an example of the long typeout that occurs on a failure of a routine if the 915 switch is on. There is one of these typeouts for each of the test routines #030 through #081 only. Routines #001 through #026 do not have any long typeouts.

Each typeout is different, depending on the needs of a particular test routine. The information typed is for the purpose of aiding the operator in interpreting the routine. The first line of type is a short statement of the routine intention. Additional lines will give the variable address and ASU used for testing the particular instruction.

This particular example means that 5 character transmit is being tested in routine #065 and the routine has failed. A field was transmitted from location 138004 to location 052479. In both the RCV and TMT instructions the ASU coding is 00.

INT. 250 FROM ROUT. 065 AT IC-015264
901 CHK

This is an example of the typeout that occurs when the non-stop switch is on and an interrupt 250 takes place due to a check trigger coming on. The first line gives the routine number and the instruction counter location at the time that a check occured. The example shown is a 901 check on TMT in routine #065 at location 015264. The first line is controlled by the 915 switch being on. If the 915 switch is off, only the second line will be typed out to indentify the check trigger. Both lines in this typeout are bypassed if the 911 switch is on. Halt 250 follows this typeout if the 913 switch is on.

UNDETERMINED INTERRUPT 250

This typeout occurs if the interrupt 250 program is entered and no reason can be found for an interrupt 250 based on the status bits in CASU 15, the ART trigger, or a Halt in the main program. This typeout is not bypassed with the 911 switch on, and there is no halt associated with it.

INT. 200 AFTER WR AND NOT RDY

This typeout occurs if an entry to the channel 20 interrupt program occurs and the channel is not ready on the selected tape drive. Each channel has this typeout, and two other similar typeouts for the cases of not ready after BSP and not ready after RD. The typeout is bypassed if the 911 switch is on. A halt follows the typeout if the 913 switch is on.

CHAN CHK ON WR 2001

This typeout occurs if the channel check trigger is on following the write operation. 2001 is the channel address. There is a similar typeout for the read operation. This typeout is bypassed if the 911 switch is on. A halt follows the typeout if the 913 switch is on.

WR-RD DATA UNEQUAL 2001

This typeout occurs if the write field does not compare with the read field, or if either the WR or RD field contains a redundant character. If the 915 switch is on, this typeout is followed by typeouts of the write and read fields. This typeout is bypassed if the 911 switch is on. A halt follows this typeout if the 913 switch is on.

J. COMMENTS

1. Manual interrupts 252 and 253 are not used at the present time.

2. The running time of 8CU37 is 45 seconds for 1000 passes with and without channel operation. The pass counter will eventually wrap around to zero after 1000000 passes which is approximately 8 hours continuous running time.

3. Based on a limited number of observations, a solid machine failure in the CPU, not involving channel overlap, should show up within 5 minutes or less running time. An intermittent failure in CPU or a solid failure which is associated with channel operation cannot be predicted in terms of running time alone.

4. Routines #027 to #029 do not exist. Routine numbers run consecutively in two blocks, #001 to #026 inclusive and #030 to #081 inclusive.

DSD POUGHKEEPSIE **DEPT. 265, BLDG. 918**

ERRATA SHEET FOR 8CU37A

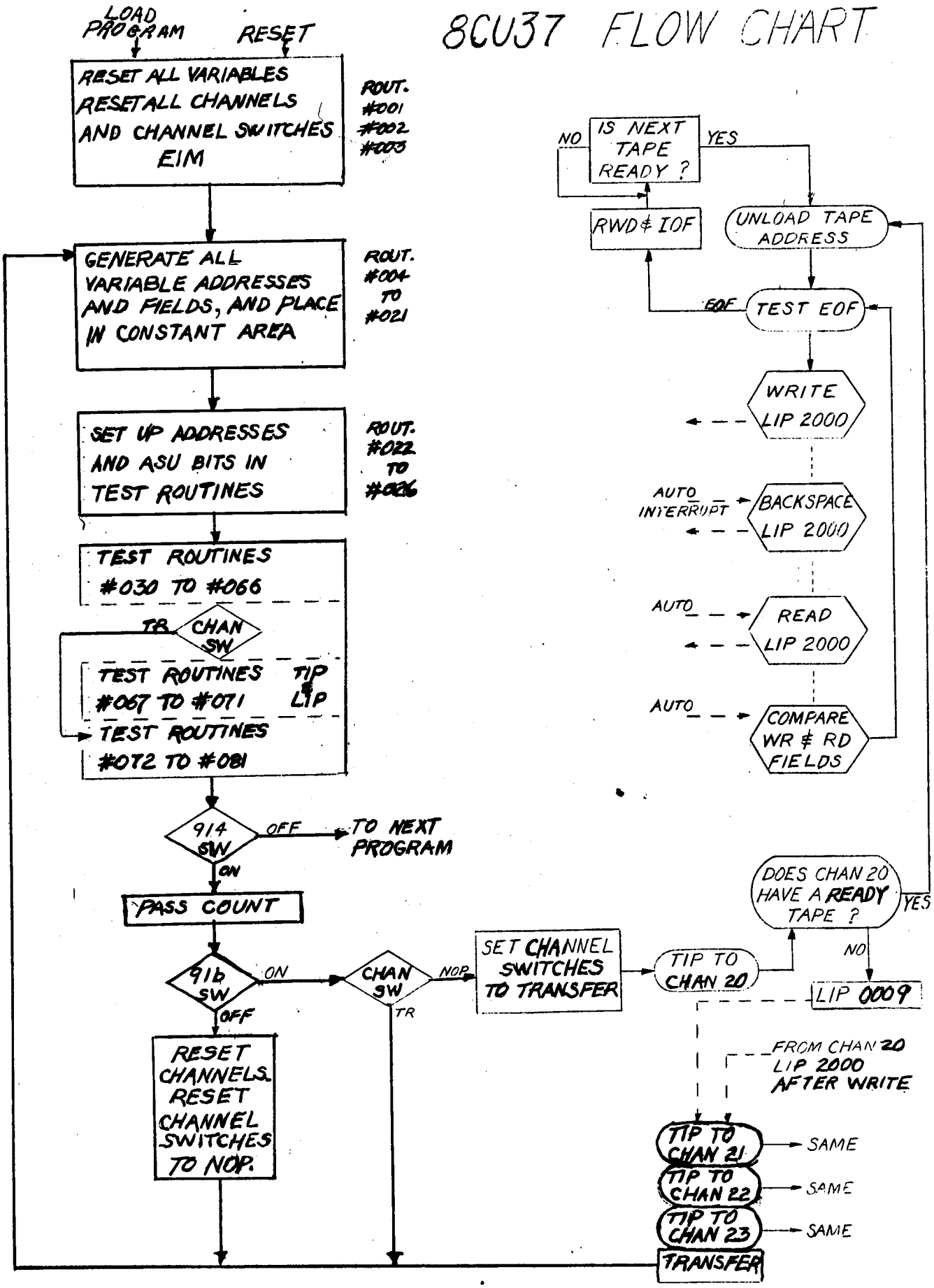
RELIABILITY TEST FOR THE 7080 CPU

On page xiv of the program writeup add the two following headings:

5. **In each channel interrupt program, if the read field contains a redundant character, a 901 check will occur when the read field is compared. The difficulty with this 901 check is that it occurs in the interrupt program and the program will stop even if the non-stop switch is on. To continue the program: turn 901 to "Program," START, and turn 901 back to "check stop."**

6. **When the 916 switch is turned off to stop channels, a "CHANNEL RESET" takes place. If tape was in motion at the time of CHR, there is a chance that the tape read head will come to rest at a point on tape just prior to previously written data. A subsequent WR operation (916 on again) may interpret this old data as noise in the gap if the spacing is just right. The result is a false channel check when the 916 switch is turned on and off repeatedly. If this situation should occur, turn the 911 switch on momentarily to bypass typeouts and allow tapes to get back in step.**

8CU37 FLOW CHART



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RELIABILITY TEST FOR
THE 7080 CPU, WITH
OPTIONAL TAPE OVERLAP.

ALTERATION SWITCHES ON

911-BYPASS TYPEOUTS AND HALTS
912-LOOP IN ROUTINE
913-HALT ON ERROR
914-STAY IN PROGRAM
915-LONG TYPEOUTS ON ERROR
916-CALL FOR TAPE OVERLAP

OTHER SWITCHES

40K SWITCH OFF
7051/II SWITCH OFF
ALL CHECK SWITCHES IN CHK STOP
NON-STOP SWITCH IS OPTIONAL
THERE ARE NO FORCED ERRORS
IN THIS TEST. WHEN NON-STOP
SWITCH IS OFF, CHECK TRIGGERS
COMING ON WILL CAUSE A
CHECK STOP. IF NON-STOP
IS ON, ANY CHECK TRIGGERS
THAT COME ON WILL BE
IDENTIFIED BY A TYPEOUT.

```
00004 EEM 3 14   0000 0&-0 
00009 LIM , 07   0000 0 &0 
00014 CHR 3 13   0000 0& 0 
00019 CHR 3 13   0000 0& 0 
00024 LIM , 07   0000 0 &0 
00029 SPC ,      0000       
```

SET UP 7080 MODE
AND RESET ALL
CHANNELS AND
ASSOCIATED INTERRUPTS

RESET SPC

```
00034 SEL 2      0500       
00039 WR  R      0050       
00044 HLT J      1111       
00049 TR  1      0079-------------A02
```

INITIAL TYPEOUT
HALT TO SET SWITCHES
TO ROUTINE #001

INITIAL TYPEOUT

```
2 022 00071                ALL CHK SW ON CHK STOP
2 001 00072                
```

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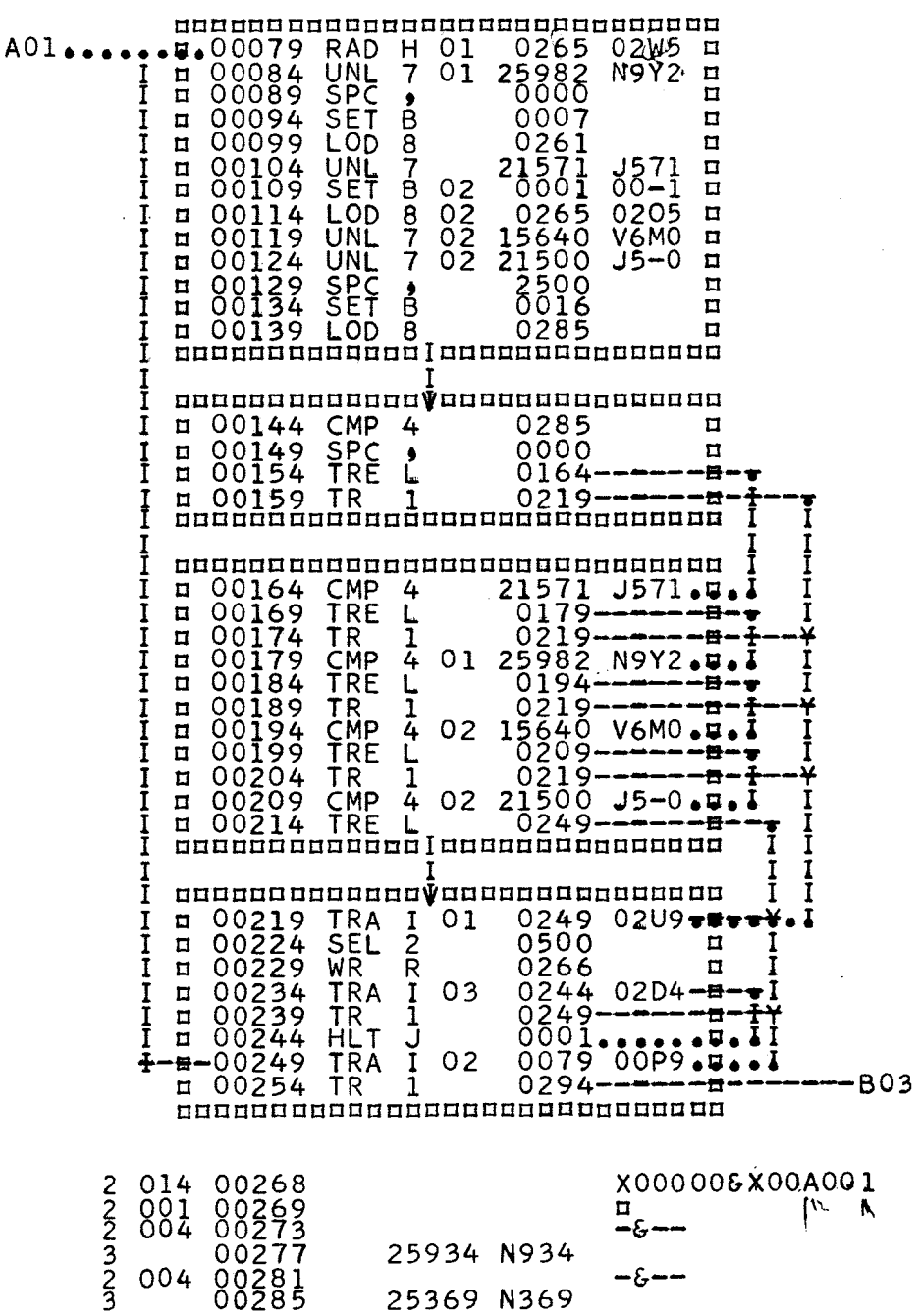
SECTION 1 HOUSEKEEPING
ROUTINE #001

ON FIRST PASS ONLY,
A. SAVE THE ROUTINE NUMBER AND VERIFY IT.
B. RESET PASS COUNTER
C. SET UP INTERRUPT WORDS 250 AND 251.
D. RESET THE TWO BYPASSES IN # 067 AND CHANNEL PROGRAM



PUT ROUTINE NUMBER IN SAVE AREA
RESET SPC

RESET PASS COUNTERS

RESET BYPASSES TO NOP IN ROUTINE #067 IN CHANNEL PROGRAM

SET UP INTERRUPT WORDS 250 AND 251.

VERIFY LOADING OF INT. WORDS 250 AND 251

ERROR

VERIFY THAT PASS COUNTER IS EQUAL PLUS ZERO
ERROR
VERIFY THAT ROUTINE NUMBER IS GOOD IN THE SAVE AREA
ERROR
CHECK THAT BYPASSES WERE RESET TO NOP
ERROR

ERROR ROUTINE

TO NEXT ROUTINE

CONSTANTS

```
2 014 00268                    X00000&X00A001
2 001 00269                    □
2 004 00273                    -&--
3     00277     25934 N934
2 004 00281                    -&--
3     00285     25369 N369
```

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```
                                                    SECTION 1 HOUSEKEEPING
                                                         ROUTINE #002
                                                    ON FIRST PASS ONLY
                                                    A. RESET THE THREE 6 DIGIT
                                                       ADDRESS NUMBERS LOCATED
                                                       IN ROUTINE #004.
                                                    B. RESET THE THREE 20 DIGIT
                                                       TEST NUMBERS LOCATED
                                                       IN ROUTINE #007

B02 00294 EIM , 06   0000 0 -0
    00299 RAD H      0547
    00304 UNL 7     25982 N982                     SAVE
                                                    ROUTINE NUMBER
    00309 SET B      0021
    00314 LOD 8      0480                           RESET ALL THREE
    00319 UNL 7      1320                           6 DIGIT ADDRESS NUMBERS
    00324 RAD H 01   0501 05 1
    00329 ST  F 01   2055 20V5                      RESET TEST NUMBER 1
    00334 RAD H 03   0522 05B2
    00339 ST  F 03   2076 20G6                      RESET TEST NUMBER 2
    00344 RAD H 05   0543 0VU3
    00349 ST  F 05   2097 2 Z7                      RESET TEST NUMBER 3

    00354 LOD 8 01   0501 05 1                      TEST THAT TEST NUMBER 1
    00359 CMP 4 01   2055 20V5                      IS EQUAL TO RESET VALUE
    00364 TRE L      0374------
    00369 TR  1      0424------                     ERROR
    00374 LOD 8 03   0522 05B2                      TEST THAT TEST NUMBER 2
    00379 CMP 4 03   2076 20G6                      IS EQUAL TO RESET VALUE
    00384 TRE L      0394------
    00389 TR  1      0424------                     ERROR
    00394 LOD 8 05   0543 0VU3                      TEST THAT TEST NUMBER 3
    00399 CMP 4 05   2097 2 Z7                      IS EQUAL TO RESET VALUE
    00404 TRE L      0414------
    00409 TR  1      0424------                     ERROR
    00414 CMP 4      1320                           TEST THAT ADDRESS NUMBERS
    00419 TRE L      0454------                     ARE EQUAL TO RESET VALUES

    00424 TRA I 01   0454 04V4                      ERROR ROUTINE
    00429 SEL 2      0500
    00434 WR  R      0548
    00439 TRA I 03   0449 04D9
    00444 TR  1      0454------
    00449 HLT J      0002
    00454 TRA I 02   0294 02R4
    00459 TR  1      0559------------C04            TO NEXT ROUTINE


                                                    CONSTANTS AND NUMBER RESETS
2 021 00480                                         X11111AX22222BX33333C ADDRESS NUMBERS
2 021 00501                                         X00000000000000000000A TEST NO. 1
2 021 00522                                         X00000000000000000000A TEST NO. 2
2 021 00543                                         X00000000000000000000A TEST NO. 3
2 007 00550                                         X00B002
2 001 00551
```

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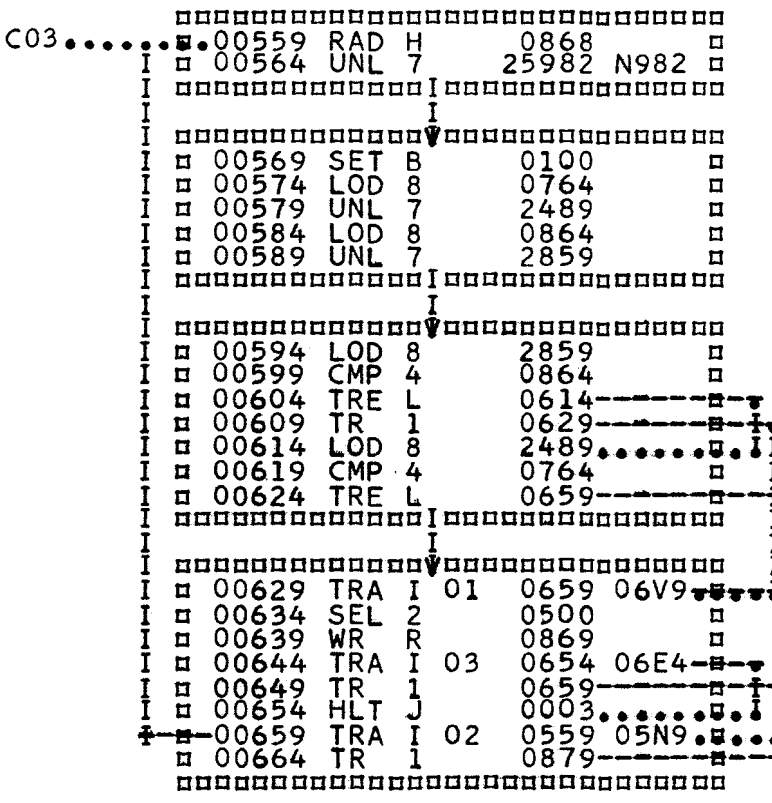
SECTION 1 HOUSEKEEPING
ROUTINE #003
ON FIRST PASS ONLY.
RESET GENERAL USE TEST FIELD.
IN ROUTINE #008 AND
UNSIGNED ADM TEST FIELD
IN ROUTINE #009



SAVE
ROUTINE NUMBER

RESET GENERAL USE TEST
FIELD IN ROUTINE #008
RESET UNSIGNED ADM TEST
FIELD IN ROUTINE #009

TEST RESET OF ADM FIELD

ERROR
TEST RESET OF GENERAL
USE TEST FIELD

ERROR ROUTINE

TO NEXT ROUTINE

CONSTANTS AND FIELD RESETS

```
2 030 00694                ABCDEFGHIJKLMNOPQRSTUVWXYZ0123
2 020 00714                456789 -&&-.,#*%$/¤@
2 030 00744                ABCDEFGHIJKLMNOPQRSTUVWXYZ0123
2 020 00764                456789 -&-.,#*%$/¤@.
2 030 00794                ABCDEFGHIJKLMNOPQRSTUVWXYZ0123
2 019 00813                456789 -&&-ABCDEFGH
2 001 00814                #
2 030 00844                ABCDEFGHIJKLMNOPQRSTUVWXYZ0123
2 019 00863                456789 -&&-ABCDEFGH
2 001 00864                #
2 007 00871                X00C003
2 001 00872                ¤
```

SECTION 2 GENERATOR
ROUTINE #004
PAGE 1

ENTER THIS ROUTINE FROM
A. ROUTINE #003
B. END OF A PROGRAM PASS
REGENERATE 3 SIX DIGIT
ADDRESS NUMBERS USING RESET
VALUES OR THE OLD NUMBERS
FROM THE LAST PROGRAM PASS.

```
D04
D06.....
          00879 EEM 3 14   0000 0&-0   SET 7080 MODE,
          00884 SPC ,      0000        RESET SPC AND
          00889 RAD H      1351        SAVE
          00894 UNL 7    25982 N982    ROUTINE NUMBER
                    I
                    V
          00899 SET B      0000
          00904 SET B      0021        CLEAR STORAGE AND
          00909 UNL 7      1341        NEW NUMBERS LOCATION
          00914 SET B      0006
                    I
                    V
          00919 RAD H      1306        PICK UP OLD #1
          00924 SET B      0007        EXTEND FOR POSSIBLE CARRY
          00929 ADD G      1313        ADD OLD #2
          00934 SET B      0006        DROP CARRY
          00939 ST  F      1327        PLACE NEW #1
                    I
                    V
          00944 RAD H      1313        PICK UP OLD #2
          00949 SET B      0007
          00954 ADD G      1320        ADD OLD #3
          00959 SET B      0006
          00964 ST  F      1334        PLACE NEW #2
                    I
                    V
          00969 RAD H      1320        PICK UP OLD #3
          00974 SET B      0007
          00979 ADD G      1327        ADD NEW #1
          00984 SET B      0006
          00989 ST  F      1341        PLACE NEW #3
                    I
                    V
          00994 SET B      0001        INTERROGATE MEMORY SIZE
          00999 LOD 8      1342        LOD 1 BIT
          01004 UNL 7    3000- &00-    UNL TO 70000
          01009 LOD 8      1343        LOD 2 BIT
          01014 UNL 7    3000& &00&    UNL TO 150000
          01019 SET B      0002
          01024 RCV U    3000- &00-    SET MAC-2 TO 70000
          01029 TZB . 02   1049 10M9   TEST FOR 2 BIT
          01034 SB  % 13   1373 1CX3   2 BIT AT 70000 MEANS 80K,
          01039 LOD 8      1345        SET LEM INST. AND LOD 07
          01044 TR  1      1059
          01049 SB  % 05   1373 1TX3   NO 2 BIT AT 150000 MEANS 160K
          01054 LOD 8      1347        SET EEM INST. AND LOD 15
          01059 UNL 7      1561        UNL 07/15 TO ROUT. #005
                    I
                    V
```

NEXT PAGE

FROM PREVIOUS PAGE

SECTION 2 GENERATOR
ROUTINE #004
PAGE 2

NEW NUMBERS ARE COMPLETE,
NOW CHECK THE ADDITION BY
REVERSING THE PROCESS AND
SUBTRACTING TO OBTAIN ZERO.

```
01064 RAD H      1327                NEW #1
01069 SET B      0007                EXTEND FOR CARRY
01074 SUB P      1313                OLD #2
01079 SUB P      1306                OLD #1
01084 SET B      0006                DROP CARRY
01089 TRZ N      1099                TEST ZERO
01094 TR  1      1264                ERROR
01099 RAD H      1334                NEW #2
01104 SET B      0007
01109 SUB P      1320                OLD #3
01114 SUB P      1313                OLD #2
01119 SET B      0006
01124 TRZ N      1134
01129 TR  1      1264                ERROR
01134 RAD H      1341                NEW #3
01139 SET B      0007
01144 SUB P      1327                NEW #1
01149 SUB P      1320                OLD #3
01154 SET B      0006
01159 TRZ N      1169
01164 TR  1      1264

01169 SET B      0002                TEST MEMORY SIZE SET UP
01174 LOD 8      1561
01179 CMP 4      1345                VS 07
01184 TRE L      1229
01189 CMP 4      1347                VS 15
01194 TRE L      1204
01199 TR  1      1264                ERROR
01204 RCV U    3000& &00&            RCV AT 150000
01209 TZB . 02   1264 12O4           TEST FOR 2 BIT
01214 RCV U      1373
01219 TZB . 05   1294 1SZ4           TEST FOR EEM INST.
01224 TR  1      1264                ERROR
01229 RCV U    3000- &00-            RCV AT 70000
01234 TZB . 01   1244 12U4           TEST FOR NO 1 BIT
01239 TR  1      1264                ERROR
01244 TZB . 02   1264 12O4           TEST FOR 2 BIT
01249 RCV U      1373
01254 TZB . 05   1264 1SW4           TEST FOR LEM INST.
01259 TR  1      1294

01264 TRA I 01   1294 12Z4           ERROR ROUTINE
01269 SEL 2      0500
01274 WR  R      1352
01279 TRA I 03   1289 12H9
01284 TR  1      1294
01289 HLT J      0004
01294 TRA I 02   0879 08P9 ----------D05
01299 TR  1      1364 ----------E07  TO NEXT ROUTINE
```

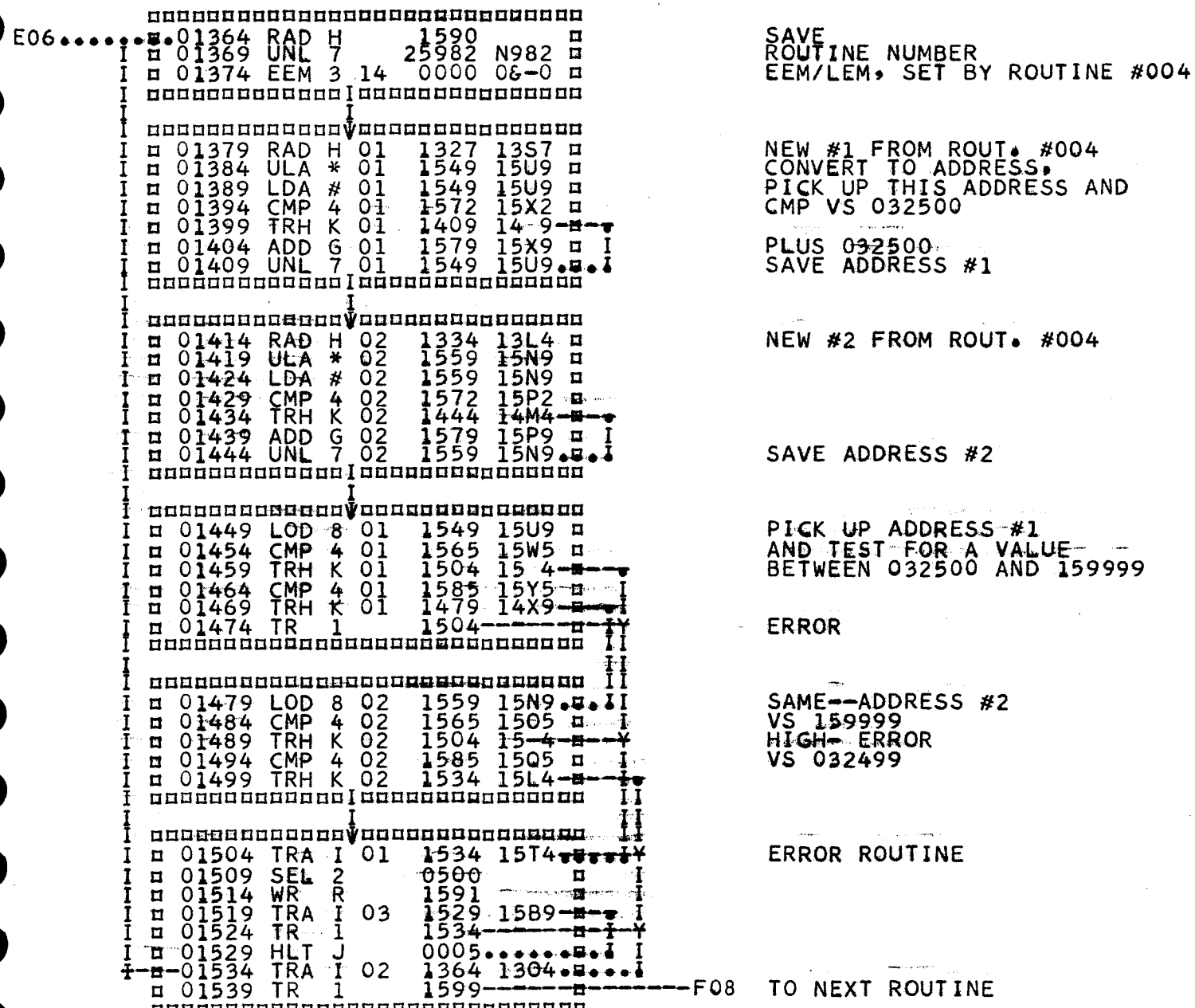
CONSTANTS AND NUMBERS

```
2 021 01320    X00000&X00000&X00000& OLD NUMBERS
2 021 01341    &00000&&00000&&00000& NEW NUMBERS
2 013 01354    120715X00D004
2 001 01355
```

g[illegible]ns/g0013365.png

SECTION 2 GENERATOR
ROUTINE #005

A. CONVERT 2 OF THE ADDRESS NUMBERS OF ROUT. #004 TO VALID ADDRESSES.
B. EXCLUDE THESE ADDRESSES FROM PROGRAM AREA



CONSTANTS AND ADDRESSES

```
2 010 01549          XXXX000000 ADDRESS #1
2 010 01559          XXXX000000 ADDRESS #2
2 020 01579          XX9999 032500 03250&
2 014 01593          032499 X00E005
2 001 01594          ¤
```

SECTION 2 GENERATOR
ROUTINE #006
PICK UP THE ADDRESSES FROM
ROUT. #005, SEPARATE BY AT
LEAST 300 SPACES.PLACE THEM I
CONSTANT AREA AS ADDRESS #1
PLUS 5 AND ADDRESS #2 PLUS 5

```
F07.....01599 RAD H      1773
       01604 UNL 7     25982 N982
       01609 EEM 3 14   0000 0&-0
       01614 SET B 01   0006 00 6
       01619 LOD 8 01   1549 15U9
       01624 SET B 02   0006 00-6
       01629 LOD 8 02   1559 15N9
       01634 SET B      0006
       01639 LOD 8      1549
       01644 CMP 4      1559
       01649 TRH K      1664------
       01654 SUB P 01   1778 17X8
       01659 TR  1      1669------
       01664 SUB P 02   1778 17P8
       01669 ULA * 01   8094 80Z4
       01674 ULA * 02   8154 81N4
       01679 LDA # 01   8094 80Z4
       01684 LDA # 02   8154 81N4
       01689 CMP 4 01   1549 15U9
       01694 TRE L      1719------
       01699 ADD G 01   1778 17X8
       01704 CMP 4 01   1549 15U9
       01709 TRE L      1724------
       01714 TR  1      1734------
       01719 ADD G 02   1778 17P8
       01724 CMP 4 02   1559 15N9
       01729 TRE L      1764------
       01734 TRA I 01   1764 17W4
       01739 SEL 2      0500
       01744 WR  R      1780
       01749 TRA I 03   1759 17E9
       01754 TR  1      1764------
       01759 HLT J      0006.....
      -01764 TRA I 02   1599 15R9
       01769 TR  1      1789------G09
```

SAVE
ROUTINE NUMBER

PICK UP
ADDRESS #1 FROM ROUT. #005

ADDRESS #2

ADDR #1
VS ADDR #2

SUB 300 FROM ADDR. #1
OR FROM ADDR. #2
WHICHEVER IS SMALLEST
PLACE ADDRESSES 1 PLUS 5
AND 2 PLUS 5 IN CONSTANT AREA

PICK UP THE ADDRESSES
FROM CONSTANT AREA
TEST ADDRESS #1 FOR EQUAL
TO VALUE IN ROUTINE #005
IF NOT EQUAL THEN ADD 300
AND COMPARE AGAIN

ERROR
ADD 300 TO ADDRESS #2
TEST ADDRESS #2

ERROR ROUTINE

TO NEXT ROUTINE

CONSTANTS

```
2 013 01782          X00F X30& 006
2 001 01783          
```

SECTION 2 GENERATOR
ROUTINE #007
PAGE 1

REGENERATE THREE 20 DIGIT TEST NUMBERS. TWO OF THESE NUMBERS WILL BE USED FOR THE TEST ROUTINES IN SECTION 4
THE THIRD NUMBER IS USED AS THE RANDOM BASIS FOR SETTING UP FIELD LENGTHS, SIGNS, ASU, ECT.

```
G08
G10.....01789 RAD H      2101
       01794 UNL 7    25982 N982
```

SAVE ROUTINE NUMBER

```
       01799 SET B      0000
       01804 SET B      0020
       01809 UNL 7      8305
       01814 UNL 7      8326
       01819 UNL 7      8347
```

CLEAR STORAGE AND NEW NUMBER LOCATION IN CONSTANT AREA

```
       01824 RAD H      2055
       01829 SET B      0021
       01834 ADD G      2076
       01839 SET B      0020
       01844 ST  F      8305
```

PICK UP OLD #1
EXTEND FOR POSSIBLE CARRY
ADD OLD #2
DROP CARRY
PLACE NEW #1 IN CONSTANT AREA

```
       01849 RAD H      2076
       01854 SET B      0021
       01859 ADD G      2097
       01864 SET B      0020
       01869 ST  F      8326
```

PICK UP OLD #2
ADD OLD #3
PLACE NEW #2 IN CONSTANT AREA

```
       01874 RAD H      2097
       01879 SET B      0021
       01884 ADD G      8305
       01889 SET B      0020
       01894 ST  F      8347
```

PICK UP OLD #3
ADD NEW #1
PLACE NEW #3 IN CONSTANT AREA

NEXT PAGE

SECTION 2 GENERATOR
ROUTINE #007
PAGE 2

```
                    I
                    I
                    I
                    I
                    I
                    I
                    I
                    I
                    I
                    V
 01899 RAD H      8305        NEW #1
 01904 SET B      0021        EXTEND FOR CARRY
 01909 SUB P      2076        OLD #2
 01914 SUB P      2055        OLD #1
 01919 SET B      0020        DROP CARRY
 01924 TRZ N      1934------  TEST ZERO
 01929 TR  1      1999------  ERROR
                             II
                             II
                             II
 01934 RAD H      8326......  NEW #2
 01939 SET B      0021        I
 01944 SUB P      2097        OLD #3
 01949 SUB P      2076        OLD #2
 01954 SET B      0020        I
 01959 TRZ N      1969------  TEST ZERO
 01964 TR  1      1999------  ERROR
                             II
                             II
                             II
 01969 RAD H      8347......  NEW #3
 01974 SET B      0021        I
 01979 SUB P      8305        NEW #1
 01984 SUB P      2097        OLD #3
 01989 SET B      0020        I
 01994 TRZ N      2029------  TEST ZERO
                  I          II
                  I          II
                  V          II
 01999 TRA I 01   2029 20S9   ERROR ROUTINE
 02004 SEL 2      0500        I
 02009 WR  R      2102        I
 02014 TRA I 03   2024 20B4   I
 02019 TR  1      2029------  I
 02024 HLT J      0007......  I
 02029 TRA I 02   1789 17Q9------G09
 02034 TR  1      2114--------H11  TO NEXT ROUTINE
```

CONSTANTS

```
2 021 02055   X00000000000000000000&  OLD #1
2 021 02076   X00000000000000000000&  OLD #2
2 021 02097   X00000000000000000000&  OLD #3
2 004 02101   X00G
2 003 02104   007
2 001 02105
```

SECTION 2 GENERATOR
ROUTINE #008
PAGE 1

REGENERATE THE 100 CHAR. GENERAL USE TEST FIELD BY SHIFTING ONE CHARACTER. THE CHARACTER TO BE SHIFTED IS DETERMINED BY TWO DIGITS IN TEST NUMBER 3 WHICH WAS GENERATED IN ROUT. #007

```
H10
H12.....*.02114 RAD H      2378
        . 02119 UNL 7     25982 N982
                  I
                  V
        . 02124 SET B      0000
        . 02129 SET B      0100
        . 02134 LOD 8      2489
        . 02139 UNL 7      8531
        . 02144 CMP 4      8531
                  I
                  V
        . 02149 SET B 02   0002 00-2
        . 02154 LOD 8 02   8346 83M6
        . 02159 UNL 7 02   2199 21R9
        . 02164 ST  F 02   2385 23Q5
                  I
                  V
        . 02169 SET B 03   0000 00&0
        . 02174 SET B 03   0006 00&6
        . 02179 ULA * 03   2214 22A4
        . 02184 LDA # 03   2389 23H9
        . 02189 SUB P 03   2385 23H5
        . 02194 ULA * 03   2214 22A4
                  I
                  V
        . 02199 SET B      00--
        . 02204 LOD 8      2489
        . 02209 SET B 01   0001 00 1
        . 02214 LOD 8 01   0000 00-0
        . 02219 UNL 7 01   8531 85T1
        . 02224 UNL 7      8530
                  I
                  V
```

NEXT PAGE

SAVE
ROUTINE NUMBER

CLEAR STORAGE
AND PRESET THE
NEW FIELD LOCATION WITH
THE OLD FIELD
DO CMP. TEST EQUAL LATER

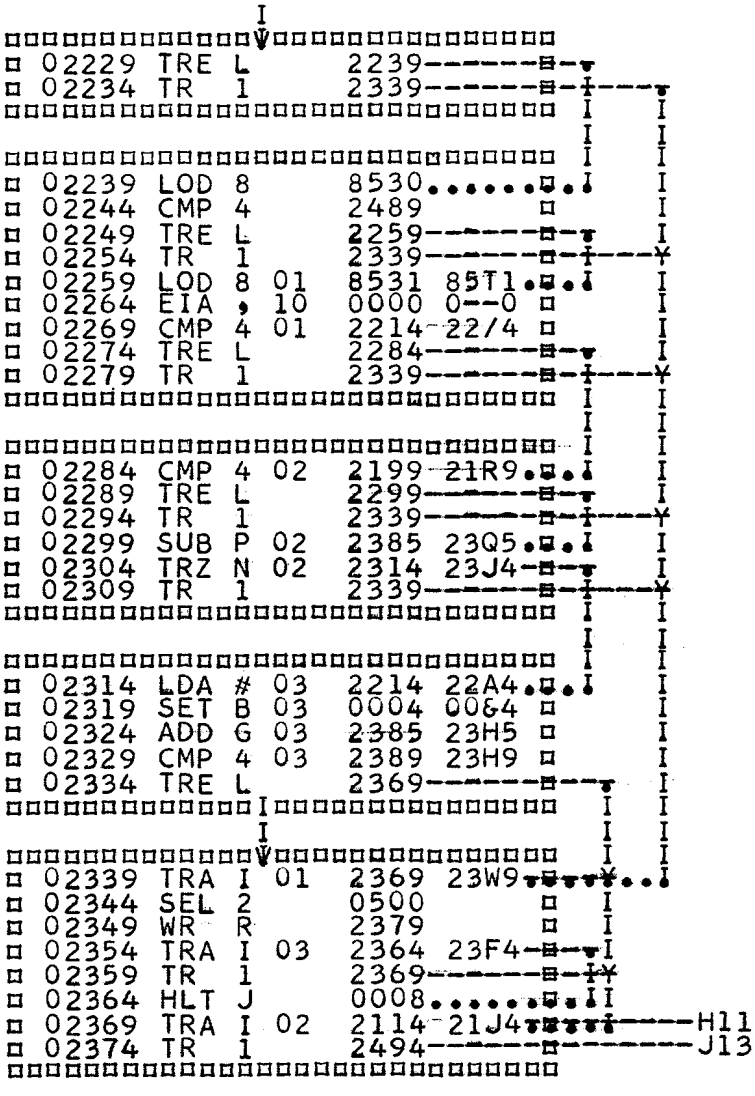
PICK UP 2 DIGITS FROM TEST #3
AND USE FOR LOCATING THE
CHARACTER TO BE SHIFTED.

CLEAR OLD ADDRESS
PICK UP FIXED ADDRESS
SUB 2 DIGIT NUMBER AND
DUMP IN BACK OF LOD 01 INST.

PICK UP OLD FIELD TO RIGHT
OF SELECTED CHARACTER
PICK UP SELECTED
CHARACTER FROM OLD FIELD
SET UP NEW FIELD WITH SELECTED
CHAR. ON RIGHT END.

FROM PREVIOUS PAGE

SECTION 2 GENERATOR
ROUTINE #008
PAGE 2



```
02229 TRE L      2239------          TEST PRESET OF NEW FIELD
02234 TR  1      2339------          ERROR

02239 LOD 8      8530.....           TEST NEW FIELD
02244 CMP 4      2489                VS OLD FIELD
02249 TRE L      2259------
02254 TR  1      2339------          ERROR
02259 LOD 8 01   8531 85T1.
02264 EIA , 10   0000 0--0
02269 CMP 4 01   2214 22/4
02274 TRE L      2284------
02279 TR  1      2339------          ERROR

02284 CMP 4 02   2199 21R9.          CHECK 2 DIGITS USED
02289 TRE L      2299------          IN LOCATING SHIFT CHAR.
02294 TR  1      2339------          ERROR
02299 SUB P 02   2385 23Q5.
02304 TRZ N 02   2314 23J4
02309 TR  1      2339------          ERROR

02314 LDA # 03   2214 22A4.          CHECK ADDRESS USED
02319 SET B 03   0004 00&4           TO PICK UP SHIFT CHAR.
02324 ADD G 03   2385 23H5           ADD 2 DIGITS FROM TEST #3
02329 CMP 4 03   2389 23H9           AND CMP VS ORIGINAL
02334 TRE L      2369------          ADDRESS.

02339 TRA I 01   2369 23W9.          ERROR ROUTINE
02344 SEL 2      0500
02349 WR  R      2379
02354 TRA I 03   2364 23F4
02359 TR  1      2369------
02364 HLT J      0008.....
02369 TRA I 02   2114 21J4.------H11
02374 TR  1      2494------------J13
```

CONSTANTS AND OLD FIELD

```
2 007 02381                X00H008
2 001 02382
2 003 02385                X00  2 DIGITS OF TEST #3
3     02389      2489 2489
5 100 02489                OLD GENERAL USE 100 CHAR FIELD.
```

SECTION 2 GENERATOR
ROUTINE #009
PAGE 1

REGENERATE THE 100 CHAR. UNSIGNED ADM FIELD BY SHIFTING ONE CHARACTER. THE CHARACTER TO BE SHIFTED IS DETERMINED BY TWO DIGITS IN *TEST* NUMBER 3 WHICH WAS GENERATED IN ROUTINE #007

```
J12
J14.....
          02494 RAD H      2751
          02499 UNL 7     25982 N982
```

SAVE ROUTINE NUMBER

```
          02504 SET B      0000
          02509 SET B      0100
          02514 LOD 8      2859
          02519 UNL 7      8831
          02524 CMP 4      8831
```

CLEAR STORAGE AND PRESET THE NEW FIELD LOCATION IN CONSTANT AREA WITH THE OLD FIELD. DO CMP, TEST EQUAL LATER

```
          02529 RAD H 02   2385 23Q5
          02534 UNL 7 02   2569 25O9
          02539 SET B 03   0000 00&0
          02544 SET B 03   0006 00&6
          02549 ULA * 03   2584 25H4
          02554 LDA # 03   2759 27E9
          02559 SUB P 03   2385 23H5
          02564 ULA * 03   2584 25H4
```

USE TWO DIGITS FOR LOCATING CHARACTER TO BE SHIFTED

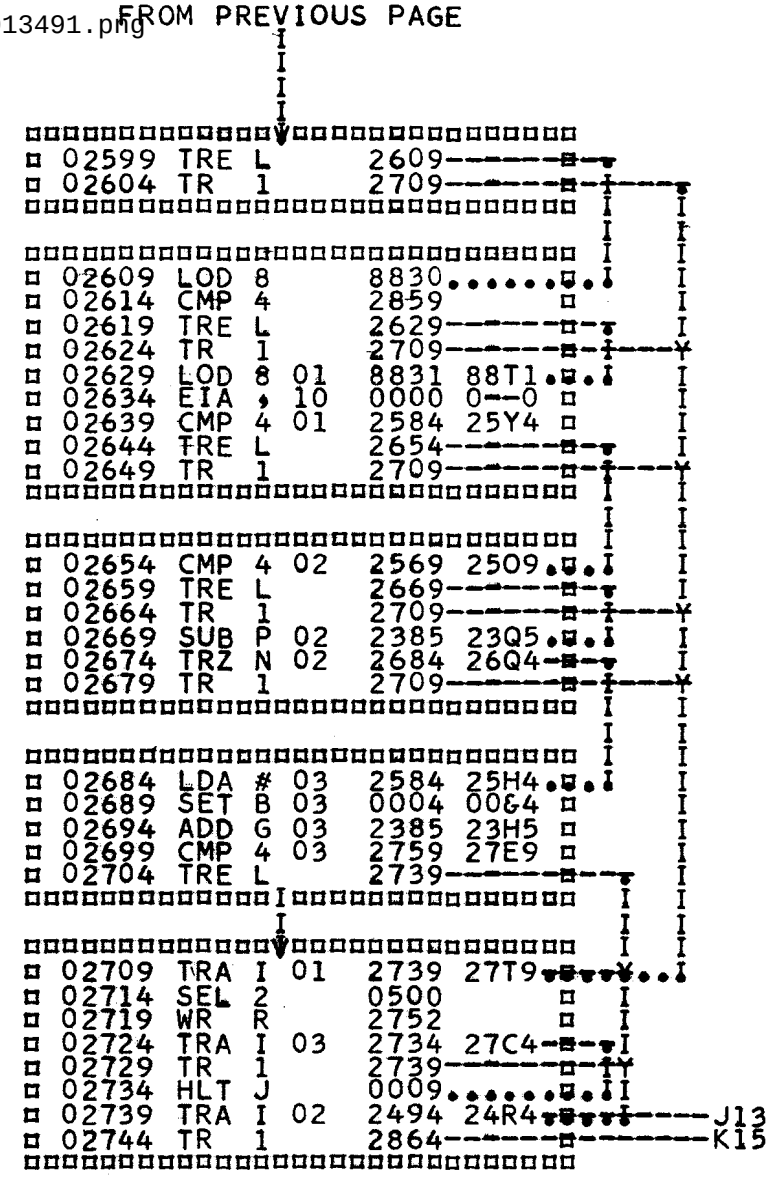
CLEAR OLD ADDRESS
PICK UP FIXED ADDRESS.
SUB 2 DIGIT NUMBER AND
DUMP IN BACK OF LOD 01 INST.

```
          02569 SET B      00--
          02574 LOD 8      2859
          02579 SET B 01   0001 00 1
          02584 LOD 8 01   0000 00-0
          02589 UNL 7 01   8831 88T1
          02594 UNL 7      8830
```

PICK UP OLD FIELD TO RIGHT OF SELECTED CHARACTER
PICK UP SELECTED CHARACTER FROM OLD FIELD
SET UP NEW FIELD WITH SELECTED CHAR. ON RIGHT END

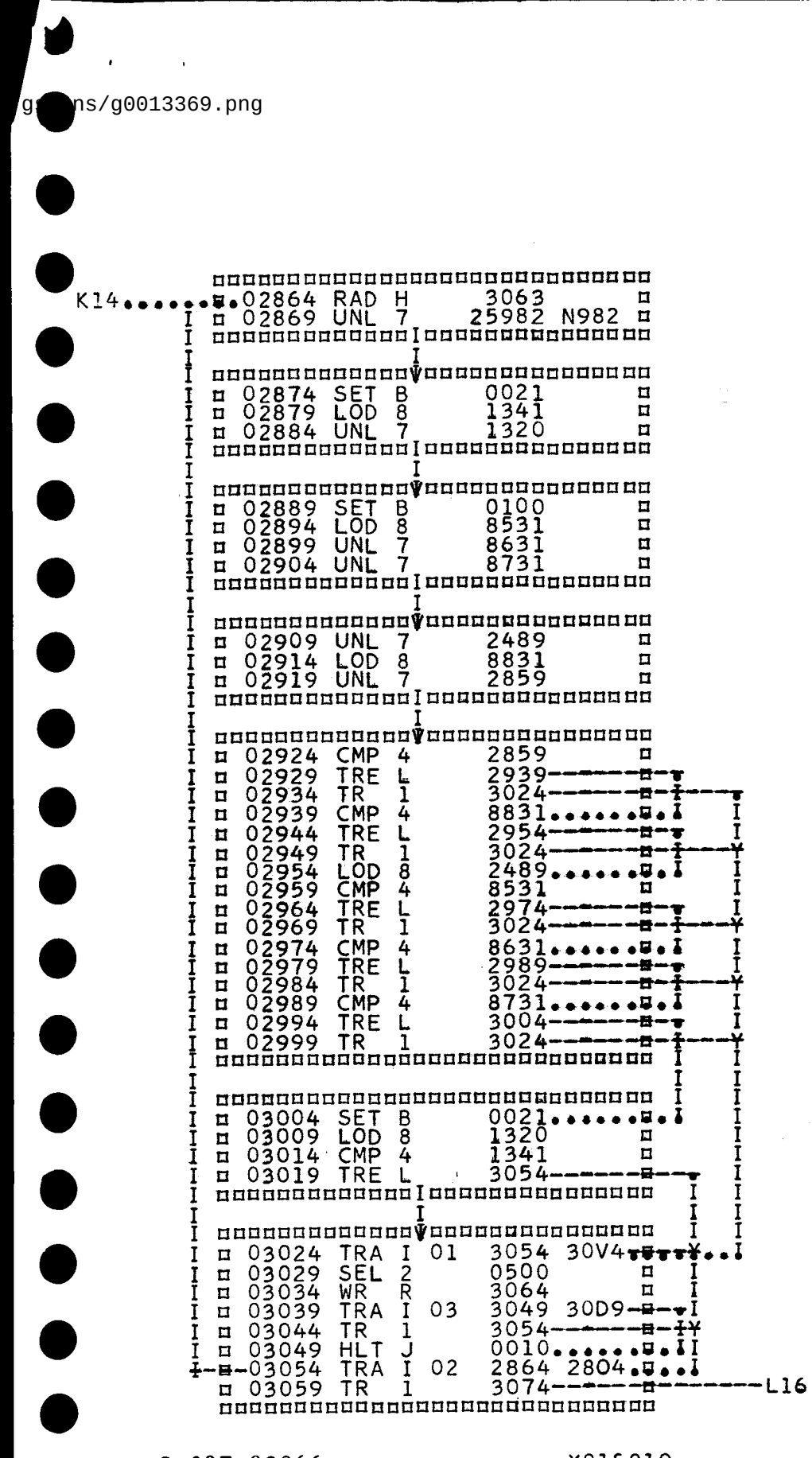
NEXT PAGE

SECTION 2 GENERATOR
ROUTINE #009
PAGE 2



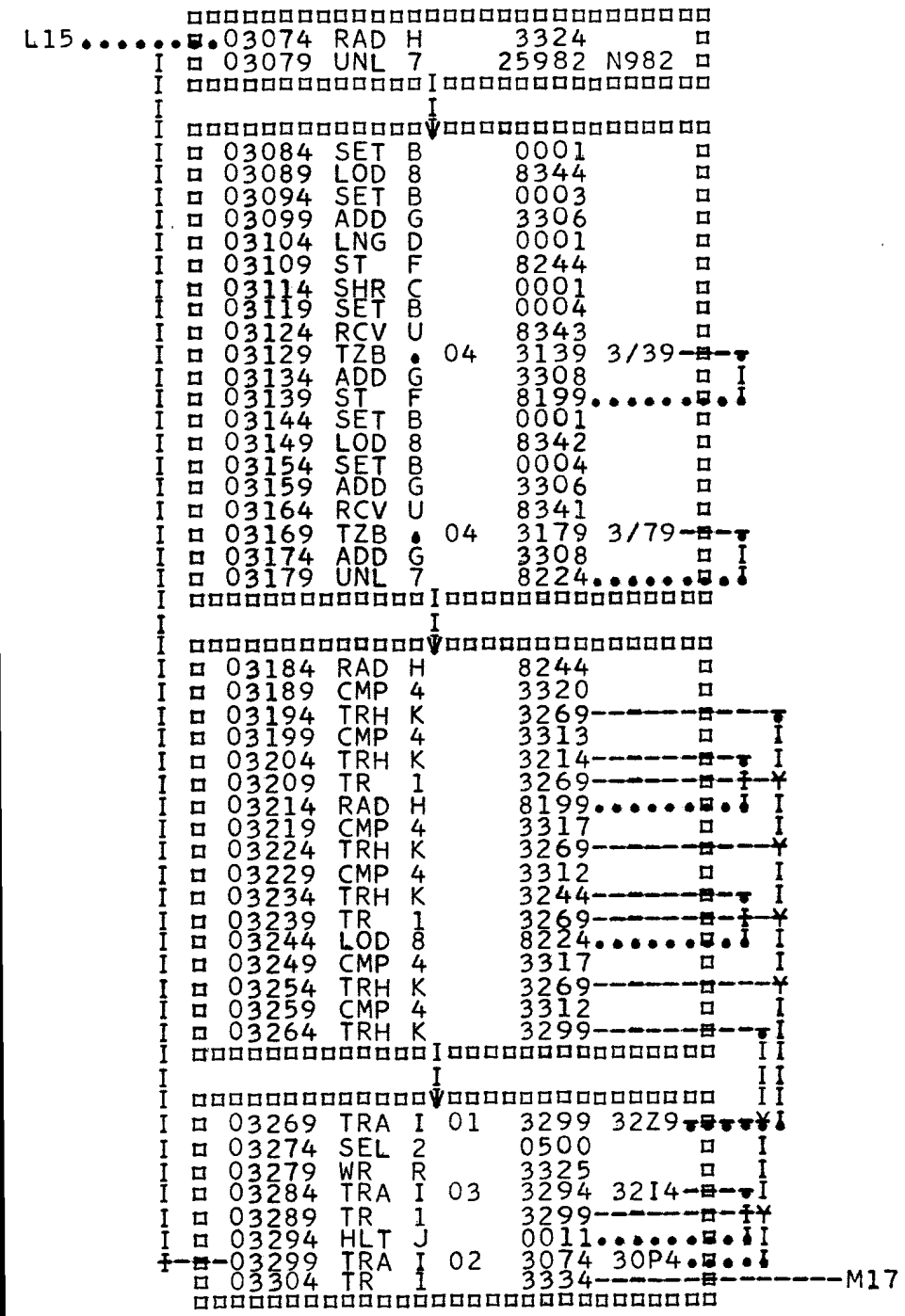
CONSTANTS

```
2 010 02754                  XXXX00I009
2 001 02755                  □
3     02759      2859 2859
5 100 02859                  /OLD UNSIGNED ADM FIELD)
```



```
                                                    SECTION 2 GENERATOR
                                                          ROUTINE #010
                                                    UPDATE ROUTINE #004, BY
                                                    DUMPING NEW ADDRESS NUMBERS
                                                    INTO OLD ONES. TRIPLE THE
                                                    GENERAL TEST FIELD TO 300 CHAR
                                                    UPDATE ROUTINES #008 AND #009
                                                    BY DUMPING NEW FIELD TO OLD ONE

K14.....02864 RAD H      3063                       SAVE
       02869 UNL 7    25982 N982                   ROUTINE NUMBER

       02874 SET B      0021                       UPDATE ROUTINE #004
       02879 LOD 8      1341                       LOD NEW
       02884 UNL 7      1320                       AND REPLACE OLD

       02889 SET B      0100                       TRIPLE TEST FIELD
       02894 LOD 8      8531                       FIRST 100 CHAR.
       02899 UNL 7      8631                       UNL TO SECOND 100 CHAR.
       02904 UNL 7      8731                       UNL TO THIRD 100 CHAR.

       02909 UNL 7      2489                       UPDATE OLD FIELD IN ROUT. #008
       02914 LOD 8      8831                       LOD NEW UNSIGNED ADM FIELD
       02919 UNL 7      2859                       UPDATE OLD FIELD IN ROUT. #009

       02924 CMP 4      2859                       CMP ADM FIELDS
       02929 TRE L      2939-----                  ERROR
       02934 TR  1      3024-----
       02939 CMP 4      8831.....                  ERROR
       02944 TRE L      2954-----                  LOD ROUT. #008 UPDATED FIELD
       02949 TR  1      3024-----                  CMP VS FIRST 100 CHAR.
       02954 LOD 8      2489.....                  INCONSTANT AREA
       02959 CMP 4      8531                       ERROR
       02964 TRE L      2974-----                  CMP VS SECOND 100 CHAR.
       02969 TR  1      3024-----
       02974 CMP 4      8631.....                  ERROR
       02979 TRE L      2989-----                  CMP VS THIRD 100 CHAR.
       02984 TR  1      3024-----
       02989 CMP 4      8731.....                  ERROR
       02994 TRE L      3004-----
       02999 TR  1      3024-----

       03004 SET B      0021.....                  TEST UPDATING OF ROUT. #004
       03009 LOD 8      1320                       LOD AND COMPARE
       03014 CMP 4      1341                       THE TWO SETS OF NUMBERS.
       03019 TRE L      3054-----

       03024 TRA I 01   3054 30V4-----             ERROR ROUTINE
       03029 SEL 2      0500
       03034 WR  R      3064
       03039 TRA I 03   3049 30D9-----
       03044 TR  1      3054-----
       03049 HLT J      0010.....
       03054 TRA I 02   2864 2804.....
       03059 TR  1      3074-----                  L16

2 007 03066                    X01&010
2 001 03067                    .
```

SECTION 2 GENERATOR
ROUTINE #011
GENERATE THREE LENGTHS OF
FIELD BASED ON NUMBER 3.
ONE LENGTH VARIES FROM
10 TO 100 AND IS USED IN TCT.
THE OTHER TWO LENGTHS ARE FOR
USE AS LENGTHS #1 AND #2



SAVE
ROUTINE NUMBER

LOD A DIGIT FROM
NUMBER 3 AND CONVERT
THIS DIGIT TO A LENGTH
OF 10 TO 100 FOR TCT
STORE IN CONSTANT AREA
GENERATE LENGTH #1
FOR A VALUE OF 0001 TO 0020
BASED ON DIGITS OF #3
IF 8 BIT
ADD 10
STORE IN CONSTANT AREA
GENERATE LENGTH #2
USING SAME SYSTEM
USED FOR GENERATING
LENGTH #1

UNL LNG #2 TO CONSTANT AREA

CHECK ALL LENGTHS
FOR VALID VALUES
ERROR
TCT LENGTH VS 0009

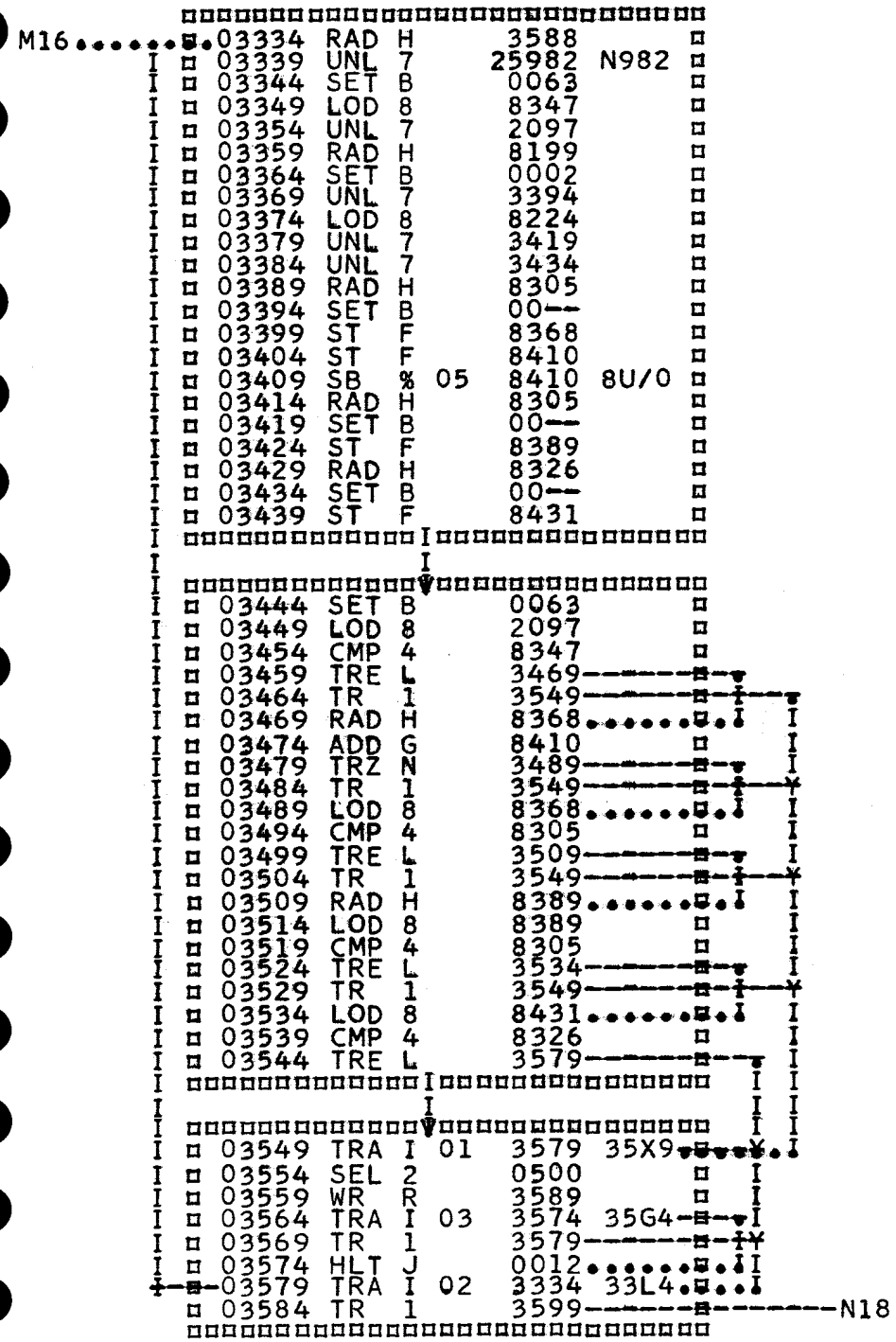
ERROR
RAD LENGTH #1
VS 0020
ERROR
VS 0000

ERROR
LOD LENGTH #2
VS 0020
ERROR
VS 0000

ERROR ROUTINE

```
2 016 03320                XA1&000090020100
2 007 03327                X01A011
2 001 03328                □
```

SECTION 2 GENERATOR
ROUTINE #012
UPDATE ROUTINE #007 AND
MOVE TEST NUMBERS #1 AND #2
TO OTHER LOCATIONS IN THE
CONSTANT AREA. SET SIGNS
AND LENGTHS ON NUMBERS.



SAVE
ROUTINE NUMBER
UPDATE ROUTINE #007
WITH NEW TEST NUMBERS

RAD VALUE OF LENGTH #1

LOD VALUE OF LENGTH #2

SET UP OTHER CONSTANT
VALUES OF TEST NUMBER 1

MAKE SIGN MINUS

SET TO LENGTH #2

SET UP PLUS NUMBER 2

TEST UPDATING OF
ROUTINE #007

ERROR
RAD PLUS #1 OF LENGTH #1
ADD MINUS #1 OF LENGTH #1
TEST ZERO
ERROR
LOD PLUS #1 OF LENGTH #1
CMP VS ORIGINAL #1

ERROR
RAD PLUS #1 OF LENGTH #2
LOD PLUS #1 OF LENGTH #2
CMP VS ORIGINAL #1

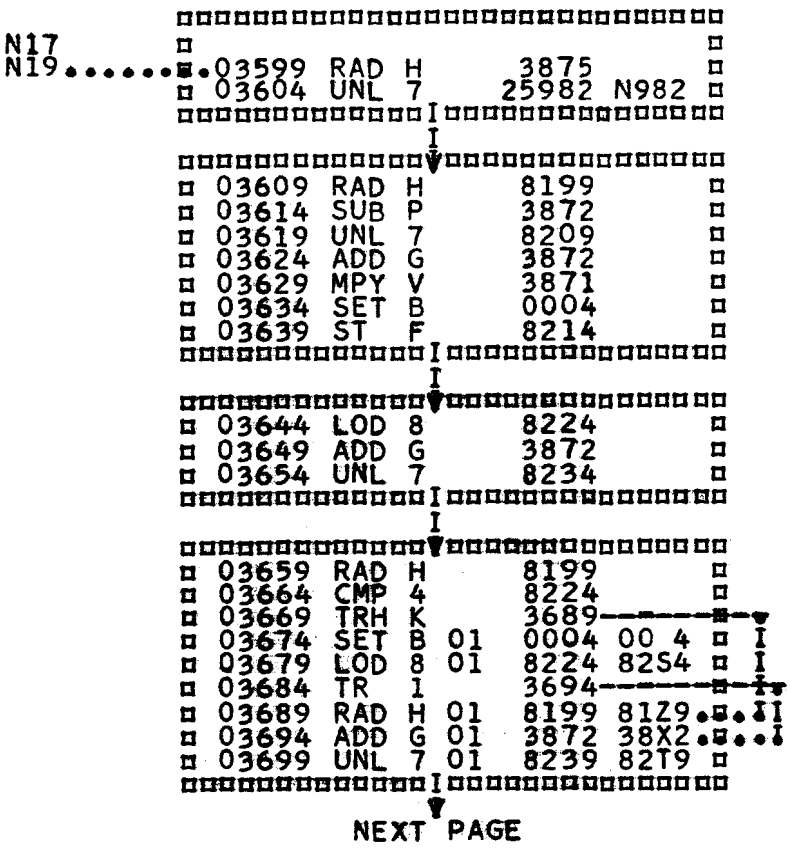
ERROR
LOD PLUS #2 OF LENGTH #2
CMP VS ORIGINAL #2

ERROR ROUTINE

2 007 03591 X01B012
2 001 03592

SECTION 2 GENERATOR
ROUTINE #013
PAGE 1

GENERATE ALL VARIATIONS OF
LENGTH #1 AND #2 IN THE
CONSTANT AREA



SAVE
ROUTINE NUMBER

RAD LENGTH #1
SUBTRACT 1 AND
PLACE IN CONSTANT AREA
ADD 1
MPY BY 5

PLACE IN CONSTANT AREA

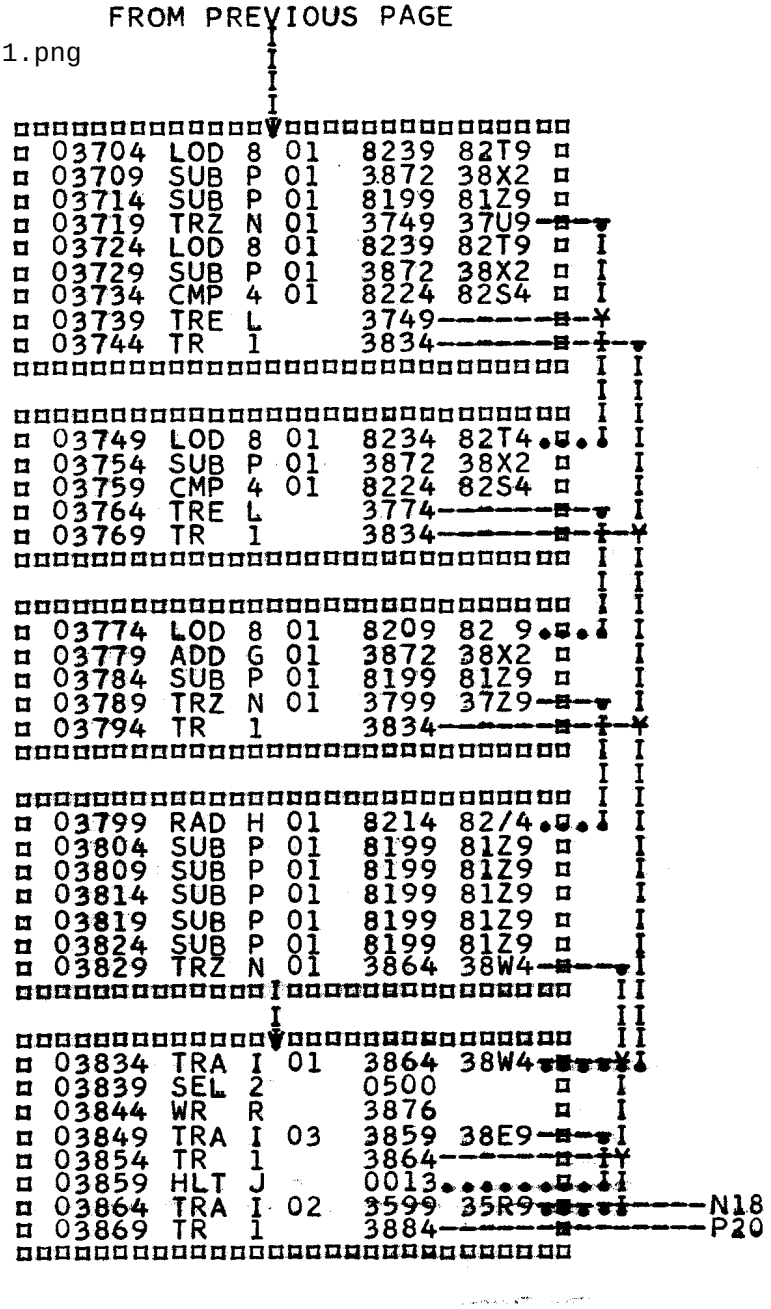
LOD LENGTH #2
ADD 1 AND
PLACE IN CONSTANT AREA

RAD LENGTH #1 AND
CMP VS LENGTH #2
#1 IS HIGH IF TRH

LOD #2

RAD #1
ADD 1 AND
PLACE IN CONSTANT AREA

SECTION 2 GENERATOR
ROUTINE #013
PAGE 2



CHECK LONGEST LENGTH PLUS 1
SUB 1
SUB LENGTH #1

IF NOT ZERO , TRY LENGTH #2
SUB 1
CMP VS LENGTH #2
AND TEST EQUAL
ERROR

CHECK LENGTH #2 PLUS 1
SUB 1
CMP VS LENGTH #2
AND TEST EQUAL
ERROR

CHECK LENGTH #1 MINUS 1
ADD 1
SUB LENGTH #1
TEST ZERO
ERROR

CHECK LENGTH #1 TIMES 5
BY SUBTRACTING
LENGTH #1
FIVE TIMES

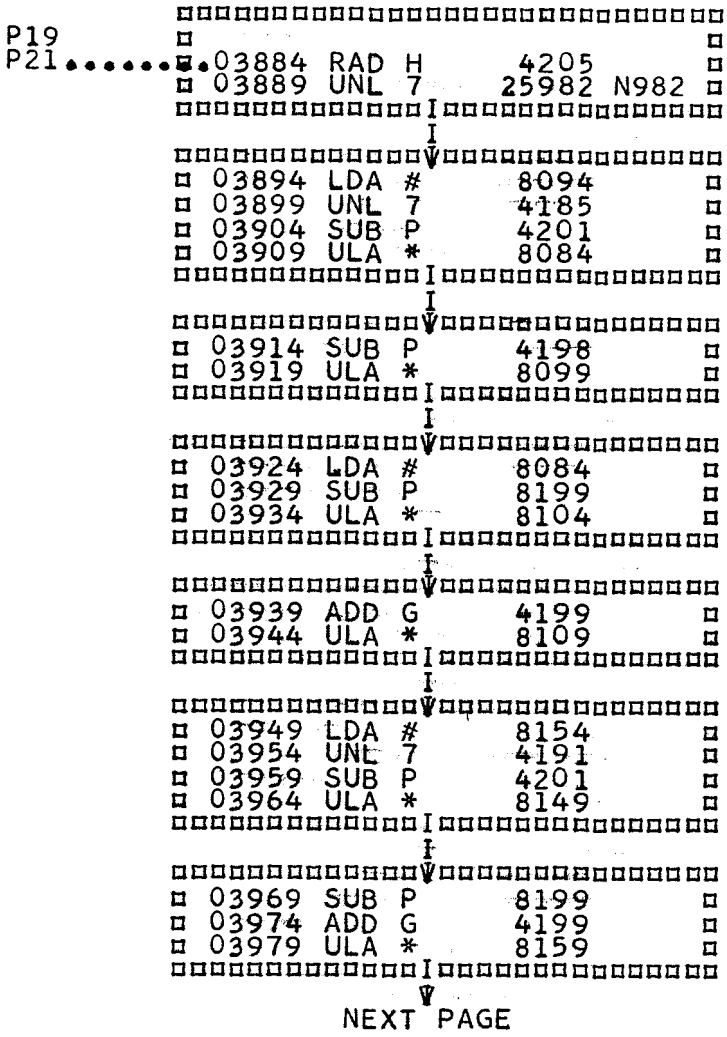
TEST ZERO

ERROR ROUTINE

2 009 03878 XEA01C013
2 001 03879

SECTION 2 GENERATOR
ROUTINE #014
PAGE 1

GENERATE VARIATIONS ON
ADDRESSES #1 AND #2
IN CONSTANT AREA



SAVE
ROUTINE NUMBER

LDA ADDRESS #1 AS SET UP
BY ROUTINE #006 AND SAVE IT
SUB PLUS 5
PUT ADDR. #1 IN CONSTANT AREA

SUB PLUS 255
PLACE ADDR. #1 MINUS 255

LDA ADDRESS #1
SUB LENGTH #1
PLACE ADDR. #1 MINUS LENGTH #1

ADD PLUS 1
PLACE ADDR. #1 - LNG #1 PLUS 1

LDA ADDRESS #2 AS SET UP
BY ROUTINE #006 AND SAVE IT
SUB PLUS 5
PUT ADDR. #2 IN CONSTANT AREA

SUB LENGTH #1
ADD PLUS 1
PLACE ADDR.#2 - LNG #1 PLUS 1

FROM PREVIOUS PAGE

SECTION 2 GENERATOR
ROUTINE #014
PAGE 2

```
 04984 LDA #      8084
 03989 ADD G      4201
 03994 CMP 4      4185
 03999 TRE L      4009
 04004 TR  1      4144

 04009 LDA #      8099
 04014 ADD G      4195
 04019 CMP 4      4185
 04024 TRE L      4034
 04029 TR  1      4144

 04034 LDA #      8104
 04039 ADD G      4201
 04044 ADD G      8199
 04049 CMP 4      4185
 04054 TRE L      4064
 04059 TR  1      4144

 04064 LDA #      8109
 04069 ADD G      4200
 04074 ADD G      8199
 04079 CMP 4      4185
 04084 TRE L      4094
 04089 TR  1      4144

 04094 LDA #      8149
 04099 ADD G      4201
 04104 CMP 4      4191
 04109 TRE L      4119
 04114 TR  1      4144

 04119 LDA #      8159
 04124 ADD G      4200
 04129 ADD G      8199
 04134 CMP 4      4191
 04139 TRE L      4174

 04144 TRA I 01   4174 41X4
 04149 SEL 2      0500
 04154 WR  R      4206
 04159 TRA I 03   4169 41F9
 04164 TR  1      4174
 04169 HLT J      0014
 04174 TRA I 02   3884 38Q4
 04179 TR  1      4214
```

CHECK GENERATED ADDRESSES
ADD 5 AND
CMP VS SAVED VALUE

ERROR

LDA ADDR. #1 MINUS 255
ADD 260

ERROR

LDA ADDR. #1 MINUS LNG #1
ADD 5
ADD LENGTH #1

ERROR

LDA ADDR. #1 - LNG #1 PLUS 1
ADD 4
ADD LENGTH #1

ERROR

LDA ADDRESS #2
ADD 5 AND
CMP VS SAVED VALUE

ERROR

LDA ADDR. #2 - LNG #1 PLUS 1
ADD 4
ADD LENGTH #1

ERROR ROUTINE

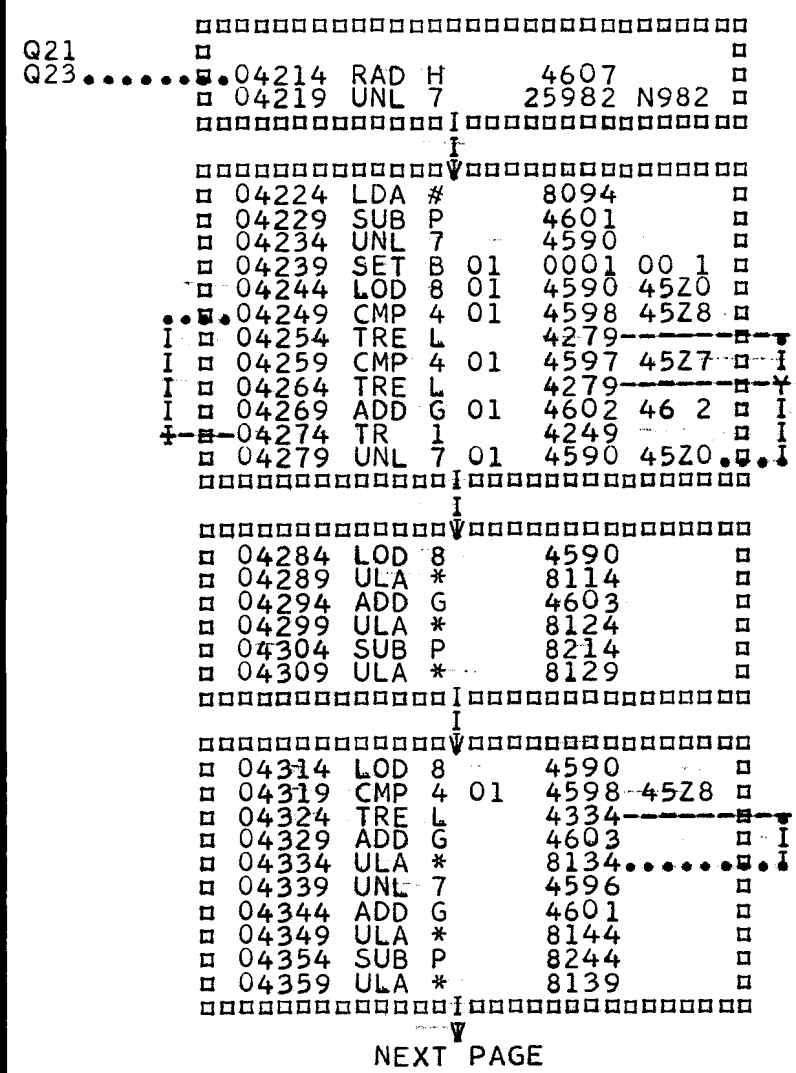
P20

Q22

```
2 006 04185                 000000 SAVED VALUE OF ADDRESS #1 PLUS 5
2 006 04191                 000000 SAVED VALUE OF ADDRESS #2 PLUS 5
2 010 04201                 X26&25EADE
2 007 04208                 X01D014
2 001 04209                 
```

SECTION 2 GENERATOR
ROUTINE #015
PAGE 1

GENERATE ALL 4/9 VARIATIONS
OF ADDRESS #1 IN CONSTANT
AREA



SAVE
ROUTINE NUMBER

LDA ADDRESS #1 PLUS 5
SUB 10
AND SAVE IT

LOD UNITS DIGIT
CMP VS 9

CMP VS 4

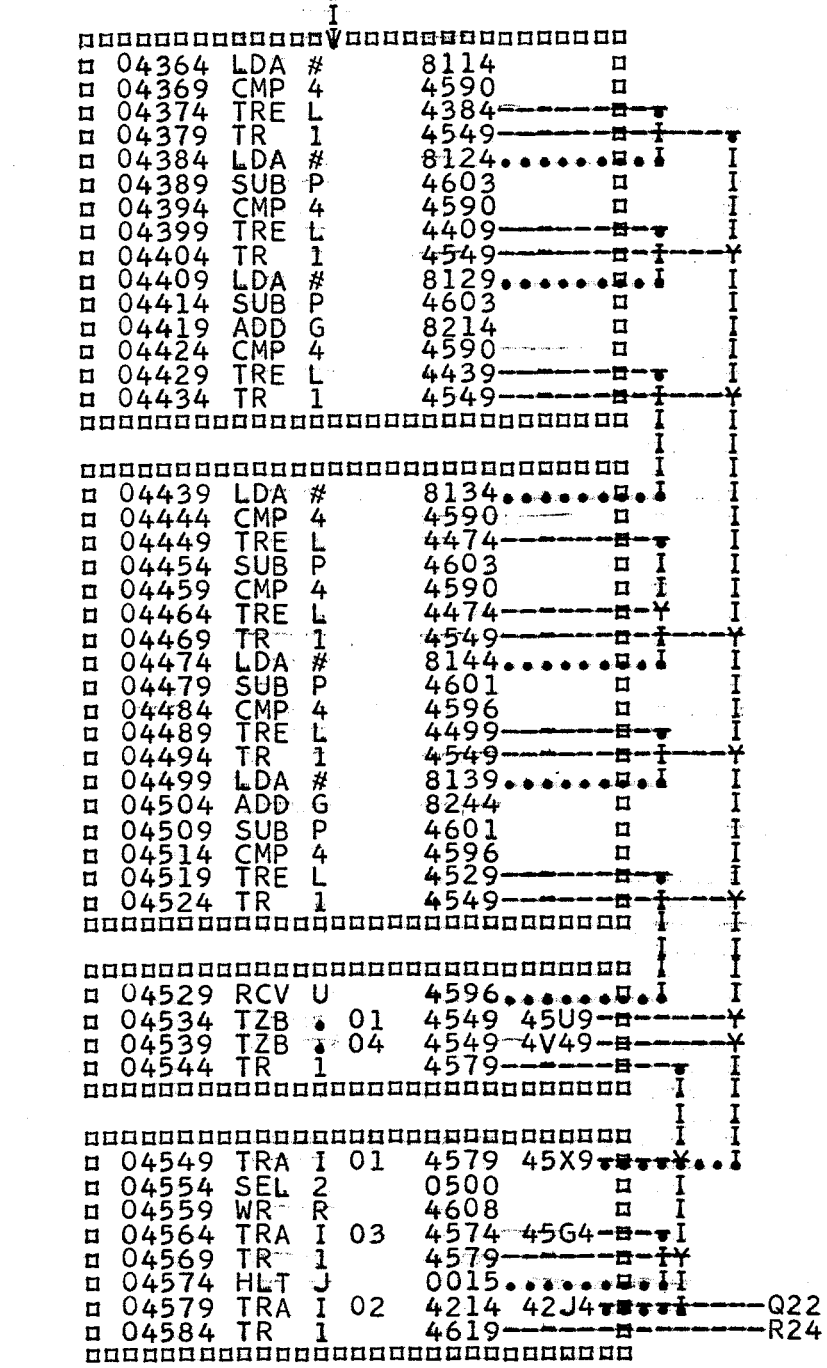
ADD 1

UNL UNITS DIGIT 4/9

LOD 4/9 ADDRESS AND
PLACE IN CONSTANT AREA
ADD 5 AND PLACE ADDRESS #1
PLUS 5, IN CONSTANT AREA
SUB LENGTH #1 TIMES 5
PLACE ADDR. #1 FOR SND/TMT LOC

CMP UNITS DIGIT VS 9

ADD 5 TO GET 9 LOCATION
ULA ADDR. #1 FOR TCT LOCATION
AND SAVE IT
ADD 10
ULA TCT LOC. PLUS 10
SUB LENGTH OF TCT FIELD
ULA TCT LOC. LEFT END



```
04364 LDA #   8114
04369 CMP 4   4590
04374 TRE L   4384
04379 TR  1   4549
04384 LDA #   8124
04389 SUB P   4603
04394 CMP 4   4590
04399 TRE L   4409
04404 TR  1   4549
04409 LDA #   8129
04414 SUB P   4603
04419 ADD G   8214
04424 CMP 4   4590
04429 TRE L   4439
04434 TR  1   4549

04439 LDA #   8134
04444 CMP 4   4590
04449 TRE L   4474
04454 SUB P   4603
04459 CMP 4   4590
04464 TRE L   4474
04469 TR  1   4549
04474 LDA #   8144
04479 SUB P   4601
04484 CMP 4   4596
04489 TRE L   4499
04494 TR  1   4549
04499 LDA #   8139
04504 ADD G   8244
04509 SUB P   4601
04514 CMP 4   4596
04519 TRE L   4529
04524 TR  1   4549

04529 RCV U   4596
04534 TZB . 01 4549 45U9
04539 TZB . 04 4549 4V49
04544 TR  1   4579

04549 TRA I 01 4579 45X9
04554 SEL 2   0500
04559 WR  R   4608
04564 TRA I 03 4574 45G4
04569 TR  1   4579
04574 HLT J   0015
04579 TRA I 02 4214 42J4 ----Q22
04584 TR  1   4619 ------R24
```

CHECK ADDRESSES GENERATED

ERROR
LDA ADDR. #1 4/9 PLUS 5
SUB 5

ERROR
LDA ADDR. #1 FOR SND/TMT
SUB 5
ADD LENGTH #1 TIMES 5

ERROR

LDA ADDR. #1 TCT LOCATION

IF NOT EQUAL, SUB 5
AND CMP AGAIN

ERROR
LDA ADDR.#1 TCT LOC. PLUS 10
SUB 10

ERROR
LDA TCT LOC. LEFT END
ADD TCT LENGTH
SUB 10

ERROR

TEST TCT LOCATION
FOR 9 IN UNITS DIGIT

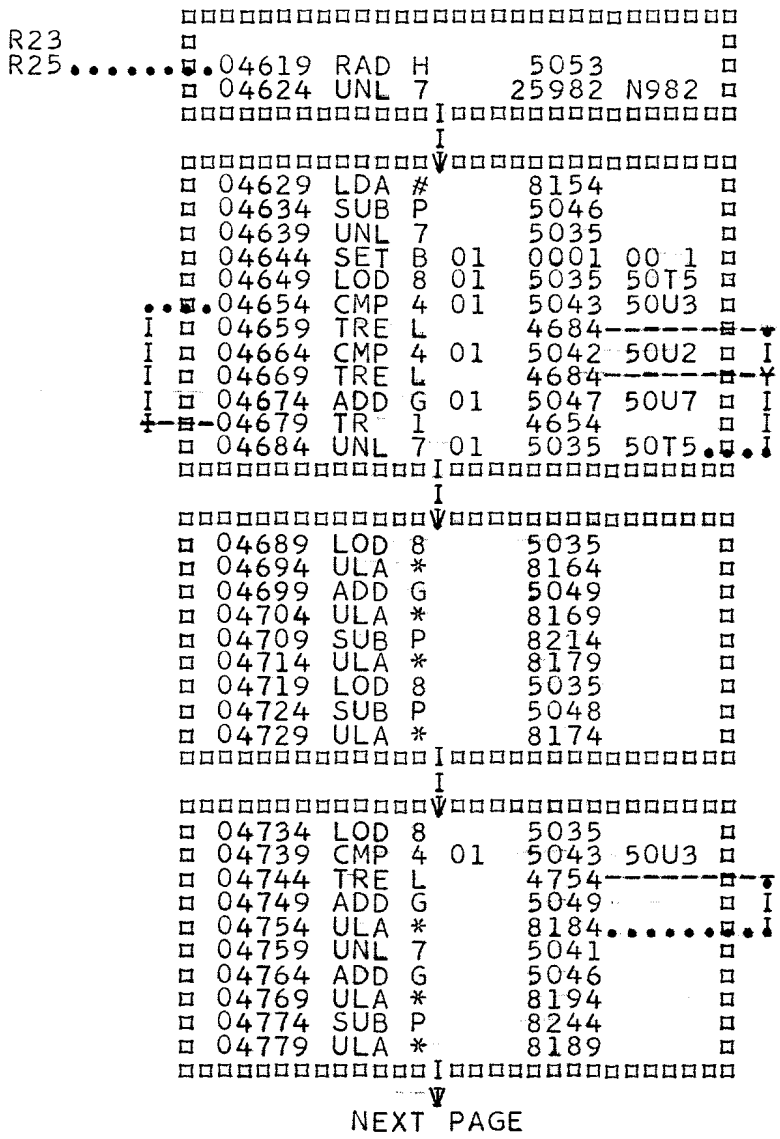
ERROR ROUTINE

CONSTANTS AND SAVE AREA

```
2 006 04590   000000 SAVE AREA FOR ADDRESS #1 4/9
2 006 04596   000000 SAVE AREA FOR ADDRESS #1 9
2 007 04603   49X1&AE
2 007 04610   X01E015
2 001 04611   □
```

SECTION 2 GENERATOR
ROUTINE #016
PAGE 1

GENERATE ALL 4/9 VARIATIONS
OF ADDRESS #2
IN CONSTANT AREA



NEXT PAGE

SAVE
ROUTINE NUMBER

LDA ADDR. #2 PLUS 5 AS SET UP
IN ROUTINE #006, SUB 10
AND SAVE IT

LOD UNITS DIGIT
AND CMP VS 9

CMP VS 4

ADD 1

UNL UNITS DIGIT 4/9

LOD 4/9 ADDRESS AND
PLACE IN CONSTANT AREA
ADD 5
PLACE ADDR. #2 4/9 PLUS 5
SUB LENGTH #1 TIMES 5
PLACE ADDR. #2 FOR RCV-TMT/SND

SUB 3
PLACE ADDR. #2 1/6 LOCATION

CMP UNITS VS 9

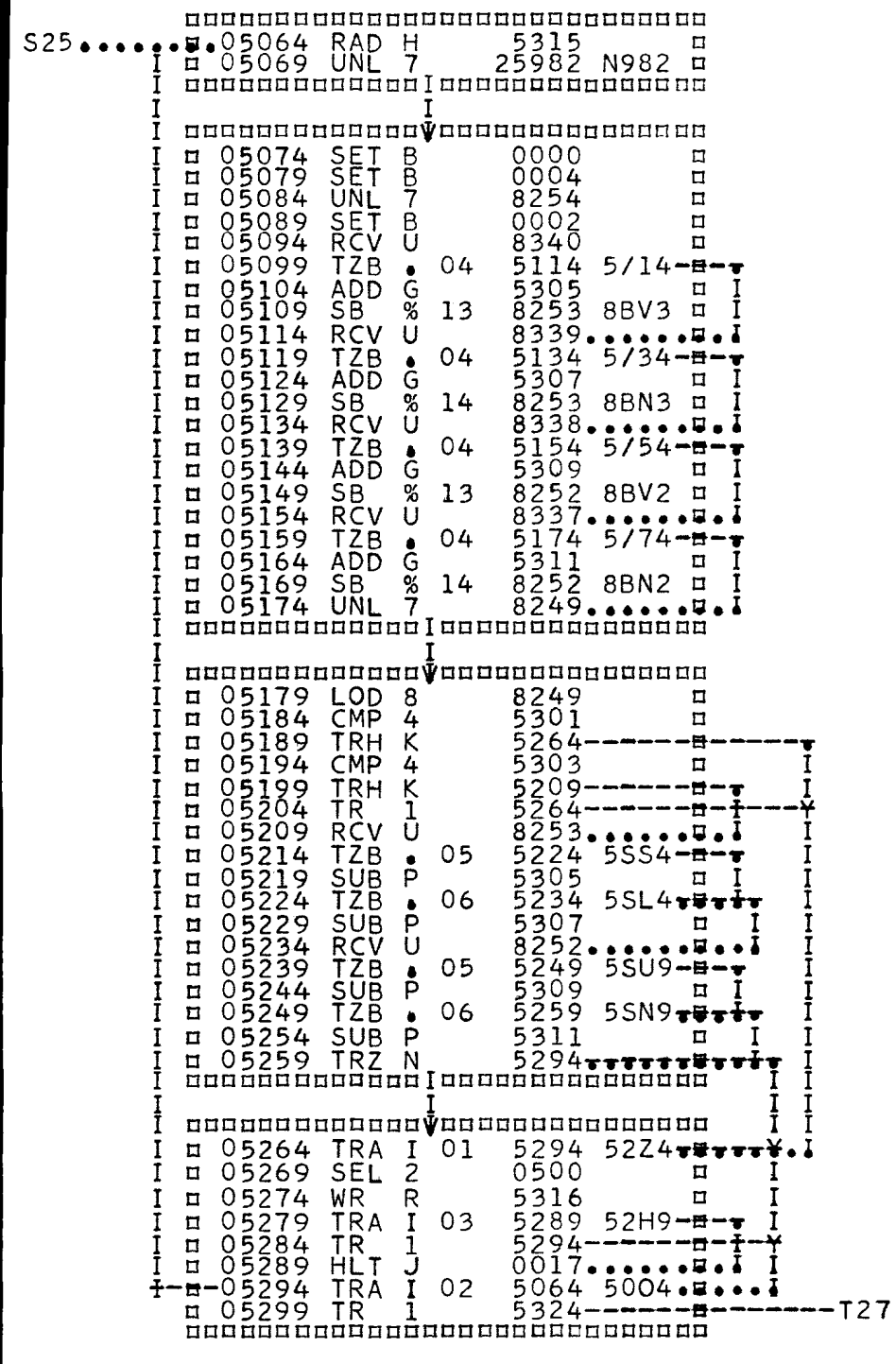
ADD 5 TO GET 9 LOCATION
ULA ADDR. #2 FOR TCT LOC.
AND SAVE IT
ADD 10
ULA TCT LOC. PLUS 10
SUB LENGTH OF TCT FIELD
ULA RCV LOC. FOR TCT

```
                                                    SECTION 2 GENERATOR
                                                         ROUTINE #016
                                                         PAGE 2
 04784 LDA #      8164                              CHECK ADDRESSES GENERATED
 04789 CMP 4      5035
 04794 TRE L      4804
 04799 TR  1      4994                              ERROR
 04804 LDA #      8169                              LDA ADDR. #2 4/9 PLUS 5
 04809 SUB P      5049                              SUB 5
 04814 CMP 4      5035
 04819 TRE L      4829
 04824 TR  1      4994                              ERROR
 04829 LDA #      8179                              LDA ADDR. #2 FOR RCV-TMT/SND
 04834 ADD G      8214                              ADD LENGTH #1 TIMES 5
 04839 SUB P      5049                              SUB 5
 04844 CMP 4      5035
 04849 TRE L      4859
 04854 TR  1      4994                              ERROR
 04859 LDA #      8174                              LDA ADDR. #2 1/6 LOCATION
 04864 ADD G      5048                              ADD 3
 04869 CMP 4      5035
 04874 TRE L      4884
 04879 TR  1      4994                              ERROR

 04884 LDA #      8184                              LDA ADDR. #2 TCT LOCATION
 04889 CMP 4      5035
 04894 TRE L      4919
 04899 SUB P      5049                              IF NOT EQUAL, SUB 5
 04904 CMP 4      5035                              AND CMP AGAIN
 04909 TRE L      4919
 04914 TR  1      4994                              ERROR
 04919 LDA #      8194                              LDA ADDR. #2 TCT LOC. PLUS 10
 04924 SUB P      5046                              SUB 10
 04929 CMP 4      5041
 04934 TRE L      4944
 04939 TR  1      4994                              ERROR
 04944 LDA #      8189                              LDA RCV LOC. FOR TCT
 04949 ADD G      8244                              ADD LENGTH OF TCT FIELD
 04954 SUB P      5046                              SUB 10
 04959 CMP 4      5041
 04964 TRE L      4974
 04969 TR  1      4994                              ERROR

 04974 RCV U      5041                              TEST TCT LOCATION
 04979 TZB . 01   4994 49Z4                        FOR A 9 IN UNITS DIGITS
 04984 TZB . 04   4994 4Z94
 04989 TR  1      5024

 04994 TRA I 01   5024 50S4                         ERROR ROUTINE
 04999 SEL 2      0500
 05004 WR  R      5054
 05009 TRA I 03   5019 50A9
 05014 TR  1      5024
 05019 HLT J      0016
 05024 TRA I 02   4619 46J9                   ----R24
 05029 TR  1      5064                        -------S26
```

CONSTANTS AND SAVE AREA

```
2 006 05035                 000000 SAVE AREA FOR ADDRESS #2 4/9
2 006 05041                 000000 SAVE AREA FOR ADDRESS #2 9
2 008 05049                 49X1&ACE
2 007 05056                 X01F016
2 001 05057                 □
```

SECTION 2 GENERATOR
ROUTINE #017
GENERATE AN ASU NUMBER
AND CORRESPONDING ZONES IN
THE CONSTANT AREA BASED ON
8 BITS IN 4 DIGITS OF TEST #3



SAVE
ROUTINE NUMBER

CLEAR
OLD ASU BITS

RCV AT A DIGIT OF TEST #3
AND INTERROGATE 8 BIT
ADD 01
SET UP A BIT ON CHAR. 3

ADD 02
SET UP B BIT ON CHAR. 3

ADD 04
SET UP A BIT ON CHAR. 2

ADD 08
SET UP B BIT ON CHAR. 2
UNL ASU NUMBER

CHECK ASU NUMBER
FOR VALID VALUE, CMP VS 15
ERROR
VS 0Z

ERROR
MATCH ASU BITS AGAINST
ASU NUMBER
SUB 01

SUB 02

SUB 04

SUB 08
TEST ZERO

ERROR ROUTINE

CONSTANTS

```
2 012 05311                150Z0A0B0D0H
2 007 05318                X01G017
2 001 05319                □
```

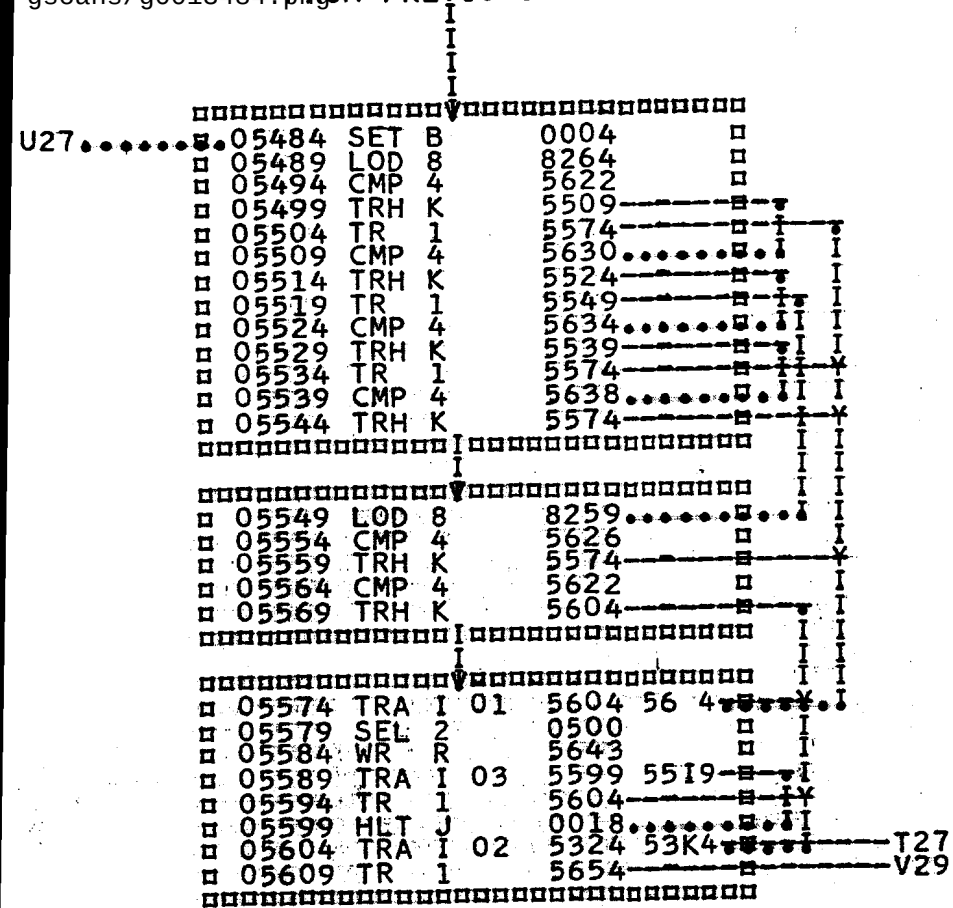
SECTION 2 GENERATOR
ROUTINE #018
PAGE 1

GENERATE AN SPC SETTING IN BANK 0 AND A LIP ADDRESS FOR USE IN ROUTINE #071. CWS 3700 AND 2500 ARE EXCLUDED IN THE LIP ADDRESS

```
T26
T28 ......05324 RAD H      5642              SAVE
          05329 UNL 7      25982 N982        ROUTINE NUMBER

          05334 SET B      0001              LOD A DIGIT FROM TEST #3
          05339 LOD 8      8336              AND MAKE IT EQUAL OR LESS
          05344 SUB P      5613              THAN 7 BY SUBTRACTING 2
          05349 UNL 7      8259              UNL TO SPC CHAR
          05354 UNL 7      8262              UNL TO LIP WORD SET

          05359 LOD 8      8335              LOD ANOTHER DIGIT FROM #3
          05364 SUB P      5613              SUB 2
          05369 UNL 7      8257              UNL TO SPC WORD SET

          05374 LOD 8      8334              LOD A DIGIT FROM TEST #3
          05379 CMP 4      5615              AND MAKE IT EQUAL OR LESS
          05384 TRH K      5394              THAN 3 BY COMPARING
          05389 TR  1      5399              VERSUS A 3 AND SUBTRACTING
          05394 SUB P      5614              7 IF NEEDED
          05399 UNL 7      8258              UNL TO SPC WORD
          05404 UNL 7      8261              UNL TO LIP BANK

          05409 LOD 8      8333              LOD ANOTHER DIGIT FROM #3
          05414 CMP 4      5615              AND MAKE IT EQUAL OR LESS
          05419 TRH K      5429              THAN 3
          05424 TR  1      5434
          05429 SUB P      5614
          05434 UNL 7      8263              UNL TO LIP WORD

          05439 SET B      0002              LOD THE LIP ADDRESS
          05444 LOD 8      8262              BANK AND WORD SET DIGITS
          05449 CMP 4      5616              VS 37
          05454 TRE L      5474
          05459 CMP 4      5618              VS 25
          05464 TRE L      5474
          05469 TR  1      5484 ------ U28
          05474 SUB P      5612              SUB 01 AND
          05479 UNL 7      8262              REPLACE
```

NEXT PAGE

SECTION 2 GENERATOR
ROUTINE #018
PAGE 2



CHECK LIP ADDRESS

CMP VS 000Z

ERROR
CMP VS 2499

CMP VS 2530

ERROR
CMP VS 3630
ERROR

CHECK SPC ADDRESS
CMP VS 0737
ERROR
CMP VS 000Z

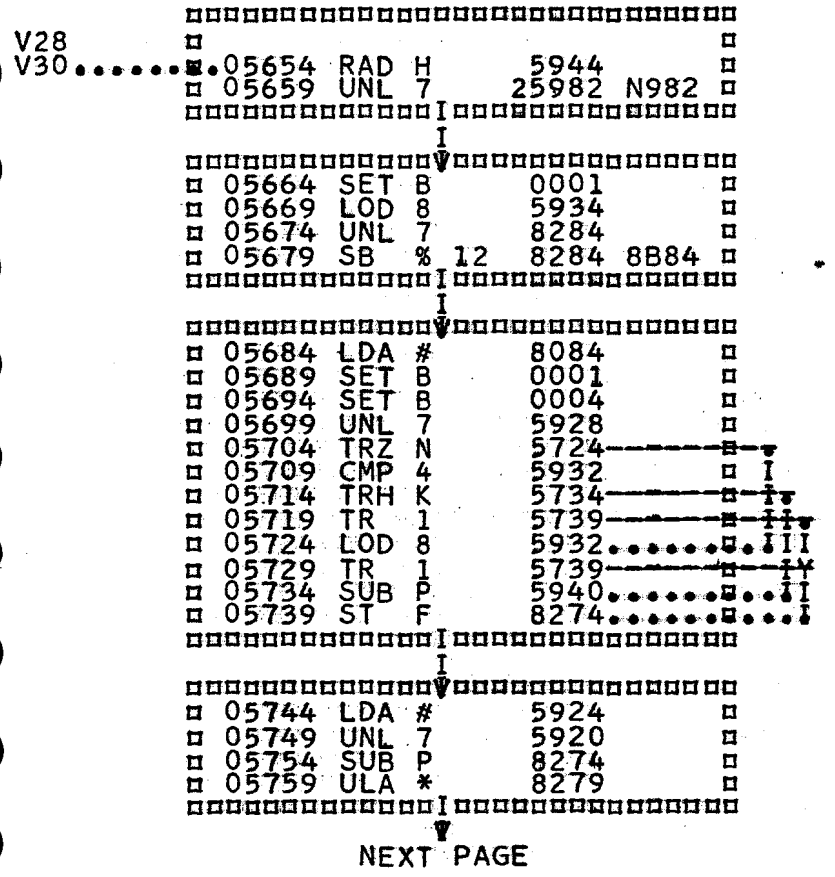
ERROR ROUTINE

CONSTANTS

2 009 05618 X0ABG3725
2 008 05626 000Z0737
2 012 05638 249925303630
2 007 05645 X01H018
2 001 05646

SECTION 2 GENERATOR
ROUTINE #019
PAGE 1

A. GENERATE AND TEST A DILROY
B. GENERATE A DIGIT ACCORDING TO UNITS OF ADDRESS #1 FOR NUMBER OF LFC/UFC CHARACTERS
C. GENERATE SPECIAL ADDRESS USED IN LFC/UFC



SAVE ROUTINE NUMBER

LOD F AND GENERATE A DILROY IN CONSTANT AREA

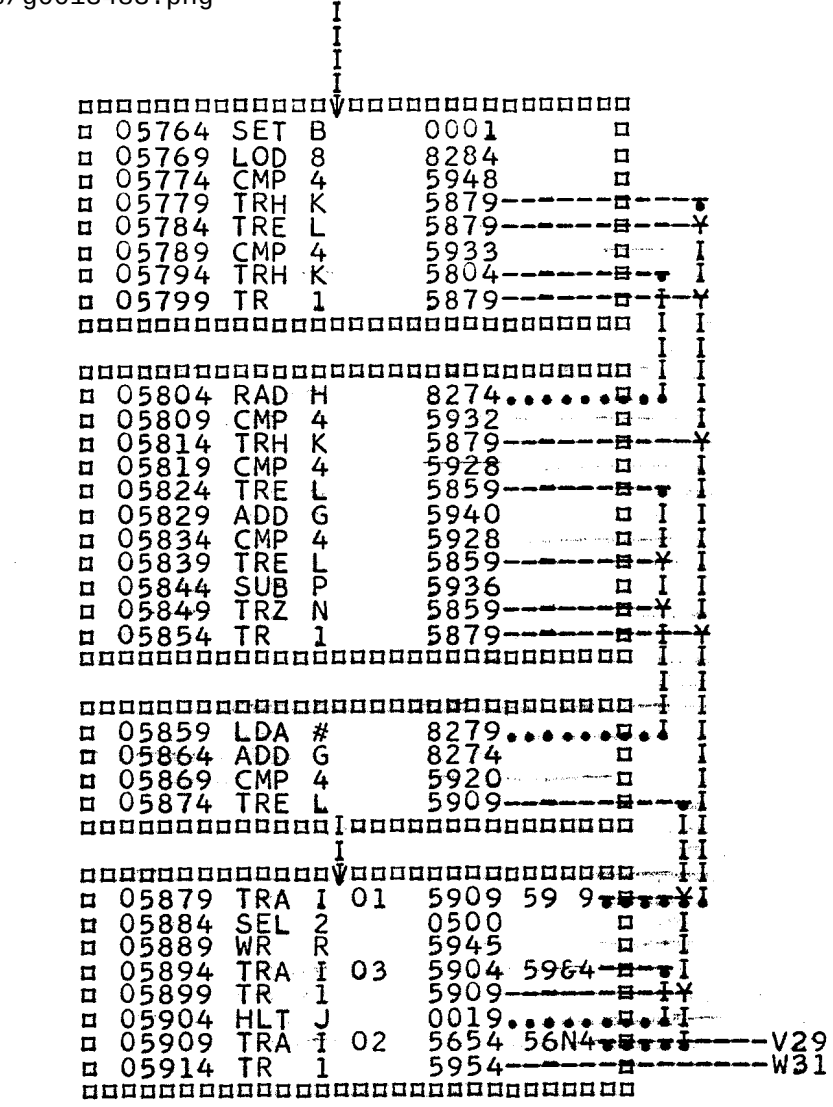
GENERATE # OF CHAR. DIGIT FOR LFC/UFC
SAVE UNIT DIGIT OF ADDR. #1
TEST DIGIT EQUAL ZERO
CMP VS 0005

IF UNITS OF ADDR. #1 IS ZERO
LOD A 5
SUB 5 IF NEEDED
STORE IN CONSTANT AREA

LDA LOCATION OF TEST FIELD
SAVE IT
SUB # CHAR. OF LFC/UFC
ULA RESULT TO CONSTANT AREA

FROM PREVIOUS PAGE

SECTION 2 GENERATOR
ROUTINE #019
PAGE 2



TEST GENERATED DILROY

COMPARE VS GROUP MARK
ERROR
ERROR
COMPARE VS LOZENGE

ERROR

TEST # OF CHAR. IN LFC/UFC
CMP VS 0005
ERROR
VS UNITS ADDRESS #1

IF NOT EQUAL, ADD 5,
AND CMP AGAIN

IF NOT EQUAL , SUB 10
AND TEST ZERO
ERROR

TEST GENERATED ADDRESS

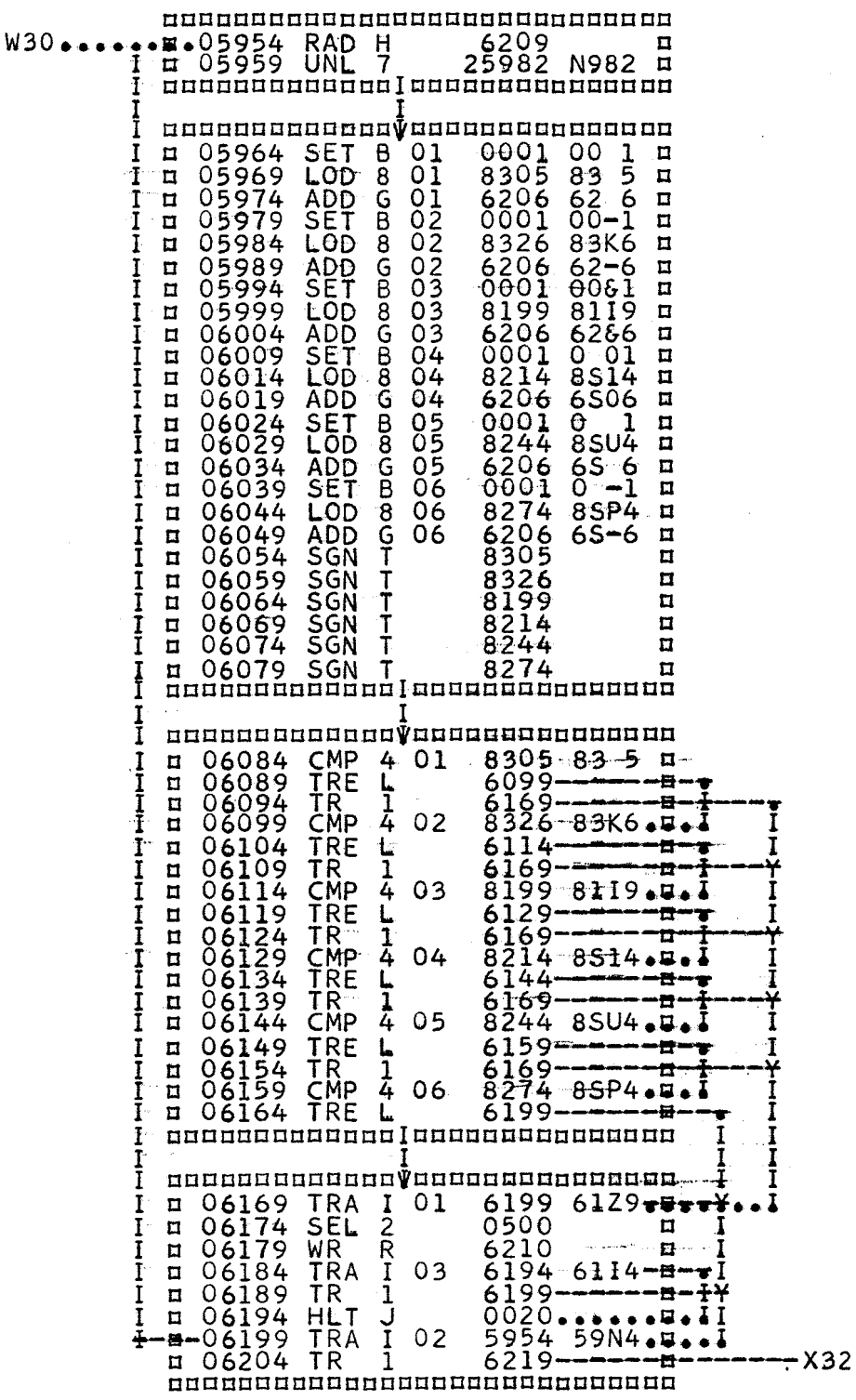
ERROR ROUTINE

CONSTANTS AND SAVE AREAS

```
2 006 05920                    000000 SAVE AREA
3     05924      8721 8721
2 004 05928                    0000 SAVE AREA
2 012 05940                    0005□F1&000E
2 007 05947                    X01I019
2 001 05948                    □
```

g ns/g0013377.png

SECTION 2 GENERATOR
ROUTINE #020
STRIP SIGNS ON ADDRESSES
IN CONSTANT AREA THAT WERE
SIGNED DURING GENERATION



2 008 06212 X&02&020
2 001 06213 ¤

gscans/g0013482.png

SECTION 2 GENERATOR
ROUTINE #021
PAGE 1

PLACE ASU BITS ON ADDRESS #1, ADDRESS #1 4/9, LENGTH #1 AND LENGTH #2, ALL OF WHICH ARE IN THE CONSTANT AREA.
SET UP SELECT ADDRESS

```
X31
X33.....06219 RAD H      6538
        06224 UNL 7     25982 N982
```

SAVE
ROUTINE NUMBER

```
        06229 SET B      0004
        06234 LOD 8      8084
        06239 UNL 7      8089
        06244 LOD 8      8114
        06249 UNL 7      8119
        06254 LOD 8      8199
        06259 UNL 7      8204
        06264 LOD 8      8224
        06269 UNL 7      8229
```

MOVE STRAIGHT ADDRESSES
TO ADDRESS PLUS ASU
LOCATIONS

```
        06274 LOD 8      8305
        06279 UNL 7      8269
```

LOD 4 DIGITS OF TEST NUMBER 1
UNL TO SELECT ADDRESS

```
        06284 SET B      0002
        06289 LOD 8      8253
        06294 ADM 6      8088
        06299 ADM 6      8118
        06304 ADM 6      8203
        06309 ADM 6      8228
```

PICK UP ASU BITS
AND ADM TO EACH ADDRESS

NEXT PAGE

SECTION 2 GENERATOR
ROUTINE #021
PAGE 2

```
06314 SET B      0004
06319 LOD 8      8254
06324 UNL 7      6519
06329 UNL 7      6524
06334 UNL 7      6529
06339 UNL 7      6534
```

TEST THE COMBINATIONS OF ASU BITS AND ADDRESSES
PRESET
SAVE AREAS
WITH ASU
BITS

```
06344 LDA # 01   8084 80Y4
06349 ULA * 01   6519 65J9
06354 LDA # 02   8114 81J4
06359 ULA * 02   6524 65K4
06364 LDA # 03   8199 81I9
06369 ULA * 03   6529 65B9
06374 LDA # 04   8224 8S24
06379 ULA * 04   6534 6V34
```

ADDRESS #1
ADDRESS #1 4/9
LENGTH #1
LENGTH #2

```
06384 LOD 8      6519
06389 CMP 4      8089
06394 TRE L      6404 ------> 06404
06399 TR  1      6479 ------> 06479
```

COMPARE THE TWO SETS OF ADDRESSES PLUS ASU
ERROR

```
06404 LOD 8      6524
06409 CMP 4      8119
06414 TRE L      6424 ------> 06424
06419 TR  1      6479 ------> 06479
```

ERROR

```
06424 LOD 8      6529
06429 CMP 4      8204
06434 TRE L      6444 ------> 06444
06439 TR  1      6479 ------> 06479
```

ERROR

```
06444 LOD 8      6534
06449 CMP 4      8229
06454 TRE L      6464 ------> 06464
06459 TR  1      6479 ------> 06479
```

ERROR

```
06464 LOD 8      8269
06469 CMP 4      8305
06474 TRE L      6509 ------> 06509
```

CHECK SELECT ADDRESS

```
06479 TRA I 01   6509 65 9 ------> 06509
06484 SEL 2      0500
06489 WR  R      6539
06494 TRA I 03   6504 65&4 ------> 06504
06499 TR  1      6509 ------> 06509
06504 HLT J      0021
06509 TRA I 02   6219 62J9 ------> X32
06514 TR  1      6549 ------> Y34
```

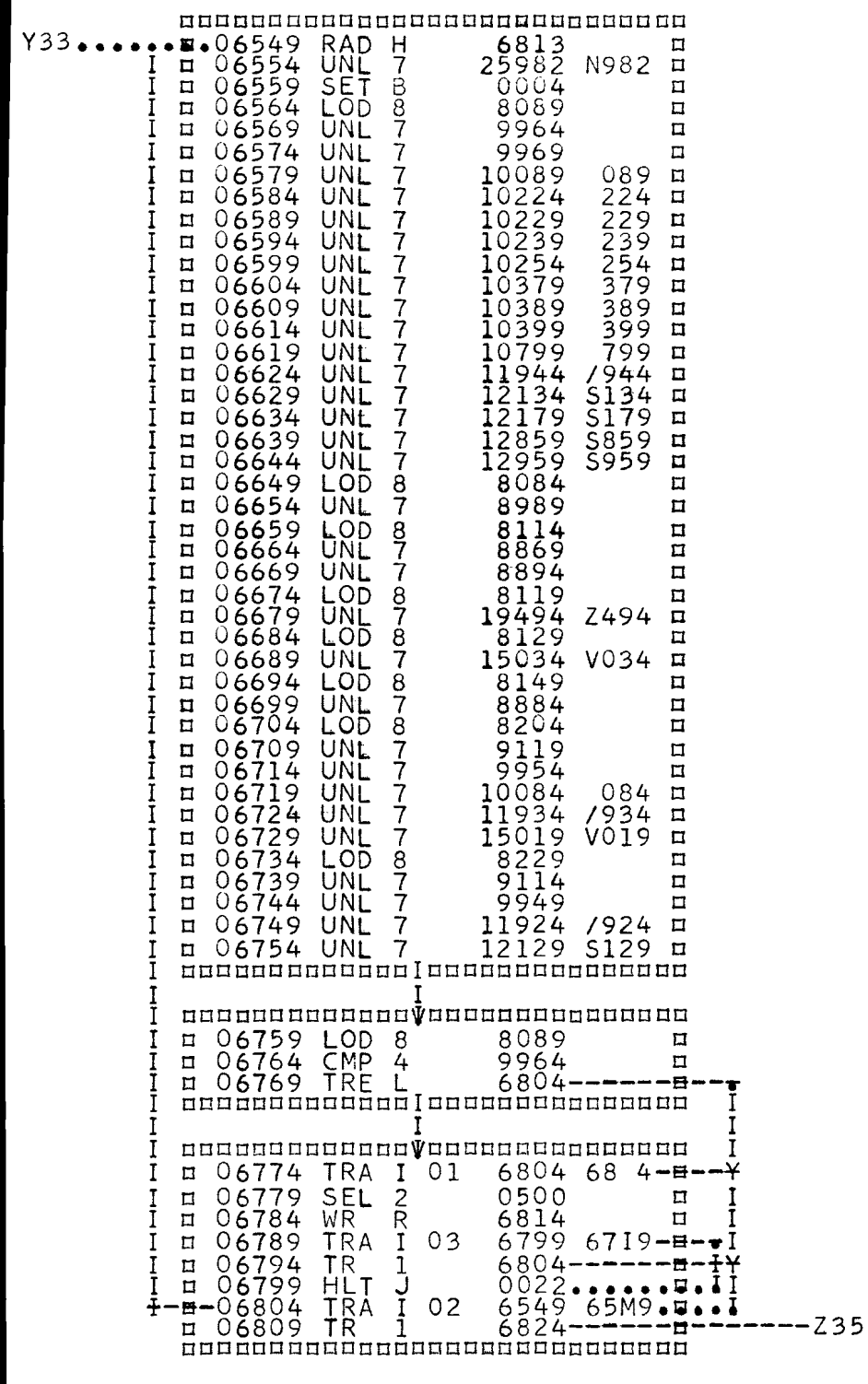
ERROR ROUTINE

CONSTANTS AND SAVE ARE&

```
2 020 06534      X0000X0000X0000X0000
2 007 06541      X02A021
2 001 06542
```

SECTION 3 SET UP
ROUTINE #022

MOVE ADDRESSES FROM CONSTANT AREA TO TEST ROUTINES. CHECK FIRST ADDRESS MOVED ONLY.



SAVE
ROUTINE NUMBER

LOD ADDRESS #1 WITH ASU
TO ROUT. #036
TO ROUT. #036
TO ROUT. #037
TO ROUT. #038
TO ROUT. #038
TO ROUT. #038
TO ROUT. #038
TO ROUT. #039
TO ROUT. #039
TO ROUT. #039
TO ROUT. #041
TO ROUT. #047
TO ROUT. #048
TO ROUT. #048
TO ROUT. #053
TO ROUT. #054
LOD ADDRESS #1 , NO ASU
TO ROUT. #031
LOD ADDRESS #1 4/9
TO ROUT. #030
TO ROUT. #030
LOD ADDRESS #1 4/9 WITH ASU
TO ROUT. #076
LOD ADDR. #1 SND/TMT LOC.
TO ROUT. #064
LOD ADDRESS #2 NO ASU
TO ROUT. #030
LOD LENGTH #1 WITH ASU
TO ROUT. #032
TO ROUT. #036
TO ROUT. #037
TO ROUT. #047
TO ROUT. #064
LOD LENGTH #2 WITH ASU
TO ROUT. #032
TO ROUT. #036
TO ROUT. #047
TO ROUT. #048

SPOT CHECK FIRST
ADDRESS MOVED

ERROR ROUTINE

2 007 06816 X02B022
2 001 06817

SECTION 2 SET UP
ROUTINE #023
SET UP ASU BITS ON VARIOUS ADDRESSES IN THE TEST ROUTINES IN SECTION 4. SPOT CHECK THE SET UP

```
Z34.....  06824 RAD H     7113
          06829 UNL 7    25982 N982
                    I
                    V
          06834 SET B 01  0002 00 2
          06839 LOD 8 01  8253 82V3
          06844 SGN T     9943
          06849 SGN T     9942
          06854 ADM 6 01  9943 99U3
          06859 SET B 02  0004 00-4
          06864 LOD 8 02  9944 99M4
          06869 UNL 7 02 12124 S1K4
          06874 UNL 7 02 12849 S8M9
          06879 UNL 7 02 12949 S9M9
          06884 UNL 7 02 19489 Z4Q9
          06889 SGN T     9958
          06894 SGN T     9957
          06899 ADM 6 01  9958 99V8
          06904 LOD 8 02  9959 99N9
          06909 UNL 7 02 11929 /9K9
          06914 SGN T     9108
          06919 SGN T     9107
          06924 ADM 6 01  9108 91 8
          06929 LOD 8 02  9109 91-9
          06934 UNL 7 02 11939 /9L9
          06939 UNL 7 02 12164 S1O4
          06944 UNL 7 02 12194 S1R4
          06949 SGN T     9128
          06954 SGN T     9127
          06959 ADM 6 01  9128 91S8
          06964 LOD 8 02  9129 91K9
          06969 UNL 7 02 10794  7R4
          06974 SGN T     9143
          06979 SGN T     9142
          06984 ADM 6 01  9143 91U3
          06989 LOD 8 02  9144 91M4
          06994 UNL 7 02 10079  0P9
          06999 SGN T    12853 S853
          07004 SGN T    12852 S852
          07009 ADM 6 01 12853 S8V3
          07014 LOD 8 02 12854 S8N4
          07019 UNL 7 02 12864 S8O4
          07024 UNL 7 02 12954 S9N4
          07029 UNL 7 02 12964 S9O4
                    I
                    V
          07034 LOD 8 02  8254 82N4
          07039 UNL 7 02  7109 71-9
          07044 LDA #    19489 Z489
          07049 ULA *     7109
          07054 LOD 8 02  7109 71-9
          07059 CMP 4 02 19489 Z4Q9
          07064 TRE L     7099------.---.
                    I                   I
                    V                   I
          07069 TRA I 01  7099 70Z9---.---X
          07074 SEL 2     0500        .   I
          07079 WR  R     7114        .   I
          07084 TRA I 03  7094 70I4---.---I
          07089 TR  1     7099------.---I-X
          07094 HLT J     0023.....:...I I
          07099 TRA I 02  6824 68K4.:...I I
          07104 TR  1     7124------.-------AA37
```

SAVE
ROUTINE NUMBER

PICK UP
ASU BITS
STRIP OFF
OLD ASU BITS AND
ADM TO ADDRESS IN ROUT. #036

TO ROUT. #048
TO ROUT. #053
TO ROUT. #054
TO ROUT. #076

IN ROUT. #036

TO ROUT. #047

IN ROUT. #032

TO ROUT. #047
TO ROUT. #048
TO ROUT. #048

IN ROUT. #032

TO ROUT. #041

IN ROUT. #032

TO ROUT. #037

IN ROUT. #053

TO ROUT. #053
TO ROUT. #054
TO ROUT. #054

TEST FIRST COMBINATION
UNL ASU BITS

ULA UNDER ASU BITS
LOD COMBINATION AND
COMPARE VS ADM COMBINATION

ERROR ROUTINE

```
2 005 07109          X0000
2 007 07116          X02C023
2 001 07117          □
```

g ns/g0013380.png

SECTION 3 SET UP
ROUTINE #024

SET UP ASU BITS ON VARIOUS ADDRESSES IN THE TEST ROUTINES OF SECTION 4. SPOT CHECK THE SETUP.

```
AA35.....07124 RAD H      7373
        I 07129 UNL 7    25982 N982
        I
        I
        I 07134 SET B 01   0002 00 2
        I 07139 LOD 8 01   8253 82V3
        I 07144 SGN T      9938
        I 07149 SGN T      9937
        I 07154 ADM 6 01   9938 99T8
        I 07159 SET B 02   0004 00-4
        I 07164 LOD 8 02   9939 99L9
        I 07169 UNL 7 02  12119 S1J9
        I 07174 UNL 7 02  12844 S8M4
        I 07179 UNL 7 02  12944 S9M4
        I 07184 UNL 7 02  19484 Z4Q4
        I 07189 SGN T     12868 S868
        I 07194 SGN T     12867 S867
        I 07199 ADM 6 01  12868 S8W8
        I 07204 LOD 8 02  12869 S8O9
        I 07209 UNL 7 02  12969 S9O9
        I 07214 SGN T      9103
        I 07219 SGN T      9102
        I 07224 ADM 6 01   9103 91 3
        I 07229 SGN T     10103  103
        I 07234 SGN T     10102  102
        I 07239 ADM 6 01  10103  1 3
        I 07244 SGN T     10828  828
        I 07249 SGN T     10827  827
        I 07254 ADM 6 01  10828  8S8
        I 07259 SGN T     10853  853
        I 07264 SGN T     10852  852
        I 07269 ADM 6 01  10853  8V3
        I 07274 ADM 6 01  15033 V0T3
        I 07279 SGN T     19498 Z498
        I 07284 SGN T     19497 Z497
        I 07289 ADM 6 01  19498 Z4Z8
        I
        I
        I 07294 LOD 8 02   8254 82N4
        I 07299 UNL 7 02   7369 7309
        I 07304 LDA #     19484 Z484
        I 07309 ULA *      7369
        I 07314 LOD 8 02   7369 7309
        I 07319 CMP 4 02  19484 Z4Q4
        I 07324 TRE L      7359------
        I                                I
        I                                I
        I 07329 TRA I 01   7359 73V9-----
        I 07334 SEL 2      0500          I
        I 07339 WR  R      7374          I
        I 07344 TRA I 03   7354 73E4-----I
        I 07349 TR  1      7359------    I
        I 07354 HLT J      0024.....    I
        I-07359 TRA I 02   7124 71K4.....I
          07364 TR  1      7384------------AB38

2 005 07369                X0000
2 007 07376                X02D024
2 001 07377                
```

SAVE
ROUTINE NUMBER

PICK UP
ASU BITS
STRIP OFF
OLD ASU BITS AND
ADM TO ADDRESS IN ROUT. #036

TO ROUT. #048
TO ROUT. #053
TO ROUT. #054
TO ROUT. #076

IN ROUT. #053

TO ROUT. #054

IN ROUT. #032

IN ROUT. #037

IN ROUT. #041

IN ROUT. #041
IN ROUT. #064

IN ROUT. #076

TEST FIRST COMBINATION
UNL ASU BITS

ULA UNDER ASU BITS
LOD COMBINATION AND
COMPARE VS ADM COMBINATION

ERROR ROUTINE

gscans/g0013479.png

SECTION 3 SET UP
ROUTINE #025

SET UP ASU BITS ON TRP,TRZ,TZB
INSTRUCTIONS IN THE TEST
ROUTINES OF SECTION 4
SPOT CHECK THE SET UP.

```
AB37
AB39.....07384 RAD H      7713
         07389 UNL 7     25982  N982
                  I
                  V
         07394 SET B 01   0002  00 2
         07399 LOD 8 01   8253  82V3
         07404 SGN T      9133
         07409 SGN T      9132
         07414 ADM 6 01   9133  91T3
         07419 SGN T      9148
         07424 SGN T      9147
         07429 ADM 6 01   9148  91U8
         07434 SGN T     10093   093
         07439 SGN T     10092   092
         07444 ADM 6 01  10093   0Z3
         07449 SGN T     10243   243
         07454 SGN T     10242   242
         07459 ADM 6 01  10243   2U3
         07464 SGN T     10213   213
         07469 SGN T     10212   212
         07474 ADM 6 01  10213   2?3
         07479 SGN T     10373   373
         07484 SGN T     10372   372
         07489 ADM 6 01  10373   3X3
         07494 SGN T     10393   393
         07499 SGN T     10392   392
         07504 ADM 6 01  10393   3Z3
         07509 SGN T     10403   403
         07514 SGN T     10402   402
         07519 ADM 6 01  10403   4 3
         07524 SGN T     10808   808
         07529 SGN T     10807   807
         07534 ADM 6 01  10808   8 8
         07539 SGN T     12138  S138
         07544 SGN T     12137  S137
         07549 ADM 6 01  12138  S1T8
         07554 SGN T     12143  S143
         07559 SGN T     12142  S142
         07564 ADM 6 01  12143  S1U3
         07569 SGN T     12153  S153
         07574 SGN T     12152  S152
         07579 ADM 6 01  12153  S1V3
         07584 SGN T     12183  S183
         07589 SGN T     12182  S182
         07594 ADM 6 01  12183  S1Y3
         07599 SGN T     12873  S873
         07604 SGN T     12872  S872
         07609 ADM 6 01  12873  S8X3
         07614 SGN T     12973  S973
         07619 SGN T     12972  S972
         07624 ADM 6 01  12973  S9X3
                  I
                  V
         07629 SET B 02   0004  00-4
         07634 LOD 8 02   8254  82N4
         07639 UNL 7 02   7709  77-9
         07644 LDA #      9134
         07649 ULA *      7709
         07654 LOD 8 02   7709  77-9
         07659 CMP 4 02   9134  91L4
         07664 TRE L      7699--------------AC39
                  I
                  V
```

NEXT PAGE

SAVE
ROUTINE NUMBER

PICK UP
ASU BITS
STRIP OLD
ASU BITS AND
ADM TO TRZ INST. IN ROUT. #032

IN ROUT. #032

IN ROUT. #037

IN ROUT. #038

IN ROUT. #038

IN ROUT. #039

IN ROUT. #039

IN ROUT. #039

IN ROUT. #041

IN ROUT. #048

IN ROUT. #048

IN ROUT. #048

IN ROUT. #048

IN ROUT. #053

IN ROUT. #054

TEST FIRST COMBINATION

UNL ASU BITS

ULA UNDER ASU BITS
LOD COMBINATION AND
COMPARE VS ADM COMBIMATION

```
gans/g0013381
          07669 TRA I 01   7699 76Z9
          07674 SEL 2      0500      I
          07679 WR  R      7714      I
          07684 TRA I 03   7694 76I4 I
          07689 TR  1      7699      I
          07694 HLT J      0025      I
AC38      07699 TRA I 02   7384 73Q4 I   AB38
          07704 TR  1      7724      I   AD40
```

```
2 005 07709                X0000
2 007 07716                X02E025
2 001 07717                
```

SECTION 3 SET UP
ROUTINE #026
SET UP PASS OR BYPASS
ROUTINES #038 AND #039
ACCORDING TO ASU NUMBER.

```
AD39
AD41.....07724 RAD H      8071          SAVE
         07729 UNL 7    25982 N982      ROUTINE NUMBER
                   I
                   V
         07734 SGN T     10165  165      SET BYPASS TO TRANSFER FOR
         07739 SGN T     10325  325      BOTH ROUTINES #038 AND #039
         07744 SET B      0002
         07749 LOD 8      8249           LOD ASU NUMBER
         07754 TRZ N      7939------.     TEST 00
         07759 CMP 4      8066      I    CMP VS 08
         07764 TRE L      7984------.--I--AE41
         07769 TRH K      7939------.--V  MORE THAN 08
                   I                 I
                   V                 I
         07774 SGN T      7868      I    ASU IS 01-07.
         07779 SGN T      7867      I    DETERMINE IF ASU MATCHES
         07784 SET B      0002      I    TEST CHARACTER
         07789 LOD 8      8253      I    PLACE ASU BITS
         07794 ADM 6      7868      I    ON CMP INST.
         07799 SET B 01   0001 00 1 I
         07804 LOD 8 01   8057 80V7 I    LOD 1
         07809 SET B 02   0001 00-1 I
         07814 LOD 8 02   8058 80N8 I    LOD 2
         07819 SET B 03   0001 00&1 I
         07824 LOD 8 03   8059 80E9 I    LOD 4
         07829 SET B 04   0001 0 01 I
         07834 LOD 8 04   8060 8 60 I    LOD 8
         07839 SET B 05   0001 0  1 I
         07844 LOD 8 05   8061 8 W1 I    LOD A BIT
         07849 SET B 06   0001 0 -1 I
         07854 LOD 8 06   8062 8 02 I    LOD B BIT
         07859 SET B 07   0001 0 &1 I
         07864 LOD 8 07   8061 8 F1 I    LOD A BIT
         07869 CMP 4      8731      I    CMP VS TEST CHARACTER
         07874 TRE L      7984------.--I--AE41
         07879 SET B      0002      I
         07884 LOD 8      8249      I    LOD ASU NUMBER
         07889 CMP 4      8064      I    CMP VS 07
         07894 TRE L      7909------.-. I  IF ASU 01-06, MODIFY ASU
         07899 SB  % 14 10252  BN2  I I I  ON SB INST. IN ROUT. #038
         07904 TR  1      7919------.-I-V I
                                     III
                                     III
         07909 SB  % 06 10213  SJ3 .I I II  IF ASU 07, SET UP TZB 05
         07914 SB  % 06 10243  SM3  I  II  IN ROUTINE #038
         07919 SET B 01   0001 00 1.I..II
         07924 LOD 8 01   8067 80W7 I    I  LOD A
         07929 UNL 7 01 10165  1W5  I    I  ENABLE ROUTINE #038
         07934 TR  1      7984------.--I--AE41
                                     I
                                     I
         07939 CMP 4      8056......I...I    VS 15
         07944 TRE L      7969------.-V
         07949 SB  % 06 10372  TP2  I I      ASU IS 00 OR 09-15
         07954 SB  % 06 10392  TR2  I I      MODIFY ASU CODING ON
         07959 SB  % 06 10397  TR7  I I      4 INSTRUCTIONS IN ROUT. #039
         07964 SB  % 06 10402  U-2  I I
         07969 SET B 01   0001 00 1.I..I
         07974 LOD 8 01   8067 80W7 I    I  LOD A
         07979 UNL 7 01 10325  3S5  I    I  ENABLE ROUTINE #039
                   I                 I
                   V                 I
```

NEXT PAGE

```
gi   ns/g0013382
AE40 07984 SET B 01  0001 00-1
     07989 LOD 8 01 10325  3S5
     07994 CMP 4 01 10165  1W5
     07999 TRE L      8009
     08004 TR  1      8049
     08009 CMP 4 01   8057 80V7
     08014 TRE L      8049
     08019 TRA I 01   8049 80U9
     08024 SEL 2      0500
     08029 WR  R      8072
     08034 TRA I 03   8044 80D4
     08039 TR  1      8049
     08044 HLT J      0026
     08049 TRA I 02   7724 77K4 ---AD40
     08054 TR  1      8839       ---AG43
```

CHECK THAT ONLY ONE OF ROUT. #038 OR #039 IS GATED

VS 1

ERROR ROUTINE

GO TO TEST ROUTINES

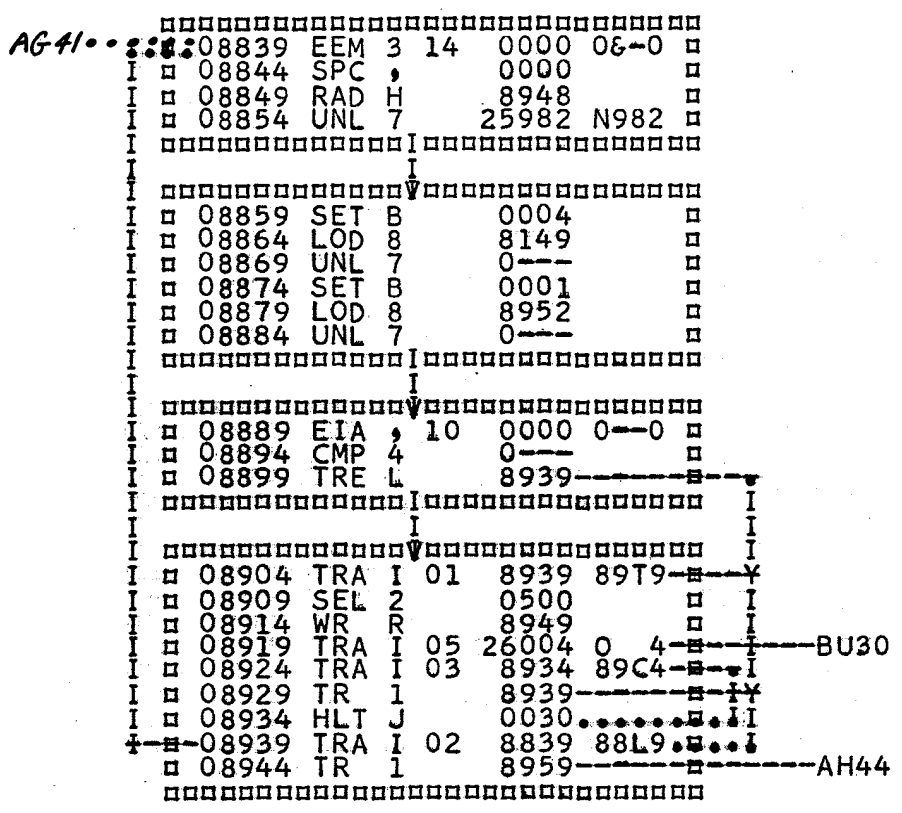
```
2 013 08067          151248 -0708A
2 007 08074          X02F026
2 001 08075
```

SECTION 3 SET-UP
VARIABLE CONSTANT ADDRESSES
AND LENGTHS DEVELOPED BY
THE GENERATOR ARE LOCATED
ON THIS PAGE. THEY WILL BE
USED IN THE TEST ROUTINES
OF SECTION 4.

```
2 005 08084 00      00000   ADDRESS #1
2 005 08089         00000   ADDR. #1 WITH ASU
2 005 08094         00000   ADDR. #1 PLUS 5
2 005 08099         00000   ADDR. #1 MINUS 255
2 005 08104         00000   ADDR. #1 MINUS LENGTH #1
2 005 08109         00000   ADDR. #1 MINUS LENGTH #1 PLUS 1
2 005 08114         00000   ADDR. #1 4/9 LOCATION
2 005 08119         00000   ADDR. #1 4/9 LOC. WITH ASU
2 005 08124         00000   ADDR. #1 4/9 LOC. PLUS 5
2 005 08129         00000   ADDR. #1 FOR LEFT END OF SND/TMT FIELD
2 005 08134         00000   ADDR. #1 FOR RIGHT END OF TCT FIELD
2 005 08139         00000   ADDR. #1 FOR LEFT END OF TCT FIELD
2 005 08144         00000   ADDR. #1 RIGHT END OF TCT FIELD PLUS 10
2 005 08149         00000   ADDRESS #2
2 005 08154         00000   ADDR. #2 PLUS 5
2 005 08159         00000   ADDR. #2 MINUS LENGTH #1 PLUS 1
2 005 08164         00000   ADDR. #2 4/9 LOCATION
2 005 08169         00000   ADDR. #2 4/9 LOC. PLUS 5
2 005 08174         00000   ADDR. #2 4/9 LOC. MINUS 3 TO 1/6 LOC.
2 005 08179         00000   ADDR. #2 FOR LEFT END RCV FIELD
2 005 08184         00000   ADDR. #2 FOR RIGHT END TCT-RCV FIELD
2 005 08189         00000   ADDR. #2 FOR LEFT END TCT-RCV FIELD
2 005 08194         00000   ADDR. #2 RIGHT END TCT-RCV FIELD PLUS 10
2 005 08199         X0000   LENGTH #1
2 005 08204         X0000   LENGTH #1 WITH ASU
2 005 08209         X0000   LENGTH #1 MINUS 1
2 005 08214         X0000   LENGTH #1 TIMES 5
2 005 08219
2 005 08224         X0000   LENGTH #2
2 005 08229         X0000   LENGTH #2 WITH ASU
2 005 08234         X0000   LENGTH #2 PLUS 1
2 005 08239         X0000   LONGEST LENGTH PLUS 1
2 005 08244         X0000   LENGTH OF TCT FIELD
2 005 08249         000XX   ASU NUMBER
2 005 08254         00--0   ASU BITS
2 005 08259         X0000   SPC VALUE
2 005 08264         X0000   LIP ADDRESS FOR ROUTINE #070
2 005 08269         X0000   SELECT ADDRESS FOR TIP/LIP
2 005 08274         X0000   # OF CHARACTERS IN LFC/UFC
2 005 08279         X0000   LOC. OF PRESET LESS # OF CHAR.
2 005 08284         XXXX0   DILROY FOR USE IN LSB/USB
2 021 08305         X0000000000000000001   TEST NUMBER 1
2 021 08326         X0000000000000000001   TEST NUMBER 2
2 021 08347         X0000000000000000001   NUMBER 3 SET-UP
2 021 08368         X000000000000000000A   TEST NUMBER 1, LNG 1
2 021 08389         X000000000000000000A   TEST NUMBER 1, LNG 2
2 021 08410         X000000000000000000J   TEST NUMBER 1, LNG 1
2 021 08431         X000000000000000000A   TEST NUMBER 2, LNG 2
5 100 08531         300 CHARACTER TEST FIELD
5 100 08631           FOR PRESETS AND FOR
5 050 08681             USE IN THE NON-NUMERIC
5 050 08731               TYPE INSTRUCTIONS
5 050 08781         100 CHARACTER TEST FIELD
5 050 08831           FOR UNSIGNED ADM.
```

SECTION 4 TEST ROUTINES
ROUTINE #030

TEST INDIRECT ADDRESSING IN 7080 MODE. ADDRESS #1 IS INDIRECT AND ADDRESS #2 IS EFFECTIVE.



SET UP 7080 MODE

SAVE ROUTINE NUMBER

PLACE ADDRESS #2 IN ADDRESS #1 AT A 4/9 LOCATION

LOD A GROUP MARK AND PLACE IT IN ADDRESS #2

DO COMPARE WITH INDIREGT ADDRESS #1

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

TO NEXT ROUTINE

2 007 08951 X03&030
2 001 08952 ¤

gscans/g0013476.png

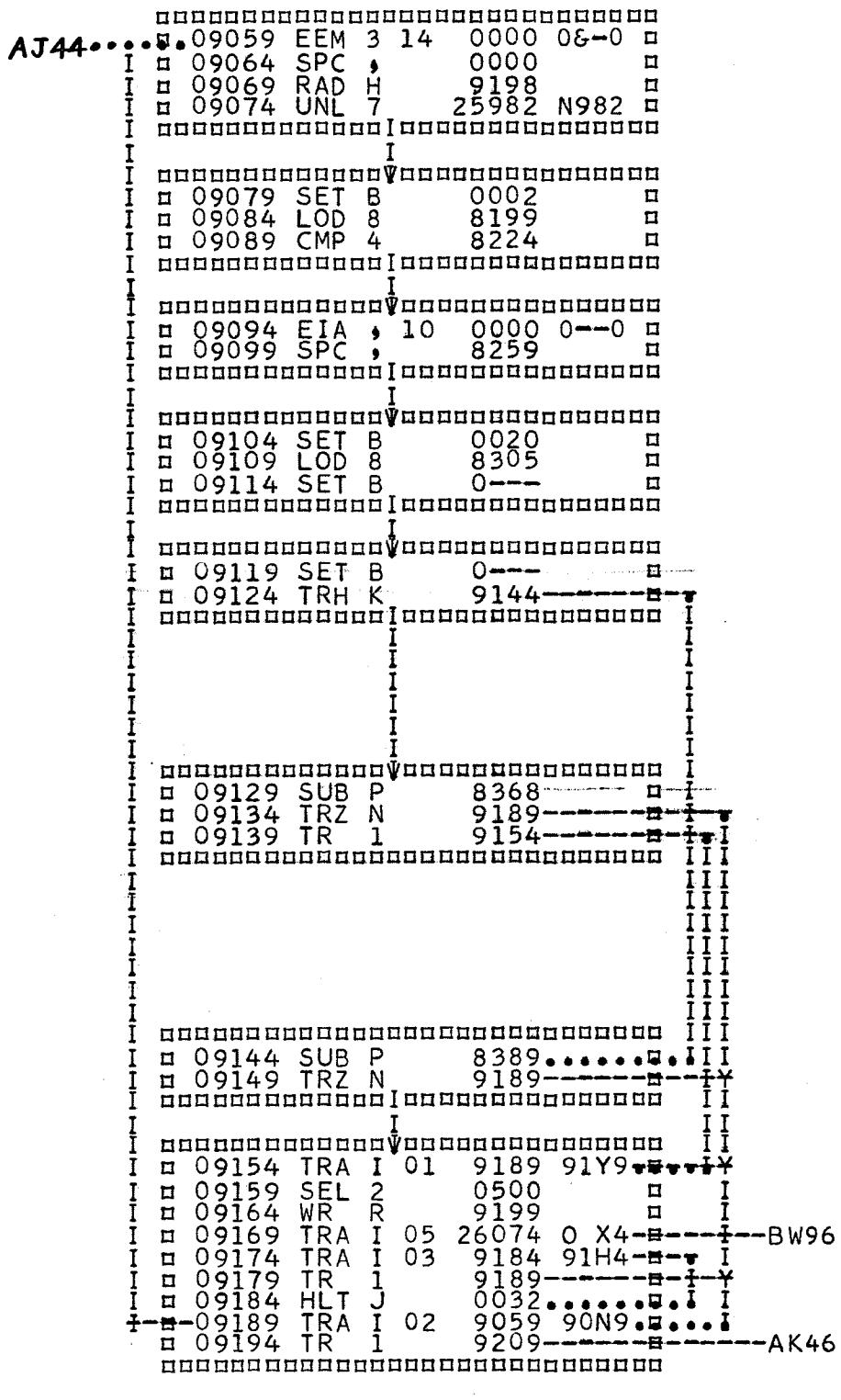
SECTION 4 TEST ROUTINES
ROUTINE #031

TEST INDIRECT ADDRESSING IN 705-3 MODE. THE EFFECTIVE OR I/A TIME SETTING OF MACI IS ADDRESS #1

```
AH43....08959 LEM 3 15   0000 0&&0      SET UP 705-3 MODE
        08964 RAD H      9048           SAVE
        08969 UNL 7    25982 N982       ROUTINE NUMBER
                  I
                  V
        08974 SB  % 13   8994 8IZ4      PUT A BIT ON CMP INSTRUCTION
        08979 SB  % 05   8989 8ZY9      TAKE POSSIBLE A-BIT OFF
        08984 SET B      0001           OF LOD INSTRUCTION AND THEN
        08989 LOD 8      0---           LOD A CHARACTER IN LOWER 80K.
                  I
                  V
        08994 CMP 4      8089-          COMPARE WITH INDIRECT ADDRESS
        08999 TRE L      9039------     EQUAL LOCATION OF ADDR. #1.
                  I                 I
                  V                 I
        09004 TRA I 01   9039 90T9-     ERROR ROUTINE
        09009 SEL 2      0500           I
        09014 WR  R      9049           I
        09019 TRA I 05 26039 0 T9-----BV96  915 SW, TR TO LONG TYPEOUT
        09024 TRA I 03   9034 90C4-     I
        09029 TR  1      9039------     I
        09034 HLT J      0031.....I
        09039 TRA I 02   8959 89N9.....I
        09044 TR  1      9059------------AJ45  TO NEXT ROUTINE
```

```
2 007 09051              X03A031
2 001 09052
```

SECTION 4 TEST ROUTINES
ROUTINE #032
TEST SET LEFT INSTRUCTION USING SET LENGTH #1 IN EITHER ACC OR AN ASU.



SET UP 7080 MODE

SAVE
ROUTINE NUMBER

COMPARE THE VALUE OF LENGTH #1 VS LNG. #2 AND SET COMPARISON INDICATORS

SET UP SPC

PRESET STORAGE UNIT WITH 20 DIGIT TEST NUMBER 1 AND STORAGE MARK AT LNG. #2

DO SET LEFT LENGTH #1

IF NOT HI, LNG #1 IS LESS THAN OR EQUAL LNG #2. SUB TEST NUMBER 1 UP TO THE STORAGE MARK PLACED BY SET LNG #1, AND TEST ZERO

ERROR

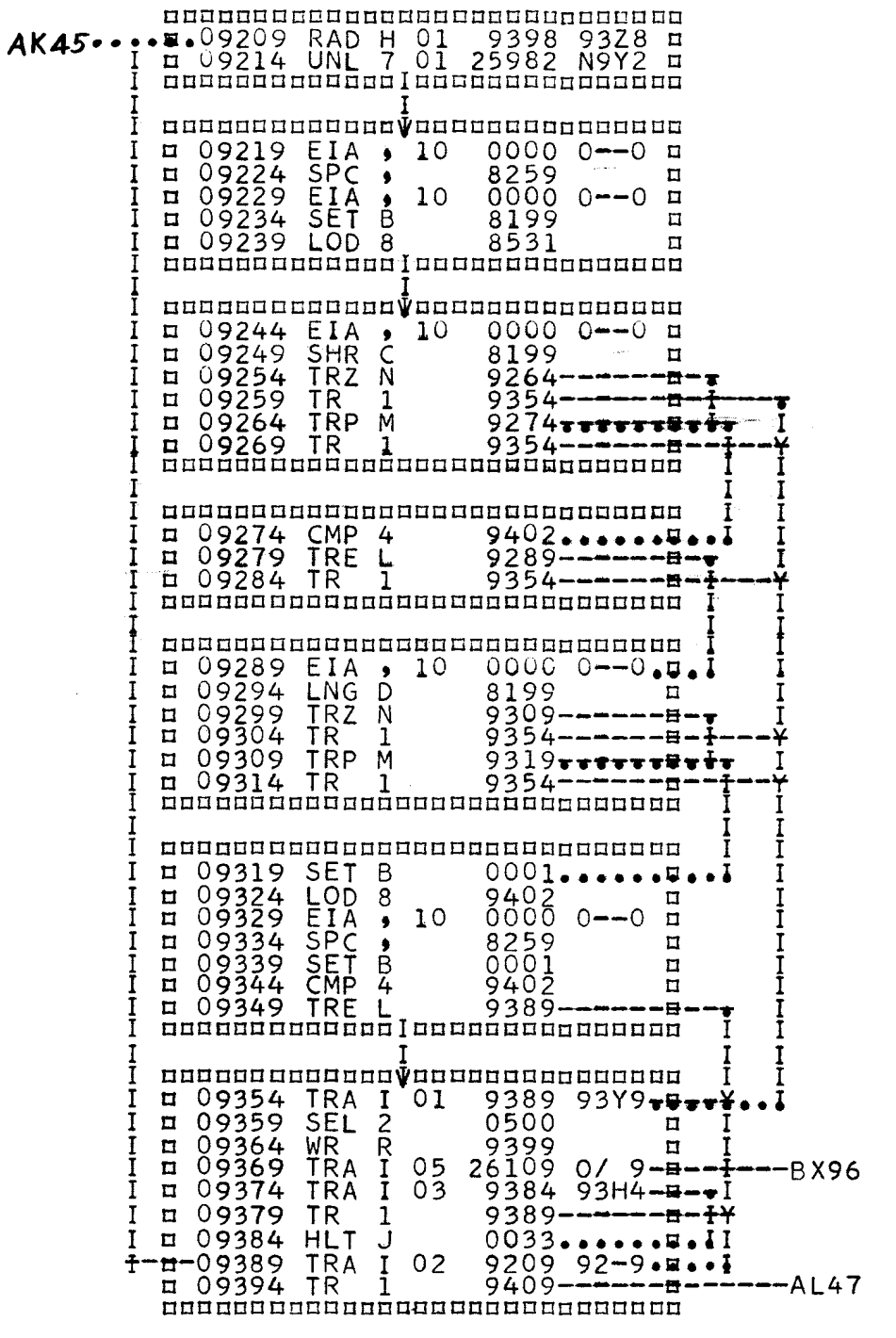
IF HI, LNG #1 IS GREATER THAN LNG #2 AND ZEROS WERE GENERATED IN STORAGE. SUB TEST NUMBER 1 UP TO THE STORAGE MARK PLACED BY SET LNG #2, AND TEST ZERO.

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 09201 X03B032
2 001 09202 □

SECTION 4 TEST ROUTINES
ROUTINE #033
TEST SHR AND LNG INSTURCTIONS
VERSUS SET AND SPC
INSTRUCTIONS.



SAVE
ROUTINE NUMBER

SET UP SPC

PLACE STORAGE MARK AT LNG #1
AND PRESET ACC

SHORTEN LENGTH #1
UP TO THE STORAGE MARK AND
TEST ZERO AND PLUS
ERROR

ERROR

CHECK SHR STEPPING OF SPC
TO STOR. MARK BY COMPARE
VS A GROUP MARK

LENGTHEN LENGTH #1
BACK TO ORIGINAL SPC
LOCATION AND TEST PLUS ZERO
ERROR

ERROR

CHECK LNG STEPPING OF SPC
BY LOD AND COMPARE
A GROUP MARK AT THE
ORIGINAL SPC POSITION

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 09401 X03C033
2 001 09402

SECTION 4 TEST ROUTINES
ROUTINE #034
TEST ROUND INSTRUCTION USING
SHR AND ADD PLUS 5

```
AL46----09409 RAD H 01   9584 95Y4          SAVE
        09414 UNL 7 01 25982 N9Y2          ROUTINE NUMBER
        09419 EIA , 10   0000 0--0
        09424 SPC ,      8259              PRESET ACC AT SPC LOCATION
        09429 SET B      0020              WITH 20 DIGITS OF TEST NO. 1
        09434 LOD 8      8305              AND EXTEND ONE POSITION
        09439 SET B      0021              FOR POSSIBLE CARRY
        09444 EIA , 10   0000 0--0
        09449 RND E      8199              DO ROUND LENGTH #1
        09454 SET B      0020              AND SAVE THE ACC RESULT
        09459 UNL 7      9579              AS 20 DIGIT FIELD
        09464 SPC ,      0000              RESET SPC TO ZERO
        09469 SET B      0020              LOD TEST NUMBER 1 AGAIN
        09474 LOD 8      8305              AND EXTEND
        09479 SET B      0021              FOR CARRY
        09484 EIA , 10   0000 0--0
        09489 SHR C      8209              LENGTH #1 MINUS 1
        09494 ADD G      9581              PLUS 5
        09499 SHR C      0001
        09504 SET B      0020
        09509 CMP 4      9579              VS RND RESULT
        09514 TRE L      9554------
        09519 TRA I 01   9554 95V4--       ERROR ROUTINE
        09524 SEL 2      0500
        09529 WR  R      9585
        09534 TRA I 05 26144 O/U4----BY96  915 SW, TR TO LONG TYPEOUT
        09539 TRA I 03   9549 95D9--
        09544 TR  1      9554------
        09549 HLT J      0034
        09554 TRA I 02   9409 94-9
        09559 TR  1      9594------------AM48
```

CONSTANTS AND ROUND RESULT

```
5 020 09579                SAVE AREA FOR RND RESULT
2 008 09587              XE03D034
2 001 09588
```

SECTION 4 TEST ROUTINES
ROUTINE #035
TEST NTR INSTRUCTION
USE ACC ONLY AND SPECIAL
ZERO AND NON-ZERO FIELDS
CONTAINED IN THIS ROUTINE.

AM49

```
AM49 ...09594 RAD H 01   9881 98Y1
     . 09599 UNL 7 01 25982 N9Y2
```

SAVE
ROUTINE NUMBER

```
     . 09604 EIA , 10   0000 0--0
     . 09609 SPC ,      8259
     . 09614 EIA , 10   0000 0--0
     . 09619 SET B      8224
     . 09624 LOD 8      9854
```

SET SPC

LOD NON-ZERO CHARACTERS
UP TO LENGTH #2

```
     . 09629 EIA , 10   0000 0--0
     . 09634 SHR C      8224
     . 09639 EIA , 10   0000 0--0
     . 09644 SET B      8209
     . 09649 LOD 8      9873
```

SHORTEN LENGTH #2

SET TO LENGTH #1 MINUS 1 AND
LOD ZEROS.

```
     . 09654 EIA , 10   0000 0--0
     . 09659 SPC ,      8259
     . 09664 NTR X      9694------.
     . 09669 SET B 01   0000 00 0 .
     . 09674 SET B 01   0004 00 4 .
     . 09679 CMP 4 01   8209 82 9 .
     . 09684 TRE L      9764------.---
     . 09689 TR  1      9794------.---AN49
     . 09694 EIA , 10   0000 0--0..... .
     . 09699 SHR C      8224       .
     . 09704 CMP 4      9873       .
     . 09709 TRE L      9719------.-
     . 09714 TR  1      9794------.---AN49
     . 09719 RAD H 01   9878 98X8..... .
     . 09724 CMP 4      9885       .
     . 09729 TRE L      9749------.-
     . 09734 SHR C      0001       .
     . 09739 ADD G 01   9878 98X8  .
     . 09744 TR  1      9724       .
     . 09749 CMP 4 01   8209 82 9..... .
     . 09754 TRE L      9764------.---¥
     . 09759 TR  1      9794------.---AN49
     . 09764 EIA , 10   0000 0--0..... .
     . 09769 SPC ,      8259       .
     . 09774 EIA , 10   0000 0--0  .
     . 09779 SET B      8224       .
     . 09784 CMP 4      9854       .
     . 09789 TRE L      9829------.------AP49
```

RETURN SPC TO STARTING POINT
AND DO NTR

IF NO NTR THAN CHECK
STORAGE FOR NO ZERO ON
LEFT END PRIOR TO NTR

ERROR

IF NTR DID TRANSFER,
TEST REMAINING ZEROS,
IF ANY, FOR NO CHANGE

ERROR

COUNT ZEROS LEFT
IN STORAGE AFTER NTR

CHECK THAT CORRECT
NUMBER OF ZEROS IN ACC

ERROR

SET SPC BACK TO NON-ZERO
FIELD,

SET LENGTH #2 AND
COMPARE NON-ZERO FIELD
FOR NO CHANGE

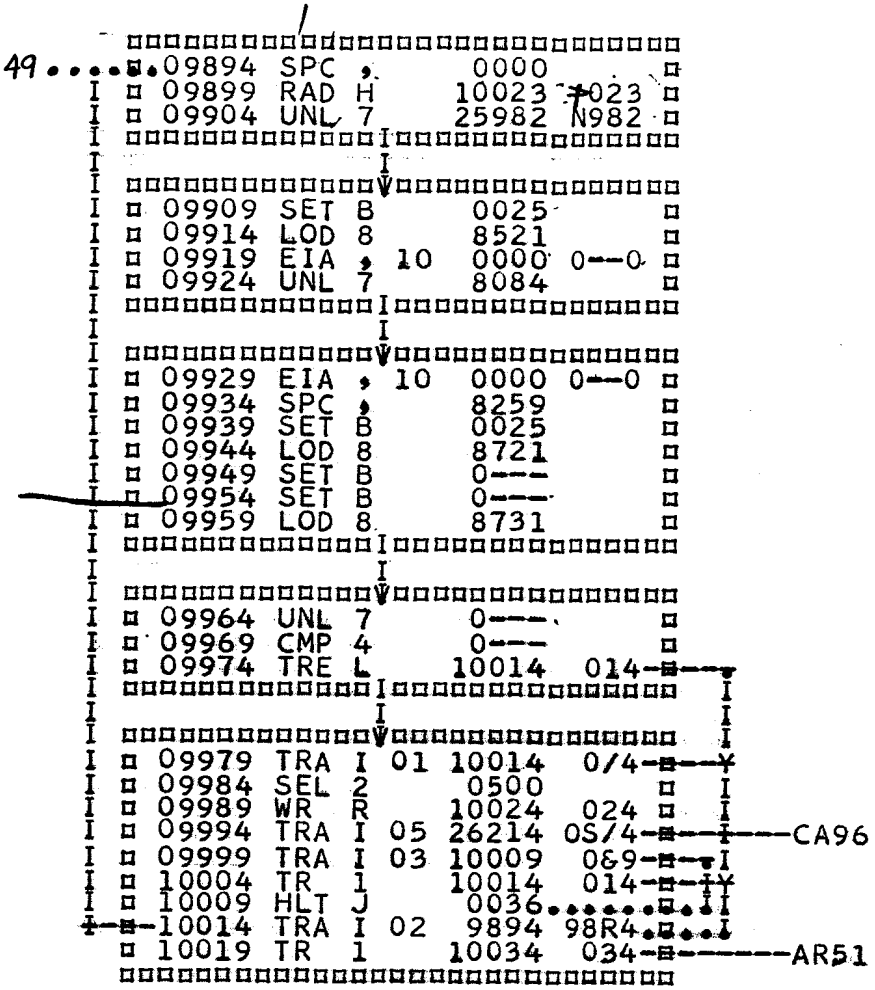
NEXT PAGE

```
AN48••  09794 TRA I 01  9829 98S9-----
        09799 SEL 2     0500       I
        09804 WR  R     9882       I
        09809 TRA I 05 26179 O7X9-----BZ96   915 SW, TR TO LONG TYPEOUT
        09814 TRA I 03  9824 98B4-----I
        09819 TR  1     9829-------IY
        09824 HLT J     0035.....II
AP48••  09829 TRA I 02  9594 95R4.....AM48
        09834 TR  1     9894-------AQ50
```

CONSTANTS AND SPECIAL FIELDS

```
2 020 09854   A-K--T5&C1,MV.7F#PY*8
2 018 09872   -&0--&&00-&-0-0&0&
2 001 09873   #.
2 011 09884   X000A03E035
2 001 09885
```

SECTION 4 TEST ROUTINES
ROUTINE #036
TEST UNL INSTRUCTION AND
CMP INSTRUCTION USING
TEST FIELD INTO ADDRESS #1



RESET SPC
AND SAVE
ROUTINE NUMBER

PRESET THE MEMORY
FIELD AT ADDRESS #1

SETUP SPC
PRESET STORAGE
WITH 25 CHARACTERS
PLACE SM AT LENGTH #2
SET LENGTH #1 AND
LOD TEST FIELD

DO UNL TO ADDR. #1
AND CMP IS ADDR. #1

ERROR ROUTINE

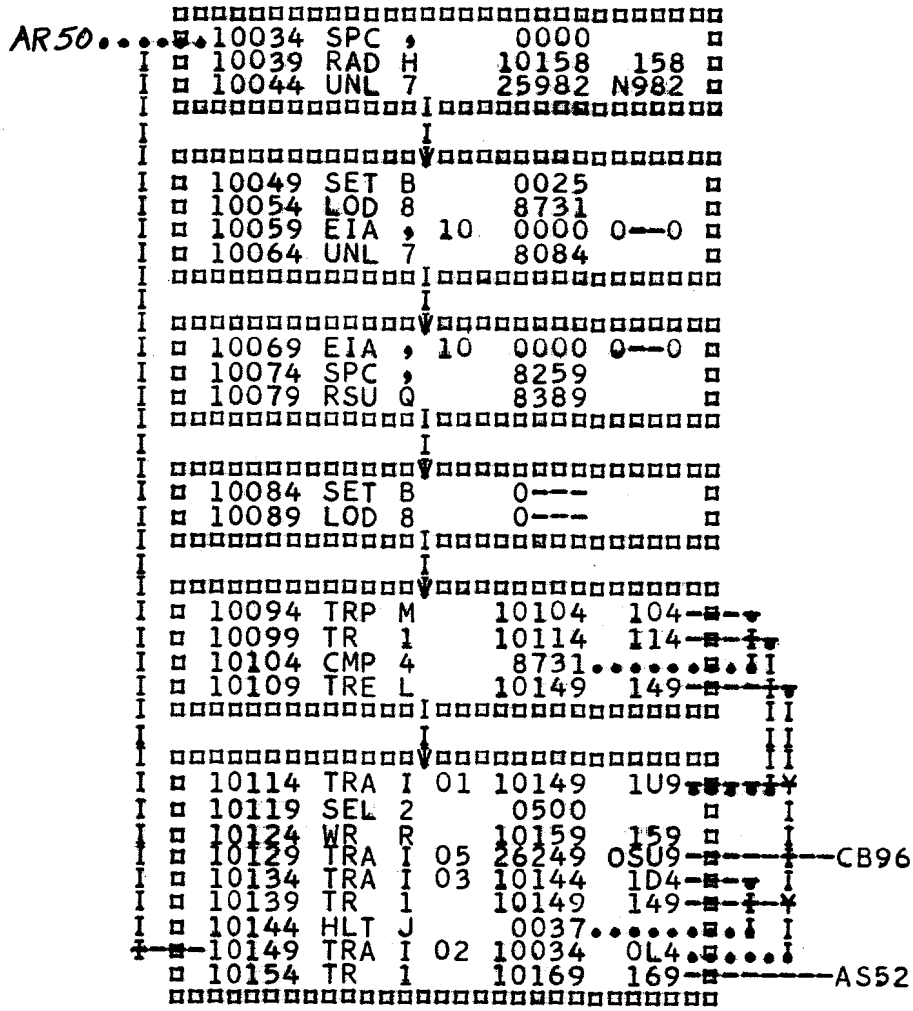
915 SW, TR TO LONG TYPEOUT

2 007 10026
2 001 10027

X03F036

g ns/g0013387.png

SECTION 4 TEST ROUTINES
ROUTINE #037
TEST THE LOD INSTRUCTION
USING THE TEST FIELD IN
ADDRESS #1. TEST STORAGE PLU



RESET SPC
AND SAVE
ROUTINE NUMBER

SET UP ADDRESS #1
WITH 25 CHARACTERS
OF THE TEST FIELD

SET UP SPC AND
PRESET STORAGE MINUS
AND WITH SM AT LENGTH #2

SET TO LENGTH #1
AND LOD ADDRESS #1

TEST PLUS
ERROR
COMPARE STORAGE RESULT
VS TEST FIELD

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 10161 X03G037
2 001 10162

SECTION 4 TEST ROUTINES
ROUTINE #038

TEST SB AND TZB INSTRUCTIONS ON ASU CODE 01 THROUGH 07 ONLY. THIS ROUTINE IS BYPASSED IF ASU CODE IS 00, 08, OR 09 THROUGH 15.

```
AS51   10169 NOP A     10314  314
       10174 RAD H 01  10318  3/8
       10179 UNL 7 01  25982 N9Y2
       10184 SET B 01   0010 00/0
       10189 LOD 8 01   8731 87T1
       10194 EIA , 10   0000 0--0
       10199 UNL 7 01   8084 80Y4
       10204 EIA , 10   0000 0--0
       10209 RCV U      8084
       10214 TZB .     10224  224
       10219 TR  1     10239  239
       10224 SB  %      000-
       10229 SB  %      000-
       10234 TR  1     10259  259
       10239 SB  %      000-
       10244 TZB .     10254  254
       10249 TR  1     10274  274
       10254 SB  %      000-
       10259 EIA , 10   0000 0--0
       10264 CMP 4 01   8084 80Y4
       10269 TRE L     10309  309
       10274 TRA I 01  10309  3 9
       10279 SEL 2       0500
       10284 WR  R     10319  319
       10289 TRA I 05  26284 OSY4   CC96
       10294 TRA I 03  10304  3&4
       10299 TR  1     10309  309
       10304 HLT J      0038
       10309 TRA I 02  10174  1P4
       10314 TR  1     10329  329   AT53
```

SW SET IN SECTION 3-SET UP, DEPENDING ON ASU CODE SAVE ROUTINE NUMBER

SET UP ADDRESS #1 WITH 10 CHARACTERS OF TEST FIELD

RCV AT ADDR. #1

TEST FOR BIT IN ZERO STATE

SET BIT TO 0 STATE
SET BIT TO 0 STATE, IF ASU 07, REVERSE A BIT TWICE

SET BIT TO ZERO STATE AND TEST WITH TZB
ERROR
SET BIT BACK TO ONE STATE

CHECK THAT ADDR. #1 CONTAINS SAME CHARACTERS

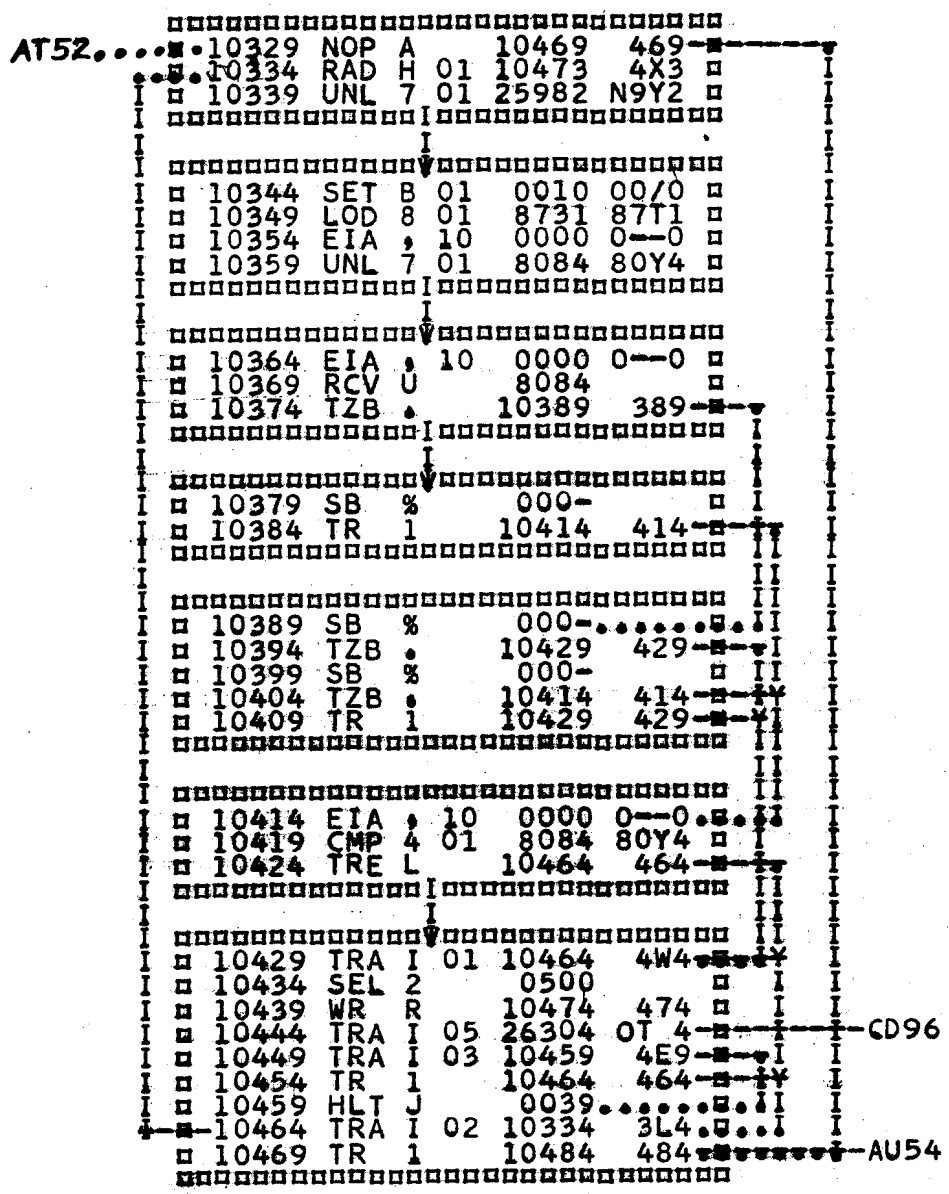
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

```
2 007 10321          X03H038
2 001 10322          □
```

SECTION 4 TEST ROUTINES
ROUTINE #039

TEST SB AND TZB INSTRUCTIONS ON ASU CODE 00 OR 09 THRU 15 THIS ROUTINE IS BYPASSED IF ASU CODE IS 01 THROUGH 08.



SW -SET IN SECTION 3 SETUP DEPENDING ON ASU CODE SAVE ROUTINE NUMBER

SET UP ADDRESS #1 WITH 10 CHARACTERS OF TEST FIELD

RCV AT ADDR #1 AND TEST FOR BIT

IF BIT IS PRESENT SET BIT TO ONE STATE - NO CHANGE

IF BIT IS ZERO, SET BIT TO ONE STATE, TEST IT AND THEN REVERSE BIT BACK.

ERROR

CHECK THAT ADDRESS #1 CONTAINS SAME CHARACTERS

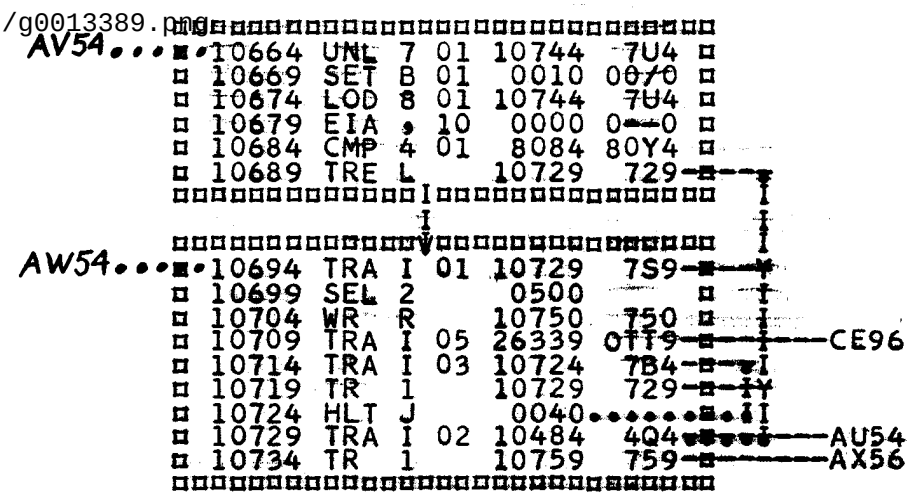
ERROR ROUTINE

915 SW, IR TO LONG TYPEOUT

2 007 10476 X03I039
2 001 10477

SECTION 4 TEST ROUTINES
ROUTINE #040
TEST SIGN INSTRUCTION FOR CORRECT MEMORY RESULT AND STORAGE UNCHANGED TO LEFT OF ZONES. USE ACC ONLY AND TEST CHARACTER AT ADDR. #1

```
AU53
AU55...  10484 RAD H 01 10749  7U9      SAVE
         10489 UNL 7 01 25982 N9Y2      ROUTINE NUMBER
                    I
                    V
         10494 SET B 01  0010 00/0      SET UP ADDRESS #1 WITH
         10499 LOD 8 01  8731 87T1      10 CHARACTERS OF TEST
         10504 EIA , 10  0000 0--0      FIELD
         10509 UNL 7 01  8084 80Y4      SAVE THE 10 CHARACTERS
         10514 UNL 7 01 10744  7U4
                    I
                    V
         10519 EIA , 10  0000 0--0      SET UP SPC
         10524 SPC ,     8259
         10529 EIA , 10  0000 0--0
         10534 SET B     8234           SET ACC TO LENGTH #2 PLUS 1
         10539 LOD 8     8721           AND PRESET ACC.
                    I
                    V
         10544 EIA , 10  0000 0--0      DO SGN ON TEST CHARACTER
         10549 SGN T     8084           AT ADDRESS #1
                    I
                    V
         10554 SHR C     0002           TEST STORAGE FIELD
         10559 CMP 4     8719           UNCHANGED TO LEFT
         10564 LNG D     0002           OF ZONE AND STOR. MARK
         10569 TRE L    10579  579-----  RESULTING FROM SGN
         10574 TR  1    10694  694-----AW55  ERROR
                                  I
                                  I
         10579 SET B 01  0001 00 1.     I   LOD THE RESULTING
         10584 EIA , 10  0000 0--0      I   MEMORY CHARACTER
         10589 LOD 8 01  8084 80Y4      I   AND TEST FOR BLANK
         10594 CMP 4 01 10746  7U6      I
         10599 TRE L    10629  629-----  I
                    I                   I
                    V                   I
         10604 SB  % 05 10744  XU4      I   ORIGINAL CHAR. WAS NOT
         10609 SB  % 06 10744  XM4      I   BL/HYP/AMP. TAKE ZONES
         10614 CMP 4 01 10744  7U4      I   OFF ORIGINAL CHAR. AND COMPARE
         10619 TRE L    10664  664-----AV55  RESULT VS ORIGINAL
         10624 TR  1    10694  694-----AW55  ERROR
                                  I
                                  I
         10629 SB  % 13 10744  GU4.     I   RESULT CHAR. IS BLANK,
         10634 SB  % 14 10744  GM4      I   TEST ORIGINAL CHARACTER
         10639 SET B 02  0001 00-1      I   FOR EQUAL BL/HYP/AMP.
         10644 LOD 8 02 10744  7M4      I   BY SETTING UP A AND B BITS
         10649 CMP 4 02 10745  7M5      I   AND COMPARING VS AMPERSAND.
         10654 TRE L    10664  664-------AV55
         10659 TR  1    10694  694-------AW55  ERROR
```



UNL RESULT CHAR. TO SAVE AREA, LOD THE RESULT CHAR. PLUS THE OTHER 9 CHARACTERS THAT WERE SAVED AND VERIFY THAT ADDR #1 IS UNCHANGED.

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

```
5 010 10744                SAVE AREA FOR 10 CHARACTERS IN ADDR. #1
2 008 10752                & 046040
2 001 10753                ¤
```

SECTION 4 TEST ROUTINES
ROUTINE #041

TEST SIGN INSTRUCTION FOR CORRECT RESULTING STORAGE SIGN AND ZONE.

```
AX55.....  10759 RAD H 01 10909   9 9          SAVE
           10764 UNL 7 01 25982 N9Y2          ROUTINE NUMBER

           10769 LOD 8 01   8731 87T1          SET UP ADDRESS #1
           10774 EIA , 10   0000 0--0          WITH 3 CHARACTERS
           10779 UNL 7 01   8084 80Y4          OF THE TEST FIELD

           10784 EIA , 10   0000 0--0
           10789 SPC ,      8259               SET UP SPC AND
           10794 RSU Q      8368               PRESET STORAGE

           10799 SGN T      0---               DO SIGN ADDRESS #1
           10804 RCV U      8731               RCV AT ORIGINAL CHARACTER
           10809 TRP M     10844  844-

           10814 TZB . 06 10864  YO4-          STORAGE MINUS, TEST
           10819 TZB . 05 10829  YS9-          ORIGINAL MEMORY CHARACTER
           10824 TR  1    10864  864-          FOR B BIT ONLY.
           10829 CMP 4    10905  905.          IF SIGN MATCHES, TEST
           10834 TRE L    10899  899-          ZONE IN STORAGE EQUAL
           10839 TR  1    10864  864-          B BIT

           10844 TZB . 06 10854  YN4-          STORAGE PLUS, TEST
           10849 TZB . 05 10864  YW4-          ORIGINAL MEMORY CHARACTER
           10854 CMP 4    10906  906.          FOR ANYTHING BUT B BIT ONLY,
           10859 TRE L    10899  899-          AND TEST STORAGE ZONE AB BITS

           10864 TRA I 01 10899  8Z9-          ERROR ROUTINE
           10869 SEL 2     0500
           10874 WR  R    10910  910
           10879 TRA I 05 26374 OTX4-----CF96  915 SW, TR TO LONG TYPEOUT
           10884 TRA I 03 10894  8I4-
           10889 TR  1    10899  899-
           10894 HLT J     0041.....
          -10899 TRA I 02 10759  7N9.
           10904 TR  1    10919  919-------AY57
```

2 008 10912 -&04A041
2 001 10913

ans/g0013390.png

SECTION 4 TEST ROUTINES
ROUTINE #042
TEST TSL INSTRUCTION.
RECEIVE LOCATION IS ADDRESS #
TSL INSTRUCTION IS AT ADDR. #

```
AY56.....  10919 RAD  H 01 11110 /1/0 
           10924 UNL  7 01 25982 N9Y2 
                      |
                      v
           10929 RAD  H 01 11106 /1 6 
           10934 TRP  M 01 11059 /0V9-----+
           10939 SET  B 01  0004 00 4     |
           10944 LOD  8 01  8114 81/4     |
           10949 UNL  7 01 11119 /1/9     |
           10954 SET  B 01  0010 00/0     |
           10959 LOD  8 01 11019 /0/9     |
           10964 EIA  , 10  0000 0--0     |
           10969 UNL  7 01  8124 81S4     |
           10974 LOD  8 01  8731 87T1     |
           10979 EIA  , 10  0000 0--0     |
           10984 UNL  7 01  8164 81W4     |
                      |                   |
                      v                   |
           10989 EIA  , 10  0000 0--0     |
           10994 RCV  U     8174          |
           10999 SB   % 13 11106 /A 6     |
           11004 EIA  , 10  0000 0--0     |
           11009 TR   1     8114------+    |
                                     |    |
           11014 TR   1 01 11024 /0S4-+--+  |
           11019 TR   1    11054 /054-+--+--+
                                     |  |  |
           11024 SB   % 05 11106 // 6.+  |  |
           11029 SET  B 01  0004 00 4     |  |
           11034 LOD  8 01  8124 81S4     |  |
           11039 EIA  , 10  0000 0--0     |  |
           11044 CMP  4 01  8164 81W4     |  |
           11049 TRE  L     11094 /094----+--+
           11054 SB   % 05 11106 // 6.+   |  |
                      |                   |  |
                      v                   |  |
           11059 TRA  I 01 11094 /0Z4.....+  |
           11064 SEL  2     0500          |  |
           11069 WR   R    11111 /111     |  |
           11074 TRA  I 05 26409 0U 9-----+--+--AF42
           11079 TRA  I 03 11089 /0H9-+   |  |
           11084 TR   1    11094 /094-+---+--+
           11089 HLT  J     0042.....+   |  |
           11094 TRA  I 02 10919  9J9.+....+  |
           11099 SB   % 05 11106 // 6 +       |
           11104 TR   1    11124 /124-+-------+--AZ58
```

SAVE
ROUTINE NUMBER

CHECK FOR WILD TRANSFER ON
PREVIOUS PROGRAM PASS

SAVE TSL LOCATION

PLACE TSL INSTRUCTION
AT 4/9 LOCATION IN MEMORY
AT ADDRESS #1.

PRESET ADDRESS #2
IN RECEIVE AREA

RCV AT ADDR. #2 1/6 LOCATION

SET WILD TRANSFER INDICATOR
AND THEN
TRANSFER TO ADDRESS #1

THESE ARE THE TWO INSTRUCTION
PLACED AT ADDRESS #1

RESET WILD TRANSFER INDICATOR
AND TEST THAT IC LOCATION
WAS RECEIVED AT ADDRESS #2

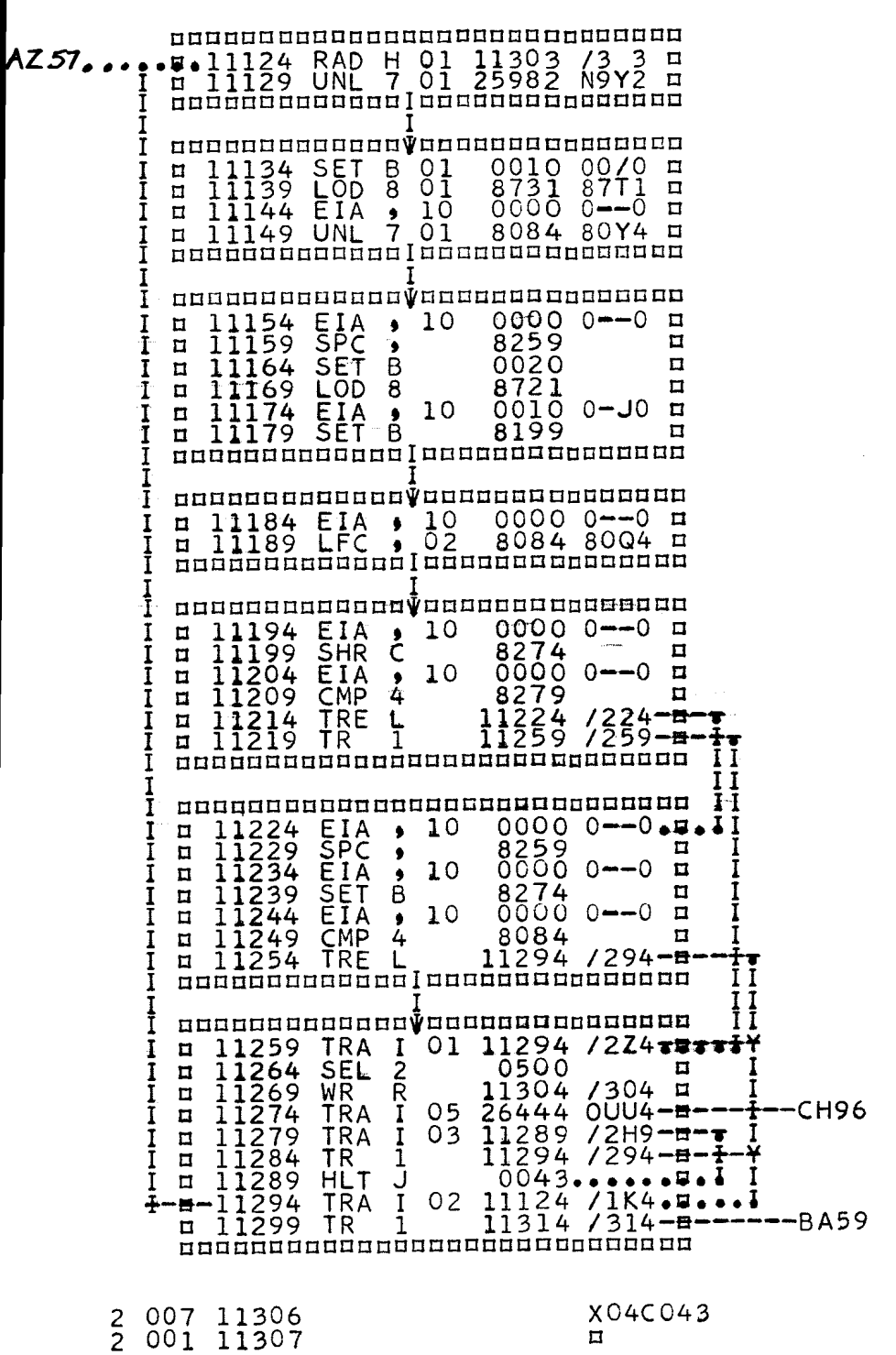
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

RESET INDICATOR

```
2 002 11106          XJ WILD TRANSFER INDICATOR EQUAL TO 1 ON ERROR
2 007 11113          X04B042
2 001 11114          
2 005 11119          00000  LOCATION OF TSL INSTRUCTION
```

SECTION 4 TEST ROUTINES
ROUTINE #043
TEST LFC INSTRUCTION IN BANK 0



SAVE
ROUTINE NUMBER

PLACE 10 CHARACTERS OF
TEST FIELD IN ADDRESS #1

SET UP SPC

PRESET STORAGE WITH
20 CHARACTERS AND
A STOR. MARK AT LENGTH #1

DO LFC ONE TO FIVE CHAR.
FROM ADDRESS #1

SHORTEN ACC AND
TEST STORAGE FIELD TO
LEFT OF LFC RESULT

ERROR

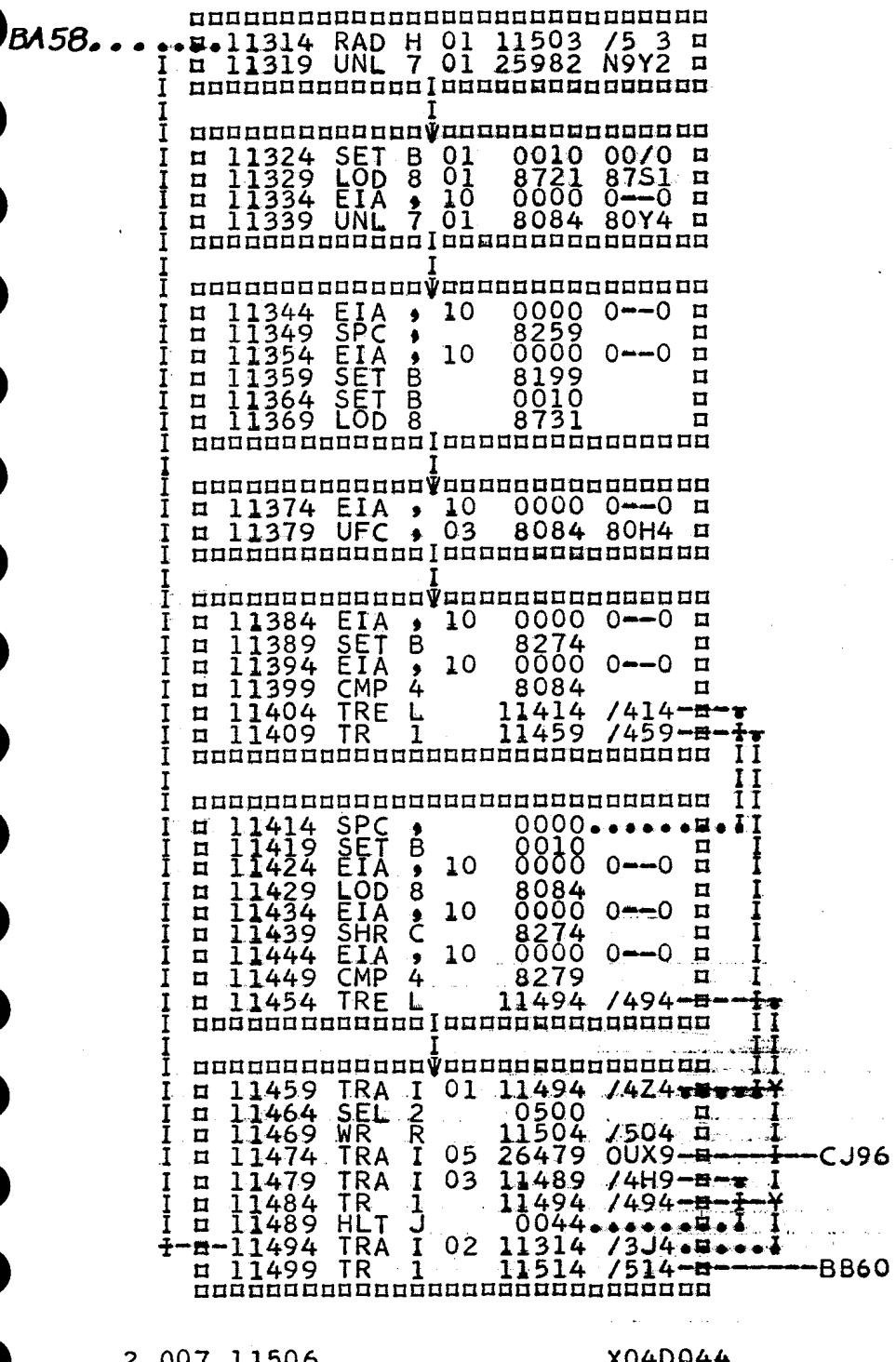
SET SPC BACK TO
LFC RESULT, SET LEFT
TO END OF LFC RESULT
AND COMPARE VERSUS
THE TEST FIELD IN ADDRESS #1

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 11306 X04C043
2 001 11307

SECTION 4 TEST ROUTINES
ROUTINE #044
TEST UFC INSTRUCTION IN BANK



SAVE
ROUTINE NUMBER

PRESET ADDRESS #1
WITH 10 CHARACTERS

SET UP SPC
PLACE A STORAGE MARK
AT LENGTH #1

LOD 10 TEST CHARACTERS

DO UFC ONE TO FIVE CHAR.
INTO ADDRESS #1.

SET LEFT TO END OF UFC
FIELD AND TEST RESULT
IN MEMORY AT ADDRESS #1

ERROR

RESET SPC

LOD RESULT FIELD
FROM ADDRESS #1

SHORTEN TO CHOP OUT UFC
RESULT AND CHECK THAT
MEMORY FIELD TO LEFT OF
UFC IS UNCHANGED

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 11506 X04D044
2 001 11507

SECTION 4 TEST ROUTINES
ROUTINE #045
TEST LSB INSTRUCTION IN BANK 1
FROM TEST FIELD AT ADDRESS #1

```
BB59.....11514 SPC ,      0000        RESET SPC
        11519 RAD H     11668 /668    SAVE
        11524 UNL 7     25982 N982    ROUTINE NUMBER

        11529 LOD 8       8259        SET UP
        11534 UNL 7     11589 /589    SPC INSTRUCTION

        11539 SET B       0255        SET UP MEMORY WITH
        11544 LOD 8       8731        255 CHARACTER TEST
        11549 EIA , 10    0000 0--0   FIELD IN ADDRESS #1
        11554 UNL 7       8084
        11559 SET B       0001
        11564 LOD 8       8284        PLACE A DILROY ON
        11569 EIA , 10    0000 0--0   LEFT END OF TEST
        11574 UNL 7       8099        FIELD.

        11579 SET B 01    0000 00 0   CLEAR BANK 1
        11584 SET B 01    0256 02V6   TO ZEROS
        11589 SPC ,       1---
        11594 EIA , 10    0000 0--0   DO LSB 255 CHARACTERS
        11599 LSB , 04    8084 8 84   PLUS DILROY FROM ADDRESS #1

        11604 SPC ,       1000
        11609 EIA , 10    0000 0--0   COMPARE
        11614 CMP 4       8084        BANK 1 RESULT VERSUS
        11619 TRE L     11659 /659    TEST FIELD AT ADDRESS #1

        11624 TRA I 01  11659 /6V9    ERROR ROUTINE
        11629 SEL 2       0500
        11634 WR  R     11669 /669
        11639 TRA I 05  26514 OV/4----CK96  915 SW, TR TO LONG TYPEOUT
        11644 TRA I 03  11654 /6E4
        11649 TR  1     11659 /659
        11654 HLT J       0045.....
        11659 TRA I 02  11514 /5J4.
        11664 TR  1     11679 /679----BC61
```

2 007 11671 X04E045
2 001 11672

SECTION 4 TEST ROUTINES
ROUTINE #046

TEST USB INSTRUCTION
USB INTO ADDRESS #1 USING
BANK 0.

```
BC60.....  11679 SPC ,      0000
           11684 RAD H 01 11848 /8U8
           11689 UNL 7 01 25982 N9Y2
                      |
                      v
           11694 SET B 01  0255 02V5
           11699 LOD 8 01  8721 87S1
           11704 EIA , 10  0000 0--0
           11709 UNL 7 01  8114 81/4
                      |
                      v
           11714 SET B     0000
           11719 SET B     0255
           11724 LOD 8     8731
           11729 EIA , 10  0000 0--0
           11734 SPC ,     8259
                      |
                      v
           11739 EIA , 10  0000 0--0
           11744 USB , 05  8084 8 Y4
           11749 TRS 0 11 11804 /Q&4---.
                      |                |
                      v                |
           11754 SPC ,     0000        |
           11759 EIA , 10  0000 0--0    |
           11764 CMP 4     8084        |
           11769 TRE L    11779 /779-.  |
           11774 TR  1    11804 /804-+--+
                                     |  |
                                     |  |
           11779 SET B 01  0001 00 1..+  |
           11784 LOD 8 01  8284 82Y4     |
           11789 EIA , 10  0000 0--0     |
           11794 CMP 4 01  8099 80Z9     |
           11799 TRE L-   11839 /839-----+--.
                      |                |  |
                      v                |  |
           11804 TRA I 01 11839 /8T9.....+  |
           11809 SEL 2    -0500             |
           11814 WR  R    11849 /849        |
           11819 TRA I 05 26549 OVU9-----+---+---CL96
           11824 TRA I 03 11834 /8C4---. |
           11829 TR  1    11839 /839---+-+
           11834 HLT J     0046.....+.| |
           11839 TRA I 02 11679 /6P9.+...|
           11844 TR  1    11859 /859-+-------BD62
```

RESET SPC
SAVE
ROUTINE NUMBER

PRESET MEMORY WITH
255 CHARACTERS AT
ADDRESS #1 4/9 LOCATION

CLEAR BANK 0
TO ZEROS AND
LOD 255 CHAR. TEST FIELD

SET SPC OFF ZERO

DO USB FROM BANK 0
INTO ADDRESS #1
TEST 901 NO AUTO STOP

COMPARE BANK 0 VERSUS
RESULT IN ADDRESS #1.

ERROR

LOD A DILROY AND COMPARE
VERSUS LEFT END OF RESULT
AT ADDRESS #1

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

```
2 007 11851                X04F046
2 001 11852                
```

SECTION 4 TEST ROUTINES
ROUTINE #047

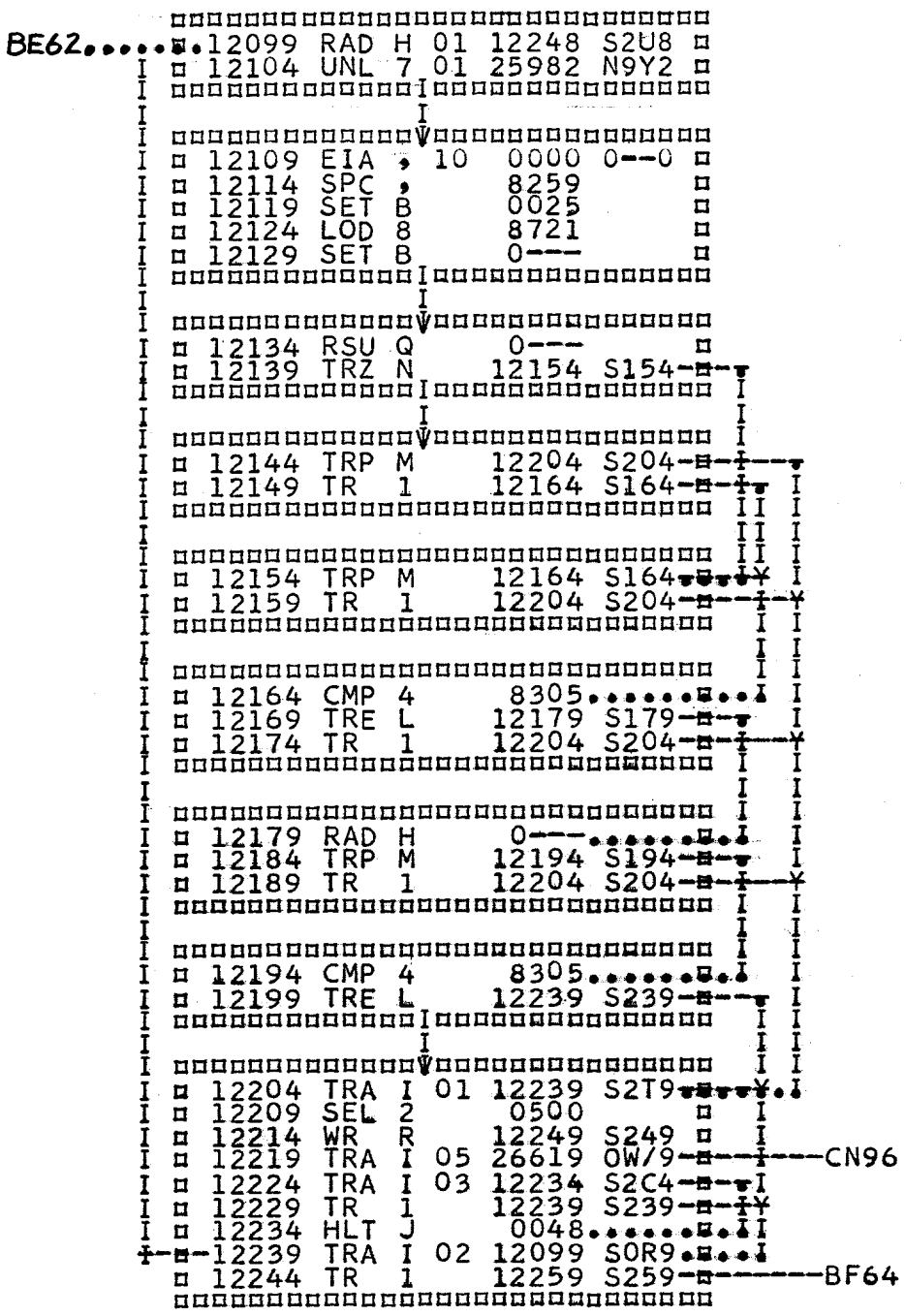
TEST STORE, SIGN PLUS
STORE TEST NUMBER 1 INTO
ADDRESS #1.

```
BD61.....11859 SPC ,      0000        RESET SPC
        I 11864 RAD H    12089 S089   SAVE
        I 11869 UNL 7    25982 N982   ROUTINE NUMBER
        I
        I
        I 11874 SET B      0025
        I 11879 LOD 8      8721       PRESET MEMORY ADDRESS #1
        I 11884 EIA , 10   0000 0--0  WITH 25 CHARACTERS
        I 11889 UNL 7      8084
        I 11894 EIA , 10   0000 0--0
        I 11899 SHR C      8199       SHORTEN LENGTH #1
        I 11904 SET B      0001       AND SAVE END CHARACTER
        I 11909 UNL 7    12085 S085
        I 11914 EIA , 10   0000 0--0
        I 11919 SPC ,      8259       SET UP SPC
        I 11924 SET B      0---       AND PRESET STORAGE
        I 11929 LOD 8      8731
        I
        I
        I 11934 SET B      0---       SET LENGTH #1
        I 11939 LOD 8      8305       LOD TEST NUMBER 1
        I 11944 ST  F      0---       AND STORE IN ADDRESS #1
        I
        I
        I 11949 SPC ,      0000       RESET SPC
        I 11954 EIA , 10   0000 0--0
        I 11959 SET B      8199       SET LENGTH #1,
        I 11964 LOD 8      8368       LOD NUMBER 1 AND
        I 11969 EIA , 10   0000 0--0  COMPARE
        I 11974 CMP 4      8084       VERSUS STORE RESULT
        I 11979 TRE L    11989 /989   IN ADDRESS #1
        I 11984 TR  1    12044 S044   ERROR
        I                              I I
        I                              I I
        I 11989 SET B      0001.....  I I
        I 11994 LOD 8    12085 S085   I   LOD END CHARACTER AND
        I 11999 CMP 4    12086 S086   I   COMPARE VERSUS Z
        I 12004 TRH K    12014 S014   I   IF HIGH, CHAR. IS NUMBER
        I 12009 TR  1    12029 S029   I I
        I 12014 SB  % 13 12085 S&Y5   I I IF CHAR. IS A NUMBER, SET
        I 12019 SB  % 14 12085 S&Q5   I I UP A AND B BITS,
        I 12024 LOD 8    12085 S085   I I LOD IT,
        I 12029 EIA , 10   0000 0--0  I I AND COMPARE IT VERSUS
        I 12034 CMP 4      8104       I   THE CHARACTER TO THE LEFT
        I 12039 TRE L    12079 S079   I   OF THE STORE FIELD IN MEMORY.
        I                              I I
        I                              I I
        I 12044 TRA I 01 12079 S0X9   I I ERROR ROUTINE
        I 12049 SEL 2      0500       I
        I 12054 WR  R    12090 S090   I
        I 12059 TRA I 05 26584 OVY4   I---CM96  915 SW, TR TO LONG TYPEOUT
        I 12064 TRA I 03 12074 S0G4   I
        I 12069 TR  1    12079 S079   I
        I 12074 HLT J      0047.....  I
        I-12079 TRA I 02 11859 /8N9   I
          12084 TR  1    12099 S099   ---------BE63
```

2 008 12092 -Z04G047
2 001 12093

g ns/g0013393.png

SECTION 4 TEST ROUTINES
ROUTINE #048
TEST RAD AND RSU ON PLUS FIEL
USE TEST NUMBER 1 AT
ADDRESS #1.



SAVE
ROUTINE NUMBER

SET UP SPC.
PRESET STORAGE WITH 25
CHARACTERS AND A STOR.
MARK AT LENGTH #2

DO RSU FROM ADDRESS #1
TEST FOR ZERO

IF NOT ZERO CHECK SIGN MINUS

IF ZERO CHECK SIGN PLUS
ERROR

COMPARE STORAGE FIELD
VERSUS TEST NUMBER 1
ERROR

DO RAD
AND TEST PLUS
ERROR

CHECK STORAGE FIELD

ERROR ROUTINE

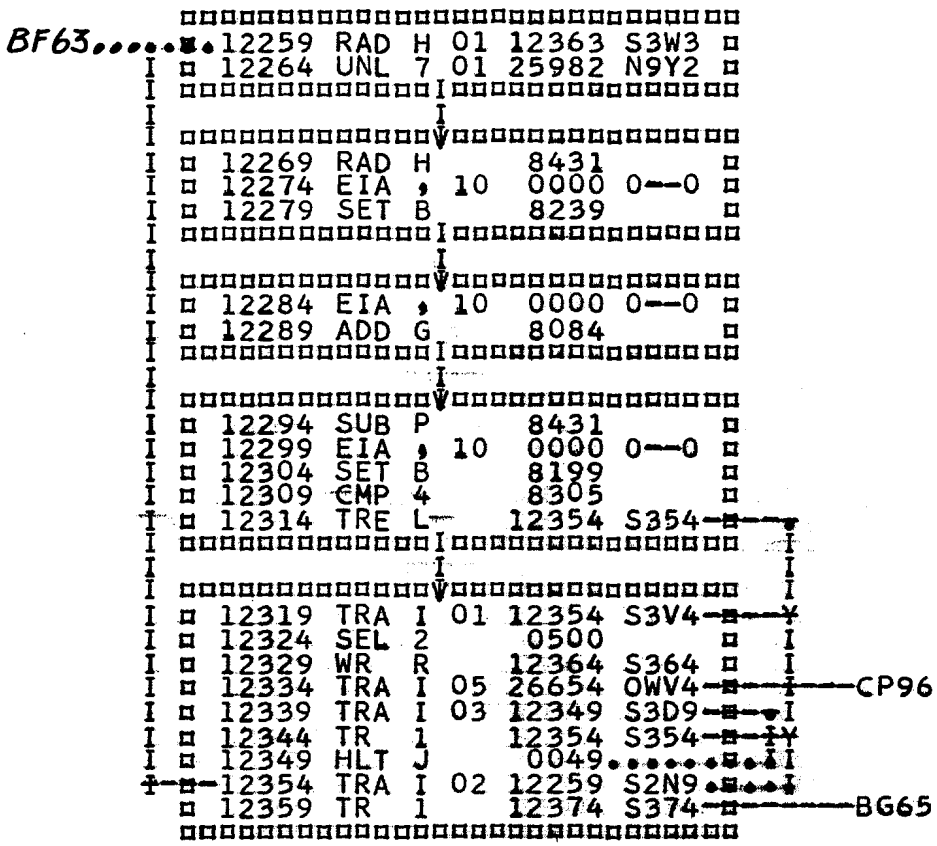
915 SW, TR TO LONG TYPEOUT

2 007 12251 X04H048
2 001 12252 □

gscans/g0013466.png

SECTION 4 TEST ROUTINES
ROUTINE #049

TEST ADD, SIGNS ALIKE PLUS
ADD TEST NUMBER 1 FROM
ADDRESS #1 TO TEST NUMBER 2
IN ACC



SAVE
ROUTINE NUMBER

RAD PLUS TEST NUMBER 2
AND SET LEFT TO LARGEST
LENGTH PLUS ONE FOR CARRY

ADD NUMBER ONE
AT ADDRESS #1

SUBTRACT PLUS NUMBER 2

SET TO LENGTH #1
AND COMPARE VERSUS CORRECT
ANSWER, NUMBER ONE.

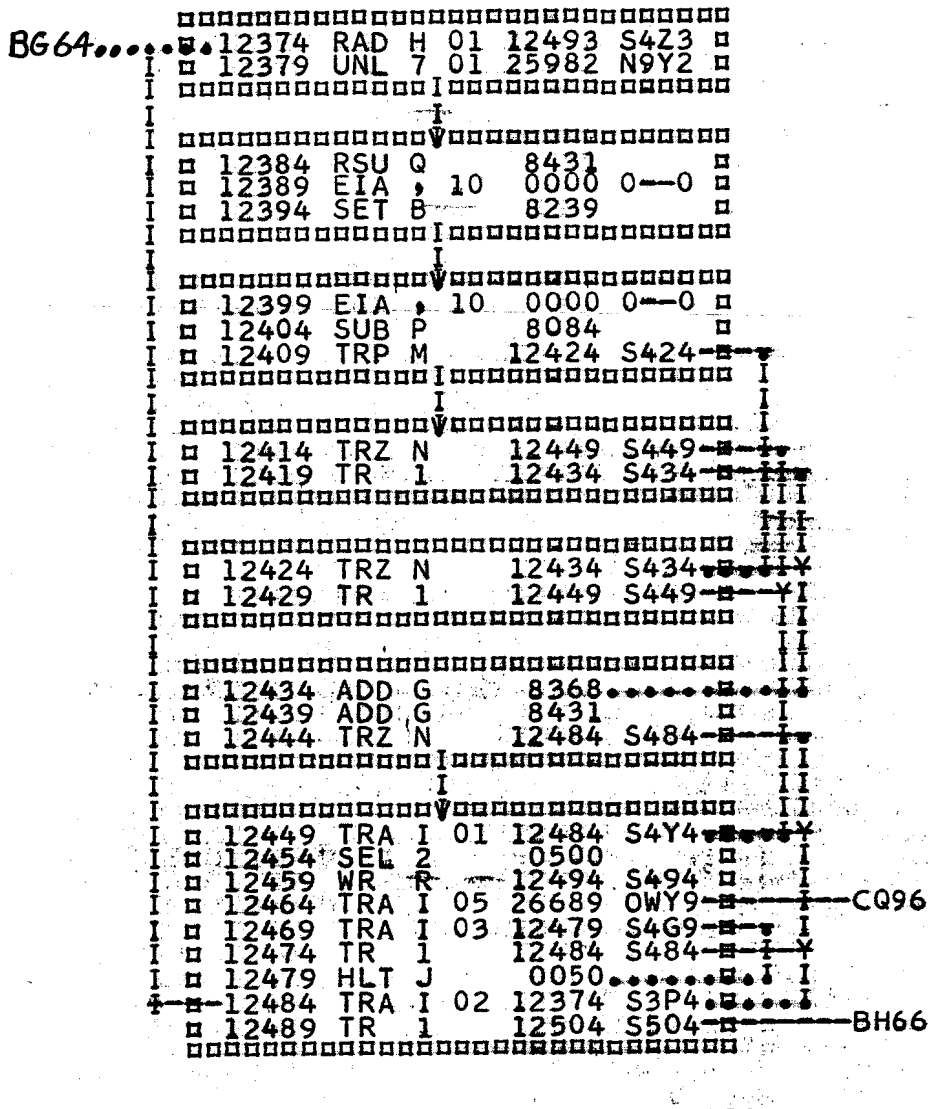
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 12366 X04I049
2 001 12367

g ns/g0013394.png

SECTION 4 TEST ROUTINES
ROUTINE #050
TEST SUB SIGNS OPPOSITE
SUBTRACT PLUS NUMBER 1 AT
ADDRESS #1 FROM MINUS
NUMBER 2 IN ACC.



SAVE
ROUTINE NUMBER

RSU PLUS NUMBER 2
AND SET LEFT TO LARGEST
LENGTH PLUS ONE, FOR CARRY

SUBTRACT NUMBER ONE
AT ADDRESS #1.
AND TEST SIGN

IF MINUS TEST FOR NOT ZERO

IF PLUS TEST FOR ZERO
ERROR

ADD PLUS NUMBER ONE
ADD PLUS NUMBER TWO
AND TEST FOR CORRECT ZERO

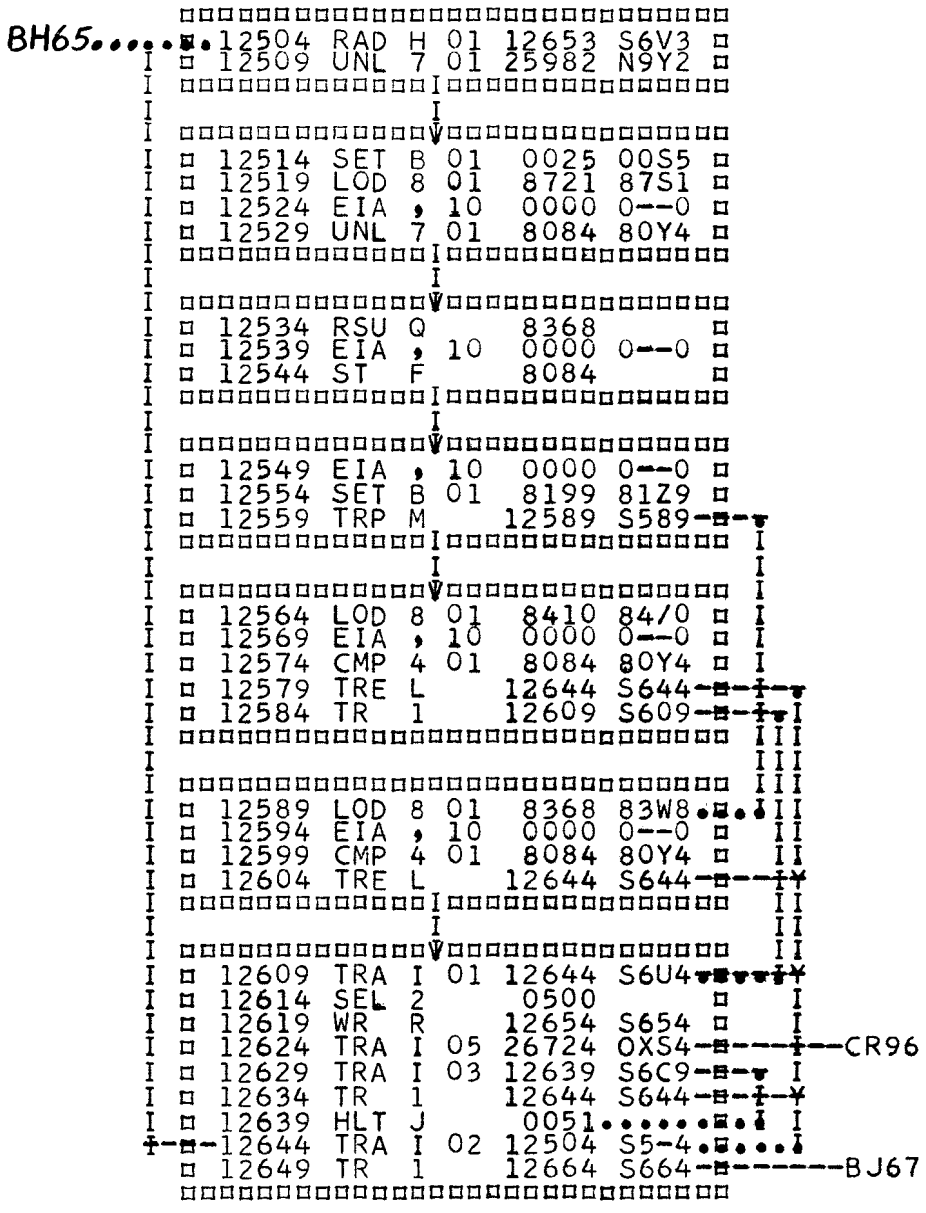
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 12496 X05&050
2 001 12497

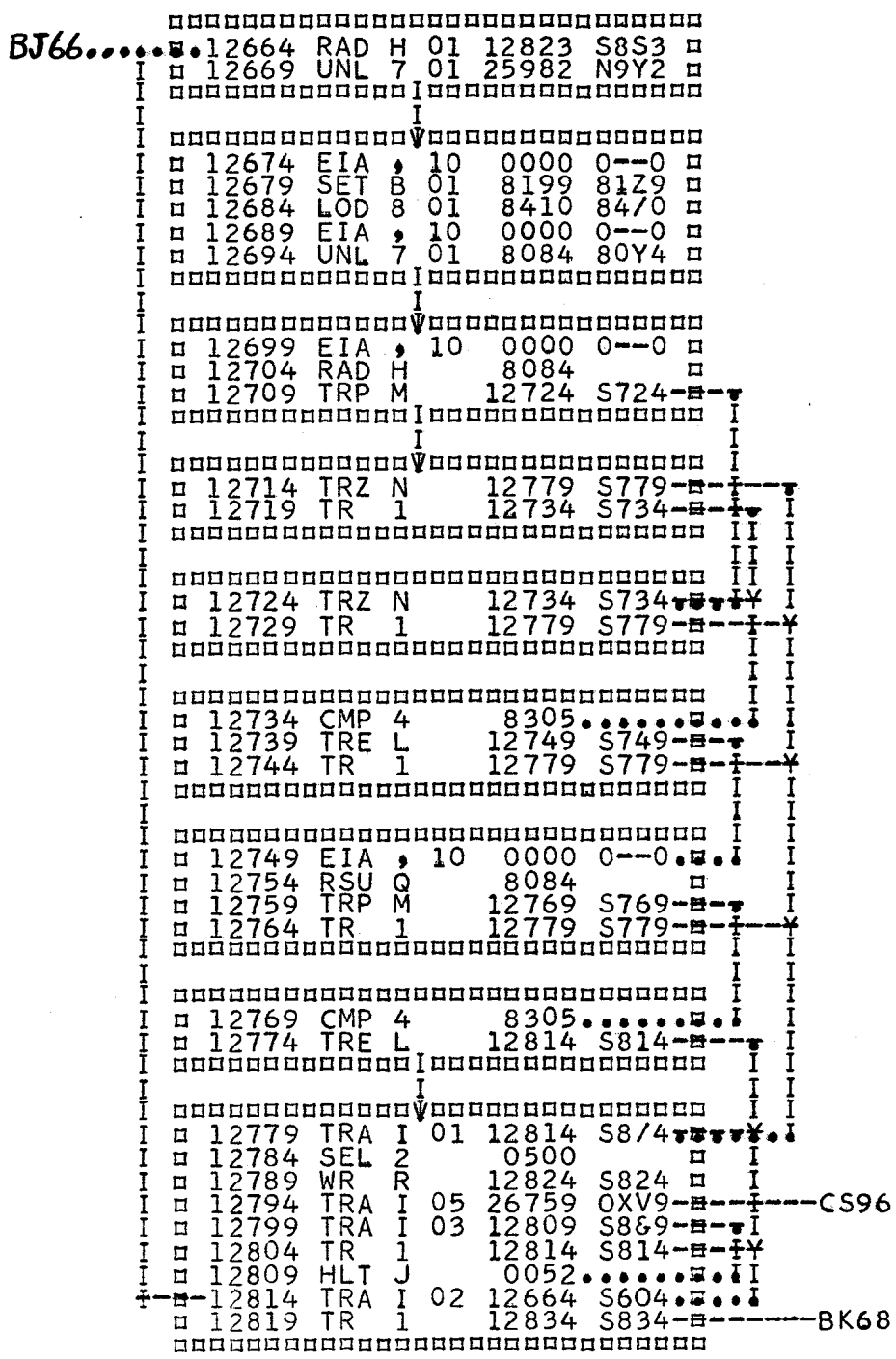
gscans/g0013465.png

SECTION 4 TEST ROUTINES
ROUTINE #051
TEST STORE INSTRUCTION
SIGN MINUS UNLESS ZERO FIELD
IN WHICH CASE, SIGN PLUS.
STORE TEST NUMBER 1 FROM ACC
IN MEMORY AT ADDRESS #1.



2 007 12656 X05A051
2 001 12657

SECTION 4 TEST ROUTINES
ROUTINE #052
TEST RAD AND RSU MINUS
USE NUMBER ONE AT ADDRESS #1
INTO ACC.



SAVE
ROUTINE NUMBER 1

SET LENGTH #1
LOD TEST NUMBER ONE - MINUS
AND
SET UP ADDRESS #1

DO RAD MINUS NUMBER ONE
FROM ADDRESS #1 AND
TEST SIGN

ERROR
IF MINUS, TEST NOT ZERO

IF PLUS, TEST FOR ZERO
ERROR

COMPARE RAD RESULT
VERSUS UNSIGNED NUMBER 1
ERROR

DO RSU MINUS NUMBER ONE
FROM ADDRESS #1.
TEST FOR SIGN PLUS
ERROR

COMPARE RSU RESULT

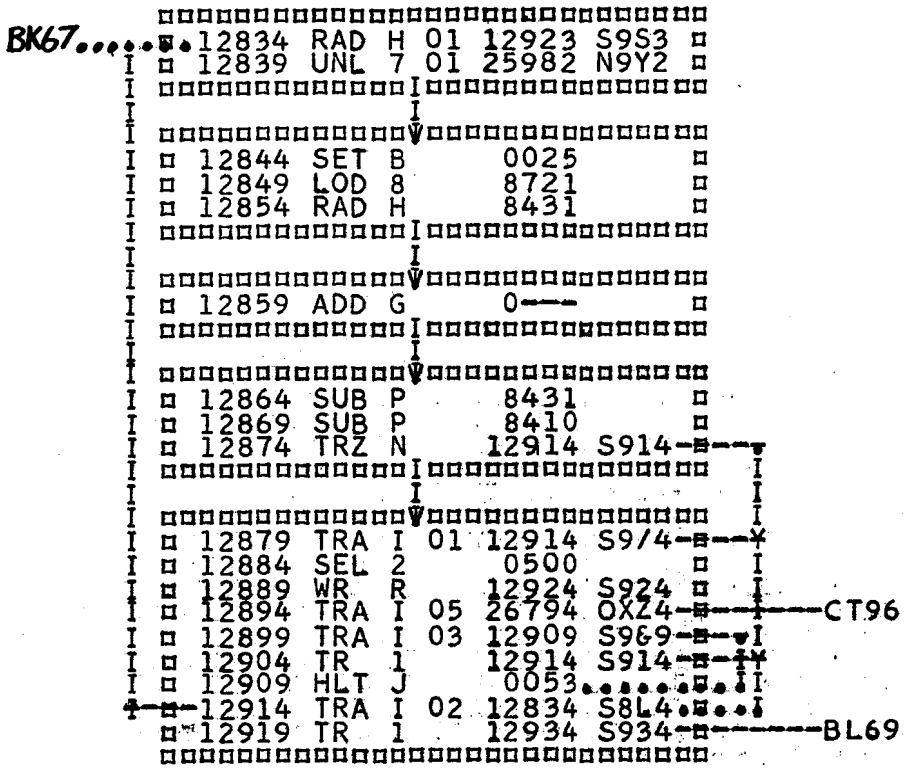
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 12826 X05B052
2 001 12827

SECTION 4 TEST ROUTINES
ROUTINE #053

TEST ADD SIGNS OPPOSITE
ADD MINUS NUMBER ONE AT
ADDRESS #1 TO PLUS NUMBER 2.



SAVE
ROUTINE NUMBER

PRESET STORAGE WITH
25 CHARACTERS AND
RAD PLUS NUMBER 2.

ADD NUMBER 1 AT ADDR. #1

SUB PLUS NUMBER 2
SUB MINUS NUMBER 1
AND TEST FOR CORRECT ZERO

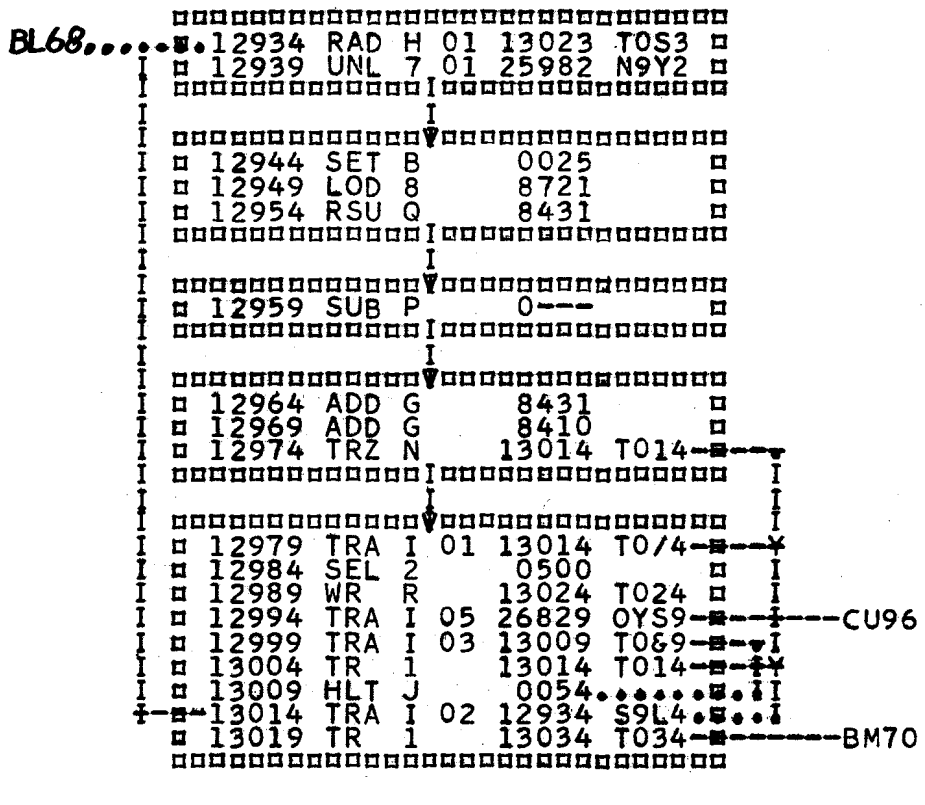
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 12926 X05C053
2 001 12927

SECTION 4 TEST ROUTINES
ROUTINE #054

TEST SUB SIGNS ALIKE
SUBTRACT MINUS NUMBER ONE
AT ADDRESS #1 FROM MINUS
NUMBER 2.



SAVE
ROUTINE NUMBER

PRESET STORAGE WITH
25 CHARACTERS AND
RSU PLUS NUMBER 2

SUB NUMBER 1 AT ADDR. #1

ADD PLUS NUMBER 2
ADD MINUS NUMBER 1
AND TEST FOR CORRECT ZERO

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

```
2 007 13026                    X05D054
2 001 13027                    ¤
```

gscans/g0013463.png

SECTION 4 TEST ROUTINES
ROUTINE #055

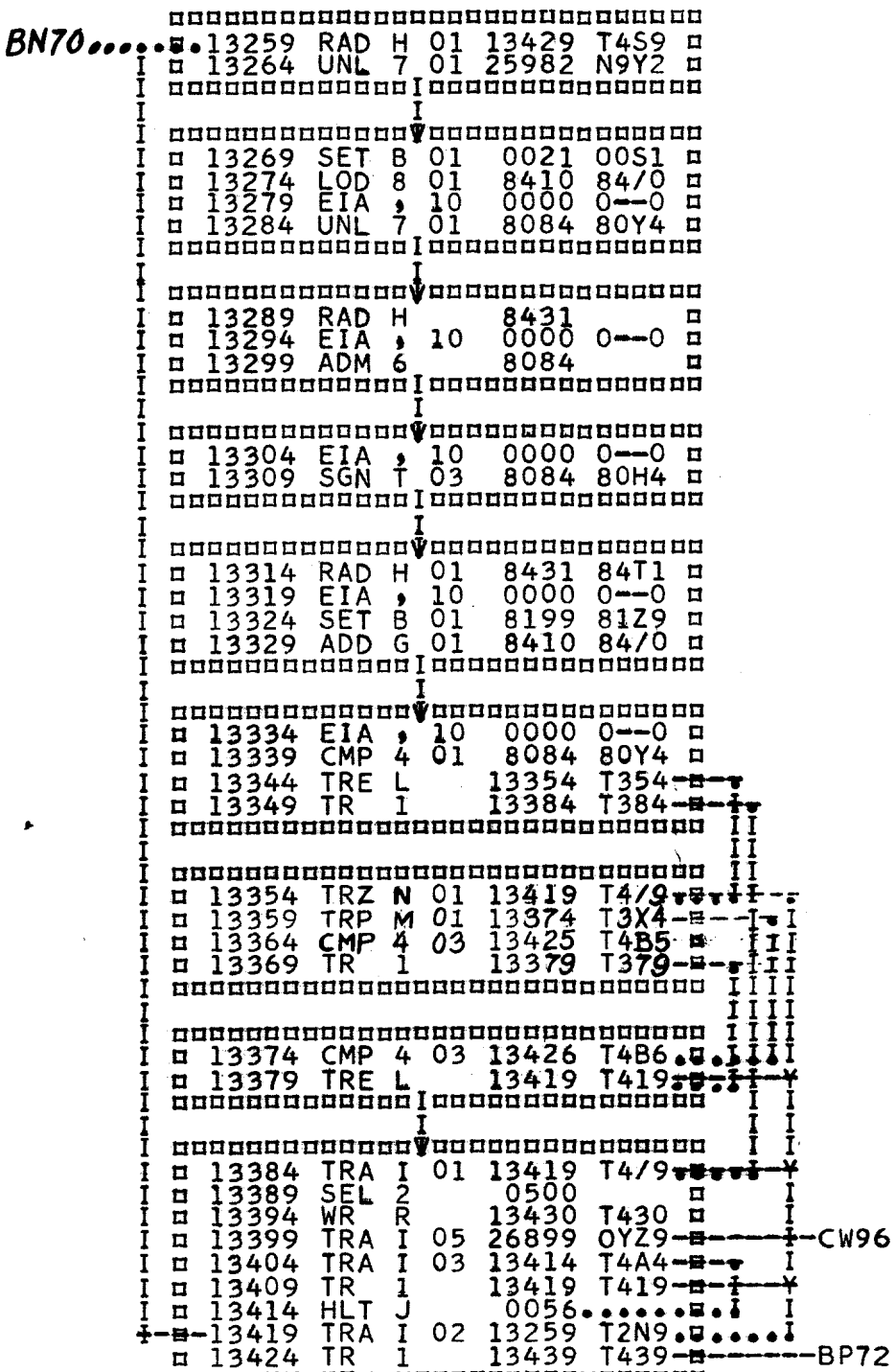
TEST SIGNED ADM, SIGNS ALIKE.
ADM PLUS NUMBER 2 IN ACC TO
PLUS NUMBER 1 IN ADDRESS #1.

```
BM69.....13034 RAD H 01 13248 T2U8    SAVE
        13039 UNL 7 01 25982 N9Y2    ROUTINE NUMBER
                     I
                     V
        13044 SET B 01   0025 00S5    PRESET MEMORY AT
        13049 LOD 8 01   8721 87S1    ADDRESS #1 WITH
        13054 EIA , 10   0000 0--0    25 CHARACTERS
        13059 UNL 7 01   8084 80Y4    RAD PLUS NUMBER ONE
        13064 RAD H 01   8368 83W8    AND STORE IT IN ADDRESS #1
        13069 EIA , 10   0000 0--0
        13074 ST  F 01   8084 80Y4    SAVE THE NON-NUMERIC
        13079 SET B 01   0001 00 1    CHARACTER TO THE LEFT OF
        13084 EIA , 10   0000 0--0    NUMBER ONE AT ADDRESS #1
        13089 LOD 8 01   8104 81 4    PRESET ACC
        13094 SET B      0025         WITH 25 CHARACTERS AND
        13099 LOD 8      8721         RAD PLUS NUMBER 2.
        13104 RAD H      8431
                     I
                     V
        13109 EIA , 10   0000 0--0
        13114 ADM 6      8084         DO ADM
                     I
                     V
        13119 EIA , 10   0000 0--0    TEST THE NON-NUMERIC
        13124 CMP 4 01   8104 81 4    TERMINATING CHARACTER
        13129 TRE L     13139 T139    FOR NO CHANGE
        13134 TR  1     13204 T204    ERROR
        13139 EIA , 10   0000 0--0    PICK SIGN OFF ADM RESULT
        13144 SGN T 01   8084 80Y4    AT ADDRESS #1
        13149 TRP M 01  13159 T1V9    AND TEST FOR PLUS
        13154 TR  1     13204 T204    ERROR
        13159 RAD H 01   8368 83W8    COMPUTE CORRECT ADM RESULT
        13164 EIA , 10   0000 0--0      RAD PLUS NUMBER 1
        13169 SET B 01   8239 82T9      SET LEFT FOR CARRY
        13174 ADD G 01   8431 84T1      ADD PLUS NUMBER 2
        13179 EIA , 10   0000 0--0
        13184 SET B 01   8199 81Z9      SET LENGTH #1
        13189 EIA , 10   0000 0--0
        13194 CMP 4 01   8084 80Y4    CMP CORRECT ANSWER VERSUS
        13199 TRE L     13239 T239    RESULT IN ADDRESS #1
                     I                  II
                     V                  II
        13204 TRA I 01 13239 T2T9       II
        13209 SEL 2      0500           I
        13214 WR  R     13249 T249      I
        13219 TRA I 05 26864 OYW4---CV96   915 SW, TR TO LONG TYPEOUT
        13224 TRA I 03 13234 T2C4       I
        13229 TR  1     13239 T239
        13234 HLT J      0055.....      I
    -13239 TRA I 02 13034 T0L4....
        13244 TR  1     13259 T259-------BN71
```

2 007 13251 X05E055
2 001 13252

g ns/g0013397.png

SECTION 4 TEST ROUTINES
ROUTINE #056
TEST SIGNED ADM SIGNS OPPOSIT
ADM PLUS NUMBER 2 IN ACC TO
MINUS NUMBER 1 IN ADDRESS #1.



SET UP ADDRESS #1
WITH MINUS NUMBER 1

RAD PLUS NUMBER 2
AND
DO ADM

PICK SIGN OFF ADM
RESULT AT ADDRESS #1

ADD NUMBER 1 MINUS
TO NUMBER 2 PLUS IN
STORAGE

COMPARE CORRECT RESULT
VERSUS ADM RESULT IN
ADDRESS #1.
ERROR

TEST SIGN OF CORRECT RESULT
IF MINUS THAN
TEST ADM SIGN
RESULT FOR MINUS

ERROR ROUTINE

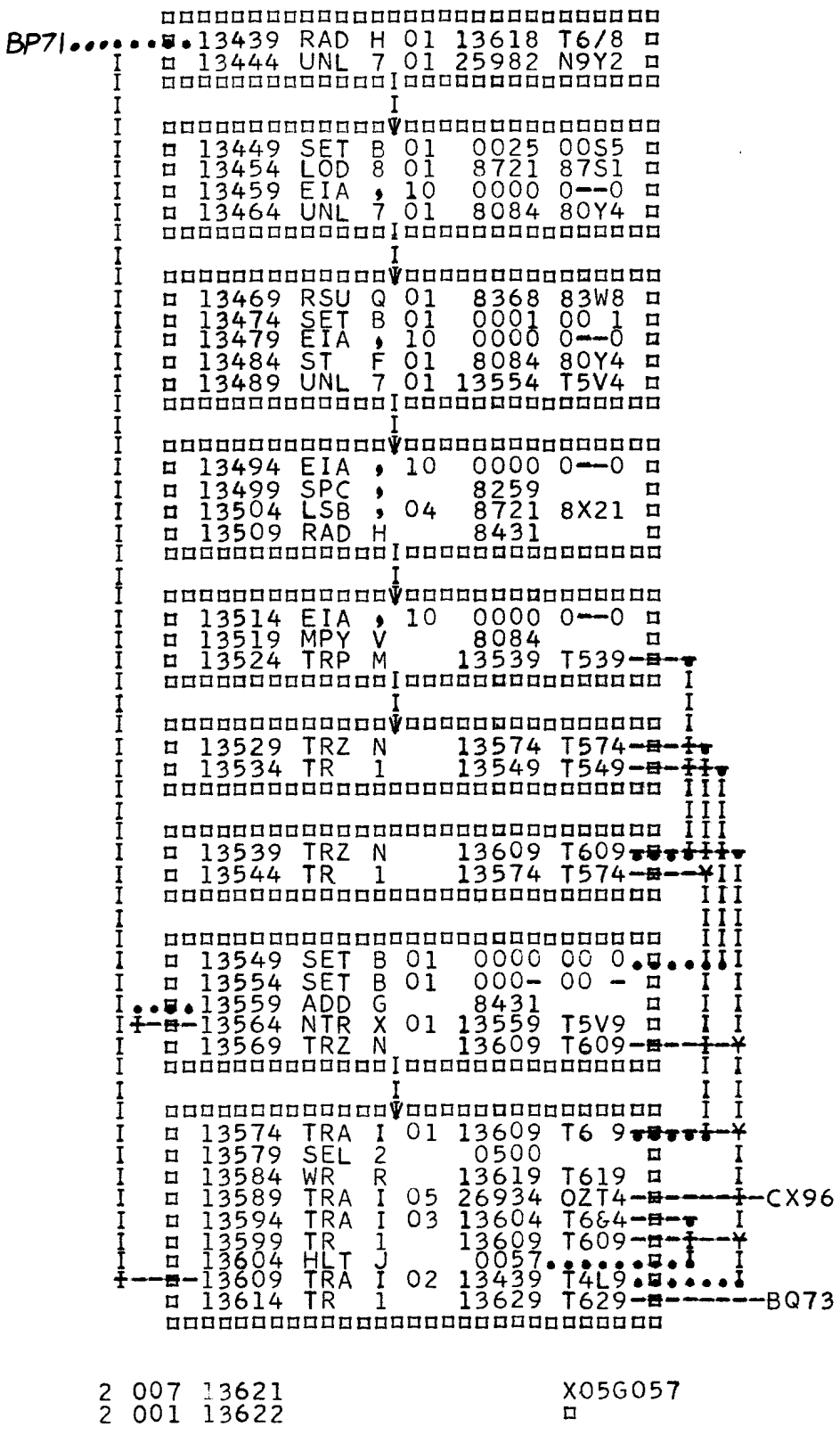
915 SW, TR TO LONG TYPEOUT

2 008 13432 -&05F056
2 001 13433

gscans/g0013462.png

SECTION 4 TEST ROUTINES
ROUTINE #057

TEST MPY SIGNS OPPOSITE
MULTIPLIER IS PLUS NUMBER 2
MULTIPLICAND IS MINUS UNITS
DIGIT OF NUMBER 1.



PRESET ADDRESS #1
WITH 25 CHARACTERS

SET UP ADDRESS #1 WITH
UNITS DIGIT OF NUMBER 1

SET UP ADD LOOP

SET UP SPC
PRESET STORAGE BANK
AND RAD PLUS NUMBER 2

DO MPY

CHECK SIGN

IF SIGN MINUS TEST NOT ZERO

IF SIGN PLUS, RESULT MUST
BE ZERO

SET UP FOR NTR LOOP WHICH
WILL ADD NUMBER 2 TO
OBTAIN ZERO

ERROR ROUTINE

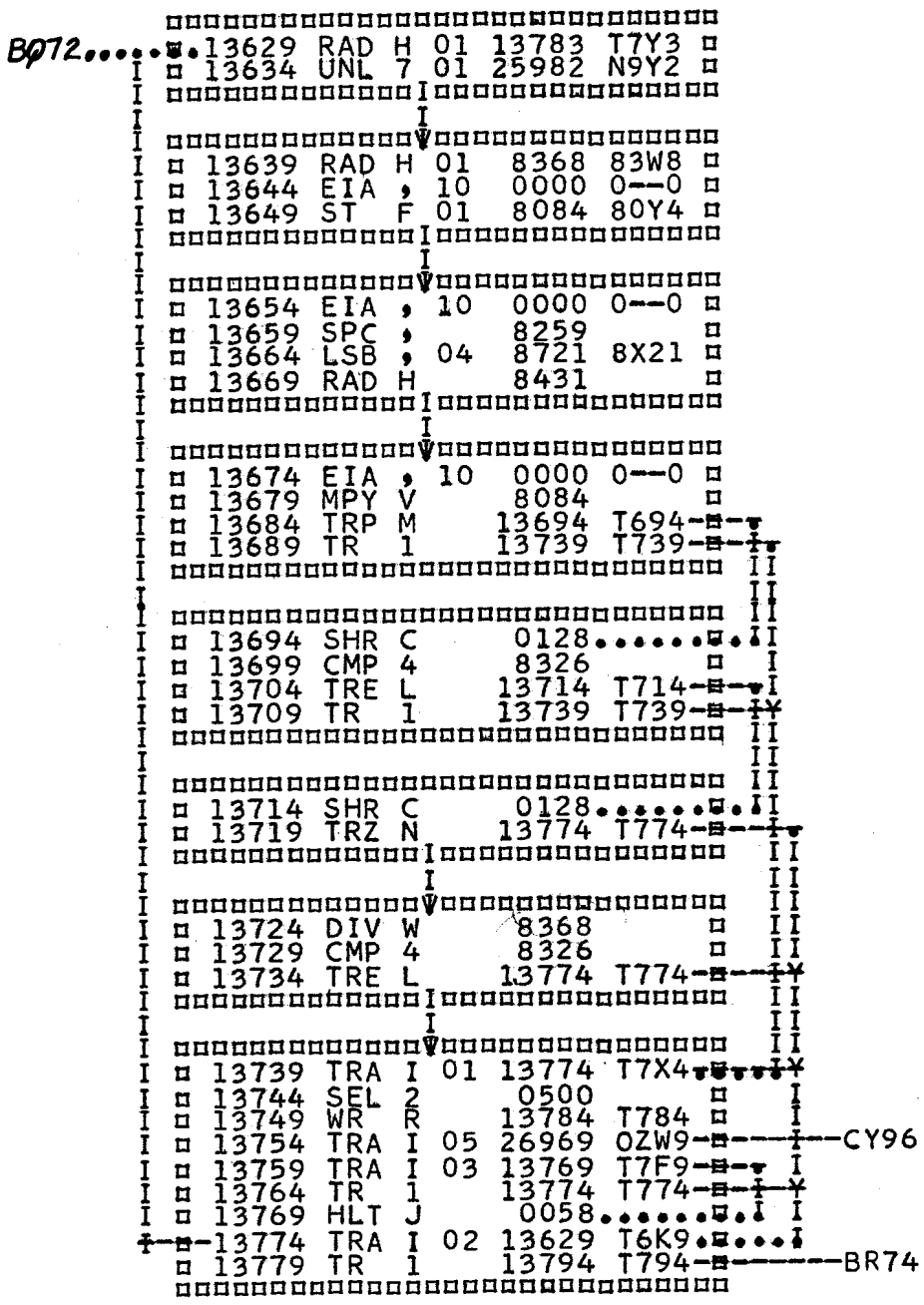
915 SW, TR TO LONG TYPEOUT

2 007 13621 X05G057
2 001 13622

gr ns/g0013398.png

SECTION 4 TEST ROUTINES
ROUTINE #058

TEST MULTIPLY SIGNS ALIKE
MULTIPLY PLUS NUMBER 1 AT
ADDRESS #1 TIMES PLUS
NUMBER 2 IN ACC. CHECK
ANSWER USING DIVIDE.



SAVE
ROUTINE NUMBER

SET UP MULTIPLICAND AT
ADDRESS #1 EQUAL TO
PLUS NUMBER 1.

SET UP SPC
PRESET STORAGE BANK
RAD PLUS NUMBER 2

DO MPY
AND
TEST PLUS
ERROR

SHORTEN TO MULTIPLIER AND
TEST FOR NO CHANGE

SHORTEN TO RESULT AND IF
ZERO, BYPASS DIVIDE CHECK

DIV BY PLUS NUMBER 1, ANSWER
SHOULD BE EQUAL TO
NUMBER 2.

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 13786
2 001 13787

X05H058

gscans/g0013461.png

SECTION 4 TEST ROUTINES
ROUTINE #059

TEST DIVIDE SIGNS OPPOSITE
DIVIDE PLUS NUMBER 2 IN ACC
BY SINGLE DIGIT DIVISOR EQUAL
TO UNITS DIGIT OF NUMBER 1 IN
ADDRESS #1. CHECK BY ADDITION

```
BR73.....13794  RAD  H  01  14042  U0U2
        13799  UNL  7  01  25982  N9Y2   SAVE
        13804  RSU  Q  01   8368  83W8   ROUTINE NUMBER
        13809  SET  B  01   0001  00 1   RAD UNITS DIGIT OF NUMBER 1
        13814  TRZ  N  01  14009  U0 9   AND IF ZERO, DO NOT DO
        13819  EIA  ,  10   0000  0--0   DIVIDE.
        13824  ST   F  01   8084  80Y4   IF NOT ZERO, THEN SET UP
        13829  UNL  7  01  13949  T9U9   ONE DIGIT DIVISOR AT ADDR. #1
        13834  EIA  ,  10   0000  0--0   SAVE DIGIT FOR ADD LOOP
        13839  SPC  ,       8259
        13844  LSB  ,  04   8721  8X21   SET UP SPC
        13849  RAD  H       8431       PRESET STORAGE BANK
        13854  EIA  ,  10   0000  0--0   RAD NUMBER 2 AS DIVIDEND
        13859  SET  B       8234       AND SET LENGTH #2 PLUS ONE TO
                                        PUT ZERO ON LEFT OF DIVIDEND
        13864  EIA  ,  10   0000  0--0
        13869  DIV  W       8084       DO DIVIDE, DIVISOR AT ADDR. #1
        13874  TRP  M      13889  T889  CHECK SIGN
        13879  TRZ  N      13974  T974   IF RESULT MINUS, TEST
        13884  TR   1      13899  T899   NOT ZERO.
        13889  TRZ  N      13899  T899   IF RESULT PLUS TEST ZERO
        13894  TR   1      13974  T974
        13899  ST   F      14036  U036   STORE QUOTIENT
        13904  SHR  C       0127       SHORTEN TO REMAINDER
        13909  SET  B       0001
        13914  ST   F      14038  U038   AND STORE IT
        13919  SB   %  13  14036  U&T6   SET PLUS SIGNS ON QUOTENT
        13924  SB   %  13  14038  U&T8   AND REMAINDER.
        13929  RAD  H  01  14038  U0T8   RAD REMAINDER
        13934  EIA  ,  10   0000  0--0
        13939  SET  B  01   8224  82S4   SET LENGTH #2
        13944  SET  B  03   0000  00&0
        13949  SET  B  03   000-  00&-   SET UP ADD LOOP
        13954  ADD  G  01  14036  U0T6   ADD QUOTIENT TO GET
        13959  NTR  X  03  13954  T9E4   ORIGINAL DIVIDEND WHICH
        13964  CMP  4  01   8326  83S6   IS EQUAL TO NUMBER 2
        13969  TRE  L      14009  U009
        13974  TRA  I  01  14009  U0 9   ERROR ROUTINE
        13979  SEL  2       0500
        13984  WR   R      14043  U043
        13989  TRA  I  05  27004  P  4-CZ00  915 SW, TR TO LONG TYPEOUT
        13994  TRA  I  03  14004  U0&4
        13999  TR   1      14009  U009
        14004  HLT  J       0059
        14009  TRA  I  02  13794  T7R4
        14014  TR   1      14054  U054-BS75
```

CONSTANTS AND SAVE AREAS
FOR QUOTIENT AND REMAINDER

```
2 022 14036              X-------------------- QUOTIENT
2 002 14038              X-  REMAINDER
2 007 14045              X05I059
2 001 14046              ¤
```

g ans/g0013399.png

SECTION 4 TEST ROUTINES
ROUTINE #060
TEST DIVIDE SIGNS ALIKE PLUS
CHECK ANSWER WITH MPY.

```
BS74                14054 RAD H 01 14320 U3S0        SAVE
                    14059 UNL 7 01 25982 N9Y2        ROUTINE NUMBER

                    14064 RAD H 01  8368 83W8
                    14069 TRZ N 01 14249 U2U9        IF NUMBER1 IS ZERO DO NOT
                    14074 EIA , 10  0000 0--0        DO DIVIDE. IF NOT ZERO, THEN
                    14079 ST  F 01  8084 80Y4        SET UP ADDRESS #1 WITH
                    14084 EIA , 10  0000 0--0        PLUS  NUMBER 1 AS DIVISOR
                    14089 SPC ,     8259             SET UP SPC
                    14094 LSB , 04  8721 8X21        PRESET STORAGE BANK
                    14099 RAD H     8431             RAD NUMBER 2 AS DIVIDEND
                    14104 EIA , 10  0000 0--0
                    14109 SHR C     8224             SHORTEN TO LEFT END OF
                    14114 EIA , 10  0000 0--0        DIVIDEND AND PLACE ZEROS
                    14119 SET B     8199             EQUAL TO LENGTH OF DIVISOR
                    14124 EIA , 10  0000 0--0
                    14129 SPC ,     8259             SET UP SPC

                    14134 EIA , 10  0000 0--0
                    14139 DIV W     8084             DO DIVIDE
                    14144 TRP M    14154 U154        AND TEST PLUS
                    14149 TR  1    14214 U214        ERROR

                    14154 ST  F    14295 U295        STORE QUOTIENT
                    14159 EIA , 10  0000 0--0
                    14164 LNG D     8199             LNG LENGTH #1.
                    14169 SHR C     0128             LOCATE AND
                    14174 SET B     0020
                    14179 ST  F    14316 U316        STORE REMAINDER

                    14184 SPC ,     0000             RESET SPC
                    14189 RAD H     8368             RAD DIVISOR
                    14194 MPY V    14295 U295        MPY BY QUOTIENT
                    14199 ADD G    14316 U316        ADD REMAINDER
                    14204 SUB P     8431             SUB DIVIDEND, CORRECT
                    14209 TRZ N    14249 U249        ANSWER IS ZERO

                    14214 TRA I 01 14249 U2U9        ERROR ROUTINE
                    14219 SEL 2     0500
                    14224 WR  R    14321 U321
                    14229 TRA I 05 27039 P T9 -DA00  915 SW, TR TO LONG TYPEOUT
                    14234 TRA I 03 14244 U2D4
                    14239 TR  1    14249 U249
                    14244 HLT J     0060
                    14249 TRA I 02 14054 U0N4
                    14254 TR  1    14329 U329 -A01   TO ROUTINE #061

                                                     CONSTANTS AND SAVE AREA
                                                     FOR REMAINDER AND QUOTIENT
2 041 14295                        X------------------------------------ QUOT.
2 021 14316                        X--------------------                 REMAINDER
2 007 14323                        X06&060
2 001 14324                        
```

gscans/g0013460.png

```
                                                    SECTION 4 TEST ROUTINES
                                                          ROUTINE #061
                                                    TEST BLMS IN ADDRESS #1 AS
                                                    MANY CHARACTERS AS LENGTH #1.
A75      14329 RAD H 01 14588 U5Y8
         14334 UNL 7 01 25982 N9Y2                  SAVE
         14339 EIA , 10  0000 0--0                  ROUTINE NUMBER
         14344 SPC ,     8259                       SET UP SPC
                  V
         14349 SET B 01  0025 00S5
         14354 LOD 8 01  8721 87S1                  PRESET ADDRESS #1 PLUS 5
         14359 EIA , 10  0000 0--0                  WITH 25 CHARACTERS
         14364 UNL 7 01  8094 80Z4
                  V
         14369 EIA , 10  0000 0--0                  RECEIVE AT LEFT END
         14374 RCV U     8109                       OF BLMS AREA
         14379 EIA , 10  0000 0--0                  AND
         14384 BLM $ 01  8199 81Z9                  DO BLMS
                  V
         14389 EIA , 10  0000 0--0
         14394 SET B 02  8199 81R9                  SET LENGTH #1
         14399 LOD 8 02 14534 U5L4                  LOD BLANKS AND
         14404 EIA , 10  0000 0--0                  CMP VERSUS ADDRESS #1.
         14409 CMP 4 02  8084 80Q4
         14414 TRE L    14424 U424-----
         14419 TR  1    14444 U444-----            ERROR
                                  II
                                  II
         14424 SET B 01  0005 00 5...II
         14429 EIA , 10  0000 0--0   I              COMPARE 5 CHARACTERS TO
         14434 CMP 4 01  8094 80Z4   I              RIGHT OF BLMS FIELD
         14439 TRE L    14479 U479-----            FOR NO CHANGE
                  V                 II
                                    II
         14444 TRA I 01 14479 U4X9-----             ERROR ROUTINE
         14449 SEL 2     0500       I
         14454 WR  R    14589 U589   I
         14459 TRA I 05 27074 P X4-------DD50       915 SW, TR TO LONG TYPEOUT
         14464 TRA I 03 14474 U4G4---  I
         14469 TR  1    14479 U479-----
         14474 HLT J     0061.....   I
         14479 TRA I 02 14329 U3K9...
         14484 TR  1    14599 U599---------B02

                                                    CONSTANTS AND BLANKS
2 050 14534
2 050 14584
2 007 14591                X06A061
2 001 14592                
```

gscans/g0013459.png

SECTION 4 TEST ROUTINES
ROUTINE #062
TEST BLM IN ADDRESS #1
NUMBER OF CHARACTERS
BLANKED EQUALS LENGTH #1
TIMES 5.

```
B01.....14599 RAD H 01 14748 U7U8
        14604 UNL 7 01 25982 N9Y2
                      I
                      V
        14609 SET B 01   0105 01 5
        14614 LOD 8 01   8721 87S1
        14619 EIA , 10   0000 0--0
        14624 UNL 7 01   8124 81S4
                      I
                      V
        14629 EIA , 10   0000 0--0
        14634 RCV U      8129
        14639 EIA , 10   0000 0--0
        14644 BLM $      8199
                      I
                      V
        14649 SET B 01   0005 00 5
        14654 EIA , 10   0000 0--0
        14659 CMP 4 01   8124 81S4
        14664 TRE L     14674 U674-----.
        14669 TR  1     14704 U704-----+-.
                                       | |
                                       | |
        14674 EIA , 10   0000 0--0.....+ |
        14679 SET B 01   8214 82/4       |
        14684 LOD 8 01 14584 U5Y4        |
        14689 EIA , 10   0000 0--0       |
        14694 CMP 4 01   8114 81/4       |
        14699 TRE L     14739 U739-------+-.
                      I                  | |
                      V                  | |
        14704 TRA I 01 14739 U7T9.....+  | |
        14709 SEL 2      0500         |  | |
        14714 WR  R     14749 U749    |  | |
        14719 TRA I 05 27109 P/ 9-----+--+-|---DE50
        14724 TRA I 03 14734 U7C4-----.  | |
        14729 TR  1     14739 U739-------+-+-.
        14734 HLT J      0062.....+.....+ | |
        14739 TRA I 02 14599 U5R9.....+...+ |
        14744 TR  1     14759 U759-----+-----|---C03
                                       |     |
                                       |     |
2 007 14751                            |     |
2 001 14752                            |     |
```

SAVE
ROUTINE NUMBER

PRESET ADDRESS #1
WITH 105 CHARACTERS

RECEIVE AT LEFT END
OF BLM AREA
AND DO BLM

CHECK 5 CHARACTERS TO
RIGHT OF BLM FIELD
FOR NO CHANGE

LOD BLANKS AND
COMPARE
VERSUS ADDRESS #1

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

X06B062

SECTION 4 TEST ROUTINES
ROUTINE #063

TEST TMTS. TEST FIELD IS MOVED FROM ADDRESS #1 TO ADDRESS #2.

```
C02.....14759 RAD H 01 14948 U9U8
       14764 UNL 7 01 25982 N9Y2
       14769 SET B 03  0025 00B5
       14774 LOD 8 03  8721 87B1
       14779 EIA , 10  0000 0--0
       14784 UNL 7 03  8154 81E4
       14789 LOD 8 03  8731 87C1
       14794 EIA , 10  0000 0--0
       14799 UNL 7 03  8094 80I4
       14804 EIA , 10  0000 0--0
       14809 SET B 01  8199 81Z9
       14814 EIA , 10  0000 0--0
       14819 RCV U     8159
       14824 EIA , 10  0000 0--0
       14829 TMT 9 01  8109 81 9
       14834 EIA , 10  0000 0--0
       14839 CMP 4 03  8094 80I4
       14844 TRE L     14854 U854
       14849 TR  1     14904 U904
       14854 LOD 8 01  8726 87S6
       14859 EIA , 10  0000 0--0
       14864 CMP 4 01  8149 81U9
       14869 TRE L     14879 U879
       14874 TR  1     14904 U904
       14879 SET B 03  0005 00&5
       14884 LOD 8 03  8721 87B1
       14889 EIA , 10  0000 0--0
       14894 CMP 4 03  8154 81E4
       14899 TRE L     14939 U939
       14904 TRA I 01  14939 U9T9
       14909 SEL 2      0500
       14914 WR  R     14949 U949
       14919 TRA I 05  27144 P/U4----DF50
       14924 TRA I 03  14934 U9C4
       14929 TR  1     14939 U939
       14934 HLT J      0063.....
  14939 TRA I 02  14759 U7N9....
       14944 TR  1     14959 U959--------D04
```

SAVE ROUTINE NUMBER

PRESET RCV FIELD WITH 25 CHARACTERS BY UNL TO ADDRESS #2 PLUS 5

SET UP TMTS AREA WITH 25 CHARACTER TEST FIELD AT ADDRESS #1 PLUS 5

SET ASU 01 TO LENGTH #1 RCV AT LEFT END OF ADDRESS #2, AND TMTS 1 TO 20 CHARACTERS FROM LEFT END OF ADDRESS #1.

CHECK TMTS FIELD AT ADDRESS #1 PLUS 5 FOR NO CHANGE ERROR

LOD KNOWN FIELD AND CMP VERSUS RECEIVED RESULT AT ADDRESS #2 ERROR

LOD 5 KNOWN CHARACTERS AND CHECK THAT FIELD TO RIGHT OF RCV AREA IS UNCHANGED.

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

```
2 007 14951                X06C063
2 001 14952
```

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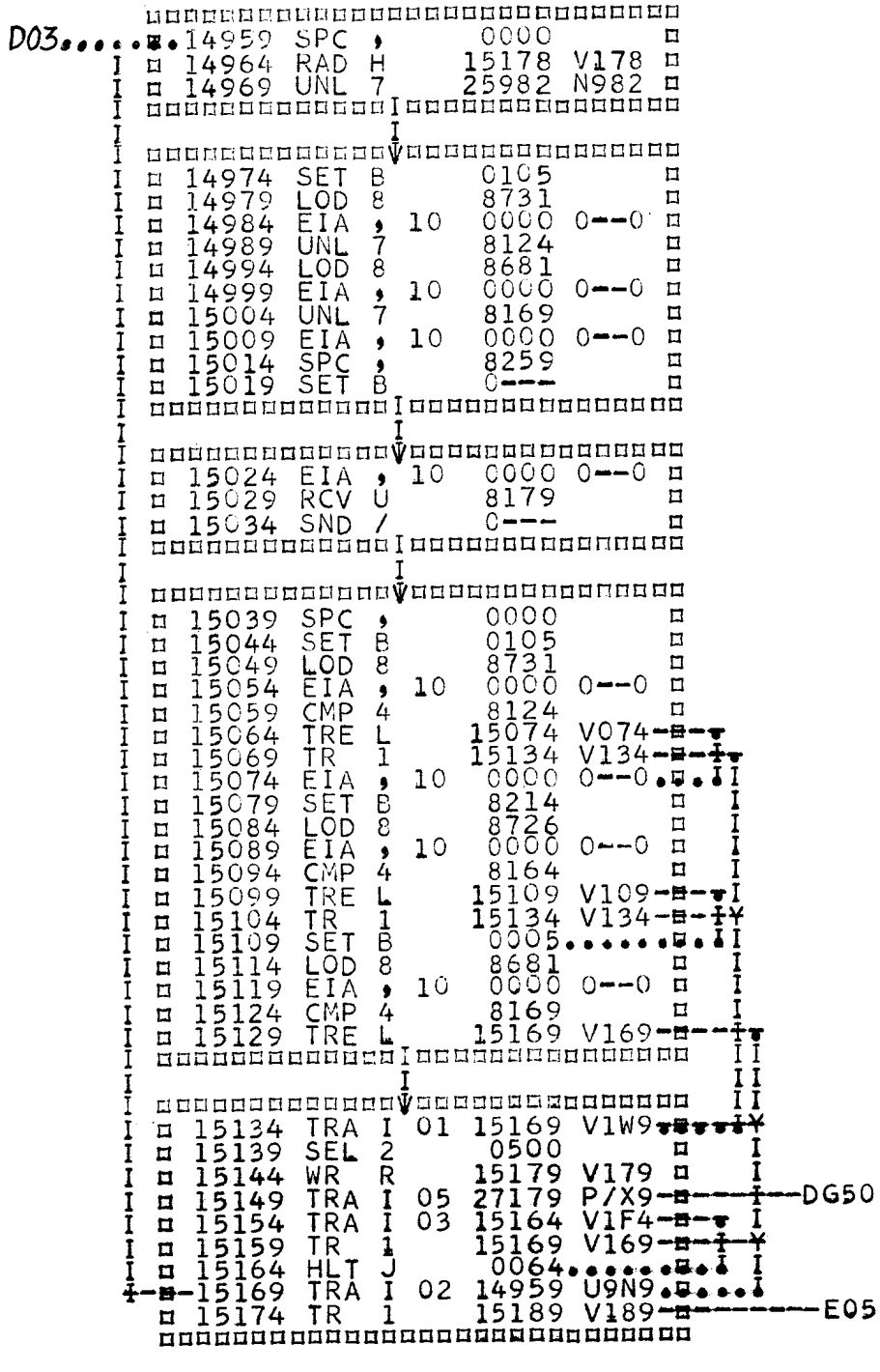
SECTION 4 TEST ROUTINES
ROUTINE #064

TEST SND INSTRUCTION.
TEST FIELD IS MOVED FROM
ADDRESS #1 TO ADDRESS #2
ADDR. #1 AND #2 ARE ADJUSTED
FOR 4/9 LOCATION. NUMBER
OF CHARACTERS IS LENGTH #1X5



RESET SPC
SAVE
ROUTINE NUMBER

SET UP SND AREA WITH
105 CHARACTER TEST FIELD
ADDRESS #1 PLUS 5

PRESET RCV AREA WITH
105 CHARACTERS BY UNL
TO ADDRESS #2 PLUS 5

SET UP SPC
SET STORAGE TO LENGTH #1

RCV AT LEFT END OF
ADDRESS #2 AND
SND FROM LEFT END OF ADDR. #1

TEST SEND FIELD AT
ADDRESS #1 PLUS 5 FOR
NO CHANGE

ERROR

SET TO LENGTH #1 TIMES 5,
AND TEST RCV FIELD
FOR CORRECT RESULT

TEST 5 CHARACTERS TO
RIGHT OF RCV AREA FOR
NO CHANGE

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 15181 X06D064
2 001 15182

SECTION 4 TEST ROUTINES
ROUTINE #065
TEST TMT INSTRUCTION
TEST FIELD IS MOVED FROM ADDRESS #1 TO ADDRESS #2. ADDR. #1 AND #2 ARE ADJUSTED FOR 4/9 LOCATION. NUMBER OF CHARACTERS MOVED IS LENGTH #1 TIMES 5.

```
E04.....15189 RAD H 01 15404 V4 4
       15194 UNL 7 01 25982 N9Y2
       15199 EIA , 10  0000 0--0
       15204 SPC ,     8259
                 I
                 V
       15209 SET B 01  0001 00 1     SAVE
       15214 LOD 8 01 15400 V4 0     ROUTINE NUMBER
       15219 EIA , 10  0000 0--0
       15224 UNL 7 01  8114 81/4     SET UP SPC
       15229 SET B 01  0105 01 5
       15234 LOD 8 01  8681 86Y1
       15239 EIA , 10  0000 0--0
       15244 UNL 7 01  8169 81W9
                 I
                 V
       15249 EIA , 10  0000 0--0     LOD RECORD MARK AND PLACE
       15254 RCV U     8179          IT AT RIGHT END OF TEST FIELD
       15259 EIA , 10  0000 0--0     AT ADDRESS #1
       15264 TMT 9     8129
                 I
                 V
       15269 EIA , 10  0000 0--0     PRESET RCV AREA WITH
       15274 SET B 01  8214 82/4     105 CHARACTERS BY UNL
       15279 EIA , 10  0000 0--0     TO ADDRESS #2 PLUS 5
       15284 LOD 8 01  8114 81/4
       15289 EIA , 10  0000 0--0
       15294 CMP 4 01  8164 81W4
       15299 TRE L    15309 V309-----
       15304 TR  1    15359 V359-----
       15309 SET B 01  0005 00 5.....
       15314 LOD 8 01  8731 87T1
       15319 EIA , 10  0000 0--0     RCV AT LEFT END
       15324 CMP 4 01  8124 81S4     OF ADDRESS #2
       15329 TRE L    15339 V339-----  AND TMT TEST FIELD FROM
       15334 TR  1    15359 V359-----  LEFT END OF ADDRESS #1
       15339 LOD 8 01  8681 86Y1.....
       15344 EIA , 10  0000 0--0
       15349 CMP 4 01  8169 81W9
       15354 TRE L    15394 V394-----
                 I
                 V
       15359 TRA I 01 15394 V3Z4-----
       15364 SEL 2     0500
       15369 WR  R    15405 V405
       15374 TRA I 05 27214 PS/4-----DH50
       15379 TRA I 03 15389 V3H9-----
       15384 TR  1    15394 V394-----
       15389 HLT J     0065.....
       15394 TRA I 02 15189 V1Q9.....
       15399 TR  1    15414 V414-----F06
```

SET LENGTH #1 TIMES 5

LOD TMT FIELD
AND
CMP VERSUS RCV FIELD

TEST 5 CHARACTERS TO RIGHT OF TMT FIELD AT ADDRESS #1 PLUS 5 FOR NO CHANGE

TEST 5 CHARACTERS TO RIGHT OF RCV FIELD AT ADDRESS #2 PLUS 5 FOR NO CHANGE

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

```
2 001 15400          #
2 007 15407          X06E065
2 001 15408
```

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SECTION 4 TEST ROUTINES
ROUTINE #066

TEST TCT INSTRUCTION
10 TO 100 CHARACTER TEST FIELD
IS MOVED FROM ADDRESS #1
TO ADDRESS #2. BOTH ADDR. #1
AND ADDR. #2 ARE ADJUSTED
FOR A 9 LOCATION.

```
F05....  15414 RAD H 01 15634 V6T4
         15419 UNL 7 01 25982 N9Y2
                                          SAVE
                                          ROUTINE NUMBER
         15424 SET B 01  0110 01/0
         15429 LOD 8 01  8681 86Y1        PRESET RCV AREA WITH
         15434 EIA , 10  0000 0--0        110 CHARACTERS AT
         15439 UNL 7 01  8194 81Z4        ADDRESS #2 PLUS 10
         15444 LOD 8 01  8731 87T1        SET UP 110 CHARACTER
         15449 EIA , 10  0000 0--0        TCT TEST FIELD AT
         15454 UNL 7 01  8144 81U4        ADDRESS #1 PLUS 10
         15459 SET B 01  0001 00 1
         15464 LOD 8 01 15630 V6T0        PLACE RECORD MARK AT
         15469 EIA , 10  0000 0--0        RIGHT END OF TCT FIELD
         15474 UNL 7 01  8134 81T4        AT ADDRESS #1
                                          RCV AT LEFT END OF
         15479 EIA , 10  0000 0--0        ADDRESS #2
         15484 RCV U     8189             DO TCT FROM LEFT END
         15489 EIA , 10  0000 0--0        OF ADDRESS #1
         15494 TCT , 08  8139 8J39
                                          SET TO LENGTH OF TCT FIELD
         15499 EIA , 10  0000 0--0
         15504 SET B 01  8244 82U4        LOD TCT FIELD FROM ADDRESS #1
         15509 EIA , 10  0000 0--0        AND COMPARE
         15514 LOD 8 01  8134 81T4        VERSUS RCV FIELD AT ADDRESS #2
         15519 EIA , 10  0000 0--0
         15524 CMP 4 01  8184 81Y4
         15529 TRE L    15539 V539
         15534 TR  1    15589 V589
         15539 SET B 01  0010 00/0
         15544 LOD 8 01  8731 87T1        TEST THAT 10 CHARACTERS
         15549 EIA , 10  0000 0--0        TO RIGHT OF TCT FIELD
         15554 CMP 4 01  8144 81U4        ARE UNCHANGED
         15559 TRE L    15569 V569
         15564 TR  1    15589 V589
         15569 LOD 8 01  8681 86Y1        TEST THAT 10 CHARACTERS
         15574 EIA , 10  0000 0--0        TO RIGHT OF RCV FIELD
         15579 CMP 4 01  8194 81Z4        ARE UNCHANGED
         15584 TRE L    15624 V624
                                          ERROR ROUTINE
         15589 TRA I 01 15624 V6S4
         15594 SEL 2     0500
         15599 WR  R    15635 V635
         15604 TRA I 05 27249 PSU9---DJ50 915 SW, TR TO LONG TYPEOUT
         15609 TRA I 03 15619 V6A9
         15614 TR  1    15624 V624
         15619 HLT J     0066
-        15624 TRA I 02 15414 V4J4
         15629 TR  1    15644 V644--------G07
```

```
2 001 15630                #
2 007 15637                X06F066
2 001 15638                
```

SECTION 4 TEST ROUTINES
ROUTINE #067
TEST TIP INSTRUCTION FOR STORING OF IC AND STATUS. TIP INSTRUCTION IS PLACED AT ADDRESS #1. STATUS STORED IS A FIXED VALUE. THIS ROUTINE IS IS BYPASSED DURING TAPE OVERLAP OPERATION-916 ON

```
G06...15644 NOP A     16789 W789-----------Q13   SW-BYPASS TO ROUTINE #072
                          I
                          V
H08...15649 SPC ,       0000                     RESET SPC
     15654 RAD H      15897 V897        067      SAVE
     15659 UNL 7      25982 N982                 ROUTINE NUMBER INT 250
                          I
                          V
     15664 RAD H      15894 V894                 TEST FOR WILD TRANSFER ON
     15669 TRP M      15829 V829-----------J08   PREVIOUS PROGRAM PASS
                          I
                          V
     15674 SET B       0004          address #1 + 5   PUT CORRECT IC VALUE
     15679 LOD 8       8124                       IN COMPARE CONSTANT
     15684 UNL 7      15892 V892
     15689 LOD 8       8114          address # 1
     15694 UNL 7      15909 V909                 SAVE IC LOCATION OF TIP
                          I
                          V
     15699 SPC ,       3700                       PRESET TEST FIELD
     15704 SET B       0032                       CASU 15.
     15709 LOD 8       8721
     15714 EIA , 10    0000 0--0
     15719 SPC ,       8259                       PRESET SPC-
     15724 EIA , 10    0000 0--0
     15729 RCV U       8149                       PRESET MACII EQUAL ADDR #2
     15734 EIA , 10    0000 0--0
     15739 SEL 2       8269.                      PRESET SEL REG.
                          I
                          V
     15744 SET B 01    0010 00/0
     15749 LOD 8 01 15789 V7Y9                    PLACE TIP INSTRUCTION
     15754 EIA , 10    0000 0--0                  AND SAFETY TRANSFER
     15759 UNL 7 01    8124 81S4                  AT ADDRESS#1
     15764 CMP 4 01 15884 V8Y4.                   CMP VS BLANKS TO SET HI IND.
     15769 SB  % 13 15894 VHZ4      A BIT TO 1    SET WILD TRANSFER INDICATOR
     15774 EIA , 10    0000 0--0                  133024
     15779 TR  1       8114-----------------     TRANSFER TO ADDRESS#1

     15784 TIP , 14 15794 VGR4-----------
     15789 TR  1    15804 V804-----------        THESE TWO INSTRUCTIONS
                                                 ARE PLACED IN ADDRESS#1
                                                  II
                                                  II
                                                  II
     15794 SET B 15    0008 0&&8.....           I
     15799 CMP 4 15 15892 VHI2                  I   TIP COMES HERE. COMPARE
     15804 SET B 15    0008 0&&8.....           I   CASU 15 FOR IC AND STATUS
     15809 SET B 15    0032 0&C2                    CLEAR CASU 15
     15814 LIP , 15    3700 3G&0                    TF INT. PROG. TRIGGER
     15819 SB  % 05 15894 VYZ4      A BIT TO 0    RESET WILD TRANSFER INDICATOR
     15824 TRE L    15864 V864-----------K08      TEST EQUAL
                          I
                          V
```

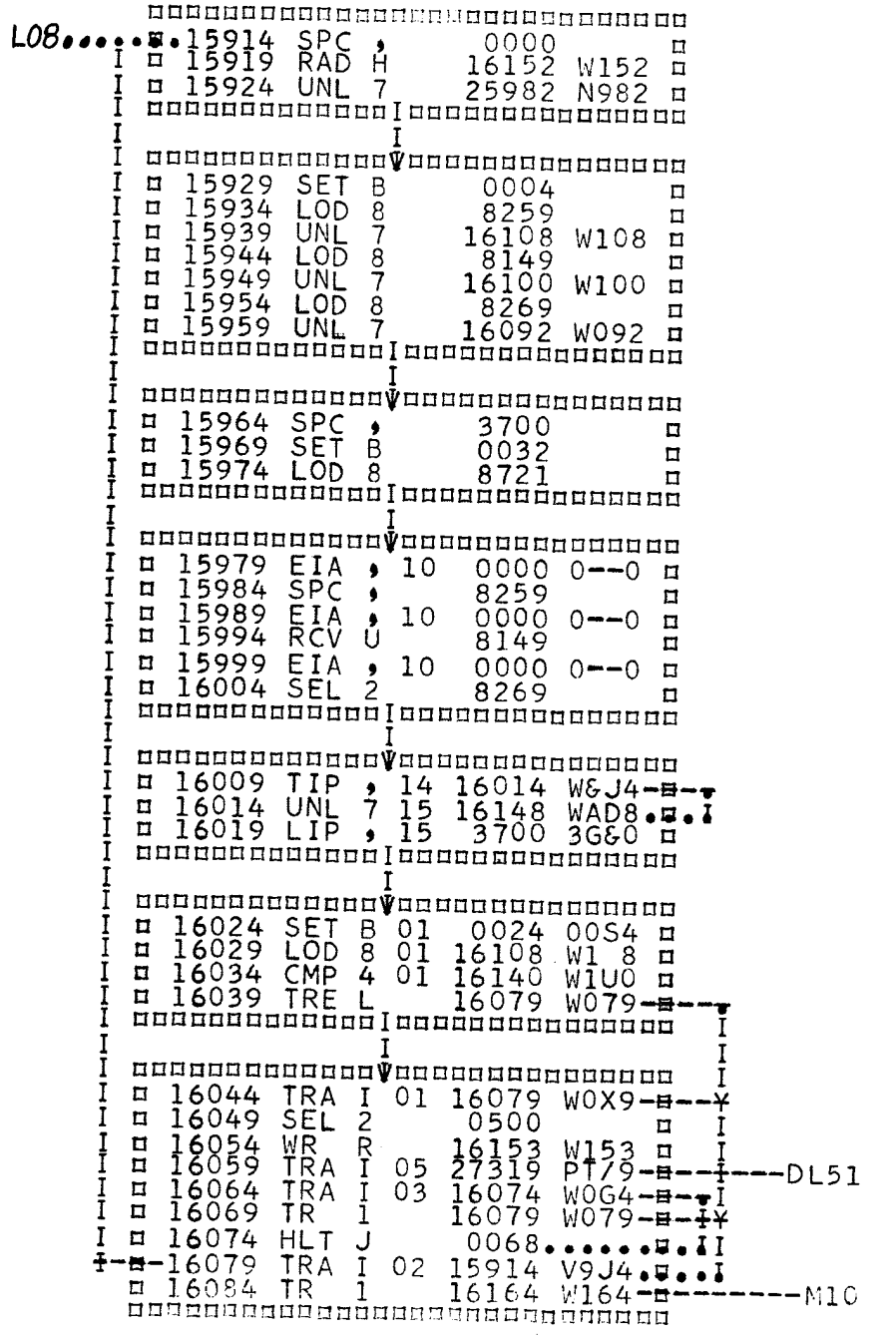
NEXT PAGE

```
J07..■.15829 TRA I 01 15864 V8W4-■---▼   0911   ERROR ROUTINE
  ■ 15834 SEL 2     0500       ■   I
  ■ 15839 WR  R     15898 V898 ■   I
  ■ 15844 TRA I 05 27284 PSY4-■---I---DK51 0915 SW, TR TO LONG TYPEOUT
  ■ 15849 TRA I 03 15859 V8E9-■---▼I
  ■ 15854 TR  1     15864 V864-■---▼▼  0913
  ■ 15859 HLT J      0067.....■.▼I
K07..■.15864 TRA I 02 15649 V6M9-▼■---I---H07 0912
  ■ 15869 SB  % 05 15894 VYZ4 ■   A BIT TO 0 RESET INDICATOR
  ■ 15874 TR  1     15914 V914-■-------L09
```

CONSTANTS

```
2 010 15884
2 008 15892          J&--XXXX ADDRESS #1 +5
2 008 15900          XJ06G067
2 001 15901          ■
2 008 15909          XXXX0000 IC LOCATION OF TIP
                     ADDRESS #1
```

SECTION 4 TEST ROUTINES
ROUTINE #068
TEST TIP INSTRUCTION FOR STORING OF SPC,MAC-2, AND SEL REG. THIS ROUTINE IS BYPASSED DURING TAPE OVERLAP OPERATION-916 ON



RESET SPC
SAVE
ROUTINE NUMBER

SET UP COMPARISON CONSTANT

CORRECT SPC VALUE
CORRECT MAC-2 VALUE
WHICH IS ADDRESS #2
CORRECT SR VALUE

PRESET CASU 15

SET SPC

SET MAC-II

SET SR

DO TIP
DUMP CASU 15
TF INT. PROG. TRIGGER

LOD COMPARISON CONSTANT
AND CMP VERSUS TIP RESULT

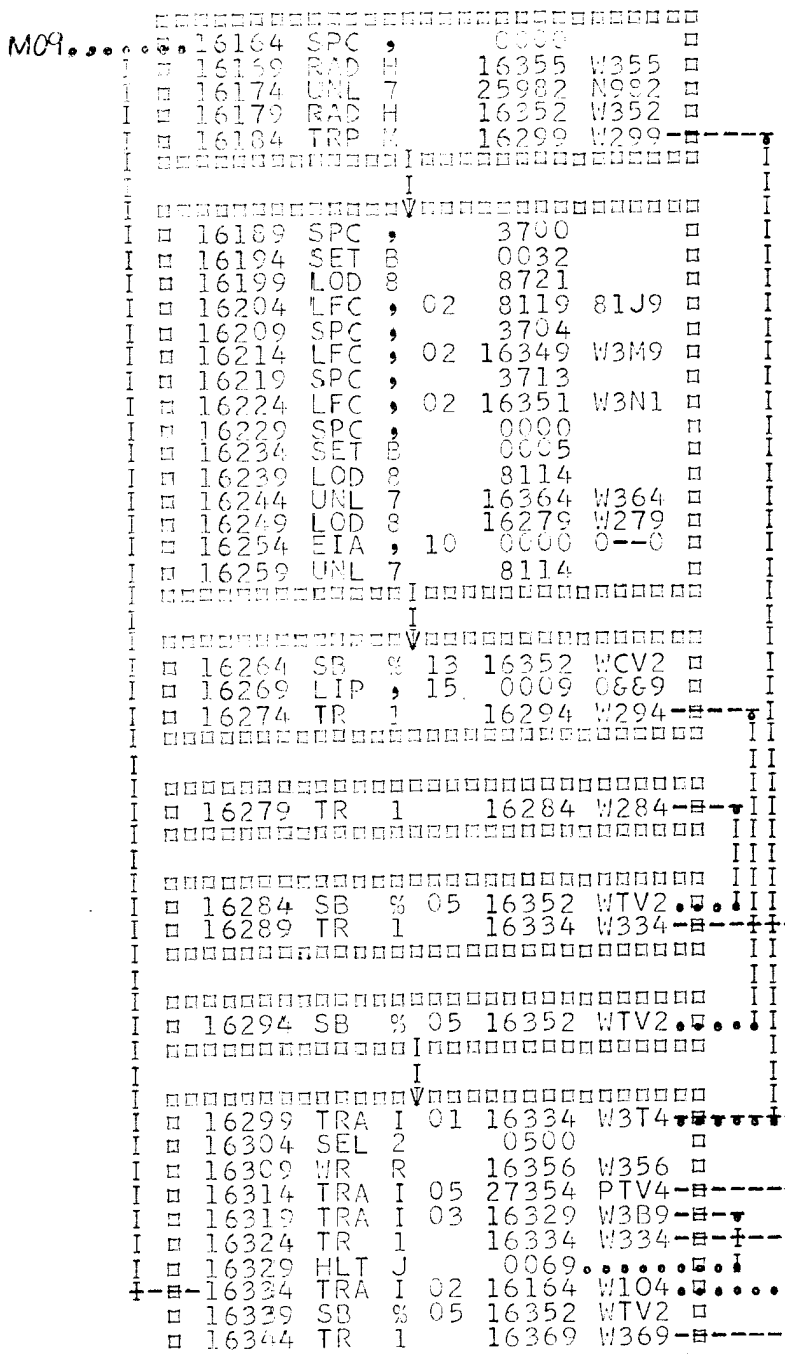
ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 032 16116
2 032 16148
2 007 16155
2 001 16156

XXXX----0000----0000---- CONSTANTS
XXXX----0000----0000---- CORRECT RESULT
X06H068 TIP RESULT

SECTION 4 TEST ROUTINES
ROUTINE #069
TEST LIP INSTRUCTION 0009
FOR SETTING IC TO WR.
THIS ROUTINE IS BYPASSED
DURING TAPE OVERLAP
OPERATION-916 ON.



RESET SPC
SAVE
ROUTINE NUMBER
TEST FOR WILD IC SETTING
ON PREVIOUS PROGRAM PASS

PRESET
CASU 15
WITH 32 CHARACTERS
SET UP IC VALUE EQUAL TO
ADDRESS #1.
PUT CLEAN STATUS IN WORD 0
PUT ZERO IN CHAR. 3
OF WORD 1 FOR SPC

SAVE IC VALUE
LOD RETURN TRANSFER
INSTRUCTION AND UNLOAD IT
INTO ADDRESS #1

SET WILD IC SET INDICATOR
LIP TO ADDRESS #1
ERROR

THIS INST. IS AT ADDR. #1

RESET WILD IC SET INDICATOR

RESET WILD IC SET INDICATOR

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

RESET INDICATOR

```
2 005 16349          0-&--
2 009 16358          X0J06I069
2 001 16359          □
2 005 16[illegible]4 X0000 IC SETTING IN CASU 15
```

```
                                                    SECTION 4 TEST ROUTINES
                                                         ROUTINE #070
                                                    TEST LIP INSTRUCTION FOR
                                                    STORING OF IC AND STATUS.
                                                    STORE FIXED IC AND STATUS
                                                    IN A VARIABLE STORAGE
                                                    WORD.

N10.....16369 SPC ,      0000                       RESET SPC
     I  16374 RAD H     16579 W579                 SAVE
     I  16379 UNL 7     25982 N982                 ROUTINE NUMBER
     I
     I
     I  16384 SPC ,      3700                      PRIOR TO LIP,SET UP WORD 0
     I  16389 SET B      0008                      OF CASU 15 WITH IC
     I  16394 LOD 8     16572 W572                 AND STATUS
     I  16399 SPC ,      3710
     I  16404 SET B      0024                      PRESET THE REST OF CASU 15
     I  16409 LOD 8      8721                      WITH 24 CHARACTERS
     I  16414 EIA , 10   0000 0--0                 PRESET A STORAGE TEST
     I  16419 SPC ,      8264                      WORD WITH 7 CHARACTERS
     I  16424 SET B      0007                      WORDS 250,251,AND
     I  16429 LOD 8      8681                      370 ARE EXCLUDED.
     I
     I
     I  16434 SPC ,      0000
     I  16439 RAD H     16574 W574                 SET UP
     I  16444 RAD H 01  16574 W5X4                 A FIXED
     I  16449 CMP 4 01  16575 W5X5                 STATUS
     I
     I
     I  16454 EIA , 10   0000 0--0                 STORE PRESENT
     I  16459 LIP , 15   8264 8BF4                 IC AND STATUS ON LIP
     I
     I
     I  16464 EIA , 10   0000 0--0
     I  16469 SPC ,      8264
     I  16474 UFC , 03  16564 W5F4                 DUMP 9 CHARACTERS
     I  16479 SHR C      0004                      OUT OF TEST WORD
     I  16484 UFC , 03  16560 W5F0
     I
     I
     I  16489 SPC ,      0000
     I  16494 SET B      0008
     I  16499 LOD 8     16572 W572
     I  16504 CMP 4     16564 W564
     I  16509 TRE L     16549 W549-----.
     I                                   I
     I                                   I
     I                                   I
     I  16514 TRA I 01  16549 W5U9-----+           ERROR ROUTINE
     I  16519 SEL 2      0500                      I
     I  16524 WR  R     16580 W580                 I
     I  16529 TRA I 05  27389 PTY9-----+---DN51    915 SW, TR TO LONG TYPEOUT
     I  16534 TRA I 03  16544 W5D4-----.I
     I  16539 TR  1     16549 W549-----+I
     I  16544 HLT J      0070.....I..II
     +--16549 TRA I 02  16369 W309.....I
        16554 TR  1     16589 W589-----------P12


                                                    CONSTANTS
2 010 16564                                    CONTENTS OF STORAGE WORD
2 004 16568                                -&--  CORRECT STORED STATUS
3     16572      16464 W464                      CORRECT STORED IC
2 010 16582                                XA1X07&070
2 001 16583                                
```

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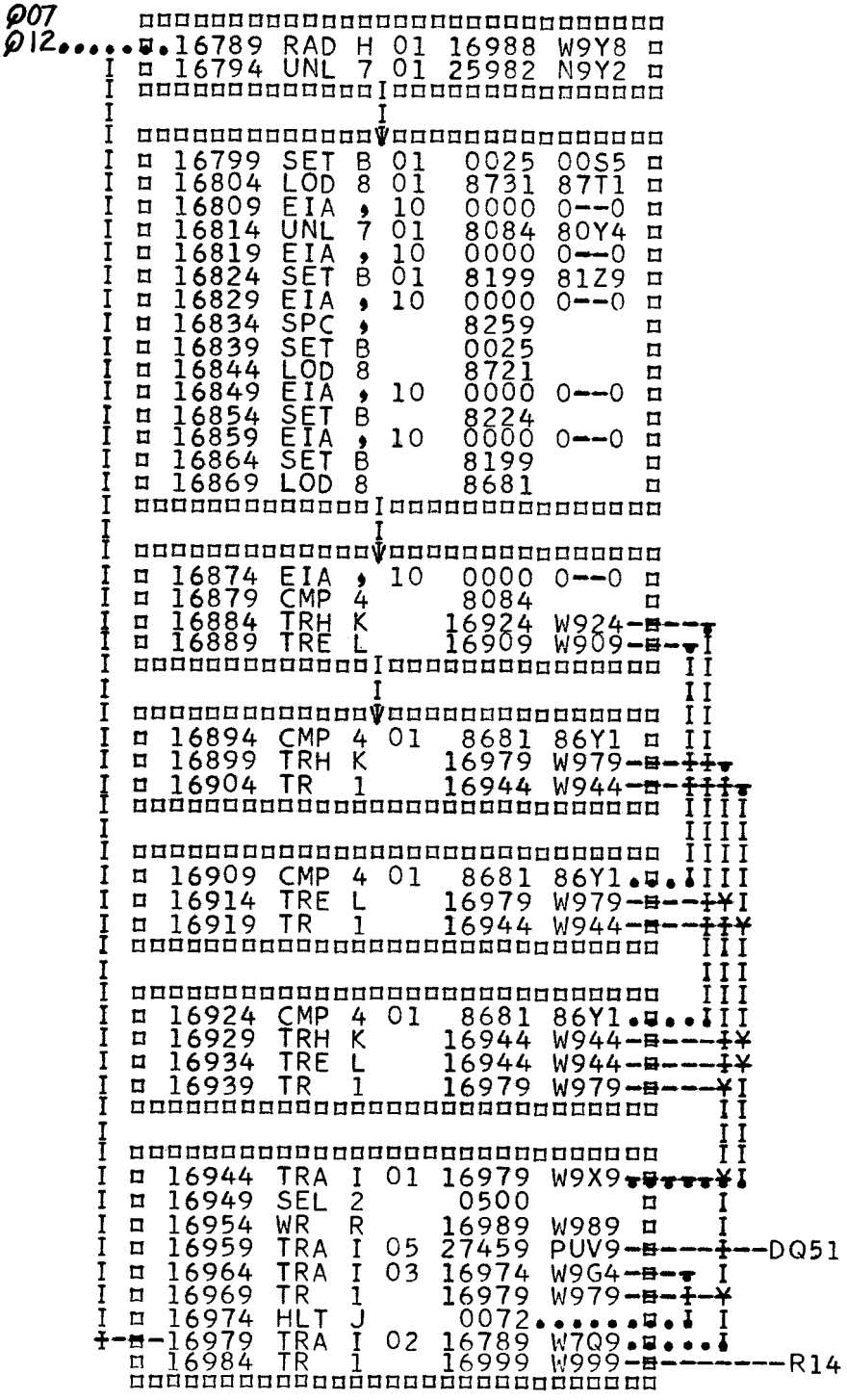
SECTION 4 TEST ROUTINES
ROUTINE #071
TEST LIP INSTRUCTION FOR
SET SPC,MAC-2,SR TO WR.

```
PII.....
          16589 SPC ,      0000
          16594 RAD H     16780 W780   RESET SPC
          16599 UNL 7     25982 N982   SAVE
                                       ROUTINE NUMBER

          16604 SET B      0004
          16609 LOD 8      8259        LOD VALUE OF SPC AND
          16614 UNL 7     16768 W768   UNL TO CASU 15 SET UP
          16619 LOD 8      8149        SAME FOR MAC-2 WHICH IS
          16624 UNL 7     16760 W760   THE VALUE OF ADDRESS #2
          16629 LOD 8      8269
          16634 UNL 7     16752 W752   SAME FOR SR

          16639 SPC ,      3700        SET UP
          16644 SET B      0032        CASU 15
          16649 LOD 8     16776 W776

          16654 SPC ,      9696        PRESET SPC
          16659 RCV U     31BCD ABCD   MAC-2
          16664 SEL 2      7557        AND SR

          16669 LIP , 15   3700 3G&0   DO LIP TO SET REGISTERS,
          16674 TIP , 14  16679 WFP9   TIP TO STORE SETTINGS AND
          16679 LIP , 15   3700 3G&0   LIP TO TF INT. PROG TGR.

          16684 SPC ,      3710
          16689 CMP 4     16768 W768
          16694 SPC ,      0000
          16699 TRE L     16739 W739
          16704 TRA I 01  16739 W7T9
          16709 SEL 2      0500
          16714 WR  R     16781 W781
          16719 TRA I 05  27424 PUS4----DP51   915 SW, TR TO LONG TYPEOUT
          16724 TRA I 03  16734 W7C4
          16729 TR  1     16739 W739
          16734 HLT J      0071.....
          16739 TRA I 02  16589 W5Q9
          16744 TR  1     16789 W789--------Q13
```

CONSTANTS

```
2 024 16768                    XXXX----0000----0000----   SR, MAC-2, SPC
2 004 16772                    -&--  STATUS
3     16776     16674 W674           IC
2 007 16783                    X07A071
2 001 16784
```

SECTION 4 TEST ROUTINES
ROUTINE #072
TEST COMPARE INSTRUCTION
DO COMPARE AND ON HI,LO,EQUAL,
REVERSE FIELDS AND TEST FOR
LO, HI, EQUAL



SAVE
ROUTINE NUMBER

LOD 25 CHARACTERS
AND
SET UP ADDRESS #1 AS
TEST FIELD A
SET ASU 01 TO LENGTH #1

SET SPC

PRESET ACC WITH
25 CHARACTERS AND
STOR. MARK AT LENGTH #2

SET LENGTH #1
LOD TEST FIELD B

COMPARE FIELD B
VERSUS FIELD A AND
TEST HI, EQUAL, LO

LO ON CMP B VS A, CMP
A VERSUS B AND TEST HI
ERROR

EQUAL ON CMP B VS A,
CMP A VS B AND TEST EQUAL
ERROR

HI ON CMP B VS A,
CMP A VS B AND TEST LO
ERROR
GOOD

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

2 007 16991 X07B072
2 001 16992

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SECTION 4 TEST ROUTINES
ROUTINE #073
TEST SPR INSTRUCTION
ON FIXED FIELD. STOR SIGN PLUS

```
R13.....16999 RAD H 01 17217 X2/7 
      17004 UNL 7 01 25982 N9Y2 
                    SAVE
                    ROUTINE NUMBER
      17009 SET B 01  0014 00/4 
      17014 LOD 8 01 17193 X1Z3 
      17019 EIA , 10  0000 0--0 
      17024 UNL 7 01  8084 80Y4 
                    LOD FIXED FIELD XX,XXXX,.XXXXX
                    SET UP ADDRESS #1
                    WITH FIXED FIELD
      17029 EIA , 10  0000 0--0 
      17034 SPC ,     8259      
      17039 RSU Q    17213 X213 
      17044 SET B     0010      
      17049 LFC , 02 17179 X1P9 
      17054 SHR C     0004      
      17059 LFC , 02 17175 X1P5 
      17064 EIA , 10  0000 0--0 
      17069 SPC ,     8259      
                    SET UP SPC
                    SET SIGN MINUS
                    LFC &1@$
                    LFC -#GH.
                    STORAGE EQUALS 0-#GH.&1A$
                    SET UP SPC AGAIN
      17074 EIA , 10  0000 0--0 
      17079 SPR 5     8084      
                    SPR FIXED FIELD
                    INTO ADDRESS #1
      17084 TRP M    17129 X129-
      17089 CMP 4    17179 X179 
      17094 TRE L    17104 X104-
      17099 TR  1    17129 X129-
                    TEST ACC SIGN STILL MINUS
                    CHECK ACC CONTENTS
                    STILL THE SAME
      17104 SET B 01  0014 00/4.
      17109 LOD 8 01 17207 X2 7 
      17114 EIA , 10  0000 0--0 
      17119 CMP 4 01  8084 80Y4 
      17124 TRE L    17164 X164-
                    LOD CORRECT RESULT IN ASU 01
                    WHICH IS    #GH.,.&1@$-
                    AND
                    CMP VERSUS ADDRESS #1
      17129 TRA I 01 17164 X1W4-
      17134 SEL 2     0500      
      17139 WR  R    17218 X218 
      17144 TRA I 05 27494 PUZ4-----DR51
      17149 TRA I 03 17159 X1E9-
      17154 TR  1    17164 X164-
      17159 HLT J     0073.....
-     -17164 TRA I 02 16999 W9R9.
      17169 TR  1    17229 X229-------S15
                    ERROR ROUTINE
                    915 SW, TR TO LONG TYPEOUT
```

CONSTANTS

```
2 010 17179   0-#GH.&1@$  STORAGE FIELD
2 014 17193   XX,XXXX,.XXXXX  MEMORY FIELD
2 014 17207     #GH.,.&1@$-  CORRECT RESULT
2 006 17213   X1111A
2 007 17220   X07C073
2 001 17221   
```

SECTION 4 TEST ROUTINES
ROUTINE #074
PAGE #1

TEST SPR INSTRUCTION USING TWO TEST FIELDS, A IN ACC AND IN MEMORY ADDRESS #1. SIGN PLUS CORRECT SPR RESULT IS CONSTRUCTED CHARACTER BY CHARACTER ON PAGE 2 AND 3

```
S14.....17229 RAD H 01 17358 X3V8        SAVE
        17234 UNL 7 01 25982 N9Y2        ROUTINE NUMBER

        17239 SET B 01  0030 00T0
        17244 LOD 8 01  8681 86Y1        LOD TEST FIELD B
        17249 EIA , 10  0000 0--0        AND
        17254 UNL 7 01  8084 80Y4        SET UP ADDRESS #1

        17259 EIA , 10  0000 0--0
        17264 SET B     8199             SET LENGTH #1
        17269 LOD 8     8731             AND LOD TEST FIELD A

        17274 EIA , 10  0000 0--0
        17279 SPR 5     8084             DO SPR A INTO B
        17284 TR  1    17399 X399--------U16  TRANSFER TO PAGE #2

T17.....17289 SET B 04  0000 0 00        RETURN
        17294 LOD 8 04 17392 XT92        SET, LOD CORRECT RESULT
        17299 EIA , 10  0000 0--0        OF SPR AND
        17304 CMP 4 04  8084 8 84        CMP VERSUS ADDRESS #1
        17309 TRE L    17349 X349---.
                                      I
                                      I
        17314 TRA I 01 17349 X3U9---*    ERROR ROUTINE
        17319 SEL 2     0500         I   I
        17324 WR  R    17359 X359    I   I
        17329 TRA I 05 27529 PVS9-----I---DS51  915 SW, TR TO LONG TYPEOUT
        17334 TRA I 03 17344 X3D4---.I
        17339 TR  1    17349 X349---I*
        17344 HLT J     0074.....I..I
        17349 TRA I 02 17229 X2K9...I..I
        17354 TR  1    18804 Y804--------X18
```

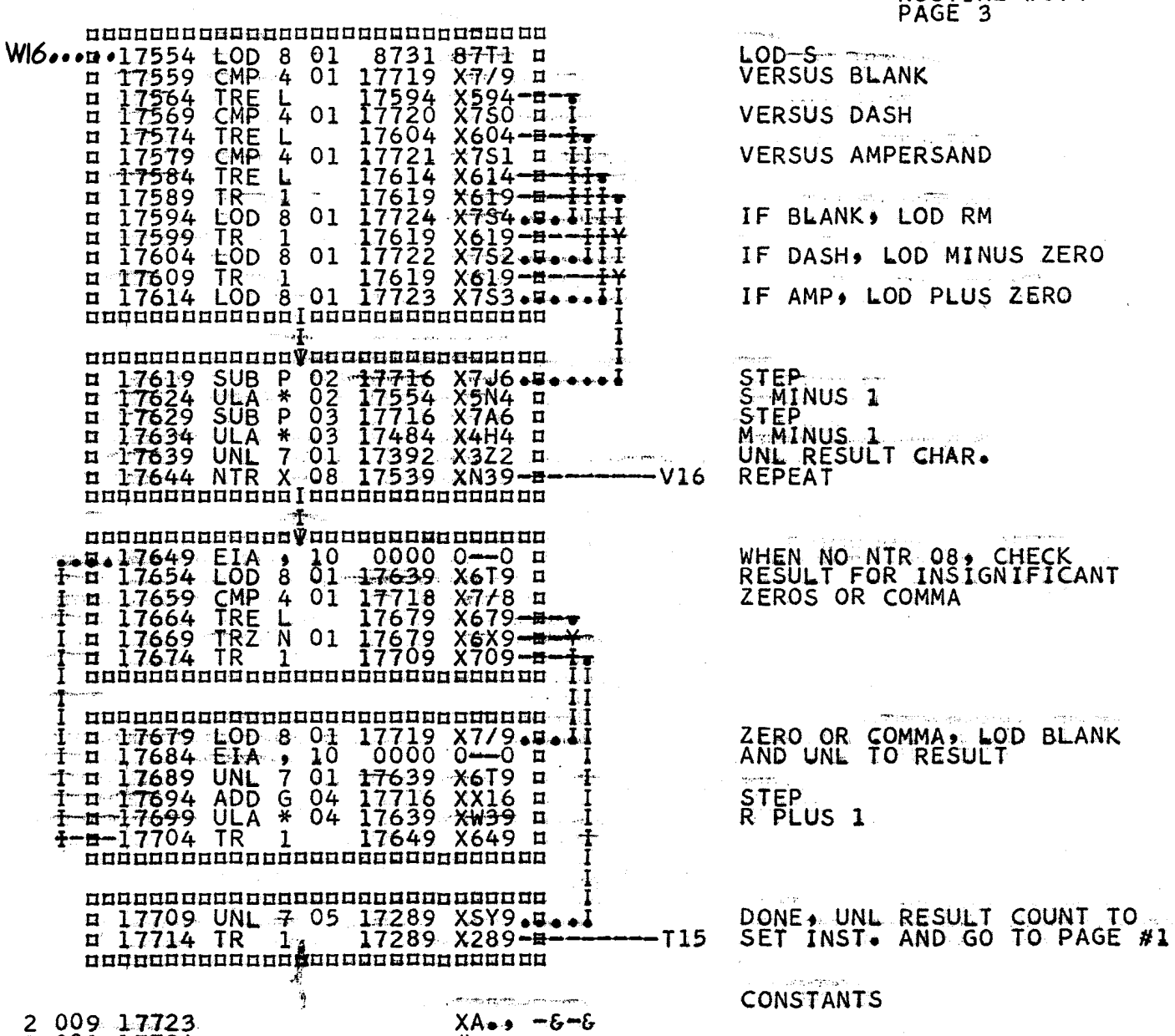
CONSTANTS AND CORRECT RESULT

```
2 007 17361              X07D074
2 001 17362              
2 030 17392              XXXXXXXXXXXXXXXXXXXXXXXXXXXXX RESULT
```

SECTION 4 TEST ROUTINES
ROUTINE #074
PAGE 2

CONSTRUCT CORRECT SPR RESULT CHARACTER BY CHARACTER. FOR REFERENCE TO LISTING NOTES BELOW, M IS THE LOCATION OF THE MEMORY CHARACTER IN FIELD B PRIOR TO SPR. S IS THE LOCATION OF THE STORAGE CHARACTER IN FIELD A PRIOR TO SPR. R IS THE LOCATION OF THE CORRECT RESULT CHARACTER.

```
U15...17399 SET B 01  0001 00 1    ASU 01 FOR CHARACTER
   17404 LDA # 02 17414 X4J4       ASU 02 FOR LOCATION OF
   17409 ULA * 02 17554 X5N4       STOR. CHAR.
   17414 NOP A     8731            INITIAL LOCATION S
   17419 LDA # 03 17429 X4B9       ASU 03 FOR LOCATION OF
   17424 ULA * 03 17484 X4H4       MEMORY CHAR. PRIOR SPR
   17429 NOP A    8681             INITIAL LOCATION M
   17434 LDA # 04 17444 XU44       ASU 04 FOR LOCATION OF
   17439 ULA * 04 17639 XW39       CORRECT RESULT CHAR.
   17444 NOP A    17392 X392       INITIAL LOCATION R
                  I
                  V
   17449 SET B 05  0002 0  2       ASU 05 FOR NUMBER OF RESULT
   17454 LOD 8 05  8199 8/Z9       CHARACTERS. INITIAL VALUE
   17459 UNL 7 05 17469 XUW9       IS LENGTH #1
   17464 SET B 08  0000 0-00       SET NTR-LOOP EQUAL TO
   17469 SET B 08  0000 0-00       NUMBER OF STORAGE CHAR.
                  I
                  V
   17474 LOD 8 01 17719 X7/9       LOD A BLANK FOR STORAGE
   17479 TR  1    17514 X514-------+
                                   I
                                   I
...17484 LOD 8 01  8681 86Y1       LOD M                    I
I  17489 CMP 4 01 17718 X7/8       VERSUS COMMA             I
I  17494 TRE L    17514 X514-------+                        I
I  17499 CMP 4 01 17717 X7/7       VERSUS PERIOD            I
I  17504 TRE L    17514 X514-------+                        I
I  17509 TR  1    17554 X554-------+-------W17              I
I                                                           I
I                                                           I
I  17514 SUB P 03 17716 X7A6...                             I
I  17519 ULA * 03 17484 X4H4       STEP
I  17524 EIA , 10  0000 0--0       M MINUS 1
I  17529 UNL 7 01 17639 X6T9       UNL RESULT CHAR.
I  17534 ADD G 05 17716 XX/6       INCREASE RESULT COUNT 1
I                  I
I                  V
V17...17539 SUB P 04 17716 XX16    STEP
I  17544 ULA * 04 17639 XW39       R MINUS 1
+--17549 TR  1    17484 X484
```



CONSTANTS

2 009 17723 XA., -&-&
2 001 17724 #

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SECTION 4 TEST ROUTINES
ROUTINE #075
PAGE 1

TEST UNSIGNED ADM
ADM A FIELD IN ACC TO ANOTHER FIELD IN ADDRESS #1. CHECK ADM RESULT BY CONSTRUCTING CORRECT RESULT, CHARACTER BY CHARACTER.

```
X15.....18804 RAD H 01 19043 Z0U3    SAVE -
        18809 UNL 7 01 25982 N9Y2    ROUTINE NUMBER

        18814 SET B 01   0020 00S0   LOD 20 TEST CHARACTERS
        18819 LOD 8 01   8781 87Y1   SAVE THEM IN WORK AREA
        18824 UNL 7 01 18999 Y9Z9    AND
        18829 EIA , 10   0000 0--0   SET UP ADDRESS #1
        18834 UNL 7 01   8084 80Y4   TEST UNITS CHARACTER
        18839 RCV U     18999 Y999   FOR SIGN.
        18844 TZB , 06 18864 YY04-----.
        18849 SGN T 01 18999 Y9Z9    IF B BIT, STRIP SIGN
        18854 EIA , 10   0000 0--0   OFF FIELDS IN WORK AREA
        18859 SGN T 01   8084 80Y4   AND IN ADDRESS #1

        18864 SET B 01   0020 00S0.....
        18869 LOD 8 01   8831 88T1   LOD STORAGE TEST
        18874 UNL 7 01 19019 Z0/9    FIELD AND PLACE IN
        18879 EIA , 10   0000 0--0   WORK AREA.
        18884 SET B      8199        SET UP ACC WITH TEST FIELD
        18889 LOD 8     19019 Z019

        18894 EIA , 10   0000 0--0   ADM ACC TO ADDRESS #1
        18899 ADM 6      8084        AND THEN TRANSFER TO
        18904 TR  1     19054 Z054-------Z19   PAGE 2 TO GET CORRECT RESULT

Y20.....18909 EIA , 10   0000 0--0   RETURN
        18914 SET B 01   8199 81Z9   SET LENGTH #1
        18919 LOD 8 01 19039 Z0T9    LOD CORRECT RESULT
        18924 EIA , 10   0000 0--0   AND COMPARE
        18929 CMP 4 01   8084 80Y4   VERSUS ADDRESS #1
        18934 TRE L     18974 Y974-----.

        18939 TRA I 01 18974 Y9X4----.   ERROR ROUTINE
        18944 SEL 2      0500
        18949 WR  R     19044 Z044
        18954 TRA I 05 27564 PVW4-------DT51   915 SW, TR TO LONG TYPEOUT
        18959 TRA I 03 18969 Y9F9-----.
        18964 TR  1     18974 Y974-----'
        18969 HLT J      0075.....
        18974 TRA I 02 18804 Y8-4.....
        18979 TR  1     19434 Z434-------AC21
```

CONSTANTS AND FIELDS

```
2 020 18999   XXXXXXXXXXXXXXXXXXX MEMORY FIELD
2 020 19019   XXXXXXXXXXXXXXXXXXX STORAGE FIELD
2 020 19039   XXXXXXXXXXXXXXXXXXX CORRECT RESULT
2 007 19046   X07E075
2 001 19047
```

SECTION 4 TEST ROUTINES
ROUTINE #075
PAGE 2

CONSTRUCT CORRECT ADM RESULT BASED ON BIT STRUCTURE IN ORIGINAL FIELDS.

```
Z18....19054 SET  B 01   0004 00 4
       19059 LOD  8 01 19408 Z4 8
       19064 UNL  7 01 19412 Z4/2
       19069 SET  B 01   0002 00 2
       19074 LOD  8 01   8199 81Z9
       19079 UNL  7 01 19089 Z0Y9
       19084 SET  B 08   0000 0-00
       19089 SET  B 08   0000 0-00
                  I
                  V
       19094 LDA  # 03 19104 Z1&4
       19099 ULA  * 03 19144 Z1D4
       19104 NOP  A    18999 Y999
       19109 LDA  # 04 19119 Z/19
       19114 ULA  * 04 19159 Z/59
       19119 NOP  A    19019 Z019
       19124 LDA  # 05 19134 Z/T4
       19129 ULA  * 05 19289 ZSY9
       19134 NOP  A    19039 Z039
                  I
                  V
AA20...19139 SET  B 01   0001 00 1
       19144 LOD  8 01 18999 Y9Z9
       19149 ADD  G 01 19418 Z4/8
       19154 ST   F 01 19414 Z4/4
       19159 LOD  8 01 19019 Z0/9
       19164 ADD  G 01 19421 Z4S1
       19169 ADD  G 01 19414 Z4/4
       19174 RCV  U    19409 Z409
       19179 TZB  . 01 19189 Z1Y9-
       19184 ADD  G 01 19416 Z4/6
                  I
                  V
       19189 RAD  H 02 19421 Z4K1.
       19194 EIA  , 10   0000 0--0
       19199 RCV  U    19144 Z144
       19204 TZB  . 05 19214 ZS/4-
       19209 ADD  G 02 19427 Z4K7
       19214 TZB  . 06 19224 ZSK4
       19219 ADD  G 02 19424 Z4K4
       19224 EIA  , 10   0000 0--0.
       19229 RCV  U    19159 Z159
       19234 TZB  . 05 19244 ZSU4-
       19239 ADD  G 02 19427 Z4K7
       19244 TZB  . 06 19254 ZSN4
       19249 ADD  G 02 19424 Z4K4
       19254 RCV  U    19411 Z411.
       19259 TZB  . 02 19279 Z2P9-------AB20
       19264 TZB  . 04 19274 ZS74-
       19269 TR   1    19279 Z279-------AB20
       19274 ADD  G 02 19427 Z4K7.
                  I
                  V
```

NEXT PAGE

RESET DIGIT AND ZONE CARRY

LOD LENGTH #1 AND
UNL TO SET 08 INST.
SET UP NTR 08 LOOP EQUAL
LENGTH #1

RESET LOCATION OF MEMORY
CHARACTER
INITIAL LOC. M
RESET LOCATION OF STORAGE
CHARACTER
INITIAL LOC. S
RESET LOCATION OF CORRECT
RESULT CHARACTER
INITIAL LOC. R PLUS 1

ADD DIGITS
LOD M
ADD 0 TO STRIP ZONE
STORE IT
LOD S
ADD 00 TO STRIP ZONE
ADD IN STORED M VALUE
INTERROGATE PREVIOUS
CARRY IF ANY AND
ADD 1.

00 ADD ZONES BY GIVING
BITS A NUMERIC VALUE
RCV AT M

ADD 05 FOR A BIT

ADD 10 FOR B BIT

RCV AT S

05 FOR A BIT

10 FOR B BIT
INTERROGATE PREVIOUS ZONE
CARRY IF ANY.

05 FOR CARRY

FROM PREVIOUS PAGE

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SECTION 4 TEST ROUTINES
ROUTINE #075
PAGE 3

```
AB19....19279 UNL 7 01 19410 Z4/0 
       19284 SET B 01  0001 00 1 
       19289 UNL 7 01 19039 Z0T9 
       19294 UNL 7 02 19412 Z4J2 
                    |
                    v
       19299 RCV U     19412 Z412 
       19304 TZB . 01 19319 Z3/9-----+
       19309 EIA , 10  0000 0--0     |
       19314 SB  % 13 19289 ZBY9     |
       19319 RCV U     19411 Z411....|
       19324 TZB . 01 19339 Z3T9-----+
       19329 EIA , 10  0000 0--0     |
       19334 SB  % 14 19289 ZBQ9     |
                    |                |
                    v                |
       19339 SUB P 03 19416 Z4A6....|
       19344 ULA * 03 19144 Z1D4     |
       19349 SUB P 04 19416 ZU16     |
       19354 ULA * 04 19159 Z/59     |
       19359 SUB P 05 19416 ZU/6     |
       19364 ULA * 05 19289 ZSY9     |
       19369 NTR X 08 19139 ZJ39-----+------AA19
                    |
                    v
       19374 RCV U     19409 Z409 
       19379 TZB . 01 18909 Y9 9-----------Y18
                    |
                    v
       19384 ADD G 02 19427 Z4K7 
       19389 SET B 01  0002 00 2 
       19394 ADD G 05 19416 ZU/6 
       19399 ULA * 05 19289 ZSY9 
       19404 TR  1    19279 Z279 
```

SET DIGIT CARRY

UNL NUMERIC RESULT R
SET ZONE CARRY AND VALUE

CONVERT ZONE VALUE TO BITS
TEST FOR VALUE X5

A BIT ON RESULT

TEST FOR VALUE 1X

B BIT ON RESULT

STEP
M MINUS 1
STEP
S MINUS 1
STEP
R MINUS 1
REPEAT

TEST FOR CARRY INTO ZONES
OUT OF HIGH ORDER

IF NUMERIC CARRY ADD
05 TO ZONE VALUE,
STEP R PLUS 1, AND
REZONE LAST RESULT CHAR.

CONSTANTS

```
2 004 19408
2 004 19412
2 002 19414
2 007 19421
2 006 19427

00
00    CARRYS AND ZONE VALUE
X-    MEMORY DIGIT VALUE
XAX&X0&
X1&X0E
```

SECTION 4 TEST ROUTINES
ROUTINE #076
TEST LOAD ADDRESS IN 7080 MODE

```
AC18....  19434 EEM 3 14   0000 0&-0      SET 7080 MODE
          19439 RAD H 01 19663 Z6W3       SAVE
          19444 UNL 7 01 25982 N9Y2       ROUTINE NUMBER

          19449 SET B 01   0004 00 4      PLACE ADDRESS #1 AS A
          19454 LOD 8 01   8089 80Y9      CONSTANT INTO ADDRESS #1
          19459 EIA , 10   0000 0--0
          19464 UNL 7 01   8114 81/4
          19469 SET B 01   0006 00 6      RESET SAVE
          19474 LOD 8 01 19625 Z6S5       AREA EQUAL 0XXXXXX
          19479 UNL 7 01 19631 Z6T1

          19484 SET B      0025           RESET STORAGE WITH
          19489 LOD 8      8721           25 CHARACTERS,
          19494 LDA #      0---           DO LDA FROM ADDRESS #1
          19499 UNL 7    19631 Z631       AND SAVE RESULT

          19504 SET B 01   0004 00 4
          19509 LOD 8 01   8084 80Y4
          19514 ADD G 01 19638 Z6T8       000006 TO STRIP ZONES

          19519 RCV U      8081           TEST A BIT
          19524 TZB , 05 19534 ZVT4       ON 1000 S
          19529 ADD G 01 19644 Z6U4       10000
          19534 TZB , 06 19544 ZVM4       TEST B BIT ON 1000 S
          19539 ADD G 01 19649 Z6U9       20000
          19544 RCV U      8084
          19549 TZB , 06 19559 ZVN9       TEST B BIT ON UNITS
          19554 ADD G 01 19654 Z6V4       40000
          19559 TZB , 05 19569 ZVW9       TEST A BIT ON UNITS
          19564 ADD G 01 19659 Z6V9       80000

          19569 CMP 4 01 19631 Z6T1       COMPARE ADDED VALUE
          19574 TRE L    19614 Z614       VERSUS LDA RESULT

          19579 TRA I 01 19614 Z6/4
          19584 SEL 2      0500
          19589 WR  R    19664 Z664
          19594 TRA I 05 27599 PVZ9 ----DU52   915 SW, TR TO LONG TYPEOUT
          19599 TRA I 03 19609 Z6&9
          19604 TR  1    19614 Z614
          19609 HLT J     0076
          19614 TRA I 02 19434 Z4L4
          19619 TR  1    19674 Z674 -------AD22
```

2 006 19625 0XXXXXX
2 006 19631 0XXXXXX LDA RESULT
2 007 19638 X000006
2 021 19659 X1000&2000&4000&8000&
2 007 19666 X07F076
2 001 19667

SECTION 4 TEST ROUTINES
ROUTINE #077
TEST LOAD ADDRESS IN 705-3
MODE. LDA ADDRESS #1 WITH ASU
FROM FIXED LOCATION

```
AD21.....19674 LEM 3 15  0000 0&0
        19679 RAD H 01 19856 Z8V6
        19684 UNL 7 01 25982 N9Y2
                  I
                  V
        19689 SET B 01  0006 00 6
        19694 LOD 8 01 19825 Z8S5
        19699 UNL 7 01 19831 Z8T1
                  I
                  V
        19704 LDA #     8089
        19709 UNL 7    19831 Z831
                  I
                  V
        19714 SET B 01  0004 00 4
        19719 LOD 8 01  8084 80Y4
        19724 ADD G 01 19837 Z8T7
                  I
                  V
        19729 RCV U     8081
        19734 TZB . 05 19744 ZXU4-----
        19739 ADD G 01 19842 Z8U2     I
        19744 TZB . 06 19754 ZXN4-----I
        19749 ADD G 01 19847 Z8U7     I
        19754 RCV U     8084.....I...I
        19759 TZB . 06 19769 ZXO9-----
        19764 ADD G 01 19852 Z8V2     I
                  I                   I
                  V                   I
        19769 CMP 4 01 19831 Z8T1.....I
        19774 TRE L    19814 Z814-----
                  I                    I
                  V                    I
        19779 TRA I 01 19814 Z8/4-----Y
        19784 SEL 2     0500          I
        19789 WR  R    19857 Z857     I
        19794 TRA I 05 27634 PWT4-----I----DV52
        19799 TRA I 03 19809 Z8&9-----I
        19804 TR  1    19814 Z814-----Y
        19809 HLT J     0077.....I...II
        19814 TRA I 02 19674 Z6P4.....I
        19819 TR  1    19869 Z869-------AE23
```

```
2 006 19825          XXXXXX
2 006 19831          XXXXXX  LDA RESULT
2 021 19852          X0000&1000&2000&4000&
2 007 19859          X07G077
2 001 19860          ¤
```

SET 705-3 MODE
SAVE
ROUTINE NUMBER

RESET SAVE AREA
EQUAL XXXXXX

LDA ADDRESS #1 FROM CONSTANT
AREA, AND SAVE RESULT

LOD 4 DIGIT ADDRESS
ADD 00000 TO STRIP ZONES

TEST A BIT ON 1000 S ORDER
10000
TEST B BIT ON 1000 S ORDER
20000

TEST B BIT ON UNITS ORDER
40000

COMPARE ADDED RESULT
VERSUS LDA RESULT

ERROR ROUTINE

915 SW, TR TO LONG TYPEOUT

SECTION 4 TEST ROUTINES
ROUTINE #078
TEST ULA INSTRUCTION IN 7080 MODE. DO ULA FROM ACC INTO ADDRESS #1.

```
AE22
AE24...  19869 EEM 3 14   0000 0&-0      SET 7080 MODE
         19874 RAD H 01 20233 -2T3        SAVE
         19879 UNL 7 01 25982 N9Y2        ROUTINE NUMBER
                       I
                       V
         19884 SET B 01   0005 00 5       PRESET MEMORY ADDRESS #1
         19889 LOD 8 01   8731 87T1       WITH 5 CHARACTERS
         19894 EIA , 10   0000 0--0
         19899 UNL 7 01   8114 81/4
                       I
                       V
         19904 RSU Q      8368            RSU TEST NUMBER 1
         19909 EIA , 10   0000 0--0        AND
         19914 ULA *      8114            DO ULA TO ADDRESS #1
                       I
                       V
         19919 SET B      0006            SAVE FIRST SIX STORAGE
         19924 UNL 7     20210 -210       DIGITS
         19929 SET B 01   0001 00 1
         19934 RCV U     20205 -205       TEST SIXTH DIGIT FOR
         19939 TZB . 01 19954 Z9V4-       ONE BIT
         19944 LOD 8 01 20227 -2S7        ONE
         19949 TR  1    19959 Z959-
         19954 LOD 8 01 20229 -2S9.       ZERO
         19959 UNL 7 01 20205 -2 5.       REPLACE SIXTH CHAR. WITH 0/1
                       I
                       V
         19964 SET B 01   0002 00 2       CONVERT FIFTH AND SIXTH
         19969 LOD 8 01 20206 -2 6        STORAGE DIGITS INTO CORRECT
         19974 CMP 4 01 20221 -2S1        ADDRESS ZONE BITS.
         19979 TRH K    19989 Z989-
         19984 TR  1    19994 Z994-
         19989 SUB P 01 20213 -2/3.       SUB 16
         19994 CMP 4 01 20223 -2S3.       VERSUS 07
         19999 TRH K    20009 -009-
         20004 TR  1    20019 -019-
         20009 SUB P 01 20215 -2/5.       SUB 08
         20014 SB  % 13 20210 -B/0        SET UP 80K BIT
         20019 CMP 4 01 20225 -2S5.       VERSUS 03
         20024 TRH K    20034 -034-
         20029 TR  1    20044 -044-
         20034 SUB P 01 20217 -2/7.       SUB 04
         20039 SB  % 14 20210 -BJ0        SET UP 40K BIT
         20044 CMP 4 01 20227 -2S7.       VERSUS 01
         20049 TRH K    20059 -059-
         20054 TR  1    20069 -069-
         20059 SUB P 01 20219 -2/9.       SUB 02
         20064 SB  % 14 20207 -B-7        SET UP 20K BIT
         20069 CMP 4 01 20229 -2S9.       VERSUS 00
         20074 TRH K    20084 -084-
         20079 TR  1    20089 -089-------AF24
         20084 SB  % 13 20207 -B 7.       SET UP 10K BIT
                       I
                       V
```

NEXT PAGE

```
AF23   20089 RCV U      8730                    SET UP ASU BITS ON RESULT
       20094 TZB . 05 20104 -/ 4                ACCORDING TO ORIGINAL ASU
       20099 SB  % 13 20209 -B 9                BITS IN MEMORY PRIOR TO ULA
       20104 TZB . 06 20114 -/J4
       20109 SB  % 14 20209 -B-9
       20114 RCV U      8729
       20119 TZB . 05 20129 -/S9
       20124 SB  % 13 20208 -B 8
       20129 TZB . 06 20139 -/L9
       20134 SB  % 14 20208 -B-8
       20139 SET B 01  0004 00 4                COMPARE CORRECT RESULT
       20144 LOD 8 01 20210 -2/0                VERSUS ULA RESULT.
       20149 ETA . 10  0000 0--0
       20154 CMP 4 01  8114 81/4
       20159 TRE L     20199 -199
       20164 TRA I 01 20199 -1Z9                ERROR ROUTINE
       20169 SEL 2     0500
       20174 WR  R     20234 -234
       20179 TRA I 05 27669 PWW9-------DW52     915 SW, TR TO LONG TYPEOUT
       20184 TRA I 03 20194 -1I4
       20189 TR  1    20199--199
       20194 HLT J     0078
       20199 TRA I 02 19869 Z8O9-------AE23
       20204 TR  1    20244 -244-------AG25
```

CONSTANTS

```
2 006 20210    000000 CORRECT RESULT
2 009 20219    X1F0H0D0B
2 010 20229    1507030100
2 007 20236    X07H078
2 001 20237
```

SECTION 4 TEST ROUTINES
ROUTINE #079

TEST ULA INSTRUCTION IN 705-3 MODE. DO ULA FROM ACC TO FIXED LOCATION.

```
AG24....20244 LEM 3 15   0000 0&&0
          20249 RAD H 01 20457 -4V7    SAVE
          20254 UNL 7 01 25982 N9Y2    ROUTINE NUMBER
                    |
                    V
          20259 SET B      0005
          20264 LOD 8      8295        PRESET TEST AREA
          20269 UNL 7     20444 -444   WITH 5 DIGITS
                    |
                    V
          20274 RAD H      8368        RAD TEST NUMBER 1
          20279 ULA *     20444 -444   AND DO ULA TO TEST AREA
                    |
                    V
          20284 SET B      0005        SAVE FIRST FIVE STORAGE
          20289 UNL 7     20449 -449   DIGITS
                    |
                    V
          20294 SET B 01   0001 00 1    CONVERT FIFTH STORAGE
          20299 LOD 8 01  20445 -4U5    CHARACTER INTO ADDRESS
          20304 CMP 4 01  20453 -4V3    ZONE BITS
          20309 TRH K     20319 -319-
          20314 TR  1     20329 -329-
          20319 SUB P 01  20451 -4V1    SUB 08 IF CHAR. IS 8 OR 9
          20324 UNL 7 01  20445 -4U5    AND REPLACE
          20329 TRZ N 01  20369 -3W9    IF ZERO, NO ZONES
          20334 RCV U     20445 -445
          20339 TZB . 03  20349 -3D9-   TEST 4 BIT
          20344 SB  % 14  20449 -DM9    SET UP 40K BIT
          20349 TZB . 02  20359 -3N9    TEST 2 BIT
          20354 SB  % 14  20446 -DM6    SET UP 20K BIT
          20359 TZB . 01  20369 -3W9    TEST 1 BIT
          20364 SB  % 13  20446 -DU6    SET UP 10K BIT
                    |
                    V
          20369 LOD 8 01   8291 82Z1    LOD THE CHAR. WHICH WAS
          20374 UNL 7 01  20445 -4U5    PRESET IN TEST AREA CHAR 0
          20379 SET B      0005
          20384 LOD 8     20449 -449    LOD CORRECT RESULT AND
          20389 CMP 4     20444 -444    COMPARE VERSUS ULA RESULT
          20394 TRE L     20434 -434-
                    |
                    V
          20399 TRA I 01  20434 -4T4-   ERROR ROUTINE
          20404 SEL 2      0500
          20409 WR  R     20458 -458
          20414 TRA I 05  27704 PX 4----DX52  915 SW, TR TO LONG TYPEOUT
          20419 TRA I 03  20429 -4B9-
          20424 TR  1     20434 -434-
          20429 HLT J      0079.....
        -20434 TRA I 02  20244 -2M4.
          20439 TR  1     20469 -469------AH26
```

CONSTANTS

```
2 005 20444    X0000  ULA TEST AREA
2 005 20449    XXXXX  CORRECT ULA RESULT
2 004 20453    XH07
2 007 20460    X07I079
2 001 20461
```

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SECTION 4 TEST ROUTINES
ROUTINE #080

TEST AAM INSTRUCTION IN 7080 MODE. AAM TEST NUMBER 1 IN ACC TO THE VALUE ADDRESS #1 IN ADDRESS #1 AT 4/9 LOCATION

AH25
AH27

```
20469 EEM 3 14  0000 0&-0     SET 7080 MODE
20474 RAD H 01 20849 -8U9     SAVE
20479 UNL 7 01 25982 N9Y2     ROUTINE NUMBER
                  I
                  V
20484 SET B 01  0010 00/0
20489 LOD 8 01  8731 87T1     PRESET ADDRESS #1
20494 EIA , 10  0000 0--0     WITH 10 CHARACTERS
20499 UNL 7 01  8114 81/4
                  I
                  V
20504 SET B 01  0004 00 4
20509 LOD 8 01  8084 80Y4     SET UP VALUE OF ADDRESS #1
20514 EIA , 10  0000 0--0     AS CONSTANT IN ADDRESS #1
20519 UNL 7 01  8114 81/4
                  I
                  V
20524 RSU Q     8368
20529 EIA , 10  0000 0--0     RSU TEST NUMBER 1 AND
20534 AAM @     8114          AAM THIS NUMBER TO
                              ADDRESS #1
                  I
                  V
20539 RAD H 01  8368 83W8     RAD SAME TEST NUMBER
20544 SET B 01  0006 00 6     SET TO SIX DIGITS
20549 ST  F 01 20836 -8T6     AND STORE IN WORK AREA
                  I
                  V
20554 SET B 02  0001 00-1     CONVERT FIFTH AND SIXTH
20559 RCV U     20831 -831    STORAGE CHARACTERS TO
20564 TZB . 01 20579 -5X9-    VALID ADDRESS VALUE
20569 LOD 8 02 20845 -8M5  I  A ONE
20574 TR  1    20584 -584-  -v
20579 LOD 8 02 20844 -8M4.  I  A ZERO
20584 UNL 7 02 20831 -8L1.  I  MAKE 2 DIGITS EQUAL 00-19
20589 SET B 02  0002 00-2
20594 LOD 8 02 20832 -8L2     LOD 2 DIGITS
20599 CMP 4 02 20843 -8M3     CMP VS 15 AND IF MORE
20604 TRH K    20614 -614-    THAN 15, TRH.
20609 TR  1    20624 -624-  -v
20614 SUB P 02 20841 -8M1.  I  SUB 16
20619 UNL 7 02 20832 -8L2  I  I
                  I           I
                  V           I
20624 LDA # 01  8084 80Y4.  I  LDA CONSTANT ADDRESS #1
20629 ADD G 01 20836 -8T6     ADD CONVERTED STORAGE
20634 UNL 7 01 20836 -8T6     NUMBER AND UNL TO WORK AREA
                  V
```

NEXT PAGE

```
20639 LOD 8 02 20832 -8L2
20644 CMP 4 02 20843 -8M3          CONVERT FIFTH AND SIXTH
20649 TRH K    20659 -659          DIGITS OF SUM INTO CORRECT
20654 TR  1    20669 -669          ADDRESS BITS.
20659 SUB P 02 20841 -8M1
20664 UNL 7 02 20832 -8L2          SUB 16
20669 RCV U    20831 -831          REPLACE
20674 TZB . 01 20694 -6Z4          TEST SIXTH CHARACTER
20679 SB  % 13 20836 -HT6          FOR ONE BIT
20684 SUB P 02 20839 -8L9          SET UP 80K BIT
20689 UNL 7 02 20832 -8L2          SUB 08
20694 RCV U    20832 -832          REPLACE
20699 SET B 02  0001 00-1
20704 TRZ N 02 20749 -7M9
20709 TZB . 04 20719 -X19
20714 SB  % 13 20836 -HT6          SET UP 80K BIT
20719 TZB . 03 20729 -7B9
20724 SB  % 14 20836 -HL6          SET UP 40K BIT
20729 TZB . 02 20739 -7L9
20734 SB  % 14 20833 -HL3          SET UP 20K BIT
20739 TZB . 01 20749 -7U9
20744 SB  % 13 20833 -HT3          SET UP 10K BIT

20749 SET B 01  0001 00 1          LOD AND UNL THE CHARACTER
20754 LOD 8 01  8727 87S7          WHICH WAS PRESET TO LEFT
20759 UNL 7 01 20832 -8T2          OF AAM RESULT IN CHAR 0

20764 SET B 01  0005 00 5
20769 LOD 8 01 20836 -8T6          LOD CORRECT RESULT AND
20774 EIA , 10  0000 0--0          COMPARE VERSUS AAM
20779 CMP 4 01  8114 81/4          RESULT IN ADDRESS #1
20784 TRE L    20824 -824

20789 TRA I 01 20824 -8S4          ERROR ROUTINE
20794 SEL 2     0500
20799 WR  R    20850 -850
20804 TRA I 05 27739 PXT9 ----DY52  915 SW, TR TO LONG TYPEOUT
20809 TRA I 03 20819 -8A9
20814 TR  1    20824 -824
20819 HLT J     0080
20824 TRA I 02 20469 -409 ----AH26
20829 TR  1    20859 -859 ------AJ28
```

CONSTANTS

```
2 007 20836          X------  CORRECT AAM WORK AREA
2 009 20845          X0H1F1501
2 007 20852          X08&080
2 001 20853          
```

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SECTION 4 TEST ROUTINES
ROUTINE #081

TEST AAM INSTRUCTION IN 705-3 MODE. DO AAM TO FIXED LOCATION IN THIS ROUTINE INCLUDE ASU BIT ADDITION.

```
AJ27
AJ29....20859 LEM 3 15   0000 0&&0
          20864 RAD H 01 21320 J3S0
          20869 UNL 7 01 25982 N9Y2
                    I
                    V
          20874 SET B 01   0004 00 4
          20879 LOD 8 01   8089 80Y9
          20884 UNL 7 01 21284 J2Y4
                    I
                    V
          20889 RAD H 01   8368 83W8
          20894 SET B 01   0010 00/0
          20899 UNL 7 01 21294 J2Z4
                    I
                    V
          20904 RCV U      8731
          20909 TZB . 05 20919 -Z/9-
          20914 SB  % 13 21293 JBZ3
          20919 TZB . 06 20929 -ZK9
          20924 SB  % 14 21293 JBR3
          20929 RCV U      8730
          20934 TZB . 05 20944 -ZU4-
          20939 SB  % 13 21292 JBZ2
          20944 TZB . 06 20954 -ZN4
          20949 SB  % 14 21292 JBR2
                    I
                    V
          20954 SET B      0010
          20959 LOD 8    21294 J294
          20964 AAM @    21284 J284
                    I
                    V
          20969 SET B 01   0005 00 5
          20974 SET B 01   0006 00 6
          20979 ST  F 01 21301 J3 1
          20984 SET B 01   0001 00 1
          20989 LOD 8 01 21297 J2Z7
          20994 CMP 4 01 21316 J3/6
          20999 TRH K    21009 J009-
          21004 TR  1    21019 J019-
          21009 SUB P 01 21315 J3/5
          21014 UNL 7 01 21297 J2Z7
                    I
                    V
          21019 LDA # 01   8084 80Y4
          21024 ADD G 01 21301 J3 1
          21029 UNL 7 01 21301 J3 1
                    I
                    V
          21034 SET B 01   0002 00 2
          21039 LOD 8 01 21297 J2Z7
          21044 CMP 4 01 21313 J3/3
          21049 TRH K    21059 J059-
          21054 TR  1    21069 J069-----AK29
          21059 SUB P 01 21311 J3/1
          21064 UNL 7 01 21297 J2Z7
                    I
                    V
```

NEXT PAGE

SET 705-3 MODE
SAVE
ROUTINE NUMBER

RESET TEST AREA EQUAL
TO ADDRESS #1 WITH
ASU BITS INCLUDED.

RAD TEST NUMBER
SET TO 10 DIGITS AND
SAVE FOR STORAGE FACTOR

TRANSFER
THE ZONES
FROM TWO TEST
CHARACTERS TO THE
STORAGE FACTOR TO
REPRESENT ASU BITS
IN THE STORAGE FACTOR
WHEN DOING AAM.

LOD STORAGE FACTOR
AND DO AAM

STORE 6 CHARACTERS OF
THE STORAGE FIELD USED

LOD THE FIFTH STORAGE
CHARACTER AND IF IT IS
MORE THAN 7, THEN
SUBTRACT 8 TO MAKE IT
A VALID AAM FIELD.

LDA THE VALUE OF ADDRESS #1
ADD MODIFIED STORAGE VALUE
AND PUT BACK RESULT

CHECK THE FIFTH AND SIXTH
CHARACTERS FOR WRAP AROUND
AND CORRECT.

```
AK28...21069 RCV U      21297 J297
          21074 TZB . 03 21084 J0H4-          CONVERT FIFTH
          21079 SB  % 14 21301 JC-1           DIGIT TO ADDRESS BITS.
          21084 TZB . 02 21104 J1-4           40K BIT
          21089 TZB . 04 21099 J 99-
          21094 TR  1    21104 J104-
          21099 SB  % 14 21298 JBR8.          20K BIT
          21104 TZB . 01 21114 J1/4
          21109 SB  % 13 21298 JBZ8           10K BIT

          21114 RAD H 01 21305 J3 5.          ADD ASU BITS FROM ORIGINAL
          21119 UNL 7 01 21308 J3 8           STORAGE AND MEMORY FIELDS
          21124 RCV U     8731
          21129 TZB . 05 21139 J/T9-
          21134 SB  % 13 21307 JC 7           SET UP A BIT
          21139 TZB . 06 21149 J/M9
          21144 SB  % 14 21307 JC-7           SET UP B BIT
          21149 RCV U     8730.....
          21154 TZB . 05 21164 J/W4-
          21159 SB  % 13 21306 JC 6           SET UP A BIT
          21164 TZB . 06 21174 J/P4
          21169 SB  % 14 21306 JC-6           SET UP B BIT
          21174 LOD 8 01  8254 82V4.          LOD ASU BITS FROM MEM FIELD
          21179 ADM 6 01 21308 J3 8           AND ADD TO STOR. FIELD
          21184 SET B 01  0002 00 2           ASU BITS
          21189 LOD 8 01 21307 J3 7
          21194 ADM 6 01 21300 J3 0           PUT ASU SUM ON RESULT

          21199 RCV U     8084                CHECK ORIGINAL MEM FIELD
          21204 TZB . 05 21214 JS/4-          FOR A BIT AND PUT ON
          21209 SB  % 13 21301 JC 1           RESULT.

          21214 SET B 01  0004 00 4.
          21219 LOD 8 01 21301 J3 1           LOD CORRECT RESULT
          21224 CMP 4 01 21284 J2Y4           AND COMPARE VERSUS
          21229 TRE L    21269 J269-          AAM RESULT

          21234 TRA I 01 21269 J2W9-
          21239 SEL 2     0500
          21244 WR  R    21321 J321
          21249 TRA I 05 27774 PXX4-----DZ52  915 SW, TR TO LONG TYPEOUT
          21254 TRA I 03 21264 J2F4-
          21259 TR  1    21269 J269-
          21264 HLT J     0081.....
          21269 TRA I 02 20859 -8N9-----AJ28
          21274 EEM 3 14  0000 0&-0
          21279 TR  1    21329 J329-------AL30
```

CONSTANTS

```
2 005 21284    X0000 AAM RESULT
2 010 21294    ---------- STORAGE FIELD
2 007 21301    X------ CORRECT RESULT
2 004 21305    X00&
2 003 21308    X000 ASU BIT SUM
2 008 21316    X0H07XH7
2 007 21323    X08A081
2 001 21324
```

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```
                                        END OF PROGRAM PASS
                                        TEST 914 AND 916 SWITCHES
                                    IF 914 OFF, LEAVE PROGRAM
                                    IF 914 ON, COUNT PASSES AND
                                    REPEAT PROGRAM.
                                    IF 916 OFF, RESET CHANNELS
                                    IF 916 ON,  START CHANNELS

AL29.....
          21329 EEM 3 14   0000 0&-0
          21334 SPC ,      0000
          21339 TRS 0 10 21344 JLM4-----              TURN OFF
          21344 TRS 0 11 21349 JLD9-----              ALL CHECK
          21349 TRS 0 12 21354 JC54-----              TRIGGERS, IF ANY,
          21354 TRS 0 13 21359 JCV9-----              AT END OF
          21359 TRS 0 14 21364 JCO4-----              EACH PASS
          21364 TRS 0 15 21369 JCF9-----
          21369 TRA I 04 21394 JT94-----              914 SWITCH OFF
          21374 LIM , 07   0000 0 &0                    IF 914 IS OFF, RESET ALL
          21379 CHR 3 13   0000 0& 0                    CHANNELS AND ASSOCI&TED
          21384 CHR 3 13   0000 0& 0                    INTERRUPTS, AND LEAVE
          21389 TR  1    18219 Y219                     THE PROGRAM

          21394 RAD H    21571 J571.....              914 SWITCH ON
          21399 SET B      0007                         IF 914 IS ON, INCREASE
          21404 ADD G    21572 J572                     PASS COUNTER BY ONE AND
          21409 SET B      0006                         TYPEOUT Z EVERY 1000
          21414 ST  F    21571 J571                     PASSES.
          21419 SET B      0003
          21424 TRZ N    21434 J434-----
          21429 TR  1    21454 J454-----
          21434 LOD 8    21568 J568.....
          21439 UNL 7    21577 J577
          21444 SEL 2      0500
          21449 WR  R    21574 J574

          21454 SET B      0001.....
          21459 TRA I 06 21504 JV-4-----              916 SWITCH
          21464 LIM , 07   0000 0 &0                    IF 916 IS OFF
          21469 CHR 3 13   0000 0& 0                    RESET CHANNELS
          21474 CHR 3 13   0000 0& 0                    AND BYPASS SWITCHES
          21479 EIM , 06   0000 0 -0
          21484 LOD 8    21572 J572
          21489 UNL 7    21500 J500                   SET SWITCH TO NOP
          21494 UNL 7    15640 V640                   RESET ROUT. 067 BYP. TO NOP
          21499 TR  1    21564 J564-----
          21504 NOP A    21564 J564-----              SW EQUALS NOP FIRST TIME
          21509 LOD 8    21573 J573
          21514 UNL 7    21500 J500                   SET SWITCH TO TRANSFER
          21519 UNL 7    15640 V640                   RESET ROUT. 067 BYP. TO TR
          21524 UNL 7    21594 J594                   SET TAPE ADDRESSES
          21529 UNL 7    21644 J644                   TO 01 ON
          21534 UNL 7    21694 J694                   ALL FOUR
          21539 UNL 7    21744 J744                   CHANNELS

          21544 TIP , 14 21584 JEQ4-----AM31          GO START CHANNEL 20 IF READY
          21549 TIP , 14 21634 JFL4-----AN31          GO START CHANNEL 21 IF READY
          21554 TIP , 14 21684 JFQ4-----AP31          GO START CHANNEL 22 IF READY
          21559 TIP , 14 21734 JGL4-----AQ31          GO START CHANNEL 23 IF READY
          21564 TR  1      0879.....                  TRANSFER TO ROUTINE #004

2 013 21577                    X00000&A1Z---
2 001 21578
```

SECTION 5 CHANNELS
INITIAL TEST FOR READY
TEST EACH CHANNEL FOR
READY ON TAPE #1 TO #9.

```
                                                    TEST CHAN 20 RDY
AM30....  21584 SET B 01  0002 00 2                 TAPE NO.
          21589 LOD 8 01 21594 J5Z4
          21594 SEL 2     200-
          21599 TRS O 01 21789 J7Y9-------AR32      IF READY, GO START CHAN 20
          21604 CMP 4 01 21781 J7Y1                 VS 09
          21609 TRE L    21629 J629-
          21614 ADD G 01 21783 J7Y3                 &1
          21619 UNL 7 01 21594 J5Z4
          21624 TR  1    21594 J594
          21629 LIP , 15  0009 0&&9.                DO LIP IF NO TAPE #01-09 READY

                                                    TEST CHAN 21 RDY
AN30....  21634 SET B 01  0002 00 2
          21639 LOD 8 01 21644 J6U4
          21644 SEL 2     210-
          21649 TRS O 01 22684 K6Y4-------BF35      IF READY, GO START CHAN 21
          21654 CMP 4 01 21781 J7Y1
          21659 TRE L    21679 J679-
          21664 ADD G 01 21783 J7Y3
          21669 UNL 7 01 21644 J6U4
          21674 TR  1    21644 J644
          21679 LIP , 15  0009 0&&9.

                                                    TEST CHAN 22 RDY
AP30....  21684 SET B 01  0002 00 2
          21689 LOD 8 01 21694 J6Z4
          21694 SEL 2     220-
          21699 TRS O 01 23579 L5X9-------BV38      IF READY, GO START CHAN 22
          21704 CMP 4 01 21781 J7Y1
          21709 TRE L    21729 J729-
          21714 ADD G 01 21783 J7Y3
          21719 UNL 7 01 21694 J6Z4
          21724 TR  1    21694 J694
          21729 LIP , 15  0009 0&&9.

                                                    TEST CHAN 23 RDY
AQ30....  21734 SET B 01  0002 00 2
          21739 LOD 8 01 21744 J7U4
          21744 SEL 2     230-
          21749 TRS O 01 24474 M4X4-------CK41      IF READY, GO START CHAN 23
          21754 CMP 4 01 21781 J7Y1
          21759 TRE L    21779 J779-
          21764 ADD G 01 21783 J7Y3
          21769 UNL 7 01 21744 J7U4
          21774 TR  1    21744 J744
          21779 LIP , 15  0009 0&&9.
```

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SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 20 PAGE 1
WR, BSP, RD ON CHANNEL 20.
CHECK FOR FALSE INTERRUPTS,
CHANNEL CHECKS, AND COMPARE
WRITE AND READ FIELDS.

```
AR31 21789 UNL 7 01 21814 J8/4
AR33 21794 UNL 7 01 21824 J8S4          SET
     21799 UNL 7 01 21844 J8U4          UP
     21804 UNL 7 01 21874 J8X4          SELECT
     21809 UNL 7 01 21914 J9/4
     21814 SEL 2     200-
     21819 TRS O     21969 J969------AY33  TEST FOR END OF FILE

     21824 SEL 2     200-
     21829 WR  R     22375 K375         WRITE 60 CHARACTERS
     21834 LIP , 15  2000 2&&0

                                        BACKSPACE

     21839 NOP A     21824 J824
     21844 SEL 2     200-
     21849 TRS O 01  21859 J8V9-----     TEST READY AFTER INTERRUPT
     21854 TR  1     22034 K034-----AZ33
AS33 21859 TRS O 02  22079 K0P9-----BA33  TEST FOR WRITE CHK
AT33 21864 BSP 3     0004
     21869 LIP , 15  2000 2&&0

                                        READ 60 CHARACTERS

     21874 SEL 2     200-
     21879 TRS O 01  21889 J8Y9-----     TEST READY AFTER INTERRUPT
     21884 TR  1     22139 K139-----BB33
AU33 21889 SET B 01  0000 00 0
     21894 SET B 01  0060 00WO
     21899 UNL 7 01  22509 K5 9          CLEAR READ FIELD
     21904 RD  Y     22450 K450
     21909 LIP , 15  2000 2&&0

                                        COMPARE WR AND RD FIELDS

     21914 SEL 2     200-
     21919 TRS O 01  21929 J9S9-----     TEST READY AFTER INTERRUPT
     21924 TR  1     22184 K184-----BC33
AV33 21929 TRS O 02  22229 K2K9-----BD34  TEST FOR RD CHK
AW34 21934 SET B 01  0060 00WO
     21939 LOD 8 01  22434 K4T4
     21944 CMP 4 01  22509 K5 9          DO CMP
     21949 TRS O 11  22279 KKG9------BE34 TEST 901
     21954 TRE L     21964 J964-----     AND EQUAL
     21959 TR  1     22279 K279-----BE34
AX34 21964 TR  1     21814 J814
```

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 20 PAGE 2
REWIND AND ERROR TYPEOUTS

```
AY32    21969 IOF 3      0000          IF END OF FILE.
        21974 RWD 3      0002          REWIND TAPE AND
        21979 SET B 01   0002 00 2     FIND NEXT READY TAPE.
        21984 LOD 8 01 21814 J8/4
        21989 CMP 4 01 22523 K5S3
        21994 TRE L    22009 K009
        21999 ADD G 01 22525 K5S5
        22004 TR  1    22014 K014
        22009 LOD 8 01 22521 K5S1
        22014 UNL 7 01 22019 K0/9
        22019 SEL 2      200-
        22024 TRS 0 01 21789 J7Y9-------AR32
        22029 TR  1    21989 J989

AZ32    22034 TRA I 01 22064 K0W4      ERROR TYPEOUT
        22039 SEL 2      0500          AND HALT 2010
        22044 WR  R    22526 K526
        22049 TRA I 03 22059 K0E9
        22054 TR  1    22064 K064
        22059 HLT J      2010
        22064 EIA , 10   0000 0--0
        22069 SEL 2    21844 J844
        22074 TR  1    21859 J859-------AS32

BA32    22079 TRA I 01 22124 K1S4      ERROR TYPEOUT
        22084 SET B 01   0001 00 1     AND HALT 2020
        22089 LOD 8 01 21844 J8U4
        22094 UNL 7 01 22632 K6T2
        22099 SEL 2      0500
        22104 WR  R    22614 K614
        22109 TRA I 03 22119 K1A9
        22114 TR  1    22124 K124
        22119 HLT J      2020
        22124 EIA , 10   0000 0--0
        22129 SEL 2    21844 J844
        22134 TR  1    21864 J864-------AT32

BB32    22139 TRA I 01 22169 K1W9      ERROR TYPE OUT
        22144 SEL 2      0500          AND HALT 2030
        22149 WR  R    22555 K555
        22154 TRA I 03 22164 K1F4
        22159 TR  1    22169 K169
        22164 HLT J      2030
        22169 EIA , 10   0000 0--0
        22174 SEL 2    21874 J874
        22179 TR  1    21889 J889-------AU32

BC32    22184 TRA I 01 22214 K2/4      ERROR TYPEOUT
        22189 SEL 2      0500          AND HALT 2040
        22194 WR  R    22585 K585
        22199 TRA I 03 22209 K2&9
        22204 TR  1    22214 K214
        22209 HLT J      2040
        22214 EIA , 10   0000 0--0
        22219 SEL 2    21914 J914
        22224 TR  1    21929 J929-------AV32
```

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SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 20 PAGE 3
ERROR TYPEOUTS, WR-RD FIELDS

```
BD32....  22229 TRA I 01 22274 K2X4
          22234 SET B 01  0001 00 1
          22239 LOD 8 01 21914 J9/4
          22244 UNL 7 01 22652 K6V2
          22249 SEL 2     0500
          22254 WR  R    22634 K634
          22259 TRA I 03 22269 K2F9
          22264 TR  1    22274 K274
          22269 HLT J     2050
          22274 TR  1    21934 J934----AW32
```

ERROR TYPEOUT
AND HALT 2050

```
BE32....  22279 TRA I 01 22359 K3V9
          22284 SET B 06  0001 0 -1
          22289 LOD 8 06 21914 JZJ4
          22294 UNL 7 06 22676 KWP6
          22299 SEL 2     0500
          22304 WR  R    22654 K654
          22309 TRA I 05 22319 KT/9
          22314 TR  1    22334 K334
          22319 WR  R    22677 K677
          22324 WR  R    22360 K360
          22329 WR  R    22435 K435
          22334 TRS O 11 22339 KLC9
          22339 TRS O 12 22344 KC44
          22344 TRA I 03 22354 K3E4
          22349 TR  1    22359 K359
          22354 HLT J     2060
          22359 TR  1    21964 J964----AX32
```

ERROR TYPEOUT
AND HALT 2060

TYPEOUT FIELDS IF 915 IS ON

WR FIELD
RD FIELD

CONSTANTS AND TYPEOUTS

```
2 015 22374
2 030 22404
2 029 22433
2 001 22434
2 015 22449
2 030 22479
2 030 22509
2 010 22519
2 006 22525
2 028 22553
2 001 22554
2 029 22583
2 001 22584
2 028 22612
2 001 22613
2 019 22632
2 001 22633
2 019 22652
2 001 22653
2 024 22677
2 001 22678
```

WR FIELD IS--
AAAAA@@@@@66666IIIII-----33333
HHHHH77777RRRRRXXXXXA@ I-OH7R
¤
RD FIELD IS--

0109 A
INT 200 AFTER WR AND NOT RDY
¤
INT 200 AFTER BSP AND NOT RDY
¤
INT 200 AFTER RD AND NOT RDY
¤
CHAN CHK ON WR 200X
¤
CHAN CHK ON RD 200X
¤
WR-RD DATA UNEQUAL 200X
¤

22415
22375

B HHHH.H

B 77777
X

1

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 21 PAGE 1

WR, BSP, RD ON CHANNEL 21.
CHECK FOR FALSE INTERRUPTS,
CHANNEL CHECKS, AND COMPARE
WRITE AND READ FIELDS.

```
BF31
BF36   22684 UNL 7 01 22709 K7 9          SET
       22689 UNL 7 01 22719 K7/9          UP
       22694 UNL 7 01 22739 K7T9          SELECT
       22699 UNL 7 01 22769 K7W9
       22704 UNL 7 01 22809 K8 9
       22709 SEL 2     210-
       22714 TRS O     22864 K864------BN36  TEST FOR END OF FILE
                          I
                          V
       22719 SEL 2     210e
       22724 WR  R     23270 L270         WRITE 60 CHARACTERS
       22729 LIP , 15  2100 2A&0
                          I
                          I
                          V
       22734 NOP A     22719 K719
       22739 SEL 2     210-
       22744 TRS O 01  22754 K7V4--+      TEST READY AFTER INTERRUPT
       22749 TR  1     22929 K929--+-----BP36
BG36   22754 TRS O 02  22974 K9P4--+-----BQ36  TEST FOR WRITE CHK
BH36   22759 BSP 3     0004
       22764 LIP , 15  2100 2A&0
                          I
                          I
                          V
       22769 SEL 2     210-
       22774 TRS O 01  22784 K7Y4--+      TEST READY AFTER INTERRUPT
       22779 TR  1     23034 L034--+-----BR36
BJ36   22784 SET B 01  0000 00 0
       22789 SET B 01  0060 00W0
       22794 UNL 7 01  23404 L4 4         CLEAR READ FIELD
       22799 RD  Y     23345 L345
       22804 LIP , 15  2100 2A&0
                          I
                          I
                          V
       22809 SEL 2     210-
       22814 TRS O 01  22824 K8S4--+      TEST READY AFTER INTERRUPT
       22819 TR  1     23079 L079--+-----BS36
BK36   22824 TRS O 02  23124 L1K4--+-----BT37  TEST FOR RD CHK
BL37   22829 SET B 01  0060 00W0
       22834 LOD 8 01  23329 L3S9
       22839 CMP 4 01  23404 L4 4         DO CMP
       22844 TRS O 11  23174 LJG4------BU37  TEST 901
       22849 TRE L     22859 K859--+      AND EQUAL
       22854 TR  1     23174 L174--+-----BU37
BM37   22859 TR  1     22709 K709
```

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SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 21 PAGE 2
REWIND AND ERROR TYPEOUTS

```
BN35....  22864 IOF 3      0000
          22869 RWD 3      0002
          22874 SET B 01   0002 00 2
          22879 LOD 8 01 22709 K7 9
          22884 CMP 4 01 23418 L4/8
          22889 TRE L    22904 K904-
          22894 ADD G 01 23420 L4SC
          22899 TR  1    22909 K909-
          22904 LOD 8 01 23416 L4/6.
          22909 UNL 7 01 22914 K9/4.
          22914 SEL 2      210-
          22919 TRS O 01 22684 K6Y4-------BF35
          22924 TR  1    22884 K884
```

IF END OF FILE,
REWIND TAPE AND
FIND NEXT READY TAPE

```
BP35....  22929 TRA I 01 22959 K9V9-
          22934 SEL 2      0500
          22939 WR  R    23421 L421
          22944 TRA I 03 22954 K9E4-
          22949 TR  1    22959 K959-
          22954 HLT J      2110.....
          22959 EIA , 10   0000 0--0.
          22964 SEL 2    22739 K739
          22969 TR  1    22754 K754-------BG35
```

ERROR TYPEOUT
AND HALT 2110

```
BØ35....  22974 TRA I 01 23019 LO/9-
          22979 SET B 01   0001 00 1
          22984 LOD 8 01 22739 K7T9
          22989 UNL 7 01 23527 L5S7
          22994 SEL 2      0500
          22999 WR  R    23509 L509
          23004 TRA I 03 23014 LOA4-
          23009 TR  1    23019 LO19-
          23014 HLT J      2120.....
          23019 EIA , 10   0000 0--0.
          23024 SEL 2    22739 K739
          23029 TR  1    22759 K759-------BH35
```

ERROR TYPEOUT
AND HALT 2120

```
BR35....  23034 TRA I 01 23064 LOW4-
          23039 SEL 2      0500
          23044 WR  R    23450 L450
          23049 TRA I 03 23059 LOE9-
          23054 TR  1    23064 LO64-
          23059 HLT J      2130.....
          23064 EIA , 10   0000 0--0.
          23069 SEL 2    22769 K769
          23074 TR  1    22784 K784-------BJ35
```

ERROR TYPEOUT
AND HALT 2130

```
BS35....  23079 TRA I 01 23109 L1 9-
          23084 SEL 2      0500
          23089 WR  R    23480 L480
          23094 TRA I 03 23104 L1&4-
          23099 TR  1    23109 L109-
          23104 HLT J      2140.....
          23109 EIA , 10   0000 0--0.
          23114 SEL 2    22809 K809
          23119 TR  1    22824 K824-------BK35
```

ERROR TYPEOUT
AND HALT 2140

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 21 PAGE 3
ERROR TYPEOUTS, WR-RD FIELDS

```
BT35....  23124 TRA I 01 23169 L1W9
          23129 SET B 01  0001 00 1
          23134 LOD 8 01 22809 K8 9
          23139 UNL 7 01 23547 L5U7
          23144 SEL 2     0500
          23149 WR  R    23529 L529
          23154 TRA I 03 23164 L1F4
          23159 TR  1    23169 L169
          23164 HLT J     2150
          23169 TR  1    22829 K829----BL35
```

ERROR TYPEOUT
AND HALT 2150

```
BU35....  23174 TRA I 01 23254 L2V4
          23179 SET B 06  0001 0 -1
          23184 LOD 8 06 22809 KY-9
          23189 UNL 7 06 23571 LVP1
          23194 SEL 2     0500
          23199 WR  R    23549 L549
          23204 TRA I 05 23214 LS/4
          23209 TR  1    23229 L229
          23214 WR  R    23572 L572
          23219 WR  R    23255 L255
          23224 WR  R    23330 L330
          23229 TRS O 11 23234 LKC4
          23234 TRS O 12 23239 LB39
          23239 TRA I 03 23249 L2D9
          23244 TR  1    23254 L254
          23249 HLT J     2160
          23254 TR  1    22859 K859----BM35
```

ERROR TYPEOUT
AND HALT 2160

TYPEOUT FIELDS IF 915 IS ON

WR FIELD
RD FIELD

CONSTANTS AND TYPEOUTS

```
2 015 23269    WR FIELD IS--
2 030 23299    BBBBB55555&&&&&#####PPPPPYYYYY
2 029 23328    .....44444GGGGG88888B5&#PY.4G
2 001 23329
2 015 23344    RD FIELD IS--
2 030 23374
2 030 23404
2 010 23414
2 006 23420    0109 A
2 028 23448    INT 210 AFTER WR AND NOT RDY
2 001 23449
2 029 23478    INT 210 AFTER BSP AND NOT RDY
2 001 23479
2 028 23507    INT 210 AFTER RD AND NOT RDY
2 001 23508
2 019 23527    CHAN CHK ON WR 210X
2 001 23528
2 019 23547    CHAN CHK ON RD 210X
2 001 23548
2 024 23572    WR-RD DATA UNEQUAL 210X
2 001 23573
```

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SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 22 PAGE 1

WR, BSP, RD ON CHANNEL 22.
CHECK FOR FALSE INTERRUPTS,
CHANNEL CHECKS, AND COMPARE
WRITE AND READ FIELDS

```
BV31
BV39    23579 UNL 7 01 23604 L6 4
        23584 UNL 7 01 23614 L6/4          SET
        23589 UNL 7 01 23634 L6T4          UP
        23594 UNL 7 01 23664 L6W4          SELECT
        23599 UNL 7 01 23704 L7 4
        23604 SEL 2     220-
        23609 TRS O     23759 L759-------CC39  TEST FOR END OF FILE
        23614 SEL 2     220-
        23619 WR  R     24165 M165         WRITE 60 CHARACTERS
        23624 LIP , 15  2200 2B&0
        23629 NOP A     23614 L614         BACKSPACE
        23634 SEL 2     220-
        23639 TRS O 01  23649 L6U9-        TEST READY AFTER INTERRUPT
        23644 TR  1     23824 L824-------CD39
BW39    23649 TRS O 02  23869 L8O9-------CE39  TEST FOR WRITE CHK
BX39    23654 BSP 3     0004
        23659 LIP , 15  2200 2B&0          READ 60 CHARACTERS
        23664 SEL 2     220-
        23669 TRS O 01  23679 L6X9-        TEST READY AFTER INTERRUPT
        23674 TR  1     23929 L929-------CF39
BY39    23679 SET B 01  0000 00 0
        23684 SET B 01  0060 00W0
        23689 UNL 7 01  24299 M2Z9         CLEAR READ FIELD
        23694 RD  Y     24240 M240
        23699 LIP , 15  2200 2B&0          COMPARE WR AND RD FIELDS
        23704 SEL 2     220-
        23709 TRS O 01  23719 L7/9-        TEST READY AFTER INTERRUPT
        23714 TR  1     23974 L974-------CG39
BZ39    23719 TRS O 02  24019 M0J9-------CH40  TEST FOR RD CHK
CA40    23724 SET B 01  0060 00W0
        23729 LOD 8 01  24224 M2S4
        23734 CMP 4 01  24299 M2Z9         DO CMP
        23739 TRS O 11  24069 M-F9-------CJ40  TEST 901
        23744 TRE L     23754 L754-        AND EQUAL
        23749 TR  1     24069 M069-------CJ40
CB40    23754 TR  1     23604 L604
```

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 22 PAGE 2
REWIND AND ERROR TYPEOUTS

```
CC3B....  23759 IOF 3       0000                  IF END OF FILE,
          23764 RWD 3       0002                  REWIND TAPE AND
          23769 SET B 01    0002  00 2            FIND NEXT READY TAPE
          23774 LOD 8 01  23604  L6 4
          23779 CMP 4 01  24313  M3/3
          23784 TRE L     23799  L799-------
          23789 ADD G 01  24315  M3/5
          23794 TR  1     23804  L804-------
          23799 LOD 8 01  24311  M3/1
          23804 UNL 7 01  23809  L8 9
          23809 SEL 2       220-
          23814 TRS O 01  23579  L5X9-------BV38
          23819 TR  1     23779  L779

CD3B....  23824 TRA I 01  23854  L8V4-------        ERROR TYPEOUT
          23829 SEL 2       0500                  AND HALT 2210
          23834 WR  R     24316  M316
          23839 TRA I 03  23849  L8D9-------
          23844 TR  1     23854  L854-------
          23849 HLT J       2210
          23854 EIA , 10    0000  0--0
          23859 SEL 2     23634  L634
          23864 TR  1     23649  L649-------BW38

CE3B....  23869 TRA I 01  23914  L9/4-------        ERROR TYPEOUT
          23874 SET B 01    0001  00 1            AND HALT 2220
          23879 LOD 8 01  23634  L6T4
          23884 UNL 7 01  24422  M4S2
          23889 SEL 2       0500
          23894 WR  R     24404  M404
          23899 TRA I 03  23909  L9&9-------
          23904 TR  1     23914  L914-------
          23909 HLT J       2220
          23914 EIA , 10    0000  0--0
          23919 SEL 2     23634  L634
          23924 TR  1     23654  L654-------BX38

CF3B....  23929 TRA I 01  23959  L9V9-------        ERROR TYPEOUT
          23934 SEL 2       0500                  AND HALT 2230
          23939 WR  R     24345  M345
          23944 TRA I 03  23954  L9E4-------
          23949 TR  1     23959  L959-------
          23954 HLT J       2230
          23959 EIA , 10    0000  0--0
          23964 SEL 2     23664  L664
          23969 TR  1     23679  L679-------BY38

CG3B....  23974 TRA I 01  24004  M0 4-------        ERROR TYPEOUT
          23979 SEL 2       0500                  AND HALT 2240
          23984 WR  R     24375  M375
          23989 TRA I 03  23999  L9I9-------
          23994 TR  1     24004  M004-------
          23999 HLT J       2240
          24004 EIA , 10    0000  0--0
          24009 SEL 2     23704  L704
          24014 TR  1     23719  L719-------BZ38
```

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SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 22, PAGE 3
ERROR TYPEOUTS, WR-RD FIELDS

```
CH38....  24019 TRA  I 01 24064 M0W4          ERROR TYPEOUT
          24024 SET  B 01  0001 00 1          AND HALT 2250
          24029 LOD  8 01 23704 L7 4
          24034 UNL  7 01 24442 M4U2
          24039 SEL  2     0500
          24044 WR   R    24424 M424
          24049 TRA  I 03 24059 M0E9
          24054 TR   1    24064 M064
          24059 HLT  J     2250
          24064 TR   1    23724 L724----CA38

CJ38....  24069 TRA  I 01 24149 M1U9          ERROR TYPEOUT
          24074 SET  B 06  0001 0 -1          AND HALT 2260
          24079 LOD  8 06 23704 LX-4
          24084 UNL  7 06 24466 MU06
          24089 SEL  2     0500
          24094 WR   R    24444 M444
          24099 TRA  I 05 24109 M/ 9          TYPEOUT FIELDS IF 915 IS ON
          24104 TR   1    24124 M124
          24109 WR   R    24467 M467
          24114 WR   R    24150 M150          WR FIELD
          24119 WR   R    24225 M225          RD FIELD
          24124 TRS  0 11 24129 MJB9
          24129 TRS  0 12 24134 MA34
          24134 TRA  I 03 24144 M1D4
          24139 TR   1    24149 M149
          24144 HLT  J     2260
          24149 TR   1    23754 L754----CB38
```

CONSTANTS AND TYPEOUTS

```
2 015 24164                 WR FIELD IS--
2 030 24194                 CCCCC  11111QQQQQ2222299999
2 029 24223                 VVVVV$$$$$LLLLL%%%%%C 1Q29V$L
2 001 24224
2 015 24239                 RD FIELD IS--
2 030 24269
2 030 24299
2 010 24309
2 006 24315                 0109 A
2 028 24343                 INT 220 AFTER WR AND NOT RDY
2 001 24344
2 029 24373                 INT 220 AFTER BSP AND NOT RDY
2 001 24374
2 028 24402                 INT 220 AFTER RD AND NOT RDY
2 001 24403
2 019 24422                 CHAN CHK ON WR 220X
2 001 24423
2 019 24442                 CHAN CHK ON RD 220X
2 001 24443
2 024 24467                 WR-RD DATA UNEQUAL 220X
2 001 24468
```

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 23 PAGE 1
WR, BSP, RD ON CHANNEL 23
CHECK FOR FALSE INTERRUPTS,
CHANNEL CHECKS, AND COMPARE
WRITE AND READ FIELDS.

```
CK31
CK42    24474 UNL 7 01 24499 M4Z9
        24479 UNL 7 01 24509 M5 9                    SET
        24484 UNL 7 01 24529 M5S9                    UP
        24489 UNL 7 01 24559 M5V9                    SELECT
        24494 UNL 7 01 24599 M5Z9
        24499 SEL 2     230-
        24504 TRS 0     24654 M654-------CS42        TEST FOR END OF FILE

        24509 SEL 2     230-
        24514 WR  R     25060 N060                   WRITE 60 CHARACTERS
        24519 LIP , 15  2300 2C&0

                                                     BACKSPACE

        24524 NOP A     24509 M509
        24529 SEL 2     230-
        24534 TRS 0 01  24544 M5U4-                  TEST READY AFTER INTERRUPT
        24539 TR  1     24719 M719-------CT42
CL42    24544 TRS 0 02  24764 M7O4-------CU42        TEST FOR WRITE CHECK
CM42    24549 BSP 3     0004
        24554 LIP , 15  2300 2C&0

                                                     READ 60 CHARACTERS

        24559 SEL 2     230-
        24564 TRS 0 01  24574 M5X4-                  TEST READY AFTER INTERRUPT
        24569 TR  1     24824 M824-------CV42
CN42    24574 SET B 01  0000 00 0
        24579 SET B 01  0060 00W0
        24584 UNL 7 01  25194 N1Z4                   CLEAR READ FIELD
        24589 RD  Y     25135 N135
        24594 LIP , 15  2300 2C&0

                                                     COMPARE WR AND RD FIELDS

        24599 SEL 2     230-
        24604 TRS 0 01  24614 M6/4-                  TEST READY AFTER INTERRUPT
        24609 TR  1     24869 M869-------CW42
CP42    24614 TRS 0 02  24914 M9J4-------CX43        TEST FOR RD CHK.
CØ43    24619 SET B 01  0060 00W0
        24624 LOD 8 01  25119 N1/9
        24629 CMP 4 01  25194 N1Z4                   DO CMP
        24634 TRS 0 11  24964 MRF4-------CY43        TEST 901
        24639 TRE L     24649 M649-                  AND EQUAL
        24644 TR  1     24964 M964-------CY43
CR43    24649 TR  1     24499 M499
```

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 23 PAGE 2
REWIND AND ERROR TYPEOUTS

IF END OF FILE,
REWIND TAPE AND
FIND NEXT READY TAPE

```
CS41.....■.24654 IOF 3      0000
           24659 RWD 3      0002
           24664 SET B 01   0002  00 2
           24669 LOD 8 01  24499  M4Z9
       ..■.24674 CMP 4 01  25208  N2 8
       I   24679 TRE L     24694  M694-■--.
       I   24684 ADD G 01  25210  N2/0    I
       I   24689 TR  1     24699  M699-■--I.
       I   24694 LOD 8 01  25206  N2 6.■.II
       I   24699 UNL 7 01  24704  M7 4.■..I
       I   24704 SEL 2      230-
       I   24709 TRS 0 01  24474  M4X4-■-------CK41
       +-■-24714 TR  1     24674  M674
```

ERROR TYPEOUT
AND HALT 2310

```
CT41.....■.24719 TRA I 01  24749  M7U9-■---.
           24724 SEL 2      0500            I
           24729 WR  R     25211  N211      I
           24734 TRA I 03  24744  M7D4-■--.I
           24739 TR  1     24749  M749-■--IY
           24744 HLT J      2310.......■.II
           24749 EIA , 10   0000  0--0.■..I
           24754 SEL 2     24529  M529
           24759 TR  1     24544  M544-■-------CL41
```

ERROR TYPEOUT
AND HALT 2320

```
CU41.....■.24764 TRA I 01  24809  M8 9-■---.
           24769 SET B 01   0001  00 1      I
           24774 LOD 8 01  24529  M5S9      I
           24779 UNL 7 01  25317  N3/7      I
           24784 SEL 2      0500            I
           24789 WR  R     25299  N299      I
           24794 TRA I 03  24804  M864-■--.I
           24799 TR  1     24809  M809-■--IY
           24804 HLT J      2320.......■.II
           24809 EIA , 10   0000  0--0.■..I
           24814 SEL 2     24529  M529
           24819 TR  1     24549  M549-■-------CM41
```

ERROR TYPEOUT
AND HALT 2330

```
CV41.....■.24824 TRA I 01  24854  M8V4-■---.
           24829 SEL 2      0500            I
           24834 WR  R     25240  N240      I
           24839 TRA I 03  24849  M8D9-■--.I
           24844 TR  1     24854  M854-■--IY
           24849 HLT J      2330.......■.II
           24854 EIA , 10   0000  0--0.■..I
           24859 SEL 2     24559  M559
           24864 TR  1     24574  M574-■-------CN41
```

ERROR TYPEOUT
AND HALT 2340

```
CW41.....■.24869 TRA I 01  24899  M8Z9-■---.
           24874 SEL 2      0500            I
           24879 WR  R     25270  N270      I
           24884 TRA I 03  24894  M8I4-■--.I
           24889 TR  1     24899  M899-■--IY
           24894 HLT J      2340.......■.II
           24899 EIA , 10   0000  0--0.■..I
           24904 SEL 2     24599  M599
           24909 TR  1     24614  M614-■-------CP41
```

SECTION 5 CHANNELS
INTERRUPT PROGRAM
FOR CHANNEL 23 PAGE 3
ERROR TYPEOUTS, WR-RD FIELDS

```
CX41....  24914  TRA  I  01  24959  M9V9
          24919  SET  B  01   0001  00 1
          24924  LOD  8  01  24599  M5Z9
          24929  UNL  7  01  25337  N3T7
          24934  SEL  2       0500
          24939  WR   R      25319  N319
          24944  TRA  I  03  24954  M9E4
          24949  TR   1      24959  M959
          24954  HLT  J       2350
          24959  TR   1      24619  M619 ----CQ41
```

ERROR TYPEOUT
AND HALT 2350

```
CY41....  24964  TRA  I  01  25044  N0U4
          24969  SET  B  06   0001  0 -1
          24974  LOD  8  06  24599  MVR9
          24979  UNL  7  06  25361  NT01
          24984  SEL  2       0500
          24989  WR   R      25339  N339
          24994  TRA  I  05  25004  N  4
          24999  TR   1      25019  N019
          25004  WR   R      25362  N362
          25009  WR   R      25045  N045
          25014  WR   R      25120  N120
          25019  TRS  0  11  25024  N-B4
          25024  TRS  0  12  25029  N&29
          25029  TRA  I  03  25039  N0C9
          25034  TR   1      25044  N044
          25039  HLT  J       2360
          25044  TR   1      24649  M649 ----CR41
```

ERROR TYPEOUT
AND HALT 2360

TYPEOUT FIELDS IF 915 IS ON

WR FIELD
RD FIELD

CONSTANTS AND TYPEOUTS

```
2 015 25059   WR FIELD IS--
2 030 25089   ÐÐÐÐÐ/////MMMMM,,,,,TTTTT*****
2 029 25118   JJJJJKKKKKSSSSSZZZZZD/M,T*JKS
2 001 25119
2 015 25134   RD FIELD IS--
2 030 25164
2 030 25194
2 010 25204
2 006 25210   0109 A
2 028 25238   INT 230 AFTER WR AND NOT RDY
2 001 25239
2 029 25268   INT 230 AFTER BSP AND NOT RDY
2 001 25269
2 028 25297   INT 230 AFTER RD AND NOT RDY
2 001 25298
2 019 25317   CHAN CHK ON WR 230X
2 001 25318
2 019 25337   CHAN CHK ON RD 230X
2 001 25338
2 024 25362   WR-RD DATA UNEQUAL 230X
2 001 25363
```

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SECTION 6
INTERRUPT 250 PAGE 1

THIS SUB-ROUTINE IS USED IF THE NON STOP SWITCH IS ON AND AN ERROR OCCURS.

```
                                                    DUMP THE INCOMING STATUS
  25369 SPC ,      3704                             BITS FOR INTERROGATION,
  25374 UFC , 03 25734 N7C4                         AND RESET THE CHECK INDICATOR
  25379 SET B 01  0001 00 1                         BITS IN CASU 15
  25384 RCV U     25732 N732
  25389 TZB . 05 25404 NU 4-                        &
  25394 LOD 8 01 25738 N7T8
  25399 TR  1     25409 N409-                       -
  25404 LOD 8 01 25739 N7T9
  25409 UNL 7 01 25736 N7T6
  25414 SPC ,  -  3705
  25419 LFC , 02 25737 N7L7

  25424 TRA I 01 25504 N5 4-                        IF 911 ON, GO TO LIP 0009

  25429 SPC ,      3700                             USING THE CONTENTS OF WORD 0
  25434 UFC , 03 25744 N7D4                         IN CASU 15, FIND THE SOURCE
  25439 LDA # 02 25744 N7M4                         OF THE INTERRUPT AND
  25444 SUB P 02 25749 N7M9                         DETERMINE WHETHER OR NOT
  25449 ULA * 02 25459 N4N9                         IT WAS DUE TO AN ERROR HALT.
  25454 LOD 8 01 25747 N7U7
  25459 CMP 4 01  0000 00 0
  25464 TRE L     25474 N474-
  25469 TR  1     25514 N514-

  25474 TRA I 03 25484 N4H4                         IF THE INTERRUPT WAS DUE
  25479 TR  1     25504 N504-                       TO AN ERROR HALT, THAN
  25484 SET B 02  0003 00-3                         EXECUTE THE HALT
  25489 LOD 8 02 25982 N9Q2
  25494 UNL 7 02 25499 N4R9
  25499 HLT J     0-
CZ45  25504 LIP , 15  0009 0&&9                     EXIT FROM SUB-ROUTINE
  25509 TR  1     25369 N369

  25514 SEL 2      0500
  25519 TRA I 05 25529 NVS9-                        IF THE INTERRUPT WAS NOT
  25524 TR  1     25559 N559-                       DUE TO AN ERROR HALT, THEN
  25529 ADD G 02 25746 N7M6                         TYPEOUT THE REASON FOR
  25534 UNL 7 02 25787 N7Q7                         INT. 250 BASED ON THE
  25539 SET B 02  0003 00-3                         STATUS BITS IN CASU 15.
  25544 LOD 8 02 25982 N9Q2
  25549 UNL 7 02 25773 N7P3                         LONG TYPEOUT IF THE
  25554 WR  R     25750 N750                        915 SWITCH IS ON

  25559 TRS O 09 25619 NO/9---DA45
  25564 RCV U     25732 N732                        IF NO ART CHECK, THAN
  25569 TZB . 01 25579 N5X9-                        TEST STATUS BITS FOR POSSIBLE
  25574 TR  1     25634 N634-----DB45               FALSE INTERRUPT
  25579 TZB . 02 25589 N5Q9
  25584 TR  1     25634 N634-----DB45
  25589 LOD 8 01 25735 N7T5
  25594 CMP 4 01 25733 N7T3
  25599 TRE L     25609 N609-
  25604 TR  1     25634 N634-----DB45
  25609 WR  R     25789 N789                        UNDETERMINED INTERRUPT
  25614 TR  1     25719 N719-------DC45
```

SECTION 6
INTERRUPT 250 PAGE 2

```
DAA4....  25619 SPC ,      3730
          25624 UFC , 03 25838 N8C8
          25629 WR  R    25821 N821          ART CHK
DBA4....  25634 RCV U    25733 N733
          25639 TZB . 01 25649 N6U9
          25644 WR  R    25849 N849          900 CHK
          25649 TZB . 02 25659 N6N9
          25654 WR  R    25862 N862          901 CHK
          25659 TZB . 03 25669 N6F9
          25664 WR  R    25875 N875          902 CHK
          25669 TZB . 05 25679 NWX9
          25674 WR  R    25888 N888          903 CHK
          25679 RCV U    25732 N732
          25684 TZB . 01 25694 N6Z4
          25689 WR  R    25901 N901          904 CHK
          25694 TZB . 02 25704 N7-4
          25699 WR  R    25914 N914          905 CHK
          25704 TRS O 11 25709 NP&9
          25709 TRS O 12 25714 NG14
          25714 TRA I 03 25724 N7B4
DCA4....  25719 TR  1    25729 N729
          25724 HLT J     0250.....
          25729 TR  1    25504 N504---CZ44   GO TO SUB-ROUTINE EXIT
```

CONSTANTS AND TYPEOUTS

```
2 005 25734                -&--   INCOMING STATUS BITS
2 005 25739               ---&-   RESETS FOR CASU 15
2 005 25744                0000   INCOMING IC LOCATION
2 005 25749                DJ I   &4 J &9
2 038 25787               INT. 250  FROM ROUT. XXX AT IC- 000000
2 001 25788
2 031 25819                    UNDETERMINED INTERRUPT 250
2 001 25820
2 027 25847                    ART CHK  0000 SELECTED
2 001 25848
2 012 25860                    900 CHK
2 001 25861
2 012 25873                    901 CHK
2 001 25874
2 012 25886                    902 CHK
2 001 25887
2 012 25899                    903 CHK
2 001 25900
2 012 25912                    904 CHK
2 001 25913
2 012 25925                    905 CHK
2 001 25926
```

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SECTION 6
INTERRUPT 251
ON MANUAL INTERRUPT 250, TYPEOUT THE NUMBER OF THE LAST ROUTINE BEGUN BUT NOT COMPLETED, AND THE NUMBER OF PASSES COMPLETED.

```
    25934 RAD  H 01 21571 J5X1
    25939 UNL  7 01 25990 N9Z0
    25944 SEL  2     0500
    25949 WR   R    25965 N965
    25954 HLT  J     0251
    25959 LIP  , 15  0009 0&&9
    25964 TR   1    25934 N934
```

```
2 033 25997
2 001 25998
```

INT. 251 ROUT. XXX XXXXXX PASSES

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```
26004 SET B 01  0004 00 4              FOR ROUT. #030
26009 LOD 8 01 26034 00T4              LOD RETURN ADDR. FOR #030
26014 SET B 02  0022 00K2
26019 LOD 8 02 27826 P8K6              LOD TYPEOUT FLAGS
26024 WR  R    28927 Q927              DO FIRST TYPEOUT
26029 TR  1    31154 A154--------EA56  TR TO OTHER TYPEOUTS
26034 NOP A     8924
26039 SET B 01  0004 00 4              FOR ROUT. #031
26044 LOD 8 01 26069 00W9
26049 SET B 02  0022 00K2
26054 LOD 8 02 27848 P8M8
26059 WR  R    28973 Q973
26064 TR  1    31154 A154--------EA56
26069 NOP A     9024
26074 SET B 01  0004 00 4              FOR ROUT. #032
26079 LOD 8 01 26104 01 4
26084 SET B 02  0022 00K2
26089 LOD 8 02 27870 P8P0
26094 WR  R    29018 R018
26099 TR  1    31154 A154--------EA56
26104 NOP A     9174
26109 SET B 01  0004 00 4              FOR ROUT. #033
26114 LOD 8 01 26139 01T9
26119 SET B 02  0022 00K2
26124 LOD 8 02 27892 P8R2
26129 WR  R    29048 R048
26134 TR  1    31154 A154--------EA56
26139 NOP A     9374
26144 SET B 01  0004 00 4              FOR ROUT. #034
26149 LOD 8 01 26174 01X4
26154 SET B 02  0022 00K2
26159 LOD 8 02 27914 P9J4
26164 WR  R    29093 R093
26169 TR  1    31154 A154--------EA56
26174 NOP A     9539
26179 SET B 01  0004 00 4              FOR ROUT. #035
26184 LOD 8 01 26209 02 9
26189 SET B 02  0022 00K2
26194 LOD 8 02 27936 P9L6
26199 WR  R    29123 R123
26204 TR  1    31154 A154--------EA56
26209 NOP A     9814
26214 SET B 01  0004 00 4              FOR ROUT. #036
26219 LOD 8 01 26244 02U4
26224 SET B 02  0022 00K2
26229 LOD 8 02 27958 P9N8
26234 WR  R    29169 R169
26239 TR  1    31154 A154--------EA56
26244 NOP A     9999
26249 SET B 01  0004 00 4              FOR ROUT. #037
26254 LOD 8 01 26279 02X9
26259 SET B 02  0022 00K2
26264 LOD 8 02 27980 P9Q0
26269 WR  R    29211 R211
26274 TR  1    31154 A154--------EA56
26279 NOP A    10134  134
26284 SET B 01  0004 00 4              FOR ROUT. #038 AND #039
26289 LOD 8 01 26299 02Z9
26294 TR  1    26314 0314---+
26299 NOP A    10294  294   I
26304 SET B 01  0004 00 4   I
26309 LOD 8 01 26329 03S9   I
26314 SET B 02  0022 00K2...+
26319 LOD 8 02 28002 Q0-2
26324 WR  R    29250 R250
26329 NOP A    10449  449
26334 TR  1    31154 A154--------EA56
```

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```
26339 SET B 01  0004 00 4
26344 LOD 8 01 26369 O3W9
26349 SET B 02  0022 00K2
26354 LOD 8 02 28024 Q0K4
26359 WR  R    29299 R299
26364 TR  1    31154 A154-------EA56
26369 NOP A    10714  714
26374 SET B 01  0004 00 4
26379 LOD 8 01 26404 O4 4
26384 SET B 02  0022 00K2
26389 LOD 8 02 28046 Q0M6
26394 WR  R    29347 R347
26399 TR  1    31154 A154-------EA56
26404 NOP A    10884  884
26409 SET B 01  0004 00 4
26414 LOD 8 01 26439 O4T9
26419 SET B 02  0022 00K2
26424 LOD 8 02 28068 Q008
26429 WR  R    29397 R397
26434 TR  1    31154 A154-------EA56
26439 NOP A    11079 /079
26444 SET B 01  0004 00 4
26449 LOD 8 01 26474 O4X4
26454 SET B 02  0022 00K2
26459 LOD 8 02 28090 Q0R0
26464 WR  R    29444 R444
26469 TR  1    31154 A154-------EA56
26474 NOP A    11279 /279
26479 SET B 01  0004 00 4
26484 LOD 8 01 26509 O5 9
26489 SET B 02  0022 00K2
26494 LOD 8 02 28112 Q1J2
26499 WR  R    29489 R489
26504 TR  1    31154 A154-------EA56
26509 NOP A    11479 /479
26514 SET B 01  0004 00 4
26519 LOD 8 01 26544 O5U4
26524 SET B 02  0022 00K2
26529 LOD 8 02 28134 Q1L4
26534 WR  R    29534 R534
26539 TR  1    31154 A154-------EA56
26544 NOP A    11644 /644
26549 SET B 01  0004 00 4
26554 LOD 8 01 26579 O5X9
26559 SET B 02  0022 00K2
26564 LOD 8 02 28156 Q1N6
26569 WR  R    29579 R579
26574 TR  1    31154 A154-------EA56
26579 NOP A    11824 /824
26584 SET B 01  0004 00 4
26589 LOD 8 01 26614 O6/4
26594 SET B 02  0022 00K2
26599 LOD 8 02 28178 Q1P8
26604 WR  R    29624 R624
26609 TR  1    31154 A154-------EA56
26614 NOP A    12064 S064
26619 SET B 01  0004 00 4
26624 LOD 8 01 26644 O6U4
26629 SET B 02  0022 00K2
26634 LOD 8 02 28200 Q2-0
26639 WR  R    29675 R675
26644 NOP A    12224 S224
26649 TR  1    31154 A154-------EA56
```

FOR ROUT. #040

FOR ROUT. #041

FOR ROUT. #042

FOR ROUT. #043

FOR ROUT. #044

FOR ROUT. #045

FOR ROUT. #046

FOR ROUT. #047

FOR ROUT. #048

```
26654 SET B 01  0004 00 4
26659 LOD 8 01 26684 O6Y4
26664 SET B 02  0022 00K2
26669 LOD 8 02 28222 Q2K2
26674 WR  R    29726 R726
26679 TR  1    31154 A154-------EA56
26684 NOP A    12339 S339
26689 SET B 01  0004 00 4
26694 LOD 8 01 26719 O7/9
26699 SET B 02  0022 00K2
26704 LOD 8 02 28244 Q2M4
26709 WR  R    29777 R777
26714 TR  1    31154 A154-------EA56
26719 NOP A    12469 S469
26724 SET B 01  0004 00 4
26729 LOD 8 01 26754 O7V4
26734 SET B 02  0022 00K2
26739 LOD 8 02 28266 Q2O6
26744 WR  R    29818 R818
26749 TR  1    31154 A154-------EA56
26754 NOP A    12629 S629
26759 SET B 01  0004 00 4
26764 LOD 8 01 26789 O7Y9
26769 SET B 02  0022 00K2
26774 LOD 8 02 28288 Q2Q8
26779 WR  R    29865 R865
26784 TR  1    31154 A154-------EA56
26789 NOP A    12799 S799
26794 SET B 01  0004 00 4
26799 LOD 8 01 26824 O8S4
26804 SET B 02  0022 00K2
26809 LOD 8 02 28310 Q3J0
26814 WR  R    29911 R911
26819 TR  1    31154 A154-------EA56
26824 NOP A    12899 S899
26829 SET B 01  0004 00 4
26834 LOD 8 01 26859 O8V9
26839 SET B 02  0022 00K2
26844 LOD 8 02 28332 Q3L2
26849 WR  R    29953 R953
26854 TR  1    31154 A154-------EA56
26859 NOP A    12999 S999
26864 SET B 01  0004 00 4
26869 LOD 8 01 26894 O8Z4
26874 SET B 02  0022 00K2
26879 LOD 8 02 28354 Q3N4
26884 WR  R    29998 R998
26889 TR  1    31154 A154-------EA56
26894 NOP A    13224 T224
26899 SET B 01  0004 00 4
26904 LOD 8 01 26929 O9S9
26909 SET B 02  0022 00K2
26914 LOD 8 02 28376 Q3P6
26919 WR  R    30044 &044
26924 TR  1    31154 A154-------EA56
26929 NOP A    13404 T404
26934 SET B 01  0004 00 4
26939 LOD 8 01 26959 O9V9
26944 SET B 02  0022 00K2
26949 LOD 8 02 28398 Q3R8
26954 WR  R    30093 &093
26959 NOP A    13594 T594
26964 TR  1    31154 A154-------EA56
```

FOR ROUT. #049

FOR ROUT. #050

FOR ROUT. #051

FOR ROUT. #052

FOR ROUT. #053

FOR ROUT. #054

FOR ROUT. #055

FOR ROUT. #056

FOR ROUT. #057

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```
 26969  SET  B  01   0004  00 4
 26974  LOD  8  01  26999  09Z9
 26979  SET  B  02   0022  00K2
 26984  LOD  8  02  28420  Q4K0
 26989  WR   R      30139  &139
 26994  TR   1      31154  A154-------EA56
 26999  NOP  A      13759  T759
 27004  SET  B  01   0004  00 4          FOR ROUT. #058
 27009  LOD  8  01  27034  P0T4
 27014  SET  B  02   0022  00K2
 27019  LOD  8  02  28442  Q4M2
 27024  WR   R      30190  &190
 27029  TR   1      31154  A154-------EA56
 27034  NOP  A      13994  T994
 27039  SET  B  01   0004  00 4          FOR ROUT. #059
 27044  LOD  8  01  27069  P0W9
 27049  SET  B  02   0022  00K2
 27054  LOD  8  02  28464  Q4O4
 27059  WR   R      30234  &234
 27064  TR   1      31154  A154-------EA56
 27069  NOP  A      14234  U234
 27074  SET  B  01   0004  00 4          FOR ROUT. #060
 27079  LOD  8  01  27104  P1 4
 27084  SET  B  02   0022  00K2
 27089  LOD  8  02  28486  Q4Q6
 27094  WR   R      30280  &280
 27099  TR   1      31154  A154-------EA56
 27104  NOP  A      14464  U464
 27109  SET  B  01   0004  00 4          FOR ROUT. #061
 27114  LOD  8  01  27139  P1T9
 27119  SET  B  02   0022  00K2
 27124  LOD  8  02  28508  Q5-8
 27129  WR   R      30322  &322
 27134  TR   1      31154  A154-------EA56
 27139  NOP  A      14724  U724
 27144  SET  B  01   0004  00 4          FOR ROUT. #062
 27149  LOD  8  01  27174  P1X4
 27154  SET  B  02   0022  00K2
 27159  LOD  8  02  28530  Q5L0
 27164  WR   R      30368  &368
 27169  TR   1      31154  A154-------EA56
 27174  NOP  A      14924  U924
 27179  SET  B  01   0004  00 4          FOR ROUT. #063
 27184  LOD  8  01  27209  P2 9
 27189  SET  B  02   0022  00K2
 27194  LOD  8  02  28552  Q5N2
 27199  WR   R      30406  &406
 27204  TR   1      31154  A154-------EA56
 27209  NOP  A      15154  V154
 27214  SET  B  01   0004  00 4          FOR ROUT. #064
 27219  LOD  8  01  27244  P2U4
 27224  SET  B  02   0022  00K2
 27229  LOD  8  02  28574  Q5P4
 27234  WR   R      30433  &433
 27239  TR   1      31154  A154-------EA56
 27244  NOP  A      15379  V379
 27249  SET  B  01   0004  00 4          FOR ROUT. #065
 27254  LOD  8  01  27274  P2X4
 27259  SET  B  02   0022  00K2
 27264  LOD  8  02  28596  Q5R6
 27269  WR   R      30475  &475
 27274  NOP  A      15609  V609
 27279  TR   1      31154  A154-------EA56          FOR ROUT. #066
```

```
27284 SET  B 01   0004 00 4                    FOR ROUT. #067
27289 LOD  8 01 27314 P3/4
27294 SET  B 02   0022 00K2
27299 LOD  8 02 28618 Q6J8
27304 WR   R      30520 &520
27309 TR   1      31154 A154-------EA56
27314 NOP  A      15849 V849
27319 SET  B 01   0004 00 4                    FOR ROUT. #068
27324 LOD  8 01 27349 P3U9
27329 SET  B 02   0022 00K2
27334 LOD  8 02 28640 Q6M0
27339 WR   R      30570 &570
27344 TR   1      31154 A154-------EA56
27349 NOP  A      16064 W064
27354 SET  B 01   0004 00 4                    FOR ROUT. #069
27359 LOD  8 01 27384 P3Y4
27364 SET  B 02   0022 00K2
27369 LOD  8 02 28662 Q6O2
27374 WR   R      30619 &619
27379 TR   1      31154 A154-------EA56
27384 NOP  A      16319 W319
27389 SET  B 01   0004 00 4                    FOR ROUT. #070
27394 LOD  8 01 27419 P4/9
27399 SET  B 02   0022 00K2
27404 LOD  8 02 28684 Q6Q4
27409 WR   R      30646 &646
27414 TR   1      31154 A154-------EA56
27419 NOP  A      16534 W534
27424 SET  B 01   0004 00 4                    FOR ROUT. #071
27429 LOD  8 01 27454 P4V4
27434 SET  B 02   0022 00K2
27439 LOD  8 02 28706 Q7-6
27444 WR   R      30696 &696
27449 TR   1      31154 A154-------EA56
27454 NOP  A      16724 W724
27459 SET  B 01   0004 00 4                    FOR ROUT. #072
27464 LOD  8 01 27489 P4Y9
27469 SET  B 02   0022 00K2
27474 LOD  8 02 28728 Q7K8
27479 WR   R      30747 &747
27484 TR   1      31154 A154-------EA56
27489 NOP  A      16964 W964
27494 SET  B 01   0004 00 4                    FOR ROUT. #073
27499 LOD  8 01 27524 P5S4
27504 SET  B 02   0022 00K2
27509 LOD  8 02 28750 Q7N0
27514 WR   R      30793 &793
27519 TR   1      31154 A154-------EA56
27524 NOP  A      17149 X149
27529 SET  B 01   0004 00 4                    FOR ROUT. #074
27534 LOD  8 01 27559 P5V9
27539 SET  B 02   0022 00K2
27544 LOD  8 02 28772 Q7P2
27549 WR   R      30842 &842
27554 TR   1      31154 A154-------EA56
27559 NOP  A      17334 X334
27564 SET  B 01   0004 00 4                    FOR ROUT. #075
27569 LOD  8 01 27589 P5Y9
27574 SET  B 02   0022 00K2
27579 LOD  8 02 28794 Q7R4
27584 WR   R      30890 &890
27589 NOP  A      18959 Y959
27594 TR   1      31154 A154-------EA56
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□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
□ 27599 SET B 01  0004 00 4 □
□ 27604 LOD 8 01 27629 P6S9 □
□ 27609 SET B 02  0022 00K2 □
□ 27614 LOD 8 02 28816 Q8J6 □
□ 27619 WR  R    30937 &937 □
□ 27624 TR  1    31154 A154-□-------EA56
□ 27629 NOP A    19599 Z599 □
□ 27634 SET B 01  0004 00 4 □
□ 27639 LOD 8 01 27664 P6W4 □
□ 27644 SET B 02  0022 00K2 □
□ 27649 LOD 8 02 28838 Q8L8 □
□ 27654 WR  R    30969 &969 □
□ 27659 TR  1    31154 A154-□-------EA56
□ 27664 NOP A    19799 Z799 □
□ 27669 SET B 01  0004 00 4 □
□ 27674 LOD 8 01 27699 P6Z9 □
□ 27679 SET B 02  0022 00K2 □
□ 27684 LOD 8 02 28860 Q8O0 □
□ 27689 WR  R    31000 A000 □
□ 27694 TR  1    31154 A154-□-------EA56
□ 27699 NOP A    20184 -184 □
□ 27704 SET B 01  0004 00 4 □
□ 27709 LOD 8 01 27734 P7T4 □
□ 27714 SET B 02  0022 00K2 □
□ 27719 LOD 8 02 28882 Q8Q2 □
□ 27724 WR  R    31033 A033 □
□ 27729 TR  1    31154 A154-□-------EA56
□ 27734 NOP A    20419 -419 □
□ 27739 SET B 01  0004 00 4 □
□ 27744 LOD 8 01 27769 P7W9 □
□ 27749 SET B 02  0022 00K2 □
□ 27754 LOD 8 02 28904 Q9-4 □
□ 27759 WR  R    31067 A067 □
□ 27764 TR  1    31154 A154-□-------EA56
□ 27769 NOP A    20809 -809 □
□ 27774 SET B 01  0004 00 4 □
□ 27779 LOD 8 01 27799 P7Z9 □
□ 27784 SET B 02  0022 00K2 □
□ 27789 LOD 8 02 28926 Q9K6 □
□ 27794 WR  R    31108 A108 □
□ 27799 NOP A    21254 J254 □
□ 27804 TR  1    31154 A154-□-------EA56
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
```

FOR ROUT. #076

FOR ROUT. #077

FOR ROUT. #078

FOR ROUT. #079

FOR ROUT. #080

FOR ROUT. #081

```
2 022 27826 00      88888XXX XX8828DCMP 00
2 022 27848         88888XXX XX8882BCMP 00
2 022 27870         88888XXX XX 888 SET XX
2 022 27892          888 LNG 00 888 SHR 00
2 022 27914         88888XXX XX 888 RND 00
2 022 27936         88888XXX XX88888XXX XX
2 022 27958         88888XXX XX8848 UNL XX
2 022 27980         88888XXX XX8848 LOD XX
2 022 28002         88888XXX XX8848 SB  XX
2 022 28024         88888XXX XX8848 SGN 00
2 022 28046         88888XXX XX8848 SGN XX
2 022 28068         8881ATSL 018488 RCV 00
2 022 28090         88888XXX XX8848 LFC 02
2 022 28112         88888XXX XX8848 UFC 03
2 022 28134         88888XXX XX8848 LSB 04
2 022 28156         88888XXX XX8848 USB 05
2 022 28178         88888XXX XX8848 ST  XX
2 022 28200         8848 RAD XX8848 RSU XX
2 022 28222         88888XXX XX8848 ADD 00
2 022 28244         88888XXX XX8848 SUB 00
2 022 28266         88888XXX XX8848 ST  00
2 022 28288         8848 RSU 008848 RAD 00
2 022 28310         88888XXX XX8848 ADD XX
2 022 28332         88888XXX XX8848 SUB XX
2 022 28354         88888XXX XX8848 ADM 00
2 022 28376         88888XXX XX8848 ADM 00
2 022 28398         88888XXX XX8848 MPY 00
2 022 28420         88888XXX XX8848 MPY 00
2 022 28442         88888XXX XX8848 DIV 00
2 022 28464         88888XXX XX8848 DIV 00
2 022 28486          888 BLM 018818 RCV 00
2 022 28508         -888 BLM 008 88 RCV 00
2 022 28530         8818 TMT 012888 RCV 00
2 022 28552         8 88 SND XX8288 RCV 00
2 022 28574         8 88 TMT 008288 RCV 00
2 022 28596         8-88 TCT 088188 RCV 00
2 022 28618         88888XXX XX88  &TIP 14
2 022 28640         88888XXX XX88888XXX XX
2 022 28662         88888XXX XX88--&LIP 15
2 022 28684         88888XXX XX4888 LIP 15
2 022 28706         88888XXX XX88888XXX XX
2 022 28728         88888XXX XX8848 CMP 00
2 022 28750         88888XXX XX8848 SPR 00
2 022 28772         88888XXX XX8848 SPR 00
2 022 28794         88888XXX XX8848 ADM 00
2 022 28816         88888XXX XX8828 LDA XX
2 022 28838         88888XXX XX88888XXX XX
2 022 28860         88888XXX XX8828 ULA 00
2 022 28882         88888XXX XX88888XXX XX
2 022 28904         88888XXX XX8828 AAM 00
2 022 28926         88888XXX XX88888XXX XX
2 045 28971         TEST INDIRECT ADDRESS IN 7080 MODE USING CMP.
2 001 28972         ¤
2 044 29016         TEST INDIRECT ADDRESS IN 705 MODE USING CMP.
2 001 29017         ¤
2 029 29046         TEST SET LEFT USING SUBTRACT
2 001 29047         ¤
2 044 29091         TEST SHORTEN AND LENGTHEN USING SET AND SPC
2 001 29092         ¤
2 029 29121         TEST ROUND USING SHR AND ADD.
2 001 29122         ¤
2 045 29167         TEST NORMALIZE AND TR USING SET,SHR AND ADD.
2 001 29168         ¤
2 041 29209         TEST UNLOAD, CHECK RESULT WITH CMP EQUAL
2 001 29210         ¤
2 038 29248         TEST LOD, CHECK RESULT WITH CMP EQUAL
2 001 29249         ¤
2 048 29297         TEST SET BIT, CHECK RESULT WITH RCV-TZB AND CMP.
2 001 29298         ¤
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```
2 047 29345  TEST SIGN,CHECK MEMORY RESULT WITH SB AND CMP.
2 001 29346  ¤
2 049 29395  TEST SIGN,CHECK STORAGE RESULT WITH TZB AND CMP.
2 001 29396  ¤
2 046 29442  TEST TR STORE LOC. ,CHECK RCV RESULT WITH CMP.
2 001 29443  ¤
2 044 29487  TEST LOAD FOUR CHAR. ,CHECK RESULT WITH CMP.
2 001 29488  ¤
2 044 29532  TEST UNL FOUR CHAR. ,CHECK RESULT WITH CMP
2 001 29533  ¤
2 044 29577  TEST LOD STOR. BANK, CHECK RESULT WITH CMP.
2 001 29578  ¤
2 044 29622  TEST UNL STOR. BANK, CHECK RESULT WITH CMP.
2 001 29623  ¤
2 050 29673  TEST STORE-SIGN PLUS, CHECK RESULT WITH SB AND C
2 001 29674  ¤
2 050 29724  TEST RSU AND RAD-SIGN PLUS, CHECK RESULT WITH CM
2 001 29725  ¤
2 050 29775  TEST ADD SIGNS ALIKE PLUS,CHECK WITH SUB AND CMP
2 001 29776  ¤
2 046 29816  TEST SUB SIGNS OPPOSITE,CHECK WITH ADD.
2 001 29817  ¤
2 046 29863  TEST STORE-SIGN MINUS,CHECK RESULT WITH CMP
2 001 29864  ¤
2 045 29909  TEST RAD AND RSU-SIGN MINUS,CHECK WITH CMP.
2 001 29910  ¤
2 041 29951  TEST ADD SIGNS OPPOSITE,CHECK WITH SUB.
2 001 29952  ¤
2 044 29996  TEST SUB SIGNS ALIKE MINUS,CHECK WITH ADD.
2 001 29997  ¤
2 045 30042  TEST SIGNED ADM SIGNS ALIKE,CHECK WITH ADD.
2 001 30043  ¤
2 048 30091  TEST SIGNED ADM SIGNS OPPOSITE,CHECK WITH ADD.
2 001 30092  ¤
2 045 30137  TEST MULTIPLY-SIGNS OPPOSITE,CHECK WITH ADD.
2 001 30138  ¤
2 050 30188  TEST MULTIPLY-SIGNS ALIKE PLUS,CHECK WITH DIVIDE
2 001 30189  ¤
2 043 30232  TEST DIVIDE-SIGNS OPPOSITE,CHECK WITH ADD.
2 001 30233  ¤
2 045 30278  TEST DIVIDE-SIGNS ALIKE PLUS,CHECK WITH MPY.
2 001 30279  ¤
2 041 30320  TEST SERIAL BLANK MEMORY,CHECK WITH CMP.
2 001 30321  ¤
2 045 30366  TEST HIGH SPEED BLANK MEMORY,CHECK WITH CMP.
2 001 30367  ¤
2 037 30404  TEST SERIAL TRANSMIT,CHECK WITH CMP.
2 001 30405  ¤
2 026 30431  TEST SEND,CHECK WITH CMP.
2 001 30432  ¤
2 041 30473  TEST HIGH SPEED TRANSMIT,CHECK WITH CMP.
2 001 30474  ¤
2 044 30518  TEST TEN CHARACTER TRANSMIT,CHECK WITH CMP.
2 001 30519  ¤
2 049 30568  TEST TIP FOR STORE IC AND STATUS,CHECK WITH CMP.
2 001 30569  ¤
2 048 30617  TEST TIP FOR STORE SPC,MAC-2,SR,CHECK WITH CMP.
2 001 30618  ¤
2 026 30644  TEST LIP FOR SET IC TO WR.
2 001 30645  ¤
```

FIRST LINE TYPEOUTS

2	049	30694	TEST LIP FOR STORE IC AND STATUS,CHECK WITH CMP.
2	001	30695	¤
2	050	30745	TEST LIP FOR SET SPC,MAC-2,SR,CHECK BY TIP-LIP-C
2	001	30746	¤
2	045	30791	TEST COMPARE HI,LO. CHECK WITH COMPARE LO,HI.
2	001	30792	¤
2	048	30840	TEST STORE FOR PRINT-SIGN MINUS,CHECK WITH CMP.
2	001	30841	¤
2	047	30888	TEST SPR-SIGN PLUS,CHECK BY CONSTRUCTED FIELD
2	001	30889	¤
2	046	30935	TEST UNSIGNED ADM,CHECK BY CONSTRUCTED FIELD.
2	001	30936	¤
2	031	30967	TEST LOAD ADDRESS IN 7080 MODE.
2	001	30968	¤
2	030	30998	TEST LOAD ADDRESS IN 705 MODE.
2	001	30999	¤
2	032	31031	TEST UNLOAD ADDRESS IN 7080 MODE.
2	001	31032	¤
2	033	31065	TEST UNLOAD ADDRESS IN 705 MODE.
2	001	31066	¤
2	040	31106	TEST ADD ADDRESS TO MEMORY IN 7080 MODE.
2	001	31107	¤
2	039	31146	TEST ADD ADDRESS TO MEMORY IN 705 MODE.
2	001	31147	¤

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SECTION 7 LONG TYPEOUTS
PAGE 10

TYPEOUT OF INSTRUCTION, ASU, AND ADDRESS USED.

```
EA47
EA48
EA49
EA50
EA51
EA52 ....  31154 UNL 7 01 31604 A6 4 □      SET RETURN TRANSFER
           31159 UNL 7 02 31626 A6K6 □       SET FLAG FOR ROUTINE
           31164 SET B 01  0000 00 0 □
           31169 SET B 01  0002 00 2 □
                          I
                          V
EB57 ....  31174 RCV U     31620 A620 □      TEST FOR DO TYPEOUT
           31179 TZB . 05 31569 AVW9 -------EB57
           31184 SET B 02  0002 00-2 □
           31189 LOD 8 02 31626 A6K6 □       LOD ASU
           31194 CMP 4 02 31683 A6Q3 □       VS XX
           31199 TRE L    31209 A209 -
           31204 TR  1    31219 A219 -
           31209 LOD 8 02  8249 82M9 .
           31214 UNL 7 02 31626 A6K6 □       SET ASU IN TYPEOUT
                          I
                          V
           31219 RCV U    31619 A619 .       PICK UP ADDRESS FOR ROUTINE
           31224 TZB . 02 31234 A2L4 -       FOR ROUT. #031
           31229 LDA # 02  8994 89R4 □       FOR ROUT. #042
           31234 TZB . 01 31244 A2U4
           31239 LDA # 02 11014 /0J4 □       FOR ROUT. #067
           31244 RCV U    31618 A618 .       FOR ROUT. #069
           31249 TZB . 05 31259 ASV9 -       ADDR. #1
           31254 LDA # 02 15784 V7Q4 □       ADDR. #1 4/9
           31259 TZB . 06 31269 AS09         ADDR. #1 PLUS 1 - LNG #1
           31264 LDA # 02 16269 W209 □       ADDR. #1 LEFT END TMT/SND
           31269 TZB . 03 31279 A2G9         ADDR. #1 LEFT END TGT
           31274 LDA # 02  8084 80Q4 □       ADDR. #2 1/6
           31279 TZB . 02 31289 A2Q9         ADDR. #2 LEFT END RCV
           31284 LDA # 02  8114 81J4 □       ADDR. #2 LEFT END RCV-TCT
           31289 TZB . 01 31299 A2Z9         ADDR. #2 PLUS 1 - LNG #1
           31294 LDA # 02  8109 81-9 □       LNG #1
           31299 RCV U    31617 A617 .       LNG #1 TIMES 5
           31304 TZB . 05 31314 AT74 -       LIP ADDRESS
           31309 LDA # 02  8129 81K9 □
           31314 TZB . 06 31324 ATK4
           31319 LDA # 02  8139 81L9 □
           31324 TZB . 03 31334 A3C4
           31329 LDA # 02  8174 81P4 □
           31334 TZB . 02 31344 A3M4
           31339 LDA # 02  8179 81P9 □
           31344 TZB . 01 31354 A3V4
           31349 LDA # 02  8189 81Q9 □
           31354 RCV U    31616 A616 .
           31359 TZB . 02 31369 A309 -
           31364 LDA # 02  8159 81N9 □
           31369 TZB . 05 31379 ATX9
           31374 LDA # 02  8199 81R9 □
           31379 TZB . 06 31389 ATQ9
           31384 LDA # 02  8214 82J4 □
           31389 TZB . 03 31399 A3I9 -------EC57
           31394 LDA # 02  8264 8204 □
                          V
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NEXT PAGE

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g  ns/g0013428.png FROM PREVIOUS PAGE
                                                              TYPEOUT OF INSTRUCTION,
                                                              ASU, AND ADDRESS.
              ¤¤¤¤¤¤¤¤¤¤¤¤¤V¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤
EC56....¤.31399 SET B 02  0006 00-6 ¤                         UNL ADDRESS TO TYPEOUT
        ¤ 31404 UNL 7 02 31633 A6L3 ¤
        ¤ 31409 SET B 02  0001 00-1 ¤
        ¤ 31414 LOD 8 02 31820 A8K0 ¤
        ¤ 31419 UNL 7 02 31636 A6L6 ¤                         UNL GROUP MARK
        ¤¤¤¤¤¤¤¤¤¤¤¤¤I¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤

        ¤¤¤¤¤¤¤¤¤¤¤¤¤V¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤
        ¤ 31424 RCV U    31620 A620 ¤
        ¤ 31429 TZB . 06 31549 AVM9-¤-------                  TEST FOR EXTENDED TYPEOUT
        ¤ 31434 SET B 03  0034 00C4 ¤       I
        ¤ 31439 TZB . 03 31454 A4E4-¤--     I
        ¤ 31444 LDA # 02  8149 81M9 ¤  I    I                 FOR ROUT. #030
        ¤ 31449 LOD 8 03 31717 A7A7 ¤  I    I
        ¤ 31454 TZB . 02 31469 A409-¤----   I
        ¤ 31459 LDA # 02  8084 80Q4 ¤   I   I                 FOR ROUT. #031
        ¤ 31464 LOD 8 03 31717 A7A7 ¤   I   I
        ¤ 31469 TZB . 01 31484 A4Y4-¤---I   I
        ¤ 31474 LDA # 02 11119 /1J9 ¤  I    I                 FOR ROUT. #042
        ¤ 31479 LOD 8 03 31751 A7E1 ¤  I    I
        ¤ 31484 RCV U    31619 A619.¤.I     I
        ¤ 31489 TZB . 05 31504 AV 4-¤--     I
        ¤ 31494 LDA # 02 15909 V9-9 ¤  I    I                 FOR ROUT. #067
        ¤ 31499 LOD 8 03 31785 A7H5 ¤  I    I
        ¤ 31504 TZB . 06 31519 AVJ9-¤----   I
        ¤ 31509 LDA # 02 16364 W304 ¤   I   I                 FOR ROUT. #069
        ¤ 31514 LOD 8 03 31819 A8A9 ¤   I   I
        ¤¤¤¤¤¤¤¤¤¤¤¤¤I¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤   I   I
                     I                  I   I
        ¤¤¤¤¤¤¤¤¤¤¤¤¤V¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤   I   I
        ¤ 31519 SET B 02  0006 00-6.¤..I    I
        ¤ 31524 UNL 7 02 31676 A6P6 ¤       I                 UNL ADDRESS
        ¤ 31529 UNL 7 03 31669 A6F9 ¤       I                 UNL DESCRIPTION
        ¤ 31534 SET B 02  0001 00-1 ¤       I
        ¤ 31539 LOD 8 02 31820 A8K0 ¤       I
        ¤ 31544 UNL 7 02 31678 A6P8 ¤       I                 UNL GROUP MARK
        ¤ 31549 SEL 2     0500......¤......I
        ¤ 31554 WRE Z    31621 A621 ¤                         DO TYPEOUT
        ¤ 31559 TRS 0 11 31564 ANF4-¤--
        ¤ 31564 TRS 0 12 31569 AE69-¤----
ED56....¤.31569 SET B 02  0011 00J1.¤..I                      SHIFT FLAG FOR
        ¤ 31574 LOD 8 02 31615 A6J5 ¤                         POSSIBLE SECOND TYPEOUT
        ¤ 31579 UNL 7 02 31626 A6K6 ¤                         AND REPEAT ONCE MORE
        ¤ 31584 NTR X 01 31174 A1X4-¤-------EB56
        ¤¤¤¤¤¤¤¤¤¤¤¤¤I¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤
                     I
        ¤¤¤¤¤¤¤¤¤¤¤¤¤V¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤
        ¤ 31589 LOD 8 02 31831 A8L1 ¤                         RESET FLAGS
        ¤ 31594 UNL 7 02 31626 A6K6 ¤                         TO ALL EIGHTS
        ¤ 31599 UNL 7 02 31615 A6J5 ¤                         TR BACK TO TEST ROUTINE
        ¤ 31604 TR  1     0000      ¤
        ¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤¤

                                                              CONSTANTS AND TYPEOUTS
  2 022 31626              FFFFFXXX 00FFFFFXXX 00
  2 009 31635               000000
  2 041 31676              ¤                                  000000
  2 007 31683               ¤   XX
  2 034 31717                 EFFECTIVE ADDRESS OF COMPARE IS
  2 034 31751               IC LOCATION OF TSL INSTRUCTION IS
  2 034 31785               IC LOCATION OF TIP INSTRUCTION IS
  2 034 31819              IC IN WORD 0 CASU 15 DURING LIP IS
  2 001 31820              ¤
  2 011 31831              88888888888
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