

8SA01A

7305 STORAGE

**SERVICE AID TEST FOR
SENSE AMPLIFIER ADJUSTMENT**

April 15, 1961

D 3

D 4

Initial Sense Amplifier Adjustment

I. Initial Static Adjustment

- A. Connect an ohmmeter in parallel with each potentiometer and adjust to zero ohms.
- B. Turn each pot 16 turns clockwise.

II. Dynamic Adjustment

A. Setup Procedure

1. Insert the sense amplifier card in the socket where it is to remain.
2. Trigger the scope from 02A2B03A (-N Read).
3. Place the scope probe on pin C of the sense amplifier being adjusted.
4. Set the scope for 0.1 usec/cm and 1 volt/cm.
5. Set the driver voltage to 60 volts while the storage is not cycling.

B. Zeros Adjustment

1. Turn on Storage Test.
2. Write zeros continuously while making the zero adjustment. (To write zeros, hold down the write zeros push button).
3. Check for a zero output (-p level during the whole cycle) as in FIGURE 1.
4. If any departure from a -p level is seen (that is, positive going pulses as shown in FIGURE 2) turn the upper pot **CLOCKWISE** no more than eight turns until some or all of the pulses disappear.

5. If some or all of the pulses do not disappear return the upper pot to its initial position and turn the lower pot CLOCKWISE until the pulses disappear and the scope display is as in FIGURE #1.
6. If some of the pulses do disappear, leave the upper pot at the point where the pulses stopped disappearing and turn the lower pot CLOCKWISE until the pulses disappear and the scope picture looks like FIGURE 1.

C. Ones Adjustment

1. Turn on Storage Test
2. Write ones continuously while making the ones adjustment. (To write ones, hold down the WRITE ONES push button).
3. Check for a one output (a +P pulse during the strobe time) as in FIGURE 3.

Specifications for the one signal are:

Amplitude (peak)	2.5v - min
Rise	20 nsec - max
Width	100 nsec - min
Time Skew of rise	20 nsec - max

4. If there are some low amplitude ones or a -P level during the strobe time, as in FIGURE 4, turn the upper pot COUNTER-CLOCKWISE until either:
 - a. All pulses have a uniform rise as in FIGURE 3 and/or further change is noticed.
 - b. If no change is noticed during the first few turns return the upper pot to its original position.

5. If there are low amplitude ones or a -P level remaining after step 4 above turn the lower pot COUNTER-CLOCKWISE until all pulses have a uniform rise as in FIGURE 3 and no further change is noticed.

D. Readjustment

1. If an adjustment was made in step II C (ones adjustment), repeat II B (zeros adjustment).
2. If a readjustment was necessary in part 1 of this procedure, repeat II C.
3. If a readjustment was necessary in part 2 of this procedure, repeat II D.

E. Bias Adjustment

1. Set the driver voltage to 56 volts and repeat II B, II C, and II D.
2. Set the driver voltage to 64 volts and repeat II B, II C, and II D.

F. Checking

1. Set the driver voltage to 60 volts and check ones and zeros.
2. Set the driver voltage to 56 volts and check ones and zeros.
3. Set the driver voltage to 63 volts and check ones and zeros.
4. If any checks occur repeat II B, II C, and II D at the voltage where the check occurred.

Program Sense Amplifier Adjustment

I. Initial Adjustment

- A. If a new card is to be put into the machine first perform the Initial Adjustment Procedure.
- B. If the sense amplifier has gone thru initial adjustment or is intermittently failing, perform the following procedure:

II. Information About 8SA01

- A. The following sequence is performed in each bank of storage depending on the setting of alteration switches 915 and 916.
 1. 915 off - 916 off -
 - (a) write a pattern in storage according to the setting of 911, 912, 913 and 914.
 - (b) write the same pattern over again.
 2. 915 off - 916 on -
 - (a) write a pattern into storage according to 911, 912, 913, and 914 setting.
 - (b) write the complement of (a)
 3. 915 on - 916 off -
 - (a) write a pattern into storage according to 911, 912, 913, and 914 setting.
 - (b) Read the pattern written in (a)
 4. 915 on 916 on -
 - (a) write a pattern into storage according to the setting of 911, 912, 913, and 914.
 - (b) write complement of (a)
 - (c) Read complement of (a).

B. Pattern Switches

1. 911 all ones
2. 912 all zeros
3. 913 alt zero-ones
4. 914 alt one-zeros
5. If all four of these switches are off, all patterns will be written serially (one after the other).

III. Sense Amplifier Adjustment Using 8SA01

A. Setup

1. Trigger the scope from 62A2B03A (-N Read).
2. Place the scope probe on pin C of the sense amplifier to be adjusted.
3. Set the scope for 0.1 usec/cm and 1 volt/cm.
4. Set the driver voltage to 60 volts while storage is not cycling.
5. Read 8SA01 into the machine.

B. Ones and Zeros Check

1. Set 912 on and all other alteration switches off. Check to see that the output is as shown in Figure 1. If some pulses exist as in Figure 2, follow the procedure in Initial Adjustment II-B.
2. Set 911 on and all other alteration switches off. Check to see that the output is as shown in Figure 3. If the output is as shown in Figure 4, then perform Initial Adjustment Procedure II-C.

C. Alternate One-Zero Check

1. Set 913 on and all other alteration switches off. Check to see that the output looks like Figure 5.
 - a. Check for a one-zero output with a uniform rise of all ones as shown in Figure 5.

b. Re-sync the scope several times and use a hood over the scope screen to look for minor discrepancies.

c. If any pulses rise late and do not attain full amplitude, as in Figure 6, 7, or 8 two situations could exist.

(1) High zeros are being picked up as ones,

(2) Ones are not being amplified enough.

2. Determine which pot(s) needs adjustment (both pots could be out of adjustment).

a. Turn the upper pot in either direction.

b. If turning this pot has no immediate effect, it is properly adjusted and should be returned to its initial position.

c. If turning the pot has an immediate effect, this pot needs adjustment.

d. Turn the lower pot in either direction and determine its state from (b) and (c).

3. Pot Adjustment

a. Turn pot in need of adjustment CLOCKWISE (if both pots need adjustment then adjust Upper pot first.)

b. If full amplitude ones begin decreasing in amplitude the resulting pulses are insufficiently amplified. The pot should be turned COUNTER CLOCKWISE until all ones rise uniformly or no further change is noticed.

c. If both pots need adjustment repeat the proceeding for the lower pot.

D. Additional Tests

1. With 914 on and all other alteration switches off, repeat section C.
2. With 911 and 916 on and all other switches off, repeat section C.
3. With 912 and 916 on repeat section C.
4. With 913 and 916 on repeat section C.
5. With 914 and 916 on repeat section C.

E. Bias Tests

1. Repeat section C and section D with the driver voltage set at 56 volts.
2. Repeat section C and section D with the driver voltage set at 64 volts.

F. Run 8SB15 at driver voltages of the operating point and the operating point ± 3 volts.

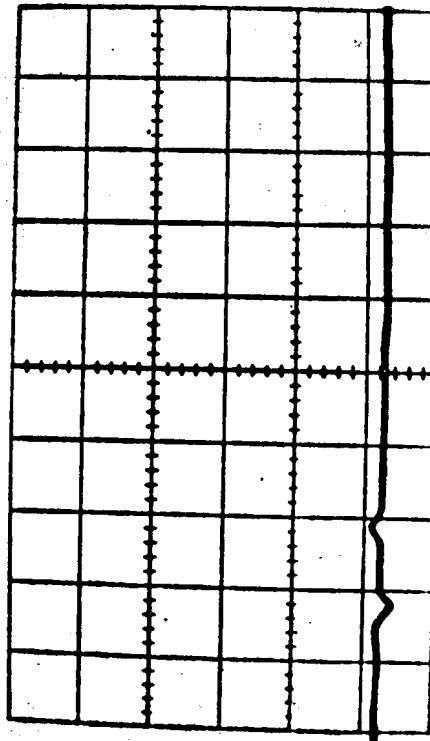


FIGURE 1. CORRECT ZERO OUTPUT

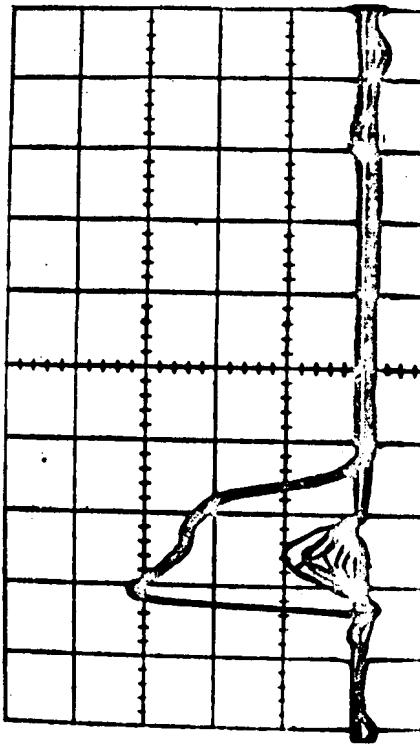


FIGURE 2. INCORRECT ZERO OUTPUT

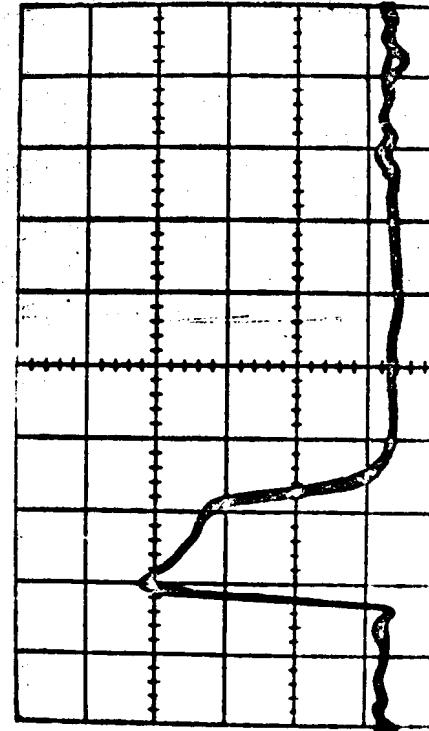


FIGURE 3. CORRECT ONE OUTPUT

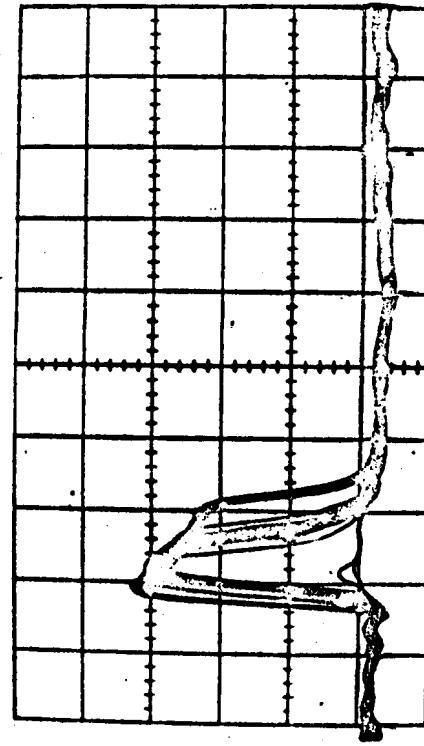


FIGURE 4. INCORRECT ONE OUTPUT

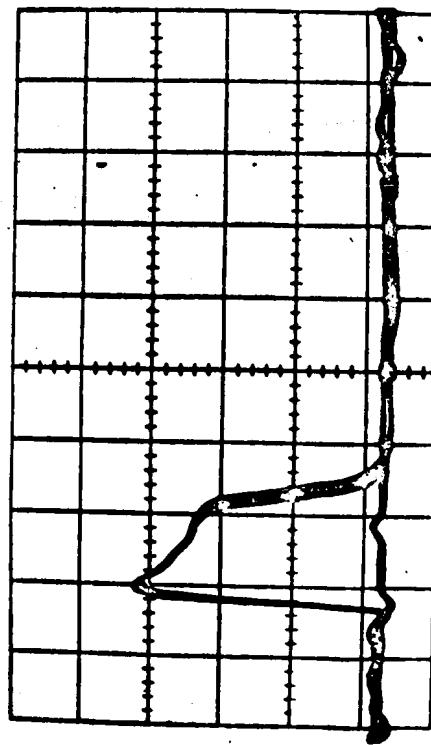


FIGURE 5. CORRECT ALTERNATE OUTPUT

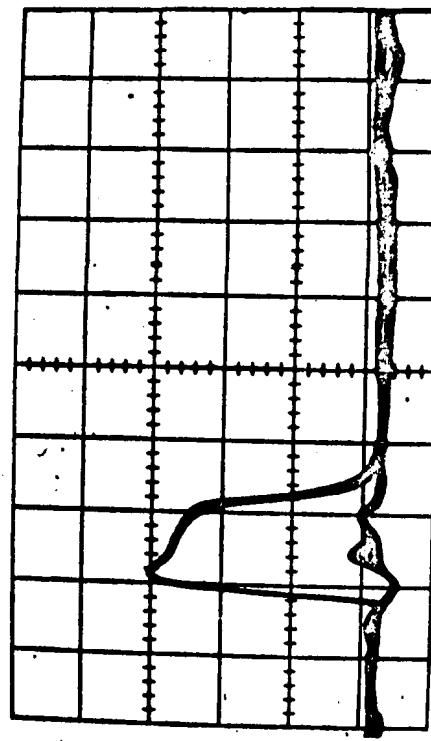


FIGURE 6. ALTERNATE OUTPUT (ZEROS BEING PICKED)

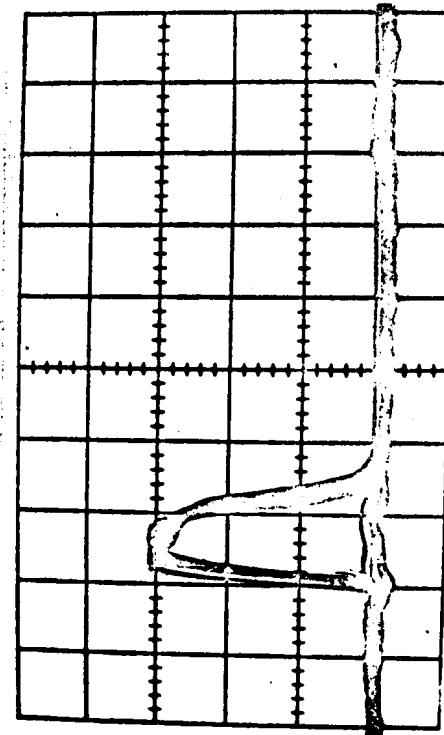


FIGURE 7. ALTERNATE OUTPUT (ONES DROPPED)

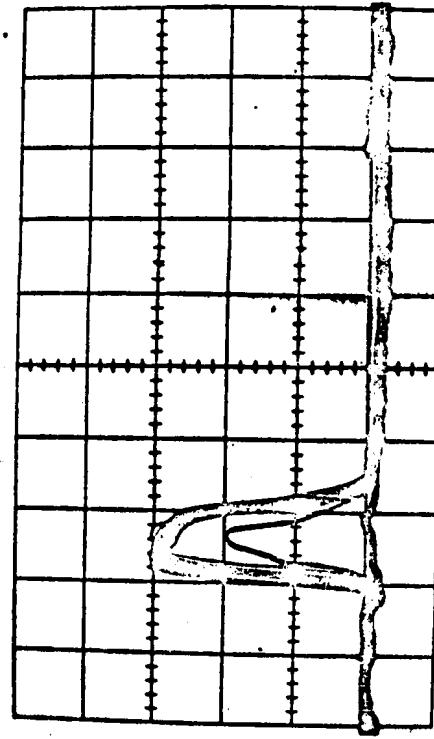


FIGURE 8. ALTERNATE OUTPUT (LOW ONES)

I. Unit Tested: 7304 Storage and I/O Control

A. PURPOSE:

To provide a means of checking initial sense amplifier adjustment from a stored program control.

B. METHOD:

1. All banks of storage are filled with various patterns of ones and zeros employing minimum delay between individual bank selection and test mode operation.
2. The program is composed of 4 distinct modes of operation each of which is in turn subdivided into 4 distinct pattern tests.
3. Only one of the 4 modes of operation may be executed at any one time and each is selective by alteration switch control at any time.
4. Regardless of mode, all 4 of the pattern tests are executed unconditionally within all banks, but each pattern is also selective by exclusive alteration switch control and may be individually looped at any time.
5. The Modes of Operations are as follows:

- | | | |
|----|------------------------------|---|
| a) | <u>Double Write Mode</u> | 0915 OFF
0916 OFF |
| | | Loads all banks with all patterns using four groups of two consecutive LSB (Load Storage Bank) operations per pattern. The second LSB of each group loads the <u>same</u> pattern as the first LSB. |
| b) | <u>Write-Read mode</u> | 0915 ON
0916 OFF |
| | | Loads and unloads all banks with all patterns using four groups of consecutive LSB and USB (unload Storage Bank) operations per pattern. |
| c) | <u>Write-Complement mode</u> | 0915 OFF
0916 ON |
| | | Loads all banks with all patterns using four groups of two consecutive LSB operations per pattern. The second LSB of each group loads the <u>complement</u> pattern of the first LSB. |

d) Write-Complement-Read mode 0915 ON
 0916 ON
Loads all banks with all patterns using four groups of consecutive LSB, LSB (complement pattern), USB operations per pattern.

6. The Pattern Tests are as follows:

a) All Ones 0911 ON only

Uses a pattern of 256 "all bits" (CBA8421) per storage bank.

b) All Zeros 0912 ON only

Uses a pattern of 256 "no bits" (storage marks) per storage bank.

c) Alternate Zeros and Ones 0913 ON only

Uses a pattern of 128 "all bits" and 128 "no bits" arranged such that the contents of each Word in each bank is the exact opposite of its adjacent Words.

Words 0 and 2 initially contain "all bits" while Words 1 and 3 contain "no bits".

d) Alternate Ones and Zeros 0914 ON only

Uses a pattern which is the exact opposite of the above alternate zeros and ones pattern. Words 0 and 2 initially contain "no bits" while Words 1 and 3 contain "all bits".

C. AREA OF MACHINE REQUIRED:

1. Units -

MF, Memory, Storage, CR or Tape

2. Memory Locations-

0000 - 2480

D. LOADING PROCEDURES:**1. Card -**

Use 8LD01 or 8LD10 Load Cards and 8TR02 ahead of and behind the program deck respectively.

Auto-Load 0100 or 0101

2. Tape -

Use tape file generated by 8TR06.

Auto-Load 0200

-Refer to 8TR06 Write-Up for further usage information.

E. PROGRAM CONTROL:**1. Card Deck -**

8LD01	2 cards
8SA01	22 cards
8TR02	1 card
3 Blanks	

2. Alteration Switches -**a) Pattern Test Selectors**

0911 ON -	Repeat All Ones
0912 ON -	Repeat All Zeros
0913 ON -	Repeat Alternate Zeros-Ones
0914 ON -	Repeat Alternate Ones-Zeros

b) Mode of Operation Selectors by Combination

0915 OFF, 0916 OFF -	Double Write
0915 ON , 0916 OFF -	Write, Read
0915 OFF, 0916 ON -	Write, Complement
0915 ON , 0916 ON -	Write, Complement, Read

3. Check Switches -

0901 Program Control
All others in Automatic.

F. NORMAL STOPS:

None

G. ERROR STOPS:

None

H. PRINTED RESULTS:

None

I. COMMENTS:

1. It is strongly recommended that two quick visual spot checks be taken while running this test to insure correct program operation.

They are as follows:

A. Spot Check #1

1. Throw all alteration switches OFF.
2. Throw 0911 ON.
3. Observe SBR (Storage Buffer Register)
All of the 56 bit neons should be brightly
LIT (unless there are known bit drop
problems).
* If they are not, reset or reload the program.

B. Spot Check #2

1. Throw all alteration switches OFF.
2. Throw 0912 ON.
3. Observe SBR.
All of the 56 bit neons should be OUT
(unless there are known bit pick problems).
*If they are not, reset or reload the program.

2. If any check indications, other than 0901 occur, reload the program.
3. This program is a service aid test and therefore has no typeout indications, pass complete indications, or "conventional" alteration switch functions as do the rest of the 7080 diagnostics. It has been designed to run continuously with no planned stops. Therefore, the test must be manually stopped to discontinue operation.
4. Refer to manual Initial Sense Amplifier Adjustment for preliminary adjustment procedure.

BKWD TR LOCATION OPN ASU ADDRESS

FWD TR

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8SA01

8SA01A

2-1-61

-7305-

STORAGE SERVICE AID TEST
FOR SENSE AMPLIFIER ADJUSTMENT
TESTS ALL BANKS-IN SEQUENCE-

00004 EEM 3 14 0000 0&-0

I

I

00009 SPC , 0000

00014 SET B 15 0016 0&A6

00019 RCV U 1405

00024 TMT 9 15 1380 1CHO

I

I

00029 SBZ % 01 1405 14 5

00034 SBZ % 01 1406 14 6

00039 SBZ % 01 1407 14 7

00044 SBZ % 01 1408 14 8

00049 SBZ % 01 1409 14 9

00054 SBZ % 01 1410 14/0

00059 SBZ % 01 1411 14/1

00064 SBZ % 01 1412 14/2

I

00069 SBR % 08 1413 1M13

00074 SBR % 08 1414 1M14

00079 SBR % 08 1415 1M15

00084 SBR % 08 1416 1M16

00089 SBR % 08 1417 1M17

00094 SBR % 08 1418 1M18

00099 SBR % 08 1419 1M19

00104 SBR % 08 1420 1M20

I

I

00109 SPC , 0000

00114 SET B .0033

00119 SET B 15 0008 0&&8

00124 RCV U 1430

00129 TMT 9 15 1413 1DA3

I

00134 NTR X 0129

I

00139 SET B 0033

00144 SET B 15 0008 0&&8

00149 RCV U 1695

00154 TMT 9 15 1405 1D&5

I

00159 NTR X 0154

I

00164 SET B 0017

00169 SET B 15 0016 0&A6

00174 RCV U 1960

00179 TMT 9 15 1405 1D&5

I

00184 NTR X 0179

I

NEXT PAGE

MOVE 16 GROUP MARKS

GROUP MARK MODIFICATION

RESET 1 BITS -CREATE 8 DILROYS

SET C BITS - CREATE 8 ALL BITS

MULTIPLE FIELDS CREATION AREA

256 ALL BITS -- CBA8421

256 DILROYS -- CBA842

256 ALTERN. DILROYS & ALL BITS

```

□□□□□□□□□□□□□□□□□□□□□□□□□
□ 00189 SET B 0033 □
□ 00194 SET B 15 0008 0&8 □
□ 00199 RCV U 2225 □
••• 00204 TMT 9 15 1413 1DA3 □
I □ 00209 TMT 9 15 1405 1D&5 □
I
+---00214 NTR X 0204 □
□□□□□□□□□□□□□□□□□□□□□□□□□
I

```

256 ALTERN. ALL BITS & DILROYS

A03
A04
A06
A07

```

□□□□□□□□□□□□□□□□□□□□□□□□□
I 00219 TAE I 05 0234 OST4-+---C05 WRITE-COMPLEMENT
I 00224 TAF I 06 0774 OXP4-+--- WRITE-WRITE
I 00229 TR 1 0244-+---+---D06 WRITE-COMPLEMENT-READ
I 00234 TAF I 06 1039 1 L9-+---+---D06 WRITE-READ
I 00239 TR 1 0509-+---+---B03
□□□□□□□□□□□□□□□□□□□□□□□□□
I

```

WRITE-WRITE MODE
0915 OFF
0916 OFF

```

I 00244 SPC , 0000 * * * * *
I 00249 LSB , 04 1685 1W85 □
I 00254 LSB , 04 1685 1W85 □
I

```

BANK 0
WRITE 256 ONES
WRITE 256 ONES AGAIN

```

I 00259 SPC , 1000 □
I 00264 LSB , 04 1685 1W85 □
I 00269 LSB , 04 1685 1W85 □
I

```

BANK 1

```

I 00274 SPC , 2000 □
I 00279 LSB , 04 1685 1W85 □
I 00284 LSB , 04 1685 1W85 □
I

```

BANK 2

```

I 00289 SPC , 3000 □
I 00294 LSB , 04 1685 1W85 □
I 00299 LSB , 04 1685 1W85 □
I

```

BANK 3

```

+---00304 TAA I 01 0244 02U4 □
□□□□□□□□□□□□□□□□□□□□□□□□□
I

```

REPEAT ALL ONES WR-WR 0911

```

I 00309 SPC , 0000 □
I 00314 LSB , 04 1950 1Z50 □
I 00319 LSB , 04 1950 1Z50 □
I

```

BANK 0
WRITE 256 ZEROES
WRITE 256 ZEROES AGAIN

```

I 00324 SPC , 1000 □
I 00329 LSB , 04 1950 1Z50 □
I 00334 LSB , 04 1950 1Z50 □
I

```

BANK 1

```

I 00339 SPC , 2000 □
I 00344 LSB , 04 1950 1Z50 □
I 00349 LSB , 04 1950 1Z50 □
I

```

BANK 2

```

I 00354 SPC , 3000 □
I 00359 LSB , 04 1950 1Z50 □
I 00364 LSB , 04 1950 1Z50 □
I

```

BANK 3

```

+---00369 TAB I 02 0309 03-9 □
□□□□□□□□□□□□□□□□□□□□□□□□□
I

```

REPEAT ALL ZEROES WR-WR 0912

NEXT PAGE

```

• 00374 SPC , 0000 □
I □ 00379 LSB , 04 2215 2S15 □
I □ 00384 LSB , 04 2215 2S15 □
I □
I □ 00389 SPC , 1000 □
I □ 00394 LSB , 04 2215 2S15 □
I □ 00399 LSB , 04 2215 2S15 □
I □
I □ 00404 SPC , 2000 □
I □ 00409 LSB , 04 2215 2S15 □
I □ 00414 LSB , 04 2215 2S15 □
I □
I □ 00419 SPC , 3000 □
I □ 00424 LSB , 04 2215 2S15 □
I □ 00429 LSB , 04 2215 2S15 □
I □
+-- 00434 TAC I 03 0374 03G4 □

```

BANK 0
WRITE ALT. ZEROES & ONES
WRITE ALT. ZEROES & ONES AGAIN
BANK 1
BANK 2
BANK 3
REPEAT ALT. -A-A WR-WR 0913

```

• 00439 SPC , 0000 □
I □ 00444 LSB , 04 2480 2U80 □
I □ 00449 LSB , 04 2480 2U80 □
I □
I □ 00454 SPC , 1000 □
I □ 00459 LSB , 04 2480 2U80 □
I □ 00464 LSB , 04 2480 2U80 □
I □
I □ 00469 SPC , 2000 □
I □ 00474 LSB , 04 2480 2U80 □
I □ 00479 LSB , 04 2480 2U80 □
I □
I □ 00484 SPC , 3000 □
I □ 00489 LSB , 04 2480 2U80 □
I □ 00494 LSB , 04 2480 2U80 □
I □
+-- 00499 TAD I 04 0439 0U39 □
I □ 00504 TR 1 0219 ----- A02

```

BANK 0
WRITE ALT. ONES & ZEROES
WRITE ALT. ONES & ZEROES AGAIN
BANK 1
BANK 2
BANK 3
REPEAT ALT. A-A- WR-WR 0914
GO TO MODE SELECTION

B02.....

```

• 00509 SPC , 0000 □
I □ 00514 LSB , 04 1685 1W85 □
I □ 00519 USB , 05 20255 -SV5 □
I □
I □ 00524 SPC , 1000 □
I □ 00529 LSB , 04 1685 1W85 □
I □ 00534 USB , 05 20255 -SV5 □
I □
I □ 00539 SPC , 2000 □
I □ 00544 LSB , 04 1685 1W85 □
I □ 00549 USB , 05 20255 -SV5 □
I □
I □ 00554 SPC , 3000 □
I □ 00559 LSB , 04 1685 1W85 □
I □ 00564 USB , 05 20255 -SV5 □
I □
+-- 00569 TAA I 01 0509 05 9 □

```

WRITE-READ MODE
0915 ON
0916 OFF
BANK 0
WRITE 256 ONES
READ 256 ONES
BANK 1
BANK 2
BANK 3
REPEAT ALL ONES WR-RD

NEXT PAGE

```

• 00574 SPC ; 04 0000
I 00579 LSB ; 04 1950 1Z50
I 00584 USB ; 05 20255 -SV5

I 00589 SPC ; 04 1000
I 00594 LSB ; 04 1950 1Z50
I 00599 USB ; 05 20255 -SV5

I 00604 SPC ; 04 2000
I 00609 LSB ; 04 1950 1Z50
I 00614 USB ; 05 20255 -SV5

I 00619 SPC ; 04 3000
I 00624 LSB ; 04 1950 1Z50
I 00629 USB ; 05 20255 -SV5

+--00634 TAB I 02 0574 05P4

```

BANK 0
WRITE 256 ZEROES
READ 256 ZEROES

BANK 1

BANK 2

BANK 3

REPEAT ALL ZEROES WR-RD

```

• 00639 SPC ; 04 0000
I 00644 LSB ; 04 2215 2S15
I 00649 USB ; 05 20255 -SV5

I 00654 SPC ; 04 1000
I 00659 LSB ; 04 2215 2S15
I 00664 USB ; 05 20255 -SV5

I 00669 SPC ; 04 2000
I 00674 LSB ; 04 2215 2S15
I 00679 USB ; 05 20255 -SV5

I 00684 SPC ; 04 3000
I 00689 LSB ; 04 2215 2S15
I 00694 USB ; 05 20255 -SV5

+--00699 TAC I 03 0639 06C9

```

BANK 0
WRITE ALT. ZEROES & ONES
READ ALT. ZEROES & ONES

BANK 1

BANK 2

BANK 3

REPEAT ALT. ZEROS & ONES WR-RD

```

• 00704 SPC ; 04 0000
I 00709 LSB ; 04 2480 2U80
I 00714 USB ; 05 20255 -SV5

I 00719 SPC ; 04 1000
I 00724 LSB ; 04 2480 2U80
I 00729 USB ; 05 20255 -SV5

I 00734 SPC ; 04 2000
I 00739 LSB ; 04 2480 2U80
I 00744 USB ; 05 20255 -SV5

I 00749 SPC ; 04 3000
I 00754 LSB ; 04 2480 2U80
I 00759 USB ; 05 20255 -SV5

+--00764 TAD I 04 0704 0X04
I 00769 TR 1 0219

```

BANK 0
WRITE ALT. ONES & ZEROES
READ ALT. ONES & ZEROES

BANK 1

BANK 2

BANK 3

REPEAT ALT. ONES & ZEROES WR-RD
GO TO MODE SELECTION

A02

WRITE-COMPLEMENT MODE

0915 OFF

0916 ON

BANK 0

WRITE 256 ONES

COMPLEMENT WRITE 256 ZEROES

BANK 1

BANK 2

BANK 3

REPEAT AAAA TO ---- WR-CMPLMT

BANK 0

WRITE 256 ZEROES

COMPLEMENT WRITE 256 ONES

BANK 1

BANK 2

BANK 3

REPEAT ---- TO AAAA WR-CMPLMT

BANK 0

WRITE ALT. ZEROES & ONES

COMPLEMENT WR ALT. ONES & ZERO

BANK 1

BANK 2

BANK 3

REPEAT -A-A TO A-A- WR-CMPLMT

NEXT PAGE

```

••• 00969 SPC ; 0000 □
I □ 00974 LSB ; 04 2480 2U80 □
I □ 00979 LSB ; 04 2215 2S15 □
I □
I □ 00984 SPC ; 1000 □
I □ 00989 LSB ; 04 2480 2U80 □
I □ 00994 LSB ; 04 2215 2S15 □
I □
I □ 00999 SPC ; 2000 □
I □ 01004 LSB ; 04 2480 2U80 □
I □ 01009 LSB ; 04 2215 2S15 □
I □
I □ 01014 SPC ; 3000 □
I □ 01019 LSB ; 04 2480 2U80 □
I □ 01024 LSB ; 04 2215 2S15 □
I □
+-- 01029 TAD I 04 0969 0Z69 □
I □ 01034 TR 1 0219 -----A02

```

BANK 0
WRITE ALT. ONES & ZEROES
COMPLEMENT WR ALT. ZEROS & ONE

BANK 1

BANK 2

BANK 3

REPEAT A-A- TO -A-A WR-CMPLMT
GO TO MODE SELECTION

D02.....

```

••• 01039 SPC ; 0000 □
I □ 01044 LSB ; 04 1685 1W85 □
I □ 01049 LSB ; 04 1950 1Z50 □
I □ 01054 USB ; 05 20255 -SV5 □
I □
I □ 01059 SPC ; 1000 □
I □ 01064 LSB ; 04 1685 1W85 □
I □ 01069 LSB ; 04 1950 1Z50 □
I □ 01074 USB ; 05 20255 -SV5 □
I □
I □ 01079 SPC ; 2000 □
I □ 01084 LSB ; 04 1685 1W85 □
I □ 01089 LSB ; 04 1950 1Z50 □
I □ 01094 USB ; 05 20255 -SV5 □
I □
I □ 01099 SPC ; 3000 □
I □ 01104 LSB ; 04 1685 1W85 □
I □ 01109 LSB ; 04 1950 1Z50 □
I □ 01114 USB ; 05 20255 -SV5 □
I □
+-- 01119 TAA I 01 1039 10T9 □

```

WRITE-COMPLEMENT-READ MODE
0915 ON
0916 ON

BANK 0
WRITE 256 ONES
COMPLEMENT WRITE 256 ZEROES
READ 256 ZEROES

BANK 1

BANK 2

BANK 3

REPEAT ALL ONES WR-CMPLMNT-RD

```

••• 01124 SPC ; 0000 □
I □ 01129 LSB ; 04 1950 1Z50 □
I □ 01134 LSB ; 04 1685 1W85 □
I □ 01139 USB ; 05 20255 -SV5 □
I □
I □ 01144 SPC ; 1000 □
I □ 01149 LSB ; 04 1950 1Z50 □
I □ 01154 LSB ; 04 1685 1W85 □
I □ 01159 USB ; 05 20255 -SV5 □
I □
I □ 01164 SPC ; 2000 □
I □ 01169 LSB ; 04 1950 1Z50 □
I □ 01174 LSB ; 04 1685 1W85 □
I □ 01179 USB ; 05 20255 -SV5 □
I □
I □ 01184 SPC ; 3000 □
I □ 01189 LSB ; 04 1950 1Z50 □
I □ 01194 LSB ; 04 1685 1W85 □
I □ 01199 USB ; 05 20255 -SV5 □
I □
+-- 01204 TAB I 02 1124 11K4 □

```

BANK 0
WRITE 256 ZEROES
COMPLEMENT WRITE 256 ONES
READ 256 ONES

BANK 1

BANK 2

BANK 3

REPEAT ALL ZEROS WR-CMPLMNT-RD

```

    01209 SPC , 0000
    01214 LSB , 04 2215 2S15
    01219 LSB , 04 2480 2U80
    01224 USB , 05 20255 -SV5

    01229 SPC , 1000
    01234 LSB , 04 2215 2S15
    01239 LSB , 04 2480 2U80
    01244 USB , 05 20255 -SV5

    01249 SPC , 2000
    01254 LSB , 04 2215 2S15
    01259 LSB , 04 2480 2U80
    01264 USB , 05 20255 -SV5

    01269 SPC , 3000
    01274 LSB , 04 2215 2S15
    01279 LSB , 04 2480 2U80
    01284 USB , 05 20255 -SV5

```

-01289 TAC I 03 1209 12&9

```

    01294 SPC , 0000
    01299 LSB , 04 2480 2U80
    01304 LSB , 04 2215 2S15
    01309 USB , 05 20255 -SV5

    01314 SPC , 1000
    01319 LSB , 04 2480 2U80
    01324 LSB , 04 2215 2S15
    01329 USB , 05 20255 -SV5

    01334 SPC , 2000
    01339 LSB , 04 2480 2U80
    01344 LSB , 04 2215 2S15
    01349 USB , 05 20255 -SV5

    01354 SPC , 3000
    01359 LSB , 04 2480 2U80
    01364 LSB , 04 2215 2S15
    01369 USB , 05 20255 -SV5

```

-01374 TAD I 04 1294 1S94

01379 TR 1 0219

BANK 0
WRITE ALT. ZEROES & ONES
COMPLEMENT WR ALT. ONES & ZEROES
READ ALT. ONES & ZEROES

BANK 1

BANK 2

BANK 3

REPEAT -A-A TO A-A- WR-CMP-RD

BANK 0
WRITE ALT. ONES & ZEROES
COMPLEMENT WR ALT. ZEROS & ONE
READ ALT. ZEROES & ONES

BANK 1

BANK 2

BANK 3

REPEAT A-A- TO -A-A WR-CMP-RD
GO TO MODE SELECTION

A02

16 GROUP MARKS

2 001 01380
2 001 01381
2 001 01382
2 001 01383
2 001 01384
2 001 01385
2 001 01386
2 001 01387
2 001 01388
2 001 01389
2 001 01390
2 001 01391
2 001 01392
2 001 01393
2 001 01394
2 001 01395

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5 005 01404 00
5 016 01420

GROUP MARK MODIFICATION FIELD
-----AAAAAAA

5 005 01429 00
5 256 01685

ALL BIT FIELD
AAAAAAAAAAAAAAAAAAAAA

5 005 01694 00
5 256 01950

DILROY FIELD

5 005 01959 00
5 256 02215

ALTERNATE DILROY-ALL BIT WORD FIELD
-----AAAAAAA-----AAAAAAA

5 005 02224 00
5 256 02480

ALTERNATE ALL BIT-DILROY WORD FIELD
AAAAAAA-----AAAAAAA-----