

# 4500 PROGRAMMING AND MAINTENANCE CONSOLE

## 1. INTRODUCTION

This publication provides preventive maintenance, adjustment, troubleshooting, and repair information for the Programming and Maintenance Console on the 4500 computer system. This console consists of a panel which contains the necessary indicators and switches to provide the user with control over the system. This control includes the ability to: Display and modify the contents of the A, P, NI, Q, and CS registers, the memory address and the content of memory at all locations; to load programs and enter alternate program load device addresses; set the demand flip-flop and lockout interrupts and stall alarms; to reset alarm conditions and initialize the CPU hardware; and to store up to eight octal digits while modifying registers, memory addresses, or memory data. Refer to the Theory publication for the procedures used to perform these control functions.

## 2. PRECAUTIONS

### CAUTION

The Panel Security switch is used to enable the controls which might disrupt the computer's operation if disturbed while on-line.

Avoid selecting the MD register when a system is running on-line with Memory Protect enabled. Displaying a protected location may cause a Memory Protect trap (4500A only).

No high voltages are present within the console. Normal precautions should be observed when troubleshooting, and repairing the unit because dc voltages up to approximately 24 V are present. Remove all power from the unit when replacing and/or disconnecting components from the console.

## 3. OPTIONS

No console options are available.

## 4. REFERENCES

The following references are useful or necessary in understanding and maintaining the 4500 Programming and Maintenance Console:

- 4500 Programming and Maintenance Console Theory, ACPU1CON-T.
- 4500 GENIE\* Bus Controller Theory, ACPU1GBC-T.

## 5. COMPONENT LOCATIONS

The Console Panel Assembly is located on the front door of the CPU cabinet.

## 6. TEST EQUIPMENT AND MATERIALS

Two test equipment items are required in the testing and troubleshooting of the console: An oscilloscope for signal verification, and a multimeter for continuity and voltage measurements.

## 7. PREVENTIVE MAINTENANCE

The Console requires no preventive maintenance other than performing the performance tests for initial installation.

## 8. PERFORMANCE TESTS

The console performance test consists of displaying register contents, displaying and modifying memory contents, and performing program load operations.

### 8.1 Display of Register Contents

This test, checks the ability of the console to access the various registers and to display the contents of those registers.

1. Place the Panel Security Switch in the enabled position.
2. Press the pushbutton for the "A" register.
3. Verify that the selected register's indicator illuminates and that the contents of the register are displayed in octal form on the display.
4. Repeat steps 2 and 3 for the "P", "NI", "Q", and "CS" registers.
5. Repeat steps 2, 3, and 4 with the Panel Security Switch in the disabled position.

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## 8.2 Display and Modify Memory Contents

This test checks the ability of the console to address a particular memory location, display the contents of memory at that location, and to modify the contents. Also the ability to display successive memory locations and contents.

### DISPLAY

1. Place the Panel Security switch in the enabled position.
2. Press the MA(memory address) pushbutton.
3. Verify that the MA indicator illuminates. The last used memory address will be displayed in octal form.
4. Press ENTER pushbutton - this turns the cursor control on and the most significant digit will blink.
5. Use the numeric keypad to enter the desired address.
6. Press the EXEC pushbutton to end the address entry.
7. Press the MD pushbutton and verify that the memory contents are displayed in OCTAL form.
8. To display the contents of successive memory locations, press INC pushbutton, then each time the EXEC pushbutton is pressed, the contents of the next memory location are displayed.
9. Press one of the register pushbuttons to leave the memory operation.

### MODIFY

10. Perform steps 1 through 7 above, then press ENTER pushbutton.
11. Use the numeric keypad to enter the new memory contents.
12. Press EXEC pushbutton to complete the data entry and to turn the cursor off.
13. To modify the contents of the next memory location, press INC and then EXEC pushbuttons. The contents of the next location will be displayed.

14. Press ENTER pushbutton and perform steps 11 and 12.
15. Press one of the register pushbuttons to leave the memory operation.

## 8.3 Program Load

1. Place the Panel Security switch in the enabled position.
2. Press the RESET pushbutton and one of the numeric keypad pushbuttons simultaneously. The device address is determined by the specific pushbutton pressed. The Bootstrap program is moved to the top end of memory and the proper device address entered into the program counter. The keypad assignments are:
  1. Card reader
  2. Paper Tape reader
  3. Primary Mass storage
  4. Secondary Mass storage
  5. Mass storage
  6. Mass storage
  7. Coat memory with contents of CS register (64k max.).
3. Press HALT-RUN pushbutton. The HALT indicator will be extinguished and the program will start loading.
4. Repeat the procedure for each program or file to be loaded.

Note: A 4500B CPU will automatically try to load from an alternate device if the selected device fails.

## 9. ASSEMBLY AND DISASSEMBLY

All components of the Console are mounted and fastened with ordinary hardware and require no special assembly or disassembly procedures. Care should be taken not to damage adjacent components when removing/replacing console components.

## 10. ADJUSTMENTS

No adjustments are necessary on the Console.

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### CAUTION

This switch is used to enable the controls which might disrupt the computer's operation if disturbed while on-line.

No high voltages are present within the console. Normal precautions should be observed when troubleshooting, and repairing the unit because dc voltages up to approximately 24 V are present. Remove all power from the unit when replacing and/or disconnecting components from the console.

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### DISPLAY

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2. Press the MA(memory address) pushbutton.
3. Verify that the MA indicator illuminates. The last used memory address will be displayed in octal form.
4. Press ENTER pushbutton - this turns the cursor control on and the most significant digit will blink.
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  2. Paper Tape reader
  3. Mass storage
  4. Reserved
  5. Reserved
  6. Reserved
  7. Coat memory with contents of CS register.
3. Press HALT-RUN pushbutton. The HALT indicator will be extinguished and the program will start loading.
4. Repeat the procedure for each program or file to be loaded.

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All components of the Console are mounted and fastened with ordinary hardware and require no special assembly or disassembly procedures. Care should be taken not to damage adjacent components when removing/replacing console components.

## 10. ADJUSTMENTS

No adjustments are necessary on the Console.

## 11. TROUBLESHOOTING

Determination of a problem area is sometimes very difficult due to the interrelationship and interaction of the console's logic plus its interaction with the GENIE Bus Controller (GBC) and the Central Processor. The following paragraphs under this Troubleshooting heading provide some suggestions for isolation of the console faults.

### 11.1 Power-Up Failure

Failure of sequenced power to come on when the console power switch is placed in the ON position is accompanied by the following:

#### Symptom -

The "REGISTER" digital displays do not light and the CS indicator (plus others depending upon the Panel Security switch setting) are not illuminated.

#### Suggested remedies -

Check the power on indicator on the basic power module. If it is not illuminated then refer to the 4500 CPU Power Subsystem Maintenance Manual, ACPU1PS-M, for troubleshooting of the power subsystem.

If the power on indicator is on then check for power to the console.

### 11.2 Register Selection Failure

This applies to the selection and display of the following registers and includes the memory address and memory data functions: NI, A, Q, P, CS, MA, and MD.

#### Symptoms -

1. Inability to select any register and display its contents. That is, the contents displayed does not change regardless of the register selected.
2. Inability to select a specific register and display its contents. Other registers can be selected and their contents displayed without problems.
3. Selection of a register retrieves and displays its contents, but, the indicator for that register is not illuminated.

4. One digit or more, but not all, of the REGISTER display fails to display anything.

#### Suggested remedies for symptom 1 -

- GBC or CPU operation failure. This is determined by checking other devices connected to the GENIE Bus for proper operation. If some or all are not operating correctly, this may indicate that the problem is with the GBC or CPU and not the console.
- Register Selection logic failure. Check for proper output of Display Mode (DML1-4), Service Mode (SMC1-4), and Console Attention (CONA) signals when a register is selected. See the CONTROL - Register Selection section and SERVICE/STATUS section in the theory publication.
- Display logic failure. Check for signals returned to the console and verify that they are latched into the Display Latch, also check for power to the displays. See the REGISTER - Display, Display Decoder/Driver section in the theory publication.

#### Suggested remedies for symptom 2 -

- This symptom is probably the result of a failure of the console's register selection logic. See Register Selection logic failure for symptom 1 above.

#### Suggested remedies for symptom 3 -

- This symptom is probably the result of a LED failure.

#### Suggested remedies for symptom 4 -

- This symptom is probably the result of a display failure.

### 11.3 Data Entry Failures

The following are failures which could occur when attempting to enter information in one of the registers, memory address, or memory data.

#### Symptoms -

1. Cursor does not turn ON when ENTER pushbutton is pressed.
2. Cursor does not move in the forward direction (left to right) when SKIP pushbutton is pressed.
3. Cursor does not move in the reverse direction (right to left) when BKSP pushbutton is pressed.
4. The display is not cleared (data displayed changes to all zeros) when CE pushbutton is pressed.
5. The display digit, designated by the blinking cursor, is not changed when a different number is selected for entry/display via the keypad.
6. Pressing the EXEC pushbutton does not terminate the ENTER operation, cursor circuit is turned OFF.

#### Suggested remedies for symptoms 1 through 6 -

- Verify that the console is in the proper state and mode of operation for the entry desired. If it is not, then set up the state and mode per the Console Procedures in the theory manual or section 8.2 of this publication, and attempt the entry again. If the problem still exists and other functions, i.e.,

display, run/halt, increment, etc., word correctly, then the problem is probably in the logic which corresponds to the symptom as listed below:

<u>Symptom</u>	<u>Associated Logic</u>
1	ENTER Logic and/or Cursor Clock and Blink Decoder Driver.
2	SKIP Logic and/or Service Request Code Logic.
3	BKSP Logic and/or Cursor Counter.
4	CE Logic and/or Service Request Code Logic.
5	Keypad Logic and/or Display Decoder/Driver.
6	EXEC Logic and/or Service Request Code Logic and/or ENTER Logic.

### 12. PARTS

Complete parts lists for the Programming and Maintenance Console are provided by the Console Panel Assembly and PL, number 51400177, and the PRGM/MAINT/CONSOLE PWB Assembly and PL, number 51309000, which are included with the system drawings provided with each computer system.

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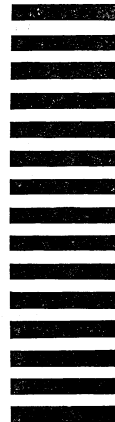
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