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OPERATING CONTROL SYSTEM - DATA ACQUISITION SYSTEM

PREOPERATIONAL TEST

PROCEDURE 340A

UNITED STATES DEPARTMENT OF ENERGY/
SOUTHERN CALIFORNIA EDISON COMPANY

10 MWe SOLAR PILOT PLANT

DAGGETT, CALIFORNIA

PROJECT:

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY

HUNTINGTON BEACH, CALIFORNIA

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OPERATING CONTROL SYSTEM - DATA ACQUISITION SYSTEM
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1.1 Power up the OCS and DAS main equipment cabinets and demonstrate power on operation.

1.2 Power up DAS and OCS peripherals and prepare for operational usage.

1.3 Perform OCS system diagnostics tests and verify system ready for functional operation.

1.4 Perform DAS system diagnostics tests and verify system ready for functional operation.

1.5 Demonstrate the MAXNET operating system is functional in the OCS computer.

		Verification Paragraph	Objective
2.0	ACCEPTANCE CRITERIA		
2.1	OCS and DAS Main Equipment Power Up		
2.1.1	The OCS 601 is powered up, operates from the correct facility circuit breaker, all cooling fans are operating and the AC input voltage is within design specifications.	8.1.1	1.1
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		Verification Paragraph	Objective
2.1.5	The OCS 605 is powered up, operates from the correct facility circuit breaker, all cooling fans are operating and the AC input voltage is within design specifications.	8.1.5	1.1
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2.1.9	The DAS 604 is powered up, operates from the correct facility circuit breaker, all cooling fans are operating, the magnetic tape transport is functional and the AC input voltage is within design specifications.	8.1.9	1.1

		Verification Paragraph	Objective
2.1.10	The DAS 605 is powered up, operates from the correct facility circuit breaker, all cooling fans are operating and the AC input voltage is within design specifications.	8.1.10	1.1

		Verification Paragraph	Objective
2.2	Peripherals		
2.2.1	Equipment Room DAS Peripherals		
2.2.1.1	The following peripherals have been loaded with paper and ribbons per their respective operating manuals.		
	DAS 608 Keyboard Printer	8.2.1.1	1.2
	DAS 609 600 LPM Printer	8.2.1.4	1.2
2.2.1.2	Each of the following DAS peripherals has been powered up and tested for functional readiness per its operating manual.		
	DAS 608 Keyboard Printer	8.2.1.1	1.2
	DAS 609 600 LPM Printer	8.2.1.4	1.2
2.2.1.3	Evaluation Room DAS Peripherals		
2.2.1.3.1	The following DAS peripherals have been loaded with paper and ribbon per their respective operating manuals.		
	DAS 808 Hard Copy Unit	8.2.1.9	1.2
	DAS 809 Hard Copy Unit	8.2.1.10	1.2
	DAS 810 Data Logger	8.2.1.2	1.2

		Verification Paragraph	Objective
2.2.1.3.2	Each of the following DAS peripherals has been powered up and tested for functional readiness per its operating manual.		
	DAS 801 Operator Color CRT	8.2.1.6	1.2
	DAS 802 Operator Color CRT	8.2.1.6	1.2
	DAS 803 B&W CRT	8.2.1.5	1.2
	DAS 804 B&W CRT	8.2.1.5	1.2
	DAS 808 Hard Copy Unit	8.2.1.7	1.2
	DAS 809 Hard Copy Unit	8.2.1.7	1.2
	DAS 810 Data Logger	8.2.1.2	1.2

		Verification Paragraph	Objective
2.2.2	OCS Peripherals		
2.2.2.1	The following OCS peripherals have been loaded with paper and ribbons per their respective operating manuals.		
	OCS 606 Console Device	8.2.1.1	1.2
	OCS 701 Matrix Printer	8.2.1.2	1.2
2.2.2.2	Each of the following OCS peripherals has been powered up and tested for functional readiness per its operating manual.		
	OCS 606 Console Device	8.2.1.1	1.2
	OCS 701 Matrix Printer	8.2.1.2	1.2
2.2.2.3	Each of the following OCS peripherals has been powered up and tested for functional readiness per its operating manual.		
	OCS 801 B&W CRT	8.2.1.6	1.2
	OCS 802 B&W CRT	8.2.1.6	1.2

		Verification Paragraph	Objective
2.3	The following diagnostics programs are performed on the OCS system.	8.3	1.3

Diagnostic Programs	Catalog No.		
Classic 7860 CPU Part 1	611821-001B.0	8.3.2	1.3
Classic 7860 CPU Part 2	611821-002B.0	8.3.2	1.3
Classic 7860 CPU Part 3	611821-003B.0	8.3.2	1.3
Classic 7860 CPU Part 4	611821-004B.0	8.3.2	1.3
Classic 7860 CPU Part 5	610821-005E.0	8.3.2	1.3
Classic 7860 CPU Part 6	610821-006K.0	8.3.2	1.3
Classic 7860 Memory	611826-001D.1	8.3.2	1.3
Classic 7860 Fixed & FP	611821-007D.0	8.3.2	1.3
I/O Processor	607855-016D.0	8.3.4	1.3
4138 Disc	607855-007E.0	8.3.4	1.3
4138 Dual Port Disc	607-040C.0	8.3.4	1.3
4806/4807 ATC/ASC Mult. Func.	607855-020B.1	8.3.4	1.3
4828 Standard Link	607855-033C.0	8.3.4	1.3
MODULAR COMMUNICATIONS MACRO	607855-008C.0	8.3.4	1.3
MODULAR COMMUNICATIONS CONTROLLER	607855-009D.0	8.3.4	1.3
200 TPI Moving Head Disc	607855-014E.0	8.3.4	1.3
Magnetic Taper Exerciser	600802-012J.0	8.3.6	1.3
4821 (4824) High Speed Serial Link	604828-001D.0	8.3.6	1.3
TTY-KSR Console Keyboard	605822-020F.0	8.3.6	1.3

		Verification Paragraph	Objective
2.4	The following diagnostics programs are performed on the DAS system.	8.4	1.4
Diagnostics Program	Catalog No.		
Classic 7860 CPU Part 1	611821-001B.0	8.4.2	1.4
Classic 7860 CPU Part 2	611821-002B.0	8.4.2	1.4
Classic 7860 CPU Part 3	611821-003B.0	8.4.2	1.4
Classic 7860 CPU Part 4	611821-004B.0	8.4.2	1.4
Classic 7860 CPU Part 5	610821-005E.0	8.4.2	1.4
Classic 7860 CPU Part 6	610821-006K.0	8.4.2	1.4
Classic 7860 Memory	611826-001D.1	8.4.2	1.4
Classic 7860 Fixed & FP	611821-007D.0	8.4.2	1.4
I/O Processor	607855-016D.0	8.4.4	1.4
4138 Disc	607855-007E.0	8.4.4	1.4
4138 Dual Port Disc	607855-040C.0	8.4.4	1.4
4806/4807/ ATC/ASC Mult. Func.	607855-020B.1	8.4.4	1.4
4828 Standard Link	607855-033C.0	8.4.4	1.4
MODULAR COMMUNICATIONS MACRO	607855-008C.0	8.4.4	1.4
MODULAR COMMUNICATIONS CONTROLLER	607855-009D.0	8.4.4	1.4
DMP Line Printer	607855-013D.0	8.4.4	1.4
4805 Parallel Link	607855-049A.0	8.4.4	1.4
Magnetic Tape Exerciser	600802-012J.0	8.4.6	1.4
TTY-KSR Console Keyboard	605822-020F.0	8.4.6	1.4
4821 (4824) High Speed Serial Link	604828-001D.0	8.4.6	1.4

		Verification Paragraph	Objective
2.5	The CPU/CPU computer links between OCS/DAS, OCS/HAC 1, OCS/HAC 2, DAS/HAC 1 and DAS/HAC 2 are functional.	8.5	1.5

3.0 REFERENCES

3.1 Pilot Plant System Description

a. 40E 900 5159450-2, Rev 2, Panel Schedules

3.2 Logic Diagrams

N/A

3.3 Flow Diagrams

N/A

3.4 Single Line Diagrams

N/A

3.5 Piping and Instrument Diagrams

N/A

3.6 Electrical Elementary Diagrams

N/A

3.7 Instrument Index

N/A

3.8 Material Requisition and/or Specification

N/A

3.9 Supplier Data

A. Texas Instruments Model 810 Printer Operating Instructions, TI No. 994353-9701.

B. Hazeltine 1510 Video Display Terminal Reference Manual, HI-1060A.

C. Intecolor User's Manual for 8000, 8300 and 8900 Series Intecolor Terminals, No. 999203.

D. High Resolution Graphics Command Processor User's Manual, Option 71, No. 999232.

E. Data Printer Corp Operating Instructions Line Printer, DPC Form 600-1.

F. Data Printer Corp Line Printer Maintenance Instructions, DPC Form 600-3.

G. Data Printer Corp Line Printer Parts Breakdown and Second Edition Electrical Diagrams.

H. LA36/LA35 DECWRITER II User's Manual, EK-LA3635-OP-003.

I. Wangco MOD II NRZI Magnetic Tape Transport Operation and Maintenance Manual, 201086-001.

J. Perkin Elmer MOD II Magnetic Tape Transport Operation and Maintenance Manual, Volume 1, Volume 2, 201540-001.

K. Control Data Corp CDC Storage Model Drive Hardware Maintenance Manual 2 Volumes, 83322150 and 83322240.

L. Control Data Corp CDC Storage Module Drive Hardware Reference Manual, 83322200.

M. Control Data Corp CDC Microcircuits, Normandale Circuits Manual, 83322440.

N. Control Data Corp CDC Storage Module Drive, Special Supplement, 83323860.

O. Printronix 300 Applications Manual, No. 102487.

P. Printronix Printer Maintenance Service Information, No. 102827 Rev. B.

Q. Printronics Shipping Kit No. 102614.

R. Printronics Printer Operator's Manual, No. 102486 Rev. A.

S. Printronics Printer Maintenance Manual, No. 101691. Must be ordered.

	Initial	Date
4.0 PREREQUISITES		
4.1 System turnover for preoperational testing is complete and in accordance with Section 5.4 of the SEC Startup and Test Program Manual, Solar One Generating Station, Daggett, California.		
4.2 The Master Tracking System has been reviewed and outstanding items (if any) will not affect this test. A summary list of outstanding items is contained in Appendix 10A.		
4.3 The Abnormal Equipment and Circuitry Log has been reviewed, is current, and is satisfactory for this test. A summary list is attached as Appendix 10B.		
4.4 All test equipment as per Section 6.0 is available, calibrated and in working order.		
4.5 A pretest coordination meeting has been held to familiarize test and operations personnel with the requirements of this test.		

5.0 LIMITS AND PRECAUTIONS

5.1 AC Voltage Checks - AC voltage tests are made to verify no load and under load conditions of applied voltage are within equipment specifications. High voltage (120 VAC nominal) terminals are probed during these tests. Probes having a minimum of uninsulated probe tip should be used during these tests.

5.2 SDPC Control Interface - The control interface with the SDPC shall be disabled or disconnected and no control operations attempted until completion of Test 305. The following interface links are subject to this requirement.

OCS Port	SDPC Port	Connecting Cable ID
605 1-2A	CON 702, CCM-1/HCP-1	H1955 CP
605 1-2A	CON 704, CCM-2/HCP-2	H1955 CM
605 1-2A	CON 705, CCM-3/HCP-3	H1955 CN

6.0 TEST EQUIPMENT

NOTE

Test equipment equivalent to that specified may be used. Equipment serial number will be recorded prior to start of tests and calibration shall be verified for expected test time period.

6.1 Indicating Instruments

6.1.1 Digital Readings Multimeter (Battery Operated)

Make: Fluke
Model: 8810A 5-1/2 Digit
Range: Multiple (20 VDC and 200 VAC RMS required)
Accuracy: 0.01 +3 DC, 0.4 +100 AC (±% of input + L.S. digits)
Number Required: Two

6.1.2 Thermometer

None required.

6.1.3 Stopwatch

None required.

6.2 Sensor and Transducers

None required.

6.3 Recording Equipment

None required.

6.4 Other

6.4.1 Mag Tape MCII/IV/Classic Diag/Util 650800-00E000 Fillable.

6.4.2 Mag Tape MCII/IV Classic Diag/Util 650800-000E000 Relocatable.

6.4.3 Blank Mag Tape 9 Track Digital, 600 Feet.

6.4.4 Blank 67 MB Disk.

6.4.5 Blank 200 TIP Disk 10 MB. (2 each)

6.4.6 67 MB Disk 340 Test OCS/DAS Operating Systems.

6.4.7 Wraparound Cable Test Set

6.4.8 Paper for the following printer terminals. All paper is standard folded, side perforated paper.

Printer Terminal	Paper Size
TI 810 Digital LA36 Printronics 300 DPC 600 LPM Printer	14-7/8" Standard

Initial	Date

7.0 INITIAL CONDITIONS

7.1 Environmental Conditions - Equipment Room, Evaluation Room and Control Room air conditioning systems are operating.

7.2 AC Power - Facility prime power and uninterruptable power is available through the circuit breakers listed in Appendix 10F.

7.3 Breakers and Switches - The status of circuit breakers and switches is as listed in Appendix 10F and 10G. The switch status in Appendix 10G is established prior to turn on of any circuit breakers to establish the initial conditions of Appendix 10F.

7.4 Temporary Installations - Temporary wrap-around cables will be installed to perform system diagnostic tests. Cable installations will be specified by the test engineer prior to performance of each diagnostic.

7.5 System Components Status - All OCS and DAS components are installed and cabled together except the following items. These items will be installed, cabled and tested in a Phase II test.

Item	Description
DAS 606	67 MB Disc Unit
DAS 610	Modacs III (BCS Interface)
DAS 805	Gould Strip Chart Recorder
DAS 806	Gould Strip Chart Recorder
DAS 807	Gould Strip Chart Recorder

	Initial	Date
7.6 System Interfaces - The OCS interface with the Beckman MV8000 - CON 703 will not be installed and operational until Phase II testing. HAC/OCS interfaces are connected.		

Initial	Date

8.0 PROCEDURE AND DATA COLLECTION

8.1 Power Up - Verify initial conditions for step 8.1 per Appendix 10F and 10G have been established.

8.1.1 OCS 601 Power Up

8.1.1.1 Turn on UPS #1 CB 10

8.1.1.2 Turn on OCS 601 CB 2 and verify utility outlet voltage per the following.

CB 2 Status	Outlet Voltage Design	Outlet Voltage Actual
OFF	0 VAC	
ON	120 ± 12 VAC	

8.1.1.3 Turn on OCS 601 CB 1 and verify all equipment cooling fans are operating.

8.1.1.4 Verify utility outlet voltage per the following.

CB 1 & CB 2 Status	Outlet Voltage Design	Outlet Voltage Actual
Both On	120 ± 12 VAC	

8.1.2 OCS 602 Power Up

8.1.2.1 Turn on UPS #1 CB 9

Initial	Date

8.1.2.2 Verify OCS 602 power input voltage per the following.

UPS #1 CB 9 Status	OCS 602 Power Input	
	Design	Actual
OFF	0	
ON	120 ± 12 VAC	

8.1.2.3 Turn the OCS 602 cabinet POWER ON switch ON.

8.1.2.4 Press the OCS 602 Magnetic Tape unit POWER on switch and verify OCP POWER indicator light is on.

8.1.2.5 Verify all OCS 602 equipment cooling fans are operating.

8.1.2.6 Verify the OCS 602 AC input voltage as follows.

Design	Actual
120 ± 12 VAC	

8.1.2.7 Functional Check - OCS 602

Load a scratch-pad reel of tape without a write enable ring onto MTT and thread tape by following procedure in Section 2 or User's Manual. Press LOAD pushbutton to initiate Load sequence. Tape should enter vacuum chambers and then move forward until it reaches BOT tab. ON

	Initial	Date
LINE indicator should light when BOT reaches photosensor. At this point, no action should occur when LOAD pushbutton is pressed. To remove system from On-Line mode, press RESET pushbutton. System is then in Off-Line mode, and ON LINE indicator extinguishes. Since write enable ring is not in place, FILE PROTECT indicator should illuminate.		
With MTT in Off-Line mode, press FORWARD Pushbutton. FORWARD indicator should illuminate. Run several feet of tape onto takeup reel and press RESET pushbutton to stop tape. Verify that when MTT is in On-Line mode action of FORWARD and REWIND pushbuttons are inoperative.		
Press REWIND pushbutton to initiate Rewind mode. Tape should rewind past BOT tab, return to BOT tab, and stop with LOAD indicator lit. To unload tape, again press REWIND pushbutton. Tape should rewind until system interlocks are broken. This should cause reels to stop and vacuum system to shut down. Remaining tape in vacuum chambers can then be taken up by file reel by keeping REWIND switch pressed. File reel can then be removed from MTT as described in Section 2.		
8.1.2.8 Load a blank tape in the OCS 602 magnetic tape unit.		

		Initial	Date
8.1.3	OCS 603 Power Up		
8.1.3.1	Turn on UPS #1 CB 8		
8.1.3.2	Verify the OCS 603 power input voltage per the following.		

UPS #1 CB 8 Status	OCS 603 Power Input	
	Design	Actual
OFF	0	
ON	120 ± 12 VAC	

8.1.3.3	Turn the OCS 603 cabinet power on switch ON.		
8.1.3.4	Turn the OCS 603 upper 10 megabit disk drive unit power ON.		
8.1.3.5	Insert a blank 10 megabit disk in the upper disk drive unit.		
8.1.3.6	Press the RUN switch and verify the OCS 603 upper 10 megabit disk drive unit is running.		
8.1.3.7	Turn the OCS 603 lower 10 megabit disk drive unit power ON.		
8.1.3.8	Insert a blank 10 megabit disk in the lower disk drive unit.		
8.1.3.9	Press the RUN switch and verify the OCS 603 lower 10 megabit disk drive unit is running.		

Initial	Date

8.1.3.10 Verify all OCS 603 equipment cooling fans are operating.

8.1.3.11 Verify the OCS 603 AC input voltage is within design requirement as follows:

Design	Actual
120 ± 12 VAC	

Initial	Date

8.1.4 OCS 604 Power Up

8.1.4.1 Turn on UPS #1 CB 7

8.1.4.2 Verify OCS 604 power input voltage per the following.

UPS #1 CB 8 Status	OCS 604 Power Input	
	Design	Actual
OFF	0	
ON	120 ± 12 VAC	

8.1.4.3 Turn on the OCS 604 cabinet power on switch ON.

8.1.4.4 Verify all cabinet equipment cooling fans are operating.

8.1.4.5 Verify the OCS 604 AC input voltage is within design requirement as follows:

Design	Actual
120 ± 12 VAC	

Initial	Date

8.1.5 OCS 605 Power Up

8.1.5.1 Turn on UPS #1 CB 6

8.1.5.2 Verify OCS 605 power input voltage per the following.

UPS #1 CB 6 Status	OCS 605 Power Input	
	Design	Actual
OFF	0	
ON	120 ± 12 VAC	

8.1.5.3 Turn the OCS 605 cabinet AC input circuit breaker ON.

8.1.5.4 Verify all cabinet equipment cooling fans are operating.

8.1.5.5 Verify the OCS 605 AC input voltage is within design requirement as follows:

Design	Actual
120 ± 12 VAC	

Initial	Date

8.1.6 DAS 601 Power Up

8.1.6.1 Turn on UPS #1 CB 1

8.1.6.2 Turn on DAS 601 CB 2 and verify utility outlet voltage per the following.

CB 2 Status	Outlet Voltage Design	Outlet Voltage Actual
OFF	0 VAC	
ON	120 ± 12 VAC	

8.1.6.3 Turn on DAS 601 CB 1 and verify all equipment cooling fans are operating.

8.1.6.4 Verify utility outlet voltage per the following.

CB 1 & CB 2 Status	Outlet Voltage Design	Outlet Voltage Actual
Both On	120 ± 12 VAC	

Initial	Date

8.1.7 DAS 602 Power Up

8.1.7.1 Turn on UPS #1 CB 2

8.1.7.2 Verify DAS 602 power input voltage per the following.

UPS #1 CB 2 Status	DAS 602 Power Input	
	Design	Actual
OFF	0 VAC	
ON	120 ± 12 VAC	

8.1.7.3 Turn the DAS 602 cabinet power on switch ON.

8.1.7.4 Verify all cabinet equipment cooling fans are operating.

8.1.7.5 Verify the DAS 602 AC input voltage is within design requirement as follows.

Design	Actual
120 ± 12 VAC	

Initial	Date

8.1.8 DAS 603 Power Up

8.1.8.1 Turn on UPS #1 CB 3

8.1.8.2 Verify DAS 603 power input voltage per the following.

UPS #1 CB 3 Status	DAS 603 Power Input	
	Design	Actual
OFF	0 VAC	
ON	120 ± 12 VAC	

8.1.8.3 Turn the DAS 603 cabinet power on switch ON.

8.1.8.4 Press the DAS 603 magnetic tape unit POWER on switch and verify OCP POWER indicator light is ON.

8.1.8.5 Verify all DAS 603 equipment cooling fans are operating.

8.1.8.6 Verify the DAS 603 AC input voltage is within design requirement.

Design	Actual
120 ± 12 VAC	

8.1.8.7 Functional Check - DAS 603

Load a scratch-pad reel of tape without a write enable ring onto MTT and thread tape by following procedure in Section 2 of User's Manual. Press LOAD pushbutton to initiate Load sequence. Tape should enter

	Initial	Date
vacuum chambers and then move forward until it reaches BOT tab. ON LINE indicator should light when BOT reaches photosensor. At this point, no action should occur when LOAD pushbutton is pressed. To remove system from On-Line mode, press RESET push-button. System is then Off-Line mode, and ON LINE indicator extinguishes. Since write enable ring is not in place, FILE PROTECT indicator should illuminate.		
With MTT in Off-Line mode, press FORWARD pushbutton. FORWARD indicator should illuminate. Run several feet of tape onto takeup reel and press RESET push-button to stop tape. Verify that when MTT is in On-Line mode action of FORWARD and REWIND pushbuttons are inoperative.		
Press REWIND pushbutton to initiate Rewind mode. Tape should rewind past BOT tab, return to BOT tab, and stop with LOAD indicator lit. To unload tape, again press REWIND pushbutton. Tape should rewind until system interlocks are broken. This should cause reels to stop and vacuum system to shut down. Remaining tape in vacuum chambers can then be taken up by file reel by keeping REWIND switch pressed. File reel can then be removed from MTT as described in Section 2.		

Initial	Date

8.1.9 DAS 604 Power Up

8.1.9.1 Turn in UPS #1 CB 4

8.1.9.2 Verify DAS 604 power input voltage per the following.

UPS #1 CB 3 Status	DAS 604 Power Input	
	Design	Actual
OFF	0 VAC	
ON	120 ± 12 VAC	

8.1.9.3 Turn the DAS 604 cabinet power on switch ON.

8.1.9.4 Press the DAS 604 magnetic tape unit POWER on switch and verify OCP POWER indicator light is ON.

8.1.9.5 Verify all DAS 604 equipment cooling fans are operating.

8.1.9.6 Verify the DAS 604 AC input voltage is within design requirement.

Design	Actual
120 ± 12 VAC	

8.1.9.7 Functional Check - DAS 604

Load a scratch-pad reel of tape without a write enable ring onto MTT and thread tape by following procedure in Section 2 or User's Manual. Press LOAD pushbutton to initiate Load sequence. Tape should enter

		Initial	Date
	vacuum chambers and then move forward until it reaches BOT tab. ON LINE indicator should light when BOT reaches photosensor. At this point, no action should occur when LOAD pushbutton is pressed. To remove system from On-Line mode, press RESET push-button. System is then in Off-Line mode, and ON LINE indicator extinguishes. Since write enable ring is not in place, FILE PROTECT indicator should illuminate.		
	With MTT in Off-Line mode, press FORWARD pushbutton. FORWARD indicator should illuminate. Run several feet of tape onto takeup reel and press RESET pushbutton to stop tape. Verify that when MTT is in On-Line mode action of FORWARD and REWIND pushbuttons are inoperative.		
	Press REWIND pushbutton to initiate Rewind mode. Tape should rewind past BOT tab, return to BOT tab, and stop with LOAD indicator lit. To unload tape, again press REWIND pushbutton. Tape should re-wind until system interlocks are broken. This should cause reels to stop and vacuum system to shut down. Remaining tape in vacuum chambers can then be taken up by file reel by keeping REWIND switch pressed. File reel can then be removed from MTT as described in Section 2.		
8.1.9.8	Load a blank tape in the DAS 604 magnetic tape unit.		

Initial	Date

8.1.10 DAS 605 Power Up

8.1.10.1 Turn on UPS #1 CB 5

8.1.10.2 Verify DAS 605 power input voltage per the following.

UPS #1 CB 5 Status	DAS 605 Power Input	
	Design	Actual
OFF	0	
ON	120 ± 12 VAC	

8.1.10.3 Turn the DAS 605 cabinet AC input circuit breaker ON.

8.1.10.4 Verify all cabinet equipment cooling fans are operating.

8.1.10.5 Verify the DAS 605 AC input voltage is within design requirement as follows.

Design	Actual
120 ± 12 VAC	

		Initial	Date
8.2	Peripherals		
8.2.1	DAS Peripherals		
8.2.1.1	Keyboard Printer (Console Device) - DAS 608		
8.2.1.1.1	Initial Preparation Verify that all packing materials have been removed from printer and print head is free to move.		
8.2.1.1.2	Checkout and Acceptance Procedures Ref. DECWRITER II User's Manual, EK-LA3635-OP-003. a. Install ribbon per installation procedure (Section 3).		
	b. Install paper per paper loading procedure (Section 3).		
	CAUTION Before connecting the LA36 to a power source, ensure that the line voltage and frequency are compatible with the power requirements of the machine. Ensure that the POWER switch on the console is OFF. 60 Hz 90-132 VAC		
	c. Connect the LA36 line cord to the correct wall receptacle; press the control panel POWER switch to the ON position. The print head automatically positions itself to the left margin.		
	d. Set the baud rate to 300 and the LINE/LOC switch to LOC.		
	e. Press the LINE FEED key, hold down the CTRL key, and then press the BELL key. The stepping motor will advance the paper one line and the bell tone will sound. Type a line of characters. When the print head passes the 64th character position, the bell tone will sound.		
	f. Press the BACKSPACE key. The print head will move one character position to the left.		

	Initial	Date
g. After 132 characters have printed, press the RETURN key and observe the return of the print head to the "home" position.		
h. Set the BAUD RATE switches to the setting prescribed for the operating system. 300		
8.2.1.2 Data Logger - DAS 810		
8.2.1.2.1 Initial Preparation		
Verify that all packing materials and print head packing restraints have been removed and that print head is free to move.		
8.2.1.2.2 Power Up Procedure - Reference the Model 810 User's Manual		
a. Check that printing ribbon and paper are correctly installed (see Subsections 2.5 and 2.6 for instructions).		
b. Set the power ON/OFF switch at the left rear of the printer to the ON (up) position.		
c. Observe that the control panel ON LINE indicator is not lit and that the print-head is at the left margin.		

At this point the Model 810 printer conforms to the following initial conditions:

- The printer is OFF LINE.
- The form length is 279 mm (11 inches) for the BSC printer and also for the FCO and FLC printers if the auxiliary control panel FORM LENGTH switch is in the PROG position. The FCO and FLC printers are set to the form selected on the FORM LENGTH switch. The VCO and VFC printers are set to the form length of the last vertical format stored or recalled.
- The line spacing is six lines per inch for the BSC, FCO, and FLC printers. The VCO and VFC printers are set to the line spacing of the last vertical format stored or recalled.

	Initial	Date

- The character spacing is 10 characters per inch.
- All horizontal tabs are cleared from the working memory. (Horizontal tabs can be set only by software.)
- All vertical tabs are cleared from the working memory of the BSC, FCO, and FLC printers. The VCO and VFC printers retain the vertical tab settings of the last vertical format stored or recalled.
- The line counter is set to zero, causing the present line location to be the first line of the form.
- The line buffer is empty (all previous printable characters have been cleared).

8.2.1.2.3 Self Test

With power on, perform the self-test as follows:

a. Check that ribbon and paper are correctly installed.

b. Lift open the access door.

c. Set the auxiliary control panel NORMAL/TEST/VFC switch to TEST/VFC.

> NOTE
>
> Do not operate the printer without paper of the appropriate width.

d. Ensure that the pencil switches are not set for parallel operation (switch 1 must be OFF).

> NOTE
>
> The printhead adjustment can be made while the printer is ON LINE and data is being printed or while the self-test cyclical character pattern (barber pole) is being printed.

e. Press the control panel ON LINE switch to start printing.

	Initial	Date
f. Move the printhead adjust lever toward the rear of the printer until print quality is satisfactory.		
g. If smudging occurs, the printhead is too close and must be backed off.		
h. Move the printhead adjust lever until the nearest detent engages.		
i. Check that the entire 64-character (or optional 95-character) character set is printed for each line and that each line shifts one column position from adjacent lines.		
j. After several lines have been printed and checked, set the auxiliary control panel NORMAL/TEST/VFC switch to NORMAL, and observe that the barber pole stops printing.		
k. Reset the pencil switches on the auxiliary control panel to the previously set positions.		
l. Close the access door.		
8.2.1.2.4 Selection of Baud Rate and Parity		
a. Lift open the access door.		
b. Using a ball point pen or similar device, set the auxiliary control panel pencil switches 1, 2, and 3 to the baud rate of the serial data to be received, or to the optional parallel input as listed in Table 3-2.		

Table 3-2. Auxiliary Control Panel Baud Rate Selections

Baud Rate		Pencil Switches		
Standard	BRO[1]	1	2	3
110	110	OFF	OFF	OFF
150	200	ON	OFF	OFF
300	300	OFF	ON	OFF
1200	1200	ON	ON	OFF
2400	2400	OFF	OFF	ON
4800	600	ON	OFF	ON
9600	9600	OFF	ON	ON
parallel[2]		ON	ON	ON

Initial	Date

c. Set the auxiliary control panel pencil switches as listed in Table 3-3 (also refer to Figure 3-3).

d. Close the access door.

Table 3-3. Auxiliary Control Panel Parity Selections

Function	Pencil Switches 4	5
Ignore Parity	OFF	OFF
Odd Parity	ON	ON
Even Parity	ON	OFF

Set baud rate to 9600 baud. Set parity to Ignore Parity.

8.2.1.3 67 MB Disk - DAS 607

8.2.1.3.1 Initial Preparation

Verify that all shipping restraints and packing materials have been removed prior to power up.

8.2.1.3.2 Power Up Procedure

General

Power application is divided into two areas: Power On Procedure, and Power Off Procedure. These procedures assume that the drive is connected to an ac power source as defined in the installation section of the maintenance manual. They also assume that the LOCAL/REMOTE switch and MAINT UNIT DISABLE switch(es), located on cards in the logic chassis, are set to REMOTE and NORM respectively.

	Initial	Date
Power On Procedure		
The following procedure describes applying power to the drive.		
a. Gain access to power control panel and set AC POWER and POWER SUPPLY circuit breakers to ON. Ensure that blower starts to operate. Allow blower to operate for two minutes minimum before proceeding.		
CAUTION FAILURE TO ALLOW BLOWER TO OPERATE FOR TWO MINUTE PERIOD BEFORE INSTALLING DISK PACK WILL NOT ALLOW SUFFICIENT PURGE TIME AND MAY CAUSE DAMAGE TO DISK PACK OR HEADS.		
b. Install disk pack in accordance with Disk Pack Installation procedure.		
Disk Pack Installation		
The disk pack must be installed prior to performing any drive operation. Disk pack installation consists of setting the pack on the drive's spindle and locking the pack in place. The following describes the procedure.		
CAUTION FAILURE TO ENSURE CLEANLINESS OF PACK OR SHROUD AREA, OR FAILURE TO PURGE BLOWER SYSTEM MAY CAUSE DAMAGE TO PACK OR HEADS.		
a. Disengage bottom dust cover from pack canister by holding bottom cover and turning canister handle counterclockwise.		

	Initial	Date

CAUTION

NON-FULLY RETRACTED HEADS INDICATE A PROBLEM IN THE DRIVE'S SERVO, AND MAY RESULT IN DAMAGE TO THE PACK OR HEADS DURING PACK INSTALLATION OR REMOVAL. IF HEADS ARE NOT FULLY RETRACTED, CONTACT MAINTENANCE PERSONNEL. DO NOT PUSH ON HEADS.

b. Raise pack access cover and ensure that heads are fully retracted.

c. Carefully set disk pack on spindle, avoiding abusive contact between pack and spindle. Rotate storage canister handle clockwise until it stops turning. Then, give a gentle snugging twist to handle and lift storage canister off pack.

d. Set storage canister into bottom dust cover and set aside for later use.

e. Close pack access cover to prevent entry of dust and contamination.

f. Press START switch on control panel and ensure that START indicator lights. Drive starts as soon as Sequence Pick and Sequence Hold signals are available from controller. Within 30 seconds of the time the sequence signals are available, the READY indicator should light. Drive is then ready for operation.

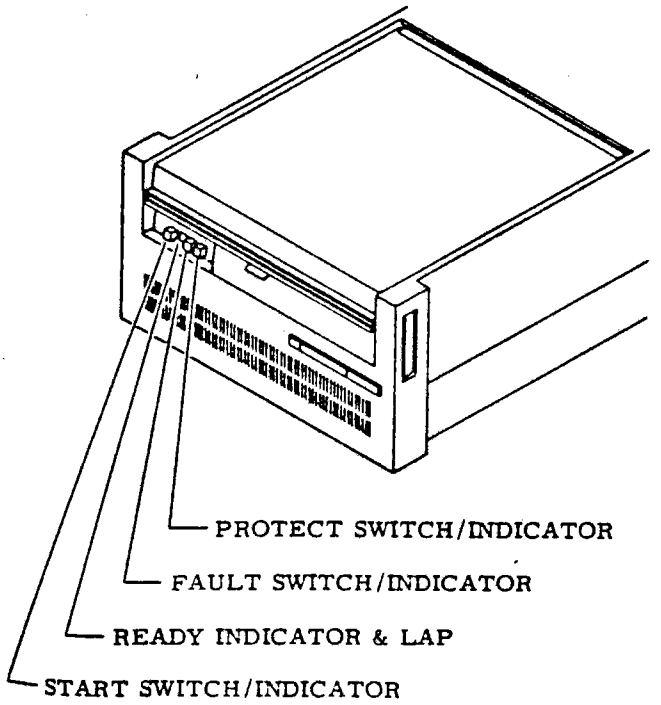
General

The drive has two basic types of operator controls and indicators. These are (1) Operator control panel (2) power control panel.

Control Panel

The control panel is located on the front of the shroud, just below the edge of the pack access cover. The panel contains the switches

and indicators required to control and monitor the basic operation of the drive as shown below.

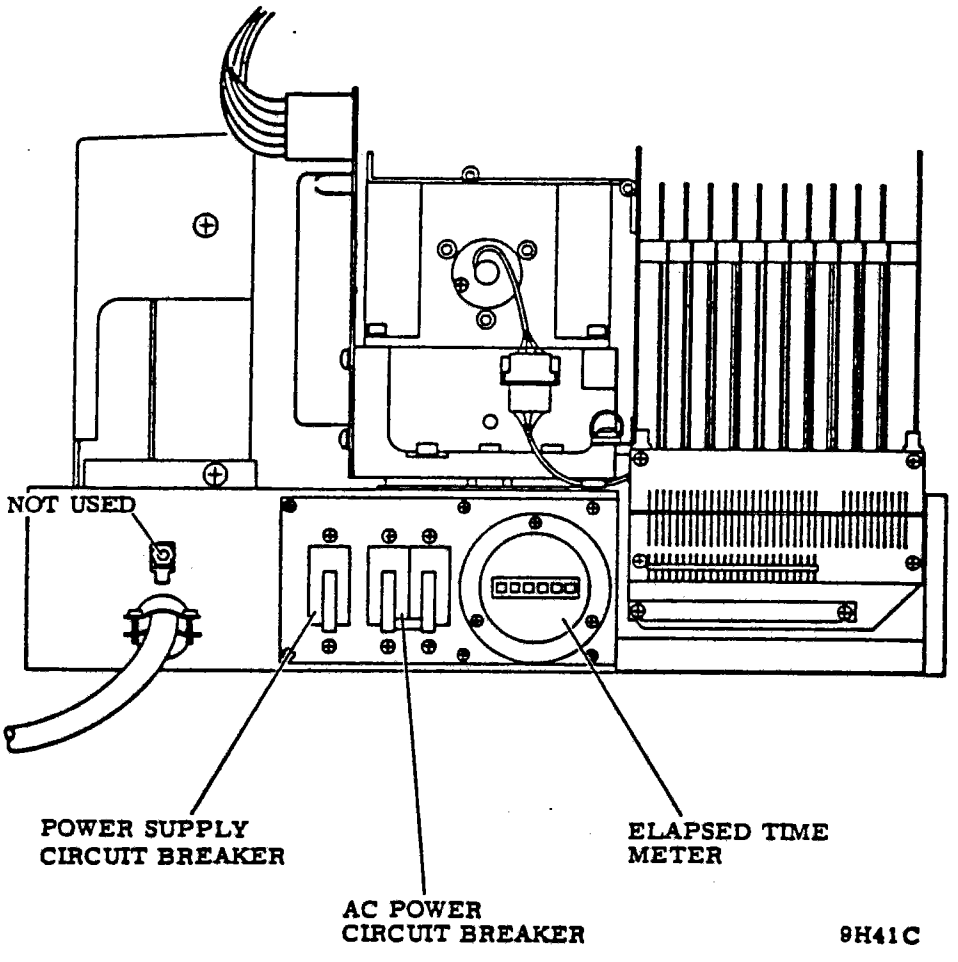


Control Panel Switches and Indicators

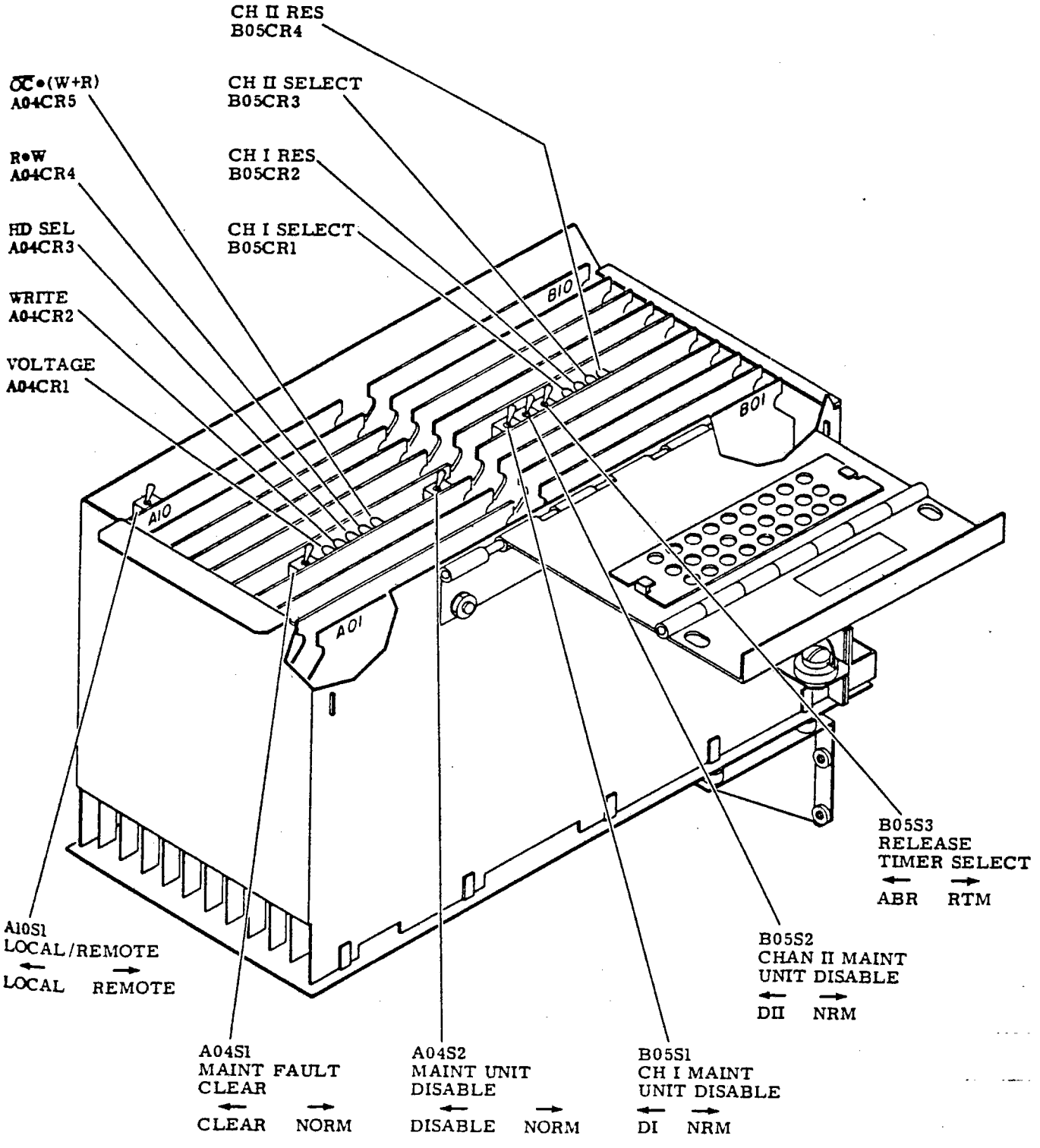
Initial	Date

Power Control Panel

The power control panel is located at the rear of the base assembly. Depending on the mounting configuration of the drive, it may be necessary to open cabinetry in order to gain access to the panel. The panel contains an elapsed time meter and the power control circuit breakers as shown below.



Power Control Panel Switches and Indicators



NOTE: DUAL CHANNEL CARD COMPLEMENT SHOWN.

Maintenance Switches and Indicators

Initial	Date

8.2.1.4 600 LPM Line Printer - DAS 609

8.2.1.4.1 Initial Preparation

Verify that all shipping restraints and packing materials have been removed prior to power up.

8.2.1.4.2 Power Up Procedure

CAUTION

BEFORE ATTEMPTING TO APPLY PRIMARY POWER TO THE PRINTER, CHECK THE SERVICE VOLTAGE AND FREQUENCY AGAINST THE LINE VOLTAGE AND FREQUENCY RATINGS OF THE PRINTER SHOWN ON THE NAMEPLATE LOCATED BEHIND THE HINGED PANEL AT THE MIDDLE FRONT OF THE PRINTER. APPLICATION OF OTHER THAN THE RATED VOLTAGE AND FREQUENCY MAY RESULT IN DAMAGE TO THE PRINTER.

With the Main Circuit Breaker, accessible through an opening at the lower left rear of the printer cabinet in the OFF position, apply correct primary power to the printer unit. Place the Main Circuit Breaker in the ON position, the red Power OFF indicator on the front control panel should be illuminated, indicating that primary power is applied.

8.2.1.4.3 Self Test

Install ribbon and paper, and set the REMOTE/LOCAL switch, accessible through an opening at the lower rear of the printer cabinet, in the LOCAL position.

Refer to operating manual for paper and ribbon installation procedures.

Initial	Date

Test Panel Controls

The printer test panel contains the controls necessary to select the LOCAL, internal test mode of operation; the test print character; and the test paper advance instruction. The test panel controls are arranged as shown in Figure 16 at the outer edge of the Character Storage/Control printed-circuit board in position 4 of the logic electronics basket, and are accessible through an opening at the lower rear of the printer.

REMOTE/LOCAL Switch

This switch selects the mode of printer operation. When in the REMOTE (toggle up) position, the printer operation is controlled by the external device connected to the printer interface, and all other test panel controls are logically inhibited so as to be non-interfering while in the REMOTE mode.

When the REMOTE/LOCAL switch is in the LOCAL (toggle down) position, the printer interface the external device is logically inhibited, and the printer is conditioned to operate automatically as designated by the remaining test panel controls. Operation of the printer in the LOCAL mode is controlled by the operator by means of the RUN and STOP pushbutton switches on the front control panel. The REMOTE/LOCAL switch should be changed to the opposite mode only when the printer is in the STOP mode; should the mode selection be changed while the printer is in the RUN mode, operation will continue as it was prior to the switch change, until the printer is switched to the STOP mode.

SS/PF (Single Space/Program Feed) Switch

This switch is enabled only in the LOCAL mode. When in the SS position (toggle up), paper will be advanced a single (one) linespace after each print operation. When in the PF

Initial	Date

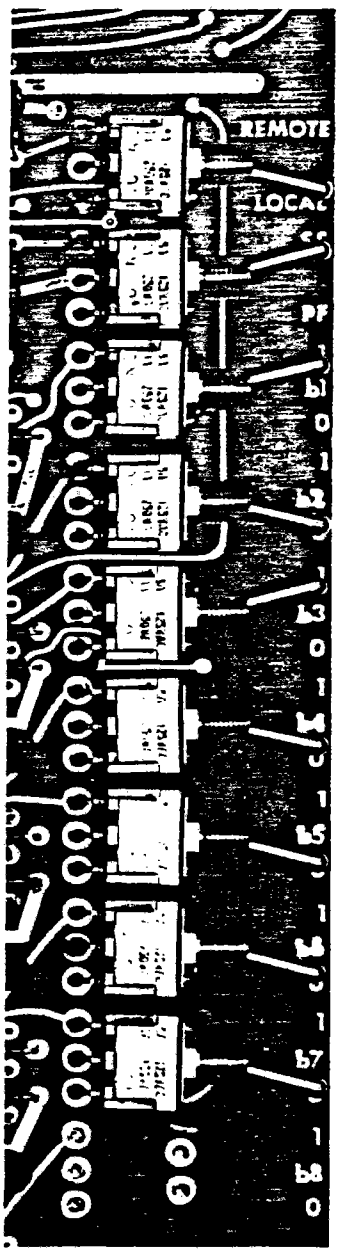
position (toggle down), paper will be advanced according to the bit pattern set by the Test Data Bit switches "b1" through "b7". (Standard paperfeed command bit-patterns are listed in Table 6 of the User's Manual Appendix.)

TEST DATA BIT Switches

The test Data Bit switches are used to select a (1) bit pattern which designates the character to be printed and, if the Program Feed mode is also selected, the paper advance instruction to be executed, during operation in the LOCAL mode. The Test Data Bit switches, designated "b1" through "b7" (or optionally, "b8"), correspond to the Data Bus in bit positions on the printer interface with the external device. When a Test Data Bit switch is in the "1" position (toggle up), the corresponding input data will be true: conversely, when in the "0" position (toggle down), the corresponding input data bit will be false. The character printed for a given bit pattern depends upon the character sequence arrangement provided on the particular unit.

On printers equipped with the optional Input Parity Check feature, Test Data Bit switch "b8" is used to complete the parity, odd or even, of the test data character code. Incorrect parity will result in the printing of "blanks" (no printout) and, if the Program Feed mode is selected, no paper advance.

- Set SS/PF Switch to SS
- Set Test Data Switches to 000 0101, b7 to b1
- Press Run Switch and verify that printer is printing upper case E and advancing one line at a time.
- Press the Stop Switch to Stop Printing.
- Set SS/PF Switch to PF.
- Press Run Switch and verify that printer is printing upper case E and advancing 5 line spaces for each line of print.



REMOTE ("On-Line")

LOCAL (Internal Test)
SS (Single Space)

PF (Program Feed)

1
b1
0
1
b2
0
1
b3
0
1
b4
0
1
b5
0
1
b6
0
1
b7
0
1
b8
0

TEST DATA
BIT SWITCHES

Figure 16. Test Panel Controls, Chaintrain Line Printer

	Initial	Date

- Press the Stop switch to stop printing.
- Examine the printout of the letter E for any discrepancies. If adjustments are required refer to the Maintenance Manual, DPC Form 600-3.
- Press One Line pushbutton and verify that paper advances one line each time switch is depressed.
- Press One Line and Home pushbutton switches simultaneously and verify that the paper tractors advance and slew feed the forms.
- Verify printer is still in STOP mode.
- Install 8 channel vertical format tape on vertical format unit (VFU) per instructions in operating manual.
- Press Home pushbutton and verify that paper advances to top of form each time button is depressed.
- Set Remote/Local switch to REMOTE and press RUN pushbutton. Printer is now ready for on line operation.

8.2.1.5 Black/White CRT Terminals - DAS 803

8.2.1.5.1 Initial Preparation

Verify that power cord is connected to an AC power source and that the computer interface cable is connected.

8.2.1.5.2 Power Up Procedure

A power-on slide switch is located at the rear of the terminal. When power is on, the POWER ON indicator located on the keyboard is lit. Allow at least 15 seconds to elapse between power off and power on in the event of unit power recycling. If the POWER ON indicator does not light, the terminal should be turned off. After 15 seconds depress the red circuit breaker located in the rear, next to the power switch, and again apply power to the terminal. If the POWER on indicator still does not light, turn power off and call your authorized service representative.

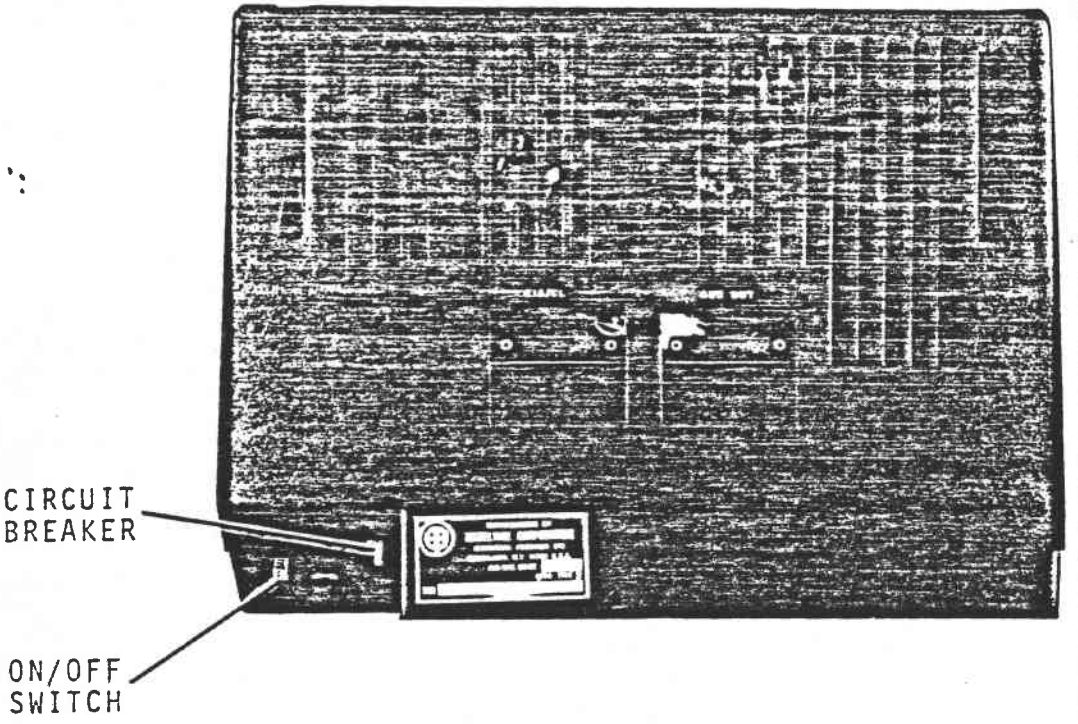


Figure 2-1. Hazeltine 1510 Terminal, Rear View

8.2.1.5.3 Warm Up

Allow 30 seconds for display warm up. At the end of this period the terminal is ready to operate.

a. If extraneous data appears and/or the cursor is not displayed in the upper left corner (HOME), depress the RESET key, followed by the CLEAR key located on the keyboard. If after depressing the RESET and CLEAR keys, if proper display/ operation is still not obtained, turn the power off and contact your authorized service representative.

b. If the cursor does not appear after the display has warmed up for a reasonable time (no more than three minutes) and the power indicator is lit, adjust the contrast control located under the access panel on the top of the keyboard. If the cursor still does not appear, turn the power off and contact your authorized service representative.

Initial	Date

8.2.1.5.4 Front Panel Switch Settings

Verify that all front panel switch settings conform to the following table. Remove the front access panel engraved with the POWER ON legend to gain access to the 23 switches.

Function	Setting	
Baud Rate	9600	
Parity	0	
Half Dup/Full	Full	
Auto-LF-CR	CR	
U/L Case-Up	Up	
Std Video-REV	Std VID	
EIA-CUR Loop	EIA	
ESC - ∿	∿	
Format	No Format	Not on OCS terminals
EOM	A on, B on	
Wraparound	Yes	
Unused Switch	Don't care	
Contrast	Adjust to suit operator	

8.2.1.6 Black/White CRT Terminal - DAS 804

8.2.1.6.1 Repeat steps 8.2.1.5.1 through 8.2.1.5.4 and verify complete for DAS 804.

8.2.1.7 DAS Color Operator CRT - DAS 801

8.2.1.7.1 Initial Preparation

The Intecolor unit was completely aligned and adjusted at the factory. Following shipment, minor adjustment touch-up and/or degaussing sometimes may be needed. The brief tests outlined in the following paragraphs will indicate whether these procedures, described in Section IV of this manual, are necessary. (Allow at least 30 minutes warm-up before attempting any readjustment.)

	Initial	Date
Place the console in position on a desk or table. The keyboard normally is placed just in front of the console; however, it may be located elsewhere within cable reach if more convenient. Connect the keyboard cable to the Keyboard socket (J3) on the console rear panel. (The flexible cable can lie under the console, free of the console feet.) Verify that the lower edge of the white power switch on the rear panel is depressed (the off position). Insert the power cord in its socket on the rear panel and then connect to a source of 115 VAC 60 Hz power (or other type of power source if the options for 230 volts and/or 50 Hz are installed in the unit).		
Disconnect and verify DAS computer interface cable and the hard copy interface cable are disconnected.		

8.2.1.7.2 Power Up Procedure

After the unit has been connected to a source of power (and prior to connecting it to other devices), depress the upper portion of the white power switch on the console rear panel. Within 60 seconds, warm-up should be completed and the screen display in the upper left corner should appear in green, yellow, magenta and cyan single height characters:

INTECOLOR 8001 CRT MODE V5.79-48S

If the sonalert should sound for several seconds it may be stopped by striking CPU RESET, keyboard upper right.

Note: V5-79-48S indicates the vintage of the system software. This may vary and should be mentioned when discussing any problems with ISC applications engineers.

(If the unit has the options required for use of Extended Disk BASIC, the initial display will be different. Operate the CPU RESET key at the upper right corner of the keyboard to obtain the display just described.)

	Initial	Date

8.2.1.7.3 Self Test

For a check of purity and of display size, select the background color red:

1. Operate the BG ON/FLG ON key. (This enables selection of the background color.)

2. With the CONTROL key held operated, operate the red Q key. Release the CONTROL key. (If the unit has the color cluster at the left side of the keyboard, the red key in the cluster may be operated instead of the CONTROL Q combination.) (This designates the background color as red.)

3. Operate the ERASE PAGE key. (This causes all foreground color to be erased and the entire raster appears in the background color.)

The raster in the selected color should be approximately 10 x 13 inches (for a terminal with a 19" CRT - see specifications for display size on a 13" or 25" CRT). The edges of the display should appear reasonably straight. The color should be fairly uniform over the entire raster area. Lack of color uniformity indicates a need for purity adjustment and/or degaussing. Substantial bowing of the raster edges indicates a need for pincushion adjustment. See Section IV for degaussing, display size adjustment and purity adjustment.

To verify convergence, use a full-screen display of white letters against a black background:

1. Operate the BG ON/FLG ON key. (To enable background color selection.)

2. With the CONTROL key held down, operate the black (P) key. (Or just the black key in the color cluster.) (To designate black as the background color.)

	Initial	Date
3. Operate the FG ON/FLG OFF key. (To enable foreground color selection.)		
4. With the CONTROL key held down, operate the white (W) key. (Or the white key in the color cluster.) (To designate white as the color for foreground.)		
5. Select double height characters by operating the A7 ON key.		
6. Operate the CAPS LOCK to the down position. (To cause alpha characters to be in caps - this key does not affect other characters.)		
7. In sequence one after the other, operate the (ESC), (TEST)Y and L keys. (The ESC Y sequence results in a full-screen display of the next character whose key is depressed.)		

There should be a full-screen display of double-height L characters, in white against a black background. The letters should have no appreciable red, blue or green edges. Color misalignment indicates a need for touch-up of convergence adjustments to obtain the white letters. This relatively quick and easy procedure is outlined in Section IV under "Final Convergence", page 4.12. Rows and columns should appear straight and linear. Substantial bowing indicates a need for pin-cushion adjustment. Appreciable non-linearity is unusual in a new unit and would require trouble-shooting.

To verify operation via the serial I/O port, a typing test may be performed in the full duplex mode. Use a small copper wire jumper (or wired shorting plug, but not a paper clip) to make a connection between pins 2 and 3 of the 25-pin RS-232C Modem socket (J1) on the rear panel. (As viewed from the rear of the console, these are the 2nd and 3rd from the right of the top row of socket pin holes.)

		Initial	Date
	With the CAPS LOCK key still in the down position, operate the (ESC) key and then the F key to set the full duplex mode. Keyboard inputs now go to the serial output port (J1, pin 2) and return via the jumper to the serial input port (pin 3) for display on the screen. With the wire jumper removed, operation of the alpha-numeric keys will not result in display.		
	Operate the CPU RESET key to obtain the initial state and display. Turn power off by depressing the lower portion of the power switch.		
8.2.1.7.4	Cable Connections		
	Connect serial data line to the DAS computer using the modem or 1st RS-232C port.		
	Connect the hard copy unit interface cable to the 2nd RS-232C port.		
8.2.1.8	DAS Color Operator CRT-DAS 802.		
8.2.1.8.1	Repeat steps 8.2.1.7.1 through 8.2.1.7.4 and verify complete for DAS 802.		
8.2.1.9	DAS Hardcopy Unit - DAS 808		
8.2.1.9.1	Initial Preparation		
	a. Verify that all shipping restraints and packing materials have been removed prior to power up.		
	b. Verify that printer power on/off toggle switch is in the OFF position.		
	c. Verify AC power cord is connected to AC power source and that the serial communications line to the color CRT is connected.		
	d. Verify that printer paper is not installed.		

	Initial	Date
8.2.1.9.2 Power Up Procedure		
a. Set AC power switch (on left-hand side of base) to ON position. Verify power indicator illuminates.		
b. Verify that CHECK light is ON.		
c. Verify that ON LINE indicator is not lit.		
8.2.1.9.3 Operational Check		
a. Load paper per instructions in operators manual. Verify that CHECK indicator goes out.		
b. Load ribbon per instructions in operators manual if required.		
c. Depress PAPER ADVANCE pushbutton and verify that paper advances as long as button is depressed.		
d. Depress TOP OF FORM pushbutton and verify that paper advances to TOF.		
e. Depress 8 LPI pushbutton. If light was on verify that it goes out. If light was off verify that it comes on. Leave in unlighted position.		
f. Depress ON LINE pushbutton and verify that the indicator comes on.		
8.2.1.10 DAS Hard Copy Unit - DAS 809		
8.2.1.10.1 Repeat steps 8.2.1.9.1 through 8.2.1.9.3 and verify complete for DAS 809.		

		Initial	Date
8.2.2	OCS Peripherals		
8.2.2.1	Keyboard Printer (Console Device) - OCS 606 Perform steps in paragraph 8.2.1.1 for OCS 606 and verify complete.		
8.2.2.2	OCS Logger - OCS 701 Perform steps in paragraph 8.2.1.2 for OCS 701 and verify complete.		
8.2.2.3	OCS Black/White CRT Terminal - OCS 801 Perform steps in paragraph 8.2.1.5 for OCS 801 and verify complete.		
8.2.2.4	OCS Black/White CRT terminal - OCS 802. Perform steps in paragraph 8.2.1.5 for OCS 802 and verify complete.		

Initial	Date

8.3 OCS Diagnostics

8.3.1 Install a FILLABLE OBJECT PROGRAMS magnetic tape in the OCS 602 magnetic tape unit.

8.3.2 For each diagnostic description listed in the table below perform the following sequence.

a. Set the OCS 601 switches to the MT settings listed in Appendix H for the catalog number listed in the table below.

b. Perform the diagnostics per the instruction appendix indicated in the following table.

c. Verify diagnostics complete per the instructions specified.

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
J	Classic 7860 CPU Part 1	611821-001B.0		
J	Classic 7860 CPU Part 2	611821-002B.0		
J	Classic 7860 CPU Part 3	611821-003B.0		
J	Classic 7860 CPU Part 4	611821-004B.0		
K	Classic 7860 CPU Part 5	610821-005E.0		
L	Classic 7860 CPU Part 6	610821-006K.0		
M	Classic 7860 Memory	611826-001D.1		
N	Classic 7860 Fixed & FP	611821-007D.0		

		Initial	Date
8.3.3	Remove the FILLABLE OBJECT PROGRAMS magnetic tape from the OCS 602 magnetic tape unit and install a DAX and RELOCATABLE TASKS magnetic tape in the OCS 602 magnetic tape unit.		
8.3.4	For each diagnostic description listed in the following table perform the following sequence.		

a. Set the OCS 601 switches to the MT settings listed in Appendix I for the catalog number listed in the table below.

b. Perform the diagnostics per the instructions appendix indicated in the table below.

c. Verify the diagnostics complete per the instructions specified.

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
P	I/O Processor	607855-016D.0		
R	4138 Disc	607855-007E.0		
Q	4138 Dual Port Disc	607855-040C.0		
V	4806/4807 ATC/ASC Mult. Func.	607855-020B.1		
T	4828 Standard Link	607855-033C.0		
Z	MODULAR COMMUNICATIONS MACRO	607855-008C.0		

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
AA	MODULAR COMMUNICATIONS CONTROLLER	607855-009D.0		
AB	200 TPI Moving Head Disc	607855-014E.0		

8.3.5 Remove the DAX and RELOCATABLE TASKS magnetic tape from the OCS 602 magnetic tape unit and reinstall the FILLABLE OBJECT PROGRAMS magnetic tape in the OCS 602 magnetic tape unit.

8.3.6 For each diagnostic description listed in the table below perform the sequence listed in 8.3.2.

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
Y	Magnetic Tape Exercisor	600802-012J.0		
W	TTY-KSR Console Keyboard	605822-020F.0		
S	4821 (4824) High Speed Serial Link	604828-001D.0		

8.3.7 Remove the FILLABLE OBJECT PROGRAMS magnetic tape from the OCS 602 magnetic tape unit.

		Initial	Date
8.4	DAS Diagnostics		
8.4.1	Install a FILLABLE OBJECT PROGRAMS magnetic tape in the DAS 603 magnetic tape unit.		
8.4.2	For each diagnostic description listed in the table below perform the following sequence.		

a. Set the DAS 601 switches to the MT settings listed in Appendix H for the catalog number listed in the table below.

b. Perform the diagnostics per the instruction appendix indicated in the following table.

c. Verify diagnostics complete per the instructions specified.

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
J	Classic 7860 CPU Part 1	611821-001B.0		
J	Classic 7860 CPU Part 2	611821-002B.0		
J	Classic 7860 CPU Part 3	611821-003B.0		
J	Classic 7860 CPU Part 4	611821-004B.0		
K	Classic 7860 CPU Part 5	610821-005E.0		
L	Classic 7860 CPU Part 6	610821-006K.0		
M	Classic 7860 Memory	611826-001D.1		
N	Classic 7860 Fixed & FP	611821-007D.0		

	Initial	Date

8.4.3 Remove the FILLABLE OBJECT PROGRAMS magnetic tape from the DAS 603 magnetic tape unit and install a DAX and RELOCATABLE TASKS magnetic tape in the DAS 603 magnetic tape unit.

8.4.4 For each diagnostic description listed in the following table perform the following sequence.

a. Set the DAS 601 switches to the MT settings listed in Appendix I for the catalog number listed in the table below.

b. Perform the diagnostics per the instructions appendix indicated in the table below.

c. Verify the diagnostics complete per the instructions specified.

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
P	I/O Processor	607855-016D.0		
R	4138 Disc	607855-007E.0		
Q	4138 Dual Port Disc	607855-040C.0		
V	4806/4807 ATC/ASC Mult. Func.	607855-020B.1		
T	4828 Standard Link	607855-033C.0		
Z	MODULAR COMMUNICATIONS MACRO	607855-008C.0		
AA	MODULAR COMMUNICATIONS CONTROLLER	607855-009D.0		

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
X	DMP Line Printer	607855-013D.0		
U	4805 Parallel Link	607855-049A.0		

8.4.5 Remove the DAX and RELOCATABLE TASKS magnetic tape from the DAS 603 magnetic tape unit and reinstall the FILLABLE OBJECT PROGRAMS magnetic tape in the DAS 603 magnetic tape unit.

8.4.6 For each diagnostic description listed in the table below perform the sequence listed in 8.4.2

Instruction Appendix	Diagnostics Description	Catalog No.	Initial	Date
Y	Magnetic Tape Exerciser	600802-012J.0		
W	TTY-KSR Console Keyboard	605822-020F.0		
S	4821 (4824) High Speed Serial Link	604828-001D.0		

8.4.7 Remove the FILLABLE OBJECT PROGRAMS magnetic tape from the DAS 603 magnetic tape unit.

	Initial	Date

8.5 MAXNET Operating System Test

8.5.1 Install the 340 Test OCS/DAS Operating System disk pack in the DAS 607 disk unit.

8.5.2 Start OCS Operating System

a. Put operating system disc in 67 MB disc drive and turn it on. Disc is labeled "340 TEST OCS/DAS O.S."

b. Load SAL program using device address 3.

HOW TO LOAD "SAL" FROM DEVICE ADDRESS 3 ON THE CPU CONSOLE

1 - Push RUN/HALT to HALT
2 - Set data switches to #0003 (Switches 14 & 15 are one, switches 0-13 are zero)
3 - Press M CLEAR (Master clear)
4 - Press FILL
5 - Press RUN/HALT to RUN
6 - The message I.5 SAL @ XXXX should appear on the console printer.

c. Load operating system by typing from the console:

HØ6 1 16

8.5.3 Start DAS Operating System

a. This should have been done in I.1
b. Same as I.2
c. Load operating system by typing from the console:

HØ4 1 16

	Initial	Date
8.5.4 Verify HAC system is up.		
8.5.5 Checkout MAXNET links.		
a. DAS/OCS		
A) On DAS console type: BREAK //RFO LKB wait for response and verify		
b. DAS/HAC 1		
A) On DAS console type: BREAK //RFO LKC wait for response and verify		
c. DAS/HAC 2		
A) On DAS console type: BREAK //RFO LKD		
d. OCS/HAC 1		
A) On OCS console type: BREAK //RFO LKC wait for response and verify		
e. OCS/HAC 2		
A) On OCS console type: BREAK //RFO LKD wait for response and verify		

APPENDIX 10A
EXTRACT
MASTER TRACKING SYSTEM

APPENDIX 10A

MASTER TRACKING SYSTEM

Item No.	Description	Section Affected	Initial/Date

APPENDIX 10B
EXTRACT
ABNORMAL EQUIPMENT AND CIRCUITS

APPENDIX 10B

ABNORMAL EQUIPMENT AND CIRCUITS

Item No.	Description	Section Affected	Initial/Date
	None		

APPENDIX 10C
EXTRACT
ELECTRICAL PREREQUISITE TESTS

APPENDIX 10C

ELECTRICAL PREREQUISITE TESTS

Component		Generic Test Procedure No.	Test Complete Initial/Date
Number	Description		
	None		

APPENDIX 10D

EXTRACT

INSTRUMENTATION & CONTROLS
PREREQUISITE TESTS AND CALIBRATIONS

APPENDIX 10D

INSTRUMENTATION & CONTROLS
PREREQUISITE TESTS AND CALIBRATIONS

Component				Generic Test Procedure No.	Test Complete Initial/Date
Number	Description	Set Point	Field Setting		
	None				

APPENDIX 10E
EXTRACT
MECHANICAL PREREQUISITE TESTS

APPENDIX 10E

MECHANICAL PREREQUISITE TESTS

Component		Generic Test Procedure No.	Test Complete Initial/Date
Number	Description		
	None		

APPENDIX 10F

EXTRACT

INITIAL STATUS OF BREAKERS FOR TEST PROCEDURE STEP 8.1

APPENDIX 1OF
INITIAL STATUS OF BREAKERS FOR TEST PROCEDURE STEP 8.1

OCS-DAS Equipment		Position	Status	Initial/Date
Number	Description			
UPS #1 CONTL BLDG EQUIP RM CB PANEL				
CB #	OCS 605	OFF		
6	OCS 604	OFF		
7	OCS 603	OFF		
8	OCS 603	OFF		
9	OCS 602	OFF		
10	OCS 601	OFF		
TBD	OCS 701	ON		
35	OCS 801 and 802	ON		
OCS EQUIPMENT BREAKERS				
OCS 601 CB1	Main Breaker	OFF		
OCS 601 CB2	Utility Breaker	OFF		
OCS 605 CB1	Main Breaker	OFF		

APPENDIX 10F
INITIAL STATUS OF BREAKERS FOR TEST PROCEDURE STEP 8.1 (Contd)

OCS-DAS Equipment		Position	Status	Initial/Date
Number	Description			
Panel UPS #1, CONTL BLDG EQUIPMENT RM				
CIR				
1	DAS-601	OFF		
2	DAS-602	OFF		
3	DAS-603	OFF		
4	DAS-604	OFF		
5	DAS-605	OFF		
13	DAS-607	ON		
12	DAS-609	ON		
26	DAS 801 and 802	ON		
30	DAS 803 and 804	ON		
25	DAS 808 and 809	ON		
27	DAS 810 and CS 801	ON		
DAS EQUIPMENT BREAKERS				
DAS 601 CB1	Main Breaker	OFF		
DAS 601 CB2	Utility Breaker	OFF		
DAS 605 CB1	Main Breaker	OFF		
DAS 607	AC Power Breaker	OFF		
DAS 607	Power Supply Breaker	OFF		

APPENDIX 10G

EXTRACT

INITIAL STATUS OF SWITCHES FOR TEST PROCEDURE STEP 8.1

APPENDIX 10G
INITIAL STATUS OF SWITCHES FOR TEST PROCEDURE STEP 8.1

Number	Description	Position	Status	Initial/Date
OCS 601	Equipment Power Switches	OFF		
OCS 601	MNL/AUTO/DSBL Switch	DSBL		
OCS 602	Top Front Panel Power Switches	OFF		
OCS 603	Top Front Panel Power Switches	OFF		
OCS 604	Top Front Panel Power Switches	OFF		
OCS 605	Equipment Power Switches	OFF		
OCS 606	Power Switch	OFF		
OCS 701	Power Switch	OFF		
OCS 801	Power Switch	OFF		
OCS 802	Power Switch	OFF		
DAS 601	Equipment Power Switches	OFF		
DAS 601	MNL/AUTO/DSBL Switch	DSBL		
DAS 602	Top Front Panel Power Switches	OFF		
DAS 603	Top Front Panel Power Switches	OFF		
DAS 604	Top Front Panel Power Switches	OFF		
DAS 605	Equipment Power Switches	OFF		
DAS 608	Power Switch	OFF		
DAS 609	Power Switch	OFF		
DAS 801	Power Switch	OFF		
DAS 802	Power Switch	OFF		
DAS 803	Power Switch	OFF		
DAS 804	Power Switch	OFF		
DAS 808	Power Switch	OFF		
DAS 809	Power Switch	OFF		
DAS 810	Power Switch	OFF		

APPENDIX 10H

EXTRACT

FILLABLE OBJECT PROGRAMS - MAG TAPE

```
**************************************************************
*  MODCOMP II/IV/CLASSIC DIAGNOSTIC/UTILITY   650800-000 E00  *
*                                                            *
*          FILLABLE OBJECT PROGRAMS  - MAG TAPE              *
*                                    - MH4140,4139,4141      *
**************************************************************
```

SWITCH SETTINGS			CATALOG NO.	INT. ID	DUMP LIMITS IN HEX
DISC	MT				
0101	----	FILLABLE DIAG. MAINTENANCE PROGRAM	600000-0211.0	101	100-B50
0201	0004	DIAGNOSTIC APPLICATION EXEC. (DAX)	607855-000G.4	1592	300-26BE
0401	0104	STAND ALONE LINKING LOADER (SAL)	600000-012J.0	20	800-160B
0501	0204	MC II/III/7810 CPU DIAGNOSTIC-PART 1	600801-001C.1	1200	100-1300
0601	0304	MC II/III/7810 CPU DIAGNOSTIC-PART 2	600801-002C.1	1210	100-1300
0701	0404	MC II/III/7810 CPU DIAGNOSTIC-PART 3	600801-003J.1	1220	100-1F00
0901	0504	MC II/III FLOATING POINT DIAGNOSTIC	600801-005E.2	1240	200-F00
0A01	0604	MC II/III/7810 SYSTEM PROTECT DIAG.	600801-006D.0	1250	100-800
0B01	0704	MC II/IV/7810/7830 SYS. PROTECT DIAG.	602801-006F.0	1500	50-CE0
0C01	0804	MC II/III/5 MEMORY DIAGNOSTC	600826-001B	1260	100-E00
0D01	0904	MC II 32K PER PLANE MEMORY	602826-001B.2	1515	100-1000
0E01	0A04	STAND ALONE RELOCATING LOADER (SAR)	600000-014E	40	400-DB0
0F01	0B04	MC 7810 SOLID STATE MEMORY DIAG.	602826-003A.1	1517	100-1300
1001	0C04	MC IV CPU DIAGNOSTIC-PART 1	610821-001C.0	4200	300-2100
1201	0D04	MC IV CPU DIAGNOSTIC-PART 2	610821-002D.0	4210	300-2100
1401	0E04	MC IV CPU DIAGNOSTIC-PART 3	610821-003C.0	4220	300-1300
1501	0F04	MC IV CPU DIAGNOSTIC-PART 4	610821-004F.0	4230	300-1A00
1701	1004	MC IV/7830/7860 CPU DIAG-PART 5	610821-005E.0	4240	300-3B30
1A01	1104	MC IV/7830/7860 CPU DIAG-PART 6	610821-006K.0	4250	300-40F0
1D01	1204	MC IV/25/35 MEMORY DIAGNOSTIC	610826-001H.0	4280	300-201B
1F01X	1304	CLASSIC 7830/7860 FIXED & F.P. DIAG	611821-007D.0	5290	300-5A00
2301	1404	MC IV DIAGNOSTIC PANEL DIAG.	610811-011A.0	4260	300-1375
2401X	1504	CLASSIC 7830/7860 CPU DIAG-PART 1	611821-001B.0	5200	100-4900
2801X	1604	CLASSIC 7830/7860 CPU DIAG-PART 2	611821-002B.0	5210	300-4F00
2C01X	1704	CLASSIC 7830/7860 CPU DIAG-PART 3	611821-003B.0	5220	300-4930
3001X	1804	CLASSIC 7830/7860 CPU DIAG-PART 4	611821-004B.0	5230	300-4500
3301	1904	AFD INITIALIZATION	600001-004A.0	195	100-160B
3401X	1A04	CLASSIC 7830/7860 MEMORY DIAG.	611826-001D.1	5280	300-589F
3801	1B04	SHARED MEMORY DIAGNOSTIC	611826-002B.0	5281	300-3340
3A01X	1C04	CLASSIC & 782X FIXED & F.P. DIAG	611821-008B.0	5390	300-7500
3F01	1D04	AFD CI BOOT/DUMP	600000-022A.0	170	100-7FB
4001*	1E04	CARTRIDGE MHD EXERCISER	600802-011I.0	1280	100-1C53

```
**********************************************************************
*  MODCOMP II/IV/CLASSIC DIAGNOSTIC/UTILITY   650800-000 E00  *
*                                                                    *
*          FILLABLE OBJECT PROGRAMS  - MAG TAPE                      *
*                                    - MH4140,4139,4141              *
**********************************************************************
```

SWITCH SETTINGS			CATALOG NO.	INT. ID	DUMP LIMITS IN HEX
DISC	MT				
4201*	1F04	CARTRIDGE MHD EXERCISER (DEV,#3)	600802-111F	1540	100-1B00
4401*	2004	MHD C.I. BOOT/DUMP (DMP)	600000-015H,0	150	80-70A
4501*	2104	MHD INITIALIZATION	600001-002K,0	180	80-160B
4601*	2204	20 HEAD MHD EXERCISER	600802-027F,0	1370	100-1F57
4801	2304	FAST FHD EXERCISER	600802-029C,0	1390	100-2000
4A01	2404	FAST FHD CI BOOT/DUMP (DMP) (DEV#2)	600000-016C,1	160	100-400
4B01	2504	FAST FHD INITIALIZATION (DMP) (DEV#2)	600001-003L,0	190	100-160B
4C01	2604	FLOPPY DISC INITIALIZER	600000-017A,0	165	100-14D0
4D01	2704	FLOPPY DISC DIAGNOSTIC	605822-002E,1	1300	100-1F00
4F01	2804*	MAG TAPE EXERCISER	600802-012J,0	1290	300-2B00
5201	2904*	MAG TAPE BOOT/DUMP	600000-006B	110	100-450
5301	2A04	TTY-KSR CONSOLE KEYBOARD DIAG.	605822-020F,0	1305	100-125E
5401	2B04	DISC/TAPE COPY	600000-108I,0	130	100-15C9
5501	2C04	PAPER TAPE COPY/VERIFY PROGRAM	605500-001B	220	100-300
5601	2D04	PAPER TAPE READER/PUNCH DIAG.	605822-021D,1	1335	100-1100
5801	2E04	UNIVAC VIP EXERCISER	606802-128	1520	100-400
5901	2F04	X-Y PLOTTER DIAGNOSTIC	605822-022	1310	100-1100
5B01	3004	ELECTROSTATIC PRINTER/PLOTTER DIAG.	605822-001A,1	1355	100-1B00
5D01	3104	PERIPHERAL SWITCH EXERCISER	602818-001A,1	1525	100-500
5E01	3204	PERIPHERAL SELECTOR EXERCISER	607898-001B,0	1345	100-6DC
5F01	3304	SYNC/ASYNC COMM. CONTROLLER DIAG.	605824-001C,1	1405	200-2200
6101	3404	SYNC. COMM. CONT. DIAG.	605824-002A,0	1402	100-1F00
6301	3504	ASYNC COMM SYSTEM DIAG-GRP B UNIT 8/9	600804-001A	1410	200-2000
6501	3604	ASYNC COMM SYSTEM DIAG-GRP B UNIT A/B	600804-101A	1412	200-2000
6701	3704	ASYNC COMM SYSTEM DIAG-GRP B UNIT C/D	600804-201A	1414	200-2000
6901	3804	ASYNC COMM SYSTEM DIAG-GRP B UNIT E/F	600804-301A	1416	200-2000
6B01	3904	IOIS ASYNC. CHANNEL (SACI) EXER.	605814-001B,0	1510	100-751
6C01	3A04	SACI DIAGNOSTIC	605823-002	1512	100-1000
6D01	3B04	REMOTE/LOCAL IOIS EXERCISER	605813-003B,0	1546	100-18D7
6E01	3C04	INTERVAL TIMER TEST (4701)	605812-001E,0	1535	100-CC5
6F01	3D04	REMOTE/LOCAL MODACS EXERCISER	605813-002B,1	1545	100-2500
7101	3E04	ANALOG INPUT SYSTEM TEST	600802-026H,0	1330	100-FF5

```
**********************************************************************
*  MODCOMP II/IV/CLASSIC DIAGNOSTIC/UTILITY   650800-000 E00  *
*                                                                    *
*          FILLABLE OBJECT PROGRAMS  - MAG TAPE                      *
*                                    - MH4140,4139,4141              *
**********************************************************************
```

SWITCH SETTINGS			CATALOG NO.	INT. ID	DUMP LIMITS IN HEX
DISC	MT				
7201	3F04	4821 HIGH SPEED SERIAL LINK DIAG	604828-0010,0	1584	100-2416
7401	4004	INT, TIMER/PULSE ACCUM, DIAG (1108)	605823-0018,0	1537	100-19AA

NOTE: *THE HALT AFTER LOAD OPTION SHOULD BE USED TO PREVENT OVER-WRITING THE FILLABLE DIAGNOSTIC MEDIA.
TO HALT AFTER LOAD - MC,FILL,CSW 8=1,RUN
WHEN FILLING FROM MAG TAPE ALL PROGRAMS HALT AT #20
WHEN FILLING FROM MH4140,4139,4141 ALL PROGRAMS HALT AT #28
EXCEPT AS NOTED BY "X", THE "X" PROGRAMS HALT AT #55

APPENDIX 10I
EXTRACT
DAX AND RELOCATABLE TASKS - MAG TAPE

```
*****************************************************************
*  MODCOMP II/IV/CLASSIC DIAGNOSTIC UTILITY   650800-000 E00   *
*                                                               *
*         DAX AND RELOCATABLE TASKS  - MAG TAPE                 *
*                                    - MH4140                   *
*****************************************************************
```

SWITCH SETTINGS			CATALOG NO.	INT. ID	DUMP LIMITS IN HEX
DISC	MT				
0201	0004	DIAGNOSTIC APPLICATION EXEC. (DAX)	607855-000G.4	1592	300-26BE

DISC TRAK	MT FILE	** RELOCATABLE TASKS **	CATALOG NO.	INT. ID
324*	2*	CLASSIC 7830/7860 FIXED & F.P. DIAG	611851-007D.0	5291
246*	3*	CLASSIC & 782X FIXED & F.P. DIAG	611851-008B.0	5391
240*	4*	MODEL 3517 F.P. SIMULATION TASK	611851-009A.0	5392
342*	5*	I/O PROCESSOR DIAGNOSTIC	607855-016D.0	1604
390*	6*	CARTRIDGE MOVING HEAD DISC DIAG.	607855-006D.0	1596
382*	7*	200 TPI MOVING HEAD DISC DIAGNOSTIC	607855-014E.0	1602
366*	8*	4138 DISC DIAGNOSTIC	607855-007E.0	1607
258*	9*	4138 DUAL PORT	607855-040C.0	1640
294*	10*	CLASSIC 4176 MHD DIAG-SINGLE PORT	607855-041A.0	1641
288*	11*	CLASSIC 4176 MHD DIAG-DUAL PORT	607855-042A.0	1642
346*	12*	CARD READER DIAGNOSTIC	607855-012D.0	1600
398*	13*	LINE PRINTER DIAGNOSTIC	607855-013D.0	1601
372*	14*	PAPER PUNCH TASK	607855-021A.0	1621
314*	15*	MODACS III CONTROLLER DIAG	607855-030C.0	1630
282*	16*	MODACS III DIGITAL DIAG	607855-031B.0	1631
310*	17*	MODACS III ANALOG DIAG	607855-032D.0	1632
302*	18*	STANDARD LINK DIAG	607855-033C.0	1633
374*	19*	ATC/AMC/MULTIFUNCTION ASYNC DIAG	607855-020B.1	1620
330*	20*	MULTIFUNCTION DIAG	607855-022B.0	1622
270*	21*	QCIC	607855-044A.0	1644
262*	22*	ASYNC FLOPPY DISC DIAG	607855-046B.0	1646
318*	23*	4805-X/4820 PARALLEL LINK	607855-049A.0	1649
386*	24*	MODULAR COMMUNICATIONS MACRO DIAGNOSTIC	607855-008C.0	1597
358*	25*	MODULAR COMMUNICATIONS CONTROLLER DIAG. (#1907)	607855-009D.0	1598
338*	26*	WIDE RANGE SOLID STATE AIS DIAGNOSTIC	607855-017B.0	1617
354*	27*	MODACS/REMACS WRR AIS REMOTE/LOCAL DIAG.	607855-018B	1608
350*	28*	MODACS AMP/ADC PER CHANNEL REMOTE/LOCAL DIAG.	607855-019A	1609
334*	29*	MEMORY + DIAGNOSTIC	607855-015B.2	1615
394*	30*	MC IV FLOATING POINT DIAG	610821-009C.2	4290
402*	31*	MODCOMP/IBM 1950 CHANNEL INTERFACE DIAGNOSTIC	602828-002B	1518

*** NOTES ***

*NOTE: THESE PROGRAMS ARE IN RELOCATABLE OBJECT FORMAT
AND MUST BE EXECUTED UNDER CONTROL OF THE DIAGNOSTICS
APPLICATIONS EXECUTIVE (DAX)
DAX IS THE FIRST PROGRAM ON THE RELOC. TAPE.

IF LOADING FROM DISC:

A. SET CONTROL SWITCHES EQUAL #0201
B. MASTER CLEAR
C. FILL
D. SET CONTROL SWITCH 8. SWITCHES = #0281
E. RUN
F. WILL HALT ON LOAD COMPLETE
G. RESET ALL CONTROL SWITCHES, SET CONTROL SWITCH 5. SWITCHES = #0400
H. ROCK HALT/RUN SWITCH
I. THE DAX ID MESSAGE WILL BE PRINTED, FOLLOWED BY "??"
J. TYPE IN: "LDEV=MH,TRAK=XXX,LOAD." (PERIOD MUST BE INCLUDED)
WHERE XXX = SPECIFEID TRACK NUMBER

IF LOADING FROM RELOCATABLE MAG TAPE:

A. SET CONTROL SWITCHES EQUAL #0004
B. MASTER CLEAR
C. FILL
D. SET CONTROL SWITCH 8. SWITCHES = #0084
E. RUN
F. WILL HALT ON LOAD COMPLETE
G. RESET ALL CONTROL SWITCHES, SET CONTROL SWITCH 5. SWITCHES = #0400
H. ROCK HALT/RUN SWITCH
I. THE DAX ID MESSAGE WILL BE PRINTED, FOLLOWED BY "??"
J. TYPE IN: "LDEV=MT,FILE=XX,LOAD." (PERIOD MUST BE INCLUDED)
WHERE XX = SPECIFIED TRACK NUMBER

APPENDIX 10J

EXTRACT

MODCOMP CLASSIC 7860/7830 CENTRAL PROCESSOR
DIAGNOSTICS PARTS 1, 2, 3, AND 4

MODCOMP CLASSIC 7860/7830 CENTRAL PROCESSOR

DIAGNOSTIC MANUAL

MODCOMP CLASSIC 7860/7830 CENTRAL PROCESSOR DIAGNOSTIC

Parts 1, 2, 3, and 4

April 27, 1979

Publication Number: 220-140000-003, Chapter 1
Product Number & Rev. No.: 611821-001, 002, 003, 004B.0
Modular Computer Systems, Inc.
1650 W. McNab Road
Fort Lauderdale, Florida 33309

PROGRAM STRUCTURE

LOAD/START PROCEDURE

Loading from the moving-head disc using the standard diagnostic pack is accomplished by: halting the processor, setting control switches 0-15 for the track and device address of the program to be loaded, setting CSW 8, and then using the normal Master Clear, Fill, Run sequence. Using CSW 8 should halt the processor before starting execution of the diagnostic. Set the desired control switches for program execution as defined in the following section and rock the RUN/HALT switch. This starts program execution.

Loading from paper tape is accomplished by using the Select device address #A in console switches, Master Clear, Fill, Run sequence. A halt should occur at #28 for a normal load. Otherwise a checksum error, device problem, or processor problem has prevented a successful load. Instructions used by the paper tape loader are:

LDM, HOP, LBR, LDS, STS, ADR, ISA, TBRB, IDA, MBL, ORR, ABRB, LDI, OCA, TRRB.

Program execution begins at #100 for Part 1 and #300 for Parts 2,3 and 4. Part 1 starts execution of a basic subset of instruction required for the error reporter. This is executed twice - in pipeline mode and in non-pipeline mode. This area is subsequently overlayed with map information and can not be re-executed after the startup message is displayed. Warm starts of Parts 1, 2, 3, and 4 require only a Master Clear once the startup message has been displayed. Parts 2, 3, and 4 cold start at location #300 and Part 1 at location #7D9.

During Part 1 basic instruction test CSW 4 can be used to halt before instruction.

CPU identification is done issuing a Master Clear to device zero and examining resulting status. Program identification is displayed and followed by processor type 786X or 783X. If the status was not correct an error message is printed and the processor type is defaulted to 786X. Memory sizing is done by using LDAM/STAM to write and compare on 16K boundaries and a map of available 16K fields is created. A reproducible psuedo-random pattern is written to memory to allow the operator to duplicate a sequence of tests and events leading to a failure. This should clear memory of parity errors from powerup or from previous data. A short delay (up to 10 seconds) after printout of the memory size is to be expected if the machine is configured with large amounts of memory. The EMA indicators on the Control Panel should indicate changing WADS of addressing if the PANEL is enabled. When the initialization of memory is completed a "??" will be printed. The diagnostic is now ready to execute. There are a number of options, directives, and controls available to the operator.

CONTROL SWITCH DEFINITIONS

CSW 0 ON — PRINT CSW DEFINITIONS/INHIBIT MILESTONE MESSAGES

Immediately following program load, the control switch definitions will be printed. At all other times this switch inhibits milestone messages including title messages and pass complete. Error messages will not be affected by this switch.

OFF — DO NOT PRINT CSW DEFINITIONS/PRINT MILESTONE MESSAGES.

CSW 1 ON — LOOP CURRENT TEST

Loop current test, test results and report errors as detected.

OFF — DO NOT LOOP CURRENT TEST

CSW 2 ON — INHIBIT ERROR MESSAGES

Inhibit printing all error messages or the console. Milestone messages will not be affected.

OFF — PERMIT ERROR MESSAGES

CSW 3 ON — HALT ON ERROR

Program will halt on error after typing appropriate error messages. The user may then set control switches to loop the test sequence for trouble shooting.

OFF — DO NOT HALT ON ERROR

CSW 4 ON — HALT BEFORE TEST

Program will halt prior to executing the test.

OFF — DO NOT HALT BEFORE TEST

CSW 5 — NOT USED

CSW 6 ON — LOOP SIMULATION

Loop simulation and all subtests whenever applicable. Note: CSW 11 must be reset.

OFF — DO NOT LOOP SIMULATION

CSW 7 ON LOOP DIAGNOSTIC

After each pass complete all tests will be repeated.

OFF DO NOT LOOP DIAGNOSTIC

CSW 8 ON NOT USED

CSW 9 ON RUN DIAGNOSTIC IN VIRTUAL MODE

The program will enter virtual mode before the beginning of any test.

OFF EXIT VIRTUAL MODE

The diagnostic will exit virtual mode at end of test unless relocated above WAD 0. Do not set or reset CSW 9 during test execution. Change this switch at pass complete.

CSW 10 ON HALT BEFORE INSTRUCTION

The program will HALT before the instruction under test.

OFF DO NOT HALT BEFORE INSTRUCTIONS

CSW 11 ON LOOP OPERAND

The program will enter a short-loop mode executing and comparing the instruction under test.

OFF DO NOT LOOP OPERAND

CSW 12 ON BELL ON ERROR

Program will ring the TTY or CRT bell on every error.

OFF NO BELL ON ERROR

CSW 13 ON INHIBIT REAL-TIME CLOCK

The real-time clock interrupt enable will be disabled.

OFF ENABLE ON REAL-TIME CLOCK

The real-time clock will interrupt every 5 milliseconds.

CSW 14 NOT USED

CSW 15 NOT USED

OPTION WORD DEFINITIONS

OPT 0 ON RELOCATION MODE

OFF DISABLE RELOCATION MODE

Relocation mode allows the program to relocate to the field specified by the FLD directive or by using the loop diagnostic control (CSW 7) to automatically relocate to the next available field (wraps to field zero at end of memory) at pass complete. Non-virtual fields are limited to fields 0-3. Current relocation bias can be displayed by the BIAS directive. Use of FLD directive changes FIELD at "AT", "T>" or "XT/" time.

OPT 1 ON SPLIT MAP MODE

The operand map is a full-access map. The instruction map is a full-access map for the area of memory occupied by the Control Section and the Test Section. All other areas of the instruction map have no access rights as these areas are used for operands.

OFF FULL ACCESS MAPPING

OPT 2 ON LINE PRINTER

The line printer will be the output device (DATA PRINTER OR CENTRONICS). No messages are sent to the terminal.

OPT 3 ON ENTER PIPELINE MODE

OFF NORMAL PROGRAMMED PIPELINE MODES

If OPT 9 is also ON, the default normal programmed pipeline mode is used to resolve the conflicting option and modes alternate at pass complete.

OPT 4 ON TRACE ON

Level 15 is activated and each instruction is traced and stored in locations "LASTI" (Last PR) and "NLAST" (Previous to each PR). To trace a defined area the "TR" directive must be executed.

OFF TRACE OFF

OPT 5 NOT USED

OPT 6 ON NETWORK

Transfer control to a network configuratior.

OFF NO NETWORK

OPT 7 ON QUICK SCAN MODE

Approximately 4K to 8K of operands are tested in quick scan mode.

OFF FULL SCAN MODE

OPT 8 ON GENTLE OPERANDS

Only gentle operands will be executed.

OFF ALL OPERANDS

OPT 9 ON INHIBIT PIPELINE MODE

OFF NORMAL PROGRAMMED PIPELINE MODES

Refer to OPT 3. When both are set the cefault normal programmed pipeline modes are used and modes alternate at pass complete.

OPT 10 ON CONTEXT SWITCHING MODE

OFF REGISTER BLOCK ZERO

In virtual mode, context s.itches are executed by the clock interrupt entry. If negative blocks other than zero are to be used this optien must be enabled in virtual mode. CSW 13 should be reset allowing clock interrupt. In context switching mode at pass complete or during execution of a RB directive the testing register block will be changed. The clock interrupt entry register block will remain at zero. When the program level or testing register block is non-zero, registers 1-14 of register block zero are set at zero and all checked at each clock interrupt to check interrupt entry register block selection and switching. Register blocks 0-16 are used as program register block and the current register is incremented on pass complete.

OPT 11 ON INHIBIT EXTENDED TESTS

OFF EXECUTE EXTENDED TESTS

This option is not valid for 7830.

OPT 12 ON INHIBIT NORMAL TESTS

OFF EXECUTE NORMAL TESTS

If used on a 7830 processor, will cause all testing to be bypassed.

OPT 13 NOT USED

OPT 14 NOT USED

OPT 15 ON INHIBIT TRACE OF GENERAL PURPOSE REGISTERS

With OPT 15 ON the general purpose registers will not be displayed on the console device during a trace.

OFF TRACE GENERAL PURPOSE REGISTERS

INFORMATIONAL MESSAGES

Each part will identify itself as follows:

```
MODCOMP 7860/7830 CPU DIAGNOSTIC PART 1
CAT. NO. 611821-001 REV X.Y (DATE)"

MODCOMP 7860/7830 CPU DIAGNOSTIC PART 2
CAT. NO. 611821-002 REV X.Y (DATE)"

MODCOMP 7860/7830 CPU DIAGNOSTIC PART 3
CAT. NO. 611821-003 REV X.Y (DATE)"

MODCOMP 7860/7830 CPU DIAGNOSTIC PART 4
CAT. NO. 611821-004 REV X.Y (DATE)"
```

Each will also print:

```
"(16K) FIELDS AVAILABLE"
"FIELDS: 1 2 3 4 "
"64K"
```

which indicates the 16K fields available, and the total memcry according to the number of fields.

```
Then:  "IF YOU NEED PROMPTING TYPE "HELP". OTHERWISE SET
       SWITCH SENSE AND OPTIONS AND TYPE "AT."
       ??"
```

Now the program is ready for input.

After each test complete, the message "END TEST=XX" will be printed. After all tests have completed the normal addressing, then the message

```
"EXTENDED ADDRESSING."

FIELD:   TEST COMPLETE
  0        a   d   f   j
  1        a   d   f   j
  2        a   d   f   j
```

will be printed, and extended addressing is tested. Starting with (16K) field zero, all the tests that will execute in extended addressing will be tested. At the end of the test the test number "a" or "d" or "f" will be displayed.

This display will occur for each available (16K) field.

Each part will also print at pass complete

"PASS n COMPLETE ON FIELD m WAD x START TEST #ZZZZ

IM=e OM=s

Where "n" is the pass count "m" is the (16K) field, "x" is the 64K block where the program was executing.

"x" concatenated with "ZZZZ" will provide the actual address of the first test.

"e" and "s" are the actual instruction and operand maps that the program was using. This is valid during virtual mode only.

If a power fail occurred during this pass, a message will be printed

"A POWER FAIL OCCURRED DURING THIS PASS"

After a directive the message "KEY ERROR" can be displayed on the console device followed by the directive that was typed.

EXAMPLE: "CSW =# BLORCH"
KEY ERROR
CSW=#BLORCH"

Meaning that the CSW cannot accept the value "BLORCH".

The message: "INPUT BUFFER OVERFLOW" will be displayed when a directive uses more than 80 characters.

APPENDIX 10K

EXTRACT

MODCOMP IV/MODCOMP CLASSIC CENTRAL PROCESSOR DIAGNOSTICS PART 5

MODCOMP CLASSIC CENTRAL PROCESSOR

DIAGNOSTIC MANUAL

MODCOMP IV/MODCOMP CLASSIC CENTRAL PROCESSOR DIAGNOSTIC

PART 5

This chapter is also located in the following manual:
220-110000-003, Chapter 3 MODCOMP IV 20/25/35
CENTRAL PROCESSOR, D.M.

April 26, 1979

Publication Number: 220-140000-003, Chapter 2
Product Number & Revision: 610821-005E.0
Modular Computer Systems, Inc.
1650 West McNab Road, Fort Lauderdale, FL 33309

3. Interrupt instructions: SIA, SIE, SIR, RIA, RIE, RIR, CIR, CAR.

4. The frequency of the real-time clock in memory cycles.

5. All program-status word fields, program-status instructions: SCRB, LCPS.

6. The REX instruction (#2300-#23FF).

7. The Execute Register Instruction (EXR) with a single-word and a double-word instruction.

8. System protect violations of all privileged instructions in non-privileged mode.

9. The stack-flush mechanism for both non-pipelire and pipeline modes (MODCOMP CLASSIC only).

10. The I/O configuration by device address.

11. The number of memory cycles that power fail allcwed.

12. The PUSH/PULL instructions: PSM & PLM for all cases.

13. Optionally (CSW 13), the Execute Register Instruction will be executed during the dynamic (directive) tests for all PUSH/PULL and INTERRUPT instructions uncer test.

CONTROL SWITCH DEFINITIONS

CSW 0 ON PRINT CSW DEFINITIONS/INHIBIT MILESTONE MESSAGES

CSW 1 ON LOOP CURRENT TEST

CSW 2 ON INHIBIT ERROR MESSAGES

CSW 3 ON HALT ON ERROR

CSW 4 ON HALT BEFORE TEST

CSW 5 ON OPERATOR INPUT OF DIRECTIVES
This switch will cause ?? to be printed at end of present sequence, and operator may now enter a directive sequence on the console device.

CSW 6 ON BYPASS MEMORY SIZING ROUTINE (MODCOMP IV ONLY)
This is to be used when the LDAM instruction which is used in this routine fails. LDAM is tested in PART VI.

CSW 7 ON LOOP DIAGNOSTIC

OFF REQUEST "??" ON PASS COMPLETE

CSW 8 ON SAVE INTERRUPT VECTORS ON M.C.
Interrupt flags are saved upon MASTER CLEAR, allowing interrogation

OFF RESTORE INTERRUPT VECTORS
Interrupt vectors are initialized normally on M.C.

CSW 9 ON RUN DIAGNOSTIC IN VIRTUAL MODE
When set, virtual mode will be entered at the beginning of the next pass.

CSW 10 ON HALT BEFORE INSTRUCTION
Halt before instruction under test.

CSW 11 ON LOOP OPERANDS
Current operand will be looped during static tests.

CSW 12 ON MASTER CLEAR RESTART DIRECTIVE SEQUENCE
The previous directive sequence will be executed directly following a MASTER CLEAR. Also called "super kludge."

CSW 13 ON EXECUTE TEST INSTRUCTIONS VIA EXECUTE REGISTER
All INTERRUPT directive test instructions will be executed in a register by the EXR instructions.

CSW 14 ON ALLOW OPERATOR INPUT WINDOW
The operator may enter any key during the delay between lines and regain control via "??."

OFF IGNORE OPERATOR INPUT WINDOW
The delay between lines of output is inhibited, increasing typeout speed.

CSW 15 ON BYPASS CONDITION CODE TESTING

OFF REPORT CONDITION CODE FAILURES

LOAD/START PROCEDURE

Load via the standard MODCOMP FILL Procedure. The program will HALT following a successful load. Rock the RUN/HALT switch to start program execution. If CSW 0 is set at initial program start, the control switch definitions will be printed (Reset CSW 0 while definitions are being printed).

PROGRAM STARTUP

The program initially begins execution at location #300. A Master Clear Restart is stored at locations #0001 and #0002. Locations #20-#3F and #80-#FF are initialized with an address in address. Locations #40-#7F are initialized with zeros.

CENTRAL PROCESSOR TYPE

The CPU TYPE is tested via a master clear to device zero, followed by an input of device status. The following status bits determine the CPU TYPE:

DEVICE 0 STATUS			
BIT 0	BIT 2	BIT 3	CPU TYPE
0	0	X	IV/25
1	0	X	IV/35
X	1	0	7830
X	1	1	7860
			"CLASSIC"

Having determined the CPU TYPE, a memory location FLAG45 is set up to indicate throughout testing which CPU TYPE is present. Bit 4, 5, or 6 is used to indicate, respectively, IV, 7860, or 7830.

MEMORY SIZING

If the CPU TYPE is a MODCOMP IV, the "LDAM" instruction is executed repeatedly for 32 clock ticks for each page of memory, (from high page to low page). Memory stalls will result in fewer "LDAM" instruction executions when memory is not present. This is a non-destructive form of sizing.

If the CPU TYPE is either 7860 or 7830, memory is sized as follows: beginning with the maximum addressable module, the program samples each successive memory plane status register's "power on" bit. If a module has power on, the program begins an "address in address" test, beginning at the first free location following the diagnostic up to the top address in the high order memory module, reporting any descrepancies. If the module sampled did not have its "power on" bit set, the program samples successive modules, until one is found, (if any), and that module found becomes the highest module tested.

In the case of a 7830 or 7860, after memory sizing is complete, the following startup message is printed:

PROGRAM INITIALIZATION

MEMORY SIZING ADR IN ADR TEST

MAX PAGES EXPECTED = xxxx

MAX PAGES TESTED = xxxx

yyyy K MODCOMP IV/V CPU

INTERRUPT/REGISTER BLOCK/PUSH-PULL DIAG ON xxxx PAGE MC 783X

CAT NO. 610821-005 (PART 5) REV E.0

The value printed for xxxx is the decimal number of memory pages, for example, a 64K 7830 would have 256 decimal pages. The program determines the highest memory module by testing the plane status register and reports "MAX PAGES EXPECTED"; then the program sizes memory, writing address in address throughout memory. The final value "MAX PAGES TESTED" should correspond with "MAX PAGES EXPECTED".

The value for yyyy is the decimal amount of memory in Kilo words.

In the case of a MODCOMP IV, after non-destructive memory sizing is complete, the following startup message is printed:

yyyy K MODCOMP IV/V CPU

INTERRUPT/REGISTER/PUSH-PULL DIAG ON xxxx PAGE MC IV

CAT NO. 610821-005 (PART 5) REV E.0

From this point, automatic testing will begin.

METHOD OF USAGE

Initially upon loading one pass of the non-directive tests will be executed allowing identification of any spurious, floating, or repetitive interrupt request latches (This is required for the correct functioning of interrupt directives). At the end of each pass, CSW 7 is interrogated. If set, the diagnostic tests will be repeated until the switch is reset or CSW 5 (operator input) is set. When the program responds with "??", the operator may optionally set the CSW's and enter a directive sequence, or "AT." for automatic tests. MASTER CLEARING the computer will immediately stop any testing and gain operator control ("??").

As each INLINE TEST is performed (if CSW 0 is reset), the test number and its function is printed as follows:

INLINE TEST 1 REGISTER BLOCK SELECTION

Similarly, as a DIRECTIVE TEST is performed, (if CSW 0 is reset), the test number and its function is printed as follows:

DIRECTIVE TEST 6 INTERRUPT VECTOR TEST

During any test or directive sequence, error messages will be reported unless CSW 2 = ON. CSW 0 = ON will inhibit pass complete messages (but not pass counting) and the operator input request message "??".

NOTE: If CSW 1 = ON, the inline test numbers and its function will be displayed for each loop through the test. This is not the case, however, for the directive tests, where the directive test number and its function is displayed only on the first execution.

It is suggested that the CSW 13 function be used after one or two successful pass completes have occurred. This function causes an EXR (execute register) instruction to execute every test instruction therefore verifying the integrity of the EXR instruction.

DIRECTIVE PROCESSOR

The "directive" tests are written in a diagnostic language hereafter referred to as simply "directives". An interpretive processor is assembled with the program and provides the capability to "interpret" directive strings.

The program accepts directives (ASCII character strings delimited with commas and terminated with a period) which are either input externally as user generated test sequences or gererated internally as part of the automatic tests. External directive input may come from the console keyboard/printer when the program has requested it by "??". These directives are used to generate a calling sequence to program subroutines.

APPENDIX 10L

EXTRACT

MODCOMP IV/MODCOMP CLASSIC 7860/7830 CENTRAL PROCESSOR
DIAGNOSTIC PART 6

MODCOMP CLASSIC CENTRAL PROCESSOR

DIAGNOSTIC MANUAL

MODCOMP IV/MODCOMP CLASSIC 7860/7830 CENTRAL PROCESSOR DIAGNOSTIC

PART 6

This chapter is also located in this manual:
220-110000-003, Chapter 4 MODCOMP IV 20/25/35 CENTRAL PROCESSOR, D. M.

April 16, 1980

Publication Number: 220-140000-003, Chapter 3
Product Number & Revision: 610821-006K.0
Modular Computer Systems, Inc.
1650 W. McNab Road, Fort Lauderdale, Florida, 33309

DAX (DIAGNOSTICS APPLICATIONS EXECUTIVE)

This program runs as a task under the Diagnostic Applications Executive (DAX) and is the only task. In contrast to other DAX tasks, this program has been assembled with DAX and is loaded as a single object program. Since this program must be the only task, the LOAD, RELD, and LDEV DAX directives have been deleted. For a description of DAX, refer to publications 220-102100-003, 220-110000-003, 220-140000-003, or 220-607855-004. Since a "frozen revision" of DAX is used not all improvements to DAX will be available.

PROGRAM LOADING

This program is loaded via the standard MODCOMP FILL procedure. Place the object program in the load device, depress MASTER CLEAR, set the load device address in the control switches, depress FILL, RUN.

EXECUTION TIME

Execution time varies proportionately to the number of fields present. All tests in field one (NON VIRTUAL) will take approximately 3 1/2 minutes. After it goes into virtual mode, it will take approximately 30 - 40 seconds for each field.

Approximate execution times, in minutes for one pass, are as follows:

MEMORY	MODCOMP IV		MODCOMP CLASSIC 7860	
SIZE WDS	NON-VIRTUAL	VIRTUAL	NON-VIRTUAL	VIRTUAL
64K	6	2 1/2	4	2
128K	8 1/2	5	6	4
512K	12.5	9	10	8
2M			35	32

START UP PROCEDURE

Before the task's ID message is printed, DAX will print a task ID as follows:

```
CPE (1)    (Since this task is a stand-alone task of DAX, the
            ID number is always 1.)
```

Next, the ID message will print:

```
MODCOMP IV
CPU DIAGNOSTIC CATALOG NUMBER 610821-006 (PART 6)
REV X.Y (DATE)
```

Now it is desired to figure out how much memory is available; in order to do this we have to use the "LDAM" instruction; which has not been tested yet. Now an "LDAM" test (Test 0) will be executed which partially checks the "LDAM" instruction. This test will only be executed once at startup time.

Now it will define the maximum memory address of the machine under test.

```
XXXK
```

After the ID message is printed another message will print. This will define the memory present as follows:

```
e.g.
FIELDS
0,1,2,3,
8,9,10,11,12,13,14,15
```

This message will define the number and positions of fields present (Field = 16K) and any missing numbers are holes in memory or non-existent memory. The above example would define a system with a maximum address of 256K with 64K memory, a 64K hole, and another 128K memory. Since it is possible to have 128K private memory and some shared memory without a hole in memory the software cannot determine if there is shared memory.

After the FIELD message is typed, the following will be typed.

```
ALL FLDS VOLATILE. TYPE DFLD/X/Y/Z,AT. TO DELETE FLD(S)
OR TYPE AT. TO TEST ALL FLDS.
?
```

It is now the operator's responsibility to start testing by either deleting fields and doing auto-tests or doing auto-tests on all memory.

To bypass the field interrogation message, set CSW 12 and CSW 5 upon loading diagnostic. Operator input will be requested; auto-tests will not start. To display control switch functions use the 'DCSW?' directive.

SPECIAL ERROR ROUTINE

Whenever an error is encountered by a directive, the directive name, test number (if auto-tests), and all parameters used will be printed as the first line of the error message. The following would be a possible error message of the SCRB directive executed under AT (auto- tests).

```
T/1, SCRB, RB=X
RB FAILED TO SELECT: EXP=X; REC=Y
```

METHOD OF TESTING

If CSW12 is set upon initial start up of diagnostic, auto-tests will start immeditely. Otherwise, operator intervention will be necessary as explained in START UP PROCEDURE.

This diagnostic is just under 16K in size. This means that at sometime due to Revisions, program size may go over 16K. The affect is that Field 1 becomes the lowest possible field. And fields 4,8, 12 etc. are omitted from the normal flow of testing. (Because of program design) However, accesses are made to those fields to determine if they are present and working.

The following is a sample of how the program would test a machine with 64K memory, a 64K hole, and 64K memory. No fields have been deleted.

FIELD	WAD	FPGE	MXPG	TESTS	EXECUTED
0	0	3F	3F	1-18	
1	0	40	7F	1-21	1-18 Non-virtual 19-21 virtual mode
2	0	80	BF	3-21	virtual
3	0	CC	FF	3-21	virtual
8	2	3F	3F	3-21	virtual
9	2	40	7F	3-21	virtual
10	2	80	BF	3-21	virtual
11	2	C0	FF	3-21	virtual

The WAD parameter is added to the FPGE and MXPG parameters which causes testing in upper core.

After the above is complete, PASS XX COMPLETE will print. If CSW 7 is set, the diagnostic will loop.

CONTROL SWITCH DEFINITIONS

CSW 0	ON	INHIBIT MILESTONE MESSAGES
CSW 1	ON	LOOP CURRENT TEST. Loop current test, test results and report errors as detected.
CSW 2	ON	INHIBIT ERROR MESSAGES. Inhibit printing all error messages on the console. Milestone messages will not be affected.
	OFF	PRINT ERROR MESSAGES
CSW 3	ON	HALT ON ERROR. Program will halt on error after typing appropriate error messages. The user may then set control switches to loop the test sequence for trouble-shooting.
	OFF	INHIBIT HALT ON ERROR
CSW 4	ON	MULTI PROCESSORS. This switch should be set if more than one processor shares the same memory.
CSW 5	ON	OPERATOR INPUT FROM KEYBOARD. The requesting task will print it's ID message and wait for input.
	OFF	CONTINUE IN AUTOMATIC TESTING
CSW 7	ON	LOOP DIAGNOSTIC
	OFF	HALT ON PASS COMPLETE
CSW 8	ON	WILL NOT TYPE TEST NUMBERS
	OFF	WILL TYPE TEST NUMBERS
CSW 10	ON	HALT BEFORE INSTRUCTION
	OFF	NO HALT
CSW 11	ON	LOOP OPERAND. Current operand will be looped.
CSW 12	ON	BYPASS OPERATOR INTERROGATION. See Start-up Procedure in this manual.

CSw 13	ON	INHIBIT REAL-TIME CLOCK INTERRUPTS
	OFF	ALLOW REAL-TIME CLOCK INTERRUPTS
CSW 14	ON	INHIBIT INTERRUPT WINDOW CHECKING. This will bypass the checking of the interrupts allowed by some of the Memory Management Instructions.
	OFF	NO FUNCTION
CSW 15	ON	INHIBIT THE PRINTING OF CONDITION CODE ERRORS
	OFF	NO FUNCTION

APPENDIX 10M

EXTRACT

MODCOMP CLASSIC MEMORY DIAGNOSTIC

MODCOMP CLASSIC CENTRAL PROCESSOR

DIAGNOSTIC MANUAL

MODCOMP CLASSIC MEMORY DIAGNOSTIC

June 27, 1980

Publication Number: 220-140000-003, Chapter 4
Product Number & Revision No: 611826-0010.0
Modular Computer Systems, Inc.
1650 W. McNab Road, Fort Lauderdale, Florida, 33309

CONFIGURATION

HARDWARE

- o MODCOMP CLASSIC Central Processor (Except 7810 models) with Memory Management
- o Minimum 65K words of memory
- o Binary input device
- o Console device

SOFTWARE

A fillable binary image of this program is the only software needed. A self-contained core image bootstrap loader (Catalog Number: 601000-001) is used to load the program.

CONSOLE SWITCH DEFINITIONS

The console switches alter program execution as defined below. The definitions will be printed at startup time if CSW 0 is ON or by the DAX directive PCSW.

0 = Inhibit Information Message
1 = Loop On Current Test
2 = Inhibit Error Messages
3 = Halt On Error
4 = Halt Before Test
5 = Loop on operator input
6 = Do Not Relocate Program
7 = Loop Diagnostic
8 = Print Short Version Messages
9 = Do Not Enter Virtual Mode
10 = Not Used
11 = Not Used
12 = Bell On Error
13 = Clock Off
14 = Cycle Last Error Path
15 = Cycle Last Subtest

LOAD/START PROCEDURE

The program is loaded using the standard MODCOMP CLASSIC FILL procedure. Enter the device address into the console switches, master clear, fill, and run. Further instructions will be displayed on the console device.

PROGRAM EXECUTION

INITIAL PROGRAM LOAD

When the program is initially loaded, it will ask for the console switches to be set before program start up. If CSW 0 is set, the console switch definitions will be printed on the console device.

PROGRAM STARTUP

After the initial operator enquiry is satisfied, the program will determine the memory available on the system and print this information on the console device. The memory available is determined from the contents of Plane Status Register zero on each module.

The program will then output the following message:

RUN STANDARD TESTS? (Y,N,ALL,LIST).

The following are the applicable replys:

A. or ALL.	Run all available tests on all modules.
L. or LIST.	Print a list of available tests.
Y. or YES.	Run standard tests on all modules.
N. or NO.	Used to specify certain tests to be run on certain modules (see the following examples)
.(PERIOD)	Will cause previous test parameters to be used in this test run. Will function the same as "Yes" immediately following an initial program load.

One of the letters A,L,Y,N, or Period is required as the first character in the reply. The following parameters are optional and if used, must follow one of the required characters.

C = CHIP	X=0-7 and denotes one of the 8 rows of 4K words on a 32K module or 16K words on a 128K module. On a dual 32K module, this parameter is limited to 16K words in rows 0 or 1. On a Dual 64K model, this parameter is 0 and 1 for chip row 0 and 3 and 4 for chip row 1 as each test one unique 16K section of the chip.
M = MODULE	XX=0-7 to denote one of the modules to be tested 60-67 for MPI 6, 70-77 for MPI 7.
T = TEST	XX = a test number from 01-41.
D = DELETE	XX = a test number from 01-41 that is to be removed from the standard test list for this run.

```
Y CX  MX,X TXX,XX  DXX.  (ALL fields are optional, any order)
  |    |      |     |
  |    |      |     *--- Do not run these standard tests
  |    |      *--------- Add these tests to standard tests
  |    *---------------- Test only these modules
  *--------------------- Run tests on this chip row only

N CX  MX,X,X  TXX,XX,XX. (All fields are optional, any order)
  |     |         |
  |     |         *----- Run only these tests
  |     *--------------- Test only these modules
  *------------------- Test this chip row only
```

EXAMPLES:

Y C1 M1 T30 D26. will decode as follows:

Run all standard tests with the addition of test 30, deleting test 26. Test chip row 1 on module 1. If no "M" is entered, then all available modules are tested. If no "C" is entered, then all chips are tested.

N M0,60,61 T01,05,07. will decode as follows:

Do not run standard tests. Run tests 1, 5 and 7 on modules (MPI) 0, 60 and 61. Test only chip row 2 on these modules.

NOTE: A particular test will only run on the memory it is designed for (core or Solid State). Also when including a chip row, specify only one chip row on only one module.

Reply Delimiters

The characters comma and space are used as delimiters. The delimiters may be omitted if the following conventions are followed:

MXX - Two characters specify a module. M3,2 specifies modules 3 and 2.

TXX - Two characters specify a test number. T12 specifies test 12, T512 will give an error.

The characters period and CR/LF act as input terminators.

Input Parameter Errors and Actions

SYS. XX = INVALID TEST #, RE-ENTER.
ANS. . BYPASS OR IGNORE THIS TEST #

XX. REPLACE INVALID TEST # WITH THIS TEST #.

SYS. NO MODULE XX IN SYSTEM, RE-ENTER.
ANS. . BYPASS OR IGNORE THIS MODULE #.
XX. REPLACE INVALID MODULE # WITH THIS MODULE #.

SYS. NO TESTS SPECIFIED, RE-ENTER PARAMS.
ANS. N------. RE-ENTER COMPLETE TEST PARAM. LINE.

INFORMATIONAL MESSAGES

All informational messages are self-explanatory and require no direct action from the operator. The informational messages can be eliminated by setting CSW 0 to ON or the number of messages can be reduced by setting CSW 8 to ON.

ERROR MESSAGES FROM TEST ROUTINES

There are generally four different error message formats.

Format 1

Is used by four of the SS tests and two of the MM TESTS. Following are four examples of Error Format 1.

```
*** E R R O R *** (1D36) TEST# 1
WRITE MEM PLANE STATUS SHOULD HAVE GENERATED THE EXPECTED PSRO WORD.
WRITE PLANE STATUS WORD= 002A
PSRO EXPECTED = 3A01
PSPO FROM MEM = 4A21

*** E R R O R *** (1E19) TEST#2
TEST WORD SHOULD HAVE GENERATED THE EXPECTED ECC CHECK BITS.
TEST WORD = 0005
ECC CHECK BITS EXPECTED = 000110
ECC CHECK BITS FROM MEM = 000000

*** E R R O R *** (1F0F) TEST# 3
THE ECC BITS SHOULD HAVE GENERATED THE EXPECTED TEST WORD.
ECC BITS             = 100110
TEST WORD EXPECTED = 0010000000000000
TEST WORD FROM MEM = 0000000000000000

*** E R R O R *** (2048) TEST# 4
PARITY TRAP DID NOT OCCUR.
TEST WORD      = 0050
VALID ECC BITS = 111111
TEST ECC BITS  = 111101
```

Line 1 - Data in brackets is the program error address
Line 2 - Explanation of the error
Line 3,4,5 - Self-Explanatory

Format 2

Is used by core memory tests.

```
*** E R R O R **** PE (30FD) TEST# 27 MOD#4
PLANE STATUS REGISTERS= 9164 ,0040 ,0001 ,2608 ,0000
DATA ADDR= 010982, HWA= 012608
EXPECTED DATA   = 0000000000000000 (0000)
ACTUAL DATA     = 0000000001000000 (0040)
EXP PARITY      = UB= 0, LB= 0
ACTUAL PARITY   = UB= 0, LB= 0
RUN TIME        = HRS:MIN:SEC
```

Line 1 - PE = Parity Error Trap
Data in brackets is the program error address

Line 2 - Contains the contents of the five plane status registers at the time of the parity trap. For an explanation of the plane status registers, refer to the MODCOMP CLASSIC Central Processor Reference Manual.

Line 3 - DATA ADDR = The address used in the program to address the test location. HWA=Hardware Address which is presented to the hardware to access the test location.

The data address is passed through an address conversion routine to develop the HWA. See Appendixes A through G for the address scrambling algorithm.

Line 4-7 - Are self-explanatory.

Format 3

Is used by the Solid State Memory Tests.

```
*** E R R O R **** DC (1FF7) TEST#  1 MOD#0
DATA ADDR= 000000, HWA= 000412, PROB CHIP LOCN=  D8E
EXPECTED DATA = 0000000000000000 (0000)
ACTUAL DATA   = 0000100000000000 (0800)
EXPECTED ECC  = 000000
ACTUAL ECC    = 000000
RUN TIME      = HR:MIN:SEC
```

Line 1 - DC = Data Compare Error.
Data in brackets is the program error address

Line 2 - DATA ADDR = The address used in the program to address the test location. HWA=Hardware Address which is presented to the hardware to access the test location.

The data address is passed through an address conversion routine to develop the HWA. See Appendixes A through G for the address scrambling algorithm.

PROB CHIP LOCN is the location on the module of the probable failing chip. The most-significant failing bit is the location printed.

Lines 3-6 Are self-explanatory

Format 4

Is used by the parity detect tests.

```
*** PLANE STATUS REGISTER ERROR *** TEST#5 MOD#2
PLANE STATUS REGISTERS = 9151, 0050, 0000, 0202, F820
EXPECTED PLANE STATUS  =       0050, 0000, 0202, F800
```

Line 1 - Indicates a plane status register error occurred during test 5 on module 2.

Line 2 - Contains the contents of the plane status registers as read from the module when the error occurred.

Line 3 - Contains the expected plane status register information.

ERROR SUMMARY MESSAGE

A test error summary message is output to the console device at the end of each test or if a test is cancelled using the CTST directive. The message is output only if errors occurred during the test.

```
TEST#26 ERROR SUMMARY
DATA BIT EPROR COUNTS:
BITS PICKED/DROPPED
B00 B01 B02 B03 B04 B05 B06 B07 B08 B09 B10 B11 B12 B13 B14 B15 UPR LPR
  0   0   0   0   0   0   0   0   0   0   1   0   1   0   1   1   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0

MAR BIT ERROR COUNTS:
WHEN BIT OFF/ON
B00 B01 B02 B03 B04 B05 B06 B07 B08 B09 B10 B11 B12 B13 B14 B15
  0   0   1   1   1   1   1   1   1   1   1   1   1   1   1   1
  1   1   0   0   0   0   0   0   0   0   0   0   0   0   0   0
```

Bits picked/dropped is a count of the number of times a bit was picked or dropped during a test. The top row is the pick count. UPR and LPR are the counts of the number of times the upper or lower parity bit failed. UPR and LPR are meaningful only in the core memory test.

For the Solid-State Memory Tests, the ECC bit error counts are printed instead of the upper and lower parity bits.

The MAR BIT ERROR COUNTS are the number of times a Memory Address Register bit was on or off when an error occurred. This information indicates the address which failed most often.

NON-TEST ERROR MESSAGES

Various non-test error messages are reported to the operator if they should occur. On the initial program load or on a Master Clear, the solid-state memory modules are initialized to the single-bit error correcting mode. During program initialization, the solid-state modules are placed into the non-correcting mode. If an error should occur in a module which is not under test, one of the following error messages will be reported to the operator:

Solid-State Module Non-Test Error Messages

```
*** NON-TEST PARITY TRAP ***
PLANE STATUS REGISTERS=B842,195E,0000,3E40,0920
PLANE IS IN SINGLE-BIT ERROR CORRECTION MODE.
```

This message indicates a single-bit error occurred in module #0 which was not under test at the time. For further explanation of the plane status registers, refer to the MODCOMP CLASSIC Central Processor Reference Manual. The module will remain in the single-bit error correction mode until it is tested or the processor is Master Cleared.

```
*** NON-TEST PARITY TRAP ***
PLANE STATUS REGISTERS=F842,1D5E,0000,3E40,0920
*** MULTIPLE BIT ERROR ***
RELOCATE MODULE AND RELOAD PROGRAM TO TEST.
```

This message indicates an unrecoverable error. The processor will Halt in the parity trap routine. The faulty module should be relocated to the upper memory block to be tested or it can be repaired from the information given in the plane status registers. The module should be removed and the program reloaded.

Core Memory Non-Test Error Message

```
***NON-TEST PARITY TRAP ***
PLANE STATUS REGISTERS = 9164,0040,0001,0088,0000
RELOCATE MODULE AND RELOAD PROGRAM TO TEST.
```

This message indicates a parity trap occurred on a non-test core memory module. The processor will halt in the parity trap routine. The module must be relocated and the program reloaded to continue testing.

Common Non-Test Error Messages

***PARITY TRAP ***
NO ERROR BIT SET ON ANY MODULE IN THE SYSTEM
MASTER CLEAR TO RESTART.

The processor will Halt in the Parity Trap routine after this message is reported. A Parity Trap occurred, however, none of the memory modules in the system indicated an error. The processor must be Master Cleared to continue testing.

LEVEL-AA-BB TRAP@CCCC PSW=DDDD. (INST=EEEE)

This message will be displayed for a level 2 or 4 violation. After the message is displayed, the program will go to the master clear entry point.

AA = 2 or 4
BB = "UI" Unimplemented Instruction
"HG" System Stall or Hang
"PV" Privileged Instruction Violation
"VM" Virtual Mode Addressing Violation
"EM" Extended Mode Addressing Violation
CCCC = Return Memory Address
DDDD = Return Program Status Word
EEEE = Contents of Return Memory Address

UNEXPLAINED INTERRUPT, CLEAR HLT TO CONTINUE.

An interrupt occurred which was not enabled. The processor will halt in the interrupt routine so the operator can investigate the unexplained interrupt. The processor must be Master Cleared to continue.

STACK ERROR AT XXXX

An overflow/underflow error occurred in the system push stack. The program will halt in the overflow/underflow error routine so the error can be investigated. The system must be Master Cleared to recover.

TEST # XX APPEARS TO BE HUNG
P-CTR = XXXX, ELAPSED TIME = XX:XX:XX
ENTER A PERIOD TO CONTINUE WITH NEXT TEST,
ELSE MC/RUN.

A timer routine runs with each executing test, provided the hardware clock is running. Each test has a maximum allowable execution time associated with it. If this time expires, this message will be output to the console device.

```
TEST#27 CURRENT STATUS (2966)
MODULE TEST ADDR  =4000
CURRENT TEST ADDR =7FFB
CURRENT PASS      =1
ELAPSED TIME      =  0: 0: 8
HANG COUNTER REM  =  0: 0:55
  R0=3029 R1=32B2 R 2-0000 R 3=4000 R 4=4000 R 5=4000 R 6=0000 R 7-0000
  R8=294F R9=7FFB R10=4000 R11=8000 R12=0000 R13=FFFF R14=0000 R15=FFFF
??
```

Line 1 - The data in parenthesis is the relative address in the program at the time of interruption. This address could be in a support routine used by the test routine such as the clock routine or the address conversion routine.

Line 2 - Module starting test address.

Line 3 - The current test address is taken from register 3 and will be valid for all memory tests (see test routine).

Line 4 - All memory tests run two passes. One pass is run with a certain background and the second pass is run with that background complemented.

Line 5,6- Represent the Elapsed time and hang counter value for the current test.

Line 7,8- Register contents at the time of interrupt. The data in this printout should be correlated with the test routine interrupted.

APPENDIX 10N

EXTRACT

MODCOMP CLASSIC 7860/7830 FIXED AND FLOATING POINT DIAGNOSTIC

MODCOMP CLASSIC CENTRAL PROCESSOR

DIAGNOSTIC MANUAL

MODCOMP CLASSIC 7860/7830 FIXED AND FLOATING-POINT DIAGNOSTIC

This Product Specification is controlled by Development. Any changes or corrections to the contents herein are initiated by the completion of a Product Specification Revision Notice. Changes and/or corrections are to be submitted to Development for approval and distribution. Contents are subject to revision until release of this product.

September 18, 1980

Publication Number: 220-140000-003, Chapter 5
Product Number: 611821-007D.0/611851-007D.0
Modular Computer Systems, Inc.
1650 West McNab Road
Fort Lauderdale, Florida 33309

TION

A halt (Stand-Alone version) or a task hang (DAX task) will then occur. Master Clearing or restarting the task will cause the question to repeated until a 'Y' response occurs. This diagnostic does not support EAU models later than Revision C. If a 'Y' response is entered, the model is assumed to be Revision C or earlier and the program continues execution.

On 7820 or 7830 models without an EAU or with a Floating Point Unit, the operator will receive this message.

IS THIS A 7820 OR A 7830 WITH REVISION C INSTALLED Y OR N ??

The operator should respond by typing a 'Y' (Yes) or 'N' (No) on the console device. If the response is a 'Y' the following message is displayed:

USE CAT #6118X1-008 FOR THIS REVISION CPU

The program will halt on the Stand-Alone versions or hang the task for the DAX Task version. In Stand-Alone version depressing Master Clear or rocking RUN/HALT will cause the diagnostic to ask the question again until 'N' response is encountered. The DAX task will repeat the question if a WAKE of the task is attempted. This diagnostic does not support 7820 central processors or 7830 central processors with Revision CB installed. If a 'N' response is encountered, the diagnostic continues execution.

AUTOMATIC TESTING

Automatic Testing is invoked by entering the automatic test directive:

AT.

If all tests are not desired, the AT directive may be given some arguments specifying which tests are to be executed:

AT/4-12. will execute tests 4 through 12
AT/3-6/8-9/15. will execute tests 3, 4, 5, 6, 8, 9, and 15.

When all the tests specified have executed, the message:

PASS XXX COMPLETE

will be typed.

If CSW 7 is ON, these tests will be executed again and again indefinitely. If CSW 7 is OFF, testing is discontinued upon reaching pass complete. It takes approximately 10 minutes to run one complete pass; however, this is variable and may be changed by changing the PAST parameter:

PAST=15. will give a pass complete time of about 15 minutes.

CONTROL SWITCH FUNCTIONS

CSW

0	= 1	Inhibit Informational Messages
1	= 1	Loop Present Test
2	= 1	Inhibit Error Messages
3	= 1	Halt on Error
4	= 1	Suspend Simulation Reporting
5	= 1	Operator Control from Keyboard
6	= 1	Not Used
7	= 1	Loop Diagnostic
8	= 1	Inhibit Milestone/Print Limited Error Messages
9	= 1	Display Micro-step Simulation
10	= 1	Halt Before Instruction Under Test
11	= 1	Loop on Operands
12	= 1	Not Used
13	= 1	Inhibit Real-Time Clock
14	= 1	Request Operands from Operator
15	= 1	Print Test Results Unconditionally

NOTE: On a CLASSIC 7830 without an EAU, CSW 15 will print the results unconditionally but these results may be invalid for the integer divide tests due to overflow conditions. This will not be an error.

TYPICAL TROUBLESHOOTING SEQUENCE

Upon loading the diagnostic and specifying the "AT" directive automatic testing will begin (unless CSW 5 is set). The conversion instructions are the first to be tested, using a "gentle" sequence of operands. The sequence used will detect failures with the simplest operands possible making troubleshooting easier.

The operator may elect to allow several failures to be detected and reported, examining the results for obvious failure patterns. To begin troubleshooting, the operator sets CSW 14 during an error message of the instruction that he wishes to troubleshoot, ideally with the operands desired. This causes the program to request operands via the console keyboard; the operator may specify operands or allow default to the current set. At this time, the operator sets CSW 11, resets CSW 14 and allows the operands to default. The program then prints a simulation of the micro steps of the instruction under test (for example, alignment, iteration and normalization).

The CPU will again hang on the failing instruction and the hardware micro-step and display capability is used to isolate the failing micro-step.

When CSW 11 is reset and the program is allowed to resume, the instruction will be executed at a high repetition rate to allow scoping of the failing step.

After the fault is corrected, CSW 14 is reset, the current request for operands is defaulted and automatic testing resumes.

LOAD/START PROCEDURE

The program runs standalone or as a task under DAX. Standalone is loaded using the standard MODCOMP FILL sequence.

As a DAX task, the program is loaded by the usual DAX task load procedure. DAX will request control from the operator by printing on the console printer:

```
DAX (0)
??
```

The object for the Diagnostic is mounted on the Binary Input Device. The operator types LOAD. and the Diagnostic is loaded. If CSW 5 is set the program will print:

```
FFP (1)
?
```

and await operator input of directives via the console keyboard.

APPENDIX 10P

EXTRACT

I/O PROCESSOR DIAGNOSTIC

MODCOMP CLASSIC 7860 CENTRAL PROCESSOR

DIAGNOSTIC MANUAL

I/O PROCESSOR DIAGNOSTIC

This chapter is also located in the publications listed below.
220-102100-003, Chapter 8 MODCOMP II and II/2 CENTRAL PROCESSOR, D. M.
220-110000-003, Chapter 6 MODCOMP IV 20/25/35 CENTRAL PROCESSOR, D. M.

July 23, 1980

Publication Number: 220-140000-003, Chapter 7
Product Number and Revision: 607855-016D.0
Modular Computer Systems, Inc.
1650 West McNab Road
Ft. Lauderdale, Florida 33309

LOAD START PROCEDURE

This program is loaded by DAX and a task and operates in a multi-task environment under control of DAX.

If DAX has not been already loaded and started, then load DAX with the standard MODCOMP fill procedure.

The DAX ID message will be printed after rocking the RUN/HALT switch, followed by:

"DAX (0)
??"

If the task's object is to be loaded from the paper tape reader, the object is mounted in the reader. When the operator types:

"LOAD."

the task will load and execute.

If the task's object is to be loaded from a device other than the paper tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

"LDEV" LOAD DEVICE: specifies the device used in loading the task program(s) various forms are:

"LDEV?" DUMP LOAD DEVICE PARAMETERS, e.g.,
"LDEV=PR DEV=A DMP=1 UNIT=0 TRAK=0 FILE=0 GEOM=4 WAD=0 VDMP=1 PIOP"

which are the default assignments at load time (see table below).

"LDEV=xy" ASSIGN LOAD DEVICE: specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follows:

								(MC IV ONLY)
	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	VDMP	IOP
MOVING HEAD DISC	MH	1	1	0	0	0	4	1	PIOP
FIXED HEAD DISC	FH	2	2	0	0	0	8	2	PIOP
MAGTAPE	MT	4	4	0	0*	0	0*	4	PIOP
FLOPPY DISC	FP	9	3	0	0	0	4	3	PIOP
CARD READER	CR	5	0*	0*	0*	0*	0*	0*	*
PAPER TAPE RDR	PR	A	0*	0*	0*	0*	0*	0*	*

* Don't Care

"LDEV=xy?" ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If the paramters to be used are other than the default values, the proper directives must be executed to modify them.

"DEV=#x" Assign device address to the hexadecimal value "X" (1 < or equal to X < or equal to F).

"DMP=y" Assign DMP channel number to the value "Y" (1 < or equal to Y < or equal to 7).

"UNIT=z" Assign unit number to the value Z (0 < or equal to Z < or equal to 3).

"TRAK=x" Assign track number to the value X (0 < or equal to X < or equal to 8119).

"FILE=y" Assign file number to the value "Y" (0 < or equal to Y < or equal to 200).

"GEOM=z" Assign geometry to the value Z (1 < or equal to Z < or equal to 8).

(MC IV ONLY:)

"WAD=X" Specifies the 64K memory block to be loaded into via the "LOAD" (initially equal to 0).

"VDMP" Specifies the DMP channel number to be used when in virtual mode.

"PIOP" Specifies that the load device is on the PRIMARY I/O PROCESSOR

"SIOP" Specifies that the load device is on the SECONDARY I/O PROCESSOR

After the load device and any non-standard parameters have been assigned, the "LOAD" directive is executed.

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

Load/#(address).

(MCIV ONLY:)

If the program is in virtual mode then the 64K module specified by "WAD" (initially 0) will be loaded. Thus to load a program into location #10000 requires the following:

- o virtual mode
- o WAD=1
- o specify "LOAD/0 (If no address follows the "LOAD" then the next available virtual address will be loaded at WAD=1)

After a program load in virtual mode, the program bounds are displayed; first, as a "virtual" address (a 16-bit address prior to indexing or mapping) and second, as an "actual" address (a final unique 18-bit address derived by mapping).

Upon being successfully loaded, the program will be assigned a task number and initialized. The following will then be printed:

```
I/O PROCESSOR DIAG 607855-016
**MOUNT SCRATCH TAPES OR DISCS BEFORE TESTING**
TO START TESTING TYPE THE UNIT NUMBER,DEVICE
ADDRESS,DMP CHANNEL NUMBER,VIRTUAL MODE
DMP CHANNEL,SECONDARY OR PRIMARY I/O
PROCESSOR,FOLLOWED BY "AT".
     EXAMPLE: "UNIT=0,DA=1/1/1,PIOP,AT."
(TYPE: "HIPG." BEFORE LOADING FURTHER PROGRAMS)
PROGRAM BOUNDS: #2000-#FFFD
MCIV 16 DMP Channels Actual pages present: 0-1FF
HIPG 1FF (HIGHEST PAGE TO BE TESTED)
```

*NOTE - No subsequent programs can be loaded until "HIPG" is executed.

```
"IS IT A TAPE(T),DISC(D),CARD READER(C),LINE PRINTER(L),I/O
TESTER(I), MEMORY PLUS (M), 4820 LINK (0), 4821 LINK (1),
MODACS III 1810 (3), OR STANDARD LINK 1887 (S)?"
```

The operator is expected to respond with a:

```
"T" if MAG TAPE
"D" if DISC
"C" if CARD READER (DMP ONLY)
"L" if LINE PRINTER (DMP ONLY)
"I" if I/O TESTER
"M" if MEMORY PLUS
"0" if 4820 LINK
"1" if 4821 LINK
"3" if MODACS III
"5" if STANDARD LINK
```

The program then tests that unit to determine its operability and if "AT" had been specified, the program begins the execution of its automatic tests.

If other programs are to be loaded, the user should type:

HIPG.

This directive reduces the highest location of the program as well as the highest test page. The operator may then load other programs into this deallocated area.

To check out another controller concurrently, the operator should load another I/O Processor (IOP) program and assign the appropriate unit and controller numbers.

*If a disc controller is specified, testing is done on the lowest unprotected cylinders.

If a mag tape controller is specified, testing is done on the entire length of the tape.

If a DMP card reader controller is specified, testing is done using "DIAGNOSTIC MODE" type commands which do not require the device to be on-line.

If a DMP line printer controller is specified, only "writes" will be executed, which will result in actual printing on the line printer if switch 10 is set; otherwise no printing occurs.

If an I/O tester is specified, writes and reads are done on the specified DMP channel only. If other DMP channels are to be tested, the operator should respecify the channel via "DA/x/y/z" where y is the non-virtual DMP channel and z is the virtual mode DMP channel. The I/O testers priority will be 12 unless respecified (see "PL"). The interrupt SID's will be keyed from the device address (#80+DA,#C0+DA). The transfer rate will be 1US (TP=255) unless respecified (SEE "TP"). Register file II mode (RF2) will be used unless respecified by "RF3". Single word transfer mode "SWRD" will be used unless respecified by "DWRD" (dual word).

---

*Note: If a controller shares a drive with another controller, that is, if a dual port configuration exists, then it is the user's responsibility to set each programs cylinder parameter such that both programs will not access the same cylinder. This should be done after the "DA" directive via "Cy=x" where x is the cylinder number.

Automatic tests are entered via "AT". As long as CSW 5 is reset, the next sequential test will be entered until all tests are executed. An exception to this occurs when specific test numbers are typed following the "AT" directive, example:

AT/1-8/13-16/20

The above example would cause the following tests to execute:

1,2,3,4,5,6,7,8,13,14,15,16,20

At the end of the last test, CSW 7 set will cause a pass complete message to be typed and testing to resume at "T/1". The pass complete message includes a count of the total number of passes executed and (if any) the number of recoverable retries in response to overflow status or CRC (read error) status as well as the number of unrecoverable errors. If CSW 7 is reset then the program types:

"TESTING COMPLETE"

and enters an "IDLE" mode. At such time the operator may type "↑" (up arrow) followed by the task number if he desires to communicate to the program; otherwise no further testing takes place.

Should a power failure occur during "AT" and if CSW 5 is reset, then testing will resume at the beginning of the interrupted test. A power failure will not resume the execution of the operators own typed-in directives unless CSW 5 is reset, in which event execution will resume at the beginning of his directive string. All power failures result in the message:

"POWER FAILURE"

as well as the time-of-day. The program's time of day is initialized via "TODY:HRS:MIN:SEC" (SEE the DAX PRODUCT SPEC 111-607855-000).

The automatic test may also be entered via T/x where x specifies the test number, and if CSW 5 is reset, the next sequential test will be entered. CSW 5 set causes program control to return to the operator after the indicated test has completed (this results in a "?" being typed).

As each test is entered, a milestone message is typed which indicates the nature of the test. These test milestones can be inhibited by setting CSW8. The pass complete message will still be typed as long as CSW 0 is reset. If CSW 0 is set then all non-error messages are inhibited. If software switch mode is used to set CSW 0 (CSW%0=1), then this particular switch (CSW 0) will be reset in response to a "WAKE/x" (x is task number) which would allow the program to type "?".

The directive contents of each test may be displayed via "T/x?" where x is a test number. This is helpful whenever additional information is required concerning the conditions or directives needed to accomplish the intended test.

It is suggested but not required that the operator run the automatic tests with CSW 3 set. This would cause the program to halt further testing upon an error and allow the operator time to examine the error results. If at this point, the operator decides to allow the program to cycle or loop on the last I/O operations, he must set switch 6 which will cause "cycling on error". Then he must allow the program to continue from its "halted" condition by typing "STRT/x,HANG." where x is the task number of the program. This must be typed to TASK 0 (DAX) and, if TASK 0 is not accepting any directive input, the operator must type "↑0" (up arrow zero). Sometimes when the "up arrow" is typed, another task takes control. Under these conditions, "up arrow 0" must be typed again until task 0 (DAX) is finally entered. Also, should there be other tasks running as well as this task, it is necessary to have all tasks under software switch mode (CSW=x) where x specifies the switch settings. While in this mode, the actual setting of hardware panel switches are ignored by those tasks who have this mode set. This is necessary because if switch 6 were set on the panel then all programs which are running would cycle on the last operations. Therefore, in a multi-task environment software switch mode should be used. For instance, after a "halt on error" the operator would type to task 0 (DAX) the following:

"CSW/x%6=1,STRT/x,HANG." (Where "x" equals the task number.)

This causes the specified task to resume testing on the last error causing sequence. The directive "HANG" is typed to place task 0 (DAX) in an idle mode.

After a "halt on error" if the operator decides to continue testing and not cycle on the error, then he should not set CSW 6 but just type to task 0, "STRT/x,HANG". The specified task will then resume testing and continue to the next directives.

APPENDIX 10Q
EXTRACT
4138 DUAL PORT DIAGNOSTIC

MOVING HEAD DISC CONTROLLER 4143, 4143-A/DISC

MODEL 4138-x, 4138-A-x, 4173-x, 4174-x

4138 DUAL PORT DIAGNOSTIC

NOTE: The x noted in the disc model number implies:

4138-1 through 8
4138-A-1 through 8
4138-DCO 78-0661
4173-1 through 4
4174-1, 2, 5, and 6

Product number 607855-007 supports single port testing; and product number 607855-040 supports dual port testing.

October 12, 1979

Publication Number: 225-200117-003, Chapter 2
Product Number and Revision: 607855-007D.0, 607855-040B.0
Modular Computer Systems
1650 McNab Road, Fort Lauderdale, FL 33309

GENERAL DESCRIPTION

This program provides extensive static and dynamic testing, via directives, under the Diagnostic Application Executive (DAX), Catalog Number 607855-000, Revision G.0 or later. Operator communication is via the console keyboard/printer; the user may enter his own tests in this manner.

CONFIGURATION

This program may be run on a MODCOMP II, MODCOMP III or MODCOMP IV Compatible Central Processor Unit with at least 32K of memory. A binary input device is required for program loading and a console keyboard/printer is required for communication. Messages may be output to a line printer if desired.

Virtual mode I/O is accommodated on MODCOMP IV Compatible.

It will test the 4138-1 through 8, the 4138 with DCO Number 78-0661 and the 4138-A-1 through 8, the 4173-1 through 4, and the 4174-1, 2, 5, and 6.

PROGRAM LOADING

The program runs as a task under DAX. DAX is loaded with the standard FILL sequence. The DAX I.D. message will be printed after rocking the RUN/HALT switch, followed by:

```
"DAX (0)
??"
```

If the task's object is to be loaded from the paper-tape reader, the object is mounted in the reader and the operator types:

```
"LOAD."
```

and the task will load and execute. Automatic testing will commence unless CSW 5 is set, in which case the program will print:

```
"DUAL (1)"
"?"
```

and await operator input of directives via the console keyboard.

If the task's object is to be loaded from a device other than the paper-tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

AUTOMATIC TEST USAGE

Automatic tests are entered via "AT". As long as CSW 5 is reset, the next sequential test will be entered until all tests are executed. An exception to this occurs when specific test numbers are typed following the "AT" directive. For example,
AT/1-6/13-16/20

The above example would cause the following tests to execute:

1,2,3,4,5,6,7,8,13,14,15,16,20

At the end of the last test, CSW 7 set will cause a pass complete message, including total execution time and pass execution time, to be typed and testing to resume at "T/2". The pass complete message includes a count of the total number of passes executed and (if any) the number of recoverable retries in response to overflow status or CRC (read error) status as well as the number of unrecoverable errors. If CSW 7 is reset then the program types:

"TESTING COMPLETE"
"INTER CHANGE LOGIC PLUGS ON MULTIPLE UNITS"
"INITIALIZE EACH PORT (INIT) AND RESTART TESTING (AT)."

and enters an "IDLE" mode. At such time the operator may type "↑" (up arrow) followed by the task number if he desires to communicate to the program; otherwise no further testing takes place. If multiple units are available he must interchange logic plugs and execute all testing again.

Should a power failure occur during "AT" and if CSW 5 is reset, then testing will resume at the beginning of the interrupted test. A power failure will not resume the execution of the operator's own typed-in directives unless CSW 5 is reset, in which event execution will resume at the beginning of his directive string. All power failures result in the message:

"POWER FAILURE"

as well as the time of day. The program's time of day is initialized via "TODY:HRS:MIN:SEC" (see the DAX Product Specification 111-607855-000).

The automatic test may also be entered via T/x where x specifies the test number, and if CSW 5 is reset, the next sequential test will be entered. CSW 5 set causes program control to return to the operator after the indicated test has completed (this results in a "?" being typed).

DCSW DISPLAY CONTROL SWITCH DEFINITIONS

Displays the following:

CSW	0	INHIBIT INFORMATIONAL MESSAGES
CSW	1	LOOP PRESENT TEST
CSW	2	INHIBIT ERROR MESSAGES
CSW	3	HALT ON ERROR
CSW	4	ENABLE DIRECTIVE TRACE
CSW	5	INPUT CONTROL FROM KEYBOARD
CSW	6	LOOP ON SUB-TEST
CSW	7	LOOP ALL TESTS
CSW	8	INHIBIT MILESTONES
CSW	9	INPUT CONTROL FROM PAPER TAPE
CSW	10	NOT USED
CSW	11	NOT USED
CSW	12	NOT USED
CSW	13	NOT USED
CSW	14	NOT USED
CSW	15	EXPANDED ERROR MESSAGE (IF RESET)

"TEST" DIRECTIVE

The general purpose test directive provides the ability to configure the "static" tests with the use of directive sequences.

TEST is a common level directive which compares various parameters of the task executing it.

The format of the directive is:

"TEST/N@M/N@M,"

wherein:

N is any parameter, data or memory address, or logical or arithmetic combination thereof;

@ specifies a test for equality (=), greater than (>) or less than (<) or combination of the two; M is similar to N with the exception that divide (X/Y) operations are not permissible. If M is preceded by a colon(:), the error message will print the quantities in decimal.

A typical use of the TEST directive follows:

"OC/#7000,OC/#4C00,TEST/SIC=:1/DIC=:1/STAT=#8080."

An output command to connect the SI and DI is followed by an EOB terminate command. A test is then made that one SI and one DI (SIC and DIC) occurred and that the status returned was equal to #8080.

APPENDIX 10R

EXTRACT

MOVING HEAD DISC CONTROLLER 4143, DISC MODEL 4138-X

MOVING HEAD DISC CONTROLLER 4143, 4143-A/DISC

MODEL 4138-x, 4138-A-x, 4173-x, 4174-x

MOVING HEAD DISC CONTROLLER 4143, DISC MODEL 4138-x

NOTE: The x noted in the disc model number implies:

4138-1 through 8
4138-A-1 through 8
4138-DCO 78-0661
4173-1 through 4
4174-1, 2, 5, and 6

Product number 607855-007 supports single port testing; and product number 607855-040 supports dual port testing.

February 19, 1980

Publication Number: 225-200117-003, Chapter 1
Product Number and Revision: 607855-007E.0, 607855-040B.0
Modular Computer Systems
1650 West McNab Road, Fort Lauderdale, FL 33309

GENERAL DESCRIPTION

This program provides extensive static and dynamic testing, via directives, under the Diagnostic Application Executive (DAX), Catalog Number 607855-000, Revision G.0 or later. Operator communication is via the console keyboard/printer; the user may enter his own tests in this manner.

CONFIGURATION

This program may be run on a MODCOMP II, MODCOMP III or MODCOMP IV Compatible Central Processor Unit with at least 32K of memory. A binary input device is required for program loading and a console keyboard/printer is required for communication. Messages may be output to a line printer if desired.

Virtual mode I/O is accommodated on MODCOMP IV compatible only.

It will test the 4138-1 through 8, the 4138 with DCO Number 78-0661, the 4138-A-1 through 8, the 4173-1 through 4, and the 4174-1, 2, 5, and 6.

PROGRAM LOADING

The program runs as a task under DAX. DAX is loaded with the standard FILL sequence. The DAX I.D. message will be printed after rocking the RUN/HALT switch, followed by:

```
"DAX (0)
??"
```

If the task's object is to be loaded from the paper tape reader, the object is mounted in the reader and the operator types:

```
"LOAD."
```

and the task will load and execute. Automatic testing will commence unless CSW 5 is set, in which case the program will print:

```
"4138 (1)"
"?"
```

and await operator input of directives via the console keyboard.

If the task's object is to be loaded from a device other than the paper tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

"LDEV" LOAD DEVICE: specifies the device used in loading the task program(s); various forms are:

"LDEV?" DUMP LOAD DEVICE PARAMETERS, for example,

```
"LDEV=PR DEV=A DMP=1 UNIT=0 TRAK=0 FILE=0 GEOM=4"
```

which are the default assignments at load time.

"LDEV=XY" ASSIGN LOAD DEVICE specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follows:

	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	(MC IV COMPATIBLE ONLY) VDMP	IOP
MOVING HEAD DISC	MH	1	1	0	0	0	4	9	PIOP
FIXED HEAD DISC	FH	2	2	0	0	0	8	A	PIOP
MAG TAPE	MT	4	4	0	0*	0	0*	4	PIOP
FLOPPY DISC	FP	9	3	0	0	0	4	3	PIOP
CARD READER	CR	5	0*	0*	0*	0*	0*	0*	*
PAPER TAPE READER	PR	A	0*	0*	0*	0*	0*	0*	*

* DON'T CARE

"LDEV=XY?" ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If parameters to be used are other than the default values, the proper directives must be executed to modify them.

"DEV=#X" Assign device address to the hexadecimal value "X". (1<X<#F).

"DMP=Y" Assign DMP channel number to the value "Y". (0<Y<8).

"UNIT=Z" Assign unit number to the value Z. (-1<Z<4).

"TRAK=X" Assign track number to the value X (-1<X<8120).

"FILE=Y" Assign file number to the value"Y" (-1<Y<200).

"GEOM=Z" Assign geometry to the value "Z" (0<Z<9).

MODCOMP IV COMPATIBLE ONLY:

"VDMP" Assign virtual mode DMP channel number.

"WAD" Specifies which 64K block of memory is to be loaded.

"PIOP" Specifies that the load device is on a primary I/O processor.

"SIOP" Specifies that the load device is on secondary I/O processor.

After the load device and any non-standard parameters have been assigned, the "LOAD" directive is executed.

EXAMPLE: LDEV=MH,UNIT=1,TRAK=398,LOAD.

This assigns the load device as the moving head disc, unit 1, track 398.

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

Load/#(address).

EXAMPLE: LOAD/#2000. LOAD starting in location #2000.

MODCOMP IV COMPATIBLE ONLY:

If the program is in virtual mode then the 64K module specified by "WAD" (initially 0) will be loaded. Thus, to load a program into location #10000 requires the following:

- o virtual mode
- o WAD=1
- o specify "LOAD/0 (if no address follows the "LOAD" then the next available virtual address will be loaded at WAD 1)

After a program load in virtual mode, the program bounds are displayed: first, as a "virtual" address (a 16-bit address prior to indexing or mapping) and second, as an "actual" address (a final unique 18-bit address derived by mapping).

AUTOMATIC TESTING

All testing is done with directive sequences. Individual tests may be executed by the use of the "T/X" directive, wherein "X" is the number of the test desired. The directive sequence of any test may be displayed by executing the interrogative form of the directive. For example, "T/1?" will display, via the console printer, the directive sequence for Test 1. Testing will not begin automatically due to the danger of writing inadvertently on system packs, diagnostic packs, etcetera. At completion of load, following the task's I.D. message, the program will print the message:

"4138 DIAG CAT. NO. 607855-007"
"TESTING 4138 (MOD) OR (-A) CONTROLLER"
"PLEASE SET TO SOFTWARE TIMER"
"PROG END AT XXXX"
"TO START TESTING TYPE THE DEVICE ADDR & DMP #."
"INITIALIZE PROGRAMS DRIVE CONFIGURATION, THEN AT."
"EXAMPLE: DA=3/3,MC,INIT,AT."
"IF NO LOGIC PLUG, TYPE: UNIT=0,PLUG=NO."
"IF FIXED PLATTER, TYPE: UNIT=0,FIXED=YES."

Note: PLUG=0 and FIXED=YES must be typed for each applicable unit. For example, if units 0 to 3 are to be tested, units 1 and 2 are fixed, and units 1 and 3 have no plug, then the following must be typed:

```
DA=3/3,UNIT=1,FIXED=YES,PLUG=NO,UNIT=2,
FIXED=YES,UNIT=3,PLUG=NO,MC,INIT,AT.
```

AUTOMATIC TEST USAGE

Automatic tests are entered via "AT". As long as CSW 5 is reset, the next sequential test will be entered until all tests are executed. An exception to this occurs when specific test numbers are typed following the "AT" directive. For example:

```
AT/1-8/13-16/20
```

The above example would cause the following tests to execute:

```
1,2,3,4,5,6,7,8,13,14,15,16,20
```

At the end of the last test, CSW 7 set will cause a pass complete message to be typed and testing to resume at "T/1". The pass complete message includes a count of the total number of passes executed and (if any) the number of recoverable retries in response to overflow status or CRC (read error) status as well as the number of unrecoverable errors. If CSW 7 is reset, then the program types:

```
"TESTING COMPLETE"
```

and enters an "IDLE" mode. At such time the operator may type "↑" (up arrow) followed by the task number if he desires to communicate to the program; otherwise no further testing takes place.

Should a power failure occur during "AT" and if CSW 5 is reset, then testing will resume at the beginning of the interrupted test. A power failure will not resume the execution of the operator's own typed-in directives unless CSW 5 is reset, in which event execution will resume at the beginning of his directive string. All power failures result in the message:

```
"POWER FAILURE"
```

as well as the time of day. The program's time of day is initialized via "TODY:HRS:MIN:SEC" (see the DAX Publications 220-102100-003, 220-110000-003, 220-140000-003, or 220-607855-C04).

The automatic test may also be entered via T/x where x specifies the test number, and if CSW 5 is reset, the next sequential test will be entered. CSW 5 set causes program control to return to the operator after the indicated test has completed (this results in a "?" being typed).

DCSW DISPLAY CONTROL SWITCH DEFINITIONS

Displays the following:

```
CSW   0    INHIBIT INFORMATIONAL MESSAGES
CSW   1    LOOP PRESENT TEST
CSW   2    INHIBIT ERROR MESSAGES
CSW   3    HALT ON ERROR
CSW   4    ENABLE DIRECTIVE TRACE
CSW   5    INPUT CONTROL FROM KEYBOARD
CSW   6    LOOP ON SUB-TEST
CSW   7    LOOP ALL TESTS
CSW   8    INHIBIT MILESTONES
CSW   9    INPUT CONTROL FROM PAPER TAPE
CSW   10   BYPASS OPTIONAL TESTS
CSW   11   NOT USED
CSW   12   NOT USED
CSW   13   NOT USED
CSW   14   NOT USED
CSW   15   EXPANDED ERROR MESSAGE (IF RESET)
```

"TEST" DIRECTIVE

The general purpose test directive provides the ability to configure the "static" tests with the use of directive sequences.

TEST is a common level directive which compares various parameters of the task executing it.

The format of the directive is:

"TEST/N@M/N@M,"

wherein:

N is any parameter, data or memory address, or logical or arithmetic combination thereof; @ specifies a test for equality (=), greater than (>) or less than (<) or combination of the two; M is similar to N with the exception that divide (X/Y) operations are not permissible.

APPENDIX 10S

EXTRACT

HIGH SPEED SERIAL COMPUTER LINK MODEL 4821/4824
DIAGNOSTIC MANUAL

HIGH SPEED SERIAL COMPUTER LINK

MODEL 4821/4824

DIAGNOSTIC MANUAL

March 20, 1980

Publication Number: 225-200128-003
Product Number and Revision: 604828-001D.0
Modular Computer Systems, Inc.
1650 West McNab Road
Ft. Lauderdale, FL 33309

SOFTWARE CONFIGURATION

The diagnostic program runs as a stand-alone task and has a self-contained loader (Core-Image Bootstrap Loader, Product Number 601000-001).

To create the object on paper tape, from 9 track source tape, the following control deck is needed:

```
$JOB
$ASS SI MT1 BO PF
$ASS LO LP
$REW SI
$EXE M2A,,$PS
$WEOF BO
$REW SI
$$
```

This will also generate a listing with symbol table.

CONTROL SWITCH DEFINITIONS

CSW 0	ON	INHIBIT MILESTONE MESSAGES Inhibits milestone messages which include title messages and pass complete. Error messages are not affected by this switch. The console switch definitions are displayed if CSW 0 is set upon load.
	OFF	NO FUNCTION
CSW 1	ON	LOOP CURRENT TEST Loop current test, test results, and report errorsas detected.
	OFF	NO FUNCTION
CSW 2	ON	INHIBIT ERROR MESSAGES Inhibits printing all error messages on the onsole. Milestone messages are not affected.
	OFF	PRINT ERROR MESSAGES
CSW 3	ON	HALT ON ERROR Program halts on error after typing appropriate errormessages. The user may then set control switches to loop the test sequence for trouble-shooting.
	OFF	INHIBIT HALT ON ERROP

CSW 4	ON	HALT BEFORE TEST Program halts prior to executing the test.
	OFF	INHIBIT HALT BEFORE TEST
CSW 5	ON	ALLOW OPERATOR INPUT OF DIRECTIVES Automatic test execution stops and '??' is printed on the console. The user may now input directive test sequences via the console.
	OFF	NO FUNCTION
CSW 6	ON	LOOP SUBTEST Program loops on a subtest.
	OFF	ADVANCE TO NEXT SUBTEST
CSW 7	ON	LOOP DIAGNOSTIC This switch is interrogated following the final tes and if ON, causes the program to repeat.
	OFF	NO FUNCTION
CSW 9	ON	IGNORE OPERATOR INPUT WINDOW The 300 ms delay between lines of outpt is inhibited, increasing typeout speed.
	OFF	DELAY BETWEEN LINES OF INPUT
CSW 12	ON	IGNORE TYPEIN DELAY PRECEDING OPERATOR INSTRUCTIONS
	OFF	DELAY PRECEDING OPERATOR INSTRUCTIONS
CSW 13	ON	DISABLE REAL-TIME CLOCK The real-time clock is disabled.
	OFF	ENABLE REAL-TIME CLOCK
CSW 14	ON	LINKS CONNECTED ON TWO COMPUTERS
	OFF	LINKS CONNECTED ON ONE COMPUTER

LOAD/START PROCEDURE

Load using the standard MODCOMP I Fill Procedure. The program halts after successful load. Rock the RUN/HALT switch to start execution which begins at location #100.

PROGRAM USAGE

OPERATION

After initial program load, rock the RUN/HALT switch to HALT and back to RUN. The program types:

```
SERIAL COMPUTER LINK DIAGNOSTIC
CAT. NO. 604828-001 Rev Date
SET CSW14 FOR TWO COMPUTERS
```

If CSW 0 is set, the console switch definitions will then be defined and the operator will be asked to reset CSW 0 to continue.

The following questions are asked:

```
TYPE IN OUTPUT DEV. ADDR/DMP#
TYPE IN INPUT DEV. ADDR/DMP#
```

Enter the device addresses and DMP numbers before program execution. The output address is used for the output portion of the static tests and for initiating any output transfers. The input address is used for the input portion of the static test and initiating the read operations. If two computers are being used, these addresses are the same. If one computer is being used, the input address should be the link to be filled by remote fill.

If CSW 14 is set, only the tests run on one link are executed. Static tests are run followed by dynamic tests. Each test is designated by number and upon completion the program types:

```
PASS XXXX COMPLETE
```

If CSW 7 is set, the automatic tests repeat. Otherwise, the program halts. Restart to type "???"; the operator may then type any directives he wishes.

DIRECTIVE PROCESSOR

The automatic tests are written in a diagnostic language referred to as directives or directive sequences. An interpretive processor is assembled with the program. The processor provides the ability to interpret directives or directive sequences.

The program accepts directives (ASCII character strings terminated with a period) which are either input externally as user-generated test sequences or generated internally as automatic tests. Any time the program responds with '??', directive input is being requested.

FUNCTIONAL CONTENT

The program consists of several automatic tests. Refer to TEST PROCEDURE FOR TWO COMPUTERS if testing on two computers.

AUTOMATIC TESTS

The automatic tests which are run using one link are executed on both links if they are in the same computer. The links must be disconnected and CSW 14 must be set if the links are in two different computers.

One-Link Tests

"I/1.", Static Test, One Link - The directive input is 'OC/#4000,OC/#4300,OC/#8024,IS,OC/#4200,MC,ST.' This static test performs the basic tests on one link.

TEST PROCEDURE FOR TWO COMPUTERS

The procedure for testing two computers is as follows:

1. Load the diagnostic on CPU1, set CSW14, and type the device addresses and DMP numbers (these are the same for output and input). Tests 1, 2, 3, and 4 are executed.

2. Repeat step 1 on CPU2.

3. Connect the two computer links.
   CPU1 - ST/IN.
   CPU2 - ST/OT.
   CPU1 should acknowledge seven external SIs and type if the status is correct or in error.

4. CPU2 - ST/IN.
   CPU1 - ST/OT.
   Same as above.

Note: If one of the CPUs is a CLASSIC 7810, type 'SL.' on both computers and skip to step 12.

5. CPU1 - T/13.
   CPU2 - T/14.
   This test transfers 100 words of #FFFF from CPU2 to CPU1.

6. CPU2 - T/13.
   CPU1 - T/14.
   Transfer 100 words of #FFFF from CPU1 to CPU2.

7. CPU1 - T/15.
   CPU2 - T/16.
   Transfer 200 words of zero from CPU2 to CPU1.

8. CPU2 - T/15.
   CPU1 - T/16.
   Transfer 200 words of zero from CPU1 to CPU2.

9. CPU1 - T/17.
   CPU2 - T/18.
   Transfer 300 words of binary progression from CPU2 to CPU1.

10. CPU2 - T/17.
    CPU1 - T/18.
    Transfer 300 words of binary progression from CPU1 to CPU2.

11. Type 'SL.' on both computers to change transmit rate to slow and repeat steps 5 through 10.

12. Type 'DT.' on both computers to change to DMP mode and repeat steps 5 through 10.

13. Type '*FS.*' on both computers to change to fast DMP mode and repeat steps 5 through 10.

14. CPU1 - IO.
    CPU2 - OO.
    This test checks the presence of overflow status when data transferred is not input on CPU1.

15. CPU2 - IO.
    CPU2 - OO.
    Same as step 14 with computer reversed.

Note: Fill may not be available. If not, the following steps might indicate false errors.

16. CPU1 - '*RF.*'
    Computer types:

        TYPE OTHER LINK DEVICE ADDRESS?

    Respond by typing address of the link on the opposite computer. For example:

        IF.

    CPU1 remote fills CPU2. The fill routine sets CPU1's status bit 11 to signal a correct file and types '*??*' on CPU2 when completed.

17. CPU2 - RF.
    Same as step 16 with computers reversed. Execute only if fill is available on both computers.

18. CPU1 - FR.
    CPU2 - FE.
    CPU1 sends the fill bit to CPU2 which then outputs a fill routine. The fill routine input on CPU1 sends status bit 11 to CPU2 and exits to the calling sequence.

19. CPU2 - FR.
    CPU1 - FE.
    Same as step 18 with computers reversed.

APPENDIX 10T
EXTRACT
DIAGNOSTIC MANUAL STANDARD LINK MODELS 4828, 1887

DIAGNOSTIC MANUAL
STANDARD LINK
MODELS 4828, 1887
225-200206-003

MODULAR COMPUTER SYSTEMS, INC., P.O. Box 6099, 1650 West McNab Road, Ft. Lauderdale, Florida 33310, Tel. (305) 974-1380. TWX 510-956-9725
European Headquarters:
MODULAR COMPUTER SYSTEMS, INC., Molly Millars Lane, Wokingham, Berkshire, England (0734) 788711, TLX 851 849149

LOAD/START PROCEDURE

This program is loaded by DAX as a task and operates in a multi-task environment under control of DAX.

If DAX has not been already loaded and started, then load DAX with the standard MODCOMP FILL procedure.

The DAX ID message will be printed after rocking the RUN/HALT switch, followed by:

```
DAX (0)
??
```

If the task's object is to be loaded from the paper-tape reader, the object is mounted in the reader and the operator types:

```
LOAD.
```

and the task will load and execute.

If the task's object is to be loaded from a device other than the paper-tape reader, the object is mounted in the proper device and the LDEV directive is executed.

LDEV — LOAD DEVICE: specifies the device used in loading the task program(s) various forms are:

LDEV? — DUMP LOAD DEVICE PARAMETERS, for example,

```
LDEV=PR DEV=A DMP=1 UNIT=0  TRAK=0  FILE=0  GEOM=4
WAD=0 VDMP=9 PIOP
```

which are the default assignments at load time (see table below).

LDEV=xy — ASSIGN LOAD DEVICE: specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follows:

	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	WAD	VDMP	IOP
MOVING-HEAD DISC	MH	1	1	0	0	0	4	0	1	PIOP
FIXED-HEAD DISC	FH	2	2	0	0	0	8	0	2	PIOP
MAGNETIC TAPE	MT	4	4	0	0*	0	0*	0	4	PIOP
FLOPPY DISC	FP	9	3	0	0	0	4	0	3	PIOP
CARD READER	CR	5	0*	0*	0*	0*	0*	0	*	*
PAPER-TAPE RDR	PR	A	0*	0*	0*	0*	0*	0	*	*

* Don't Care.

LDEV=xy? ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If the parameters to be used are other than the default values, the proper directives must be executed to modify them.

DEV=#x — Assign device address to the hexadecimal value X (1< or equal to X < or equal to F).

DMP=y — Assign DMP channel number to the value Y (1 < or equal to Y < or equal to 7).

UNIT=z — Assign unit number to the value Z (0 < or equal to Z < or equal to 3).

TRAK=x — Assign track number to the value X (0 < or equal to X < or equal to 8119).

FILE=y — Assign file number to the value Y (0 < or equal to Y < or equal to 200).

GEOM=z — Assign geometry to the value Z (1 < or equal to Z < or equal to 8).

(MODCOMP IV AND CLASSIC 7860/7830 ONLY)

VDMP=x — Assign virtual mode DMP channel number.

WAD=y — Assign a 64K block of core to be loaded.

PIOP
SIOP — Specifies that the load device is on a primary or a secondary I/O processor.

After the load device and any non-standard parameters have been assigned, the LOAD directive is executed.

Example:

```
LDEV=MH,UNIT=2,TRAK=100,WAD=1,LOAD.
     LDEV=MT,FILE=10,LOAD.
```

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

```
LOAD/#(address).
```

The Diagnostic will be assigned a task number and then be initialized. The diagnostic will default to an address of #18/#19, DMP 2/3 for WRITE/READ Channels.

DIRECTIVE PROCESSOR

The automatic tests are written in a diagnostic language referred to as directives, which are interpreted and executed. To input directives to a specific task the user must have this task activated. This is done by commanding DAX with WAKE/task ID.

The task ID is a number from 1 to 15. The activated task will then accept directives, which are separated by commas until a period is detected after which the user's directive string is executed.

Example:

WAKE/1,HANG. Wake task 1 and hang DAX.

OPERATOR CONTROL

The operator can regain control during program execution by depressing console interrupt or master clear, or by typing ↑1 (uparrow-task number).

DECIMAL NUMBERS

All numeric values are assumed to be decimal unless the number is immediately preceded by a (#) character in which case it is considered to be hexadecimal.

STATEMENT NUMBERS

Statement numbers may exist anywhere in the directive string provided they are decimal and fall within the range of 0-7. Unless redefined in the directive string, statement number 0 denotes the start of the directive string.

SPECIAL CHARACTERS

A backarrow (upper case O) or backspace (control H) causes a backspace of one byte position in the TTY input buffer.

A rubout/delete causes a reset to the beginning of the typewriter input buffer. The input routine terminates input and exits when a period is detected. Line feed, carriage return, and spaces are ignored by the program.

CONSOLE SWITCH DEFINITIONS

SWITCH	POSITION	DEFINITION
CSW 0	1	Inhibit milestone messages
CSW 1	1	Loop current test
CSW 2	1	Inhibit error messages
CSW 3	1	Halt on error
CSW 4	1	Trace Directives
CSW 5	1	Keyboard input request
CSW 6	1	Loop sub-test
CSW 7	1	Loop diagnostic
CSW 8	1	Inhibit test milestone messages
CSW 9	1	Input directives from paper tape
CSW 10	1	Inhibit modem test
CSW 11	1	Use external wrap cable for data transfer and enable "Ring" Test
CSW 12	1	Inhibit error message, bit definition
CSW 13	1	Inhibit real time clock
CSW 14	1	Bypass automatic status checks
CSW 15	0	Inhibit optional tests

AUTOMATIC TESTS

INTRODUCTION

Automatic tests (AT) can be executed in any sequence, however, it is recommended that tests first be run in sequence. The tests are designed to test the basic Controller and Channel operation if run in sequence. The higher numbered tests, expect that the basic functions have been tested. Basic checks continue to be made in all tests.

Automatic tests are entered via AT. As long as CSW 5 is reset, the next sequential test will be entered until all tests are executed. An exception to this occurs when specific test numbers are typed following the AT directive, example:

AT/1-8/13-16/20.

The above example would cause the following tests to execute:

1,2,3,4,5,6,7,8,13,14,15,16,20

At the end of the last test, CSW 7 set will cause a pass complete message to be typed and testing to resume at T/1. The pass complete message includes a count of the total number of passes executed. If CSW 7 is reset then the program types:

TESTING COMPLETE

and enters an IDLE mode. At such time the operator may type ↑ (up arrow) followed by the task number if he desires to communicate to the program; otherwise no further testing takes place.

Should a power failure occur during AT and if CSW 5 is reset, then testing will resume at the beginning of the interrupted test. A power failure will not resume the execution of the operators own typed-in directives unless CSW 5 is reset, in which event execution will resume at the beginning of his directive string. All power failures result in the message:

POWER FAILURE

as well as the time-of-day. The program's time-of-day is initialized via TODY:HRS:MIN:SEC. (Refer to the DIAGNOSTIC APPLICATION EXECUTIVE Reference Manual 210-607855-004.)

The automatic test may also be entered via T/x where x specifies the test number, and if CSW 5 is reset, the next sequential test will be entered. CSW 5 set causes program control to return to the operator after the indicated test has completed (this results in a ? being typed).

APPENDIX 10U

EXTRACT

DIAGNOSTIC MANUAL PARALLEL INTERFACE CONTROLLER MODEL 4805

DIAGNOSTIC MANUAL
DATA TERMINAL MODEL 4805-1
COMPUTER LINK MODEL 4820
PARALLEL INTERFACE CONTROLLER MODEL 4805-2
225-200125-003

MODULAR COMPUTER SYSTEMS, INC., PO. Box 6099, 1650 West McNab Road, Ft. Lauderdale, Florida 33310, Tel. (305) 974-1380. TWX 510-956-9725
European Headquarters:
MODULAR COMPUTER SYSTEMS, INC., Molly Millars Lane, Wokingham, Berkshire, England (0734) 788711, TLX 851 849149

SOFTWARE CONFIGURATION

No other software is used as it runs as a stand alone task and has a self-contained loader (Core Image Bootstrap Loader, Catalog Number 601000-001).

The MODCOMP I Core Image Bootstrap Loader is used for program loading. The storage required is less than 4K core.

Load/Start Procedure

Load using the standard FILL procedure. To start, hit RUN and for restarting, hit HALT, MASTER CLEAR, and RUN.

Control Switch Settings

The control switches are used to alter the execution of the tests and also to select the test to be executed.

CSW	0	ON - Halt on Error
	1	ON - Inhibit error printout
	3	ON - Loop in subtest
	7	ON - Select static test
	8	ON - Select output register
	9	ON - Select input to register
	10	ON - Select output to command register
	11	ON - Input status
	12	ON - Output-Input test
	13	ON - Output with DMP
	14	ON - Input with DMP
	15	ON - Output - Data Chain

Program Usage

Automatic testing of the Data Terminal is comprised of two parts - Static Tests an Dynamic Tests. The Static Test and each Dynamic Test is selected by setting a control switch. Immediately following program load, the following message is typed:

```
CONTROLLER ADDRESS?
```

A valid input of 1-3F in hexadecimal is expected. CSW 07 may be set to start the static test. Upon completion of the static portion, the program will type:

```
STATIC TEST COMPLETE
```

Any CSW may be set to run its corresponding Dynamic Test.

Following are descriptions of the Static and Dynamic Tests and their corresponding error messages.

APPENDIX 10V

EXTRACT

AYNCHRONOUS TERMINAL CONTROLLER

GENERAL DESCRIPTION

This program is provided for functional testing of the Asynchronous Terminal Controller, Asynchronous Modem Controller, and Multifunction Controller Asynchronous Channels. The program incorporates extensive error reporting and troubleshooting aids via the control switches and the console keyboard/printer.

The program can accommodate user generated test sequences from the console keyboard/printer using a simple directive language. Automatic tests incorporate directive sequence tests. After all automatic tests have been executed, the program will loop the automatic test if control switch 7 is set.

OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

- A MODCOMP II/IV or CLASSIC series compatible CPU (minimum 32K)
- A console keyboard/printer will be needed to print informational/error messages.
- A binary input device to load the diagnostic
- An Asynchronous Terminal Controller, Model 4806/4807, Asynchronous Modem Controller, Model 4808, or Multifunction Controller Asynchronous Channels, Model 4858.
- DAX Revision G.0 or later

SOFTWARE CONFIGURATION

This is a DAX task which requires assembling by the Macro Assembler. The Job Control cards to assemble the program with paper tape are:

```
$JOB
$ASS      SI=MT2, BO=PP, LO=LP
$REW      SI
$EXE      M2A
$WEOF     BO
$REW      SI
$$
```

The object output consists of a relocatable binary file. No editing or cataloging of the object program is required. Library update (LIB) may be used to copy it to other mediums.

CONTROL SWITCH DEFINITIONS

CSW 0 ON — INHIBIT MILESTONE MESSAGES
This switch inhibits milestone messages whic include title messages and pass complete Error messages will not be affected by thi switch.

OFF — NO FUNCTION

CSW 1 ON — LOOP CURRENT TEST
Loop current test, test results and repor errors as detected.

CSW 2 ON — INHIBIT ERROR MESSAGES
Inhibit printing all error messages on th console. Milestone messages will not b affected.

OFF — PRINT ERROR MESSAGES

CSW 3 ON — HALT ON ERROR
Program will halt on error after typin appropriate error messages. The user ma then set control switches to loop the tes sequence for troubleshooting.

OFF — INHIBIT HALT ON ERROR

CSW 4 ON — TRACE DIRECTIVES
The directive name is displayed befor execution.

CSW 5 ON — ALLOW OPERATOR INPUT OF DIRECTIVES
Automatic test execution will stop and "?? will be printed on the console. The user ma now input directive test sequences via th console.

OFF — NO FUNCTION

CSW 6 ON — LOOP SUB-TEST
Program will loop on a sub-test and prevent incrementing to next channel, when used with 'CHAN=XX' will cause auto test to loop on desired channel.

OFF — ADVANCE TO NEXT SUB-TEST

CSW 7	ON	LOOP DIAGNOSTIC This switch will be interrogated following the final test and if on will cause the program to be repeated starting with the original test.
	OFF	HALT WHEN COMPLETED
CSW 8	ON	INHIBIT TEST MILESTONE MESSAGES AND INHIBIT OPERATOR INSTRUCTIONS AT INITIAL PROGRAM STARTUP
CSW 9	ON	INPUT DIRECTIVES FROM PAPER TAPE
CSW 10	ON	APPEND ALL ENABLED CHANNEL'S PARAMETERS TO ERROR MESSAGES (DP). (Note: Prints lots of data, use only if channel interaction problem).
CSW 11	ON	ENABLE TERMINAL TESTS
CSW 12	OFF	EXECUTE OPTIONAL TESTS
CSW 13	ON	INHIBIT REAL TIME CLOCK
CSW 14	ON	WAIT BEFORE EXECUTING VERIFY EXTERNAL WRAP (1st OPTIONAL TEST)
	OFF	DELAY 30 SECONDS BEFORE EXECUTING VERIFY EXTERNAL WRAP (16 CHANNEL ONLY)
CSW 15	ON	DO NOT INCREMENT TO NEXT 4 CHANNEL GROUP DURING LAST OPTIONAL TEST (16 CHANNEL ONLY)
	OFF	INCREMENT TO NEXT 4 CHANNEL GROUP

LOAD START PROCEDURE

This program is loaded by DAX as a task and operates in a multi-task environment under control of DAX.

If DAX has not been already loaded and started, then load DAX with the standard MODCOMP FILL procedure.

The DAX ID message will be printed after rocking the RUN/HALT switch, followed by:

```
"DAX (0)
 ??"
```

If the task's object is to be loaded from the paper-tape reader, the object is mounted in the reader and the operator types:

"LOAD."

and the task will load and execute.

If the task's object is to be loaded from a device other than the paper-tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

"LDEV" LOAD DEVICE: specifies the device used in loading the task program(s) various forms are:

"LDEV?" DUMP LOAD DEVICE PARAMETERS, e.g.,

"LDEV=PR DEV=A DMP=1 UNIT=0 TRAK=0 FILE=0 GEOM=4 WAD=0 VDMP=9 PIOP"

which are the default assignments at load time (see table below

"LDEV=xy" ASSIGN LOAD DEVICE: specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follow

								(MC IV ONLY)		
	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	WAD	VDMP	IOP
MOVING HEAD DISC	MH	1	1	0	0	0	4	0	1	PIOP
FIXED HEAD DISC	FH	2	2	0	0	0	8	0	2	PIOP
MAG TAPE	MT	4	4	0	0*	0	0*	0	4	PIOP
FLOPPY DISC	FP	9	3	0	0	0	4	0	3	PIOP
CARD READER	CR	5	0*	0*	0*	0*	0*	0	*	*
PAPER TAPE RDR	PR	A	0*	0*	0*	0*	0*	0	*	*

* Don't Care.

"LDEV=xy?" ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If the parameters to be used are other than the default values, the proper directives must be executed to modify them.

"DEV=#x" Assign device address to the hexadecimal value "X" (1< or equal to X < or equal to F).

"DMP=y" Assign DMP channel number to the value "Y" (1 < or equal to Y < or equal to 7).

"UNIT=z" Assign unit number to the value Z (0 < or equal to Z < or equal to 3).

"TRAK=x" Assign track number to the value X (0 < or equal to X < or equal to 8119).

"FILE=y" Assign file number to the value "Y" (0 < or equal to Y < or equal to 200).

"GEOM=z" Assign geometry to the value Z (1 < or equal to Z < or equal to 8).

(MC IV ONLY)
"VDMP=x" Assign virtual mode DMP channel number.

"WAD=y" Assign a 64K block of core to be loaded.

"PIOP" Specifies that the load device is on a primary or
"SIOP" a secondary I/O processor.

After the load device and any non-standard parameters have been assigned, the "LOAD" directive is executed.

Example:
"LDEV=MH,UNIT=2,TRAK=100,WAD=1,LOAD."
"LDEV=MT,FILE=10,LOAD."

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

Load/#(address).

The ATCD will be assigned a task number, and then be initialized. The ATCD will default to an address of #18.

Tests 29-53 - Optional Test (Set control switch 12=0 tc enable optional tests, requires external channel wrap. 16 channel ATC/AMC only, see test 58 - 75 for Multifunction.)

Test 29 -- Verify External Wrap

Purpose:

1) Configure channel interface type, only performed the first time the test is run.

2) Performs a 30-second wait or delay until CSW 14 set to 0 every time the test is executed to allow the external cable to be moved. (30 second delay may be bypassed if cables are available for all channels.)

3) Insure that the proper external cable is installed and operational for the optional test.

Method:

1) The operator is asked to configure the channels by entering an 'R' for RS-232 or a 'C' for current interface. The question will be asked for each group of 8 channels. The operator has the opportunity to change any group type after all groups have been initially set and before entering 'C' to continue. A message is printed informing the operator when this function is enabled.

2) The operator can move the cable within 30 seconds of the message "channels X-X" which informs him which channels are to be tested next and the test will continue automatically after the delay. If the operator does not have time to change the cable he may set CSW 14=1 and the program will wait until CSW 14 is set to 0 before continuing.

3) Channel pairs are enabled and data is transferred using quick transfer initiate and test and transfer mode. Checks are made for proper transfer of data between externally wrapped channels.

```
"0,JP/1/SW%14,"
"DM/DELS,1,JP/3/SW%14=0,RLQ,JP/1/SW%14,"
"3,MC,MCCH,NW,"
"4,P1=CHAN,"
"6,CN/P1-P4/P3-P2,CH/P1,LO/0+1,CH/P3,LO/1+1,"
"CH/P1/P4,LI/0,P8=0,AC,CP,"
"CH/P2/P3,LI/0,P8=1,AC,CP."
```

APPENDIX 10W

EXTRACT

CONSOLE KEYBOARD

1.0 GENERAL DESCRIPTION

This program supports the functional diagnosis of the keyboard/printer portion of the TTY controller. The program is MC I, II, III, IV compatible. Minimal operator intervention is required for completion of automatic testing and console switches allow dynamic control of program execution. The operator may dynamically specify tests. The program will continue thru to completion on models not equipped with the control panel.

1.1 PURPOSE

The purpose of the program is to provide diagnostic and checkout capability for the keyboard/printer portion of the TTY controller.

2.0 OPERATING ENVIRONMENT

2.1 HARDWARE CONFIGURATION

2.1.1 a) MC I, II, III, or IV central processor with a minimum of 4K words random access memory.

2.1.2 b) A console keyboard/printer and paper tape reader controller (device address #A default, can be reassigned).

2.1.3 c) A console input/output device, console TTY, console keyboard/printer, or console CRT display.

2.1.4 d) Binary input device for program loading.

2.2 SOFTWARE CONFIGURATION

a) No software is used other than the program itself as it runs only as a stand alone and has a self-contained loader (Core Image Bootstrap Loader, Catalog Number 60100U-001).

2.3 CONTROL SWITCH DEFINITIONS

The console control switches may be used to alter program executed as defined below:

CSW 0 ON — PRINT CSW DEFINITIONS/INHIBIT MILESTONE MESSAGES.
Following program load causes output of control switch definitions followed by a halt. At all other time this switch inhibits milestone messages which includes: title message and pass count. Error messages will not be affected by this switch.

OFF — NO FUNCTION.

CSW 1 ON — LOOP CURRENT TEST.
Loop current test, test results and report errors as detected.

OFF — ADVANCE TO NEXT TEST.

CSW 2 ON — INHIBIT ERROR MESSAGES.
Inhibit printing all error messages on the console printer. Milestone messages will not be affected by this switch.

OFF — PRINT ERROR MESSAGES.

CSW 3 ON — HALT ON ERROR.
Following and error halt, register contents may be examined for error/status bits. The user may at this time set control switches to loop the test sequence for trouble shooting.

OFF — INHIBIT HALT ON ERROR

CSW 4 ON — DISABLE REAL TIME CLOCK.
The real time clock if present will be disabled. A Master Clear restart must occur to restart the clock.

OFF — NO FUNCTION
The real time clock is normally enabled and running unless disabled by above.

CSW 5 ON — ALLOW OPERATOR TO SPECIFY TEST.
!SELECT TEST will be printed on the console keyboard/printer. The operator may then type in the name of the test followed by a carriage return. Preceding the !SELECT TEST message, the list of available tests will be printed (inhibit with CSW 0=ON).

OFF — NO FUNCTION

CSW 6 ON HALT BEFORE TEST.
Halt prior to executing test to allow changes in other control switches.

OFF NO FUNCTION

CSW 7 ON LOOP TEST SECTION.
Static tests: The switch will be interrogated at pass complete time and if on will cause another pass of the static tests.

Dynamic tests: The switch will be interrogated at the end of the dynamic tests and if on will cause another pass of the dynamic tests.

OFF NO FUNCTION
Static tests: Static tests will be allowed to complete and the dynamic tests will start.

Dynamic tests: At the end of dynamic tests, the END OF DYNAMIC TESTS message will be printed.

CSW 8 thru 15 DATA SWITCHES only, not control functions.
Specify ASCII character as output test data.

CONSOLE INTERRUPT The console interrupt (MC II,III,IV) may be used to terminate any message typeout in progress.

.4 LOAD/START PROCEDURE

Load using the standard MODCOMP I fill procedure. The program will halt after a successful load. At this time, if a device address different from the default address of #A is desired, the operator must set console switch 2 and then depress run. The program will halt a location #107 with a register 1 loaded with #A. The user then enters his desired address in hex into register 1 and depresses run. If no device address change is desired, the operator merely depresses run without setting switch 2. The program then begins execution at location #100. To restart the program from the beginning depress MASTER CLEAR then RUN.

2.4.1 SET_UP (assuming paper tape)

Central Processor: on, halt, master clear
Console Keyboard/Printer: on-line
Paper Tape Reader: on*, tape in reader

2.4.2 LOADING

a) Enter the device address in the console switches (HEX 000A assuming paper tape reader).

b) Depress FILL, RUN
Reader will read tape until end of program is reached and then stop with the paper tape still in the reader. The central processor will halt at location #2B if the load is successful. Otherwise, if a checksum error has occurred, the central processor will loop at #28. See section 2.4 for device address change directions.

2.4.3 START

Set the console switches; CSW 0 ON will print the CSW definitions if desired. Rock the RUN/HALT switch to HALT and then back to RUN to start program execution. The typeout may be terminated by master clearing.

3.0 FUNCTIONAL_CONTENT

The program is divided into two parts: static tests and dynamic tests. Upon start or restart, the static tests and then the dynamic tests are executed. The static tests require no operator input.

---

* The ON-OFF switch on the high speed reader selects the reader to be used.

ON = high speed reader OFF = ASR reader if present

APPENDIX 10X
EXTRACT
DMP LINE PRINTER

GENERAL DESCRIPTION

This program provides extensive static and dynamic testing cf the line printer anc controller via directives, under the Diagnostic Applications Executive (DAX), Catalog Number 607855-000, Revision G.0 or later. Automatic tests are provided and may be executed via operator contrcl. The operator may define his own tests with directives entered via the console keyboard/printer.

Refer to the DIAGNOSTIC APPLICATIONS EXECUTIVE Reference Manual 220-607855-004 for further information on DAX.

PURPOSE

This program is designed to provide functional testing of the line printer controller and line printer during

- o Manufacturing Test
- o Customer acceptance
- o Field service
- o Preventive maintenance

CONFIGURATION

This program requires the following configuration:

SOFTWARE

DAX Catalog Number 607855-000, Revision G.0 or later; Line Printer Diagnostic 607855-013x.y, relocatable object program.

HARDWARE

MODCOMP II, III, IV, or CLASSIC 78xy CPU with at least 16K memory.

Binary input device for program loading
Console Keyboard/printer
Line printer controller (MODELS 4211/14, 4854/55/64, 4856/66, 4860/70)
Line printer:
Data Printer or
Data Products

CONTROL SWITCH DEFINITIONS

Following program load, these definitions will apply to the line printer task:

CSW 0 ON — INHIBIT MILESTONE MESSAGES
This switch inhibits milestone messages which include title, pass complete messages. Error messages will not be affected by this switch.

OFF — PRINT MILESTONE MESSAGES

CSW 1 ON — LOOP CURRENT TEST
Loops current test, test results and report errors if detected.

CSW 2 ON — INHIBIT ERROR MESSAGES
Inhibits printing of all error messages, but does not affect milestone messages.

CSW 3 ON — HALT ON ERROR
The program will be "halted" (execution stopped) upon detection of an error after reporting any error messages. The program may be restarted via a START/n, or waked up via a WAKE/n Command.

CSW 5 ON — OPERATOR INPUT OF DIRECTIVES
"?" will be printed on console and the operator may input directives via the console device. This switch must be reset to execute auto tests "AT".

CSW 6 ON — LOOP ON OPERAND
Prcgram will loop on subtest.

CSW 7 ON — LOOP AUTO TESTS
When auto-tests "AT". are executing, this switch is tested at pass complete time and if set will allow another pass of the auto tests.

OFF — DON'T LOOP AUTO TESTS
At pass complete time, this task will relinquish rather than restart auto tests.

CSW 8 ON — ALTERNATE FORMAT MESSAGES
This switch inhibits the error header or error messages, and the test name message on auto-tests, and the startup informational message.

CSW 9 ON — PAPER TAPE READER INPUT OF DIRECTIVES
If the rubout key is depressed with this switch set as a resonse to "?" the directive input will be read from the paper-tape reader. Reset this switch befcre the tape stops moving to reset this state for the next directive input.

CSW 11 ON BYPASS ATTENTION INTERRUPTS TEST
This switch causes the Attention Interrupts Test to be byoassed.

CSW 12 ON INHIBIT BOTTOM-OF-FORM TEST/USE ON TI 810 or TTY 40
This switch inhibits the bottom-of-form test and should be used on Models 4856/66 (MFC TI Model 810) and 4860/70 (MFC TTY Model 40). Essential timing mocifications also are performed by the program to meet the requirements of these printers.

CSW 13 ON DISABLE REAL-TIME CLOCK
The clock enable is turned off inhibiting all timing functions. The directive CKON with CSW 13 off will turn on the clock.

The task is initialized with hardware control switches enabled, the software ccntrol switches may be enabled via the CSW directive.

LOAD START AUTO-TEST PROCEDURE

This program is loaded by DAX as a task and operates in a multi-task environment under control of DAX.

If DAX has not been already loaded and started, then load DAX with the standard MODCOMP FILL procedure.

The DAX ID message will be printed after rocking the RUN/HALT switch, followed by:

"DAX (0)
??"

LOADING

If the task's object is to be loaded from the paper-tape reader, the object is mounted in the reader and the operator types:

"LOAD."

and the task will load and type the startup message.

If the task's object is to be loaded from a device other than the paper-tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

"LDEV" LOAD DEVICE: specifies the device used in loading the task program(s); various forms are:

"LDEV?" DUMP LOAD DEVICE PARAMETERS, e.g.,
"LDEV=PR,DEV=A,DMP=1,UNIT=0,TRAK=0,FILE=0,GEOM=4,WAD=0,VDMP=9,PIOP".

which are the default assignments at load time (see table below).

"LDEV=XY" ASSIGN LOAD DEVICE: specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follows:

							(VIRTUAL ONLY)		
	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	VDMP	IOP
MOVING-HEAD DISC	MH	1	1	0	0	0	4	1	PIOP
FIXED-HEAD DISC	FH	2	2	0	0	0	8	2	PIOP
MAG TAPE	MT	4	4	0	0*	0	0*	4	PIOP
FLOPPY DISC	FP	9	3	0	0	0	4	3	PIOP
CARD READER	CR	5	0*	0*	0*	0*	0*	0*	*
PAPER-TAPE RDR	PR	A	0*	0*	0*	0*	0*	0*	*

*Don't care.

"LDEV=xy" ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If the parameters to be used are other than the default values, the proper directives must be executed to modify them.

"DEV=#x" Assign device address to the hexadecimal value "X" (1 < or equal to X < or equal to #F).

"DMP=y" Assign DMP channel number to the value "Y" (1 < or equal to Y < or equal to 15).

"UNIT=z" Assign unit number to the value Z (0 < or equal to Z or equal to 3).

"TRAK=x" Assign track number to the value X (0 < or equal to X < or equal to 8119).

"FILE=y" Assign file number to the value "Y" (0 < or equal to Y < or equal to 200).

"GEOM=z" Assign geometry to the value Z (1 < or equal to Z < or equal to 100).

(MODCOMP IV and CLASSIC 78xy Only):

"VDMP" Assign virtual mode DMP channel number

"WAD" Specifies which 64K block of memory is to be loaded.

(MODCOMP IV Only):

"PIOP" Specifies that the load device is on a primary I/O processor

"SIOP" Specifies that the load device is on secondary I/O processor

After the load device and any non-standard parameters have been assigned, the "LOAD" directive is executed.

EXAMPLE: LDEV=MH,UNIT=1,TRAK=398,LOAD. This assigns the load device as the moving-head disc, unit 1, track 398.

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

Load/#(address).

EXAMPLE: LOAD/#2000. LOAD starting in location #2000.

(MODCOMP IV and CLASSIC 78xy Only):

If the program is in virtual mode then the 64K module specified t "WAD" (initially 0) will be loaded. Thus to load a program int location #10000 recuires the following:

- o virtual mode
- o WAD=1
- o specify "LOAD/0 (if no address follows the "LOAD" the the next available virtual address will be loade at WAD 1)

After a program load in virtual mode, the program bounds ar displayed; first, as a "virtual" address (a 16-bit address prio to indexing or mapping) and second, as an "actual" address (final unique 18-bit address derived by mapping).

STARTUP

Upon being successfully loaded, the program will be assigned task number and initialized. The following will then be printed:

LINE PRINTER DIAGNOSTIC CAT. NO. 607855-013 Rev. x.y (cate)

A startup message with examples will then be printed.

Testing may now be started by resetting CSW 5, entering the devic address, DMP channel number (if present) and by typing "AT".

Example:

DA=7,COL=110,AT.	Non-dmp printer on MODCOMP II with small paper
DA=7/7/7,PIOP,COL=132,AT.	Dmp printer on MODCOMP IV with large paper

If the CPU is a MC IV or CLASSIC 78xy the following message will appear on the console:

IS THIS CONTROLLER IN SINGLE OR DUAL WORD MODE? (S OR D)

"D" should be entered if the controller is set in DUAL WORD transfer mode on a MODCOMP IV or CLASSIC 78xy; otherwise "S" should be entered. The parameter DUAL is set to "1" if "D"; otherwise if "S" set to "0". Special TA simulation is required for the "D" case during special character terminate.

NOTE: The AT directive should be executed with CSW 5 set if the operator does not want to run auto-tests. This sequence initializes device parameters and must be performed before any I/O directives are executed. In this case, control is immeciately returned to the operater after reporting the device type. The device type message will report whether the controller is NON-DMP or DMP and whether the device is a DATA PRINTER or DATA PRODUCTS.

Auto tests will execute in interrupts transfer if a NON-DMP Controller or DMP Transfer if a DMP Controller.

AUTOMATIC TESTING

All testing is done with directive, sequences. Individual tests may be executed by the use of the

"T/n" directive, wherein "n" is the number of the test desired. The directive sequence of any test may be displayed by executing the interrogative form of the directive, for example,

"T/1?" will display, via the console printer, the directive sequence for Test 1.

Each test will identify itself by printing a header message containing the test number and the function to be tested. This message may be inhibited by setting CSW 8.

When a failure occurs, a header message will be printec; this message contains the following:

"T/n", where n is the number of the failing test;

"xxxx error", where xxxx is the mnemonic of the directive detecting the failure;

"aa bb cc dd", where the mnemonics of the last four directives executed are dislayed;

"ISW, TIW, OCW, DIC, SIC, TA, TC, CC", where the input status word, the transfer initiate word, the output command word, the data interrupt counter, the service interrupt counter, the transfer address, the transfer count, the character count and the transfer mode are displayed.

If the halt or error switch (CSW 3) is set, the task will halt error. To regain control of the task, the operator must fi execute a command command via DAX. If CSW 5 is set, control w be resumed to DAX, if not, ↑0 (up arrow zero) should be typed return control to DAX and the DAX message will be printed:

```
DAX (0)
??
```

Enter:

WAKE/n,HANG. to wake task "n" at "?"

STRT/n,HANG. to resume task "n" at point of error

If the operator WAKES this task, enter:

HSTY,DP,DS. to display directive history, parameters, an status.

The directives comprising any test may be displayed by entering

T/n? where "n" is the test number.

Auto testing may be initiated or resumed at a particular pcint executing T/n with CSW 5=0.

APPENDIX 10Y

EXTRACT

MAG TAPE EXERCISER

CONFIGURATION

The Magnetic Tape Unit Controller requires a MODCOMP II, II/2, III, IV, or CLASSIC 78xy Computer with a minimum of 16K of memory, one or more magnetic tape transports (Models 4145-1 and 4146-1), a binary input device and a teletype keyboard/printer. If there is less than 32K of core, the Write Max Test (Test 30) will not execute.

SUBROUTINES USED

The Core-Image Bootstrap Loader (Catalog Number 600000-001) is used for program loading.

STORAGE REQUIRED

Locations 0-#3124 are used by the program for Revision I.0.

TIMING

All timing tests are predicated on a 45 or 75 ips tape transport.

LOAD/START PROCEDURE

Load using the standard fill procedure. The program starts automatically after load complete unless CSW 1 is on, in which case the program stops at location #0026. Restart is accomplished by Master Clear in Run Mode (except MCIV is Halt, Master Clear, Run). On a CLASSIC 7830 restart is accomplished by the following procedure:

1. Depress and hold Console Interrupt (CI).
2. Depress HALT while holding CI.
3. Depress MASTER CLEAR while holding CI.
4. Depress RUN while holding CI.
5. Release CI.

CONSOLE SWITCH SETTINGS

CSW 0 is set to 1	Type out console switches and directive. Output test directives as program operates.
CSW 1 is set to 1	Loop on current test directive sequence.
CSW 2 is set to 1	Inhibit error typeouts.
CSW 3 is set to 1	Halt on error (after typeout).
CSW 4 is set to 1	Operate tape under non interrupt programmed I/O.
CSW 5 is set to 1	Allow operator input of directives.
CSW 6 is set to 1	Use paper-tape reader as source of directives (if CSW 5 is set to 1).

CSW 7 is set to 1	Loop exerciser program.
CSW 8 is set to 1	Inhibit single cycle scan.
CSW 9 is set to 1	Inhibit Virtual Mode Entry in MODCOMP IV, CLASSIC 7860, or CLASSIC 7830.
CSW 10 is set to 1	Inhibit auto retry RD-WR of records containing parity error.
CSW 11 is set to 1	Dump directive buffer to paper tape (Paper-Tape Reader/Punch with Controller (BRPE), Model Numbers 4512-E1, 4515-E1).
CSW 12 is set to 1	Loop on current test.
CSW 13 is set to 1	Inhibit real time clock interrupts.
CSW 14 is set to 1	Operate tape under programmed I/O only.
CSW 15 is set to 1	Execute abbreviated tests only.

APPENDIX 10Z
EXTRACT
MODULAR COMMUNICATIONS MACROS

MODCOMP II/IV/CLASSIC 7830/7860 COMMUNICATIONS PROCESSOR
DIAGNOSTIC MANUAL

MODULAR COMMUNICATION MACROS
DIAGNOSTIC

October 10, 1979

Publication Number: 220-145000-003
Product Number and Revision: 607855-008C.0
Modular Computer Systems, Inc.
1650 W. McNab Road
Fort Lauderdale, Florida 33309

OPERATING ENVIRONMENT

HARDWARE CONFIGURATION

- o MODCOMP II, IV , CLASSIC 7860 or 7830 Communications Processors
- o 16K Minimum Memory Size
- o Console Keyboard Printer at Device Address #A
- o Optionally a Disc Controller for Concurrent DMP Activity:
  Model 4126 thru 4129 Cartridge MHD or
  Model 4123,4136,4137 200 TPI MHD

SOFTWARE CONFIGURATION

- o DIAGNOSTIC APPLICATION EXECUTIVE 607855-000 revision G.2 or later
- o Binary relocatable version of this program 607855-008

CONTROL SWITCH DEFINITIONS

The console control switches may be used to alter program execution as defined:

CSW 0 ON INHIBIT MILESTONE MESSAGES

This switch inhibits milestone messages which include title message and pass count. Error messages will not be affected by this switch.

OFF ALLOW MILESTONE MESAGES

CSW 1 ON LOOP CURRENT TEST

Loop current test, results and report errors as detected.

OFF ADVANCE TO NEXT TEST

CSW 2 ON INHIBIT ERRCR MESSAGES

Inhibit printing all error messages on the console printer. Milestone messages will not be affected by this switch.

OFF PRINT ERROR MESSAGES

CSW 3 ON HALT ON ERROR

Program will halt on error after typing appropriate error messages. The user may at this time set control switches to loop the test sequence for troubleshooting.

OFF INHIBIT HALT ON ERROR

CSW 4 ON TRACE DIRECTIVES

CSW 5 ON ALLOW OPERATOR INPUT OF DIRECTIVES

Automatic test execution will stop and ? will be printed on the console keyboard/printer. The user may now input a directive test sequence from the console keyboard/ printer.

OFF IGNORE OPERATOR INPUT

CSW 7 ON LOOP DIAGNOSTIC

This switch will be interrogated following the final test and if on will cause the automatic tests to be repeated.

OFF SUSPEND PROGRAM EXECUTION AFTER LAST TEST

CSW 8 ON INHIBIT EXPANDED ERROR MESSAGES

OFF NO EFFECT ON ERROR MESSAGES

CSW 10 ON INHIBIT DMP

Concurrent DMP reads from disc is inhibited until another RD directive with CSW 10 OFF occurs.

OFF Allow concurrent DMP reads unless previously inhibited.

CSW 11 ON INHIBIT ENTERING VIRTUAL MODE (MODCOMP IV ONLY)

This program will not issue a "MCIV" directive at pass 1 complete.

OFF ENTER VIRTUAL MODE after first pass (MODCOMP IV or CLASSIC 7830/7860 ONLY).

CSW 12 ON RMI (REQUEST MULTIPROCESSOR INTERRUPT, an external signal) executed immediately before instruction under test.

OFF NO RMI EXECUTED

CSW 13 NOT USED

CSW 14 ON ABBREVIATED TESTING

Execute an abbreviated version of the automatic tests, reducing pass completion time.

OFF EXECUTE COMPLETE TEST

CSW 15 ON CONTINUE UPON ERROR

Continue execution of macro although error condition has existed.

OFF TERMINATE UPON ERROR

Macro execution will be terminated upon occurrence of error, allowing execution of next directive in sequence.

LOAD START PROCEDURE

This program is loaded by DAX as a task and operates in a multi-task environment under control of DAX. See the DIAGNOSTIC APPLICATIONS EXECUTIVE Reference Manual (210-607855-004) for a more complete explanation of DAX.

If DAX has not been already loaded and started, then load DAX with the standard MODCOMP Fill procedure.

The DAX ID message will be printed after rocking the HALT/RUN switch, followed by:

```
DAX (0)
??
```

If the task's object is to be loaded from the paper-tape reader, the object is mounted in the reader and the operator types:

```
LOAD.
```

and the task will load and execute.

If the task's object is tc be loaded from a device other than the paper-tape reader, the object is mounted in the proper device and the LDEV directive is executed.

LDEV (Load device): Specifies the device usec in loading the task program(s) various forms are:

LDEV? (Dump Load Device Parameters) for example,
LDEV=PR DEV=A DMP=1 UNIT=0 TRAK=0 FILE=0 GEOM=4 WAD=0 VDMP=9 PIOP

which are the default assignments at load time (see table below).

LDEV=xy (Assign Load Device): specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follows:

	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	** WAD	** VDMP	** IOP
Moving Head Disc	MH	1	1	0	0	0	4	0	1	PIOP
Fixed Head Disc	FH	2	2	0	0	0	8	0	2	PIOP
Mag Tape	MT	4	4	0	0*	0	0*	0	4	PIOP
Floppy Disc	FP	9	3	0	0	0	4	0	3	PIOP
Card Reader	CR	5	0*	0*	0*	0*	0*	0	*	*
Paper Tape RDR	PR	A	0*	0*	0*	0*	0*	0	*	*

*Don't Care - Parameter not applicable to this device.

** MODCOMP IV and CLASSIC 7830/7860 virtual mode only

LDEV=xy? ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If the parameters to be used are other than the default values, the proper directives must be executed to modify them.

DEV=#x Assign device address to the hexadecimal value X
(1 < or equal to X < or equal to F).

DMP=y Assign DMP channel number to the value Y
(1 < or equal to Y < or equal to 7).

UNIT=z Assign unit number to the value Z
(0 < or equal to Z < or equal to 3).

TRAK=x Assign track number to the value X
(0 < or equal to X < or equal to 8119).

FILE=y Assign file number to the value Y
(0 < or equal to Y < or equal to 200).

GEOM=z Assign geometry to the value Z
(1 < or equal to Z < or equal to 8).

(MODCOMP IV, CLASSIC 7830/7860 Only)

VDMP=x Assign virtual mode DMP channel number.

WAD=y Assign a 64K block of core to be loaded.

(MODCOMP IV only)

PIOP	Specifies that the load device is on a primary I/O processor
or	
SIOP	Specifies that the load device is on a secondary I/O processor

After the load device and any non-standard parameters have been assigned, the LOAD directive is executed.

EXAMPLE: LDEV=MH,UNIT=1,TRAK=398,LOAD. This assigns the load device as the moving head disc, unit 1, track 398.

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

Load/#(address).

(VIRTUAL MODE ONLY)

If the program is in virtual mode then the 64K module specified by WAD (initially 0) will be loaded. Thus to load a program into location #10000 requires the following:

- o virtual mode
- o WAD=1
- o specify LOAD/0

(if no address follows the LOAD then the next available

virtual address will be loaded at WAD 1).

After a program load in virtual mode, the program bounds are displayed; first, as a "virtual" address (a 16-bit address prior to indexing or mapping) and second, as an "actual" address (a final unique 18-bit address derived by mapping).

EXECUTION TIME

Pass complete time for the automatic tests is at least 30 minutes and will increase if other tasks are active. Pass complete time for the abbreviated tests (CSW 14 = ON) is approximately 10 minutes.

METHOD OF USAGE

OPERATION

Upon initial loading, the program will print the startup message and a "?" requesting operator input. The program will sequentially execute all automatic tests after the operator types AT. (CSW 5 OFF.) The initialization and completion of all tests will be indicated on the console keyboard printer. Error messages will be reported unless CSW 2=ON. At the end of the automatic tests, CSW 7 will be interrogated. If CSW 7 is set, the automatic tests will be repeated until CSW 7 is reset. Upon completion of automatic tests, the program will respond with "?". The operator may optionally set the CSW's and enter a directive sequence to further test or hang the program by typing "HANG".

Operator control may be gained at test complete time by depressing CSW 5. Immediate operator control may be gained by depressing console interrupt; concurrent DMP activity will not be affected.

The program will test lower 32K or upper 32K depending on where the buffers reside.

If a disc drive is present and CSW 10 is reset (allowing disc reads for concurrent DMP activity), default disc assignments will be listed on the console. Non-standard parameters must be assigned before executing the AT directive. (A description of concurrent DMP activity is found later in this section.)

CSW 10 must be set (to inhibit disc activity) if the assigned controller is being used by either another task or by DAX for program loading.

AUTOMATIC TESTS

Automatic tests are entered via the "AT." directive. As long as CSW 5 is reset the next sequential test will be entered until all tests are executed. At the end of the last test, a pass complete message will be printed. If CSW 7 is set, the automatic tests will be restarted at test #1 (T/1); otherwise testing is complete and the program will enter a relinquish "idle" mode.

An exception to the sequential execution of automatic tests occurs when specific test numbers are typed following the "AT" directive:

```
AT/1-3/2/7-9.
```

The above example will cause the following tests to execute:

```
1,2,3,2,7,8,9
```

Should a power failure occur during "AT" and if CSW 5 is reset, then testing will resume at the beginning of the interrupted test. If CSW 5 is set, the task will "wake up" at "?", requesting directive input.

The automatic tests may also be entered via T/x where x specifies the test number and if CSW 5 is reset when that test completes, the next sequential test will execute.

The directive contents of each test may be displayed via "T/x?" where x is the test number. This is helpful whenever additional information is required concerning a test.

It is suggested that the operator run the automatic tests with CSW 3 set. This will cause the program to halt further testing upon an error and allow the operator to examine the error results. If the task has halted on error and CSW 5 is not set, it must be restarted under control of DAX. If CSW 5 is set, the error message is printed and control is returned to the operator. Type "↑0" (uparrow zero) to get control of DAX. DAX will print:

```
DAX (0)
??
```

Enter:

```
WAKE/x,HANG.  (where x is the task number)
              to wake the task at "?".
```

or:

```
STRT/x,HANG. to continue the task at the point of error.
```

To cycle on a test, set CSW 1. To cycle on a error, the operator may execute a "tighter" loop by entering his own directive sequence. Control of a task must first begain by typing "^x", where x is the task number or executing "WAKE/x,HANG." under DAX. CSW 5 should be set to maintain control of the task (signified by "?").

To inhibit error messages set CSW 2. It the operator desires to supress all error messages but still be informed of an error with a bell, then he must set the "ring bell on error" option by typing to his task:

"BLON." (bell on)

This option is reset via "BLOF" (bell off). Should the task be running when the operator decided to use the bell option, "BLON" or "BLOF" may be executed under DAX control:

"BLON/x." (where x is the task number)
"BLOF/x."

To assist the operator in information gathering, CSW 4 when set, results in the typing of the name of the directive which is currently executing. The current contents of parameters may also be dumped by previouly specifying them in the "TPAR" directive. It is important to note that in this mode, the total directive processing time is increased and may affect the error results if critical timing situations are a factor.

The following tests are executed automatically under the control of the "AT" directive.

T/1 Test for correct byte moves with no mask compares CW=#0000

```
BC=0,EC/0,MX=0,CW=0,LT/0+1,LS/0/32,JL/6,LS/#FF/32,JL/6,
JP/5,6,P1=0,BL=16,1,P1+1,JR/6/P1>1000,LD/#55/16,
MB,CO,LD/#AA/32,MU,CO,LD/#FF/32,MP,CO,LD/#AA/16,
TB,CO,LD/#22/ 32,TU,CO,LD/#44/32,TP,CO,JR/6/SW%14,JP/1,5
```

T/2 Test extended load/store CW=#0000

```
EC/0,MX=0,CW=0,BL=16,P1=0,1,P1+1,JP/2/P1>1000,
LS/0/16,LD/#FF/16,EM,LS/#FF/16,LD/0/16,EM,JP/2/SW%14,
JP/1,2.
```

APPENDIX 10AA
EXTRACT
MODULAR COMMUNICATIONS CONTROLLER DIAGNOSTIC

UNIVERSAL COMMUNICATIONS SUBSYSTEM

MODELS 1907A, 1907B, 1908 and 1909

DIAGNOSTIC MANUAL

MODULAR COMMUNICATIONS CONTROLLER DIAGNOSTIC

October 10, 1979

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Modular Computer Systems
1650 McNab Road
Fort Lauderdale, Florida 33309

GENERAL DESCRIPTION

This program is provided for functional testing of the Modular Communications Controller and the Integrated Communications Subsystem. The program will incorporate extensive error reporting and troubleshooting aids via the control switches (CSWs) and the console keyboard/printer.

The program can accommodate user generated test sequences from the console keyboard/printer using a simple directive language. Automatic tests will incorporate directive sequence tests. After the automatic test has been executed, the program will loop the automatic test if control switch 7 is set.

Upon initial loading the program will take the maximum available core and will set every memory plane to use byte detect mode if the processor is a CLASSIC 7830 or 7860. To load other tasks the directive "HIPG" must be used accordingly to reflect the space for the new task. Refer to "HIPG" directive for more information.

After each pass it will continue to move the buffers up to the end of available core. Then the next pass the buffers will be reset to low core and continue the process.

OPERATING ENVIRONMENT

This program operates on a MODCOMP II, IV, or CLASSIC 7810/7860/7830 with a minimum of 32K of memory.

A console keyboard/printer will be needed to print informational/error messages.

A binary input device to load the diagnostic is required.

A Communications Controller, Model 1907 A, 1907 B, 1908, or 1909 is required.

The Diagnostic Applications Executive (DAX) program Revision G.2 or later is required.

CONTROL SWITCH DEFINITIONS

CSW C ON PRINT CSW DEFINITIONS/INHIBIT MILESTONE MESSAGES
Following program load causes output of control switch definitions. At all other times this switch inhibits milestone messages which includes title messages and pass complete. Error messages will not be affected by this switch.

OFF NO FUNCTION

CSW 1	ON	LOOP CURRENT TEST Loop current test, test results and report errors as detected.
CSW 2	ON	INHIBIT ERROR MESSAGES Inhibit printing all error messages on the console. Milestone messages will not be affected.
	OFF	PRINT ERROR MESSAGES
CSW 3	ON	HALT ON ERROR Program will halt on error after typing appropriate error messages. The user may then set control switches to loop the test sequence for trouble-shooting.
	OFF	INHIBIT HALT ON ERROR
CSW 4	ON	TRACE DIRECTIVES The directive name is displayed before execution.
CSW 5	ON	ALLOW OPERATOR INPUT OF DIRECTIVES Automatic test execution will stop and "?" will be printed on the console. The user may now input directive test sequences via the console.
	OFF	NO FUNCTION
CSW 6	ON	LOOP SUB-TEST Program will loop on a sub-test and loop on error.
	OFF	ADVANCE TO NEXT SUB-TEST
CSW 7	ON	LOOP DIAGNOSTIC This switch will be interrogated following the final test and if on will cause the program to be repeated starting with the original test. For example: "AT/17-38." will loop from test 17 to test 38 (CSW 12 ON).
	OFF	HALT WHEN COMPLETED
CSW 8	ON	INHIBIT TEST MILESTONES
CSW 9	ON	INHIBIT OPERATOR INPUT WINDOW
CSW 11	ON	INHIBIT ENTERING VIRTUAL MODE
	OFF	ENTER VIRTUAL MODE AFTER ONE PASS COMPLETED
CSW 12	OFF	EXECUTE OPTIONAL TESTS

LOAD PROCEDURE

This program is loaded by DAX as a task and operates in a multi-task environment under control of DAX.

If DAX has not been already loaded and started, then load DAX with the standard MODCOMP FILL procedure.

The DAX Identification (ID) message will be printed after rocking the RUN/HALT switch, followed by:

```
"DAX (0)
??"
```

If the task's object is to be loaded from the paper-tape reader, the object is mounted in the reader and the operator types:

```
"LOAD."
```

and the task will load and execute.

If the task's object is to be loaded from a device other than the paper-tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

"LDEV" LOAD DEVICE: specifies the device used in loading the task program(s) various forms are:

"LDEV?" DUMP LOAD DEVICE PARAMETERS, for example,
"LDEV=PR DEV=A DMP=1 UNIT=0 TRAK=0 FILE=0 GEOM=4 WAD=0 VDMP=9 PIOP"

which are the default assignments at load time (refer to table below).

"LDEV=xy" ASSIGN LOAD DEVICE: specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and default parameters follows:

								(VIRTUAL MODE ONLY)		
	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	WAD	VDMP	IOP
MOVING HEAD DISC	MH	1	1	0	0	0	4	0	1	PIOP
FIXED HEAD DISC	FH	2	2	0	0	0	8	0	2	PIOP
MAGNETIC TAPE	MT	4	4	0	0*	0	0*	0*	4	PIOP
FLOPPY DISC	FP	9	3	0	0	0	4	0	3	PIOP
CARD READER	CR	5	0*	0*	0*	0*	0*	0	0*	PIOP
PAPER TAPE RDR	PR	A	0*	0*	0*	0*	0*	0	0*	PIOP

* Don't Care.

"LDEV=xy?" ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If the parameters to be used are other than the default values, the proper directives must be executed to modify them.

"DEV=#x"	Assign device address to the hexadecimal value X (1< or equal to X < or equal to F).
"DMP=y"	Assign DMP channel number to the value Y (1 < or equal to Y < or equal to 7).
"UNIT=z"	Assign unit number to the value Z (0 < or equal to Z < or equal to 3).
"TRAK=x"	Assign track number to the value X (0 < or equal to X < or equal to 8119).
"FILE=y"	Assign file number to the value Y (0 < or equal to Y < or equal to 200).
"GEOM=z"	Assign geometry to the value Z (1 < or equal to Z < or equal to 8).

(VIRTUAL MODE ONLY)

"VDMP=x"	Assign virtual mode DMP channel number.
"WAD=y"	Assign a 64K block of core to be loaded.
"PIOP" "SIOP"	Specifies that the load device is on a primary or a secondary I/O processor.

After the load device and any non-standard parameters have been assigned, the "LOAD" directive is executed.

Example:

```
"LDEV=MH,UNIT=2,TRAK=100,WAD=1,LOAD."
"LDEV=MT,FILE=10,LOAD."
```

The program will then be loaded into the lowest available memory core not occupied by another task. To load into a specific memory location, enter:

```
LOAD/#(address).
```

The Modular Communications Controller Diagnostic (MCD) will be assigned a task number, and then initialized. This diagnostic no longer supports a default device address. It is necessary to input the device address before automatic testing. For example: DA=#18,AT. Automatic testing is begun with optional milestone messages and any error messages output to the console device.

To load other tasks after the MCD was loaded, "HIPG" must be executed to reflect the necessary space.

START UP PROCEDURE

Before the task's ID message is printed, DAX will print a task ID as follows:

I/O (X) (Where X is the task number assigned by DAX.)

Next the ID message will print:

MODULAR COMMUNICATIONS CAT.NO. 607855-009 REV X.Y DATE

DIRECTIVE PROCESSOR

The automatic tests are written in a diagnostic language referred to as directives, which are interpreted and executed. To input directives to a specific task the user must have this task activated. This is done by commanding DAX with WAKE/task ID.

The task ID is a number from 1 to 15. The activated task will then accept directives which are separated by commas until a period is detected. When the period is detected the user's directive string is executed.

Example:

WAKE/1,HANG. Wake task 1 and hang DAX.

OPERATOR CONTROL

The operator can regain control during program execution by depressing console interrupt or Master Clear, or by typing " ↑x " (uparrow-task number) where x is the task number assigned by DAX.

DECIMAL NUMBERS

All numeric values are assumed to be decimal unless the number is immediately preceded by a (#) character in which case it is considered to be hexadecimal.

STATEMENT NUMBERS

Statement numbers may exist anywhere in the directive string provided they are decimal and fall within the range of 0-7. Unless redefined in the directive string, statement number 0 denotes the start of the directive string.

SPECIAL CHARACTERS

A backarrow (upper case O) or backspace (control H) causes a backspace of one byte position in the TTY input buffer.

A rubout/delete causes a reset to the beginning of the typewriter input buffer. The input routine terminates input and exits when a period is detected. Line feed, carriage return, and spaces are ignored by the program.

DIRECTIVE CAPABILITY

Directives are used to call program subroutines and are used to configure automatic tests or the operator may execute directives to configure his own tests.

A language processor converts the directive text to a series of branch and links with associated arguments to directive subroutines. Upon completion of conversion, control is transferred to the calling sequence.

A "directive" consists of a mnemonic with optional arguments separated from other directives in the sequence by delimiters. The mnemonic is a combination of one- to four-alphanumeric characters. The arguments are character combinations representing numeric value, parameters or symbolics, separated from the mnemonic and from each other by special characters.

A directive sequence consists of one or more directives separated by commas and terminated by a period.

A typical directive sequence follows:

P1=10,1,DTX,TIX/RD,ISC,JP/1/STX%8,IDX,P1-1,JP/1/P/>0,TEX.

This sequence sets the value of general purpose parameter P1 to ten, sets DMP mode transfer, transfer initiates (READ), inputs controller status, jumps back to statement label 1 until bit 8 (DATA READY STATUS) is reset, inputs data, decrements P1, jumps back to 1 until P1 equals 0, terminates the device, and exits the sequence. Statement numbers may range from 0 to 7; if 0 is not defined in the sequence its definition is the beginning of the sequence. A statement number may be defined only once in a sequence but may be referenced any number of times.

PARAMETER CAPABILITY

Parameters are data values which are used by directives to accomplish the desired goals. There are two types of parameters.

AUTOMATIC TESTS

Caution should be used when executing tests out of sequence. If tests were to be executed immediately after program loading, errors would occur due to action taker on vacant channel positions and on channels that are asynchronous.

Tests 17 and 18, which configure present channels and determine syncrhonous or asynchronous channels, should be executed if the program's parameters have not been initialized.

Parameter tables are destroyed when channels are added or deleted; therefore all channels should have parameters re-established after any configuration change.

Most tests intentionally do not set up all the operating parameters required for testing. Some parameters are set in previous tests and are not set again either to avoid redundancy or tc facilitate slight parameter variations to assist in trouble-shooting. Therefore, the operator should be wary of implied operating parameters when executing automatic tests out of sequence. "T/n?." will display tests.

AUTOMATIC TEST USAGE

Automatic tests are entered via "AT". As long as CSW 5 is reset, the next sequential test will be entered until all tests are executed. An exception to this occurs when specific test numbers are typed following the "AT" directive, example:

AT/1-8/13-16/20.

The above example would cause the following tests to execute:

1,2,3,4,5,6,7,8,13,14,15,16,20

At the end of the last test, CSW 7 set will cause a pass complete message to be typed and testing to resume at "T/1". The pass complete message includes a count of the total number of passes executed and (if any) the number of recoverable retries in response to overflow status or CRC (read error) status as well as the number of unrecoverable errors. If CSW 7 is reset then the program types:

"TESTING COMPLETE"

and enters an "IDLE" mode. At such time the operator may type "↑" (up arrow) followed by the task number if he desires to communicate to the program; otherwise no further testing takes place.

Should a power failure occur during "AT" and if CSW 5 is reset, then testing will resume at the beginning of the interrupted test. A power failure will not resume the execution of the operators own typed-in directives unless CSW 5 is reset, in which event execution will resume at the beginning of his directive string. All power failures result in the message:

"POWER FAILURE"

as well as the time of day. The program's time of day is initialized via "TODY:HRS:MIN:SEC". (Refer to the DIAGNOSTIC APPLICATIONS EXECUTIVE Reference Manual 210-607855-004.) The automatic test may also be entered via T/x where x specifies the test number, and if CSW 5 is reset, the next sequential test will be entered. CSW 5 set causes program control to return to the operator after the indicated test has completed (this results in a "?" being typed).

As each test is entered, a milestone message is typed which indicates the nature of the test. These test milestones can be inhibited by setting CSW 8. The pass complete message will still be typed as long as CSW 0 is reset. If CSW 0 is set then all non-error messages are inhibited. If software switch mode is used to set CSW 0 (CSW%0=1), then this particular switch (CSW 0) will be reset in response to a "WAKE/x" (x is task number) which would allow the program to type "?".

The directive contents of each test may be displayed via "T/x?" where x is a test number. This is helpful whenever additional information is required concerning the conditions or directives needed to accomplish the intended test.

It is suggested but not required that the operator run the automatic tests with CSW 3 set. This would cause the program to halt further testing upon an error and allow the operator time to examine the error results. If at this point, the operator decides to allow the program to cycle or loop on the last I/O operations, he must set CSW 6 which will cause "cycling an error." Then he must allow the program to continue from its "halted" condition by typing "STRT/x,HANG." where x is the task number of the program. This must be typed again until task 0 (DAX) is finally entered. Also, should there be other tasks running as well as this task, it is necessary to have all tasks under software switch mode (CSW=x) where x specifies the switch settings. While in this mode, the actual setting of hardware panel switches are ignored by those tasks who have this mode set. This is necessary because if CSW 6 were set on the panel then all programs which are running would cycle on the last operations. Therefore, in a multi-task environment software switch mode should be used. For instance, after a "halt on error" the operator would type to task 0 (DAX) the following:

"CSW/x%6=1,STRT/x,HANG." (where "x" equals the task number).

OPTIONAL TESTS (EXECUTED IF SW 12 IS OFF)

Optional tests are executed after all other tests have been completed, but they may be invoked at any time via "OT/x". A message will be output indicating on which channel pair the modem test plug is to be installed. After 30 seconds, all the optional tests will be run testing that channel pair. Then the TTY bells will ring indicating channel testing complete followed by a message requesting that the modem plug be moved to the next channel. At this time the program will wait until the timeout value "WATE" is exceeded (usually five seconds) and re-execute the optional tests. This will continue until all configured channels are tested. "OT/x?" will display tests (where x is the test number).

* WARNING *

Refer to Appendix C for the proper setting of the baud rate and clock switches.

OPT TEST 1 RING
(EXECUTED FOR RS232 CHANNELS ONLY)

A positive mask command will be issued to set RING in the mask register followed by a mode command to set data terminal ready. Channel status bit 13 and one SI is expected.

P8=CHAN,P7=P8+1,CH/P8-P7,MC,ECI,FI,FM,NMD,NMSK,ZI,ZM,CH/P8
H(,SIC=0,DIC=0,),G(,TEST/SIC=0/DIC=0,H,),
F(,TEST/SIC=1/DIC=0,H.

H,DTR,RNG,PMSK,PMD,DLY/1,F,IS,CP/ST=4/#F.

ERROR MESSAGES

All error messages are preceded by a heading which indicates the last four directives, test number, channel number, directive causing the error, and the "AC" pass count. The pass count "PASS" indicates the number of successful "AC" directives before an error occurred and is reset to zero after an error. The following is an example:

```
T/20CH,LO,LI,IT
T20 CHAN 3 DURING AC PASS 1
NO SI
```

The following is a list of the possible error messages that may be output during the AC directive:

"SI FROM UNEXPECTED CHAN> **STATUS=#XXXX"

An SI was received from a channel that was neither enabled nor configured. Controller status is reported.

"DI FROM UNEXPECTED CHAN. **STATUS=#XXXX"

A DI was received from a channel that was neither enabled nor configured. Controller status is reported.

"SI FROM BUSY CONTROLLER"

A SI was received from a channel but the controller ICB bit was still set indicating it was still master clearing.

"DI FROM BUSY CONTROLLER"

A DI was received from a controller that was master clearing.

"NO SI IN SERVICE"
"NO DI IN SERVICE"

A DI or SI was received but the controller status did not indicate "in service".

"BYTE COUNT ERR 11 SHOULD BE 12"

A channel failed to input one more byte. On synchronous input channels this could be the result of deleting the wrong synchronous character.

"FINAL TC ERR #EFFE EXP #F000"

The transfer count is output in this form when in DMI mode. In this example, the final TC is two less then expected.

"XFR ADR ERR #6410 EXPD #6411"

The TA that was fetched via the "Read TA/TC" macro after the channel went non-busy was not as expected.

"NO SPECIAL CHARACTER DETECTED BIT"

The SCD parameter was set while in the DI routine. A select command was issued with bit 6 set but the subsequent controller status did not have bit 6 set.

"NO EOB DI BIT"

Bit 5 was set in the select command and at the DI level a select command was issued, however no controller status with bit 5 set was received.

"STATUS ERROR #1080 EXPECTED #8080"

Final status was in error.

"BUSY AT INITIATE"

Prior to initializing a channel, the channel status was checked to ensure an initiate command would not be ignored.

"FAILED TO GO BUSY"

A channel is issued a transfer initiate command and busy status checked.

"NO SI"

No SI was received. If status indicates busy, and the final transfer count is not complete, then no SI was due to a terminate not being issued.

"NO DI"

No data interrupts were received.

"UNEXPECTED SI"

An SI was received when none was expected or more than one SI was received when only one was expected.

"UNEXPECTED DI"

A DI was received when none was expected.

"BUSY AT TIMEOUT"

The timeout value exceeded "TM" (5 millisecond/unit) and status taken. The timeout is initially 5 second.

"DI CHAN # ERR."

A channel select command was issued at the DI level to the channel causing the interrupt and the controller status to not reflect the selected channel.

"INPUTTED DATA ERROR BIT 0"

A data byte was input and bit 0 was set. This error is usually accompanied by status error showing parity or underflow.

"NO SYNC CHAR RECEIVED"

A synchronous channel pair was activated and the input data stream contained a byte equal to the synchronous code, but no "synchronous character received" status was ever seen when inputting bytes.

"UNEXPECTED SYNC CHAR"

Upon inputting data, the channel status reflected "synchronous character received" when no such status was expected.

"NO TERMINATE PENDING"

The input channel status was checked after a terminate was issued and no terminate pending status was detected.

"DATA READY DID NOT RESET AFTER BYTE 3"

A byte was either input or output in response to bit 8 being true, but bit 8 did not reset after the Input/Output instruction was executed. The number of bytes transferred at the time of error is also displayed.

"LIST ADDRESS ERR #7410 EXPD #7412"

After data transfer is complete in DMI mode, and if data chaining, the "read list" macro is issued and the final address checked.

"STATUS ERROR AT BYTE 3"

Whenever data is transferred (non-DMI) the status is checked for errors and the number of bytes processed at the time of error is saved. This is done to assist in determining the relative time of an error.

"EOB CNT ERR 1 EXP 2"

A channel chained 2 blocks of data but only 1 EOB DI occurred.

"EXP 2 HITS RECEIVED 3 HITS"
"HIT 2 EXP STATUS=#8000 TA=#7D10"
" RECVD STATUS=#0080 TA=#7D10"

A DMI channel pair with special character detect enabled was expected to receive 3 detects but only received 2. Any algorithm status errors or transfer address errors at the time of the detect are reported. If the "stop" is reset in either A or B control byte then no status or TA is retrieved or saved upon detects, and the algorithm status is not cleared after a hit. Therefore, character detect in "non-stop" mode will be operative for 1 hit only. In stop mode, a maximum of 15 hits is counted, but only the status of the first 4 hits is saved.

"ILLEGAL SCD HIT"

An output channel received a DI and the controller status reflected a special character detect.

"DATA CHAIN TABLE CONTENT ERROR"
"BLOCK ADDRESS EXPECTED ACTUAL
0 7D10 7FFE 6EF0 7FFC 6EF0

A channel can have it's data chain table modified after a character detect hit. The TC will be replaced by the current TC at time of detection if data chaining is forced. Should the table have an incorrect TC or TA, then the incorrect TC/TA pair block address, the expected TC/TA, the actual TC/TA will be displayed.

"NO UIT FOR INST.#5346", the 5X instruction "53" was executed and did not generate a trap. (MODCOMP IV only.)

"MPE EXPECTED ON CH=1 STAT=#8180 EXP EXIT BA-C6"

The directive "MPAC" was executed. Channel 1 status word bit 3 equaled 0 but was expected to equal 1. The exit expected was BA-C6.

APPENDIX 10AB
EXTRACT
200 TPI MOVING HEAD DISC

200 TPI MOVING HEAD DISC DIAGNOSTIC

DIAGNOSTIC MANUAL

Note: References to 78xy in this manual imply the following CLASSIC Model Numbers: 7810, 7830, 7860.

December 19, 1979

Publication Number: 225-200112-003
Product Number and Revision: 607855-014E.0

Modular Computer Systems, Inc.
1650 West McNab Road
Ft. Lauderdale, Florida 33309

PROGRAM LOADING

The program runs as a task under DAX. DAX is loaded with the standard FILL sequence. The DAX I.D. message will be printed after rocking the RUN/HALT switch, followed by:

```
"DAX (0)
??"
```

If the task's object is to be loaded from the paper tape reader, the object is mounted in the reader and the operator types:

```
"LOAD."
```

and the task will load and execute. Automatic testing will commence unless CSW5 is set, in which case the program will print:

```
"200T (1)
?"
```

and await operator input of directives via the console keyboard.

If the task's object is to be loaded from a device other than the paper tape reader, the object is mounted in the proper device and the "LDEV" directive is executed.

"LDEV" LOAD DEVICE: specifies the device used in loading the task program(s); various forms are:

"LDEV?" DUMP LOAD DEVICE PARAMETERS, e.g.,

```
"LDEV=PR DEV=A DMP=1 UNIT=0 TRAK=0 FILE=0 GEOM=4"
```

which are the default assignments at load time (see table below).

"LDEV=xy" ASSIGN LOAD DEVICE specifies the device type, by mnemonic, to be used in loading the task program(s); standard parameters are assigned by DAX. A table of the devices, mnemonics and defaults parameters follows:

	LDEV	DEV	DMP	UNIT	TRAK	FILE	GEOM	WAD **	VDMP **	IOP **
MOVING HEAD DISC	MH	1	1	0	0	0	4	0	1	P
FIXED HEAD DISC	FH	2	2	0	0	0	8	0	2	P
MAG TAPE	MT	4	4	0	0*	0	0*	0	4	P
FLOPPY DISC	FP	9	3	0	0	0	4	0	3	P
CARD READER	CR	5	0*	0*	0*	0*	0*	0	0*	P
PAPER TAPE READER	PR	A	0*	0*	0*	0*	0*	0	0*	P

* DON'T CARE
** MCIV ONLY

"LDEV=xy?" ASSIGN LOAD DEVICE AND DUMP PARAMETERS

If parameters to be used are other than the default values, the proper directives must be executed to modify them.

"DEV=#x" Assign device address to the hexadecimal value "X". (1<X<#10).

"DMP=y" Assign DMP channel number to the value "Y". (0<Y<8).

"UNIT=z" Assign unit number to the value Z. (-1<Z<4)

"TRAK=x" Assign track number to the value X (-1<X<8120)

"FILE=y" Assign file number to the value"Y" (-1<Y<200)

"GEOM=z" Assign geometry to the value "Z" (0<Z<100).

"WAD=x" Assign the 64K module of memory to be loaded to X (MC IV virtual mode only). (0<X<4)

"VDMP=y" Assign Virtual DMP Channel Number (0<y<64). (MC IV ONLY)

"PIOP" or "SIOP" Assign type of I/O processor to which the load device is connected. (MCIV ONLY)

After the load device and any non-standard parameters have been assigned, the "LOAD" directive is executed, as in the following example:

```
"LDEV=MH,DEV=2,DMP=3,UNIT=2,TRAK=1,FILE=2,WAD=3,
VDMP=#A,SIOP,GEOM=2,LOAD."
```

CONSOLE SWITCH SETTINGS

CSW0 = 1	Inhibit Informational Messages
CSW1 = 1	Loop Current Test
CSW2 = 1	Inhibit Error Messages
CSW3 = 1	Wait If Error
CSW4 = 1	Enable Directive Trace
CSW5 = 1	Operator Input From Keyboard
CSW6 = 1	Loop On Operand
CSW7 = 1	Loop Diagnostic
CSW8 = 1	Inhibit Milestone Messages
CSW9 = 1	Directive Input From Paper Tape
CSW11 = 1	Inhibit Compatibility Testing
CSW12 = 1	Inhibit Virtual Mode Testing
CSW14 = 1	Inhibit Surface Test
CSW15 = 1	Print Results Unconditionally

AUTOMATIC TESTING

All testing is done with directive sequences. Individual tests may be executed by the use of the "T/X" directive, wherein "X" is the number of the test desired. The directive sequence of any test may be displayed by executing the interrogative form of the directive, e.g., "T/1?" will display, via the console printer, the directive sequence for Test 1.

Testing will not begin automatically due to the danger of writing inadvertently on system packs, diagnostic packs, etc. At completion of load, following the task's I.D. message, the program will print the message:

> "ALL DISC CARTRIDGES ON LINE ARE VOLATILE.
>
> TO ASSIGN NON-STANDARD DEVICE ADDRESS AND/OR DMP CHANNEL EXECUTE 'DA' DIRECTIVE; DEFAULT ASSIGNMENTS ARE: DA=1/1/1. DEFAULT IS PIOP; EXECUTE 'SIOP' DIRECTIVE IF NOT. TO COMMENCE AUTO TESTING EXECUTIVE 'AT'.
> ?"
>
> *'PIOP, SIOP' message appears only on MCIV.

Each test will identify itself by printing a header message containing the test number and function to be tested. This message may be inhibited by setting CSW 8.

Each test is run on the first available unit (drive) of the controller under test before proceeding to the next on-line unit; all available units are tested. Additional controllers may be tested by executing the "DA" directive to configure the device address and DMP channel, followed by the "AT" directive.

Following execution of the "AT." directive, the program will print:

> "FOLLOWING CYLINDERS PROTECTED:
> x-y
> LOW TEST CYLINDER = z"

and proceed with Test 1.

NOTE: Several tests require that this be the only task active. These tests are executed only during the first pass of the diagnostic. Therefore, it is desirable to allow the diagnostic to complete one pass before running other tasks concurrently.

NOTE: While this task may be run concurrently with other DAX tasks, this task must have exclusive use of this controller.

```
UNIT=UNIT>,TT,NO,I=UNIT,IT,P8,SE,
IS,JP/2/ISW%3,P8=500,SYNC,
1,CY=RN,CSCN,SK,P8-1,JP/1/P8>0,TIME,
P8=MSEC,P8-800,P8/500,SET/MSEC=P8,UNIT:?,
'     AVERAGE SEEK TIME =!,D/MSEC,'MSECS',
2,EX I.
```

TEST 4 READ AND WRITE TEST

This test checks for proper status, interrupt and CWA response to various write and read commands.

End of record, end of file and end of device detection are checked.

Test and transfer mode write and read of 40 words is tested to assure fillability: otherwise, all transfers are made in DMP mode.

Inhibiting EOR by setting bit 7 of the write command is also tested.

Underflow and overflow conditions are intentionally generated.

Note: In the course of automatic testing this is the first test to execute write commands. Therefore track zero, sector zero of each on-line disc is read and checked for File Manager Volume identification. If a File Manager Volume is present, the error message:

"OPERATION ABORTED; FILE MANAGER VOLUME DETECTED"

will be printed and auto testing will cease. The task will then request further instructions from the operator.

This test also checks that test and transfer mode writes every other word and reads every other word.

```
READ AND WRITE TEST

DT,NO,CLR/HD/SC/CY/OFST/RTRY,WC=7,
UNIT=UNIT>,I=UNIT,SE,IS,JP/2/ISW%3,SH,
OC/#8800,IS,JP/2/ISW%6,MC,RD,MNGR,
2,MC,EX I.

TT,NO,CLR/HD/SC,CY=LOCY,WC=40,LBW/1+1,
RTRY=0,UNIT=UNIT>,I=UNIT,SE,IS,
JP/2/ISW%3,SH,JL/3,2,EX I,JP/EX,
3,WP,SC+1,JP/3/SC>0,RD,TEST/ISW&#F8=#90,CO,DT,
4,WEOD,RD,TEST/ISW&#F8=#D0,CO,
5,WEOF,RD,TEST/ISW&#F8=#B0,CO,
6,WERN,RD,TEST/ISW&#F8=#80,CO,JR/3.
```

ERROR MESSAGES

When a failure occurs, a header message will be printed;* this message contains the following:

"T/x" , where x is the number of the failing test;

"xyz ERROR", where xyz is the mnemonic of the directive detecting the failure;

"ab cd ef gh", where the mnemonics of the last four directives executed are displayed;

"ISW ,TIW ,OCW ,UNIT ,TA ,TC ,TM", where the input status word, the transfer initiate word, the output command word, the unit, the transfer address, transfer count and transfer mode are displayed;

"CY ,SC ,HD ,WC, PLTR", where the cylinder, sector, head, platter and word count are displayed.

*The header will be inhibited if CSW 8=1.

If CSW 3 is set a 'dynamic' halt on error condition occurs; the CPU does not halt but the task will remain halted until a WAKE or STRT directive is executed under DAX. See EXECUTIVE LEVEL CONTROL DIRECTIVES for further explanation.

If a halt or hang condition should occur, master clear, WAKE the task, and execute

"HSTY,DS,DP."

to display the history, status and parameters in effect when the error condition occurred.

The directives comprising any test may be displayed by executing "t/x?."
where x is the number of the test desired.

Auto testing may be initiated or resumed at a particular point by executing "t/x." with CSW 5=0.

OPERATOR ACTION

Before the next test begins a message will alert the operator that some action on his part is required:

> "TO TEST INTER-DEVICE COMPATIBILITY MOVE PACKS BETWEEN DRIVES, BRING ALL DRIVES UNDER TEST ON-LINE TO BYPASS COMPATIBILITY TEST TYPE A "B" TO CONTINUE TESTING TYPE A PERIOD.

This message and the next two tests will be bypassed if CSW11=1.

TEST 7 COMPATIBILITY TEST

This test checks that information written by one drive can be read by another drive. Reads (DMP mode) are done from random drives, heads, cylinders and sectors. The data read is not compared; the successful acquisition of the proper sector of the correct cylinder is the criterion for compatibility. A read of sector zero, cylinder zero is done on each on-line drive.

This test will only run automatically during the first pass.

This test uses track offset and retries if recoverable errors are encountered; this is a gross alignment test.

```
COMPATIBILITY TEST

P3,P3=#400,WC=2,DC,DT,
1,JP/2/P3=0,P3-1,UNIT=RN,SE,IS,JP/1/ISW%3,
RTRY=4,HD=RN,CY=RN,SC=RN,PLTR=RN,
SK,RD,JP/1/P3>0,
2,CLR/HD/SC/CY,UNIT=UNIT>,I=UNIT,
SE,IS,JP/4/ISW%3,SK,RD,
PLTR+1,RD,4,EX I.
```

TEST 8 ALIGNMENT TEST

This test is similar to Test 7 with the exception that no retries are attempted and no track offset is used; this is a fine alignment test.

```
ALIGNMENT TEST

P3,P3=1024,WC=WPSC,DC,DT,CLR/RTRY/OFST,
1,JP/2/P3=0,P3-1,UNIT=RN,SE,IS,JP/1/ISW%3,
HD=RN,CY=RN,SC=RN,PLTR=RN,
SK,RD,JP/1,2,CLR/HD/CY/SC,UNIT=UNIT>,
I=UNIT,SE,IS,JP/4/ISW%3,SK,RD,PLTR+1,
RD,4,EX I.
```

TEST 13 DATA CHAIN TEST

A DMP write of two random block lengths is executed, followed by a DMP read with the block lengths reversed. Data and resultant transfer addresses are compared against expected results.

```
DATA CHAIN TEST

P1,P2,P3,P4,P6,HD=HD<,CY=CY<,P4=HD+CY,
CLR/RTRY/OFST,
P1=400,DT,NO,P2>0<128,P3>0<128,
1,JP/4/P1=0,P1-1,UNIT=RN,SE,IS,JP/1/ISW%3,
2,HD=RN,CY=RN,P6=HD+CY,JP/2/P6=P4,SC=RN,
JP/2/CY<=LOCY,
LBW/RN,P2=RN,P3=RN,DCW/P2/P3,DCR/P3/P2,
3,WR,RD,CO,JP/1/P1>0,4,DC.
```

TEST 14 SURFACE TEST

This is the surface test and is executed only if CSW 14 is set, after all other tests have been run. Every test cylinder is written with each of four phases of a bit crowding pattern, then read and verified. Because of the length of this test, it should only be executed if the recording surface is suspect.

```
SURFACE TEST

DT,WC=WPSC,CLR/OFST/RTRY,DC,
F(,1,WR,SC+5,JP/1/SC>0,HD+1,JP/1/HD>0,
2,RD,CO,SC+5,JP/2/SC>0,HD+1,JP/2/HD>0,).

CLR/PLTR,UNIT=UNIT>,I=UNIT,3,CLR/HD/CY/SC,
SE,IS,JP/6/ISW%3,JP/4/UNIT>0,CY=LOCY,
4,SK,LBW/#EEEE,F,LBW/#DDDD,F,LBW/#BBBB,F,
LBW/#7777,F,
CY+1,JP/4/CY>0,5,PLTR+1,JP/3/PLTR>0,
6,EX I.
```

TEST 15 ENTER VIRTUAL MODE

This test executes a "MCIV" directive to switch to virtual mode if the CPU is a MCIV; all subsequent operations will be in the virtual mode until a master clear occurs. This test will not execute if already in the virtual mode, if CSW 12 is set, or if CPU is not MCIV.

DOE FILE COPY

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
ENERGY PROGRAMS
5301 Bolsa Avenue, Huntington Beach, California 92647 (714) 896-3311 Telex: 678426

A3-202-EP-RGR-444
28 July 1981

T-66

Department of Energy
San Francisco Operations Office
1333 Broadway
Oakland, CA 94612

Attention: Mr. David J. Tenca, Contracting Officer

Subject: CONTRACT DE-AC03-79SF10499
SOLAR FACILITIES DESIGN INTEGRATION
SECOND PARTIAL SUBMITTAL OF SUBSYSTEM STAND ALONE
(PREOPERATIONAL) TEST PROCEDURES (RADL ITEM 2-45)

References: (a) MDAC Letter A3-130-EP-DSB-138, dated 3 March 1981, "Revised Delivery Date for Subsystem Stand Alone Test Procedures" (RADL Item 2-45)

(b) MDAC Letter A3-202-EP-RGR-417, dated 17 July 1981, "Partial Submittal of Subsystem Stand Alone (Preoperational) Test Procedures" (RADL Item 2-45)

Dear Mr. Tenca:

One (1) each of four of the Preoperational Test Procedures that comprise a portion of the subject RADL item is being submitted in accordance with the requirements of the Phase II Reports and Deliverables List of the subject contract, as modified by the contents of the Reference (a) letter. The initial transmittal was accomplished per the Reference (b) letter.

This letter transmits the following Preoperational Test Procedures:

•	205/250	Thermal Storage System	Revision 0
•	340	Operating Control System - Data Acquisition System (Part A)	Revision 0
•	405	Main/Admission Steam	Revision 0
•	940	Plant Drains & Sumps	Revision 0

It should be noted that the 340 Preoperational Test Procedure will be written and submitted in two parts, with this first submittal being called Part A.

A copy of this letter also transmits the master copy of each of the procedures to Southern California Edison (L. H. Chillcott) at the Solar One site for control and implementation. Any revisions to these procedures which are originated by the SFDI will be coordinated informally with SCE and subsequently transmitted by letter in the same manner as the subject documents.

Additional submittals will be made as other preoperational test procedures become available in Revision 0 versions, and you will be notified when all of the preoperational test procedures that comprise RADL item 2-45 have been submitted.

Technical questions regarding these procedures should be directed to R. G. Riedesel at (714) 896-3357. For contractual questions, please call the undersigned at (714) 896-1340.

Very truly yours,

D. S. Butler
Contract Administrator
Solar Facilities Design Integration

Enclosure: (as noted)

Cy: L. H. Chillcott, SCE-Daggett (1)
J. M. Slaminski, DOE/STMPO (1)

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