Program Number B06-129R09

COMMON UNIVERSAL LOGIC INTERFACE TEST

Consists of:

Program Description	**B06-129M95R08A15**
Program Listing	**06-129M96R07A13**
Bootstrap Loader Tape	**06-129M17R07**
R09 Patch Information	**Sheet i/ii**

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R09 PATCH INFORMATION
FOR TEST PROGRAM 06-129

To set up the Power Fail Save Area Pointer and the Data Formal Fault (Boundary Error) new PSW. Patches are mandatory on Series 3200 and are as follows:

Location	Old	New		
0A0C	B9AB	B1A3		
0A12	00F0	00EE		
0E54	962E	DA2E		WD R2,0(R14)
0E56	9D25	0000		
0E58	2081	26E1		AIS R14,1
0E5A	4309	4300		B PATCH
0E5C	0004	11A0		
11A0	XXXX	05FE	PATCH	CLHR R15,R14
11A2	↓	4380		BNL X'E50'
11A4	↓	0E50		
11A6	↓	9D25		SSR R2,R5
11A8	↓	2081		BTBS 8,1
11AA	↓	4309		B 4(R9)
11AC	↓	0004		

Note: This patch to be incorporated in object labeled 06-129 R07.1 on Multimedia Packages.

1. COMMON UNIVERSAL LOGIC INTERFACE TEST PROGRAM DESCRIPTION

1.1 Related Documents:

Test Program Listing	06-129M96R07A13
Test Program Tape:	06-129M17R07
Universal Logic Interface Instruction Manual	29-311
Universal Interface Module Instruction Manual (obsolete, but supported)	29-273

1.2 Test programs to be run prior to loading this test:

1.2.1 For 16-Bit Processors

Memory Test	06-003
Series 16 Processor Test	06-106
5/16 Processor Test Part 1	06-215
5/16 Processor Test Part 2	06-216
8/16 Processor Test Part 1	06-209
8/16 Processor Test Part 2	06-210
8/16E Processor Test Part 1	06-211
8/16E Processor Test Part 2	06-212

1.2.2 For 32-Bit Processors

Series 32 Basic Test	06-158
Series 32 Processor Test	
Part 1	06-154
Part 2	06-155
Part 3	06-178
Series 32 Memory Test	06-156

1.2.3 Other Test Programs

Teletype Basic Confidence Test	06-004
CRT Test	06-146
Carousel 300 Test	06-183
Current Loop Interface Test	06-184

2. PURPOSE OF TEST

2.1 General Test Information

The Universal Logic Interface Test Program is used to check the proper operation of the Universal Logic Interface (ULI) or the Universal Interface Module (UIM). Halfword and byte data transfers are exercised. Output commands, status requests, and the interrupt mechanism are also exercised.

2.2 Test Description

The program checks the halfword and byte modes by writing a shifting data pattern that is alternately a one in a field of zeros and a zero in a field of ones. The data written is read back from the module and compared to the original pattern. The same pattern is used to test the returned status and command latches. After the data transfers are complete, the interrupt mechanism is tested. Output commands are used to disarm, arm and enable the ULI and to generate an interrupt. The device number on acknowledge is also checked.

3. MINIMUM HARDWARE REQUIRED

The following is a list of hardware necessary to perform this test:

1. Processor

   Model 7/16 or equivalent
   Model 7/32 or equivalent

2. Minimum Memory - 8KB

3. Console Input/Output Device (See Appendix 1)
   Teletype, CRT, or Carousel

4. Paper Tape Reader

   Teletype or High Speed Paper Tape Reader

5. Device Under Test

   ULI (Product #M48-013) or UIM (Obsolete Product #M48-009)

6. Test Cable (17-200)

4. REQUIREMENTS OF MACHINE UNDER TEST

4.1 Test Configuration

The 17-200 Test Cable must be attached to the ULI (UIM) at connector 3, assuming that the present signals on connector 3 are those wired at the factory. Refer to Appendix 5 and the ULI schematics (02-304D08). These schematics can be found in the Universal Logic Interface Instruction Manual, 29-311.

4.2 Device Address

The ULI should be strapped for device address X'8B'. If the address is different, the DEVADR option must be entered. Refer to Appendix 3.

4.3 Console Device

If the console device is other than a Teletype with device address of X'02', see Appendix 1 for program modification.

5. LOADING PROCEDURES

5.1 Test Tape Format

The format consists of an absolute non-zoned object tape (M17) with front-end boot loader. The test program occupies memory from X'A00' through X'1149'.

5.2 Normal Loading Procedure

1. Manually enter the X'50' sequence shown below:

	LOCATION	CONTENTS
	X'30'	X'0000'
	X'32'	X'0000'
	X'34'	X'0000'
	X'36'	X'0050'
	X'50'	X'D500'
	X'52'	X'00CF'
	X'54'	X'4300'
	X'56'	X'0080'
for TTY	X'78'	X'0294'
for HSPTR	X'78'	X'0399'
for HSPTR/P	X'78'	X'1399'

2. Place the program tape (06-129M17R07) in the paper tape reader.

3. Execute at address X'30'.

4. When the Processor halts, observe the console display registers D1 and D2. If zero, loading is complete; otherwise, repeat the loading procedure.

5. Refer to Appendix 1 and set up the addresses for Console I/O Device.

6. Address memory location X'A00' for a 32-bit processor or X'A04' for a 16-bit processor.

7. Start the program execution. Observe the following title is printed on the console device:

    COMMON ULI TEST 06-129R07

6. OPERATING PROCEDURES

6.1 Normal Testing (Universal Logic Interface 02-304)

1. Ascertain that the 17-200 test cable is properly plugged into the ULI connector 3.

2. When the asterisk is printed, enter the desired options via the console device. Refer to Appendix 2 for the option/command input structure and Appendix 3 for option explanation.

3. Enter the RUN command via the console device.

4. If no errors are detected, characters "NO ERRORS" are printed almost immediately after execution. Should an error occur, refer to Section 6.3 for the appropriate action.

5. To re-execute the test, enter the RUN command via the console device.

6.2 Optional Testing (Universal Interface Module 02-243)

The ULI Test Program may be used to test the Universal Interface Module (02-243). The test cable (17-200) must be attached and the test executed as though testing the ULI with the byte to halfword option.

To test I/O slots without interrupts the INTRPT option must be specified. Refer to Appendix 3.

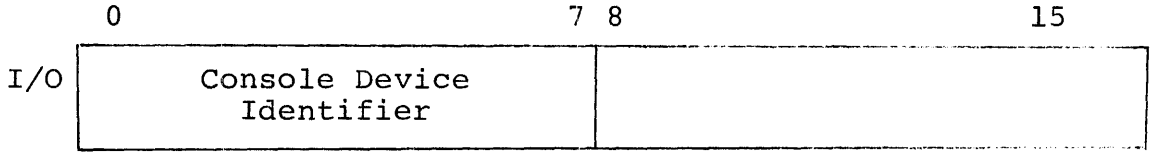
6.3 Error Procedures

If an error is encountered, the Processor loops on the failure, the error number is displayed on D1 of the Processor Display Panel, and the error number is printed on the console device. Refer to Appendix 4 for the meaning of the error number. To re-execute test after an error has occurred, address the desired memory location (step 6 in Section 5.2) and start program execution. Note, however, in case of unsolicted interrupt the program prints the error number each time it occurs and continues normal execution of the test program.

APPENDIX 1

CONSOLE DEVICE DEFINITION

1. The halfword labeled I/O (see the listing) has the default value for Teletype (address X'02') as the console device. If the configuration is different, the test program must be changed as follows:



Console Device Identifier	Explanation
X'01'	GDT/CRT on PASLA/PALM interface, strapped for FDX and the highest baud rate.
X'02'	TTY on TTY interface. GDT/CRT on Current Loop Interface
X'04'	Carousel 300 on PASLA/PALM interface, strapped for FDX and the highest baud rate.
X'05'	Micro I/O Bus Interface.
0,X'03,X'06'-X'FF'	Reserved. The program defaults it to 2.

2. The Teletype or Current Loop interface, if used, should be strapped for the device address of X'02'. If it is different, the halfword labeled TTYADR (see the listing) must be changed accordingly.

3. The Carousel, GDT (Graphical Display Terminal) or CRT; if used on PASLA interface should be strapped for the device address of X'10' and X'11' for receiving and transmitting sides respectively. If it is different, the halfword labeled CRTADR (in case of CRT) or CAROUADR (in case of carousel) must be changed accordingly (see listing).

4. The micro I/O Bus if used should be strapped for device address X'C0'. If the address is different, the halfword MICADR (see the listing) must be changed accordingly.

APPENDIX 2

OPTION/COMMAND INPUT STRUCTURE

An asterisk (*) is output to the console device to indicate that the program is waiting an option input. The options and option values may be printed out by typing in the command 'OPTION' followed by a carriage return.

The option values may be changed by typing in the option from the console device, followed by a space and the desired hexadecimal value. A carriage return (CR) is issued to terminate every option/command input. An invalid option/command causes a (?) followed by a carriage return (CR), line feed (LF), and an asterisk (*) to occur.

OPTION	DEFAULT VALUE	DESCRIPTION
DEVADR	X'8B'	Specifies the device address of the Universal Logic Interface.
MODE	0	Specifies whether the byte to half-word option is installed. 0 = option not installed. 1 = option installed.
INTLEV	0	Specifies the interrupt level that the Universal Logic Interface is physically attached to and consequently the register set to which an external interrupt from the ULI will vector to. INTLEV = F on 7/16 or equivalent INTLEV = 0 on 7/32 INTLEV = 0, 1, 2, or 3 on 8/32
INTOPT	0	Specifies whether ULI interrupts will be tested. 0 = interrupts will be tested 1 = interrupts will not be tested.

APPENDIX 3

FAILURE NUMBER DEFINITION

NUMBER		FAILURE
01	Halfword Mode Data Transfer	R4 = Data Written, R6 = Data Read
02	Byte Mode of Byte to Halfword Mode Data XFER	R4 = Data Written R6 = Data Read
03	Sense Status Bits (0:3)	R4(12:15) = Test Data R6(12:15) = Error Bits
04	Output Command Bits (4:7) or Sense Status Bits (4:7)	R4 = Output Command R6 = Returned Status
05	Unsolicited Interrupt	
06	No Interrupt	
07	Wrong Device Number Returned on Acknowledge	R4 = Received Device Number
08	Acknowledge Doesn't Reset Atn.	

Interrupt level is X, the register set that the interrupt has vectored to.

APPENDIX 4

17-200 TEST CONNECTOR

This appendix shows how the 17-200 test connector should be wired. See Page 3 of 02-304A20.

SIN000	to	DOT120
SIN010	to	DOT130
SIN020	to	DOT140
SIN030	to	DOT150
SIN040	to	COT040
SIN050	to	COT050
SIN060	to	COT060
SIN070	to	COT070
DIN000	to	DOT000
DIN010	to	DOT010
DIN020	to	DOT020
DIN030	to	DOT030
DIN040	to	DOT040
DIN050	to	DOT050
DIN060	to	DOT060
DIN070	to	DOT070
DIN080	to	DOT080
DIN090	to	DOT090
DIN100	to	DOT100
DIN110	to	DOT110
DIN120	to	DOT120
DIN130	to	DOT130
DIN140	to	DOT140
DIN150	to	DOT150

APPENDIX 5

TEST LOADER

The test loader must be loaded with the 50 Sequence as described in Section 5.2. The test loader resides in memory from X'80' to X'CE' and loads the test at the correct memory location. While reading the program tape, each data byte location is output to the Display Panel. While loading the test into memory, the loader performs an Exclusive OR of each instruction to verify that the test was loaded correctly, the loader halts the Processor with the last location of the test displayed on the Display Panel, and the loading procedures in Section 5.2 must be repeated. If the test did load correctly, the Display is zeroed and the Processor is put in the Wait state.

PROG= CULIP ASSEMBLED BY CAL 03-066R04-01 (32-BIT)

```
                                1          CROSS                                                                ULI00010
                                2          WIDTH  120                                                           ULI00020
                                3          TARGT  16                                                            ULI00030
    0000R                       4          SQCHK                                                                ULI00040
                                6  *       THIS TEST IS DESIGNED TO TEST THE UNIVERSAL LOGIC                   ULI00060
                                7  * INTERFACE M48-013(35-479) AND THE UNIVERSAL INTERFACE MODULE              ULI00070
                                8  * M48-009(35-399).                                                          ULI00080
                                9  *                                                                           ULI00090
                               10  * ASSUMPTIONS:                                                             ULI00100
                               11  *       IT IS ASSUMED THAT THE FOLLOWING TESTS HAVE BEEN RUN                ULI00110
                               12  *  WITHOUT DETECTING AN ERROR PRIOR TO LOADING THE COMMON ULI TEST:         ULI00120
                               13  *                                                                           ULI00130
                               14  *     16 BIT PROCESSORS:                                                    ULI00140
                               15  *        MEMORY TEST                    06-003                              ULI00150
                               16  *        SERIES 16 PROCESSOR TEST       06-106                              ULI00160
                               17  *        5/16 PROCESSOR TEST PART 1     06-215                              ULI00170
                               18  *        5/16 PROCESSOR TEST PART 2     06-216                              ULI00180
                               19  *        8/16 PROCESSOR TEST PART 1     06-209                              ULI00190
                               20  *        8/16 PROCESSOR TEST PART 2     06-210                              ULI00200
                               21  *        8/16E PROCESSOR TEST PART 1    06-211                              ULI00210
                               22  *        8/16E PROCESSOR TEST PART 2    06-212                              ULI00220
                               23  *                                                                           ULI00230
                               24  *     32 BIT PROCESSORS:                                                    ULI00240
                               25  *        SERIES 32 BASIC TEST           06-158                              ULI00250
                               26  *                                                                           ULI00260
                               27  *        SERIES 32 PROCESSOR TEST                                           ULI00270
                               28  *             PART 1                    06-154                              ULI00280
                               29  *             PART 2                    06-155                              ULI00290
                               30  *             PART 3                    06-178                              ULI00300
                               31  *                                                                           ULI00310
                               32  *        SERIES 32 MEMORY TEST          06-156                              ULI00320
                               33  *                                                                           ULI00330
                               34  *    OTHER APPLICABLE TESTS:                                               ULI00340
                               35  *        TELETYPE BASIC CONFIDENCE TEST 06-004                              ULI00350
                               36  *        CRT TEST                       06-146                              ULI00360
                               37  *        CAROUSEL 300 TEST              06-183                              ULI00370
                               38  *        CURRENT LOOP INTERFACE TEST    06-184                              ULI00380
                               39  *                                                                           ULI00390
                               40  * DESIGN SPECIFICATIONS:                                                   ULI00400
                               41  *       THE 06-129R07 TESTS THE ULI FIRST IN HALFWORD DATA TRANSFERS,       ULI00410
                               42  * CHECKS STATUS, AND THEN CHECKS BYTE OR BYTE TO HALFWORD TRANSFERS.        ULI00420
                               43  * THEN THE TEST CHECKS THAT COMMAND BITS SET THE PROPER STATUS BITS,        ULI00430
                               44  * THAT THE INTERFACE GIVES INTERRUPTS ON THE PROPER COMMANDS, AND          ULI00440
                               45  * THAT THE INTERRUPTING INTERFACE GIVES THE CORRECT DEVICE ADDRESS         ULI00450
                               46  * AND STATUS UPON ACKNOWLEDGEMENT OF THE INTERRUPT ON THE PROPER          ULI00460
                               47  * INTERRUPT LEVEL.                                                        ULI00470
                               48  *                                                                           ULI00480
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50  *  LOADING PROCEDURE:                                                    ULI00500
51  *        THE 06-129M17 PAPER TAPE IS LOADED USING THE STANDARD           ULI00510
52  *  50 SEQUENCE:                                                          ULI00520
53  *                                                                        ULI00530
54  *              LOC                  DATA                                 ULI00540
55  *                                                                        ULI00550
56  *             X'0050'              X'D500'                               ULI00560
57  *             X'0052'              X'00CF'                               ULI00570
58  *             X'0054'              X'4300'                               ULI00580
59  *             X'0056'              X'0080'                               ULI00590
60  *                                                                        ULI00600
61  *   TTY       X'0078'              X'0294'                               ULI00610
62  *   HSPTR     X'0078'              X'0399'                               ULI00620
63  *   HSPTR/P   X'0078'              X'1399'                               ULI00630
64  *                                                                        ULI00640
65  *  USER OPTIONS:                                                         ULI00650
66  *        START THE PROGRAM AT X'A00' FOR A 32 BIT PROCESSOR, AND AT      ULI00660
67  *  X'A04' FOR A 16 BIT PROCESSOR.                                        ULI00670
68  *                                                                        ULI00680
69  *                  DEFAULT                                               ULI00690
70  *        OPTION    VALUE          DESCRIPTION                            ULI00700
71  *        ******    *******        ***********                            ULI00710
72  *                                                                        ULI00720
73  *        DEVADR    X'8B'          ULI INTERFACE ADDRESS                  ULI00730
74  *                                                                        ULI00740
75  *        INTRPT    0              INTERFACE TESTING UNDER INTERRUPTS     ULI00750
76  *                                 0 = YES     1 = NO                     ULI00760
77  *                                                                        ULI00770
78  *  NORMAL TESTING:                                                       ULI00780
79  *                                                                        ULI00790
80  *                  DEFAULT                                               ULI00800
81  *        OPTION    VALUE          DESCRIPTION                            ULI00810
82  *        ******    *******        ***********                            ULI00820
83  *                                                                        ULI00830
84  *        INTLEV    0              INTERRUPT LEVEL OF INTERFACE           ULI00840
85  *                                 7/16 OR EQUIV = F                      ULI00850
86  *                                 7/32 = 0                               ULI00860
87  *                                 8/32 = 0-3 FOR CORRECT INTERRUPT       ULI00870
88  *                                 LEVEL                                  ULI00880
89  *                                                                        ULI00890
90  *        MODE      0              0 = BYTE TRANSFERS                     ULI00900
91  *                                 1 = BYTE TO HALFWORD TRANSFERS         ULI00910
92  *                                                                        ULI00920
93  *        TO EXECUTE THE TEST, ENTER THE "RUN" COMMAND FOLLOWED BY A      ULI00930
94  *  CARRIAGE RETURN.  A "NO ERROR" OR THE APPROPRIATE ERROR MESSAGE WILL  ULI00940
95  *  BE IMMEDIATELY PRINTED ON THE CONSOLE DEVICE.  IF AN ERROR IS         ULI00950
96  *  ENCOUNTERED, THE ERROR NUMBER WILL ALSO BE WRITTEN TO THE             ULI00960
97  *  DISPLAY PANEL (D1).                                                   ULI00970
98  *                                                                        ULI00980
99  *  FOR COMPLETE INSTRUCTIONS, SEE 06-129M95R07A15 TEST DESCRIPTION.      ULI00990
100 *                                                                        ULI01000
```

```
102  * ERROR PROCEDURES:                                                    ULI01020
103  *                                                                      ULI01030
104  *      ERROR                                                           ULI01040
105  *      NUMBER  FAILURE                    COMMENTS                     ULI01050
106  *                                                                      ULI01060
107  *        01    HALFWORD MODE DATA         R4=DATA WRITTEN              ULI01070
108  *              TRANSFER                   R6=DATA READ                 ULI01080
109  *                                                                      ULI01090
110  *        02    BYTE MODE OF BYTE TO       R4=DATA WRITTEN              ULI01100
111  *              HALFWORD MODE DATA XFER    R6=DATA READ                 ULI01110
112  *                                                                      ULI01120
113  *        03    SENSE STATUS BITS(0:3)     R4(RIGHT 4 BITS)=TEST DATA   ULI01130
114  *                                         R6(RIGHT 4 BITS)=ERROR BITS  ULI01140
115  *                                                                      ULI01150
116  *        04    OUTPUT COMMAND BITS 4:7    R4=OUTPUT COMMAND            ULI01160
117  *              OR SENSE STATUS BITS       R6=RETURNED STATUS           ULI01170
118  *              (4:7)                                                   ULI01180
119  *                                                                      ULI01190
120  *        05    UNSOLICITED INTERRUPT                                   ULI01200
121  *                                                                      ULI01210
122  *        06    NO INTERRUPT                                            ULI01220
123  *                                                                      ULI01230
124  *        07    WRONG DEVICE NUMBER        16 BIT PROCESSOR,            ULI01240
125  *              RETURNED ON ACKNOWLEDGE       R4=RECIEVED DEVICE NUMBER ULI01250
126  *                                         32 BIT PROCESSOR,            ULI01260
127  *                                            R2 OF APPROPRIATE REGISTER ULI01270
128  *                                            SET=RECIEVED DEVICE NUMBER ULI01280
129  *                                                                      ULI01290
130  *        08    ACKNOWLEDGE DOESN'T RESET ATTENTION                     ULI01300
131  *                                                                      ULI01310
132  *   INCORRECT INTERRUPT LEVEL = X      WHERE X = REG. SET THAT THE      ULI01320
133  *                                      INTERRUPT VECTORED INTO          ULI01330
```

ULI LOADER

```
                0000 0000            135  R0       EQU    0                                                        ULI01350
                0000 0001            136  R1       EQU    1                                                        ULI01360
                0000 0002            137  R2       EQU    2                                                        ULI01370
                0000 0003            138  R3       EQU    3                                                        ULI01380
                0000 0004            139  R4       EQU    4                                                        ULI01390
                0000 0005            140  R5       EQU    5                                                        ULI01400
                0000 0006            141  R6       EQU    6                                                        ULI01410
                0000 0007            142  R7       EQU    7                                                        ULI01420
                0000 0008            143  R8       EQU    8                                                        ULI01430
                0000 0009            144  R9       EQU    9                                                        ULI01440
                0000 000A            145  R10      EQU    10                                                       ULI01450
                0000 000B            146  R11      EQU    11                                                       ULI01460
                0000 000C            147  R12      EQU    12                                                       ULI01470
                0000 000D            148  R13      EQU    13                                                       ULI01480
                0000 000E            149  R14      EQU    14                                                       ULI01490
                0000 000F            150  R15      EQU    15                                                       ULI01500
                                     151  *                                                                        ULI01510
                                     152  *                                                                        ULI01520
0000?                                153           ORG    X'80'                                                    ULI01530
                                     154  *                                                                        ULI01540
                                     155  *                                                                        ULI01550
0080    2421                         156           LIS    R2,1                                                     ULI01560
0082    23C3                         157           BS     BOOT                                                     ULI01570
0084    0F48                         158           DC     Z(PSWSAVE)      CURRENT PSW SAVE POINTER(32-BIT M/C)     ULI01580
0086    0F50                         159           DC     Z(RSAVE)        REGISTER SAVE POINTER(32-BIT M/C)        ULI01590
0088    C810 0A00                    160  BOOT     LHI    R1,ORIGIN1      R1 = ADR( ORIGIN1 BYTE OF TEST PROG)     ULI01600
008C    C830 0F45                    161           LHI    R3,LNZB+1       R3= ADR( LAST NON-ZERO BYTE)             ULI01610
0090    4030 0022                    162           STH    R3,X'22'        REGISTER SAVE POINTER(16 BIT M/C)        ULI01620
0094    2731                         163           SIS    R3,1                                                     ULI01630
0096    C960 0000                    164  MN       LHI    R6,0            R6 = CHKSUM BYTE = X'MN'                 ULI01640
009A    D340 0078                    165           LB     R4,X'78'        INPUT DEV ADR                            ULI01650
009E    DB40 0079                    166           OC     R4,X'79'                                                 ULI01660
00A2    9D45                         167  LEADER   SSR    R4,R5                                                    ULI01670
00A4    2091                         168           BTBS   9,1             DU,BSY                                   ULI01680
00A6    9B45                         169           RDR    R4,R5                                                    ULI01690
00A8    0855                         170           LDAR   R5,R5                                                    ULI01700
00AA    2234                         171           BZS    LEADER          IGNORE LEADER                            ULI01710
00AC    D251 0000                    172  LOAD     STB    R5,0(R1)        STORE 1ST NON ZERO & SUBSEQUENT BYTE     ULI01720
00B0    D351 0000                    173           LB     R5,0(R1)        RELOAD DATA BYTE TO                      ULI01730
00B4    0765                         174           XAR    R6,R5           GENERATE CHECKSUM                        ULI01740
00B6    9481                         175           EXBR   R8,R1                                                    ULI01750
00B8    9828                         176           WHR    R2,R8           DISPLAY MEMORY ADDRESS                   ULI01760
00BA    9D45                         177           SSR    R4,R5                                                    ULI01770
00BC    2091                         178           BTBS   9,1             DU,BUSY                                  ULI01780
00BE    9B45                         179           RDR    R4,R5                                                    ULI01790
00C0    C110 00AC                    180           BXLE   R1,LOAD         LOAD TILL LAST BYTE                      ULI01800
00C4    9486                         181           EXBR   R8,R6                                                    ULI01810
00C6    9828                         182           WHR    R2,R8           FINAL CHECKSUM                           ULI01820
00C8    2478                         183  LDWT     LIS    R7,8                                                     ULI01830
00CA    917C                         184           SLLS   R7,12           R7 = X'8000'                             ULI01840
00CC    9557                         185           EPSR   R5,R7           HALT PROCESSOR                           ULI01850
00CE    22D3                         186           BS     LDWT                                                     ULI01860
                                     187  *                                                                        ULI01870
```

```
                                 189  *                                                                      ULI01890
                                 190  *                                                                      ULI01900
0ODO                             191           ORG    X'A00'                                                 ULI01910
                                 192  *                                                                      ULI01920
                                 193  *                                                                      ULI01930
0A00   4300 0A1C                 194  ORIGIN1  B      START32          ** START FOR 32 BIT PROCESSORS **     ULI01940
0A04   4300 0A20                 195  SECOND   B      START16          ** START FOR 16 BIT PROCESSORS **     ULI01950
                                 196  *                                                                      ULI01960
                                 197  * ********************************************************************** ULI01970
                                 198  *                                                                      ULI01980
0A08   A498                      199  READ1    DC     X'A498'          READ/WRITE I/O COMMANDS               ULI01990
       0000 0A09                 200  WRITE1   EQU    *-1                                                    ULI02000
0A0A   A498                      201  READ2    DC     X'A498'          TTY I/O COMMANDS                      ULI02010
0A0C   B9AB                      202  READ3    DC     X'B9AB'          PASLA I/O COMMANDS                    ULI02020
0A0E   9212                      203  READ4    DC     X'9212'          MICROBUS I/O COMMANDS                 ULI02030
                                 204  *                                                                      ULI02040
                                 205  * ********************************************************************** ULI02050
                                 206  *                                                                      ULI02060
0A10   02C2                      207  IO       DC     X'02C2'          CONSOLE DEVICE POINTER                ULI02070
0A12   00                        208  ADDRESS  DB     X'0'             CONSOLE DEVICE ADDRESS                ULI02080
0A13   F0                        209  PADSET   DB     X'F0'            PASLA SPEED COMMAND                   ULI02090
                                 210  *                                                                      ULI02100
                                 211  * / DEVICE POINTERS /                                                 ULI02110
                                 212  * CRT        ... 1                                                    ULI02120
                                 213  * TTY        ... 2                                                    ULI02130
                                 214  * CAROUSEL   ... 4                                                    ULI02140
                                 215  * MICROBUS   ... 5                                                    ULI02150
                                 216  *                                                                      ULI02160
0A14   1011                      217  CRTADR   DC     X'1011'          PASLA ADDRESS                         ULI02170
0A16   02C2                      218  TTYADR   DC     X'02C2'          TTY ADDRESS                           ULI02180
0A18   C0C0                      219  MICADR   DC     X'C0C0'          MICROBUS ADDRESS                      ULI02190
0A1A   1011                      220  CAROUADR DC     X'1011'          CAROUSEL ADDRESS                      ULI02200
                                 221  *                                                                      ULI02210
                                 222  * ********************************************************************** ULI02220
                                 223  *                                                                      ULI02230
0A1C   243F                      224  START32  LIS    R3,X'F'          MODEL FLAG = 'F'                      ULI02240
0A1E   23C2                      225           BS     START                                                  ULI02250
0A20   2430                      226  START16  LIS    R3,0             MODEL FLAG = '0'                      ULI02260
0A22   4030 0F34                 227  START    STH    R3,MODEL         STORE MODEL FLAG                      ULI02270
0A26   C830 00F0                 228           LHI    R3,X'F0'                                               ULI02280
0A2A   9523                      229           EPSR   R2,R3            GO TO RS F                            ULI02290
0A2C   D330 0A10                 230           LB     R3,IO                                                  ULI02300
0A30   C530 0001                 231           CLHI   R3,1             IS I/O ON PASLA ?                     ULI02310
0A34   4330 0A62                 232           BE     CRT              YES, BRANCH                           ULI02320
0A38   C530 0004                 233           CLHI   R3,4                                                   ULI02330
0A3C   4330 0A62                 234           BE     CRT                                                    ULI02340
0A40   C530 0005                 235           CLHI   R3,5             IS I/O ON THE MICROBUS                ULI02350
0A44   4330 0A92                 236           BE     MICBUS           YES, BRANCH                           ULI02360
                                 237  *                                                                      ULI02370
                                 238  *                                                                      ULI02380
0A48   4830 0A0A                 239  TTY      LH     R3,READ2         NO                                    ULI02390
0A4C   4030 0A08                 240           STH    R3,READ1         STORE TTY COMMANDS                    ULI02400
0A50   D330 0A16                 241           LB     R3,TTYADR                                              ULI02410
0A54   D230 0A12                 242           STB    R3,ADDRESS       STORE TTY ADDRESS                     ULI02420
0A58   0733                      243           XHR    R3,R3                                                  ULI02430
0A5A   4030 0F3C                 244           STH    R3,PASFLG        ZERO PASLA FLAG                       ULI02440
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0A5E  4300 0AA8          245          B      WRTITLE                                    ULI02450
                         246  *                                                          ULI02460
                         247  *                                                          ULI02470
0A62  4830 0A0C          248  CRT     LH     R3,READ3                                   ULI02480
0A66  4030 0A08          249          STH    R3,READ1        STORE PASLA COMMANDS       ULI02490
0A6A  243F               250          LIS    R3,X'F'                                    ULI02500
0A6C  4030 0F3C          251          STH    R3,PASFLG       SET PASLA FLAG             ULI02510
0A70  D330 0A10          252          LB     R3,IO                                      ULI02520
0A74  C530 0001          253          CLHI   R3,1            IS I/O ON CRT              ULI02530
0A78  2336               254          BES    CRT1            YES,BRANCH                 ULI02540
0A7A  D330 0A1A          255          LB     R3,CAROUADR                                ULI02550
0A7E  D230 0A12          256          STB    R3,ADDRESS      STORE CAROUSEL ADDRESS     ULI02560
0A82  2305               257          BS     CMD                                        ULI02570
0A84  D330 0A14          258  CRT1    LB     R3,CRTADR                                  ULI02580
0A88  D230 0A12          259          STB    R3,ADDRESS      STORE CRT ADDRESS          ULI02590
0A8C  DF30 0A13          260  CMD     OC     R3,PADSET       OC TIMING TO PASLA         ULI02600
0A90  230C               261          BS     WRTITLE                                    ULI02610
                         262  *                                                          ULI02620
                         263  *                                                          ULI02630
0A92  4830 0A0E          264  MICBUS  LH     R3,READ4                                   ULI02640
0A96  4030 0A08          265          STH    R3,READ1        STORE MICROBUS COMMANDS    ULI02650
0A9A  0733               266          XHR    R3,R3                                      ULI02660
0A9C  4030 0F3C          267          STH    R3,PASFLG       ZERO PASLA FLAG            ULI02670
0AA0  D330 0A18          268          LB     R3,MICADR                                  ULI02680
0AA4  D230 0A12          269          STB    R3,ADDRESS      STORE MICROBUS ADDRESS     ULI02690
                         270  *                                                          ULI02700
0AA8  4190 0E38          271  WRTITLE BAL    R9,PRINT        "COMMON ULI TEST 06-129R07" ULI02710
0AAC  0EA6               272          DC     Z(TITLE)                                   ULI02720
0AAE  0EC1               273          DC     Z(EDTITLE)                                 ULI02730
0AB0  4300 0AE8          274  CRG     B      TTYIN                                      ULI02740
                         275  *                                                          ULI02750
                         276  *                                                          ULI02760
0AB4  0000               277  MODE    DC     X'0',C'MODE  '                             ULI02770
0AB6  4D4F4445
      2020
0ABC  098F               278  ULIADR  DC     X'8B',C'DEVADR'                            ULI02780
0ABE  44455641
      4452
0AC4  0000               279  INTLEV  DC     X'0',C'INTLEV'                             ULI02790
0AC6  494E544C
      4556
0ACC  0000               280  INTRPT  DC     X'0',C'INTRPT'                             ULI02800
0ACE  494E5452
      5054
0AD4  0000               281  RUN     DC     X'0',C'RUN   '                             ULI02810
0AD6  52554F20
      2020
0ADC  0000               282  OPTION  DC     X'0',C'OPTION',X'0',X'FFFF'                ULI02820
0ADE  4F505449
      4F4F
0AE4  0000
0AE6  FFFF
                         283  *                                                          ULI02830
0AE8  4190 0E38          284  TTYIN   BAL    R9,PRINT        PRINT "*"                  ULI02840
0AEC  01C2               285          DC     Z(STAR)                                    ULI02850
0AEE  0BC9               286          DC     Z(STREND)                                  ULI02860
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0AF0  C8E0 2020          287          LHI   R14,X'2020'       LOAD ASCII SPACE                          ULI02870
0AF4  40E0 0BB0          288          STH   R14,TTYBUF        CLEAR CHR BUFFER                          ULI02880
0AF8  40E0 0BB2          289          STH   R14,TTYBUF+2                                                ULI02890
0AFC  40E0 0BB4          290          STH   R14,TTYBUF+4                                                ULI02900
0B00  0711               291          XHR   R1,R1             CLEAR CHR BUFFER INDEX                    ULI02910
0B02  4190 0E5E          292  RDCHR   BAL   R9,INPUT 4340 BC2 GET A CHARACTER                           ULI02920
0B06  C5F0 000D          293          CLHI  R14,X'0D'         IS IT A "CR" ?                            ULI02930
0B0A  2335               294          BES   OKIN              YES, TRY TO MATCH IT TO TABLE             ULI02940
0B0C  C5E0 0020          295          CLHI  R14,X'20'         NO, IS IT A SPACE                         ULI02950
0B10  2337               296          BES   OKIN              YES, TRY A MATCH                          ULI02960
0B12  D2E1 0BB0          297          STB   R14,TTYBUF(R1)     NO, STOR IN CHR BUFFER                    ULI02970
0B16  2611               298          AIS   R1,1              INCREMENT INDEX                           ULI02980
0B18  C510 0006          299          CLHI  R1,6              HAVE WE REACHED 6 CHARS ?                 ULI02990
0B1C  203D               300          BNES  RDCHR             NO, GET ANOTHER                           ULI03000
0B1E  0711               301  OKIN    XHR   R1,R1             YES, CLEAR TABLE INDEX                    ULI03010
0B20  0733               302  OKIN2   XHR   R3,R3             CLEAR CHR BUFFER INDEX                    ULI03020
0B22  0841               303          LHR   R4,R1             SET NEW TABLE INDEX                       ULI03030
0B24  48F4 0AB6          304  LOOKUP  LH    R15,ORG+6(R4)     GET HALFWORD FROM OPTION TABLE            ULI03040
0B28  4210 0BB6          305          BM    QMARK             IF MINUS PRINT "?"                        ULI03050
0B2C  45F3 0BB0          306          CLH   R15,TTYBUF(R3)    COMPARE TO CHR BUFFER                     ULI03060
0B30  2333               307          BES   INC               IF EQUAL CHECK NEXT HALFWORD IN BUF       ULI03070
0B32  2618               308          AIS   R1,8              IF NOT EQUAL INCREMENT TABLE INDEX        ULI03080
0B34  22CA               309          BS    OKIN2             CHECK NEXT TABLE ENTRY                    ULI03090
0B36  2642               310  INC     AIS   R4,2              INCREMENT TABLE INDEX                     ULI03100
0B38  2632               311          AIS   R3,2              INCREMENT CHR BUFFER INDEX                ULI03110
0B3A  C530 0006          312          CLHI  R3,6              HAVE WE FOUND 3 EQUAL HALFWORDS ?         ULI03120
0B3E  203F               313          BNES  LOOKUP            NO, CHECK NEXT TABLE ENTRY                ULI03130
0B40  C510 0020          314  MATCH   CLHI  R1,RUN-ORG-4      IS THIS THE RUN OPTION ?                  ULI03140
0B44  4330 0BC2          315          BE    EXECUTE           YES, EXECUTE TEST                         ULI03150
0B48  C510 0028          316          CLHI  R1,X'28'          IS THIS THE COMMAND 'OPTION'              ULI03160
0B4C  4230 0B60          317          BNE   QM                NO,BRANCH                                 ULI03170
0B50  4190 0E5E          318          BAL   R9,INPUT                                                     ULI03180
0B54  C5F0 000D          319          CLHI  R14,X'0D'         IS IT A 'CR' AFTER CMD 'OPTION'           ULI03190
0B58  4330 0DEE          320          BE    PROPT             YES,BRANCH TO PROPT                       ULI03200
0B5C  4300 0BB6          321          B     QMARK             NO,PRINT A '?'                            ULI03210
0B60  C5F0 000D          322  QM      CLHI  R14,X'0D'         IS IT A "CR"                              ULI03220
0B64  4330 0BB6          323          BE    QMARK             YES,PRINT A '?'                           ULI03230
0B68  4190 0E5E          324  HEXASC  BAL   R9,INPUT          NO, GET OPTION VALUE                      ULI03240
0B6C  0766               325          XHR   R6,R6             CLEAR BUFFER REGISTER                     ULI03250
0B6E  C5E0 000D          326          CLHI  R14,X'0D'         IS IT A 'CR'                              ULI03260
0B72  4330 0BB6          327          BE    QMARK             PRINT A "?"                               ULI03270
0B76  C5E0 0020          328          CLHI  R14,X'20'         SKIP LEADING SPACES                       ULI03280
0B7A  2239               329          BES   HEXASC                                                     ULI03290
0B7C  C5E0 003A          330  HEXLP   CLHI  R14,X'3A'         CHECK IF VALID HEX CHARACTER              ULI03300
0B80  218A               331          BLS   HEX                                                       ULI03310
0B82  C5E0 0041          332          CLHI  R14,X'41'                                                 ULI03320
0B86  4280 0BB6          333          BL    QMARK                                                     ULI03330
0B8A  C5E0 0047          334          CLHI  R14,X'47'                                                 ULI03340
0B8E  4280 0BB6          335          BNL   QMARK                                                     ULI03350
0B92  26F9               336          AIS   R14,9                                                     ULI03360
0B94  C4E0 000F          337  HEX     NHI   R14,X'F'                                                  ULI03370
0B98  9164               338          SLHLS R6,4                                                      ULI03380
0B9A  066F               339          OHR   R6,R14            OR CHARACTER INTO REGISTER BUFFER         ULI03390
0B9C  4190 0E5E          340          BAL   R9,INPUT          GET NEXT CHARACTER                        ULI03400
0BA0  C5E0 000D          341          CLHI  R14,X'0D'         IS IT A "CR" ?                            ULI03410
0BA4  4230 0B7C          342          BNE   HEXLP             NO, CHECK IF VALID HEX CHARACTER          ULI03420
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0BA8  4061 0AB4          343          STH   R6,ORG+4(R1)      YES, STORE HEX OPTION VALUE      ULI03430
0BAC  4300 0AE8          344          B     TTYIN             PRINT AN "*"                     ULI03440
                         345  *                                                                 ULI03450
                         346  *                                                                 ULI03460
0BB0  00C0               347  TTYBUF  DC    X'0',X'0',X'0'    CHARACTER BUFFER                 ULI03470
0BB2  00C0
0BB4  00C0
                         348  *                                                                 ULI03480
                         349  *                                                                 ULI03490
0BB6  4190 0E38          350  QMARK   BAL   R9,PRINT          CR,LF," ?",CR,LF                 ULI03500
0BBA  0ED6               351          DC    Z(QMSG)                                            ULI03510
0BBC  0EDB               352          DC    Z(EDQMSG)                                          ULI03520
0BBE  4300 0AE8          353          B     TTYIN             RETURN                           ULI03530
                         354  *                                                                 ULI03540
                         355  *                                                                 ULI03550
0BC2  48C0 0ABC          356  EXECUTE LH    R12,ULIADR                                         ULI03560
0BC6  91C1               357          SLHLS R12,1                                              ULI03570
0BC8  CAC0 00D0          358          AHI   R12,X'D0'                                          ULI03580
0BCC  40C0 0F38          359          STH   R12,IIP           STORE INTERRUPT TABLE ADDRESS    ULI03590
0BD0  2430               360          LIS   R3,0                                               ULI03600
0BD2  4030 0F3A          361          STH   R3,LAST           ZERO LAST                        ULI03610
                         362  *                                                                 ULI03620
                         363  *                                                                 ULI03630
0BD6  4830 0ABC          364  RESTRT  LH    R3,ULIADR         LOAD DEVICE ADDRESS              ULI03640
0BDA  07C0               365          XHR   R0,R0             ZERO REGISTER 0                  ULI03650
0BDC  4840 0F34          366          LH    R4,MODEL          IS PROCESSOR 32 BIT              ULI03660
0BE0  4230 02F4          367          BNZ   REP32             YES,BRANCH                       ULI03670
0BE4  40C0 0044          368          STH   R0,X'44'          NO,SET UP INT PSW                ULI03680
0BE8  C840 0D74          369          LHI   R4,ERRI                                            ULI03690
0BEC  4040 0046          370          STH   R4,X'46'                                           ULI03700
0BF0  43C0 0C16          371          B     REP16                                              ULI03710
0BF4  C8C0 00D0          372  REP32   LHI   R12,X'D0'                                         ULI03720
0BF8  24F2               373          LIS   R15,2                                              ULI03730
0BFA  C8E0 02CE          374          LHI   R14,X'2CE'                                         ULI03740
0BFE  C8F0 0D74          375          LHI   R15,ERRI                                           ULI03750
0C02  40FC 0000          376  SIT32   STH   R15,0(R12)                                         ULI03760
0C06  C1C0 0C02          377          BXLE  R12,SIT32                                          ULI03770
0C0A  48C0 0F38          378          LH    R12,IIP                                            ULI03780
0C0E  C840 0D74          379          LHI   R4,ERRI           LOAD LOC OF ERROR ROUTINE        ULI03790
0C12  404C 0000          380          STH   R4,0(R12)         STORE AT INTERRUPT LOC           ULI03800
0C16  C8C0 70F0          381  REP16   LHI   R12,X'70F0'                                       ULI03810
0C1A  959C               382          EPSR  R9,R12            ENABLE INTERRUPTS                ULI03820
                         383  *                                                                 ULI03830
0C1C  2451               384          LIS   R5,1              DATA                             ULI03840
0C1E  0845               385  LOOP1   LHR   R4,R5             ONE THRU ZEROS                   ULI03850
0C20  41F0 0CFC          386          BAL   R15,TESTDS        TEST DATA AND STATUS             ULI03860
0C24  C740 FFFF          387          XHI   R4,X'FFFF'        ZERO THRU ONES                   ULI03870
0C28  41F0 0CFC          388          BAL   R15,TESTDS        TEST DATA AND STATUS             ULI03880
0C2C  0A55               389          AHR   R5,R5             SHIFT DATA PATTERN               ULI03890
0C2E  2288               390          BNCS  LOOP1             LOOP                             ULI03900
                         391  *                                                                 ULI03910
                         392  *                                                                 ULI03920
0C30  2474               393          LIS   R7,4              ERROR NUMBER 04                  ULI03930
0C32  0744               394          XHR   R4,R4             CHECK THAT COMMAND               ULI03940
0C34  9E34               395  LOOP2   OCR   R3,R4             BITS 04:07 RETURN                ULI03950
0C36  9D36               396          SSR   R3,R6             ON STATUS BITS 04:07             ULI03960
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0C38  C460 000F          397          NHI   R6,X'F'                                  ULI03970
0C3C  0546               398          CLHR  R4,R6                                    ULI03980
0C3E  2334               399          BES   INCRE          OK                       ULI03990
0C40  41D0 0D9A          400          BAL   R13,ERROR       ERROR 04                 ULI04000
0C44  2208               401          BS    LOOP2           LOOP ON FAILURE          ULI04010
0C46  2641               402  INCRE   AIS   R4,1            INCREMENT PATTERN        ULI04020
0C48  C340 0010          403          THI   R4,X'10'                                  ULI04030
0C4C  223C               404          BZS   LOOP2                                    ULI04040
                         405  *                                                       ULI04050
                         406  * TEST INTERRUPTS                                      ULI04060
                         407  *                                                       ULI04070
0C4E  4870 0ACC          408          LH    R7,INTRPT       INTERRUPTS ?             ULI04080
0C52  4230 0DE2          409          BNZ   AOK             NO, BRANCH               ULI04090
0C56  0777               410          XHR   R7,R7           YES, ERROR NUMBER        ULI04100
0C58  DE30 0F41          411          CC    R3,ATN          SHOULDN'T INTERRUPT      ULI04110
0C5C  DE30 0F42          412          OC    R3,DRMATN       SHOULDN'T INTERRUPT      ULI04120
0C60  DE30 0F3F          413          OC    R3,DBLATN       SHOULDN'T INTERRUPT      ULI04130
0C64  9E37               414  DROP    OCR   R3,R7                                   ULI04140
0C65  DE30 0F40          415          CC    R3,EBL          SHOULDN'T INTERRUPT      ULI04150
0C5A  49C0 0F34          416          LH    R12,MODEL       IS PROCERROR 32 BIT ?    ULI04160
0C6E  2338               417          BZS   DR16           NO, BRANCH               ULI04170
0C70  C840 0C38          418          LHI   R4,INTSVR       YES, CONTINUE            ULI04180
0C74  48C0 0F38          419          LH    R12,IIR                                  ULI04190
0C78  404C 0000          420          STH   R4,0(R12)       ESTABLISH INTERRUPT TABLE POINTER ULI04200
0C7C  2305               421          BS    DR32                                     ULI04210
0C7E  C840 0C9A          422  DR16    LHI   R4,INTSVC                                ULI04220
0C82  404C 0046          423          STH   R4,X'46'        SET UP INT PSW           ULI04230
0C86  DF30 0F3E          424  DR32    OC    R3,EBLATN       SHOULD INTERRUPT         ULI04240
0C8A  247F               425          LIS   R7,X'F'                                  ULI04250
0C8C  2771               426  WAIT1   SIS   R7,1                                     ULI04260
0C8E  2031               427          BNZS  WAIT1           WAIT                     ULI04270
0C90  2476               428          LIS   R7,6            ERROR NUMBER 06          ULI04280
0C92  41D0 0D9A          429          BAL   R13,ERROR                                ULI04290
0C96  4300 0C64          430          B     DROP            LOOP                     ULI04300
                         431  *                                                       ULI04310
                         432  *                                                       ULI04320
0C9A  9F45               433  INTSVC  ACKR  R4,R5           ACKNOWLEDGE              ULI04330
0C9C  0543               434          CLHR  R4,R3                                    ULI04340
0C9E  2335               435          BES   INT8            DEV NO. OK ?             ULI04350
0CA0  2477               436          LIS   R7,7            ERROR 07                 ULI04360
0CA2  41D0 0D9A          437          BAL   R13,ERROR                                ULI04370
0CA6  2206               438          BS    INTSVC          AGAIN                    ULI04380
0CA8  9F45               439  INT8    ACKR  R4,R5           SHOULD GET FALSE SYNC    ULI04390
0CAA  0543               440          CLHR  R4,R3                                    ULI04400
0CAC  4230 0DE2          441          BNE   AOK                                      ULI04410
0CB0  2478               442          LIS   R7,8            ERROR 08                 ULI04420
0CB2  41D0 0D9A          443          BAL   R13,ERROR       ATN DIDN'T DROP          ULI04430
0CB6  2207               444          BS    INT8            AGAIN                    ULI04440
                         445  *                                                       ULI04450
                         446  *                                                       ULI04460
0CB8  9599               447  INTSVR  EPSR  R9,R9           SAVE PSW (RS)            ULI04470
0CBA  C490 00F0          448          NHI   R9,X'F0'                                 ULI04480
0CBE  9094               449          SRHLS R9,4                                     ULI04490
0CC0  4590 0AC4          450          CLH   R9,INTLEV       IS INTERRUPT LEVEL CORRECT (RS) ? ULI04500
0CC4  4230 0DBC          451          BNE   INTERL          NO, BRANCH TO ERROR      ULI04510
0CC8  4520 0ABC          452  INT9    CLH   R2,ULIADR       YES, IS INTER DEV = ULI ? ULI04520
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0CCC   2336             453          BES    CONTINT          YES, BRANCH                    ULI04530
0CCE   2411             454          LIS    R1,1             NO                             ULI04540
0CD0   2477             455          LIS    R7,7             ERROR 7                        ULI04550
0CD2   41D0 0D9A        456          BAL    R13,ERROR                                       ULI04560
0CD6   22C7             457          BS     INT9             AGAIN                          ULI04570
0CD8   C8C0 0CF4        458 CONTINT  LHI    R12,ERRINT                                      ULI04580
0CDC   4890 0F38        459          LH     R9,IIR                                          ULI04590
0CE0   40C9 0000        460          STH    R12,0(R9)                                       ULI04600
0CE4   C890 70F0        461 INTSVQ   LHI    R9,X'70F0'                                      ULI04610
0CE8   95C9             462          EPSR   R12,R9           ENABLE INTERRUPTS              ULI04620
0CEA   24CF             463          LIS    R12,X'F'                                        ULI04630
0CEC   27C1             464 WAIT2    SIS    R12,1                                           ULI04640
0CEE   2031             465          BNZS   WAIT2           WAIT                           ULI04650
0CF0   4300 0DE2        466          B      AOK              AOK                            ULI04660
                        467 *                                                               ULI04670
                        468 *                                                               ULI04680
0CF4   2478             469 ERRINT   LIS    R7,8             ERROR 8                        ULI04690
0CF5   41D0 0D9A        470          BAL    R13,ERROR                                       ULI04700
0CFA   22CB             471          BS     INTSVQ           LOOP                           ULI04710
                        472 *                                                               ULI04720
                        473 * DATA TEST (HALFWORD)                                         ULI04730
                        474 *                                                               ULI04740
0CFC   DE30 0F43        475 TESTDS   OC     R3,HW            SELECT HALFWORD MODE           ULI04750
0D00   9834             476          WHR    R3,R4            HALFWORD DATA TRANSFER         ULI04760
0D02   9936             477          RHR    R3,R6                                           ULI04770
0D04   9404             478          EXBR   R0,R4            JUSTIFY REGISTER 4             ULI04780
0D06   2440             479          LIS    R4,0                                            ULI04790
0D08   9440             480          EXBR   R4,R0                                           ULI04800
0D0A   9406             481          EXBR   R0,R6            JUSTIFY REGISTER 6             ULI04810
0D0C   2460             482          LIS    R6,0                                            ULI04820
0D0E   9460             483          EXBR   R6,R0                                           ULI04830
0D10   0546             484          CLHR   R4,R6            CHECK DATA                     ULI04840
0D12   2335             485          BES    TSTDS1                                          ULI04850
0D14   2471             486          LIS    R7,1             ERROR 01                       ULI04860
0D16   41D0 0D9A        487          BAL    R13,ERROR                                       ULI04870
0D1A   22CF             488          BS     TESTDS           LOOP ON ERROR                  ULI04880
                        489 *                                                               ULI04890
                        490 * STATUS TEST                                                   ULI04900
                        491 *                                                               ULI04910
0D1C   9D36             492 TSTDS1   SSR    R3,R6                                           ULI04920
0D1E   9064             493          SRHLS  R6,4             TEST THAT D08:11               ULI04930
0D20   0764             494          XHR    R6,R4            RETURNS ON STATUS              ULI04940
0D22   C460 000F        495          NHI    R6,X'F'          BITS 04:07                     ULI04950
0D26   2335             496          BES    TSTDS2                                          ULI04960
0D28   2473             497          LIS    R7,3             ERROR 03                       ULI04970
0D2A   41D0 0D9A        498          BAL    R13,ERROR                                       ULI04980
0D2E   2209             499          BS     TSTDS1           LOOP                           ULI04990
                        500 *                                                               ULI05000
                        501 * DATA TEST (BYTE)                                             ULI05010
                        502 *                                                               ULI05020
0D30   DE30 0F44        503 TSTDS2   OC     R3,BYTE          SELECT BYTE MODE               ULI05030
0D34   9374             504          LBR    R7,R4                                           ULI05040
0D36   9444             505          EXBR   R4,R4                                           ULI05050
0D38   0766             506          XHR    R6,R6            CLEAR REG. 6                   ULI05060
0D3A   4860 0A84        507          LH     R6,MODE          FIND OUT OPTION                ULI05070
0D3E   4220 0D6A        508          BTC    2,BTH                                           ULI05080
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0D42  9A34            509          WDR   R3,R4          WRITE FIRST BYTE                ULI05090
0D44  9E36            510          RDP   R3,R6          READ FIRST BYTE                 ULI05100
0D46  9A37            511          WDP   R3,R7          WRITE SECOND BYTE               ULI05110
0D48  9B37            512          PDR   R3,R7          READ SECOND BYTE                ULI05120
0D4A  9466            513          EXBR  R6,R6                                          ULI05130
0D4C  0667            514          OHR   R6,R7                                          ULI05140
0D4E  9444            515  RTN     EXBR  R4,R4                                          ULI05150
0D50  9404            516          EXBR  R0,R4          JUSTIFY REGISTER 4              ULI05160
0D52  2440            517          LIS   R4,0                                           ULI05170
0D54  9440            518          EXBR  R4,R0                                          ULI05180
0D56  9406            519          EXBR  R0,R6          JUSTIFY REGISTER 6              ULI05190
0D58  2460            520          LIS   R6,0                                           ULI05200
0D5A  9460            521          EXBR  R6,R0                                          ULI05210
0D5C  0546            522          CLHR  R4,R6          IS DATA OK ?                    ULI05220
0D5E  033F            523          BER   R15            YES, RETURN                     ULI05230
0D60  2472            524          LIS   R7,2           NO, ERROR 02                    ULI05240
0D62  41D0 0D9A       525          BAL   R13,ERROR                                      ULI05250
0D66  4300 0D30       526          B     TSTDS2         LOOP                            ULI05260
                      527  *                                                            ULI05270
                      528  * DATA TEST (BYTE TO HALFWORD)                               ULI05280
                      529  *                                                            ULI05290
0D6A  9A34            530  BTH     WDR   R3,R4          WRITE HIGH BYTE                 ULI05300
0D6C  9A37            531          WDR   R3,R7          WRITE LOW BYTE                  ULI05310
0D6E  9936            532          RHR   R3,R6          READ BOTH BYTES                 ULI05320
0D70  4300 0D4E       533          B     RTN                                            ULI05330
                      534  *                                                            ULI05340
                      535  *                                                            ULI05350
0D74  2475            536  ERRI    LIS   R7,5           ERROR 05                        ULI05360
0D76  41D0 0D9A       537          BAL   R13,ERROR                                      ULI05370
0D7A  07EE            538          XHR   R14,R14                                        ULI05380
0D7C  40E0 0F3A       539          STH   R14,LAST                                       ULI05390
0D80  48C0 0F34       540          LH    R12,MODEL                                      ULI05400
0D84  2133            541          BNZS  ERRI1                                          ULI05410
0D86  C2C0 0040       542          LPSW  X'40'          RESTORE PSW & RETURN            ULI05420
0D8A  24C0            543  ERRI1   LIS   R12,0                                         ULI05430
0D8C  959C            544          EPSR  R9,R12                                         ULI05440
0D8E  4010 0F36       545          STH   R1,LOCPSW                                      ULI05450
0D92  9510            546          EPSR  R1,R0          RESTORE PSW                     ULI05460
0D94  48C0 0F36       547          LH    R12,LOCPSW                                     ULI05470
0D98  03CC            548          BR    R12            RETURN                          ULI05480
                      549  *                                                            ULI05490
                      550  *                                                            ULI05500
0D9A  2481            551  ERROR   LIS   R8,1                                          ULI05510
0D9C  9A87            552          WDR   R8,R7          ERROR NUMBER                    ULI05520
0D9E  C670 0030       553          OHI   R7,X'30'       R7 = ERR.NO. IN ASCII           ULI05530
0DA2  D270 0F03       554          STB   R7,ERRNO+1                                     ULI05540
0DA6  4870 0F3A       555          LH    R7,LAST                                        ULI05550
0DAA  023D            556          BNZR  R13                                            ULI05560
0DAC  4190 0E38       557          BAL   R9,PRINT       "ERROR XX"                      ULI05570
0DB0  0EFA            558          DC    Z(ERRMSG)                                      ULI05580
0DB2  0F03            559          DC    Z(ERRMSZ)                                      ULI05590
0DB4  24EF            560          LIS   R14,X'F'                                       ULI05600
0DB6  40E0 0F3A       561          STH   R14,LAST                                       ULI05610
0DBA  03CD            562          BR    R13                                            ULI05620
                      563  *                                                            ULI05630
                      564  *                                                            ULI05640
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0DBC  08A9           565  INTERL  LHR   R10,R9                                    ULI05650
0DBE  4190 0E38      566          BAL   R9,PRINT          "INCORRECT INTERRUPT LEVEL ="  ULI05660
0DC2  0EDC           567          DC    Z(MSGINT)                                 ULI05670
0DC4  0FF9           568          DC    Z(EDMSGINT)                               ULI05680
0DC6  C6A0 0030      569          OHI   R10,X'30'         CONVERT INTERRUPT LEVEL TO ASCII  ULI05690
0DCA  C5A0 003A      570          CLHI  R10,X'3A'                                 ULI05700
0DCE  2182           571          BLS   HDIT                                      ULI05710
0DD0  26A7           572          AIS   R10,7                                     ULI05720
0DD2  9A2A           573  HDIT    WDR   R2,R10            WRITE INTERRUPT LEVEL     ULI05730
0DD4  9D20           574          SSR   R2,R0                                     ULI05740
0DD6  2081           575          BIBS  8,1               WAIT FOR NOT BUSY         ULI05750
0DD8  C8E0 70F0      576          LHI   R14,X'70F0'       GO TO RS F                ULI05760
0DDC  95FE           577          EPSR  R15,R14                                   ULI05770
0DDE  4300 0AE8      578          B     TTYIN                                     ULI05780
                     579  *                                                       ULI05790
                     580  *                                                       ULI05800
0DE2  4190 0E38      581  AOK     BAL   R9,PRINT          "NO ERROR"                ULI05810
0DE5  0ECA           582          DC    Z(MSG)                                    ULI05820
0DE8  0ED5           583          DC    Z(EDMSG)                                  ULI05830
0DEA  4300 0AE8      584          B     TTYIN             RETURN                  ULI05840
                     585  *                                                       ULI05850
                     586  *                                                       ULI05860
0DEE  243A           587  PROPT   LIS   R3,10             ROUTINE TO DISPLAY OPTIONS AND  ULI05870
0DF0  0799           588          XHR   R9,R9             OPTION VALUES.            ULI05880
0DF2  48F9 0AB4      589  PROPT1  LH    R15,MODE(R9)      LOAD IN THE OPTION VALUE  ULI05890
0DF6  0700           590          XHR   R0,R0                                     ULI05900
0DF8  08EF           591          LHR   R14,R15           LOAD THE OPTION VALUE IN REG.14  ULI05910
0DFA  90F4           592          SRHLS R14,4             SHIFT TO GET THE MOST SIG. DIGIT  ULI05920
0DFC  2302           593          BS    PROPT3                                    ULI05930
0DFE  08EF           594  PROPT2  LHR   R14,R15           GET THE LEAST SIG. DIGIT  ULI05940
0E00  C4E0 000F      595  PROPT3  NHI   R14,X'F'                                 ULI05950
0E04  C6E0 0030      596          OHI   R14,X'30'         CONVERT TO ASCII          ULI05960
0E08  C5E0 003A      597          CLHI  R14,X'3A'                                 ULI05970
0E0C  2182           598          BLS   PROPT4                                    ULI05980
0E0E  26E7           599          AIS   R14,7                                     ULI05990
0E10  D2E3 0F04      600  PROPT4  STB   R14,OPTMSG(R3)    STORE THE VALUE IN MSG LOC.  ULI06000
0E14  2631           601          AIS   R3,1                                     ULI06010
0E16  26C1           602          AIS   R0,1                                     ULI06020
0E18  C500 0001      603          CLHI  R0,1                                     ULI06030
0E1C  4330 0DFE      604          BE    PROPT2                                    ULI06040
0E20  263A           605          AIS   R3,10                                    ULI06050
0E22  2698           606          AIS   R9,8                                     ULI06060
0E24  C590 0020      607          CLHI  R9,32                                    ULI06070
0E28  4230 0DF2      608          BNE   PROPT1                                   ULI06080
0E2C  4190 0E38      609          BAL   R9,PRINT          PRINT THE OPTIONS AND OPT. VALUES  ULI06090
0E30  0F04           610          DC    Z(OPTMSG)                                 ULI06100
0E32  0F33           611          DC    Z(ENOPTMSG)                               ULI06110
0E34  4300 0AE8      612          B     TTYIN                                     ULI06120
                     613  *                                                       ULI06130
                     614  *                                                       ULI06140
0E38  D320 0A12      615  PRINT   LB    R2,ADDRESS        LOAD I/O ADDRESS          ULI06150
0E3C  48E9 0000      616          LH    R14,0(R9)         LOAD START ADDR OF MSG    ULI06160
0E40  48F9 0002      617          LH    R15,2(R9)         LOAD END ADDR OF MSG      ULI06170
0E44  48B0 0F3C      618          LH    R11,PASFLG        IS I/O ON PASLA ?         ULI06180
0E48  2332           619          BZS   GO                NO,BRANCH                 ULI06190
0E4A  2621           620          AIS   R2,1              YES, MODIFY I/O ADDRESS   ULI06200
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0E4C  DE20 0A09          621  GO       CC     R2,WRITE1          OC WRITE MODE                    ULI06210
0E50  9D25               622           SSR    R2,R5                                               ULI06220
0E52  2081               623           BTBS   8,1                WAIT FOR NOT BUSY                ULI06230
0E54  962E               624           WBR    R2,R14             WRITE                            ULI06240
0E56  9D25               625           SSR    R2,R5                                               ULI06250
0E58  2081               626           BTBS   8,1                WAIT FOR NOT BUSY                ULI06260
0E5A  4309 0004          627           B      4(R9)              RETURN                           ULI06270
                         628  *                                                                    ULI06280
                         629  *                                                                    ULI06290
0E5E  D320 0A12          630  INPUT    LB     R2,ADDRESS         LOAD I/O ADDRESS                 ULI06300
0E62  C8E0 00F0          631           LHI    R14,X'F0'                                           ULI06310
0E66  95FE               632           EPSR   R15,R14            SET UP NEW PSW                   ULI06320
0E68  D3C0 0A10          633           LB     R12,IO                                              ULI06330
0E6C  C5C0 0005          634           CLHI   R12,5              IS MICROBUS ON IO                ULI06340
0E70  4330 0E86          635           BE     INPUT1             YES BRANCH                       ULI06350
0E74  DE20 0A08          636           OC     R2,READ1           NO,SET IO IN READ MODE           ULI06360
0E78  9D20               637           SSR    R2,R0                                               ULI06370
0E7A  2281               638           BFBS   8,1                                                 ULI06380
0E7C  9D20               639           SSR    R2,R0                                               ULI06390
0E7E  2081               640           BTBS   8,1                                                 ULI06400
0E80  9B2E               641           RDR    R2,R14             READ CHARACTER                   ULI06410
0E82  4309 0E94          642           B      INPUT2             BRANCH                           ULI06420
0E86  DE20 0A08          643  INPUT1   OC     R2,READ1           SET MICROBUS IN READ MODE        ULI06430
0E8A  9B20               644           RDR    R2,R0              DUMMY READ                       ULI06440
0E8C  9D20               645           SSR    R2,R0                                               ULI06450
0E8E  2081               646           BTBS   8,1                                                 ULI06460
0E90  9B2E               647           RDR    R2,R14             READ CHARACTER                   ULI06470
0E92  9A2E               648           WDR    R2,R14             ECHO CHARACTER                   ULI06480
0E94  C4E0 007F          649  INPUT2   NHI    R14,X'7F'                                           ULI06490
0E98  C5E0 005F          650           CLHI   R14,X'5F'          CHECK FOR LOWER CASE CHARACTERS  ULI06500
0E9C  4320 0EA4          651           BNP    INPUT3             NO,BRANCH                        ULI06510
0EA0  CBE0 0020          652           SHI    R14,X'20'          YES,CONVERT TO UPPER CASE        ULI06520
0EA4  0309               653  INPUT3   BR     R9                 RETURN                           ULI06530
                         654  *                                                                    ULI06540
                         655  *                                                                    ULI06550
0EA6  0D0A               656  TITLE    DC     X'0D0A',C'COMMON ULI TEST 06-129R07'                ULI06560
0EA8  434F4D4D
      4F4E2055
      4C492054
      45535420
      30362D31
      32395230
      3720
      0000 0EC1          657  EDTITLE  EQU    *-1                                                 ULI06570
                         658  *                                                                    ULI06580
0EC2  0000               659  STAR     DC     X'0',X'0D0A',X'0',C'* '                             ULI06590
0EC4  0D0A
0EC6  0000
0EC8  2A20
      0000 0EC9          660  STREND   EQU    *-1                                                 ULI06600
                         661  *                                                                    ULI06610
0ECA  0D0A               662  MSG      DC     X'0D0A',C'NO ERRORS'                                ULI06620
0ECC  4E4F2045
      52524F52
      5320
      0000 0ED5          663  EDMSG    EQU    *-1                                                 ULI06630
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                                664  *                                                                    ULI06640
                                665  *                                                                    ULI06650
0ED6   0D0A                     666  QMSG     DC     X'0D0A',C' ?',X'0D0A'                               ULI06660
0ED8   203F
0EDA   0D0A
       0000 0ED9                667  EDQMSG   EQU    *-1                                                 ULI06670
                                668  *                                                                    ULI06680
                                669  *                                                                    ULI06690
                                670  *                                                                    ULI06700
                                671  *                                                                    ULI06710
0EDC   0D0A                     672  MSGINT   DC     X'0D0A',C'INCORRECT INTERRUPT LEVEL = '              ULI06720
0EDE   494E434F
       52524543
       5420494E
       54455252
       55505420
       4C455645
       4C203D20
       0000 0EF9                673  EDMSGINI EQU    *-1                                                 ULI06730
                                674  *                                                                    ULI06740
                                675  *                                                                    ULI06750
0EFA   0D0A                     676  ERRMSG   DC     X'0D0A',C'ERROR '                                   ULI06760
0EFC   4552524F
       5220
0F02   3030                     677  ERRNC    DC     C'00'                                               ULI06770
       0000 0F03                678  ERRMSZ   EQU    *-1                                                 ULI06780
                                679  *                                                                    ULI06790
                                680  *                                                                    ULI06800
0F04   0D0A                     681  OPTMSG   DC     X'0D0A',C'MODE   =  '                               ULI06810
0F06   4D4F4445
       2020203D
       2020
0F10   0D0A                     682          DC     X'0D0A',C'DEVADR =  '                               ULI06820
0F12   44455641
       4452203D
       2020
0F1C   0D0A                     683          DC     X'0D0A',C'INTLEV =  '                               ULI06830
0F1E   494E544C
       4556203D
       2020
0F28   0D0A                     684          DC     X'0D0A',C'INTRPT =  '                               ULI06840
0F2A   494E5452
       5054203D
       2020
       0000 0F33                685  ENOPTMSG EQU    *-1                                                 ULI06850
                                686  *                                                                    ULI06860
                                687  * ****************************************************************** ULI06870
                                688  *                                                                    ULI06880
0F34   0000                     689  MODEL    DC     X'0'            0 = 7/16; F = 7/32                  ULI06890
0F36   0000                     690  LOCPSW   DC     X'0'            RETURN LOC FROM ERRI                ULI06900
0F38   0000                     691  IIR      DC     X'0'            IMMED INTERR POINTER LOC            ULI06910
0F3A   0000                     692  LAST     DC     X'0'            0=NO ERRORS; F=ERRORS)              ULI06920
0F3C   0000                     693  PASFLG   DC     X'0'            PASLA FLAG                          ULI06930
                                694  *                                                                    ULI06940
                                695  * ****************************************************************** ULI06950
                                696  *                                                                    ULI06960
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0F3E  48                    697  EBLATN   DB     X'48'                                                    ULI06970
0F3F  88                    698  DBLATN   DB     X'88'                                                    ULI06980
0F40  40                    699  EBL      DB     X'40'                                                    ULI06990
0F41  08                    700  ATN      DB     X'08'                                                    ULI07000
0F42  C8                    701  DRMATN   DB     X'C8'                                                    ULI07010
0F43  E0                    702  HW       DB     X'E0'                                                    ULI07020
0F44  C0                    703  BYTE     DB     X'C0'                                                    ULI07030
      0000 0F44             704  LNZB     EQU    *-1                                                      ULI07040
0F48  0000 0000             705  PSWSAVE  DCW    0,0                                                      ULI07050
0F4C  0000 0000
0F50                        706  RSAVE    DS     512                                                      ULI07060
                            707  *        CHKSUM                                                          ULI07070
                            708  *        (THE FOLLOWING CODE IS NOT PART OF THE TEST.)                   ULI07080
                            709  *                                                                        ULI07090
                            710  *                                                                        ULI07100
1150  24C0                  711  SCHKSUM  LIS    R0,0             PUNCH M17 TAPE WITH CHECKSUM            ULI07110
1152  9510                  712           EPSR   R1,R0            SELECT REG. SET 0                       ULI07120
                            713  *                                                                        ULI07130
1154  C810 0A00             714           LDAI   R1,ORIGIN1       START                                   ULI07140
1159  2421                  715           LIS    R2,1             INCREMENT                               ULI07150
115A  C830 0F44             716           LDAI   R3,LNZB          FINAL                                   ULI07160
115E  2440                  717           LIS    R4,0             CHECKSUM BYTE                           ULI07170
1160  D351 0000             718  SGEN     LB     R5,0(R1)                                                 ULI07180
1164  0745                  719           XAR    R4,R5                                                    ULI07190
1166  C110 1160             720           BXLE   R1,SGEN                                                  ULI07200
116A  D240 0099             721           STB    R4,MN+3          CHECKSUM BYTE TO BOOT LOADER            ULI07210
                            722  *                                                                        ULI07220
116E  C810 0080             723  STAPE    LHI    R1,X'0080'                                               ULI07230
1172  9E21                  724           CCR    R2,R1            DISPLAY : NORMAL MODE                   ULI07240
1174  9444                  725           EXBR   R4,R4                                                    ULI07250
1176  9824                  726           WHR    R2,R4            CHECKSUM BYTE TO D1                     ULI07260
1178  9411                  727           EXBR   R1,R1                                                    ULI07270
117A  9501                  728           EPSR   R0,R1            HALT PROCESSOR.                         ULI07280

117C  D360 007A             730  SPUNCH   LB     R6,X'7A'         GET BOUTDV (PUNCH) ADDRESS.             ULI07300
1180  DE60 007B             731           CC     R6,X'7B'         START TAPE PUNCH                        ULI07310
1184  9D60                  732           SSR    R6,R0                                                    ULI07320
1186  2081                  733           BTBS   8,1                                                      ULI07330
1188  41F0 11CA             734           BAL    R15,STAPL        PUNCH LEADER                            ULI07340
118C  9411                  735           EXBR   R1,R1            (R1) = X'0080'                          ULI07350
118E  C830 00CF             736           LHI    R3,X'CF'                                                 ULI07360
1192  DA61 0000             737  SPNCH1   WD     R6,0(R1)         PUNCH BOOT LOADER                       ULI07370
1196  9D60                  738           SSR    R6,R0                                                    ULI07380
1198  2081                  739           BTBS   8,1                                                      ULI07390
119A  C110 1192             740           BXLE   R1,SPNCH1                                                ULI07400
119E  41F0 11D0             741           BAL    R15,STAPL1       PUNCH ONE-FOLD GAP.                     ULI07410
                            742  *                                                                        ULI07420
11A2  D340 0099             743           LB     R4,MN+3          GET CHECKSUM BYTE                       ULI07430
11A6  C810 0A00             744           LDAI   R1,ORIGIN1       (NORMALLY X'A00')                       ULI07440
11AA  C830 0F44             745           LDAI   R3,LNZB                                                  ULI07450
11AE  D351 0000             746  SPNCH2   LB     R5,0(R1)         PUNCH PROGRAM                           ULI07460
11B2  0745                  747           XAR    R4,R5                                                    ULI07470
11B4  9A65                  748           WDR    R6,R5                                                    ULI07480
11B6  9401                  749           EXBR   R0,R1                                                    ULI07490
11B8  9820                  750           WHR    R2,R0            DATA ADDRESS TO DISPLAY.                ULI07500
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11BA  9D60           751          SSR   R6,R0                                  ULI07510
11BC  2081           752          BTBS  8,1                                    ULI07520
11BE  C110 11AE      753          BXLE  R1,SPNCH2                              ULI07530
11C2  41F0 11CA      754          BAL   R15,STAPL      PUNCH TRAILER.          ULI07540
11C6  4300 115E      755          B     STAPE          DISPLAY CHECKSUM, HALT PROCESSOR.  ULI07550

11CA  C800 0100      757  STAPL   LHI   R0,256       TO PUNCH BLANK LEADER   ULI07570
11CE  23C3           758          BS    STAPLP                                 ULI07580
11D0  C8C0 0055      759  STAPL1  LHI   R0,85        TO PUNCH 1-FOLD GAP     ULI07590
11D4  27C1           760  STAPLP  SIS   R0,1                                   ULI07600
11D6  032F           761          BNPR  R15           RETURN                  ULI07610
11D8  2430           762          LIS   R3,0                                   ULI07620
11DA  9A63           763          WDR   R6,R3         PUNCH BLANK FRAME       ULI07630
11DC  9D68           764          SSR   R6,R8                                  ULI07640
11DE  2081           765          BTBS  8,1                                    ULI07650
11E0  22C6           766          BS    STAPLP        CONTINUE.               ULI07660
                     767  *                                                    ULI07670
11E2                 768          END                                          ULI07680
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NO ERRORS 0 SQUEZ PASSES

CAL 04-01

SCHKSUM	1150					
SGEN	1160	720				
SPNCH1	1192	740				
SPNCH2	11AE	753				
SPUNCH	117C					
STAPE	116E	755				
STAPL	11CA	734	754			
STAPL1	11D0	741				
STAPLP	11D4	758	766			
ABSTOP	1152					
ADC	0002					
ADDRESS	0A12	615	630			
ACK	0DE2	409				
ATN	0E41	411				
BOOT	0088	157				
BTH	0D6A					
BYTE	0E44					
CARDUADR	0A1A					
CMD	0A8C					
CONTINT	0CD8					
CRT	0A62	232	234			
CRT1	0A84					
CRTADR	0A14					
DBLAIN	0F3F	413				
DR16	0C7E	417				
DR32	0C86	421				
DRMATN	0E42	412				
DROP	0C64	430				
EBL	0F40	415				
EBLATN	0F3E	424				
EDMSG	0ED5	583				
EDMSGINT	0EF9	568				
EDQMSG	0EDB					
EDTITLE	0EC1					
ENOPTMSG	0E33	611				
ERRI	0D74					
ERRI1	0D8A	541				
ERRINT	0CF4					
ERRMSG	0EFA	558				
ERRMSZ	0F03	559				
ERRNO	0F02	554				
ERROR	0D9A	400	429	437	525	537
EXECUTE	08C2					
GO	0E4C	619				
HDIT	0DD2	571				
HEX	0894					
HEXASC	0868					
HEXLP	087C					
HW	0F43					
IIP	0F38	419				
IMPTOP	0000R					
INC	0836					

NO ERRORS 0 SQUEZ PASSES

CAL 04-01

		718 720 723 724 727 727 728 735 735 737 740
R10	000A	565 569 570 572 573
R11	000B	618
R12	000C	540 543 544 547 548 416 419 420 540 543 544 547 548
		633 634
R13	000D	525 537 556 562 400 423 437 525 537 556 562
R14	000E	647 648 649 650 652 538 538 539 560 561 576 577 647
		648 649 650 652 538 538 539 560 561 576 577 591 592
		594 595 596 597 599 600 616 624 631 632 641 647 648
		649 650 652
R15	000F	734 741 754 761 523 577 589 734 741 754 761 523 577
		589 591 594 617
R2	0002	156 176 192 229 643 644 645 647 648 715 724 726 750
		573 574 643 644 645 647 648 715 724 726 750 573 574
		615
R3	0003	161 162 163 224 226 227 228 229 230 231 233 235 641
		716 736 745 762 763 530 531 532 587 395 396 411 412
		413 414 415 424 434 716 736 745 762 763 530 531 532
		587 600 601 605 716 736 745 762 763
R4	0004	155 166 167 169 177 179 717 719 721 725 725 726 743
		747 515 515 516 517 518 522 530 394 394 395 398 402
		403 418 420 422 423 433 434 717 719 721 725 725 726
		743 747 515 515 516 517 518 522 530 717 719 721 725
		725 726 743
R5	0005	167 169 170 170 172 173 174 177 179 185 718 719 746
		747 748 433 718 719 746 747 748 622 625
R6	0006	164 174 181 730 731 732 737 738 748 751 763 764 513
		514 519 520 521 522 532 396 397 398 730 731 732 737
		738 748 751 763 764 513 514 519 520 521 522 532 730
		731 732
R7	0007	183 184 185 514 524 531 536 552 553 554 555 393 408
		410 410 414 425 426 428 436 514 524 531 536 552 553
		554 555
R8	0008	175 176 181 182 764 551 552
R9	0009	653 544 557 565 566 581 588 588 589 653 544 557 565
		566 581 588 588 589 606 607 609 616 617 627 653
RDCHP	0B02	
READ1	0A08	643 643 636 643
READ2	0A0A	
READ3	0A0C	
READ4	0A0E	
REP16	0C16	
REP32	0BF4	
RESTRT	0BD6	
RSAVE	0F50	159
RTN	0D4E	533
RUN	0AD4	
SECOND	0A04	
SIT32	0C02	
STAR	0EC2	
START	0A22	225
START16	0A20	195
START32	0A1C	194
STREND	0EC9	
TESTDS	0CFC	
TITLE	0EA6	

TSTDS1	0D1C						
TSTDS2	0D30	526					
TTY	0A48						
TTYADR	0A16						
TTYBUF	0BB0						
TTYIN	0AE8	578	584	578	584	612	
ULIADR	0ABC						
WAIT1	0C8C	427					
WAIT2	0CEC						
WRITE1	0A09	521					
WRTITLE	0AA8						