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PROGRAM

Super Teletype Test II

TAPES

Binary 085-000004-00

ABSTRACT

Teletype II is a maintenance program designed to detect malfunctions in the teletype logic, interrupt system, and the I/O bus logic. The program may be used to test teletype models ASR33, KSR33, and KSR35. The program contains routines to punch and read random data, echo typed keys, punch from the switch register, etc.

SUPER TELETYPE II

;1. ABSTRACT

TELETYPE II IS A MAINTENANCE PROGRAM DESIGNED TO DETECT MALFUNCTIONS IN THE TELETYPE LOGIC, INTERRUPT SYSTEM, AND THE I/O BUS LOGIC. THE PROGRAM MAY BE USED TO TEST TELETYPE MODELS ASR33, KSR33, AND KSR35. THE PROGRAM CONTAINS ROUTINES TO PUNCH AND READ RANDOM DATA, ECHO TYPED KEYS, PUNCH FROM THE SWITCH REGISTER, ETC.

;2. MACHINE REQUIREMENTS

- ;2.1 SUPERNOVA PROCESSOR
- ;2.2 2K READ/WRITE MEMORY
- ;2.3 ASR33, KSR33, OR KSR35 TELETYPE

;3. SWITCH SETTINGS

- ;3.1 000040 =DIAGNOSTIC STARTING ADDRESS
- ;3.2 000041 =PRINT C(SWITCHES) R ON TELETYPE
- ;3.3 000042 =ECHO TYPED INPUT
- ;3.4 000043 =PRINT CHARACTER SET
- ;3.5 000044 =PUNCH AND READ RANDOM DATA
- ;3.6 000045 =PUNCH AND READ COUNTER
- ;3.7 SWITCH 0(1) =PROCEED FROM AN ERROR
- ;3.8 SWITCH 1(1) =SET FOR KSR TELETYPES
- ;3.9 SWITCH 2(1) =DON'T CHECK KEYBOARD PARITY

;4. OPERATING PROCEDURE

- ;4.1 LOAD THE PROGRAM VIA THE BINARY LOADER, USE THE HIGH SPEED READER IF AVAILABLE.
- ;4.2 TESTING AN ASR 33 TELETYPE
 - ;4.2.1 SET THE TELETYPE TO THE LOCAL POSITION
 - ;4.2.2 PRESS THE TAPE PUNCH ON BUTTON
 - ;4.2.3 PRESS THE "HERE IS" KEY. THE PUNCH SHOULD FEED BLANK TAPE.
 - ;4.2.4 PRESS THE "REPT" KEY, THEN THE "RUB OUT" KEY. EXAMINE THE TAPE FOR ALL HOLES.
 - ;4.2.5 PERFORM THE ABOVE TWO STEPS UNTIL ABOUT 18 INCHES OF TAPE HAVE BEEN PUNCHED.
 - ;4.2.6 SET THE TELETYPE SWITCH TO LINE.
 - ;4.2.7 PLACE THE END OF THE PUNCHED TAPE IN THE READER. A TAPE LOOP ABOUT ONE FOOT LONG IS THUS FORMED BETWEEN THE READER AND THE PUNCH.
 - ;4.2.8 SET THE READER SWITCH TO THE START POSITION.
 - ;4.2.9 SET THE SWITCH REGISTER TO 000040
 - ;4.2.10 PRESS START
 - ;4.2.11 THE PROGRAM WILL RUN UNTIL MANUALLY STOPPED OR AN ERROR IS DETECTED. THE WORD "PASS" WILL BE PRINTED AT THE END OF EACH PASS. OTHER INDETERMINATE CODES WILL ALSO BE PRINTED.

;4. 2. 12 WHEN THE PROGRAM HAS COMPLETED SEVERAL
 ; PASSES SET THE DATA SWITCHES TO 000043.
 ;4. 2. 13 PRESS RESET
 ;4. 2. 14 SET THE READER SWITCH TO FREE.
 ;4. 2. 15 PRESS THE PUNCH OFF BUTTON
 ;4. 2. 16 PRESS START
 ;4. 2. 17 A SUBSET OF THE ASCII CHARACTER SET WILL
 ; BE PRINTED. THE SET BEGINS WITH THE SEQUENCE
 ; "MMM" TO PERMIT CARRIAGE RETURN
 ; ADJUSTMENTS ON A WIDE LETTER.
 ;4. 2. 18 AFTER SEVERAL LINES HAVE BEEN PRINTED
 ; PRESS RESET AND EXAMINE THE PRINTED DATA.
 ;4. 2. 19 SET THE DATA SWITCHES TO 000042, *PRESS START.*
 ;4. 2. 20 STRIKE EACH KEY ON THE KEYBOARD AND CHECK
 ; TO INSURE THAT IT IS ECHOED PROPERLY.
 ;4. 2. 22 SET THE DATA SWITCHES TO 000044
 ;4. 2. 23 PRESS RESET.
 ;4. 2. 24 REMOVE THE PUNCHED TAPE FROM THE
 ; READER AND PUNCH.
 ;4. 2. 25 PRESS THE PUNCH ON BUTTON
 ;4. 2. 26 PRESS START
 ;4. 2. 27 INSERT THE LEADER OF ALL ZEROS INTO
 ; THE READER.
 ;4. 2. 28 SET THE READER SWITCH TO START.
 ;4. 2. 29 THE PROGRAM SHOULD PUNCH AND READ RANDOM
 ; DATA UNTIL MANUALLY STOPPED OR AN ERROR
 ; IS DETECTED.

;4. 3 TELETYPE WHICH DO NOT CONTAIN THE READER AND
 ; PUNCH OPTIONS MAY BE TESTED BY SETTING DATA
 ; SWITCH 1(1) AND OMITTING THOSE STEPS PERTAIN-
 ; ING TO THE READING AND PUNCHING OF TAPE.

;5. PROGRAM OUTPUT/ERROR DESCRIPTION

;5. 1 WHEN AN ERROR IS DETECTED BY THE DIAGNOSTIC
 ; THE PROGRAM WILL HALT AT LOCATION ERR+6.
 ; EXAMINE AC3 TO OBTAIN THE ADDRESS OF THE
 ; FAILING ROUTINE.
 ; CONSULT THE LISTING TO DETERMINE THE CAUSE
 ; OF THE ERROR.
 ; PRESSING CONTINUE WILL CAUSE THE PROGRAM
 ; TO ENTER A FAILING LOOP SUITABLE FOR SCOPING.
 ; SETTING SWITCH 0(1) WILL CAUSE THE PROGRAM
 ; TO PROCEED FROM THE ERROR.
 ;5. 2 WHEN A HALT IS EXECUTED IN ROUTINES OTHER
 ; THAN THE DIAGNOSTIC CONSULT THE LISTING FOR
 ; THE CAUSE OF ERROR.

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;5.3 PUNCH SWITCHES ROUTINE (START ADDRESS 41)
; THIS ROUTINE MAY BE USED FOR SCOPING THE
; TELETYPE OUTPUT LOGIC. THE ROUTINE TRANS-
; MITTS A CHARACTER EVERY 102MS INDEPENDENT
; OF THE TELETYPE BUSY OR DONE FLAG. THE
; CHARACTER TRANSMITTED IS A FUNCTION OF THE
; RIGHT HALF DATA SWITCHES.
;5.4 TERMINATING A LINE INPUTTED IN THE ECHO
; TEST WITH "CTRL Z" WILL CAUSE THE LINE TO
; BE REPEATED UNTIL ANOTHER KEY IS STRUCK.
; THIS PERMITS SPECIAL CODE COMBINATIONS,
; FOR MECHANICAL ADJUSTMENTS, TO BE TYPED.

;6. PROGRAM DESCRIPTION/THEORY OF OPERATION
;6.1 TELETYPE DIAGNOSTIC (START ADDRESS 40)
; THIS ROUTINE WILL TEST THE TELETYPE INTER-
; FACE LOGIC. THE ROUTINE WILL ALSO TEST
; INPUT-OUTPUT BUS AND INTERRUPT LOGIC
; CONTAINED IN THE CPU. AT THE END OF EACH
; PROGRAM PASS THE WORD PASS IS PRINTED.
; IF AFTER A FEW MINUTES THE WORD PASS IS
; NOT PRINTED THE PROGRAM MAY BE IN A LOOP
; OR THERE MAY BE A TELETYPE MALFUNCTION.
;6.2 PUNCH SWITCHES (START ADDRESS 41)
; THE PUNCH SWITCHES ROUTINE PERMITS THE
; OPERATOR TO SCOPE THE TELETYPE OUTPUT
; LOGIC. THE ROUTINE ISSUES A I/O RESET
; PULSE, SENDS THE CONTENTS OF THE SWITCHES
; RIGHT HALF, WAITS 102MS, AND ITERATES THE
; SEQUENCE.
;6.3 ECHO TEST (START ADDRESS 42)
; THE ECHO TEST PROVIDES A MEANS OF DETER-
; MINING IF THE CODES PRODUCED BY THE KEY-
; BOARD ARE CORRECT. WHEN THE OPERATOR STRIKES
; A KEY THE PROGRAM RECEIVES THE CHARACTER AND
; CHECKS IT FOR EVEN PARITY.... THE CHARAC-
; TER IS STORED IN A BUFFER AND ECHOED BACK
; TO THE OPERATOR. IF A TAB HAS BEEN TYPED
; A RUBOUT IS ALSO ECHOED. THE OPERATOR MUST
; CHECK THE CHARACTER PRINTED TO BE THE SAME
; AS THE KEY DEPRESSED. WHEN THE CARRIAGE
; RETURN KEY IS STRUCK THE PROGRAM CLEARS
; THE BUFFER AND ECHOES A CARRIAGE RETURN
; LINE FEED SEQUENCE. IF THE OPERATOR TERMI-
; NATES A LINE WITH A "CTRL Z" KEY THE PROGRAM
; WILL INSERT A CARRIAGE RETURN AND ECHO THE
; LINE UNTIL ANOTHER KEY IS STRUCK.

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;6.4 PRINT CHARACTER SET (START ADDRESS 43)
; A PORTION OF THE ASCII CHARACTER SET IS
; REPEATEDLY TYPED.
;6.5 PUNCH AND READ RANDOM (START ADDRESS 44)
; THIS IS THE PRIME TEST OF THE TELETYPE
; READER AND PUNCH IN FULL DUPLEX OPERATION.
; THE MSKO INSTRUCTION AND THE INTERRUPT SYS-
; TEM ARE USED TO PROVIDE RANDOM START-STOP
; SEQUENCES TO THE READER AND PUNCH. THE DATA
; PUNCHED IS EVEN PARITY... RANDOM NUMBERS.
;6.6 PUNCH AND READ COUNT (START ADDRESS 45)
; THIS TEST IS SIMILAR TO THE PREVIOUS TEST
; EXCEPT THAT A COUNT PATTERN IS USED.

;7. RESTRICTIONS/MISC
;7.1 THE DIAGNOSTIC ROUTINE WILL PRINT VARIOUS
; INDETERMINATE CHARACTERS.
;7.2 THE DIAGNOSTIC ROUTINE WILL NOT OPERATE
; PROPERLY WITH THE MODEL 37 TELETYPE.

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000001 .LOC 1
00001 000250 INTR ;INTERRUPT SERVICE ADDRESS

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000040 .LOC 40
00040 002065 JMP @BEG ;DIAGNOSTIC
00041 000132 JMP SWITCH ;PRINT FROM SWITCH
00042 000145 JMP ECHO ;ECHO THE INPUT
00043 002064 JMP @ALPHA ;PRINT CHARACTER SET
00044 002062 JMP @MAINR ;RANDOM READ/PUNCH
00045 002063 JMP @MAINC ;COUNTER READ/PUNCH

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00046 177634 CM100: -144
00047 100004 IND4: 04
00050 002212 ER: ERR
006050 EHALT=JSR @ER
00051 002176 SETUP: ENTER
00052 002222 LOOP: CYCLE
00053 002164 TIME: TIMER
00054 037301 CTIML: 16065.
00055 040521 CTIMH: 16721.
00056 040011 CTIM: 16393.
00057 000236 TWO: 17376/62
00060 000000 TIMEX: 0
00061 000000 PASS: 0
00062 000364 MAINR: MAIN
00063 000365 MAINC: MAIN+1
00064 002274 ALPHA: ALPH
00065 000447 BEG: BEGIN
00066 000000 SAV0: 0
00067 000000 SAV1: 0
00070 000000 SAV2: 0
00071 000000 SAV3: 0
00072 000000 SAVC: 0
00073 000011 TIO: .TTO
00074 000010 TIOX: .TTI
00075 000000 TINCH: 0
00076 135525 C1355: 135525
00077 000000 RANI: 0
00100 000000 BROKEN: 0
00101 000000 ICTR: 0
00102 000000 CRA: 0
00103 000424 RAND: XRAND
00104 000000 OCTR: 0
00105 000000 RANO: 0
00106 000100 LT: 100
00107 000000 TYO: 0
00110 000000 TIMDEL: 0
00111 000004 C4: 4
00112 000177 C177: 177
00113 000000 MESSR: 0
00114 000377 C377: 377
00115 000015 C215: 15
00116 000012 C12: 12
00117 004000 C4000: 4000
00120 001463 PC5: 16393./20.
00121 000250 CINTR: INTR

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00122 002450 CTABL: TABLE+100
00123 002350 CTABF: TABLE
00124 000000 CNTR: 0
00125 000032 C232: 32
00126 020000 C20K: 20000
00127 002266 ICRLF: CRLF
00130 002243 IMESS: MESS
00131 000011 C11: 11
000011 .TTO=11
000010 .TTI=10

00132 062677 SWITCH: IORST
00133 020055 LDA 0,CTIMH
00134 100420 NEGZ 0,0
00135 102410 SUB# 0,0
00136 102410 SUB# 0,0
00137 063600 SKPDN 0
00140 101404 INC 0,0,SZR
00141 000135 JMP .-4
00142 074477 READS 3
00143 075111 DOAS 3,.TTO
00144 000133 JMP SWITCH+1

;TYPE FROM SWITCHES

;DELAY ABOUT 102 MS

;SEND C(SWITCH)R TO
;THE TELETYPE.

00145 006127 ECHO: JSR 0ICRLF
00146 030122 LDA 2,CTABL
00147 034123 LDA 3,CTABF
00150 102400 SUB 0,0
00151 041400 STA 0,0,3
00152 175400 INC 3,3
00153 156414 SUB# 2,3,SZR
00154 000151 JMP .-3
00155 030123 LDA 2,CTABF
00156 040124 STA 0,CNTR

;ECHO ON OUTPUT THE
;CHARACTORS RECEIVED
;ON INPUT.

;SET COUNTER TO 0

00157 004215 ECHO1: JSR TIN
00160 024115 LDA 1,C215
00161 106405 SUB 0,1,SNR
00162 000145 JMP ECHO
00163 024125 LDA 1,C232
00164 106414 SUB# 0,1,SZR
00165 000174 JMP ECHO3

;LOOK FOR INPUT

;CARRIAGE TYPED

;STORE THE CHARACTER

00166 006127 ECHO2: JSR 0ICRLF
00167 063710 SKPDE .TTI
00170 000213 JMP ECHO4
00171 006130 JSR 0IMESS
00172 002350 TABLE
00173 000166 JMP ECHO2

;CNTRL Z TYPED
;KEEP SENDING THE
;LINE TYPED UNTILL
;A KEY IS STRUCK.

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00174	024114	ECHO3:	LDA 1,C377	STORE THE CHARACTER
00175	030124		LDA 2,CNTR	
00176	010124		ISZ CNTR	
00177	034123		LDA 3,CTABF	BEGIN OF TABLE
00200	151223		MOVER 2,2,SNC	
00201	123401		AND 1,0,SKP	
00202	123700		ANDS 1,0	
00203	157000		ADD 2,3	
00204	025400		LDA 1,0,3	
00205	107000		ADD 0,1	
00206	045400		STA 1,0,3	
00207	030122		LDA 2,CTABL	
00210	156414		SUB# 2,3,SZR	CHECK FOR
00211	000157		JMP ECHO1	BUFFER FULL
00212	000145		JMP ECHO	

00213	060210	ECHO4:	NIOC .TTI
00214	000145		JMP ECHO

00215	063610	TIN:	SKPDN .TTI	;INPUT A CHARACTER
00216	000215		JMP .-1	;FROM THE KEYBOARD.
00217	060610		DIAC 0, .TTI	;CHAR TO AC0
00220	063710		SKPDZ .TTI	
00221	063077		HALT	;FLAG CHECK!
00222	061111		DOAS 0, .TTO	;XMITT CHARACTER
00223	111020		MOVE 0,2	
00224	126000		ADC 1,1	
00225	147000		ADD 2,1	
00226	133404		AND 1,2, SZR	
00227	000224		JMP .-3	
00230	024126		LDA 1, C20K	;LOOK AT SWITCH 2
00231	070477		READS 2	
00232	133404		AND 1,2, SZR	
00233	000236		JMP .+3	;DONT CHECK PARITY.
00234	101012		MOV# 0,0, SZC	;C(0)=CHARACTOR
00235	063077		HALT	
00236	024112		LDA 1, C177	;STRIP THE PARITY BIT.
00237	123400		AND 1,0	
00240	024131		LDA 1, C11	
00241	106414		SUB# 0,1, SZR	;CHECK FOR TAB
00242	001400		JMP 0,3	;EXIT NOT A TAB.
00243	126000		ADC 1,1	
00244	063611		SKPDN .TTO	;INSERT A RUBOUT
00245	000244		JMP .-1	
00246	065111		DOAS 1, .TTO	
00247	001400		JMP 0,3	
00250	040066	INTR:	STA 0, SAV0	;INTERRUPT SERVICE
00251	044067		STA 1, SAV1	
00252	050070		STA 2, SAV2	
00253	054071		STA 3, SAV3	
00254	175200		MOVR 3,3	
00255	054072		STA 3, SAVC	;SAVE AC+CARRY.
00256	063777		SKPDZ CPU	
00257	063077		HALT	;POWER FAIL FLAG?
00260	024073		LDA 1, T10	
00261	071477		INTA 2	
00262	132415		SUB# 1,2, SNR	
00263	000332		JMP TYPE	;OUTPUT
00264	024074		LDA 1, T10X	
00265	132414		SUB# 1,2, SZR	
00266	063077		HALT	;UNKOWN INTERRUPT! SEE C(2)
00267	063610	XTIN:	SKPDN .TTI	;READER INPUT
00270	063077		HALT	;RD DONE FLAG FAILED.
00271	064510		DIAS 1, .TTI	;GET CHARACTER
00272	063710		SKPDZ .TTI	
00273	063077		HALT	;FLAG CHECK
00274	063410		SKPBN .TTI	
00275	063077		HALT	;FLAG CHECK
00276	044075		STA 1, TINCH	;SAVE INPUT CHARACTER.

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00277 125004 TIN1:  MOV 1,1,SZR
00300 000310      JMP TIN2
00301 020076      LDA 0,C1355      ;ON ZERO INPUT
00302 040077      STA 0,RANI      ;INIT RANDOM NUMBER
00303 010100      ISZ BROKEN     ;IF TOO MUCH LEADER
00304 102401      SUB 0,0,SKP    ;OR ALL CHARACTORS 0
00305 063077      HALT          ;ERROR.
00306 040101      STA 0,ICTR    ;INIT COUNT PATTERN.
00307 000505      JMP DISMIS    ;EXIT INTERRUPT.

00310 030046 TIN2:  LDA 2,CM100
00311 050100      STA 2,BROKEN
00312 034102      LDA 3,CRA
00313 175005      MOV 3,3,SNR
00314 000324      JMP TIN3      ;RANDOM DATA
00315 010101      ISZ ICTR     ;COUNTER
00316 101010      MOV# 0,0
00317 020101      LDA 0,ICTR
00320 106414      SUB# 0,1,SZR  ;C(0)=GOOD,C(1)=BAD
00321 063077      HALT          ;READ OR PUNCH ERROR.
00322 044101      STA 1,ICTR  ;RESET COUNTER
00323 000471      JMP DISMIS    ;EXIT INTERRUPT.

00324 006103 TIN3:  JSR 0RAND
00325 000077      RANI
00326 024075      LDA 1,TINCH
00327 106414      SUB# 0,1,SZR  ;C(0)=GOOD,C(1)=BAD
00330 063077      HALT          ;READ OR PUNCH ERROR.
00331 000463      JMP DISMIS

00332 063611 TYPE:  SKPBN .TTO  ;OUTPUT COUNT OR RANDOM
00333 063077      HALT          ;PATTERN. FLAG CHECK.
00334 034102      LDA 3,CRA      ;SWITCH
00335 175005      MOV 3,3,SNR
00336 000343      JMP TYPE1    ;RANDOM
00337 010104      ISZ OCTR    ;INC OUT COUNTER
00340 101010      MOV# 0,0
00341 020104      LDA 0,OCTR
00342 000345      JMP +3

00343 006103 TYPE1: JSR 0RAND
00344 000105      RANO
00345 024106      LDA 1,LT      ;LEADER CHECK
00346 030107      LDA 2,TYO
00347 130032      ADCE# 1,2,SEC
00350 000356      JMP TYPE2
00351 020076      LDA 0,C1355  ;RESET RANDOM IN LEADER
00352 040105      STA 0,RANO
00353 010107      ISZ TYO      ;+1 TO LEADER COUNT
00354 102400      SUB 0,0
00355 040104      STA 0,OCTR

00356 061111 TYPE2: DOAS 0,.TTO  ;SEND THE CHARACTER
00357 063411      SKPBN .TTO
00360 063077      HALT          ;FLAG CHECK
00361 063711      SKPDE .TTO
00362 063077      HALT          ;FLAG CHECK
00363 000431      JMP DISMIS    ;EXIT INTERRUPT.

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00364 102401	MAIN:	SUB 0,0,SKP	!READ/PUNCH RANDOM
00365 102000		ADC 0,0	!READ/PUNCH COUNTER
00366 040102		STA 0,CRA	!INITIALIZE
00367 062677		IORST	
00370 020046		LDA 0,CM100	
00371 040100		STA 0,BROKEN	
00372 102400		SUB 0,0	
00373 040107		STA 0,TYO	
00374 024121		LDA 1,CINTR	
00375 044001		STA 1,1	
00376 060177		INTEN	!ENABLE INTERRUPTS
00377 061111		DOAS 0,.TTO	
00400 060510		DIAS 0,.TTI	
00401 006103	MAIN1:	JSR 0RAND	!MAIN LOOP CNTL
00402 000110		TIMDEL	!OF READER/PUNCH
00403 152400		SUB 2,2	!INTERRUPT.
00404 104300		COMS 0,1	
00405 072077		MSKO 2	
00406 125404		INC 1,1,SER	
00407 000777		JMP --1	
00410 151400		INC 2,2	
00411 151237		MOVER0 2,2,SBN	
00412 000772		JMP MAIN1+3	
00413 000766		JMP MAIN1	
00414 020066	DISMIS:	LDA 0,SAV0	!DISMISS A INTERRUPT
00415 024067		LDA 1,SAV1	!RESTORE MACHINE STATE.
00416 030070		LDA 2,SAV2	
00417 034072		LDA 3,SAV3	
00420 175100		MOVL 3,3	
00421 034071		LDA 3,SAV3	
00422 060177		INTEN	
00423 002000		JMP 00	
00424 027400	XRAND:	LDA 1,00,3	!GENERATE A 8 BIT
00425 020112		LDA 0,C177	!EVEN PARITY RANDOM
00426 131120		NOVEL 1,0	!NUMBER.
00427 151120		NOVEL 2,0	
00430 133000		ADD 1,0	
00431 024403		LDA 1,0+3	
00432 147000		ADD 2,1	
00433 101300		MOVS 0,0	
00434 123725		ANDES 1,0,SNR	
00435 000770		JMP XRAND+1	
00436 047400		STA 1,00,3	!STORE A 16 BIT RANDOM
00437 111300		MOVS 0,2	
00440 126000		ADC 1,1	!PARITY GENERATOR
00441 107000		ADD 0,1	
00442 123404		AND 1,0,SER	
00443 000775		JMP --3	
00444 101200		MOVR 0,0	
00445 143300		ADDS 2,0	!C(0)R=EVEN PARITY#
00446 001401		JMP 1,3	

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00447 102400	BEGIN:	SUB 0,0	DIAGNOSTIC STARTS HERE.
00450 040061		STA 0,PASS	
00451 102620	T00:	SUBZR 0,0	INIT FOR POSSIBLE INTERRUPT.
00452 040001		STA 0,1	
00453 006051		JSR @SETUP	THE SELB LINE IS
00454 063500		SKPBE 0	GROUNDED.
00455 006050		EHALT	CHECK (A82)
00456 006052		JSR @LOOP	AND INPUT TO SKIP LOGIC.
00457 006051	T02:	JSR @SETUP	THE SELD LINE IS
00460 063700		SKPDE 0	GROUNDED.
00461 006050		EHALT	CHECK (A80).
00462 006052		JSR @LOOP	CHECK SKIP LOGIC.
00463 006051	T04:	JSR @SETUP	TTO SHOULD NOT BE
00464 060211		NIOC .TTO	BUSY,ITS BEEN CLEARED.
00465 062677		IORST	IN TO DIFFRENT WAYS.
00466 063511		SKPBE .TTO	CHECK TTO BUSY(1) INPUT
00467 006050		EHALT	TO SELB LINE (A82).
00470 006052		JSR @LOOP	
00471 006051	T06:	JSR @SETUP	TROUBLE IN CPU.
00472 063411		SKPEN .TTO	SELECTION OF SKIP SEX.
00473 101001		MOV 0,0,SKP	CHECK SKIP INVERT LOGIC
00474 006050		EHALT	
00475 006052		JSR @LOOP	
00476 006051	T08:	JSR @SETUP	TTI SHOULD NOT BE BUSY
00477 060210		NIOC .TTI	IT HAS BEEN CLEARED IN
00500 062677		IORST	TWO WAYS. CHECK TTI INPUT
00501 063510		SKPBE .TTI	TO SELB LINE (A82).
00502 006050		EHALT	CHECK THE FLOP.
00503 006052		JSR @LOOP	
00504 006051	T10:	JSR @SETUP	TTO SHOULD NOT BE DONE
00505 060211		NIOC .TTO	IT HAS BEEN CLEARED
00506 062677		IORST	IN TWO WAYS. CHECK
00507 063711		SKPDE .TTO	TTO INPUT TO SELD (A80)
00510 006050		EHALT	ALSO THE TTO DONE FLOP.
00511 006052		JSR @LOOP	
00512 006051	T12:	JSR @SETUP	TTI SHOULD NOT BE DONE
00513 060210		NIOC .TTI	IT HAS BEEN CLEARED
00514 062677		IORST	IN TWO WAYS. CHECK
00515 063710		SKPDE .TTI	TTI INPUT TO SELD(A80).
00516 006050		EHALT	ALSO THE TTI DONE FLOP.
00517 006052		JSR @LOOP	

00520 006051
00521 063610
00522 101001
00523 006050
00524 006052

T14:

JSR @SETUP
SKPDN .TTI
MOV 0,0,SKP
EHALT
JSR @LOOP

;CHECK SKIP
;INVERTER IN CPU.
;TTI DONE IS ZERO.

00525 006051
00526 060111
00527 060211
00530 062677
00531 063511
00532 006050
00533 006052

T16:

JSR @SETUP
NIOS .TTO
NIOC .TTO
IORST
SKPBZ .TTO
EHALT
JSR @LOOP

;TTO BUSY CAN NOT
;BE CLEARED BY I/O
;RESET OF A CLEAR
;PULSE. CHECK E41-11,
;E39 12-13, AND THE
;CLEAR INPUT TO TTO
;BUSY.

00534 006051
00535 060111
00536 062677
00537 063511
00540 006050
00541 006052

T18:

JSR @SETUP
NIOS .TTO
IORST
SKPBZ .TTO
EHALT
JSR @LOOP

;TTO BUSY CAN'T BE
;CLEARED BY I/O RESET.
;CHECK E41 13-11,
;E39 3-4. THE I/O
;RESET PULSE SIGNAL.

00542 006051
00543 060111
00544 060211
00545 063511
00546 006050
00547 006052

T20:

JSR @SETUP
NIOS .TTO
NIOC .TTO
SKPBZ .TTO
EHALT
JSR @LOOP

;THE CLEAR PULSE TO
;THE TTO BUSY FLOP
;FAILED. CHECK E42 4-5-6
;(CLEAR,TTO SELECT) ALSO
;INPUT TO E41.

00550 006051
00551 060011
00552 063511
00553 006050
00554 006052

T22:

JSR @SETUP
NIO .TTO
SKPBZ .TTO
EHALT
JSR @LOOP

;SELECTING TTO SET
;ITS BUSY FLOP. CHECK
;E42 1-2-3. (START,
;TTO SELECT). NO START
;PULSE WAS ISSUED.

00555 006051
00556 060100
00557 063511
00560 006050
00561 006052

T24:

JSR @SETUP
NIOS 0
SKPBZ .TTO
EHALT
JSR @LOOP

;A START PULSE TO
;A DEVICE NOT THE TTO
;SET TTO BUSY. CHECK
;E42 1-2-3 THE
;TTO SELECT INPUT.

.EOT

00562	006051	T26:	JSR @SETUP	THE TTI BUSY FLOP
00563	060110		NIOS .TTI	WAS NOT CLEARED BY
00564	060210		NIOC .TTI	A CLEAR PULSE OR
00565	062677		IORST	I/O RESET. CHECK CLEAR
00566	063510		SKPBZ .TTI	INPUT TO FLOP. ALSO
00567	006050		EHALT	E39 8-9, E41 8-9-10
00570	006052		JSR @LOOP	
00571	006051	T28:	JSR @SETUP	THE TTI BUSY FLOP
00572	060110		NIOS .TTI	WAS NOT CLEARED BY
00573	062677		IORST	I/O RESET. CHECK
00574	063510		SKPBZ .TTI	E41 8-9, I/O RESET
00575	006050		EHALT	INPUT TO CLEAR SIDE
00576	006052		JSR @LOOP	OF TTI BUSY.
00577	006051	T30:	JSR @SETUP	THE TTI BUSY FLOP
00600	060110		NIOS .TTI	WAS NOT CLEARED BY
00601	060210		NIOC .TTI	TTI SELECT AND A
00602	063510		SKPBZ .TTI	CLEAR PULSE. CHECK
00603	006050		EHALT	AND GATE E42 8-9-10
00604	006052		JSR @LOOP	AND THE INPUT TO E41.
00605	006051	T32:	JSR @SETUP	SELECTING THE TTI
00606	060010		NIOC .TTI	WITHOUT A START
00607	063510		SKPBZ .TTI	PULSE SET TTI
00610	006050		EHALT	RDR BUSY. CHECK
00611	006052		JSR @LOOP	E42 11-12-13
00612	006051	T34:	JSR @SETUP	SELECTING DEVICE 76
00613	060176		NIOS 76	WITH A START PULSE
00614	063510		SKPBZ .TTI	SET TTI BUSY. CHECK
00615	006050		EHALT	E42 11-12-13, AND OF
00616	006052		JSR @LOOP	(START, TTI SELECT)
00617	006051	T36:	JSR @SETUP	CHECK DEVICE SELECTION
00620	060151		NIOS .TTO+40&77	
00621	063511		SKPBZ .TTO	
00622	006050		EHALT	
00623	006052		JSR @LOOP	
00624	006051	T38:	JSR @SETUP	CHECK DEVICE SELECTION
00625	060131		NIOS 31	
00626	063511		SKPBZ .TTO	
00627	006050		EHALT	
00630	006052		JSR @LOOP	
00631	006051	T40:	JSR @SETUP	CHECK DEVICE SELECTION
00632	060101		NIOS 1	
00633	063511		SKPBZ .TTO	
00634	006050		EHALT	
00635	006052		JSR @LOOP	

00636	006051	T42:	JSR @SETUP	; CHECK DEVICE SELECTION
00637	060115		NIOS 15	
00640	063511		SKPBE .TTO	
00641	006050		EHALT	
00642	006052		JSR @LOOP	
00643	006051	T44:	JSR @SETUP	; CHECK DEVICE SELECTION
00644	060110		NIOS 13	
00645	063511		SKPBE .TTO	
00646	006050		EHALT	
00647	006052		JSR @LOOP	
00650	006051	T46:	JSR @SETUP	; CHECK DEVICE SELECTION
00651	060150		NIOS .TTI+40&77	
00652	063510		SKPBE .TTI	
00653	006050		EHALT	
00654	006052		JSR @LOOP	
00655	006051	T48:	JSR @SETUP	; CHECK DEVICE SELECTION
00656	060114		NIOS 14	
00657	063510		SKPBE .TTI	
00660	006050		EHALT	
00661	006052		JSR @LOOP	
00662	006051	T50:	JSR @SETUP	; CHECK DEVICE SELECTION
00663	060112		NIOS 12	
00664	063510		SKPBE .TTI	
00665	006050		EHALT	
00666	006052		JSR @LOOP	
00667	006051	T52:	JSR @SETUP	; CHECK DEVICE SELECTION
00670	060111		NIOS 11	
00671	063510		SKPBE .TTI	
00672	006050		EHALT	
00673	006052		JSR @LOOP	
00674	006051	T54:	JSR @SETUP	; START AND TTO SELECT
00675	060111		NIOS .TTO	; FAILED TO SET TTO
00676	063411		SKPBN .TTO	; BUSY. CHECK SELB (A82)
00677	006050		EHALT	; BUSY FLOP, ETC,ETC.
00700	006052		JSR @LOOP	
00701	006051	T56:	JSR @SETUP	; THE BUSY FLOP (TTO)
00702	060111		NIOS .TTO	; WAS GATED ON TO THE
00703	063500		SKPBE 0	; SELB LINE (A82)
00704	006050		EHALT	; WITHOUT TTO SELECT
00705	006052		JSR @LOOP	; BEING PRESENT.
00706	006051	T58:	JSR @SETUP	; THE TTO BUSY FLOP
00707	060111		NIOS .TTO	; WAS CLEARED VIA A
00710	060200		NIOS 0	; START PULSE WITH-
00711	063411		SKPBN .TTO	; OUT TTO SELECT.
00712	006050		EHALT	
00713	006052		JSR @LOOP	

00714 006051	T60:	JSR 0SETUP	THE TTO BUSY FLOP
00715 060111		NIOS .TTO	WAS CLEARED VIA
00716 060011		NIO .TTO	SELECTING THE TTO
00717 063411		SKPBN .TTO	WITHOUT A CLEAR PULSE.
00720 006050		EHALT	
00721 006052		JSR 0LOOP	
00722 006051	T62:	JSR 0SETUP	THE TTO FLAG WAS
00723 060111		NIOS .TTO	CLEARED VIA DEVICE
00724 060213		NIOC 13	CODE 13. CHECK E33-10
00725 063411		SKPBN .TTO	INPUT TO DEVICE
00726 006050		EHALT	SELECT.
00727 006053		JSR 0TIME	
00730 063511		SKPBE .TTO	
00731 006052		JSR 0LOOP	
00732 006051	T64:	JSR 0SETUP	THE TTI BUSY FLOP
00733 060110		NIOS .TTI	FAILED TO SET VIA
00734 063410		SKPBN .TTI	A START PULSE.
00735 006050		EHALT	CHECK THE READER
00736 006053		JSR 0TIME	START LEVEL, ETC, ETC.
00737 063510		SKPBE .TTI	
00740 006052		JSR 0LOOP	
00741 006051	T66:	JSR 0SETUP	SETTING TTI BUSY
00742 060110		NIOS .TTI	CAUSED SELB
00743 063500		SKPBE 0	LINE (AS2) TO GO LOW
00744 006050		EHALT	WITHOUT TTI SELECT.
00745 006053		JSR 0TIME	CHECK AND GATE OF
00746 063510		SKPBE .TTI	(TT RDR BUSY(1),
00747 006052		JSR 0LOOP	TTI SELECT). E29 1-2-3
00750 006051	T68:	JSR 0SETUP	SETTING TTO DONE
00751 060111		NIOS .TTO	CAUSED ALL DONE
00752 006053		JSR 0TIME	FLAGS TESTING TO SKIP.
00753 063511		SKPBE .TTO	DONE IS GATED ONTO
00754 063700		SKPBE 0	SELB (AS0) WITHOUT
00755 006050		EHALT	DEVICE SELECT.
00756 006052		JSR 0LOOP	
00757 006051	T70:	JSR 0SETUP	BOTH A I/O RESET
00760 060111		NIOS .TTO	AND A CLEAR PULSE
00761 006053		JSR 0TIME	FAILED TO CLEAR
00762 063511		SKPBE .TTO	THE DONE FLAG(TTO).
00763 060211		NIOC .TTO	CHECK THE START+CLR+RST
00764 062677		IORST	PULSE, THE FOLLOWING
00765 063711		SKPBE .TTO	INVERTER, THE
00766 006050		EHALT	DONE FLOP ITSELF.
00767 006052		JSR 0LOOP	
00770 006051	T72:	JSR 0SETUP	A I/O RESET FAILED
00771 060111		NIOS .TTO	TO CLEAR THE TTO
00772 006053		JSR 0TIME	DONE FLOP. INPUT
00773 063511		SKPBE .TTO	TO OR GATE E40 FAILED
00774 062677		IORST	CHECK LEAD 10, THEN
00775 063711		SKPBE .TTO	REPLACE E40.
00776 006050		EHALT	
00777 006052		JSR 0LOOP	


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01000 006051 T74: JSR @SETUP ;A TTO CLEAR PULSE
01001 060111 NIOS .TTO ;FAILED TO RESET
01002 006053 JSR @TIME ;TTO DONE. CHECK
01003 063511 SKPBZ .TTO ;E40-9, THE OR GATE
01004 060211 NIOC .TTO ;THAT PRODUCES THE
01005 063711 SKPDZ .TTO ;(STRT+CLR+RST) PULSE.
01006 006050 EHALT
01007 006052 JSR @LOOP

01010 006051 T76: JSR @SETUP ;A TTO STRT PULSE
01011 060111 NIOS .TTO ;FAILED TO CLEAR TTO
01012 006053 JSR @TIME ;DONE. CHECK E40-11
01013 063511 SKPBZ .TTO ;THE OR GATE THAT
01014 060111 NIOS .TTO ;PRODUCES THE (STRT
01015 063711 SKPDZ .TTO ;+CLR+RST) PULSE.
01016 006050 EHALT
01017 006052 JSR @LOOP

01020 006051 T78: JSR @SETUP ;THE TTO FINISH PULSE
01021 102000 ADC 0,0 ;FAILED TO CLEAR BUSY.
01022 061111 DOAS 0,.TTO ;SCOPE TO FIND OUT WHY.
01023 006053 JSR @TIME
01024 063511 SKPBZ .TTO
01025 063511 SKPBZ .TTO ;A LARGE NUMBER OF THINGS
01026 006050 EHALT ;COULD HAVE FAILED.
01027 006052 JSR @LOOP

01030 006051 T80: JSR @SETUP ;TRY TO SET DONE
01031 102000 ADC 0,0 ;VIA TTO FINISH. CHECK
01032 061111 DOAS 0,.TTO ;SELD (A80)
01033 006053 JSR @TIME ;INPUTS AND
01034 063511 SKPBZ .TTO ;THE TTO DONE FLOP
01035 063511 SKPDN .TTO ;OUTPUT, RESET, AND
01036 006050 EHALT ;CLOCK INPUTS.
01037 006052 JSR @LOOP

01040 006051 T82: JSR @SETUP ;THE CPU FAILED
01041 102000 ADC 0,0 ;TO READ IN ANYTHING
01042 061477 INTA 0 ;ON INTA. CHECK CPU.
01043 100015 COM# 0,0,SNR
01044 006050 EHALT
01045 006052 JSR @LOOP

01046 006051 T84: JSR @SETUP
01047 102520 SUSZL 0,0 ;A BIT 15 WAS READ
01050 065477 INTA 1 ;IN ON INTA. CHECK
01051 107414 AND# 0,1,SZR ;E12, ETC.
01052 006050 EHALT
01053 006052 JSR @LOOP

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01054 006051	T86:	JSR @SETUP	; AFTER A I/O RESET
01055 061477		INTA 0	; (ISSUED BY SETUP) INTA
01056 101004		MOV 0,0,SZR	; SHOULD READ BACK NO
01057 006050		EHALT	; BITS, BUT IT DID
01060 006052		JSR @LOOP	; GET BITS BACK.
01061 006051	T88:	JSR @SETUP	; SET THE TTO
01062 102000		ADC 0,0	; DONE FLAG. THEN
01063 062077		MSKO 0	; PERFORM A INTA
01064 062677		IORST	; AND CHECK IF
01065 061111		DOAS 0,.TTO	; ANY BITS WERE
01066 006053		JSR @TIME	; RECEIVED BY THE
01067 063511		SKPBE .TTO	; CPU.
01070 061477		INTA 0	; SUGGEST TTO INT
01071 101005		MOV 0,0,SNR	; REQUEST FLOP FAILED.
01072 006050		EHALT	
01073 006052		JSR @LOOP	
01074 006051	T90:	JSR @SETUP	; WITH THE DONE
01075 060111		NIOS .TTO	; FLAG SET INTA
01076 006053		JSR @TIME	; SHOULD READ BACK
01077 063511		SKPBE .TTO	; BIT 15. CHECK
01100 061477		INTA 0	; INTA INPUT TO BIT 15
01101 126520		SUBZL 1,1	; E31,E32,E12
01102 107405		AND 0,1,SNR	
01103 006050		EHALT	
01104 006052		JSR @LOOP	
01105 006051	T92:	JSR @SETUP	; A MSKO WITH BIT 15
01106 060111		NIOS .TTO	; ZERO SHOULD NOT
01107 006053		JSR @TIME	; CHANGE THE STATE OF
01110 063511		SKPBE .TTO	; TTO INT DISABLT.
01111 102400		SUB 0,0	; NO BITS WERE READ
01112 062077		MSKO 0	; BACK ON INTA HOW-
01113 061477		INTA 0	; EVER. CHECK DATA-15
01114 101005		MOV 0,0,SNR	; INPUT TO TTO INT
01115 006050		EHALT	; DISABLE FLOP.
01116 006052		JSR @LOOP	
01117 006051	T94:	JSR @SETUP	; THE DEVICE CODE
01120 060111		NIOS .TTO	; READ BACK FOR
01121 006053		JSR @TIME	; THE TTO SHOULD
01122 063511		SKPBE .TTO	; BE 11 (FIRST TTO) OR
01123 061477		INTA 0	; 51 (SECOND TTO).
01124 024405		LDA 1,T94A	; SOME OTHER NUMBER
01125 106414		SUB# 0,1,SZR	; WAS READ BACK.
01126 006050		EHALT	; EXAMINE C(0).
01127 006052		JSR @LOOP	
01130 101001		MOV 0,0,SKP	
01131 000011	T94A:	.TTO	; CONSTANT!

01132 006051	T96:	JSR @SETUP	; THE TTO INT DISABLE
01133 102520		SUBZL 0,0	; FLOP IS SET VIA
01134 062077		MSKO 0	; MSKO THEN CLEARED
01135 062677		IORST	; VIA I/O RESET. NO
01136 060111		NIOS .TTO	; BITS WERE READ BACK.
01137 006053		JSR @TIME	; SUGGEST I/O RESET
01140 063511		SKPBZ .TTO	; FAILED TO CLEAR
01141 061477		INTA 0	; TTO INT DISABLE FLOP.
01142 101005		MOV 0,0,SNR	; OR ITS INPUT TO TTO
01143 006050		EHALT	; INT REQ FAILED.
01144 006052		JSR @LOOP	
01145 006051	T98:	JSR @SETUP	; THE TTO INT DISABLE
01146 102520		SUBZL 0,0	; FLOP EITHER FAILED TO
01147 062077		MSKO 0	; SET VIA MSKO OR
01150 060111		NIOS .TTO	; THE AND GATE
01151 006053		JSR @TIME	; (TTO DONE(1),TTO INT DIS(0))
01152 063511		SKPBZ .TTO	; FAILED, BECAUSE IT
01153 061477		INTA 0	; DID NOT PREVENT
01154 101004		MOV 0,0,SZR	; TTO INT REQ FROM
01155 006050		EHALT	; SETTING.
01156 006052		JSR @LOOP	
01157 006051	U00:	JSR @SETUP	; CHECK THE TIME IT TAKES
01160 102000		ADC 0,0	; TO PRINT A CHARACTER. CHECK
01161 061111		DOAS 0,.TTO	; AND GATE TO MAKE UP FINISH
01162 006053		JSR @TIME	; IF TIME IS 9MS,STOP(1)
01163 063511		SKPBZ .TTO	; " " " 18MS,TT00(1)
01164 102000		ADC 0,0	; " " " 27MS," 1(1)
01165 061111		DOAS 0,.TTO	; " " " 36MS," 2(1)
01166 006053		JSR @TIME	; " " " 45MS," 3(1)
01167 063511		SKPBZ .TTO	; " " " 54MS," 4(1)
01170 024054		LDA 1,CTIML	; " " " 63MS," 5(1)
01171 106432		SUBZ# 0,1,SZC	; " " " 72MS," 6(1)
01172 006050		EHALT	; " " " 81MS," 7(1)
01173 006052		JSR @LOOP	; " " " 90MS," 8(1)
01174 006051	U02:	JSR @SETUP	; A CHECK TO INSURE THAT
01175 102000		ADC 0,0	; DOA TO THE TTO DOES
01176 061111		DOAS 0,.TTO	; NOT SHIFT THE REGISTER
01177 006053		JSR @TIME	; IF TTO IS BUSY
01200 063511		SKPBZ .TTO	; CHECK AND GATE OF
01201 102000		ADC 0,0	; (DATA OUT-A,TTO SELECT,
01202 061111		DOAS 0,.TTO	; TTO BUSY(0)) THE TTO
01203 061011		DOA 0,.TTO	; BUSY 0 INPUT.
01204 061011		DOA 0,.TTO	
01205 061011		DOA 0,.TTO	
01206 006053		JSR @TIME	
01207 063511		SKPBZ .TTO	
01210 024054		LDA 1,CTIML	; FAILURE IF TIME SHORT.
01211 106432		SUBZ# 0,1,SZC	; C(CTIML)=98% OF TOTAL.
01212 006050		EHALT	
01213 006052		JSR @LOOP	

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01214 006051 U04: JSR @SETUP ;TEST THE TIME FOR TO
01215 102000 ADC 0,0 ;LONG. CHECK AND GATE
01216 061111 DOAS 0,.TTO ;(DATA OUTA,TTO SELECT,
01217 006053 JSR @TIME ;TTO BUSY (0)).
01220 063511 SKPBZ .TTO
01221 102000 ADC 0,0
01222 061111 DOAS 0,.TTO
01223 006053 JSR @TIME
01224 063511 SKPBZ .TTO
01225 024055 LDA 1,CTIMH
01226 106433 SUBZ# 0,1,SNC
01227 006050 EHALT
01230 006052 JSR @LOOP

01231 006051 U06: JSR @SETUP ;TEST FOR SHORT TIME
01232 061111 DOAS 0,.TTO ;IF START FAILED TO
01233 006053 JSR @TIME ;CLEAR OUTPUT BUFFER
01234 063511 SKPBZ .TTO ;IT WILL CONTAIN ALL
01235 060111 NIOS .TTO ;ONES. CHARACTOR WILL
01236 006053 JSR @TIME ;END QUICKLY.
01237 063511 SKPBZ .TTO
01240 024054 LDA 1,CTIML
01241 106432 SUBZ# 0,1,SZC
01242 006050 EHALT
01243 006052 JSR @LOOP

01244 006051 U10: JSR @SETUP ;TEST FOR LONG TIME
01245 061111 DOAS 0,.TTO ;IF STOP1 WAS 0 AND
01246 006053 JSR @TIME ;START STILL GOT THROUGH
01247 063511 SKPBZ .TTO ;THE AND GATE TO
01250 061011 DOA 0,.TTO ;RESET THE BUFFER
01251 060111 NIOS .TTO ;THE TIME WOULD BE
01252 006053 JSR @TIME ;LONG.
01253 063511 SKPBZ .TTO
01254 024055 LDA 1,CTIMH
01255 106433 SUBZ# 0,1,SNC
01256 006050 EHALT
01257 006052 JSR @LOOP

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01260 006051	U14:	JSR @SETUP	!TIME TO PRINT A
01261 061111		DOAS 0,.TTO	!CHARACTOR IS LESS
01262 006053		JSR @TIME	!THAN 2% OFF FROM 100MS.
01263 063511		SKPBZ .TTO	!OR A ERROR IS ASSUMED.
01264 061111		DOAS 0,.TTO	
01265 006053		JSR @TIME	
01266 063511		SKPBZ .TTO	
01267 024056		LDA 1,CTIM	
01270 106423		SUBZ 0,1,SNC	
01271 124400		NEG 1,1	
01272 030057		LDA 2,TWO	
01273 132433		SUBZ# 1,2,SNC	
01274 006050		EHALT	
01275 006052		JSR @LOOP	

01276 006051	U16:	JSR @SETUP	!THE MSKO LEVEL
01277 102520		SUBZL 0,0	!WAS RAISED AT DTOB
01300 062000		DOB 0,0	!TIME EVEN THOUGH
01301 060111		NIOS .TTO	!IT WAS NOT A CPU INST.
01302 006053		JSR @TIME	!CHECK MSKO (A38).
01303 063511		SKPBZ .TTO	
01304 061477		INTA 0	
01305 101005		MOV 0,0,SNR	
01306 006050		EHALT	
01307 006052		JSR @LOOP	

01310 006051	U18:	JSR @SETUP	!THE MSKO LEVEL
01311 102520		SUBZL 0,0	!WAS RAISED AT
01312 060077		NIO CPU	!CPU INST TIME
01313 060111		NIOS .TTO	!EVEN THOUGH NO
01314 006053		JSR @TIME	!DTOB WAS GIVEN.
01315 063511		SKPBZ .TTO	
01316 061477		INTA 0	
01317 101005		MOV 0,0,SNR	
01320 006050		EHALT	
01321 006052		JSR @LOOP	

01322 006051	U20:	JSR @SETUP	!THE INTA LEVEL (A40)
01323 060111		NIOS .TTO	!WAS RAISED AA DTIB
01324 006053		JSR @TIME	!TIME EVEN THOUGH NO
01325 063511		SKPBZ .TTO	!CPU INSTRUCTION WAS
01326 061400		DIB 0,0	!GIVEN.
01327 024405		LDA 1,U20A	
01330 106415		SUB# 0,1,SNR	
01331 006050		EHALT	
01332 006052		JSR @LOOP	
01333 101011		MOV# 0,0,SKP	
01334 000011	U20A:	.TTO	

.EOT

01335 006051	B10:	JSR @SETUP	;GROUND THE INTR LINE.
01336 102620		SUBZR 0,0	;NO INTERRUPT SHOULD
01337 040000		STA 0,0	;OCCURE BECAUSE ION
01340 040001		STA 0,1	;IS NOT SET.
01341 061111		DOAS 0,.TTO	
01342 063511		SKPBZ .TTO	;CHECK 4 INPUT AND/OR
01343 000777		JMP .-1	;GATE TO THE FLOP
01344 024000		LDA 1,0	;PRODUCING INT PEND LEVEL.
01345 106414		SUB# 0,1,SZR	;ALSO CHECK AND/OR GATE
01346 006050		EHALT	; (ION,ION SYNC,FETCH). SEE
01347 102000		ADC 0,0	;SUPER NOVA INPUT/OUTPUT
01350 006052		JSR @LOOP	;PRINT.
01351 006051	B11:	JSR @SETUP	;GROUND THE INTR LINE.
01352 102620		SUBZR 0,0	;TURN THE INTERRUPT
01353 040000		STA 0,0	;SYSTEM ON AND OFF.
01354 040001		STA 0,1	;NO INTERRUPT SHOULD
01355 061111		DOAS 0,.TTO	;OCCURE. CHECK THE
01356 063511		SKPBZ .TTO	;3 INPUT AND GATE
01357 000777		JMP .-1	;PRODUCING INT-PEND
01360 060177		NIOS CPU	; (B31) LEVEL.
01361 060277		NIOC CPU	
01362 024000		LDA 1,0	
01363 106414		SUB# 0,1,SZR	
01364 006050	B11A:	EHALT	
01365 006052		JSR @LOOP	
01366 024047	B12:	LDA 1,IND4	;LOCATIONS 1-2
01367 044001		STA 1,1	;SHALL CONTAIN
01370 044002		STA 1,2	; (04). LOCATION 3
01371 044003		STA 1,3	;TO 1 WILL RETURN
01372 024772		LDA 1,B11A	;THROUGH LOC 4.
01373 044000		STA 1,0	
01374 006051	B13:	JSR @SETUP	;CHECK TO INSURE MA
01375 102001		ADC 0,0,SKP	;IS CLEARED AT PTG-5
01376 001410		B13A	;OF P11 CYCLE.
01377 024777		LDA 1,.-1	
01400 044004		STA 1,4	;SET RETURN.
01401 000047		LDA 2,IND4	
01402 050001		STA 2,1	
01403 061111		DOAS 0,.TTO	
01404 063511		SKPBZ .TTO	
01405 000777		JMP .-1	
01406 060177		NIOS CPU	
01407 000001		JMP 1	;MA=1
01410 024001	B13A:	LDA 1,1	;CHECK LOC 1 FOR
01411 132414		SUB# 1,2,SZR	;BEING SAME AS
01412 006050		EHALT	;BEFORE INTERRUPT.
01413 060277		NIOC CPU	;CHECK AND (P11-TS3)
01414 006052		JSR @LOOP	;SHOULD INHIBIT ADDER OUT.

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01415 006051 B14: JSR @SETUP      ;DEFER FAILED TO SET
01416 102001      ADC 0,0,SKP    ;AT THE END OF PI-2
01417 001427      B14A          ;CYCLE. CHECK 3 INPUT
01420 024777      LDA 1,-1    ;OR GATE TO PRODUCE
01421 044004      STA 1,4     ;DEFER SET.
01422 061111      DOAS 0,.TTO
01423 063511      SKPBE .TTO
01424 000777      JMP .-1
01425 060177      NIOS CPU
01426 101010      MOV# 0,0
01427 100014 B14A: COM# 0,0,SER
01430 006050      EHALT
01431 060277      NIOC CPU
01432 006052      JSR @LOOP

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01433 006051 B15: JSR @SETUP      ;A INTERRUPT DEFERED
01434 102001      ADC 0,0,SKP    ;THROUGH LOCATION 0
01435 001447      B15A          ;NOT LOCATION 1. CHECK
01436 024777      LDA 1,-1    ;1 TO MA AT PI-2 TIME.
01437 044004      STA 1,4     ;CHECK ADD ONE LOGIC
01440 061111      DOAS 0,.TTO    ;(A91) AND GATE
01441 063511      SKPBE .TTO    ;(PI2,TS3).
01442 000777      JMP .-1
01443 060177      NIOS CPU
01444 101010      MOV# 0,0
01445 063477      SKPSN CPU
01446 006050      EHALT
01447 060277 B15A: NIOC CPU
01450 006052      JSR @LOOP

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01451 006051 B16: JSR @SETUP      ;A INTERRUPT OCCURED
01452 102001      ADC 0,0,SKP    ;BUT FAILED TO STORE
01453 001464      B16A          ;ANYTHING IN LOC 0.
01454 024777      LDA 1,-1    ;CHECK INPUTS TO
01455 044004      STA 1,4     ;MEM MOD LOGIC.
01456 040000      STA 0,0
01457 061111      DOAS 0,.TTO
01460 063511      SKPBE .TTO
01461 000777      JMP .-1
01462 060177      NIOS CPU
01463 000404      JMP .+4
01464 024000 B16A: LDA 1,0
01465 106415      SUB# 0,1,SNR
01466 006050      EHALT
01467 006052      JSR @LOOP

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01470 006051	B17:	JSR 0SETUP	WHEN A INTERRUPT
01471 102001		ADC 0,0,SKP	OCCURS THE ION FLOP
01472 001502		B17A	SHOULD BE CLEARED BY
01473 024777		LDA 1,-1	THE PI CLR PULSE.
01474 044004		STA 1,4	
01475 061111		DOAS 0,.TTO	
01476 063511		SKPBE .TTO	
01477 000777		JMP -1	
01500 060177		NIOS CPU	
01501 000403		JMP +3	
01502 063577	B17A:	SKPBE CPU	
01503 006050		EHALT	
01504 006052		JSR 0LOOP	
01505 006051	B18:	JSR 0SETUP	TURN THE INTERRUPT
01506 102001		ADC 0,0,SKP	SYSTEM ON AND CHECK
01507 001521		B18A	FOR A INTERRUPT.
01510 024777		LDA 1,-1	
01511 044004		STA 1,4	
01512 061111		DOAS 0,.TTO	
01513 063511		SKPBE .TTO	
01514 000777		JMP -1	CHECK INT PEND LEVEL
01515 060177		NIOS CPU	(B81). CHECK FOR PI1
01516 101010		MOV# 0,0	AND PI2 LEVELS.
01517 101010		MOV# 0,0	CHECK INTR LINE ETC.
01520 006050		EHALT	
01521 006052	B18A:	JSR 0LOOP	
01522 006051	B19:	JSR 0SETUP	TEST TO INSURE THE
01523 102001		ADC 0,0,SKP	PC IS NOT INCREMENTED
01524 001536		B19A	DURING THE PI1 CYCLE
01525 024777		LDA 1,-1	WHEN ALC SKIP IS NOT
01526 044004		STA 1,4	PRESENT. CHECK OR
01527 061111		DOAS 0,.TTO	GATE (PI1,DCH1) THE
01530 063511		SKPBE .TTO	PI1 INPUT.
01531 000777		JMP -1	
01532 060177		NIOS CPU	
01533 101010		MOV# 0,0	
01534 000400		JMP .	
01535 001535		.	
01536 024000	B19A:	LDA 1,0	
01537 030776		LDA 2,-2	
01540 132415		SUB# 1,2,SNR	
01541 006050		EHALT	
01542 006052		JSR 0LOOP	

01543 006051	B20:	JSR 0SETUP	;A TEST TO INSURE THE
01544 060277		NIOS CPU	;ADC INSTRUCTION FOLLOWING
01545 102001		ADC 0,0,SKP	;THE NIOS IS
01546 001556		B20A	;EXECUTED BEFORE THE
01547 024777		LDA 1,.-1	;INTERRUPT. CHECK THE
01550 044004		STA 1,4	;LOAD INPUT TO THE
01551 061111		DOAS 0,.TTO	;I.C. PRODUCING
01552 063511		SKPBE .TTO	;INT PEND AND DCH PEND.
01553 000777		JMP .-1	
01554 060177		NIOS CPU	
01555 126000		ADC 1,1	
01556 106414	B20A:	SUB# 0,1,SZR	
01557 006050		EHALT	
01560 006052		JSR 0LOOP	
01561 006051	B22:	JSR 0SETUP	;FORCE A INTERRUPT
01562 102001		ADC 0,0,SKP	;AND CHECK TO INSURE
01563 001573		B22A	;THE PC TO MEM
01564 024777		LDA 1,.-1	;TRANSFER OCCURS IN
01565 044004		STA 1,4	;THE PI2 CYCLE. CHECK
01566 061111		DOAS 0,.TTO	;OR GATE (FETCH,PI2)
01567 063511		SKPBE .TTO	;ON THE STATES CPU-2
01570 000777		JMP .-1	;PRINT.
01571 060177		NIOS CPU	
01572 101010		MOV# 0,0	
01573 024000	B22A:	LDA 1,0	
01574 125005		MOV 1,1,SNR	
01575 006050		EHALT	
01576 006052		JSR 0LOOP	
01577 006051	B23:	JSR 0SETUP	;TEST TO INSURE THE
01600 102001		ADC 0,0,SKP	;PC IS STORED PROPERLY
01601 001611		B23A	;VIA INTERRUPT.
01602 024777		LDA 1,.-1	
01603 044004		STA 1,4	
01604 061111		DOAS 0,.TTO	
01605 063511		SKPBE .TTO	
01606 000777		JMP .-1	
01607 060177		NIOS CPU	
01610 004401		JSR .+1	
01611 024000	B23A:	LDA 1,0	
01612 106414		SUB# 1,3,SZR	
01613 006050		EHALT	
01614 006052		JSR 0LOOP	

01615	006051	B24:	JSR @SETUP	;	A INTERRUPT IS CAUSED
01616	102001		ADC 0,0,SKP	;	TO OCCURE JUST AFTER A
01617	001630		B24A	;	ALC SKIP INSTRUCTION
01620	024777		LDA 1,-1	;	WHICH SKIPS. THE PC
01621	044004		STA 1,4	;	SHOULD BE INCREMENTED
01622	051111		DOAS 0,.TTO	;	IN THE P11 CYCLE TO
01623	063511		SKPEZ .TTO	;	STORE THE PROPER
01624	020777		JMP -1	;	PROGRAM COUNTER IN
01625	060177		NIOS CPU	;	LOCATION 0.
01626	101001		MOV 0,0,SKP		
01627	001630		.+1	;	PC WAS NOT INCREMENTED
01630	034777	B24A:	LDA 3,-1	;	CHECK OR GATE (PI1,DCH1)
01631	024000		LDA 1,0	;	IN THE LOGIC FEEDING
01632	166414		SUB# 3,1,SER	;	THE INC PC FLOP.
01633	006050		ENALT		
01634	006052		JSR @LOOP		

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01635 006051 B25: JSR 0SETUP ; THIS TEST INSURES THAT
01636 102001 ADC 0,0,SKP ; THE ION SYNC LOGIC
01637 001651 B25A ; WILL REMAIN ON
01640 024777 LDA 1,0,-1 ; DURING PERIODS WHEN
01641 044004 STA 1,4 ; THE PROCESSOR IS NOT
01642 061111 DOAS 0,.TTO ; IN THE FETCH STATE.
01643 063511 SKPBE .TTO ; CHECK THE AND/OR
01644 060777 JMP .-1 ; GATE FEEDING THE ION
01645 060177 NIOS CPU ; SYNC INVERTER, THE TOP
01646 026402 LDA 1,0,+2 ; TWO INPUTS. ALSO CHECK
01647 101001 MOV 0,0,SKP ; THE INVERTER PRODUCING
01650 001647 .-1 ; ION SYNC (A3)
01651 034777 B25A: LDA 0,0,-1 ; AND THE FOLLOWING FLOP.
01652 024000 LDA 1,0
01653 136414 SUB# 1,3,SER
01654 006050 EHALT
01655 006052 JSR 0LOOP
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01656 006051 B27: JSR 0SETUP ; A TEST TO INSURE A
01657 102001 ADC 0,0,SKP ; "LDA 1,0,+2" INSTRUCTION
01660 001673 B27A ; IS EXECUTED PRIOR TO
01661 024777 LDA 1,0,-1 ; A INTERRUPT CYCLE.
01662 044004 STA 1,4 ; CHECK AND GATE INPUT
01663 040000 STA 0,0 ; TO P11 STATUS FLOP.
01664 061111 DOAS 0,.TTO
01665 063511 SKPBE .TTO
01666 060777 JMP .-1
01667 060177 NIOS CPU
01670 026402 LDA 1,0,+2
01671 101001 MOV 0,0,SKP
01672 000000 0
01673 136414 B27A: SUB# 0,1,SER
01674 006050 EHALT
01675 006052 JSR 0LOOP
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TTY

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01676 006051 B29: JSR @SETUP ;TRY TO CLEAR ALL
01677 102001 ADC 0,0,SKP ;IR BITS VIA INTERRUPT
01700 001712 B29A
01701 024777 LDA 1,-1
01702 044004 STA 1,4
01703 061111 DOAS 0,.TTO
01704 063511 SKPBZ .TTO
01705 000777 JMP .-1
01706 060177 NIOS CPU
01707 177777 ANDCS# 3,3,SNB
01710 101010 MOV# 0,0
01711 006050 EHALT
01712 006052 B29A: JSR @LOOP

01713 102400 B31: SUB 0,0 ;TEST TO SEE IF
01714 126520 SUBBL 1,1 ;MUL/DIV IN THIS MACH.
01715 131120 MOVBL 1,2
01716 073301 DOCP 2,1
01717 132414 SUB# 1,2,SZR
01720 000440 JMP B34 ;NO MUL/DIV!

01721 006051 B32: JSR @SETUP ;CHECK MUL RESULT
01722 102401 SUB 0,0,SKP ;WITH INT PEND.
01723 001735 B32A
01724 024777 LDA 1,-1
01725 044004 STA 1,4
01726 126520 SUBBL 1,1
01727 131120 MOVBL 1,2
01730 061111 DOAS 0,.TTO
01731 063511 SKPBZ .TTO
01732 000777 JMP .-1
01733 060177 NIOS CPU
01734 073301 DOCP 2,1 ;MUL
01735 101005 B32A: MOV 0,0,SNR
01736 132414 SUB# 1,2,SZR
01737 006050 EHALT
01740 006052 JSR @LOOP

01741 006051 B33: JSR @SETUP ;CHECK PC STORED
01742 102001 ADC 0,0,SKP ;WITH INTERRUPT ON
01743 001753 B33A ;MUL INSTRUCTION.
01744 024777 LDA 1,-1
01745 044004 STA 1,4
01746 061111 DOAS 0,.TTO
01747 063511 SKPBZ .TTO
01750 000777 JMP .-1
01751 060177 NIOS CPU
01752 073301 DOCP 2,1 ;MUL
01753 004401 B33A: JSR .-1
01754 024000 LDA 1,0
01755 136014 ADC# 1,3,SZR
01756 006050 EHALT
01757 006052 JSR @LOOP
01760 101010 B34: MOV# 0,0
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01761	006051	V00:	JSR @SETUP	; DIA DID NOT
01762	102000		ADC 0,0	; CHANGE THE CONTENTS
01763	060410		DIA 6,.TTI	; OF AC0.
01764	100015		COM# 0,0,SNR	
01765	006050		ENALT	
01766	006052		JSR @LOOP	
01767	074477		READS 3	; IF KSR TTY DON'T
01770	175100		MOVL 3,3	
01771	175102		MOVL 3,3,SEC	; DO THIS SECTION
01772	000561		JMP LE025	
01773	006051	V02:	JSR @SETUP	; STARTING THE PAPER
01774	060110		NIOS .TTI	; TAPE READER DID NOT
01775	006053		JSR @TIME	; CAUSE DONE TO SET.
01776	060610		SKPDN .TTI	; IS THE READER IN THE
01777	101002		MOV 0,0,SEC	; START POSITION? TAPE IN
02000	006050		ENALT	; READER? SWITCH IN THE
02001	006052		JSR @LOOP	; LINE POSITION?

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02002 006051 V04: JSR @SETUP ;THE SETTING OF
02003 060110 NIOS .TTI ;TTI DONE DID NOT
02004 006053 JSR @TIME ;CLEAR TT RDR BUSY.
02005 063610 SKPDN .TTI ;CHECK TTI DONE(1)
02006 063510 SKPBZ .TTI ;INPUT TO CLOCK. ALSO
02007 006050 EHALT ;DATA INPUT SHOULD BE
02010 006052 JSR @LOOP ;GROUND.

02011 006051 V06: JSR @SETUP ;I/O RESET FAILED
02012 060110 NIOS .TTI ;TO CLEAR THE TTI
02013 006053 JSR @TIME ;DONE FLOP. CHECK
02014 063510 SKPBZ .TTI ;E40 5-6. ALSO INVERTER
02015 062677 IORST ;E39 10-11. TO THE
02016 063710 SKPDZ .TTI ;RESET SIDE OF THE
02017 006050 EHALT ;DONE FLOP.
02020 006052 JSR @LOOP

02021 006051 V08: JSR @SETUP ;A CLEAR PULSE TO
02022 060110 NIOS .TTI ;THE TTI LOGIC FAILED
02023 006053 JSR @TIME ;TO CLEAR DONE.
02024 063510 SKPBZ .TTI ;CHECK E40 4-6.
02025 060210 NIOC .TTI ;THE OF GATE TO
02026 063710 SKPDZ .TTI ;RESET SIDE OF DONE.
02027 006050 EHALT
02030 006052 JSR @LOOP

02031 006051 V10: JSR @SETUP ;A START PULSE TO
02032 060110 NIOS .TTI ;THE TTI LOGIC FAILED
02033 006053 JSR @TIME ;TO CLEAR DONE.
02034 063510 SKPBZ .TTI ;CHECK E40 3-6. THE
02035 060110 NIOS .TTI ;OR GATE TO RESET SIDE
02036 063710 SKPDZ .TTI ;OF DONE.
02037 006050 EHALT
02040 006053 JSR @TIME
02041 063510 SKPBZ .TTI
02042 006052 JSR @LOOP

02043 006051 V12: JSR @SETUP ;AFTER A I/O
02044 061477 INTA 0 ;RESET INTA SHOULD
02045 101004 MOV 0,0,SZR ;READ NO BITS.
02046 006050 EHALT
02047 006052 JSR @LOOP

02050 006051 V14: JSR @SETUP ;WITH THE DONE FLAG
02051 102400 SUB 0,0 ;SET INTA SHOULD
02052 062077 MSK0 0 ;READ BACK A DEVICE
02053 062677 IORST ;CODE. CHECK TTI
02054 060110 NIOS .TTI ;INT REQ FLOP.
02055 006053 JSR @TIME
02056 063510 SKPBZ .TTI
02057 061477 INTA 0
02060 101005 MOV 0,0,SNR
02061 006050 EHALT
02062 006052 JSR @LOOP

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02063 006051	V16:	JSR @SETUP	;CHECK THAT I/O RESET
02064 102520		SUBZL 0,0	;WILL RESET TTI INT
02065 101100		MOVL 0,0	;DISABLE.
02066 062077		MSKO 0	;SET THE FLOP
02067 062677		IORST	;TRY TO CLEAR
02070 060110		NIOS .TTI	;SET DONE.
02071 006053		JSR @TIME	
02072 063510		SKPBE .TTI	
02073 061477		INTA 0	;EXPECT DEVICE CODE.
02074 101005		MOV 0,0,SNR	
02075 006050		EHALT	
02076 006052		JSR @LOOP	
02077 006051	V18:	JSR @SETUP	;A MSKO INSTRUCTION
02100 102400		SUB 0,0	;WITHOUT A BIT 14
02101 062077		MSKO 0	;SHOULD NOT SET
02102 060110		NIOS .TTI	;TTI INT DISABLE. NO
02103 006053		JSR @TIME	;DEVICE CODE WAS READ
02104 063510		SKPBE .TTI	;BACK ON INTA HOWEVER.
02105 061477		INTA 0	;SUGGEST THE DATA INPUT
02106 101005		MOV 0,0,SNR	;TO TTI INT DISABLE
02107 006050		EHALT	;FAILED.
02110 006052		JSR @LOOP	
02111 006051	V20:	JSR @SETUP	;TTI INT DISABLE FAILED
02112 102520		SUBZL 0,0	;TO SET ON A MSKO
02113 101120		MOVL 0,0	;INSTRUCTION OR , THE
02114 062077		MSKO 0	;AND GATE (TTI INT DISABLE
02115 060110		NIOS .TTI	; (0),TTI DONE(1)) FAILED.
02116 006053		JSR @TIME	;MSKO SHOULD PREVENT
02117 063510		SKPBE .TTI	;INTA FROM READING
02120 061477		INTA 0	;DEVICE CODE.
02121 101004		MOV 0,0,SZR	
02122 006050		EHALT	
02123 006052		JSR @LOOP	
02124 006051	V22:	JSR @SETUP	;CHECK THAT I/O RESET
02125 102620		SUBSR 0,0	;WILL CLEAR TTI
02126 040001		STA 0,1	;INT REQ.
02127 060110		NIOS .TTI	
02130 006053		JSR @TIME	;WAIT FOR DONE
02131 063510		SKPBE .TTI	
02132 060177		NIOS CPU	;ENABLE INTERRUPT
02133 062477		DIC 0,CPU	;I/O RESET
02134 063477		SKPBN CPU	;CHECK THAT NO
02135 006050		EHALT	;INTERRUPT OCCURED.
02136 060277		NIOS CPU	
02137 006052		JSR @LOOP	

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02140 006051 V24: JSR @SETUP ;CHECK THE READ A
02141 0060110 NIOS .TTI ;CHARACTOR TIME TO
02142 006053 JSR @TIME ;BE WITHIN 5% OF
02143 0063510 SKPBZ .TTI ;100MS.
02144 024056 LDA 1,CTIM
02145 106423 SUBZ 0,1,SNC
02146 124400 NEG 1,1
02147 030120 LDA 2,PCS
02150 132433 SUBZ# 1,2,SNC
02151 006050 EHALT
02152 006052 JSR @LOOP

002153 LEO25=.
02153 006127 V26: JSR @ICRLF ;END OF PASS MESSAGE
02154 006127 JSR @ICRLF
02155 006130 JSR @IMESS ;MESSAGE PASS
02156 002345 PMESS
02157 006127 JSR @ICRLF
02160 0063611 SKPDN .TTO
02161 000777 JMP .-1
02162 002401 JMP 0,+1
02163 000451 T00

02164 021400 TIMER: LDA 0,0,3 ;TIME THE INST
02165 040405 STA 0,+5 ;FOLLOWING THE CALL.
02166 102040 ADCO 0,0
02167 102410 SUB# 0,0
02170 101402 INC 0,0,SZC
02171 001401 JMP 1,3
02172 000000 0
02173 000774 JMP .-4
02174 040060 STA 0,TIMEX
02175 001401 JMP 1,3

02176 054413 ENTER: STA 3,LOOPR ;ITERATION RETURN
02177 034406 LDA 3,ITR ;THIS TEST INITIALIZES
02200 054406 STA 3,ITRCT ;EACH ROUTINE.
02201 176400 SUB 3,3
02202 054405 STA 3,ESWIT
02203 062677 IORST ;I/O RESET
02204 002405 JMP @LOOPR

02205 000003 ITR: 3
02206 000000 ITRCT: 0
02207 000000 ESWIT: 0
02210 000000 RETURN: 0
02211 000000 LOOPR: 0

02212 054776 ERR: STA 3,RETURN ;ERROR
02213 034774 LDA 3,ESWIT
02214 175004 MOV 3,3,SER
02215 002773 JMP @RETURN ;NOT FIRST ERROR
02216 034772 LDA 3,RETURN ;SET ERROR SWITCH
02217 054770 STA 3,ESWIT ;C(3)=PC+1 OF THE
02220 063077 HALT ;ERROR
02221 002767 JMP @RETURN

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02222 054766 CYCLE: STA 3,RETURN ; ITERATION ROUTINE
02223 014763 DSZ ITRCT ; END OF EACH TEST.
02224 000410 JMP CYCTS ; NOT 10 ITERATIONS
02225 034760 LDA 3,ITR ; RESET ITERATION
02226 054760 STA 3,ITRCT ; COUNTER. IF ERROR
02227 034760 LDA 3,ESWIT ; OCCURED STAY IN LOOP.
02230 062677 IORST
02231 175004 MOV 3,3,SZR
02232 002757 JMP @LOOPR ; ITERATE PROGRAM
02233 002755 JMP @RETURN ; GO TO NEXT PROG.

02234 034753 CYCTS: LDA 3,ESWIT ; IF A ERROR
02235 175004 MOV 3,3,SZR ; LOOK AT SWITCH 0
02236 074477 READS 3
02237 062677 IORST ; IF SWITCH SET PROCEED.
02240 175113 MOVL# 3,3,SNC
02241 002750 JMP @LOOPR ; ITERATE
02242 002746 JMP @RETURN ; NEXT TEST.

02243 054113 MESS: STA 3,MESSR ; PRINT A TEXT MESSAGE
02244 010113 ISZ MESSR
02245 031400 LDA 2,0,3 ; C(2) POINTS TO MESSAGE
02246 024114 LDA 1,C377 ; 8 BIT MASK
02247 021000 LDA 0,0,2 ; C(2)=DATA WORD
02250 125112 MOVL# 1,1,SZC
02251 123701 ANDS 1,0,SKP
02252 123401 AND 1,0,SKP ; C(0)=DATA CHARACTER
02253 151400 INC 2,2 ; INC TO NEXT WORD
02254 124000 CCM 1,1 ; FLIP MASK
02255 004403 JSR CHAR ; PRINT
02256 000771 JMP MESS+4 ; ANOTHER
02257 002113 JMP @MESSR ; LAST

02260 101005 CHAR: MOV 0,0,SNR ; PRINT A CHARACTER FROM
02261 001401 JMP 1,3 ; C(0)R. EXIT +2 IF NULL
02262 063511 SKPBZ .TTO
02263 000777 JMP -1 ; WAIT IF TTO BUSY
02264 061111 DOAS 0,.TTO ; XMITT CHARACTER
02265 001400 JMP 0,3 ; EXIT +1

02266 054113 CRLF: STA 3,MESSR ; PRINT A CARRIAGE
02267 020115 LDA 0,C215 ; RETURN AND A LINE
02270 004770 JSR CHAR ; FEED SEQUENCE.
02271 020116 LD0 0,C12
02272 004766 JSR CHAR
02273 002113 JMP @MESSR

02274 006127 ALPH: JSR @ICRLF ; ALPHA TEST MESSAGE
02275 006130 JSR @IMESS
02276 002300 ALP ; MESSAGE STORAGE AREA
02277 000775 JMP ALPH

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YTT

02300	046515	ALP:	.TXTE IMM
02301	027115	M.	
02302	121442	"#	
02303	122444	\$%	
02304	023646	&'	
02305	124450	()	
02306	025652	*+	
02307	026654	,-	
02310	127456	.7	
02311	130460	01	
02312	031662	23	
02313	032664	45	
02314	133466	67	
02315	034670	89	
02316	135472	:3	
02317	037675	=?	
02320	040700	@A	
02321	141502	BC	
02322	142504	DE	
02323	043706	FG	
02324	144510	HI	
02325	045712	JK	
02326	046714	LM	
02327	147516	NO	
02330	150520	PQ	
02331	051722	RS	
02332	052724	TU	
02333	153526	VW	
02334	054730	XY	
02335	156532	Z]	
02336	116333	[
02337	057736	+-	
02340	037700	@?	
02341	037700	@?	
02342	037700	@?	
02343	037700	@?	
02344	000300	@!	

02345	040520	PMESS:	.TXTE IPA
02346	051523	SS	
02347	000000	!	

02350	000000	TABLE:	0
		.END	