

TM02/TU45

DATA TAPE CREATE
CZTUNA0

AH-E485A-MC

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MADE IN USA

.NLIST SEQ,LOC,BIN
.REM_

IDENTIFICATION

PRODUCT CODE: AC-E484A-MC
PRODUCT NAME: CZTUNAO TM02/TU45 DATA TAPE CREATE
DATE: 25 MAY 1978
MAINTAINER: COMPUTER SPECIAL SYSTEMS
AUTHOR: R. B. BARNES/R. J. COLLINS

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1. ABSTRACT

THIS IS NOT A TEST PROGRAM! IT IS A SUPPLEMENT TO BOTH THE TM11/TU10 AND TM02/TU45 DATA RELIABILITY PROGRAMS. ITS PURPOSE IS TO ALLOW THE OPERATOR TO CREATE A PAPER TAPE OF WHATEVER DATA PATTERN IS DESIRED, TO BE USED BY THE DATA RELIABILITY PROGRAMS, WHEN DATA PATTERN ZERO (0) IS SELECTED.

2. REQUIREMENTS

- A. ANY PDP-11 PROCESSOR
- B. TELETYPE OR LA30 KEYBOARD
- C. HIGH SPEED OR LOW SPEED PUNCH
- D. 1K OF CORE

3. LOADING PROCEDURE

USE STANDARD BINARY LOADING PROCEDURE

4. STARTING PROCEDURE

THE PROGRAM MAY BE STARTED AT EITHER 200 (8) OR 204 (8). WHEN STARTED AT 200 (8), OPERATING INSTRUCTIONS WILL BE PRINTED BEFORE STARTING INPUT. WHEN STARTED AT 204 (8), INPUT IS IMMEDIATELY STARTED. INPUT START IS NOTED BY AN ASTERISCK (*).

SAMPLE START AT 200: (LOAD 200, PRESS START)

EXTERNAL DATA TAPE CREATE PROGRAM
MAXIMUM OF 377 OCTAL CHARACTERS.
ENTER 3 DIGITS (0-7) FOR EACH CHARACTER.
CR WILL ECHO CR-LF.
CONTROL C ENDS INPUT AT LESS THAN 377.
A SINGLE CHARACTER CORRECTION MAY BE DONE
BY TYPING A SLASH AND RETYPING THE CHARACTER.

* (THE ASTERISCK INDICATES START OF INPUT)

SAMPLE START AT 204: (LOAD 204 PRESS START)

* (START INPUT)

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5. OPERATION:

WHEN THE ASTERISCK IS PRINTED AFTER THE START AT 200 OR 204, START INPUTTING CHARACTERS. EACH GROUP OF THREE (3) DIGITS (0-7) EQUALS ONE (1) CHARACTER ON TAPE. ENTER AS MANY 3 DIGIT GROUPS PER THE NUMBER OF CHARACTERS DESIRED IN THE PATTERN. THE PROGRAM WILL ACCEPT UP TO 256 CHARACTERS (377 OCTAL). IF LESS THAN 256 ARE DESIRED, TERMINATE INPUT BY TYPING A CONTROL C. A CARRIAGE RETURN (CR) MAY BE TYPED ANY TIME AND WILL ECHO A CR-LF BUT WILL NOT BE PLACED IN THE DATA PATTERN NOR COUNTED AS AN INPUT CHARACTER. ANY INPUT OTHER THAN AN OCTAL DIGIT (0-7), A CARRIAGE RETURN (CR), OR A CONTROL C WILL BE CONSIDERED ILLEGAL AND BE FLAGGED BY A QUESTION MARK (?). THE ILLEGAL ENTRY IS NEITHER PLACED IN THE DATA PATTERN NOR COUNTED AS A CHARACTER. WHEN INPUT IS COMPLETED (CONTROL C OR 256 CHARACTERS), THE PROGRAM TYPES END OF INPUT AND REQUESTS SELECTION OF HIGH SPEED OR LOW SPEED PUNCH FOR OUTPUT. A RESPONSE OF L TO THIS REQUEST WILL CAUSE OUTPUT ON THE TTY PUNCH, A RESPONSE OF H TO THIS REQUEST WILL OUTPUT ON THE HIGH SPEED PUNCH.

WHEN OUTPUT IS COMPLETE, THE PROGRAM WILL AGAIN REQUEST AN OUTPUT RESPONSE. IF EITHER H OR L IS TYPED, THE SAME DATA PATTERN IS AGAIN OUTPUT. THIS CAN BE REPEATED AS MANY TIMES AS DESIRED. IF NO MORE OUTPUT IS NEEDED, BUT A DIFFERENT PATTERN IS DESIRED, TYPE A CR TO RETURN TO START OF INPUT WHICH WILL BE INDICATED BY AN ASTERISCK (*). THE FIRST CHARACTER PUNCHED ON THE TAPE IS THE NUMBER OF CHARACTERS ON THAT TAPE AND IS NOT USED AS PART OF THE PATTERN BY THE EXERCISERS. THE DATA ON THE TAPE WILL APPEAR AS BYTES IN CORE WHEN USED BY THE EXERCISERS.

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6. EXAMPLES

THE FOLLOWING EXAMPLES SHOW THE TAPE LAYOUT RESULTING
FROM ITS INPUT AND THE RESULTANT CORE MAP IN THE EXERCISER,
(READ THE EXERCISER DOCUMENT TO SEE HOW TO USE THESE PATTERN TAPES)

EXAMPLE 1: LOAD AND START AT 204 (8)

*0001112223334449?377/6(CONTROL C)

END OF INPUT
ASSURE PUNCH IS ON
AND TYPE L FOR LOW SPEED
OR H FOR HIGH SPEED
OR CR FOR RESTART WITH NO PUNCH

L (OUTPUT IS NOW MADE ON TTY PUNCH)

OUTPUT TAPE BIT LAYOUT:

0000.110 (NUMBER OF CHARACTERS IN PATTERN IS 6)
0000.000
01001.001
10010.010 (THE DOT . REPRESENTS THE SPROCKET HOLE)
11011.011
00100.100
11111.110

EXERCISER CORE MAP:

WRITE BUFFER: 0100100100000000
+2: 1101101110010010 (6 CHARACTER = 3 WORDS)
+4: 111111011011011

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EXAMPLE 2: LOAD AND START 204 (8)

*377(CR)
500(CR)
8?G?3(CR)
334266(CONTROL C)

END OF INPUT
ASSURE PUNCH IS ON
AND TYPE L FOR LOW SPEED
OR H FOR HIGH SPEED
OR CR FOR RESTART WITH NO PUNCH

H(OUTPUT IS NOW MADE OF HIGH SPEED PUNCH)

OUTPUT TAPE BIT LAYOUT:

0000.101 (NUMBER OF CHARACTERS IS 5)
1111.111
0100.000
1101.011 (THE DOT REPRESENTS THE SPROCKET HOLE)
0010.110
1000.000

EXERCISER CORE MAP:

WRITE BUFFER: 0100000011111111
+2: 0001011011011011
+4: 0000000010000000

(5 CHARACTER = 2 WORDS + 1 BYTE)

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7. EXCEPTION

NOTE THAT THE FIRST DIGIT OF THE 3 DIGITS PER CHARACTER IS LEFT JUSTIFIED. BECAUSE THE TAPE IS ONLY EIGHT (8) BITS WIDE, THE MOST SIGNIFICANT BIT OF THE FIRST DIGIT INPUT FOR EACH CHARACTER IS LOST. SEE EXAMPLE ONE (1), THE FIFTH (5) CHARACTER INPUT IS 444, BUT THE TAPE OUTPUT SHOWS 00100100 BECAUSE THE MOST SIGNIFICANT BIT IS LOST. EXAMPLE 2, THE SECOND (2) CHARACTER INPUT, ALSO SHOWS THIS. REMEMBER, THE FIRST DIGIT INPUT FOR EACH CHARACTER WILL ONLY SHOW THE TWO (2) LEAST SIGNIFICANT BITS OF THAT DIGIT. THE OTHER EXCEPTION TO KEEP IN MIND, IS THAT IF INPUT IS TERMINATED AT SOME NUMBER OF DIGITS NOT DIVISABLE BY THREE (3), THE PARTIAL CHARACTER AT THE END OF THE FIELD WILL BE FILLED TO THE RIGHT WITH ZEROS (0). EXAMPLE 2, THE FIFTH (5) CHARACTER, HAS NOT BEEN COMPLETED BY INPUT BEFORE TERMINATION. SEE THE TAPE LAYOUT, CHARACTER 5 WHICH SHOWS THAT THE TWO (2) LEAST SIGNIFICANT DIGIT POSITIONS ARE FILLED WITH ZEROES (0) TO COMPLETE THE CHARACTER FOR OUTPUT.

8. EXERCISER USAGE

THE EXERCISERS WILL READ THE TAPE CREATED BY DTC AND FILL THEIR ENTIRE WRITE BUFFER WITH REPITIONS OF THE DATA TAPE SO THAT ANY SIZE RECORD CAN BE WRITTEN.

9. LISTING

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```
259          .LIST  SEQ,LOC,BIN
260          .TITLE DATA TAPE CREATE
261          :CZTUNAO
262          :R. BARNES/R. J. COLLINS
263          :25 MAY 1978
264
265          .ENABLE ABS
266
267          000000          R0=%0
268          000001          R1=%1
269          000002          R2=%2
270          000003          R3=%3
271          000004          R4=%4
272          000005          R5=%5
273          000006          SP=%6
274          000007          PC=%7
275
276          000000          .=0
277          000200          .REPT 200
278
279          .+2
280          HALT
281          .ENDR
282
283          000200 000167 000774          JMP      .=200          ;STARTING ADDRESS=200(8) FOR HELP
284
285          000204 000167 001012          JMP      .=204          ;STARTING ADDRESS FOR NO HELP
286
287
288          001000          .=1000
289          ;CONSTANTS*****
290
291          001000 177560          TKS:    177560          ;LOW SPEED PUNCH
292          001002 177562          TKB:    177562
293          001004 177564          TPS:    177564
294          001006 177566          TPB:    177566
295          001010 177554          PPS:    177554          ;HIGH SPEED PUNCH
296          001012 177556          PPB:    177556
297          001014 177776          PSW:    177776          ;PROGRAM STATUS WORD
298
299          ;BUFFERS*****
300
301          001016 000000          TIB:    0          ;INPUT BUFFER
302          001020 000000          TOB:    0          ;OUTPUT BUFFER
303
```

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304          001200          . =1200
305          ;PROGRAM START AND HOUSEKEEPING*****
306
307 001200 012777 000340 177606 START: MOV #340,@PSW ;SET TO PRIORITY LEVEL 7
308 001206 012706 000500          MOV #500,SP ;SET STACK TO 500
309 001212 012704 002176          MOV #MSG1,R4
310 001216 004767 000532          JSR PC,TTOUT ;TYPE HELP MESSAGE
311 001222 012777 000340 177564 ST1: MOV #340,@PSW
312 001230 012706 000500          MOV #500,SP
313 001234 005067 177560          CLR TOB
314 001240 005067 177552          CLR TIB ;CLEAR BUFFERS
315 001244 012700 000250          MOV #250,R0 ;SET SIZE IF DATA AREA
316 001250 012702 002754          MOV #DAM40,R2 ;SET START OF AREA TO CLEAR
317 001254 005022          ST2: CLR (R2)+ ;CLEAR DATA AREA
318 001256 005300          DEC R0 ;CLEAR R0 FOR USE AS CHARACTER COUNTER
319 001260 001375          BNE ST2 ;BR IF NOT DONE
320 001262 005001          CLR R1 ;CLEAR R1 FOR USE AS DIGIT POSITION POINTER
321 001264 012702 003017          MOV #DA+1,R2 ;SET START OF DATA AREA
322 001270 004767 000642          ST3: JSR PC,CRLF ;TYPE CR,LF AND *
323
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324                                     ;DATA READ FROM TTY*****
325
326 001274 004767 000552          READ: JSR    PC,TTIN      ;GO INPUT DATA
327 001300 122767 000215 1775    CMPB   #215,TIB
328 001306 001007                BNE    RD1          ;BR IF NOT CR
329 001310 012767 000212 177502  MOV    #212,TOB
330 001316 004767 000512          JSR    PC,TOG      ;DO LF
331 001322 000167 177746          JMP    READ        ;GET NEXT DATA
332 001326 122767 000203 177462  RD1:  CMPB   #203,TIB
333 001334 001004                BNE    RD2          ;BR IF NOT CONTROL C
334 001336 005700                TST    R0
335 001340 001753                BEQ    ST3         ;BR IF FIRST INPUT
336 001342 000167 000234          JMP    PUNCH       ;GO TO PUNCH ROUTINE
337 001346 122767 000257 177442  RD2:  CMPB   #257,TIB  ;SEE IF RUBOUT
338 001354 001002                BNE    RD2A        ;IF NOT: BR
339 001356 000167 000042          JMP    RUBOUT      ;ELSE RUBOUT LAST ENTRY
340 001362 122767 000260 177426  RD2A: CMPB   #260,TIB
341 001370 101407                BLOS   RD3         ;BR IF NOT TOO LOW
342 001372 012767 000277 177420  RD2B: MOV    #277,TOB
343 001400 004767 000430          JSR    PC,TOG      ;TYPE?
344 001404 000167 177664          JMP    READ
345 001410 122767 000267 177400  RD3:  CMPB   #267,TIB
346 001416 103031                BHIS   RD4         ;BR IF NOT TOO HIGH
347 001420 000167 177746          JMP    RD2B
348
```

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349                                     ;LAST ENTRY RUBOUT ROUTINE*****
350
351 001424 000240 RUBOUT: NOP
352 001426 022701 000001 CMP #1,R1 ;SEE WHERE LAST ENTRY WAS
353 001432 101006 BHI R80 ;IF POSITION 0: BR
354 001434 103414 BLO RB1 ;IF POSITION 1: BR
355 001436 142712 000300 BICB #300,(R2)
356 001442 005001 CLR R1 ;RESET POSITION POINTER
357 001444 000167 177624 JMP READ ;REENTER
358 001450 142742 000007 RB0: BICB #7,-(R2)
359 001454 005300 DEC R0 ;RESET CHAR POINTER
360 001456 012701 000002 MOV #2,R1 ;RESET POSITION POINTER
361 001462 000167 177606 JMP READ ;REENTER
362 001466 142712 000070 RB1: BICB #70,(R2)
363 001472 012701 000001 MOV #1,R1 ;RESET POSITION POINTER
364 001476 000167 177572 JMP READ ;REENTER
365
366                                     ;POSITION DIGITS TO FORM CHARACTER AND LOAD DATA AREA*****
367
368 001502 016703 177310 RD4: MOV TIB,R3
369 001506 142703 000370 BICB #370,R3 ;R3=STRIPPED DIGIT(0-7)
370 001512 022701 000001 CMP #1,R1 ;TEST POSITION POINTER
371 001516 101016 BHI RD6 ;DO POSITION 2
372 001520 103410 BLO RD5 ;DO POSITION 0
373 001522 000241 CLC
374 001524 106103 ROLB R3
375 001526 106103 ROLB R3 ;POSITION DIGIT 1
376 001530 106103 ROLB R3
377 001532 150312 BISB R3,(R2) ;LOAD DIGIT 1
378 001534 005201 INC R1 ;BUMP POINTER
379 001536 000167 000026 JMP RDEX ;CHECK FOR END
380 001542 150322 RD5: BISB R3,(R2)+ ;LOAD DIGIT 0
381 001544 005001 CLR R1 ;CLEAR POSITION POINTER
382 001546 005200 INC R0 ;BUMP CHARACTER COUNTER
383 001550 000167 000014 JMP RDEX ;LOAD DIGIT
384 001554 000303 RD6: SWAB R3
385 001556 000241 CLC
386 001560 006003 ROR R3 ;POSITION DIGIT 2
387 001562 006003 ROR R3
388 001564 150312 BISB R3,(R2) ;LOAD DIGIT 2 AND BUMP CHARACTER ADDRESS
389 001566 005201 INC R1 ;BUMP POINTER
390 001570 022700 000377 RDEX: CMP #377,R0
391 001574 001402 BEQ PUNCH ;BR IF FILLED DATA AREA
392 001576 000167 177472 JMP READ
393

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394                                     ;TAPE PUNCH ROUTINE*****
395
396 001602 110067 001210      PUNCH:  MOVB   RO,DA           ;LOAD DATA AREA SIZE
397 001606 062700 000100      ADD     #100,RO        ;EXPAND FOR LEADER/TRAILER
398 001612 012701 002754      MOV     #DAM40,R1     ;LOAD PUNCH START ADDRESS
399 001616 012704 002574      PG:    MOV     #MSG2,R4
400 001622 004767 000126      JSR    PC,TTOUT      ;TYPE PUNCH REQUEST(H OR L)
401 001626 004767 000220      P0:    JSR    PC,TTIN  ;GET RESPONSE
402 001632 122767 000314 177156  CMPB   #314,TIB
403 001640 001421              BEQ    P1             ;BR IF LS PUNCH
404 001642 122767 000310 177146  CMPB   #310,TIB
405 001650 001427              BEQ    P2             ;BR IF HS PUNCH
406 001652 122767 000215 177136  CMPB   #215,TIB     ;SEE IF CR
407 001660 001002              BNE    PE            ;IF NOT: BR
408 001662 000167 177334              JMP    ST1           ;ELSE RESTART
409 001666 012767 000277 177124  PE:    MOV     #277,TOB
410 001674 004767 000134      JSR    PC,TOG        ;TYPE?
411 001700 000167 177722      JMP    P0
412
413                                     ;PUNCH TAPE ON LOW SPEED*****
414
415 001704 112167 177110      P1:    MOVB   (R1)+,TOB
416 001710 004767 000120      JSR    PC,TOG        ;PUNCH CHARACTER
417 001714 005300              DEC    RO
418 001716 001372              BNE    P1            ;BR IF NOT DONE
419 001720 116700 001072      MOVB   DA,RO
420 001724 000167 177652      JMP    PUNCH        ;RESTART
421
422                                     ;PUNCH TAPE ON HIGH SPEED*****
423
424 001730 112167 177064      P2:    MOVB   (R1)+,TOB
425 001734 004767 000160      JSR    PC,THG        ;PUNCH CHARACTER
426 001740 005300              DEC    RO
427 001742 001372              BNE    P2            ;BR IF NOT DONE
428 001744 116700 001046      MOVB   DA,RO
429 001750 000167 177626      JMP    PUNCH
430

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431                                     ;TTY OUTPUT SUBROUTINE*****
432
433 001754 112467 177040      TTOUT:  MOVB   (R4)+,TOB
434 001760 122767 000043 177032    CMPB   #43,TOB
435 001766 001430                BEQ    TEX
436 001770 122767 000045 177022    CMPB   #45,TOB
437 001776 001403                BEQ    TCRLF
438 002000 004767 000030                JSR    PC,TOG
439 002004 000763                BR     TTOUT
440 002006 112767 000015 177004    TCRLF:  MOVB   #15,TOB
441 002014 004767 000014                JSR    PC,TOG
442 002020 112767 000012 176772    MOVB   #12,TOB
443 002026 004767 000002                JSR    PC,TOG
444 002032 000750                BR     TTOUT
445 002034 105777 176744      TOG:    TSTB   @TPS
446 002040 100375                BPL    TOG
447 002042 116777 176752 176736    MOVB   TOB,@TPB
448 002050 000207      TEX:    RTS     PC
449
450                                     ;TTY READ SUBROUTINE*****
451
452 002052 005077 176722      TTIN:   CLR     @TKS
453 002056 005077 176720                CLR    @TKB
454 002062 005067 176730                CLR    TIB
455 002066 105777 176706      TTIN1:  TSTB   @TKS
456 002072 100375                BPL    TTIN1
457 002074 017767 176702 176714    MOV    @TKB,TIB
458 002102 105777 176676      TTIN2:  TSTB   @TPS
459 002106 100375                BPL    TTIN2
460 002110 116777 176702 176670    MOVB   TIB,@TPB
461 002116 000207      RTS     PC
462
463                                     ;HIGH SPEED PUNCH SUBROUTINE*****
464
465 002120 105777 176664      THG:    TSTB   @PPS
466 002124 100375                BPL    THG
467 002126 116777 176666 176656    MOVB   TOB,@PPB
468 002134 000207      RTS     PC
469
470                                     ;CR, LF, * TYPE SUBROUTINE*****
471
472 002136 012767 000215 176654    CRLF:  MOV    #215,TOB
473 002144 004767 177664                JSR    PC,TOG
474 002150 012767 000212 176642    MOV    #212,TOB
475 002156 004767 177652                JSR    PC,TOG
476 002162 012767 000252 176630    MOV    #252,TOB
477 002170 004767 177640                JSR    PC,TOG
478 002174 000207      RTS     PC
479

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480						.EVEN
481						;MESSAGES*****
482						
483	002176	022445	054105	042524	MSG1:	.ASCII /%EXTERNAL DATA TAPE CREATE PROGRAM%/
484	002204	047122	046101	042040		
485	002212	052101	020101	040524		
486	002220	042520	041440	042522		
487	002226	052101	020105	051120		
488	002234	043517	040522	022515		
489	002242	040515	044530	052515		.ASCII /MAXIMUM OF 377 OCTAL CHARACTERS%/
490	002250	020115	043117	031440		
491	002256	033467	047440	052103		
492	002264	046101	041440	040510		
493	002272	040522	052103	051105		
494	002300	022523				
495	002302	047105	042524	020122		.ASCII /ENTER 3 DIGITS(0-7)FOR EACH CHARACTER%/
496	002310	020063	044504	044507		
497	002316	051524	030050	033455		
498	002324	043051	051117	042440		
499	002332	041501	020110	044103		
500	002340	051101	041501	042524		
501	002346	022522				
502	002350	051103	053440	046111		.ASCII /CR WILL ECHO CR-LF%/
503	002356	020114	041505	047510		
504	002364	041440	026522	043114		
505	002372	045				
506	002373	103	047117	051124		.ASCII /CONTROL C ENDS INPUT AT LESS THAN 377.%/
507	002400	046117	041440	042440		
508	002406	042116	020123	047111		
509	002414	052520	020124	052101		
510	002422	046040	051505	020123		
511	002430	044124	047101	031440		
512	002436	033467	022456			
513	002442	020101	044523	043516		.ASCII /A SINGLE CHARACTER CORRECTION MAY BE DONE%/
514	002450	042514	041440	040510		
515	002456	040522	052103	051105		
516	002464	041440	051117	042522		
517	002472	052103	047511	020116		
518	002500	040515	020131	042502		
519	002506	042040	047117	022505		
520	002514	054502	052040	050131		.ASCII /BY TYPING A SLASH AND RETYPING THE CHARACTER.%#/
521	002522	047111	020107	020101		
522	002530	046123	051501	020110		
523	002536	047101	020104	042522		
524	002544	054524	044520	043516		
525	002552	052040	042510	041440		
526	002560	040510	040522	052103		
527	002566	051105	022456	043		
528						
529		002574				.EVEN
530	002574	022445	047105	020104	MSG2:	.ASCII /%END OF INPUT%/
531	002602	043117	044440	050116		
532	002610	052125	045			
533	002613	101	051523	051125		.ASCII /ASSURE PUNCH IS ON%/
534	002620	020105	052520	041516		
535	002626	020110	051511	047440		

536	002634	022516			
537	002636	047101	020104	054524	.ASCII /AND TYPE L FOR LOW SPEED%/
538	002644	042520	046040	043040	
539	002652	051117	046040	053517	
540	002660	051440	042520	042105	
541	002666	045			
542	002667	117	020122	020110	.ASCII /OR H FOR HIGH SPEED%/
543	002674	047506	020122	044510	
544	002702	044107	051440	042520	
545	002710	042105	045		
546	002713	117	020122	051103	.ASCII /OR CR FOR RESTART WITH NO PUNCH%/
547	002720	043040	051117	051040	
548	002726	051505	040524	052122	
549	002734	053440	052111	020110	
550	002742	047516	050040	047125	
551	002750	044103	021445		
552					
553					.EVEN
554					;DATA AREA*****
555					
556	002754	000000			DAM40: 0
557		003016			. = .+40
558	003016	000000			DA: 0
559					
560					
561		000001			.END

CRLF	002136	PUNCH	001602	RD2B	001372	ST3	001270	TPS	001004
DA	003016	P0	001626	RD3	001410	TCRLF	002006	TTIN	002052
DAM40	002754	P1	001704	RD4	001502	TEX	002050	TTIN1	002066
MSG1	002176	P2	001730	RD5	001542	THG	002120	TTIN2	002102
MSG2	002574	RBO	001450	RD6	001554	TIB	001016	TTOUT	001754
PE	001666	RB1	001466	READ	001274	TKB	001002	.	= 003020
PG	001616	RDEX	001570	RUBOUT	001424	TKS	001000		
PPB	001012	RD1	001326	START	001200	TOB	001020		
PPS	001010	RD2	001346	ST1	001222	TOG	002034		
PSW	001014	RD2A	001362	ST2	001254	TPB	001006		

. ABS. 003020 000

ERRORS DETECTED: 0

,CZTUNA.SEQ/SOL,CZTUNA.P11
RUN-TIME: 25.2 SECONDS
RUN-TIME RATIO: 12/9=1.3
CORE USED: 5K (10 PAGES)