

IDENTIFICATION

PRODUCT CODE:	DEC-11-YPTB-D
PRODUCT NAME:	TC11 DECTAPE FORMATTER
DATE CREATED:	May 12, 1971
MAINTAINER:	PDP-11 DIAGNOSTICS
AUTHOR:	ROBERT J. COLLINS

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1.0 ABSTRACT

11TOG IS A PROGRAM FOR MAKING DECTAPES ON UNIT 0 WITH A STANDARD FORMAT OF 578(10) BLOCKS OF 256(10) WORDS EACH.

2.0 REQUIREMENTS

- A, MINIMUM CONFIGURATION PDP=11/20.
- B, PDP=11 DECTAPE CONTROL AND TRANSPORT(S).
- C, DECTAPE(S).

3.0 LOADING PROCEDURE

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4.0 PRELIMINARY OPERATIONS

- A, MOUNT A DECTAPE ON UNIT 0, WRAPPING ENOUGH TURNS TO INSURE TENSION.
- B, SET THE WRTM AND WALL SWITCHES TO ON (UP).

5.0 STARTING PROCEDURE

LOAD ADDRESS ~~766~~⁶⁰⁰⁰ AND PRESS START.

6.0 OPERATING PROCEDURE

- A, ONCE STARTED THE PROGRAM WRITES ALL MARKTRACK INFORMATION IN ONE FORWARD PASS AND THEN HALTS AT ADDRESS 766(8).
- B, (IF TAPE HAS RUN OFF THE REEL, REMOUNT IT) RESET THE WRTM SWITCH (DOWN) AND PRESS CONTINUE. THE TAPE WILL BACK OUT FOR THREE BLOCKS, THEN TURN AROUND AND WRITE THE COMPLEMENT OBVERSE OF LAST BLOCK NUMBER (1101) IN WRITEALL IN ALL DATA SLOTS UNTIL END ZONE IS SENSED; THE TAPE THEN REVERSES AND WRITES RELEVANT INFORMATION IN ALL BLOCKS DOWN THROUGH 0 IN WRITEALL.
- C, THE TAPE NOW REVERSES AND ALTERNATELY SEARCHES FOR EACH BLOCK NUMBER IN SEQUENCE THEN CHANGES TO READALL TO CHECK EACH BLOCK FOR CORRECT DATA (0).
- D, AFTER ALL BLOCKS HAVE BEEN VERIFIED FORWARD, THE TAPE IS REVERSED AGAIN AND ALTERNATELY SEARCHES FOR EACH BLOCK NUMBER IN REVERSE SEQUENCE THEN WRITES EACH BLOCK TO 0 IN WRITE DATA MODE. THIS ENSURES PARITY CONSERVATION IF THE TAPE IS TO BE READ BEFORE BEING REWRITTEN.
- E, THE PROGRAM THEN HALTS AT 1774(8). TO FORMAT ANOTHER TAPE, PERFORM THE OPERATIONS IN SECTION 4.0 THEN PRESS CONTINUE.

ERROR HALTS AND DESCRIPTION

ADDRESS -----	DESCRIPTION -----
EVERY FOURTH ADDRESS FROM 2 THROUGH 576(8),	TRAP ERROR, EXAMINE THE STACK TO LOCALIZE THE PROGRAM AREA OF THE ERROR.
ALL ERROR HALTS BELOW WILL STOP WITH THE RELEVANT INFORMATION IN THE LIGHT REGISTER.	
1440(8)	WRONG FORWARD BLOCK NUMBER, CONTINUE TO SEE CORRECT BLOCK NUMBER.
1446(8)	EXPECTED BLOCK NUMBER, CONTINUE TO TRY AGAIN.
1514(8)	BLOCK CONTAINING A DATA ERROR IN LIGHTS. CONTINUE TO SEE WHICH WORD.
1526(8)	NUMBER OF BAD WORD, 0=REVERSE CHECKSUM. CONTINUE TO SEE VALUE.
1534(8)	BAD DATA WORD (0=GOOD), CONTINUE TO TRY AGAIN.
1602(8)	BLOCK NUMBER FOUND AFTER LAST FORWARD BLOCK (1101), RESTART.
1672(8)	WRONG REVERSE BLOCK NUMBER, CONTINUE TO SEE CORRECT BLOCK NUMBER.
1700(8)	EXPECTED BLOCK NUMBER, CONTINUE TO TRY AGAIN.
1766(8)	BLOCK NUMBER FOUND AFTER LAST REVERSE BLOCK (0), RESTART.
2266(8)	DECTAPE STATUS ERROR, STATUS IS DISPLAYED. RESTART.

ITOG-11 V.02
 ITC11 DECTAPE FORMATTER
 IROBERT J. COLLINS
 IJUNE 27, 1970
 IMODIFIED MAY 12, 1971

I FORMAT DECTAPES ON UNIT 0 IN STANDARD FORMAT OF
 I 578(10) BLOCKS WITH 256(10) 18 BIT WORDS PER BLOCK.

000000
 000001
 000002
 000003
 000004
 000005
 000006
 000007
 000006
 000007
 000000
 177570
 177776
 000240
 000000
 000040
 000100
 000140
 000200
 000240
 000300
 000340
 000001
 000002
 000004
 000010
 000020
 000040
 000100
 000200

R0=X0
 R1=X1
 R2=X2
 R3=X3
 R4=X4
 R5=X5
 R6=X6
 R7=X7
 SP=R6
 PC=R7
 XX=HALT
 SR=177570
 PS=177776
 NOP=240
 P0=0
 P1=40
 P2=100
 P3=140
 P4=200
 P5=240
 P6=300
 P7=340
 B0=1
 B1=2
 B2=4
 B3=10
 B4=20
 B5=40
 B6=100
 B7=200

I REGISTER DEFINITIONS

I SWITCH REGISTER
 I PROCESSOR STATUS

I PI PRIORITY LEVELS

I BIT POSITION CONSTANTS

000400
001000
002000
004000
010000
020000
040000
100000
005726
022626
000015
000012
177560
177562
177564
177566
000060
000064

B8=400
B9=1000
B10=2000
B11=4000
B12=10000
B13=20000
B14=40000
B15=100000
POP=5726
POPPOP=22626
CR=15
LF=12
TKS=177560
TKB=177562
TPS=177564
TPB=177566
TKV=60
TPV=64

IPOP STACK ONCE,=TST(6)+
IPOP STACK TWICE,=CMP (6)+,(6)+
ICARRIAGE RETURN
ILINE FEED
IKEYBOARD STATUS
IKEYBOARD BUFFER
ITELEPRINTER STATUS
ITELEPRINTER BUFFER
IKEYBOARD VECTOR
ITELEPRINTER VECTOR

		,MACR	AND A,B	
		BIC	#-A-1,B	IMASK A APPLIED TO B
		.ENDM		
	000000	,=0		
	000140	,REPT	140	
		,+2		ITRAPPED TO PREVIOUS ADDRESS
		XX		
		.ENDR		
000000	000002	,+2		ITRAPPED TO PREVIOUS ADDRESS
000002	000000	XX		
000004	000006	,+2		ITRAPPED TO PREVIOUS ADDRESS
000006	000000	XX		
000010	000012	,+2		ITRAPPED TO PREVIOUS ADDRESS
000012	000000	XX		
000014	000016	,+2		ITRAPPED TO PREVIOUS ADDRESS
000016	000000	XX		
000020	000022	,+2		ITRAPPED TO PREVIOUS ADDRESS
000022	000000	XX		
000024	000026	,+2		ITRAPPED TO PREVIOUS ADDRESS
000026	000000	XX		
000030	000032	,+2		ITRAPPED TO PREVIOUS ADDRESS
000032	000000	XX		
000034	000036	,+2		ITRAPPED TO PREVIOUS ADDRESS
000036	000000	XX		
000040	000042	,+2		ITRAPPED TO PREVIOUS ADDRESS
000042	000000	XX		
000044	000046	,+2		ITRAPPED TO PREVIOUS ADDRESS
000046	000000	XX		
000050	000052	,+2		ITRAPPED TO PREVIOUS ADDRESS
000052	000000	XX		
000054	000056	,+2		ITRAPPED TO PREVIOUS ADDRESS
000056	000000	XX		
000060	000062	,+2		ITRAPPED TO PREVIOUS ADDRESS
000062	000000	XX		
000064	000066	,+2		ITRAPPED TO PREVIOUS ADDRESS
000066	000000	XX		
000070	000072	,+2		ITRAPPED TO PREVIOUS ADDRESS
000072	000000	XX		
000074	000076	,+2		ITRAPPED TO PREVIOUS ADDRESS
000076	000000	XX		
000100	000102	,+2		ITRAPPED TO PREVIOUS ADDRESS
000102	000000	XX		
000104	000106	,+2		ITRAPPED TO PREVIOUS ADDRESS
000106	000000	XX		
000110	000112	,+2		ITRAPPED TO PREVIOUS ADDRESS
000112	000000	XX		
000114	000116	,+2		ITRAPPED TO PREVIOUS ADDRESS
000116	000000	XX		
000120	000122	,+2		ITRAPPED TO PREVIOUS ADDRESS
000122	000000	XX		
000124	000126	,+2		ITRAPPED TO PREVIOUS ADDRESS
000126	000000	XX		

000130	000132	,+2	ITRAPPED TO PREVIOUS ADDRESS
000132	000000	XX	
000134	000136	,+2	ITRAPPED TO PREVIOUS ADDRESS
000136	000000	XX	
000140	000142	,+2	ITRAPPED TO PREVIOUS ADDRESS
000142	000000	XX	
000144	000146	,+2	ITRAPPED TO PREVIOUS ADDRESS
000146	000000	XX	
000150	000152	,+2	ITRAPPED TO PREVIOUS ADDRESS
000152	000000	XX	
000154	000156	,+2	ITRAPPED TO PREVIOUS ADDRESS
000156	000000	XX	
000160	000162	,+2	ITRAPPED TO PREVIOUS ADDRESS
000162	000000	XX	
000164	000166	,+2	ITRAPPED TO PREVIOUS ADDRESS
000166	000000	XX	
000170	000172	,+2	ITRAPPED TO PREVIOUS ADDRESS
000172	000000	XX	
000174	000176	,+2	ITRAPPED TO PREVIOUS ADDRESS
000176	000000	XX	
000200	000202	,+2	ITRAPPED TO PREVIOUS ADDRESS
000202	000000	XX	
000204	000206	,+2	ITRAPPED TO PREVIOUS ADDRESS
000206	000000	XX	
000210	000212	,+2	ITRAPPED TO PREVIOUS ADDRESS
000212	000000	XX	
000214	000216	,+2	ITRAPPED TO PREVIOUS ADDRESS
000216	000000	XX	
000220	000222	,+2	ITRAPPED TO PREVIOUS ADDRESS
000222	000000	XX	
000224	000226	,+2	ITRAPPED TO PREVIOUS ADDRESS
000226	000000	XX	
000230	000232	,+2	ITRAPPED TO PREVIOUS ADDRESS
000232	000000	XX	
000234	000236	,+2	ITRAPPED TO PREVIOUS ADDRESS
000236	000000	XX	
000240	000242	,+2	ITRAPPED TO PREVIOUS ADDRESS
000242	000000	XX	
000244	000246	,+2	ITRAPPED TO PREVIOUS ADDRESS
000246	000000	XX	
000250	000252	,+2	ITRAPPED TO PREVIOUS ADDRESS
000252	000000	XX	
000254	000256	,+2	ITRAPPED TO PREVIOUS ADDRESS
000256	000000	XX	
000260	000262	,+2	ITRAPPED TO PREVIOUS ADDRESS
000262	000000	XX	
000264	000266	,+2	ITRAPPED TO PREVIOUS ADDRESS
000266	000000	XX	
000270	000272	,+2	ITRAPPED TO PREVIOUS ADDRESS
000272	000000	XX	
000274	000276	,+2	ITRAPPED TO PREVIOUS ADDRESS
000276	000000	XX	
000300	000302	,+2	ITRAPPED TO PREVIOUS ADDRESS
000302	000000	XX	
000304	000306	,+2	ITRAPPED TO PREVIOUS ADDRESS

000306	000000	XX	
000310	000312	,+2	ITRAPPED TO PREVIOUS ADDRESS
000312	000000	XX	
000314	000316	,+2	ITRAPPED TO PREVIOUS ADDRESS
000316	000000	XX	
000320	000322	,+2	ITRAPPED TO PREVIOUS ADDRESS
000322	000000	XX	
000324	000326	,+2	ITRAPPED TO PREVIOUS ADDRESS
000326	000000	XX	
000330	000332	,+2	ITRAPPED TO PREVIOUS ADDRESS
000332	000000	XX	
000334	000336	,+2	ITRAPPED TO PREVIOUS ADDRESS
000336	000000	XX	
000340	000342	,+2	ITRAPPED TO PREVIOUS ADDRESS
000342	000000	XX	
000344	000346	,+2	ITRAPPED TO PREVIOUS ADDRESS
000346	000000	XX	
000350	000352	,+2	ITRAPPED TO PREVIOUS ADDRESS
000352	000000	XX	
000354	000356	,+2	ITRAPPED TO PREVIOUS ADDRESS
000356	000000	XX	
000360	000362	,+2	ITRAPPED TO PREVIOUS ADDRESS
000362	000000	XX	
000364	000366	,+2	ITRAPPED TO PREVIOUS ADDRESS
000366	000000	XX	
000370	000372	,+2	ITRAPPED TO PREVIOUS ADDRESS
000372	000000	XX	
000374	000376	,+2	ITRAPPED TO PREVIOUS ADDRESS
000376	000000	XX	
000400	000402	,+2	ITRAPPED TO PREVIOUS ADDRESS
000402	000000	XX	
000404	000406	,+2	ITRAPPED TO PREVIOUS ADDRESS
000406	000000	XX	
000410	000412	,+2	ITRAPPED TO PREVIOUS ADDRESS
000412	000000	XX	
000414	000416	,+2	ITRAPPED TO PREVIOUS ADDRESS
000416	000000	XX	
000420	000422	,+2	ITRAPPED TO PREVIOUS ADDRESS
000422	000000	XX	
000424	000426	,+2	ITRAPPED TO PREVIOUS ADDRESS
000426	000000	XX	
000430	000432	,+2	ITRAPPED TO PREVIOUS ADDRESS
000432	000000	XX	
000434	000436	,+2	ITRAPPED TO PREVIOUS ADDRESS
000436	000000	XX	
000440	000442	,+2	ITRAPPED TO PREVIOUS ADDRESS
000442	000000	XX	
000444	000446	,+2	ITRAPPED TO PREVIOUS ADDRESS
000446	000000	XX	
000450	000452	,+2	ITRAPPED TO PREVIOUS ADDRESS
000452	000000	XX	
000454	000456	,+2	ITRAPPED TO PREVIOUS ADDRESS
000456	000000	XX	
000460	000462	,+2	ITRAPPED TO PREVIOUS ADDRESS
000462	000000	XX	


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000464 000466 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000466 000000 XX
000470 000472 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000472 000000 XX
000474 000476 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000476 000000 XX
000500 000502 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000502 000000 XX
000504 000506 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000506 000000 XX
000510 000512 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000512 000000 XX
000514 000516 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000516 000000 XX
000520 000522 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000522 000000 XX
000524 000526 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000526 000000 XX
000530 000532 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000532 000000 XX
000534 000536 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000536 000000 XX
000540 000542 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000542 000000 XX
000544 000546 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000546 000000 XX
000550 000552 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000552 000000 XX
000554 000556 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000556 000000 XX
000560 000562 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000562 000000 XX
000564 000566 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000566 000000 XX
000570 000572 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000572 000000 XX
000574 000576 ,+2 iTRAPPED TO PREVIOUS ADDRESS
000576 000000 XX

```

000600 ,=600

```

000600 000005 START: RESET iCLEAR THE WORLD
000602 012706 000600 MOV #START,SP iINITIALIZE THE STACK POINTER
000606 012767 000340 177162 MOV #P7,PS iLOCKOUT PI BY RAISING CPU PRIORITY
000614 012700 101101 MOV #101101,R0 iREVERSE END ZONE=55
000620 012704 170000 MOV #-4096,,R4 iCOUNTER FOR REZ
000624 012777 000013 002470 MOV #13,@TCCM iGO
000632 004767 001410 LP1: JSR PC,FLAG iWAIT FOR READY OR ERROR
000636 012077 002464 MOV R0,@TCDT iLOAD MARK TRACK
000642 005204 INC R4 iDONE ALL?
000644 001372 BNE LP1 iLOOP IF NOT FINISHED
000646 012704 177471 MOV #-199,,R4 iCOUNTER FOR IBS

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000652 012700 010101
000656 004767 001364
000662 010077 002440
000666 005204
000670 001372
000672 012703 176676
000676 004767 000072
000702 005203
000704 001374
000706 012704 177471
000712 012700 010101
000716 004767 001324
000722 010077 002400
000726 005204
000730 001372
000732 012704 170000

MOV #10101,R0
LP2: JSR PC,FLAG
MOV R0,@TCDT
INC R4
BNE LP2
MOV #-578,,R3
LP3: JSR PC,FRMBLK
INC R3
BNE LP3
MOV #-199,,R4
MOV #10101,R0
LP4: JSR PC,FLAG
MOV R0,@TCDT
INC R4
BNE LP4
MOV #-4096,,R4

;INTERBLOCK SYNC=25
;WAIT FOR FLAG
;LOAD MARK CODE
;DONE ALL?
;IF NOT, KEEP LOADING
;COUNTER FOR NUMBER OF BLOCKS
;WRITE CODES FOR ONE BLOCK
;DONE ALL?
;IF NOT, WRITE ANOTHER BLOCK
;COUNTER FOR IBS
;INTERBLOCK SYNC=25
;WAIT FOR FLAG
;LOAD MARK CODE
;DONE ALL?
;IF NOT, KEEP WRITING IBS
;COUNTER FOR FEZ

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000736 012700 010010
000742 004767 001300
000746 010077 002354
000752 005204
000754 001372
000756 004767 001264
000762 005077 002334
000766 000000
000770 000167 000032

MOV #10010,R0
LP5: JSR PC,FLAG
MOV R0,@TCDT
INC R4
BNE LP5
JSR PC,FLAG
CLR @TCCM
HLT1: XX
JMP WRTBNO

IFORWARD END ZONE=22
IWAIT FOR FLAG
ILOAD MARK CODE
IDONE ALL?
IIF NOT KEEP WRITING FEZ
IWAIT FOR LAST FLAG
ISTOP TAPE, MARK + TIMING TRACKS ARE
IWRITTEN. RESET WRIM SWITCH AND
ISET WAL. SWITCH THEN CONTINUE.

000774	012704	177366		FRMBLK:	MOV	#=266,,R4	I	COUNTER FOR 1 BLOCK'S WORTH OF MKTRACK
001000	012700	002272			MOV	#BLKMRK,R0	I	POINTER TO MARK CODE TABLE
001004	004767	001236		LP6:	JSR	PC,FLAG	I	WAIT FOR FLAG
001010	011077	002312			MOV	(R0),@TCDT	I	FETCH MARK CODE
001014	062700	000002			ADD	#2,R0	I	ADVANCE POINTER
001020	005204				INC	R4	I	DONE ALL?
001022	001370				BNE	LP6	I	IF NOT FETCH ANOTHER CODE
001024	000207				RTS	PC	I	IF SO, EXIT
001026	004767	001004		WRTBNO:	JSR	PC,COBLKG	I	GENERATE TABLE OF CMPOBV BLK NUMBERS
001032	012700	177775			MOV	#=3,R0	I	THREE BLOCKS
001036	012777	004002	002256		MOV	#4002,@TCCM	I	SEARCH REVERSE
001044	105277	002252		WLP1:	INCB	@TCCM	I	GO
001050	004767	001172			JSR	PC,FLAG	I	WAIT FOR BLOCK NUMBER
001054	005200				INC	R0	I	FOUND THREE?
001056	001372				BNE	WLP1	I	IF NOT KEEP SEARCHING
001060	012700	076677			MOV	#76677,R0	I	COMPLEMENT OBLVERSE OF 1011 (LAST BLOCK#)
001064	012777	000017	002230		MOV	#17,@TCCM	I	WRITE ALL FORWARD
001072	004767	001150			JSR	PC,FLAG	I	WAIT TO SYNC UP FOR WRITING
001076	152777	000003	002220	WLP2:	BISB	#3,@TCST	I	SET XDA BITS FOR 0 REVERSE
001104	010077	002216			MOV	R0,@TCDT	I	WRITE LAST BLOCK # FROM HERE TO END ZONE
001110	004767	000666			JSR	PC,FLAG1	I	SKIP NEXT INSTRUCTION IF END ZONE IS SENSED
001114	000770				BR	WLP2	I	KEEP WRITING 1011
001116	012767	001101	001104		MOV	#1101,FBLK	I	INITIALIZE PARAMETERS FOR LAST BLOCK,
001124	012705	002236			MOV	#BYST,R5	I	XDA BIT TABLE AND
001130	012703	003334			MOV	#RBN,R3	I	TABLE OF REVERSE BLOCK NUMBERS
001134	012777	004017	002160		MOV	#4017,@TCCM	I	WRITE ALL REVERSE
001142	005367	001062		WALUP:	DEC	FBLK	I	DECREMENT BLOCK NUMBER
001146	022767	177776	001054		CMP	#=2,FBLK	I	LAST BLOCK WRITTEN?
001154	001500				BEQ	CHECK	I	YES- CHECK DATA AND BLOCK NUMBERS
001156	012704	177777			MOV	#=1,R4	I	I-1 REVERSE =0 FWD
001162	012767	177374	002130		MOV	#=260,,TOG1	I	NUMBER OF WORDS
001170	004767	001052		WLP3:	JSR	PC,FLAG	I	WAIT FOR SYNC FLAG TO WRITE
001174	152777	000003	002122		BISB	#3,@TCST	I	I1 KBV=0 FWD
001202	010477	002120			MOV	R4,@TCDT	I	LOAD DATA WORD
001206	005267	002106			INC	TOG1	I	WRITE IT 260 TIMES
001212	001366				BNE	WLP3	I	KEEP WRITING UNTIL FINISHED
001214	004767	001026			JSR	PC,FLAG	I	WAIT FOR FLAG BEFORE WRITING FWD BLK#
001220	112577	002100			MOV	(R5)+,@TCST	I	FETCH RELEVANT XDA BITS
001224	011377	002076			MOV	(R3),@TCDT	I	FETCH RELEVANT CMP,OBV,BLK#
001230	062703	000002			ADD	#2,R3	I	ADVANCE TABLE POINTER
001234	020527	002246			CMP	R5,#BYST+10	I	SEE IF XDA BIT TABLE IS EXHAUSTED
001240	001002				BNE	,+6	I	IF NOT, PROCEED
001242	012705	002236			MOV	#BYST,R5	I	IF SO, REINITIALIZE POINTER
001246	012704	002224			MOV	#WALBF,R4	I	SETUP POINTER FOR LAST FIVE WORDS
001252	012767	177776	002040		MOV	#=2,TOG1	I	COUNT OF TWO
001260	004767	000762		WLP4:	JSR	PC,FLAG	I	WAIT FOR REQUEST FLAG
001264	152777	000003	002032		BISB	#3,@TCST	I	SET XDA 17 & 16
001272	012477	002030			MOV	(R4)+,@TCDT	I	FETCH DATA WORD
001276	005267	002016			INC	TOG1	I	ADVANCE COUNT
001302	001366				BNE	WLP4	I	KEEP WRITING UNTIL FINISHED
001304	004767	000736			JSR	PC,FLAG	I	WAIT
001310	142777	000003	002006		BICB	#3,@TCST	I	CLEAR XDA 17 AND 16 FOR REVERSE BLK

001316	012477	002004			MOV	(R4)+,@TCDT	I REVERSE BLOCK NUMBER
001322	012767	177776	001770		MOV	#=2,TOG1	I COUNT OF TWO
001330	004767	000712		WLP5:	JSR	PC,FLAG	I WAIT FOR FLAG
001334	152777	000003	001762		BISB	#3,@TCST	I SET XDA 17 AND 16
001342	012477	001760			MOV	(R4)+,@TCDT	I FETCH DATA WORD
001346	005267	001746			INC	TOG1	I ADVANCE COUNT
001352	001366				BNE	WLP5	I KEEP WRITING UNTIL FINISHED
001354	000672				BR	WALUP	I FINISHED = DO NEXT BLOCK
001356	004767	000664		CHECK1:	JSR	PC,FLAG	I TAPE IS FORMATTED, CHECK DATA
001362	112777	000003	001732		MOVB	#3,@TCCM	I REWIND INTO END ZONE
001370	004767	000406		CHKL1:	JSR	PC,FLAG1	I SKIP NEXT INSTRUCTION IF EZ
001374	000772				BR	CHECK+4	I KEEP REWINDING
001376	005077	001720			CLR	@TCCM	I STOP TAPE
001402	005067	001710			CLR	TOG2	I START WITH BLOCK#0
001406	112777	000003	001706	CHKL2:	MOVB	#3,@TCCM	I SEARCH FWD
001414	004767	000626			JSR	PC,FLAG	I WAIT FOR FLAG
001420	026777	001672	001700		CMP	TOG2,@TCDT	I IS FWD BLOCK NUMBER CORRECT?
001426	001413				BEQ	DATCHK	I YES = CHECK DATA
001430	017700	001672			MOV	@TCDT,R0	I NO = PUT INCORRECT BLK# IN R0 FOR DISPLAY
001434	005077	001662			CLR	@TCCM	I STOP TAPE AND
001440	000000			EHLT2:	XX		I HALT WITH BAD FWD BLK IN LIGHTS, CONTINUE
001442	016700	001650			MOV	TOG2,R0	I TO FIND CORRECT BLOCK#
001446	000000			EHLT3:	XX		I HALT WITH CORRECT FWD BLK# IN LIGHTS
001450	012777	004003	001644		MOV	#4003,@TCCM	I TRY AGAIN
001456	012767	177377	001634	DATCHK:	MOV	#=257,TOG1	I CHECK REV, CHKSUM AND DATA
001464	112777	000007	001630		MOVB	#7,@TCCM	I READ ALL
001472	004767	000550		DCHKL1:	JSR	PC,FLAG	I WAIT FOR WORD
001476	005777	001624			TST	@TCDT	I IT SHOULD=0
001502	001421				BEQ	DATOK	I IF SO PROCEED
001504	005077	001612			CLR	@TCCM	I IF NOT STOP TAPE,
001510	016700	001602			MOV	TOG2,R0	I FETCH BLK# AND
001514	000000			EHLT4:	XX		I HALT WITH BLK# IN LIGHTS, CONTINUE

001516	012700	000401		MOV	#257,,R0	ITO FIND DATA WORD POSITION.
001522	066700	001572		ADD	TOG1,R0	IDETERMINE WHICH WORD IS WRONG
001526	000000		EHLT5:	XX		IHALT WITH #OF WORD IN LIGHTS, 0=REV, CHKSUM
001530	017700	001572		MOV	@TCDT,R0	ICONTINUE TO FETCH BAD WORD
001534	000000		EHLT6:	XX		IHALT WITH BAD DATA IN LIGHTS, CONTINUE
001536	012777	004003	001556	MOV	\$4003,@TCCM	ITO TRY AGAIN
001544	000711			BR	CHKL1	IRESTART CHECK
001546	005267	001546	DATOK:	INC	TOG1	ICHECK ALL DATA IN BLOCK
001552	001347			BNE	DCHKL1	KEEP CHECKING UNTIL DONE
001554	005267	001536		INC	TOG2	ISSETUP FOR NEXT BLOCK
001560	022767	001102	001530	CMP	#1102,TOG2	IHAVE ALL BLOCKS BEEN CHECKED?
001566	001307			BNE	CHKL2	IF NOT KEEP CHECKING
001570	112777	000003	001524	RCHK:	MOV#	YES = FIND FWD EZ
001576	004767	000200		JSR	PC,FLAG1	ISKIP ON EZ
001602	000000		EHLT7:	XX		I1101 SHOULD BE LAST BLOCK#, RESTART
001604	012767	001101	001504	MOV	#1101,TOG2	IFIRST REVERSE BLK=1101
001612	012777	004000	001502	RRCV:	MOV	ISSET TAPE TO REVERSE
001620	012700	005540		MOV	#DATBUF,R0	INITIALIZE DATA BUFFER POINTER
001624	005010		ZLUP:	CLR	(R0)	IZERO DATA WORD
001626	062700	000002		ADD	#2,R0	IADVANCE POINTER
001632	020027	006540		CMP	R0,#DATBUF+512	IS BUFFER FILLED?
001636	001372			BNE	ZLUP	IF NOT KEEP CLEARING
001640	112777	000003	001454	CHKL3:	MOV#	SEARCH REVERSE AND
001646	004767	000374		JSR	PC,FLAG	WAIT FOR FLAG
001652	026777	001440	001446	CMP	TOG2,@TCDT	IS REVERSE BLOCK# CORRECT?
001660	001417			BEQ	WRDTA	YES = WRITE DATA
001662	017700	001440		MOV	@TCDT,R0	INO = PUT INCORRECT BLK# IN R0 FOR DISPLAY
001666	005077	001430		CLR	@TCCM	ISTOP TAPE AND
001672	000000		EHLT10:	XX		IHALT WITH BAD REV, BLK# IN LIGHTS, CONTINUE
001674	016700	001416		MOV	TOG2,R0	ITO FIND CORRECT BLK#
001700	000000		EHLT11:	XX		IHALT WITH CORRECT REV, BLK# IN LIGHTS, CONTINUE
001702	112777	000003	001412	MOV#	#3,@TCCM	ITO TRY PASS AGAIN
001710	004767	000066		JSR	PC,FLAG1	IFIND FWD EZ AND
001714	000772			BR	EHLT11+2	IRESTART REVERSE
001716	000735			BR	RRCV	ICHECK PASS
001720	012777	177400	001404	WRDTA:	MOV	INC FOR 1 BLOCK OF DATA
001726	012777	005540	001374	MOV	#DATBUF,@TCBA	ICA INITIALIZATION
001734	112777	000015	001360	MOV#	#15,@TCCM	IWRITE DATA TO MAKE PARITY OK
001742	004767	000300		JSR	PC,FLAG	IWAIT FOR COMPLETION OR ERROR
001746	005367	001344		DEC	TOG2	IDECREMENT BLOCK#
001752	100332			BPL	CHKL3	IF BELOW 0 FINISH VP, OTHERWISE KEEP CHECKING
001754	112777	000003	001340	FINIS:	MOV#	IFIND REVERSE EZ
001762	004767	000014		JSR	PC,FLAG1	ISKIP ON EZ
001766	000000			XX		IO SHOULD HAVE BEEN LAST BLOCK# IN REVERSE
001770	005077	001326		CLR	@TCCM	ISTOP TAPE AND
001774	000000			XX		IHALT, PROGRAM IS FINISHED, MOUNT NEW
001776	000167	176576		JMP	START	ITAPE, SET WRTM SWITCH AND CONTINUE
002002	032777	100200	001312	FLAG1:	BIT	ITEST ERROR AND READY BITS
002010	001774			BEQ	FLAG1	IWAIT FOR EITHER FLAG
002012	100401			BMI	,+4	IF ERROR = CHECK FURTHER
002014	000207			RTS	PC	IF READY = EXIT
002016	005777	001302		TST	@TCST	IS ERROR END ZONE?
002022	100402			BMI	,+6	YES = SKIP
002024	000167	000216		JMP	FLAG	INO = GO TO REGULAR STATUS ERROR

002030	062716	000002		ADD	#2,(SP)	IINCREMENT EXIT POINTER TO SKIP ON RETURN
002034	000207			RTS	PC	IEXIT
002036	012700	001101	COBLKG:	MOV	#1101,R0	I COMPLEMENT OBVERSE BLOCKS 1101-0
002042	012701	003334		MOV	#RBN,R1	I BUFFER POINTER INITIALIZATION
002046	010002		CBKL1:	MOV	R0,R2	I FETCH WORD TO BE PROCESSED
002050	005102			COM	R2	I COMPLEMENT IT
002052	012767	177775 001240		MOV	#=3,TOG1	I COUNT OF 3
002060	010203			MOV	R2,R3	I MOV WORD INTO WORK AREA
002062	006002			ROR	R2	I SHIFT NEXT 3 BITS INTO POSITION
002064	006002			ROR	R2	I FOR MANIPULATION
002066	006002			ROR	R2	I ON NEXT PASS
				AND	1,R3	
002070	042703	177776		BIC	#=1=1,R3	I MASK 1 APPLIED TO R3
002074	010346			MOV	R3,=(SP)	I STACK IT
002076	010203		CBKL2:	MOV	R2,R3	I MOVE BYTE(3) INTO WORK AREA
002100	006002			ROR	R2	I SHIFT
002102	006002			ROR	R2	I NEXT 3 BITS
002104	006002			ROR	R2	I INTO POSITION
				AND	7,R3	
002106	042703	177770		BIC	#=7=1,R3	I MASK 7 APPLIED TO R3
002112	010346			MOV	R3,=(SP)	I STACK BYTE
002114	005267	001200		INC	TOG1	I DONE ALL?
002120	001366			BNE	CBKL2	I NO
002122	005003			CLR	R3	I YES = CLEAR WORK AREA
002124	066603	000006		ADD	6(SP),R3	I ADD AND
002130	004567	000056		JSR	R5,RTHL	I SHIFT BYTES IN REVERSE ORDER

002134	066603	000004		ADD	4(SP),R3	INEXT BYTE
002140	004567	000046		JSR	R5,RTHL	ISHIFT
002144	066603	000002		ADD	2(SP),R3	INEXT BYTE
002150	004567	000036		JSR	R5,RTHL	ISHIFT
002154	061603			ADD	(SP),R3	LAST BYTE FROM STACK
002156	004567	000030		JSR	R5,RTHL	ISHIFT
002162	004567	000024		JSR	R5,RTHL	ISHIFT
002166	062703	000077		ADD	#77,R3	I=00 FWD
002172	010311			MOV	R3,(R1)	ISTORE CMP,ORV,BLK# IN TABLE
002174	062706	000010		ADD	#10,SP	IADVANCE STACK
002200	062701	000002		ADD	#2,R1	IADVANCE TABLE POINTER
002204	005300			DEC	R0	IDECREMENT BLK#
002206	100317			BPL	CBKL1	ILOOP UNTIL IT PASSES 0
002210	000207			RTS	PC	ITHEN EXIT
002212	000241		RTHL1	CLC		ITHREE BIT LEFT SHIFT, CLEAR CARRY
002214	006103			ROL	R3	ISHIFT 1
002216	006103			ROL	R3	I 2
002220	006103			ROL	R3	I 3
002222	000205			RTS	R5	ITHEN EXIT
002224	177777		WALBF1	,WORD	-1	I-I REVERSE =0 FORWARD
002226	177777			,WORD	-1	
002230	001101		FBLK1	,WORD	1101	IBLOCK NUMBER GOES HERE
002232	177777			,WORD	-1	
002234	177777			,WORD	-1	
002236	003		BYST1	,BYTE	3	ITABLE OF XDA 17 & 16 FOR CMP,OBV,BLK#
002237	003			,BYTE	3	
002240	000			,BYTE	0	
002241	000			,BYTE	0	
002242	001			,BYTE	1	
002243	001			,BYTE	1	
002244	002			,BYTE	2	
002245	002			,BYTE	2	
002246	032777	100200	001046	FLAG1	BIT	#B15+B7,@TCOM
002254	001774			BEQ	FLAG	ITEST ERROR AND READY BITS
002256	100401			BMI	,+4	IKEEP CHECKING IF BOTH DOWN
002260	000207			RTS	PC	ISKIP TO ERROR IF B15=1
002262	017700	001036		MOV	@TCST,R0	IEXIT ON READY FLAG
002266	000000		EHLT1:	XX		IMOVE STATUS TO R0 FOR DISPLAY
						ISTATUS ERROR HALT, STATUS IS IN REGISTER

002270	000776		BR	EHLT1	ILIGHTS FIX PROBLEM AND RESTART PROGRAM
002272	010101	BLKMRK:	.WORD	010101	IINTERBLOCK SYNC=25
002274	010110		.WORD	010110	I FORWARD BLOCK MARK=26
002276	011010		.WORD	011010	I REVERSE GUARD=32
002300	001000		.WORD	001000	I LOCK=10
002302	001000		.WORD	001000	I REVERSE PARITY=10
002304	001000		.WORD	001000	I REVERSE FINAL=10
002306	001000		.WORD	001000	I REVERSE PRE=FINAL=10
	000374		.REPT	374	
			.WORD	111000	IMARK DATA=70
			.ENDR		
002310	111000		.WORD	111000	IMARK DATA=70
002312	111000		.WORD	111000	IMARK DATA=70
002314	111000		.WORD	111000	IMARK DATA=70
002316	111000		.WORD	111000	IMARK DATA=70
002320	111000		.WORD	111000	IMARK DATA=70
002322	111000		.WORD	111000	IMARK DATA=70
002324	111000		.WORD	111000	IMARK DATA=70
002326	111000		.WORD	111000	IMARK DATA=70
002330	111000		.WORD	111000	IMARK DATA=70
002332	111000		.WORD	111000	IMARK DATA=70
002334	111000		.WORD	111000	IMARK DATA=70
002336	111000		.WORD	111000	IMARK DATA=70
002340	111000		.WORD	111000	IMARK DATA=70
002342	111000		.WORD	111000	IMARK DATA=70
002344	111000		.WORD	111000	IMARK DATA=70
002346	111000		.WORD	111000	IMARK DATA=70
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002354	111000		.WORD	111000	IMARK DATA=70
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002426	111000		.WORD	111000	IMARK DATA=70
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002432	111000		.WORD	111000	IMARK DATA=70
002434	111000		.WORD	111000	IMARK DATA=70

002436	111000	,WORD	111000	MARK DATA=70
002440	111000	,WORD	111000	MARK DATA=70
002442	111000	,WORD	111000	MARK DATA=70
002444	111000	,WORD	111000	MARK DATA=70
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003272	111000	,WORD	111000	IMARK	DATA=70
003274	111000	,WORD	111000	IMARK	DATA=70
003276	111000	,WORD	111000	IMARK	DATA=70
003300	111011	,WORD	111011	IPRE-FINAL=73	
003302	111011	,WORD	111011	IFINAL=73	
003304	111011	,WORD	111011	IPARITY=73	
003306	111011	,WORD	111011	IREVERSE LOCK=73	
003310	101001	,WORD	101001	IGUARD=51	
003312	100101	,WORD	100101	IREVERSE BLOCK MARK=45	
003314	010101	,WORD	010101	IINTERBLOCK SYNC=25	

003316	000000	TOG2:	XX
003320	000000	TOG1:	XX
003322	177342	TCCM:	177342

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003324 177340
003326 177350
003330 177346
003332 177344

TCST: 177340
TCDT: 177350
TCBA: 177346
TCWC: 177344

005540

RBN: ., +2204

006540
000001

DATBUF: ., +1000
.END

!THAT'S ALL FOLKS!

B0	000001	NOP	000240
B1	000002	P0	000000
B10	002000	P1	000040
B11	004000	P2	000100
B12	010000	P3	000140
B13	020000	P4	000200
B14	040000	P5	000240
B15	100000	P6	000300
B2	000004	P7	000340
B3	000010	PC	000007R
B4	000020	POP	005726
B5	000040	POPPOP	022626
B6	000100	PS	177776
B7	000200	R0	000000R
B8	000400	R1	000001R
B9	001000	R2	000002R
BKMRK	002272	R3	000003R
BYST	002236	R4	000004R
CBKL1	002046	R5	000005R
CBKL2	002076	R6	000006R
CHECK	001356	R7	000007R
CHKL1	001370	RBN	003334
CHKL2	001406	RCHK	001570
CHKL3	001640	RENOV	001612
COBLK6	002036	RTHL	002212
CR	000015	SP	000006R
DATBUF	005540	SR	177570
DATCHK	001456	START	000600
DAYOK	001540	TCBA	003370
DCHKL1	001472	TCCH	003322
ENLY1	002266	TCDT	003326
ENLY10	001672	TCST	003324
ENLY11	001700	TCWC	003302
ENLY2	001440	TKB	177502
ENLY3	001446	TKS	177560
ENLY4	001514	TKV	000000
ENLY5	001520	TOG1	003320
ENLY6	001534	TOG2	003316
ENLY7	001602	TPB	177566
FBLK	002230	TPS	177564
FINIS	001754	TPV	000064
FLAG	002246	WALBF	002224
FLAG1	002002	WALUP	001142
FRMBLK	000774	WLP1	001044
HLT1	000766	WLP2	001076
LF	000012	WLP3	001170
LP1	000632	WLP4	001260
LP2	000656	WLP5	001330
LP3	000676	WRTBNO	001026
LP4	000716	WRTDTA	001720
LP5	000742	XX	000000
LP6	001004	ZLUP	001624

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ERRORS DETECTED: 0

RUN-TIME: 7 SECONDS

4K CORE USED