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1 REM *****
2 REM >> TRAK/POSN << - STI-13-T COPYRIGHT (C) 1979 SAT TRAK
3 REM BY WILIAM N BARKER AND DAVID G COOKE
4 REM - ALL RIGHTS RESERVED MOD 10 FEB 80
5 REM *****
10 CLEAR 4000
20 CLS:PRINT CHR$(23):PRINT@280,"SATELLITE TRAK/POSN"
25 PRINT@344,"COPYRIGHT (C) 1980"
30 PRINT@408,"SAT TRAK INT'L"
200 DIM N$(9)
240 DIM TLC(9,3):DIM DB(9,13)
250 DATA 77,1.737371,4.879062,-.05227522
260 DATA 78,1.733205,4.874896,-.05674153
270 DATA 79,1.729039,4.870730,-.061208
280 DATA 80,1.724872,4.866563,-.0656743
290 DATA 81,1.737908,4.879601,-.05293787
300 DATA 82,1.733742,4.875434,-.05740420
310 DATA 83,1.729576,4.871268,-.06187052
320 DATA 84,1.725409,4.867101,-.06633684
330 DATA 85,1.738446,4.880138,-.05360119
340 DATA 86,1.734279,4.875971,-.05806752
350 FORI=0TO9:FORJ=0TO3:READTL(I,J):NEXTJ:NEXTI
360 OPEN" I",1,"WKFILE"
370 FORI=0TO9
375 PRINT@450,"*** INPUT SATELLITE FILE ***"
380 INPUT#1,N$(I)
390 FOR J=0TO13:INPUT#1,DB(I,J):NEXT J
395 DB(I,0)=I+1
396 PRINT@450,"
400 NEXT I
410 CLOSE
570 CR=57.29578:R9=1.570796:ER=6378.145
580 FF=3.352892E-3:E2=6.694542E-3:PI=3.1415926
590 RP=1.7453292E-2:QJ2=8.119117E-4:MJ2=-1.623823E-3
600 KE=1.070882E2:RR=6.283185:CV=7.905368
610 V=0
620 CLS
630 PRINT"***** SATELLITE DATA BASE *****"
640 PRINT" # OBJ # NAME PERIOD INCLIN ";
650 PRINT" ELSET# REV # EPOCH"
660 FOR I=0TO9
690 PRINTDB(I,0);TAB(3)DB(I,1);TAB(11)N$(I);TAB(22)24/DB(I,12)*60;
700 PRINTTAB(31)DB(I,7);
710 PRINTTAB(40)DB(I,6);TAB(47)DB(I,13);TAB(54)DB(I,3)+DB(I,4)
730 NEXT I
740 FOR I=1 TO 64: PRINT"*";: NEXT I
750 INPUT "SELECT SATELLITE ";S
770 S=S-1:IF(S<=9 AND S>=0)THEN 790
780 PRINT"SELECT ONLY <1> THRU <10>":GOTO 750
790 YY=DB(S,2):DD=DB(S,3):FD=DB(S,4)
800 M0=DB(S,11)*RP:RI=DB(S,8)*RP:AP=DB(S,10)*RP
810 E0=DB(S,9):I0=DB(S,7)*RP:N0=DB(S,12)*RR:ND0=DB(S,5)*RR
812 CLS
815 PRINT:PRINTN$(S)
820 FORI=0 TO 9: IF TL(I,0)=YY THEN 850
830 NEXT I
840 PRINT"YEAR NOT IN ALMANAC":INPUT"PRESS <ENTER>";D:GOTO 610:
850 IF (YY=86 AND DD>305) THEN PRINT"*** NOTICE ***"
860 IF(YY=86 AND DD>305) THEN PRINT"ALMANAC UPDATE REQUIRED IN <60 DAYS"
870 T1=TL(I,1):SN=TL(I,2):MC=TL(I,3)
880 A=(T1+DD*1.720279E-2+FD*6.300388):GOSUB 2630

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890 T2=X
900 IY=YY:YF=0:DI=365:LY=48
910 FOR J=1 TO 12:LY=LY+4
920 IF YY-1=LY THEN YF=1
930 IF IY=LY THEN 960
940 NEXT J
950 GOTO 970
960 DI=366
970 PRINT"ENTER TIME OF INTEREST AS-":PRINT
980 Y1=0:D1=0:H1=0:MN=0:T1=9E9
990 PRINT"YY,DDD,HH,DDD,HH (USE COMMMAS)"
1000 INPUT Y1,D1,H1,D2,H2
1040 IF (YY<Y1)AND(D2<D1) THEN PRINT">>>ERROR ON INPUT<<<":GOTO 970
1050 INPUT"OUTPUT INTERVAL IN MINUTES <DEFAULT 10>":MN
1060 IF MN=0 THEN MN=10
1070 IF D1=0 THEN D1=DD:Y1=YY:H1=FD*24:T1=0
1075 PRINT:INPUT"WORLD MAP (W) OR TABLE (T) DISPLAY";Q$:IFQ$<>"W"THEN4000
1080 CLS
1082 PRINT @ 2,"18 21 24 27 30 33 0 3 6 9 12 15 18
1085 FOR IX=80 TO -40STEP-10: PRINT USING "##";ABS(IX):NEXTIX
1090 PRINT USING "% %";N$(S);
1092 PRINT @ 907,"INC: ";:PRINT USING "###";I0*CR
1094 PRINT@916,"DEC PER: ";:PRINTUSING"###";24/DB(S,12)*60;
1096 PRINT@931,"MIN ECC: ";:PRINTUSING"*.##CCCC";E0;
1098 PRINT@960,"TIME: YY DDD HH MM SSS LAT: LON: ALT:";
1100 GOSUB3000
1150 GOSUB 2580
1160 IF T1=0 THEN 1240
1170 IF YY=Y1 THEN 1240
1180 IF YY>Y1THEN 1210
1190 DA=D1-DD+DI
1200 ED=D2-DD+DI:GOTO 1280
1210 DA=D1-DD-365-YF:IF D2>=D1 THEN 1230
1220 ED=D2-DD:GOTO 1280
1230 ED=D2-DD-365-YF:GOTO 1280
1240 DA=D1-DD
1250 IF D2>=D1THEN 1270
1260 ED=D2-DD+DI:GOTO1280
1270 ED=D2-DD
1280 HA=(H1/24)-FD:IF T1=0 THEN 1300
1290 T1=DA+HA
1300 BH=(H2/24)-FD:TF=BD+BH
1310 DT=MN/1440:FS=0:LS=0:T=T1-DT
1320 T=T+DT:IFT>(TF+.000011)THEN 1350
1330 IFABS(T-TF)<.000011THEN 1360
1340 GOTO 1370
1350 IFLS=1THEN 1680
1360 LS=1:T=TF
1370 GOSUB 2100
1380 GOSUB 1800
1390 TG=T2+IT*1.720218E-2+FT*6.300387
1400 A=TG: GOSUB 2630
1410 TG=X
1420 IF RX=0THEN RX=1E-7
1430 IF RY=0THEN RY=1E-7
1440 AL=ATN(RY/RX)
1450 IF(RX>0 AND RY>0)THEN 1470
1460 AL=AL+PI:IF(RX>0 AND RY<0)THENAL=AL+PI
1470 LE=AL-TG: A=LE: GOSUB 2630
1480 LE=X
1490 IF LE>0 GOTO 1510
1500 LE=LE+RR
1510 LE=LE*CR

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1520 DC=(ATN(UZ/SQR(1-UZ*UZ))): UZ=UZ*UZ
1530 B1=1+(E2/RS)*(1-2*UZ)+(E2/2)*UZ
1540 B2=(E2/RS)*UZ*(SQR(1-UZ))
1550 B3=B1*B2:B4=(ATN(B3/SQR(1-B3*B3))):GD=(B4+DC)*CR
1560 HT=(RS-1+UZ*FF+1.5*UZ*(FF/2)*(1-UZ))*ER
1570 DC=DC*CR:AL=AL*CR
1580 GOSUB 1860
1585 IF Q<>"W" THEN 1630
1590 PRINT@965,STR$(YI);:PRINTUSING"####";ID;:PRINTUSING"###";IH;:PRINTUSING"###";IM;:PRINTUSING"###";IS;
1595 PRINT@987," ";:PRINTUSING"+###.#";GD;:PRINT@999," ";:PRINTUSING"###.#";LE;
1600 PRINT@1011," ";:PRINTUSING"#####.#";HT;
1605 FX=64+LE/3:IFFX>127 THEN FX=FX-120
1610 FY=28-GD*.3:IFFY<40RPY>40.99 THEN 1320
1615 IF POINT(FX,FY) THEN RESET(FX,FY) ELSE SET(FX,FY)
1620 GOTO 1320
1630 PRINTSTR$(YI);TAB(3)STR$(ID);
1632 PRINTTAB(7)STR$(HI);TAB(10)STR$(IM);
1634 PRINTTAB(13)STR$(IS);
1636 PRINTTAB(17)GD;TAB(26)LE;
1638 PRINTTAB(36)AL;TAB(45)DC;
1640 PRINTTAB(54)HT
1642 V=V+1:IF V<13 THEN 1320
1644 INPUT<ENTER> TO CONTINUE";D
1646 GOSUB 4100
1650 GOTO 1320
1680 IFQ<>"W" THEN PRINT"CALCULATION COMPLETE - PRESS <ENTER>";:INPUTQ$:CLS:GOTO 1700
1690 PRINT@907,"CALCULATION COMPLETE. PRESS ENTER.";:PRINTCHR$(30);
1695 Q$=INKEY$:IFQ$="" THEN FORI=1 TO 100:PRINT@947,"***";:PRINT@947,CHR$(30);:NEXT I:GOTO 1695 ELSE CLS
1700 INPUT"NEW TIME OF INTEREST Y/N";Q$
1710 IF Q$="Y" THEN 970
1720 IF Q$="N" GOTO 1740
1730 IF Q<>"N" THEN PRINT"<Y> OR <N> ONLY";:GOTO 1700
1740 INPUT"NEW SATELLITE Y/N";Q$
1750 IF Q$="Y" GOTO 610
1760 IF Q$="N" GOTO 1780
1770 IF Q<>"N" THEN PRINT"<Y> OR <N> ONLY";:GOTO 1740
1780 IF Q$="N" THEN PRINT"END OF PROGRAM": RUN "CONTROL"
1790 END
1800 IF ABS(T)<1E-6 THEN 1840
1810 A=T: GOSUB 2660
1820 IT=X: FT=T-IT
1830 GOTO 1850
1840 IT=0:FT=0
1850 RETURN
1860 ID=DD+IT:FX=FD+FT
1870 IF (ABS(FX)<1E-6) THEN FX=0
1880 IF ABS(FX)<1 THEN 1910
1890 A=FX: GOSUB 2660
1900 HR=X: ID=ID+HR: FX=FX-HR
1910 IF FX>=0 THEN 1930
1920 FX=FX+1:ID=ID-1
1930 HR=FX*24:IH=INT(HR):MI=(HR-IH)*60:IM=INT(MI)
1940 SD=(MI-IM)*60:IS=INT(SD):FR=SD-IS
1950 IF FR>=.5 THEN IS=IS+1
1960 IF ABS(IS-60)<.5 THEN 1980
1970 IF IS<60 THEN 1990
1980 IS=0:IM=IM+1
1990 IF IM<60 THEN 2010
2000 IM=0:IH=IH+1
2010 IF IH<24 THEN 2030

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2020 IH=0:ID=ID+1
2030 IFID>0 THEN 2060
2040 ID=ID+365+YF:YI=IY-1
2050 GOTO 2090
2060 IF ID>DI THEN 2080
2070 YI=IY:GOTO 2090
2080 ID=ID-DI:YI=IY+1
2090 RETURN
2100 IF FST=1 GOTO 2220
2110 FS=1:A0=(KE/N0)C.6666667:DP=(COS(I0))C2
2120 IF E0=0 THEN E0=1E-6
2130 DE=(QJ2/A0C2)*(3*DP-1)/(1-E0C2)C1.5
2140 A0=A0*(1-.3333333*DE-DEI2-1.654321*DEI3)
2150 P0=A0*(1-E0C2):CCI=COS(I0):SCI=SIN(I0):Q0=A0*(1-E0)
2160 IF I0<=R9 GOTO 2180
2170 L0=M0+AP-RI:GOTO 2190
2180 L0=M0+AP+RI
2190 RD=(MJ2/P0C2)*N0*CCI:OD=(QJ2/P0C2)*N0*(5*DP-1)
2200 A2=E0*COS(AP):A3=E0*SIN(AP):AC=ABS(CC)
2210 DP=- (MJ2/P0C2)*(2-2.5*(SIN(I0)C2)-ACCI)
2220 NT=N0+2*(ND*T):AI=A0*(N0/NT)C.6666667
2230 IF AI>Q0 GOTO 2250
2240 ET=1E-6:GOTO 2260
2250 ET=1-Q0/AI
2260 PT=AI*(1-ETC2):RA=RI+RD*T:SA=SIN(RA):CA=COS(RA)
2270 DW=OD*T:SW=SIN(DW):CW=COS(DW)
2280 AX=(ET/E0)*(A2*CW-A3*SW)
2290 AYN=(ET/E0)*(A2*SW+A3*CW)+(1.124660E-3*SCI/P0)
2300 XM=-SA*CC:YM=CA*CC:ZM=SC:XN=CA:YN=SA
2310 L3=(.5623302E-3/P0)*AXN*SCI*(3+5*ACCI)/(1+ACCI)
2320 XL=L0+N0*(1+DP)*T+L3+ND0*TC2
2330 IF I0<=R9 GOTO 2350
2340 U=XL+RA:GOTO 2360
2350 U=XL-RA
2360 K=0:EW=U:DF=1E9
2370 FOR J=1TO10
2380 EP=U+AXN*SIN(EW)-AYN*COS(EW)
2390 A1=ABS(EP-EW)
2400 IF A1<=1E-6 THEN 2480
2410 IF A1>DF THEN 2430
2420 DF=A1:HOLD=EP
2430 DL=(EP-EW)/(1-AXN*COS(EW)-AYN*SIN(EW))
2440 D=ABS(DL):IF D<1 THEN 2460
2450 DL=DL/D
2460 EW=EW+DL:NEXT J
2470 K=1:EP=HO
2480 EW=EP:CEW=COS(EW):SEW=SIN(EW):EC=AX*CE+AY*SE
2490 ES=AX*SE-AY*CE:RS=AI*(1-EC):AA=ES/(1+SQR(1-ETC2))
2500 CU=AI/RS:SU=CU*(SE-AY-AX*AA)
2510 CU=CU*(CE-AX+AY*AA)
2520 UX=XN*CU+XM*SU:UY=YN*CU+YM*SU:UZ=ZM*SU
2530 RX=RS*UX:RY=RS*UY:RZ=RS*UZ
2540 VE=SQR(AI)*ES/RS:UX=-XN*SU+XM*CU:UY=-YN*SU+YM*CU
2550 VZ=ZM*CU:RV=SQR(PT)/RS:XD=VE*UX+RV*VX
2560 YD=VE*UY+RV*VY:ZD=VE*UZ+RV*VZ
2570 RETURN
2580 RETURN
2620 REM FNB SUBR.
2630 Z=A:A=A/RR:GOSUB 2660
2640 X=Z-X*RR:A=Z:RETURN

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