

HIGH SPEED DESCENDING TURN D.VONDRASEK 24 FEBRUARY 1965  
 DIMENSION CRD(200),H(6),TEMP(6),POP(6),ROR(6)  
 COMMON CRD,LOC,ZT,YT,XT,H,TEMP,POP,ROR,R,TO,VCO  
 EQUIVALENCE(CRD(177),VO),(CRD(178),HO),(CRD(179),XMUO),(CRD(180),  
 1PSIO),(CRD(181),XLAMO),(CRD(182),DV),(CRD(183),VEND),(CRD(184),W),  
 2(CRD(185),SW),(CRD(186),TEST),(CRD(187),CONFIG),(CRD(188),VI)  
 1000 FORMAT(30H HIGH SPEED DESCENDING TURN//4X4HALT.,4X4HMACH,  
 14X4HVEL.,4X2HMU,5X6HLAMBDA,2X5HRANGE,4X4HTIME,5X3HPSI,5X3HPHI/  
 25X3HFT.,5X3HNO.,5X3HFPS,3X4HDEG.,5X4HDEG.,4X3HNAM,5X4HSEC.,  
 35X4HDEG.,4X4HDEG./)  
 1001 FORMAT(F10.0,F7.2,F8.0,F8.2,F8.2,F8.1,F8.1,F8.2,F8.2)  
 1002 FORMAT(/4X8HCONFIG =F8.1)  
 H(1)=0.  
 H(2)=36089.  
 H(3)=82021.  
 H(4)=154199.  
 H(5)=173783.  
 H(6)=259196.  
 TEMP(1)=518.688  
 TEMP(2)=389.988  
 TEMP(3)=389.988  
 TEMP(4)=508.788  
 TEMP(5)=508.788  
 TEMP(6)=298.188  
 POP(1)=1.0  
 POP(2)=.22336  
 POP(3)=.24561E-01  
 POP(4)=.11887E-02  
 POP(5)=.57778E-03  
 POP(6)=.99613E-05  
 ROR(1)=1.0  
 ROR(2)=.29707  
 ROR(3)=.32666E-01  
 ROR(4)=.12118E-02  
 ROR(5)=.58947E-03  
 ROR(6)=.17291E-04  
 R=53.3  
 TO=518.688  
 VCO=661.3  
 G=32.174  
 GRO=673.28689E+06  
 WP=7.272205E-05  
 RO=20.926428E+06  
 1931 CALL INPUT  
 J=0  
 V2=VO  
 H2=HO  
 XMUR=XMUO\*.01745  
 PSIR=PSIO\*.01745  
 XLAMR=XLAMO\*.01745  
 SUMR=0.  
 SUMT=0.  
 IF(SENSE SWITCH 1)200,300  
 200 PRINT 1000

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GO TO 1
300 PUNCH 1000
1 CPHLOW=(RO/(RO+H2))*2*(1.-V2**2/GRO)-2.*WP*V2/G*COSF(XLAMR)*
1SINF(PSIR)
2 ZT=H2
CALL ATMOS
XMACH=V2/(XT*1.6878)
QS=1481.2*YT*XMACH**2*SW
JL=CRD(113)
JCF=JL+113
DO 3 IC=114,JCF
IF(CRD(IC)-XMACH)3,4,4
3 CONTINUE
4 JC=IC+JL
PHID=-((CRD(IC)-XMACH)/(CRD(IC)-CRD(IC-1)))*(CRD(JC)-CRD(JC-1))-
1CRD(JC))
PHIR=PHID*.01745
COSPFI=COSF(PHIR)
XLOW2=CPHLOW/COSPFI
IF(J)35,5,35
5 CL=W*XLOW2/QS
6 KL=CRD(41)
KCF=KL+41
DO 7 IC=42,KCF
IF(CRD(IC)-XMACH)7,8,8
7 CONTINUE
8 JC=IC+KL
CDO=-((CRD(IC)-XMACH)/(CRD(IC)-CRD(IC-1)))*(CRD(JC)-CRD(JC-1))-
1CRD(JC))
LL=CRD(81)
LCF=LL+81
DO 9 IC=82,LCF
IF(CRD(IC)-XMACH)9,10,10
9 CONTINUE
10 JC=IC+LL
XL=-((CRD(IC)-XMACH)/(CRD(IC)-CRD(IC-1)))*(CRD(JC)-CRD(JC-1))-
1CRD(JC))
CD=CDO+XL*CL**2
DOL2=CD/CL
E2=H2+V2**2/64.348
TANPG=-2.*WP*SINF(XLAMR)/(G/V2*CPHLOW)
PHIG=ATANF(TANPG)
PSIDT2=XLOW2*G/V2*SINF(PHIR-PHIG)
IF(J)42,11,42
11 V1=V2
H1=H2
T1=SUMT
R1=SUMR
XLOW1=XLOW2
DOL1=DOL2
E1=E2
PSIDT1=PSIDT2
XMUR1=XMUR
XLAMR1=XLAMR

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PSIR1=PSIR
XMUD=XMUR*57.296
XLAMD=XLAMR*57.296
PSID=PSIR*57.296
RANGE=SUMR/6076.1
IF(SENSE SWITCH 1)201,301
201 PRINT 1001,H2,XMACH,V2,XMUD,XLAMD,RANGE,SUMT,PSID,PHID
GO TO 12
301 PUNCH 1001,H2, XMACH,V2,XMUD,XLAMD,RANGE,SUMT,PSID,PHID
12 IF(J)13,131,14
13 IF(SENSE SWITCH 1)202,302
202 PRINT 1002,CONFIG
GO TO 1931
302 PUNCH 1002,CONFIG
GO TO 1931
131 V2=V1
J=1
GO TO 16
14 V2=V1-DV
IF(V2-VEND)15,16,16
15 V2=VEND
J=-1
16 H2=H1
DOL2=DOL1
E2=H2+V2**2/64.348
DE=E2-E1
ELOW=(RO/(RO+H2))**2*(1.-V2**2/GRO)/COSPHI
EDR=-DE/(.5*(DOL1*XLOW1+DOL2*ELOW))*(RO/(RO+H2))
DT=EDR/(.5*(V1+V2))
TANPG=-2.*WP*SINF(XLAMR)/(G/V2*ELOW*COSPHI)
PHIG=ATANF(TANPG)
PSIDT2=ELOW*G/V2*SINF(PHIR-PHIG)
17 DPSI=DT*.5*(PSIDT1+PSIDT2)
TDXORO=SINF(EDR/RO)/COSE(EDR/RO)*COSE(DPSI)
SDYORO=SINF(EDR/RO)*SINF(DPSI)
DXORO=ATANF(TDXORO)
DYORO=ATANF(SDYORO/SQRTF(1.-SDYORO**2))
CA=PSIR1
SB=DXORO
SC=1.5707964-XLAMR1
COSSA=COSF(SB)*COSF(SC)+SINF(SB)*SINF(SC)*COSF(CA)
TANSA=SQRTF(1.-COSSA**2)/COSSA
IF(TANSA)19,18,18
18 SA=ATANF(TANSA)
GO TO 20
19 SA=3.1415927-ATANF(-TANSA)
20 SINCB=SINF(SB)/SINF(SA)*SINF(CA)
TANCB=SINCB/SQRTF(1.-SINCB**2)
IF(CA-3.1415927)21,21,22
21 CB=ATANF(TANCB)
GO TO 23
22 CB=-ATANF(-TANCB)
23 SINCC=ABSF(SINF(SC)/SINF(SA)*SINF(CA))
IF(SA-SC)231,232,232

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231 COSCC=-SQRTF(1.-SINCC**2)
    GO TO 233
232 COSCC=SQRTF(1.-SINCC**2)
233 SINCC2=-COSCC
    COSCC2=SINCC
    COSSC2=COSF(SA)*COSF(DYORO)+SINF(SA)*SINF(DYORO)*COSCC2
    SINCB2=SINF(DYORO)/SQRTF(1.-COSSC2**2)*SINCC2
    TANSC2=SQRTF(1.-COSSC2**2)/COSSC2
    IF(COSSC2)25,24,24
24 SC2=ATANF(TANSC2)
    GO TO 26
25 SC2=3.1415927-ATANF(-TANSC2)
26 TANCB2=SINCB2/SQRTF(1.-SINCB2**2)
    IF(TANCB2)28,27,27
27 CB2=ATANF(TANCB2)
    GO TO 29
28 CB2=-ATANF(-TANCB2)
29 TANCX=-SINCC/COSCC
    IF(PSIR1-3.1415927)30,30,33
30 IF(TANCX)32,31,31
31 CX=ATANF(TANCX)
    GO TO 34
32 CX=3.1415927-ATANF(-TANCX)
    GO TO 34
33 TANCX=-TANCX
    IF(TANCX)31,32,32
34 XLAMR=1.5707964-SC2
    XMUR=XMUR1+CB+CB2
    PSIR=CX+DPSI
    IF(PSIR)341,342,342
341 PSIR=PSIR+6.2831853
342 CPHLOW=(RO/(RO+H2))**2*(1.-V2**2/GRO)-2.*WP*V2/G*COSF(XLAMR)*
    1SINF(PSIR)
    GO TO 2
35 IF(TEST)39,36,39
36 CLEST=CL
    SIGM=W*XLOW2/(.001189*V2**2*CLEST*SW)
    ZT=SIGM
    CALL SIGMA
    H2=YT
    ZT=YT
    CALL ATMOS
    XMACH=V2/(XT*1.6878)
    ML=CRD(1)
    MCF=ML+1
    DO 37 IC=2,MCF
    IF(CRD(IC)-XMACH)37,38,38
37 CONTINUE
38 JC=IC+ML
    CL=-((CRD(IC)-XMACH)/(CRD(IC)-CRD(IC-1)))*(CRD(JC)-CRD(JC-1))-CRD
    1(JC)
    IF(ABSF(CL-CLEST)-.001)6,6,36
39 NL=CRD(145)
    NCF=NL+145

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DO 40 IC=146,NCF
IF(CRD(IC)-V2)40,41,41
40 CONTINUE
41 JC=IC+NL
H2=-((CRD(IC)-V2)/((CRD(IC)-CRD(IC-1))*(CRD(JC)-CRD(JC-1))-CRD(JC)))
ZT=H2
CALL ATMOS
XMACH=V2/(XT*1.6878)
QS=1481.2*YT*XMACH**2*SW
GO TO 5
42 DE=E2-E1
DR=-DE/(.5*(DOL1*XLOW1+DOL2*XLOW2))*(RO/(RO+H2))
DT=DR/(.5*(V1+V2))
IF(ABS(DR-EDR)-6076.1143,43,44)
43 SUMR=R1+DR
SUMT=T1+DT
GO TO 11
44 EDR=DR
GO TO 17
END
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SUBROUTINE INPUT

DIMENSION CRD(200)

COMMON CRD

1 READ 3, L1, N1, CRD(N1), CRD(N1+1), CRD(N1+2), CRD(N1+3), CRD(N1+4), CRD  
1(N1+5), CRD(N1+6), CRD(N1+7)

IF(L1) 1, 1, 2

2 RETURN

3 FORMAT(11, 14, 2X, 8(E9.0))

END

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SUBROUTINE ATMOS
DIMENSION CRD(200),H(6),TEMP(6),POP(6),ROR(6)
COMMON CRD,LOC,ZT,YT,XT,H,TEMP,POP,ROR,R,TO,VCO
DO 1 I=1,6
IF(ZT-H(I))2,1,1
1 CONTINUE
2 L=I-1
IF(L-1)6,6,3
3 IF(L-3)5,6,4
4 IF(L-5)5,6,5
5 XT=VCO*(TEMP(L)/TO)**.5
YT=POP(L)*EXPF((H(L)-ZT)/(R*TEMP(L)))
RETURN
6 TOTS=1.+1./TEMP(L)*(TEMP(I)-TEMP(L))/(H(I)-H(L))*(ZT-H(L))
A=(H(I)-H(L))/(R*(TEMP(I)-TEMP(L)))
XT=VCO*(TEMP(L)/TO)**.5*TOTS**.5
YT=POP(L)*TOTS**(-A)
RETURN
END
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SUBROUTINE SIGMA
DIMENSION CRD(200),H(6),TEMP(6),POP(6),ROR(6)
COMMON CRD,LOC,ZT,YT,XT,H,TEMP,POP,ROR,R,TO,VCO
DO 1 I=1,6
IF(ROR(I)-ZT)2,1,1
1 CONTINUE
2 L=I-1
IF(L-1)6,6,3
3 IF(L-3)5,6,4
4 IF(L-5)5,6,5
5 C=ZT*TEMP(L)/(TO*POP(L))
YT=H(L)-LOGF(C)*R*TEMP(L)
RETURN
6 A=(H(I)-H(L))/(R*(TEMP(I)-TEMP(L)))
B=(ZT*TEMP(L)/(TO*POP(L)))**(.1/(-A-.))
YT=(B-.)*TEMP(L)*(H(I)-H(L))/(TEMP(I)-TEMP(L))+H(L)
RETURN
END

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