Section 9

Predefined Operational Programs (POPs)

Section Contents

9 PREDEFINED OPERATIONAL PROGRAMS (POPs)

9.1 Categorization Of POPs

The Predefined Operational Programs (POPs) are constituent parts of the SUMER DPU instrument software. They are defined using the SUMER command language (SCL) and processed by the SUMER preprocessor (SPP) into the SCL intermediate token code (SXF). They are stored in the system PROMs and transferred to a CU's RAM by the boot controller at boot time.

The following tables (status 04-Jun-93) list all POPs giving the POP number, the POP's name, and the POP's author. The tasks to be performed are described in section 9.3.

Authors of the POPs

AGAlan GabrielPLPhilippe Lemaire
EHE. HaugPMPer Maltby
EMEckart MarschPMnP. Mein/B. Schmieder
FKFranz KneerPMWPeter McWhirter
HMHelen MasonRAHRichard Harrison
JCVJean-Claude VialSJSteward Jordan
KWKlaus WilhelmVBV. Bommier et al.

OKMOlav Kjeldseth-MoeWCWerner Curdt
OVOsmi VilhuWHIW.-H. Ip et al.

nr observational programauthor

01 High Resolution Line ShiftsPL
02 Line Shift Variation/Line Ratios Along A StructurePL
03 Line Ratios At Fixed LocationPL
04 Off Limb Line ProfilesPL
05 Reference Spectra Along A StructurePL
06 Full Sun ImagingPL
07 Evolution Of StructuresPL
08 Explosive Events Temporal AnalysisOKM
09 Lyman α 'Calibration'JCV
10 Fine Structure Of A ProminenceJCV
also: Deuterium Abundance Ratio D/HPM
11 Ephemeral Active Region Correlative ObservationFK
12 Bright Point DiagnosticOV
13 Active Structure DynamicsPMn
14 Vector Velocity Fields In Structures Above The LimbsVB
15 Star Spectra And Coronal StreamersPL
16 Turbulences And FlowsKW
17 Sunspot Velocity Field And Line ProfilesPM
18 MHD Waves In CoronaPM
19 Forbidden/Allowed Line Widths By DEM AnalysisPMW
20 TR/Corona StudiesHM
21 TR/Coronal Emission Relationship Using Si IIIHM
also: N_e Diagnostic Using Si IIIHM
22 N_e Diagnostic Using O IV, Si IV, Si VHM
23 N_e Diagnostic Using Ar VIII, Si VIII, And Fe XI Off LimbHM
24 Explosive Events At Different TemperaturesOKM
25 Limb Scans For CME Onset Correlative StudiesRAH
26 Source Of Solar Wind In A Coronal HoleSJ
27 Sun Grazing Comet ObservationWHI
28 Chromospheric Network InvestigationWHI
29 Prominences/CMEs DiagnosticWHI

30 Sub-Second Oscillations And Photon StatisticsWC
31 Synoptic Sequence, Intensities, And VelocitiesJCV
32 Transition Region Line IntensitiesEH
33 Coronal MHD TurbulenceEM
34 Temperature Gradient In A Coronal HoleAG

In order to decrease the storage requirements of the predefined operational programs, a revision of all POPs was performed. The POPs were examined and grouped according to their internal structure. The categories thus found are represented by the following generic POPs (G-POPs):

ASingle Spectroheliograms
BDouble Spectroheliograms
CComplex Series of Spectroheliograms (no entries)
DSeries of Spectroheliograms with Repetitions
ESpectroheliogram and Reference Spectrum
FSpectroheliograms With Integration Time Control
GCelestial Object Detection and Observation
HIIF Sender (Explosive Events Observation)
IIIF Receiver
JRepoint TC Receiver
KFull Sun Imaging
LAlternating Spectroheliograms

All POPs defined can be performed by executing generic POPs once or repeatedly. The following table associates the POPs to be performed with the G-POPs that need to be executed.

nrobservational programG-POP

01High Resolution Line ShiftsB
02Line Shift Variation/Line Ratios Along A StructureD
03Line Ratios At Fixed LocationD
04Off Limb Line ProfilesF
05Reference Spectra Along A StructureE
06Full Sun ImagingK
07Evolution Of StructuresA
08Explosive Events Temporal AnalysisH
09Lyman α 'Calibration'12*A
10Fine Structure Of A Prominence9*A
11Ephemeral Active Region Correlative ObservationJ
12Bright Point DiagnosticJ
13Active Structure DynamicsJ
14Vector Velocity Fields In Structures Above The LimbsB
15Star Spectra And Coronal StreamersG
16Turbulences And FlowsJ
17Sunspot Velocity Field And Line Profiles6*A
18MHD Waves In Corona2*A/2*F
19Forbidden/Allowed Line Widths By DEM Analysis5*A
20TR/Corona StudiesJ
21TR/Coronal Emission Relationship Using Si IIIA
22N_e Diagnostic Using O IV, Si IV, Si VA
23N_e Diagnostic Using Ar VIII, Si VIII, And Fe XI Off LimbA
24Explosive Events At Different TemperaturesH
25Limb Scans For CME Onset Correlative StudiesI
26Source Of Solar Wind In A Coronal HoleL
27Sun Grazing Comet ObservationG
28Chromospheric Network InvestigationA
29Prominences/CMEs Diagnostic5*A
30Sub-Second Oscillations And Photon StatisticsB
31Synoptic Sequence, Intensities, And VelocitiesK

32Transition Region Line Intensities2*9*A
33Coronal MHD TurbulenceB
34Temperature Gradient In A Coronal HoleF

9.2 Generic POPs

This section lists the members, the program structures, and the parameter sets of all generic POPs (G-POPs). In addition, the SCL program sources of all G-POPs are given.

9.2.1 Single Spectroheliograms (G-POP A)

9.2.1.1 Members

This G-POP category consists of POPs that acquire single spectroheliograms or groups of single spectroheliograms. It contains the following POPs:

nrobservational programauthor

07Evolution Of StructuresPL
09Lyman α 'Calibration' (12*A)JCV
10Fine Structure Of A Prominence (9*A)JCV
17Sunspot Velocity Field And Line Profiles (6*A)PM
18MHD Waves In Corona (part 1 of 2, 2*A)PM
19Forbidden/Allowed Line Widths By DEM Analysis (5*A)PMW
21TR/Coronal Emission Relationship Using Si IIIHM
22N_e Diagnostic Using O IV, Si IV, Si VHM
23N_e Diagnostic Using Ar VIII, Si VIII, And Fe XI Off LimbHM
28Chromospheric Network InvestigationWHI
29Prominences/CMEs Diagnostic (5*A)WHI
32Transition Region Line Intensities (2*9*A)EH

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)
res = slit( s)
res = lambda18( px, l1, l2, l3, l4, l5, l6, l7, l8)
res = compression( c)

for (k=1 to r)
    res = spectrohelio3( t, f, i, n)
forend

res = rot_comp( -1)
```

9.2.1.2 Parameter Set Of Category A

nrtypparameter

1R4rcsolar rotation compensation
2I4sslit
3I4pxreference pixel
4R4l1lambda1
5R4l2lambda2
6R4l3lambda3
7R4l4lambda4
8R4l5lambda5
9R4l6lambda6
10R4l7lambda7
11R4l8lambda8
12I4ccompression scheme
13I4tintegration time
14I4fimage format
15I4iincrement, size of raster step
16I4nraster steps
17I4rrepetitions of spectrohelio1

9.2.2 Double Spectroheliograms (G-POP B)

9.2.2.1 Members

This G-POP category consists of POPs that acquire double spectroheliograms or groups of double spectroheliograms. It contains the following POPs:

nrobservational programauthor

01High Resolution Line ShiftsPL
14Vector Velocity Fields In Structures Above The LimbsVB
30Sub-Second Oscillations And Photon StatisticsWC
33Coronal MHD TurbulenceEM

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)

for (j=1 to r0)
    res = slit( s1)
    res = lambda18( px1, l11,l12,l13,l14,l15,l16,l17,l18)
    res = compression( c1)

    for (k=1 to r1)
        res = spectrohelio3( t1, f1, i1, n1)
    forend

    res = slit( s2)
    res = lambda18( px2, l21,l22,l23,l24,l25,l26,l27,l28)
    res = compression( c2)

    for (k=1 to r2)
        res = spectrohelio3( t2, f2, i2, n2)
    forend
forend
```

```
res = rot_comp( -1)
```

9.2.2.2 Parameter Set Of Category B

nrtypparameter

1R4rcsolar rotation compensation
2I4r0repetitions of both phases
3I4s1phase 1 / slit
4I4px1phase 1 / reference pixel
5R4l11phase 1 / lambda1
6R4l12phase 1 / lambda2
7R4l13phase 1 / lambda3
8R4l14phase 1 / lambda4
9R4l15phase 1 / lambda5
10R4l16phase 1 / lambda6
11R4l17phase 1 / lambda7
12R4l18phase 1 / lambda8
13I4c1phase 1 / compression scheme
14I4t1phase 1 / integration time
15I4f1phase 1 / image format
16I4i1phase 1 / increment, size of raster step
17I4n1phase 1 / raster steps
18I4r1phase 1 / repetitions
19I4s2phase 2 / slit
20I4px2phase 2 / reference pixel
21R4l21phase 2 / lambda1
22R4l22phase 2 / lambda2
23R4l23phase 2 / lambda3
24R4l24phase 2 / lambda4
25R4l25phase 2 / lambda5
26R4l26phase 2 / lambda6
27R4l27phase 2 / lambda7
28R4l28phase 2 / lambda8

29I4c2phase 2 / compression scheme
30I4t2phase 2 / integration time
31I4f2phase 2 / image format
32I4i2phase 2 / increment, size of raster step
33I4n2phase 2 / raster steps
34I4r2phase 2 / repetitions

9.2.3 Series of Spectroheliograms (G-POP C)

This category is empty. All POPs contained before can be performed by executing generic POPs once or repeatedly in succession.

9.2.4 Series of Spectroheliograms with Repetitions (G-POP D)

9.2.4.1 Members

This G-POP category consists of POPs that acquire complex series of spectroheliograms with repetitions of some parts. It contains the following POPs:

nrobservational programauthor

02Line Shift Variation/Line Ratios Along A StructurePL
03Line Ratios At Fixed LocationPL

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)
res = slit( s)
res = compression( c)

/* phase 1 */
res = Set_SphelDirection( +1)
res = lambda11( px1, l11)
res = spectrohelio3( t1, f1, i1, n1)

/* phase 2 */
res = lambda13( px2, l21, l22, l23)
for (k=1 to r)
    res = spectrohelio3( t2, f2, i2, n2)
forend

/* repeat phase 1 */
res = Set_SphelDirection( +1)
res = lambda11( px1, l11)
res = spectrohelio3( t1, f1, i1, n1)

res = rot_comp( -1)
```

9.2.4.2 Parameter Set Of Category D

nrtypparameter

1R4rcsolar rotation compensation
2I4sslit
3I4ccompression scheme
4I4px1phase 1 / reference pixel
5R4l11phase 1 / lambda1
6I4t1phase 1 / integration time
7I4f1phase 1 / image format
8I4i1phase 1 / increment, size of raster step
9I4n1phase 1 / raster steps
10I4px2phase 2 / reference pixel
11R4l21phase 2 / lambda1
12R4l22phase 2 / lambda2
13R4l23phase 2 / lambda3
14I4t2phase 2 / integration time
15I4f2phase 2 / image format
16I4i2phase 2 / increment, size of raster step
17I4n2phase 2 / raster steps
18I4rphase 2 / repetitions

9.2.5 Spectroheliogram and Reference Spectrum (G-POP E)

9.2.5.1 Members

This G-POP category consists of a POP that acquires a single spectroheliogram at the current position followed by a reference spectrum:

nrobservational programauthor

05Reference Spectra Along A StructurePL

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)
res = slit( s1)
res = lambda11( px1, l1)
/* phase 1 */
res = compression( c1)
res = spectrohelio1( t1, f1, i1, n1)
/* phase 2 */
res = compression( c2)
res = ref_spec( t2, f2, lam, del, nri);
res = rot_comp( -1)
```

9.2.5.2 Parameter Set Of Category E

nrtypparameter

1R4rcsolar rotation compensation
2I4s1slit
3I4px1reference pixel
4R4l1lambda1
5I4c1phase 1 / compression scheme
6I4t1phase 1 / integration time

7I4f1phase 1 / image format
8I4i1phase 1 / increment, size of raster step
9I4n1phase 1 / raster steps
10I4c2phase 2 / compression scheme
11I4t2phase 2 / integration time
12I4f2phase 2 / image format
13R4lamphase 2 / lambda start in ref_spec
14R4delphase 2 / lambda step in ref_spec
15I4nriphase 2 / number of spectra in ref_spec

9.2.6 Spectroheliograms with Integration Time Control (G-POP F)

9.2.6.1 Members

This G-POP category consists of POPs that acquire series of spectroheliograms off the Sun's limb with integration times that increase with the distance from the limb:

nrobservational programauthor

04Off Limb Line ProfilesPL
18MHD Waves In Corona (part 2 of 2, 2*F)PM
34Temperature Gradient In A Coronal HoleAG

The program structure (in pseudo-SCL notation) is:

```
INT32 function func( yp, zp)
    /* yp, zp in units of 1/16 arcsec */
    y2 = (REAL32)yp * (REAL32)yp
    z2 = (REAL32)zp * (REAL32)zp
    /* di, dist, sol in units of 1 arcsec */
    di   = sqrt( y2 + z2) / 16.0
    dist = di - sol
    /* compute time factor */
    tf = exp( itc * dist)
    return tf
end

:

y0 = SystemS( 32)     /* get current pointing */
z0 = SystemS( 33)     /* get current pointing */

res = slit( s)
res = lambda18( px, l1, l2, l3, l4, l5, l6, l7, l8)
res = compression( c)
```

```
for (k=0 to r-1)
    y   = y0 + 16.0 * 0.38 * x * k
    res = point( y, z0)
    res = spectrohelio1( t * func( y, z0), f, i, 0)
forend

res = rot_comp( -1)
```

9.2.6.2 Parameter Set Of Category F

nrtypparameter

1I4sslit
2I4pxreference pixel
3R4l1lambda1
4R4l2lambda2
5R4l3lambda3
6R4l4lambda4
7R4l5lambda5
8R4l6lambda6
9R4l7lambda7
10R4l8lambda8
11I4ccompression scheme
12I4tbasic integration time
13I4fimage format
14I4iincrement, size of raster step (no longer used, always set to 0)
15I4rraster steps
16I4xdisplacement between spectroheliograms in units of 0.38"
(half steps)
17R4solsolar radius in arcsec (for limb distance)
(default value: 986.0 arcsec)
18R4itcintegration time control factor
(default value: 0.0156227 $arcsec^{-1}$)

9.2.7 Celestial Object Detection and Observation (G-POP G)

9.2.7.1 Members

This G-POP category consists of POPs that detects and tracks celestial objects off the Sun's limb for observation:

nrobservational programauthor

15Star Spectra And Coronal StreamersPL
27Sun Grazing Comet ObservationWHI

The program structure (in pseudo-SCL notation) is:

```
res = slit( s)
res = celestial_obj( tm, ts, img, drk, lam, del, nri)
```

9.2.7.2 Parameter Set Of Category G

nrtypparameter

1I4sslit
2I4tmmaximum search time
3R4tstime step for object motion compensation
4I4imgimages to acquire

5I4drkdark signal
6R4lamlambda start for reference spectrum
7R4dellambda step for reference spectrum
8I4nriimages in reference spectrum

9.2.8 IIF Sender (G-POP H)

9.2.8.1 Members

This G-POP category consists of POPs that will inform other instruments aboard SOHO by sending an inter-instrument flag (IIF) whenever they detect events of a predefined intensity on the Sun. It contains the following POPs:

nrobservational programauthor

08Explosive Events Temporal AnalysisOKM
24Explosive Events At Different TemperaturesOKM

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)
res = slit( s1)
res = lambda11( px1, l11)
res = compression( c1)

res = expl_event_search( t1, f1, i1, n1, lev, tmin, tmax)

if (res > 0)
    res = slit( s2)
    res = lambda18( px2, l21,l22,l23,l24,l25,l26,l27,l28)
    res = compression( c2)

    for (k=1 to r)
        res = spectrohelio3( t2, f2, i2, n2)
    forend
ifend

res = rot_comp( -1)
```

9.2.8.2 Parameter Set Of Category H

nrtypparameter

1R4rcsolar rotation compensation
2I4s1search phase / slit
3I4px1search phase / reference pixel
4R4l11search phase / lambda1
5I4c1search phase / compression scheme
6I4t1search phase / integration time
7I4f1search phase / image format
8I4i1search phase / increment, size of raster step
9I4n1search phase / raster steps
10I4levsearch phase / detection level
11I4tminsearch phase / minimum search time
12I4tmaxsearch phase / maximum search time
13I4s2study phase / slit
14I4px2study phase / reference pixel
15R4l21study phase / lambda1
16R4l22study phase / lambda2
17R4l23study phase / lambda3
18R4l24study phase / lambda4
19R4l25study phase / lambda5
20R4l26study phase / lambda6
21R4l27study phase / lambda7
22R4l28study phase / lambda8
23I4c2study phase / compression scheme
24I4t2study phase / integration time
25I4f2study phase / image format
26I4i2study phase / increment, size of raster step
27I4n2study phase / raster steps
28I4rrepetitions of spectrohelio1

9.2.9 IIF Receiver (G-POP I)

9.2.9.1 Members

This G-POP category consists of a POP that will be informed by other instruments aboard SOHO if events of a predefined intensity have been detected on the Sun. It contains the following POP:

nrobservational programauthor

25Limb Scans For CME Onset Correlative StudiesRAH

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)
res = sphel_mode ( m)
res = slit( s)
res = lambda13( px, l1, l2, l3)
res = compression( c)

for (k=1 to r)
    res = spectrohelio3( t, f, i, n)
    valid = cont()
    if (valid > 0)
        res = Set_SphelPointCenter( contY(), contZ())
    ifend
forend

res = rot_comp( -1)
```

9.2.9.2 Parameter Set Of Category I

nrtypparameter

1R4rcsolar rotation compensation
2I4msphel_mode
3I4sslit
4I4pxreference pixel
5R4l1lambda1

6R4l2lambda2
7R4l3lambda3
8I4ccompression scheme
9I4tintegration time
10I4fimage format
11I4iincrement, size of raster step
12I4nraster steps
13I4rrepetitions

9.2.10 Repoint TC Receiver (G-POP J)

9.2.10.1 Members

This G-POP category consists of POPs that will react to repointing telecommands from the EGSE. They acquire spectroheliograms continuously at the current position until that position gets changed. This category contains the following POPs:

nrobservational programauthor

11Ephemeral Active Region Correlative ObservationFK
12Bright Point DiagnosticOV
13Active Structure DynamicsPMn
16Turbulences And FlowsKW
20TR/Corona StudiesHM

The program structure (in pseudo-SCL notation) is:

```
abs_n2 = abs( n2)

res = rot_comp( rc)
res = sphel_mode( m)

for (j=1 to r0)
    /* phase 1 */
    res = slit( s1)
    res = lambda18( px1, l11,l12,l13,l14,l15,l16,l17,l18)
    res = compression( c1)

    for (k=1 to r1)
        res = spectrohelio3( t1, f1, i1, n1)
        if (cont() > 0)
            res = point( contY(), contZ())
```

```
            goto PHASE2
        ifend
    forend

PHASE2:
    /* phase 2 */
    res = slit( s2)
    res = compression( c2)

    posY0 = SystemS( 32)
    posZ  = SystemS( 33)

    for (k=1 to r2)
        posY1 = posY0
        if (n2 < 0)                         /* shifting required */
            if (abs(i2) > 2)                /* > 1 full step     */
                x = (k - 1) % (i2 / 2)      /* shift             */
                posY1 = posY1 + x * 12.16
                res = Set_SphelPointCenter( posY1, posZ)
            ifend
        ifend

        res = lambda18( px2, l21,l22,l23,l24,l25,l26,l27,l28)
        res = spectrohelio3( t2, f2, i2, abs_n2)

        if (l31 > 0.0)
            res = lambda13( px3, l31, l32, l33)
            res = spectrohelio3( t3, f2, i2, abs_n2)
        ifend

        if (l41 > 0.0)
            res = lambda13( px4, l41, l42, l43)
            res = spectrohelio3( t4, f2, i2, abs_n2)
        ifend

        if (l51 > 0.0)
            res = lambda13( px5, l51, l52, l53)
            res = spectrohelio3( t5, f2, i2, abs_n2)
        ifend
    forend
forend

res = rot_comp( -1)
```

9.2.10.2 Parameter Set Of Category J

nrtypparameter

1R4rcsolar rotation compensation
2I4mIIF/TC mode (sphel_mode)
3I4r0repetitions of both phases
4I4s1phase 1 / slit
5I4px1phase 1 / reference pixel
6R4l11phase 1 / lambda11
7R4l12phase 1 / lambda12
8R4l13phase 1 / lambda13
9R4l14phase 1 / lambda14
10R4l15phase 1 / lambda15
11R4l16phase 1 / lambda16
12R4l17phase 1 / lambda17
13R4l18phase 1 / lambda18
14I4t1phase 1 / integration time
15I4c1phase 1 / compression scheme
16I4f1phase 1 / image format
17I4i1phase 1 / increment, size of raster step
18I4n1phase 1 / raster steps
19I4r1maximum repetitions of phase 1
20I4s2phase 2 / slit
21I4px2phase 2 / reference pixel 2
22 R4 l21 phase 2 / lambda21
23R4l22phase 2 / lambda22
24R4l23phase 2 / lambda23
25R4l24phase 2 / lambda24
26R4l25phase 2 / lambda25
27R4l26phase 2 / lambda26
28R4l27phase 2 / lambda27
29R4l28phase 2 / lambda28
30I4t2phase 2 / integration time 2

31I4px3phase 2 / reference pixel 3
32R4l31phase 2 / lambda31
33R4l32phase 2 / lambda32
34R4l33phase 2 / lambda33
35I4t3phase 2 / integration time 3
36I4px4phase 2 / reference pixel 4
37R4l41phase 2 / lambda41
38R4l42phase 2 / lambda42
39R4l43phase 2 / lambda43
40I4t4phase 2 / integration time 4
41I4px5phase 2 / reference pixel 5
42R4l51phase 2 / lambda51
43R4l52phase 2 / lambda52
44R4l53phase 2 / lambda53
45I4t5phase 2 / integration time 5
46I4c2phase 2 / compression scheme
47I4f2phase 2 / image format
48I4i2phase 2 / increment, size of raster step
49I4n2phase 2 / raster steps
50I4r2repetitions of phase 2

9.2.11 Full Sun Imaging (G-POP K)

9.2.11.1 Members

This G-POP category consists of a POP that performs series of scans to observe either the Sun's full disk or the Sun's central meridian. It contains the following POPs:

nrobservational programauthor

06Full Sun ImagingPL
31Synoptic Sequence, Intensities, And Velocities (3*K)JCV

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)
res = slit( s)
res = compression( c)
res = lambda13( px, l1, l2, l3)
res = full_disk( t, f, i, sch, cen)
res = rot_comp( -1)
```

9.2.11.2 Parameter Set Of Category K

nrtypparameter

1R4rcsolar rotation compensation

2I4sslit
3I4ccompression scheme
4I4preference pixel
5R4l1lambda1
6R4l2lambda2
7R4l3lambda3
8I4tintegration time
9I4fimage format
10I4iincrement, size of raster step
11I4schsch < 0: "Schmierschritt"
12I4cen0: full disk, 1: central meridian

9.2.12 Alternating Spectroheliograms (G-POP L)

9.2.12.1 Members

This G-POP category consists of a POP that acquires spectroheliograms at alternating wavelengths. It contains the following POP:

nrobservational programauthor

26Source Of Solar Wind In A Coronal HoleSJ

The program structure (in pseudo-SCL notation) is:

```
res = rot_comp( rc)

/* phase 1 */
res = slit( s1)
res = lambda13( px1, l11,l12,l13)
res = compression( c1)

for (k=1 to r1)
    res = spectrohelio3( t1, f1, i1, n1)
forend

/* phase 2 */
res = slit( s2)
res = lambda13( px2, l21,l22,l23)
res = lambda23( px3, l31,l32,l33)
res = compression( c2)

for (k=1 to r2)
    res = spectrohelio4( t2, f2, i2, n2)
forend

res = rot_comp( -1)
```

9.2.12.2 Parameter Set Of Category L

nrtypparameter

1R4rcsolar rotation compensation
2I4s1phase 1 / slit
3I4px1phase 1 / reference pixel 1
4R4l11phase 1 / lambda11
5R4l12phase 1 / lambda12
6R4l13phase 1 / lambda13
7I4c1phase 1 / compression scheme
8I4t1phase 1 / integration time
9I4f1phase 1 / image format
10I4i1phase 1 / increment, size of raster step
11I4n1phase 1 / raster steps
12I4r1repetitions of phase 1
13I4s2phase 2 / slit
14I4px2phase 2 / reference pixel 2
15R4l21phase 2 / lambda21
16R4l22phase 2 / lambda22
17R4l23phase 2 / lambda23
18I4px3phase 2 / reference pixel 3
19R4l31phase 2 / lambda31
20R4l32phase 2 / lambda32
21R4l33phase 2 / lambda33
22I4c2phase 2 / compression scheme
23I4t2phase 2 / integration time
24I4f2phase 2 / image format
25I4i2phase 2 / increment, size of raster step
26I4n2phase 2 / raster steps
27I4r2repetitions of phase 2

9.2.13 Generic POPs: SCL Program Listings

This section contains the SCL program listings of all generic POPs.

9.2.13.01 SCL Program Listing Of Category A

```
/* ---------------------------------------------------------------
POP   : Category A (POPs 07, 09, 10, 17, 18, 19, 21, 22, 23, 28, 29, 32)

Function : Acquire a single spectroheliogram or a group of single
           spectroheliograms.
--------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.0

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables --------------------- */
   uINT16 Cnt; INT32 Res;

   /* ----- definition and loading of program parameters -------- */
   REAL32 rc =         ParamR(1);
   uINT8  s  = (uINT8) ParamS(2);
   uINT16 px = (uINT16)ParamS(3);
   REAL32 l1 =         ParamR(4);
   REAL32 l2 =         ParamR(5);
   REAL32 l3 =         ParamR(6);
   REAL32 l4 =         ParamR(7);
   REAL32 l5 =         ParamR(8);
   REAL32 l6 =         ParamR(9);
   REAL32 l7 =         ParamR(10);
   REAL32 l8 =         ParamR(11);
   INT16  c  = (INT16) ParamS(12);
   uINT16 t  = (uINT16)ParamS(13);
   uINT8  f  = (uINT8) ParamS(14);
   INT16  i  = (INT16) ParamS(15);
   INT16  n  = (INT16) ParamS(16);
   uINT16 r  = (uINT16)ParamS(17);
```

```
   Res = rot_comp(rc); ExitOnError;
   Res = slit(s); ExitOnError;
   Res = lambda18(px, l1, l2, l3, l4, l5, l6, l7, l8); ExitOnError;
   Res = compression(c); ExitOnError;

   for (Cnt = (uINT16)1 to r)
       Res = spectrohelio3(t, f, i, n); ExitOnError;
   forend;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.02 SCL Program Listing Of Category B

```
/* ----------------------------------------------------------------
POP      : Category B (POPs O1, 14, 3O, 33)

Function : Acquire a double spectroheliogram or a group of double
           spectroheliograms.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)O) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.O

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables -------------------- */
   INT32 Res; uINT16 Cnt1, Cnt2;

   /* ----- definition and loading of program parameters -------- */
   REAL32 rc  =         ParamR(1);
   uINT16 rO  = (uINT16)ParamS(2);
   uINT8  s1  = (uINT8) ParamS(3);
   uINT16 px1 = (uINT16)ParamS(4);
   REAL32 l11 =         ParamR(5);
   REAL32 l12 =         ParamR(6);
   REAL32 l13 =         ParamR(7);
   REAL32 l14 =         ParamR(8);
   REAL32 l15 =         ParamR(9);
   REAL32 l16 =         ParamR(1O);
   REAL32 l17 =         ParamR(11);
```

```
   REAL32 l18 =         ParamR(12);
   INT16  c1  = (INT16) ParamS(13);
   uINT16 t1  = (uINT16)ParamS(14);
   uINT8  f1  = (uINT8) ParamS(15);
   INT16  i1  = (INT16) ParamS(16);
   INT16  n1  = (INT16) ParamS(17);
   uINT16 r1  = (uINT16)ParamS(18);
   uINT8  s2  = (uINT8) ParamS(19);
   uINT16 px2 = (uINT16)ParamS(20);
   REAL32 l21 =         ParamR(21);
   REAL32 l22 =         ParamR(22);
   REAL32 l23 =         ParamR(23);
   REAL32 l24 =         ParamR(24);
   REAL32 l25 =         ParamR(25);
   REAL32 l26 =         ParamR(26);
   REAL32 l27 =         ParamR(27);
   REAL32 l28 =         ParamR(28);
   INT16  c2  = (INT16) ParamS(29);
   uINT16 t2  = (uINT16)ParamS(30);
   uINT8  f2  = (uINT8) ParamS(31);
   INT16  i2  = (INT16) ParamS(32);
   INT16  n2  = (INT16) ParamS(33);
   uINT16 r2  = (uINT16)ParamS(34);


   Res = rot_comp(rc); ExitOnError;

   for (Cnt1 = (uINT16)1 to r0)
       /* ----- process phase 1 -------------------------------- */
       Res = slit(s1); ExitOnError;
       Res = lambda18(px1, l11, l12, l13, l14, l15, l16, l17, l18);
             ExitOnError;
       Res = compression(c1); ExitOnError;

       for (Cnt2 = (uINT16)1 to r1)
           Res = spectrohelio3(t1, f1, i1, n1); ExitOnError;
       forend;

       /* ----- process phase 2 -------------------------------- */
       Res = slit(s2); ExitOnError;
       Res = lambda18(px2, l21, l22, l23, l24, l25, l26, l27, l28);
             ExitOnError;
       Res = compression(c2); ExitOnError;

       for (Cnt2 = (uINT16)1 to r2)
           Res = spectrohelio3(t2, f2, i2, n2); ExitOnError;
       forend;
   forend;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.03 SCL Program Listing Of Category C

As the G-POP category does not contain any members, no SCL program has been developed.

9.2.13.04 SCL Program Listing Of Category D

```
/* ----------------------------------------------------------------
POP      : Category D (POPs O2, O3)

Function : Acquire complex series of spectroheliograms with
           repetitions of some parts.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.0

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables -------------------- */
   uINT16 Cnt; INT32 Res;
   /* ----- definition and loading of program parameters -------- */
   REAL32 rc  =         ParamR(1);
   uINT8  s   = (uINT8) ParamS(2);
   INT16  c   = (INT16) ParamS(3);
   uINT16 px1 = (uINT16)ParamS(4);
   REAL32 l11 =         ParamR(5);
   uINT16 t1  = (uINT16)ParamS(6);
   uINT8  f1  = (uINT8) ParamS(7);
   INT16  i1  = (INT16) ParamS(8);
   INT16  n1  = (INT16) ParamS(9);
   uINT16 px2 = (uINT16)ParamS(10);
   REAL32 l21 =         ParamR(11);
   REAL32 l22 =         ParamR(12);
   REAL32 l23 =         ParamR(13);
   uINT16 t2  = (uINT16)ParamS(14);
   uINT8  f2  = (uINT8) ParamS(15);
```

```
   INT16  i2  = (INT16) ParamS(16);
   INT16  n2  = (INT16) ParamS(17);
   INT16  r   = (INT16) ParamS(18);


   Res = rot_comp(rc); ExitOnError;
   Res = slit(s); ExitOnError;
   Res = compression(c); ExitOnError;

   /* ----- phase 1 ------------------------------------------- */
   Res = Set_SphelDirection (+1);
   Res = lambda11(px1, l11); ExitOnError;
   Res = spectrohelio3(t1, f1, i1, n1); ExitOnError;

   /* ----- phase 2 ------------------------------------------- */
   Res = lambda13(px2, l21, l22, l23); ExitOnError;
   for (Cnt = (uINT16)1 to r)
       Res = spectrohelio3(t2, f2, i2, n2); ExitOnError;
   forend;

   /* ----- repeat phase 1 ------------------------------------ */
   Res = Set_SphelDirection (+1);
   Res = lambda11(px1, l11); ExitOnError;
   Res = spectrohelio3(t1, f1, i1, n1); ExitOnError;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.05 SCL Program Listing Of Category E

```
/* ------------------------------------------------------------ */
POP      : Category E (POPs O5)

Function : Acquire a single spectroheliogram at the current position
           followed by a reference spectrum.
------------------------------------------------------------ */

/* ----- abbreviations ---------------------------------------- */
ExitOnError  ALIAS  if (Res < (INT32)O) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.O

/* ----- main program ----------------------------------------- */
main;
   /* ----- definition of program variables ------------------- */
   INT32 Res;

   /* ----- definition and loading of program parameters ------- */
   REAL32 rc  =         ParamR(1);
   uINT8  s1  = (uINT8) ParamS(2);
   uINT16 px1 = (uINT16)ParamS(3);
   REAL32 l1  =         ParamR(4);
   INT16  c1  = (INT16) ParamS(5);
   uINT16 t1  = (uINT16)ParamS(6);
   uINT8  f1  = (uINT8) ParamS(7);
   INT16  i1  = (INT16) ParamS(8);
   INT16  n1  = (INT16) ParamS(9);
   INT16  c2  = (INT16) ParamS(1O);
   uINT16 t2  = (uINT16)ParamS(11);
   uINT8  f2  = (uINT8) ParamS(12);
   REAL32 lam =         ParamR(13);
   REAL32 del =         ParamR(14);
   INT16  nri = (INT16) ParamS(15);

   Res = rot_comp(rc); ExitOnError;
   Res = slit(s1); ExitOnError;
   Res = lambda11(px1, l1); ExitOnError;
   Res = compression(c1); ExitOnError;
   Res = spectrohelio1(t1, f1, i1, n1); ExitOnError;

   Res = compression(c2); ExitOnError;
   Res = ref_spec(t2, f2, lam, del, nri); ExitOnError;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.06 SCL Program Listing Of Category F

```
/* ----------------------------------------------------------------
POP      : Category F (POPs 04, 34)

Function : Acquire series of spectroheliograms off the sun's limb
           with integration times that increase with the distance
           from the limb.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend

/* ----- main program ------------------------------------------- */
main;

   /* ----- definition of program variables ---------------------- */
   uINT16 Cnt1; REAL32 Posy0, Posy1, Posz, Time, Cnt2;
   INT32 Res;

   /* ----- definition and loading of program parameters -------- */
   uINT8  s   = (uINT8) ParamS(1);
   uINT16 px  = (uINT16)ParamS(2);
   REAL32 l1  =         ParamR(3);
   REAL32 l2  =         ParamR(4);
   REAL32 l3  =         ParamR(5);
   REAL32 l4  =         ParamR(6);
   REAL32 l5  =         ParamR(7);
   REAL32 l6  =         ParamR(8);
   REAL32 l7  =         ParamR(9);
   REAL32 l8  =         ParamR(10);
   INT16  c   = (INT16) ParamS(11);
   REAL32 t   = (REAL32)ParamS(12);
   uINT8  f   = (uINT8) ParamS(13);
   INT16  i   = (INT16) ParamS(14);
   INT16  r   = (INT16) ParamS(15);
   REAL32 x   = (REAL32)ParamS(16);
   REAL32 sol =         ParamR(17);
   REAL32 itc =         ParamR(18);


   /* ----- get current position [1 = 1/16"] ---------------------- */
   Posy0 = (REAL32)SystemS(32); Posz = (REAL32)SystemS(33);

   Res = slit(s); ExitOnError;
   Res = lambda18(px, l1, l2, l3, l4, l5, l6, l7, l8); ExitOnError;
   Res = compression(c); ExitOnError;

   /* ----- acquire spectroheliograms ---------------------------- */
   Cnt2 = 0.0;
   for (Cnt1 = (uINT16)1 to (uINT16)r)
```

```
      /* ----- next position ---------------------------------- */
      Posy1 = Posy0 + x * Cnt2 * 6.08 /* 16 * 0.38 */;
      Res = point( (INT16)Posy1, (INT16)Posz); ExitOnError;

      /* ----- calculate next integration time ---------------- */
      Time = sqrt(Posy1*Posy1 + Posz*Posz) / 16.0 - sol;
      Time = t * exp(Time * itc);

      /* ----- acquire spectroheliogram ----------------------- */
      Res = spectrohelio1((uINT16)Time, f, i, 0); ExitOnError;

      Cnt2 = Cnt2 + 1.0;
   forend;

Exit:

end;
```

9.2.13.07 SCL Program Listing Of Category G

```
/* ----------------------------------------------------------------
POP      : Category G (POPs 15, 27)

Function : Detect and track celestial objects off the Sun's limb.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables -------------------- */
   INT32 Res;

   /* ----- definition and loading of program parameters -------- */
   uINT8  s   = (uINT8) ParamS(1);
   uINT16 tm  = (uINT16)ParamS(2);
   REAL32 ts  =         ParamR(3);
   uINT16 img = (uINT16)ParamS(4);
   INT16  drk = (INT16) ParamS(5);
   REAL32 lam =         ParamR(6);
   REAL32 del =         ParamR(7);
   uINT16 nri = (uINT16)ParamS(8);


   Res = slit(s); ExitOnError;
   Res = celestial_obj(tm, ts, img, drk, lam, del, nri);
         ExitOnError;

Exit:

end;
```

9.2.13.08 SCL Program Listing Of Category H

```
/* ----------------------------------------------------------------
POP      : Category H (POPs O8, 24)

Function : Acquire a single spectroheliogram or a group of single
           spectroheliograms, whenever events of a predefined
           intensity on the Sun are detected.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)O) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.O

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables --------------------- */
   INT16 Cnt; INT32 Res;

   /* ----- definition of program variables --------------------- */
   REAL32 rc   =         ParamR(1);
   uINT8  s1   = (uINT8) ParamS(2);
   uINT16 px1  = (uINT16)ParamS(3);
   REAL32 l11  =         ParamR(4);
   INT16  c1   = (INT16) ParamS(5);
   uINT16 t1   = (uINT16)ParamS(6);
   uINT8  f1   = (uINT8) ParamS(7);
   uINT8  i1   = (uINT8) ParamS(8);
   INT16  n1   = (INT16) ParamS(9);
   uINT8  lev  = (uINT8) ParamS(1O);
   uINT16 tmin = (uINT16)ParamS(11);
   uINT16 tmax = (uINT16)ParamS(12);
   uINT8  s2   = (uINT8) ParamS(13);
   uINT16 px2  = (uINT16)ParamS(14);
   REAL32 l21  =         ParamR(15);
   REAL32 l22  =         ParamR(16);
   REAL32 l23  =         ParamR(17);
   REAL32 l24  =         ParamR(18);
   REAL32 l25  =         ParamR(19);
   REAL32 l26  =         ParamR(2O);
   REAL32 l27  =         ParamR(21);
   REAL32 l28  =         ParamR(22);
   INT16  c2   = (INT16) ParamS(23);
   uINT16 t2   = (uINT16)ParamS(24);
   uINT8  f2   = (uINT8) ParamS(25);
   INT16  i2   = (INT16) ParamS(26);
   INT16  n2   = (INT16) ParamS(27);
   uINT8  r    = (uINT8) ParamS(28);
```

```
   /* ----- process search phase ------------------------------- */
   Res = rot_comp(rc); ExitOnError;
   Res = slit(s1); ExitOnError;
   Res = lambda11(px1, l11); ExitOnError;
   Res = compression(c1); ExitOnError;

   /* ----- look for explosive events -------------------------- */
   Res = expl_event_search(t1, f1, i1, n1, lev, tmin, tmax);
         ExitOnError;

   if (Res > (INT32)0)
       /* ----- process study phase ---------------------------- */
       Res = slit(s2); ExitOnError;
       Res = lambda18(px2, l21, l22, l23, l24, l25, l26, l27, l28);
             ExitOnError;
       Res = compression(c2); ExitOnError;

       for (Cnt = 1 to r)
           Res = spectrohelio3(t2, f2, i2, n2); ExitOnError;
       forend;
   ifend;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.09 SCL Program Listing Of Category I

```
/* ----------------------------------------------------------------
POP      : Category I (POPs 25)

Function : Other instruments inform about events of a predefined
           intensity on the Sun.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.0

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables -------------------- */
   INT32  Res; uINT16 Cnt;

   /* ----- definition of program variables -------------------- */
   REAL32 rc =         ParamR(1);
   uINT8  m  = (uINT8) ParamS(2);
   uINT8  s  = (uINT8) ParamS(3);
   uINT16 px = (uINT16)ParamS(4);
   REAL32 l1 =         ParamR(5);
   REAL32 l2 =         ParamR(6);
   REAL32 l3 =         ParamR(7);
   INT16  c  = (INT16) ParamS(8);
   uINT16 t  = (uINT16)ParamS(9);
   uINT8  f  = (uINT8) ParamS(10);
   INT16  i  = (INT16) ParamS(11);
   INT16  n  = (INT16) ParamS(12);
   uINT16 r  = (uINT16)ParamS(13);


   Res = rot_comp(rc); ExitOnError;
   Res = sphel_mode(m); ExitOnError;
   Res = slit(s); ExitOnError;
   Res = lambda13(px, l1, l2, l3); ExitOnError;
   Res = compression(c); ExitOnError;

   for (Cnt = 1 to r)
       Res = spectrohelio3(t, f, i, n); ExitOnError;
       /* --- event? ------------------------------------------- */
       if (cont() > (INT32)0)
           Res = Set_SphelPointCenter( (INT16)contY(), (INT16)contZ());
                 ExitOnError;
       ifend;
   forend;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
```

```
end;
```

9.2.13.10 SCL Program Listing Of Category J

```
/* ----------------------------------------------------------------
POP      : Category J (POPs 11, 12, 13, 16, 20)

Function : Acquire spectroheliograms at the current position until
           that position gets changed.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.0

/* ----- main program ------------------------------------------- */
main;

   /* ----- definition of program variables --------------------- */
   uINT16 Cnt1, Cnt2; INT16 Posz, abs_n2;
   INT32 Res; REAL32 x, Posy0, Posy1;

   /* ----- definition and loading of program parameters -------- */
   REAL32 rc  =         ParamR(1);
   uINT8  m   = (uINT8) ParamS(2);
   uINT16 r0  = (uINT16)ParamS(3);
   uINT8  s1  = (uINT8) ParamS(4);
   uINT16 px1 = (uINT16)ParamS(5);
   REAL32 l11 =         ParamR(6);
   REAL32 l12 =         ParamR(7);
   REAL32 l13 =         ParamR(8);
   REAL32 l14 =         ParamR(9);
   REAL32 l15 =         ParamR(10);
   REAL32 l16 =         ParamR(11);
   REAL32 l17 =         ParamR(12);
   REAL32 l18 =         ParamR(13);
   uINT16 t1  = (uINT16)ParamS(14);
   INT16  c1  = (INT16) ParamS(15);
   uINT8  f1  = (uINT8) ParamS(16);
   INT16  i1  = (INT16) ParamS(17);
   INT16  n1  = (INT16) ParamS(18);
   uINT16 r1  = (uINT16)ParamS(19);
   uINT8  s2  = (uINT8) ParamS(20);
   uINT16 px2 = (uINT16)ParamS(21);
   REAL32 l21 =         ParamR(22);
   REAL32 l22 =         ParamR(23);
   REAL32 l23 =         ParamR(24);
   REAL32 l24 =         ParamR(25);
   REAL32 l25 =         ParamR(26);
   REAL32 l26 =         ParamR(27);
   REAL32 l27 =         ParamR(28);
   REAL32 l28 =         ParamR(29);
   uINT16 t2  = (uINT16)ParamS(30);
   uINT16 px3 = (uINT16)ParamS(31);
```

```
   REAL32 l31 =         ParamR(32);
   REAL32 l32 =         ParamR(33);
   REAL32 l33 =         ParamR(34);
   uINT16 t3  = (uINT16)ParamS(35);
   uINT16 px4 = (uINT16)ParamS(36);
   REAL32 l41 =         ParamR(37);
   REAL32 l42 =         ParamR(38);
   REAL32 l43 =         ParamR(39);
   uINT16 t4  = (uINT16)ParamS(40);
   uINT16 px5 = (uINT16)ParamS(41);
   REAL32 l51 =         ParamR(42);
   REAL32 l52 =         ParamR(43);
   REAL32 l53 =         ParamR(44);
   uINT16 t5  = (uINT16)ParamS(45);
   INT16  c2  = (INT16) ParamS(46);
   uINT8  f2  = (uINT8) ParamS(47);
   INT16  i2  = (INT16) ParamS(48);
   INT16  n2  = (INT16) ParamS(49);
   uINT16 r2  = (uINT16)ParamS(50);

   abs_n2 = (INT16)abs(n2);
   Res = rot_comp(rc); ExitOnError;
   Res = sphel_mode(m); ExitOnError;

   for (Cnt1 = (uINT16)1 to r0)
       /* ----- process phase 1 --------------------------------- */
       Res = slit(s1); ExitOnError;
       Res = lambda18(px1, l11, l12, l13, l14, l15, l16, l17, l18);
             ExitOnError;
       Res = compression(c1); ExitOnError;

       for (Cnt2 = (uINT16)1 to r1)
           Res = spectrohelio3(t1, f1, i1, n1); ExitOnError;
           /* ----- valid flag received? ------------------------ */
           if (cont() > (INT32)0)
               Res = point( (INT16)contY(), (INT16)contZ());
                     ExitOnError;
               goto Phase2;
           ifend;
       forend;

Phase2:
       /* ----- process phase 2 --------------------------------- */
       Res = slit(s2); ExitOnError;
       Res = compression(c2); ExitOnError;

       /* ----- get current position [1 = 1/16"] ---------------- */
       Posy0 = (REAL32)SystemS(32); Posz = (INT16)SystemS(33);

       for (Cnt2 = (uINT16)1 to r2)
           Posy1 = Posy0;

           /* ----- if shifting required, ----------------------- */
```

```
            if (n2 < (INT16)0)

                /* ----- if more than one full step required, ---- */
                if ( (INT16)abs(i2) > (INT16)2)
                    /* ----- shift y by one full step ------------ */
                    x = (Cnt2 - (uINT16)1) % (i2 / (INT16)2);
                    Posy1 = Posy1 + x * 12.16 /* 0.76*16.0 */;

                    /* ----- set new position -------------------- */
                              Res  =  Set_SphelPointCenter((INT16)Posy1,  Posz);
ExitOnError;
                ifend;
            ifend;

            Res = lambda18(px2, l21, l22, l23, l24,
                           l25, l26, l27, l28); ExitOnError;
            Res = spectrohelio3(t2, f2, i2, abs_n2); ExitOnError;

            if (l31 > 0.0)
                Res = lambda13(px3, l31, l32, l33); ExitOnError;
                Res = spectrohelio3(t3, f2, i2, abs_n2); ExitOnError;
            ifend;

            if (l41 > 0.0)
                Res = lambda13(px4, l41, l42, l43); ExitOnError;
                Res = spectrohelio3(t4, f2, i2, abs_n2); ExitOnError;
            ifend;

            if (l51 > 0.0)
                Res = lambda13(px5, l51, l52, l53); ExitOnError;
                Res = spectrohelio3(t5, f2, i2, abs_n2); ExitOnError;
            ifend;
        forend;
    forend;

Exit:
    Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.11 SCL Program Listing Of Category K

```
/* ----------------------------------------------------------------
POP      : Category K (POPs O6)

Function : Perform series of scans to observe either the Sun's
           full disk or the Sun's central meridian.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.0

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables -------------------- */
   INT32 Res;

   /* ----- definition and loading of program parameters -------- */
   REAL32 rc  =         ParamR(1);
   uINT8  s   = (uINT8) ParamS(2);
   INT16  c   = (INT16) ParamS(3);
   uINT16 p   = (uINT16)ParamS(4);
   REAL32 l1  =         ParamR(5);
   REAL32 l2  =         ParamR(6);
   REAL32 l3  =         ParamR(7);
   uINT16 t   = (uINT16)ParamS(8);
   uINT8  f   = (uINT8) ParamS(9);
   INT16  i   = (INT16) ParamS(10);
   INT16  sch = (INT16) ParamS(11);
   INT16  cen = (INT16) ParamS(12);


   Res = rot_comp(rc); ExitOnError;
   Res = slit(s); ExitOnError;
   Res = compression(c); ExitOnError;
   Res = lambda13(p, l1, l2, l3); ExitOnError;

   Res = full_disk(t, f, i, sch, cen); ExitOnError;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.2.13.12 SCL Program Listing Of Category L

```
/* ----------------------------------------------------------------
POP      : Category L (POPs 26)

Function : Acquire spectroheliograms at alternating wavelengths.
---------------------------------------------------------------- */

/* ----- abbreviations ------------------------------------------ */
ExitOnError  ALIAS  if (Res < (INT32)0) goto Exit; ifend
ROT_COMP_OFF ALIAS -1.0

/* ----- main program ------------------------------------------- */
main;
   /* ----- definition of program variables ---------------------- */
   INT32 Res; uINT16 Cnt1, Cnt2;

   /* ----- definition and loading of program parameters -------- */
   REAL32 rc  =         ParamR(1);
   uINT8  s1  = (uINT8) ParamS(2);
   uINT16 px1 = (uINT16)ParamS(3);
   REAL32 l11 =         ParamR(4);
   REAL32 l12 =         ParamR(5);
   REAL32 l13 =         ParamR(6);
   INT16  c1  = (INT16) ParamS(7);
   uINT16 t1  = (uINT16)ParamS(8);
   uINT8  f1  = (uINT8) ParamS(9);
   INT16  i1  = (INT16) ParamS(10);
   INT16  n1  = (INT16) ParamS(11);
   uINT16 r1  = (uINT16)ParamS(12);
   uINT8  s2  = (uINT8) ParamS(13);
   uINT16 px2 = (uINT16)ParamS(14);
   REAL32 l21 =         ParamR(15);
   REAL32 l22 =         ParamR(16);
   REAL32 l23 =         ParamR(17);
   uINT16 px3 = (uINT16)ParamS(18);
   REAL32 l31 =         ParamR(19);
   REAL32 l32 =         ParamR(20);
   REAL32 l33 =         ParamR(21);
   INT16  c2  = (INT16) ParamS(22);
   uINT16 t2  = (uINT16)ParamS(23);
   uINT8  f2  = (uINT8) ParamS(24);
   INT16  i2  = (INT16) ParamS(25);
   INT16  n2  = (INT16) ParamS(26);
   uINT16 r2  = (uINT16)ParamS(27);
```

```
   Res = rot_comp(rc); ExitOnError;

   /* ----- process phase 1 ------------------------------------ */
   Res = slit(s1); ExitOnError;
   Res = lambda13(px1, l11, l12, l13); ExitOnError;
   Res = compression(c1); ExitOnError;

   for (Cnt2 = (uINT16)1 to r1)
       Res = spectrohelio3(t1, f1, i1, n1); ExitOnError;
   forend;

   /* ----- process phase 2 ------------------------------------ */
   Res = slit(s2); ExitOnError;
   Res = lambda13(px2, l21, l22, l23); ExitOnError;
   Res = lambda23(px3, l31, l32, l33); ExitOnError;
   Res = compression(c2); ExitOnError;

   for (Cnt2 = (uINT16)1 to r2)
       Res = spectrohelio4(t2, f2, i2, n2); ExitOnError;
   forend;

Exit:
   Res = rot_comp(ROT_COMP_OFF);
end;
```

9.3 Detailed List Of POPs

This chapter lists all POPs in detail. For each POP, it contains three subsections providing:

1the description of the sequence of observations to be performed based on the POP descriptions as communicated by MPAe (Dr. W. Curdt),
2the POP's default parameter set that can be loaded by the telecommand

init_POP_param<POP nr>

3the telecommand sequence needed to execute the POP.

The execution times of the POPs given in the descriptions are usually computed from the integration times and therefore give minimal times to be expected. They do not take into account the times needed to drive the mechanisms which heavily depend on the actual motor positions.

The memory requirements given in the POP descriptions are usually computed for the low telemetry rate. These are approximate values; the actual requirements depend on many different factors (e.g. motor positions and stepping times, telemetry rate, compression scheme used, etc.) and therefore cannot be computed exactly in advance.

For most of the POPs, the telecommand sequence consists of two telecommands only:

init_POP_param<POP nr>
start_POP<POP nr>

All POP parameter sets are loaded with the default parameters when the software is booted. If a POP's parameters have not been changed subsequently, there is no need to perform the init_POP_param telecommand

before executing that POP.

For batch POPs, the telecommand sequence consists of the starting sequence:

init_POP_param<POP nr>
start_POP <POP nr>

After changing parameters as necessary, the POP can be re-executed:

change_POP_param<POP nr> <POP param nr> <POP param value>
start_POP <POP nr>

In the listings of the telecommand sequences, comments are introduced by the apostrophe character ('). The POPs' default parameter sets use several common definitions to facilitate reading and checking the values. These definitions are explained in the table below.

```
name                    value   remark

                                codes for spectrometer's slits:
SLIT_1_4x300            1        slit 1 (  4" * 300" center)
SLIT_2_1x300            2        slit 2 (  1" * 300" center)
SLIT_3_1x120            3        slit 3 (  1" * 120" top   )
SLIT_4_1x120            4        slit 4 (  1" * 120" center)
SLIT_5_1x120            5        slit 5 (  1" * 120" bottom)
SLIT_6_3x120            6        slit 6 (0.3" * 120" top   )
SLIT_7_3x120            7        slit 7 (0.3" * 120" center)
SLIT_8_3x120            8        slit 8 (0.3" * 120" bottom)

LAM_NONE                0.0      no wavelength (lambda) selected
                                integration time codes:
INT_TIME_60_MS          0        integration time 60 ms
INT_TIME_1_SEC          4        integration time  1 s
INT_TIME_1_MIN          240      integration time  1 min
INT_TIME_1_HOU          14400    integration time  1 h
                                compression scheme codes:
COMP_NONE               5        no compression
COMP_13_SCALE_MIN_MAX   1        bytescale_min_max           (was #13)
COMP_16_SCALE_LOC_HGH   2        bytescale_local_high        (was #16)
COMP_23_ROOT_MIN_MAX    3        squareroot_min_max          (was #23)
COMP_26_ROOT_LOC_HGH    4        squareroot_local_high       (was #26)
COMP_33_LOG_MIN_MAX     5        quasilog_min_max            (was #33)
COMP_53_ROOT_MAX        6        relevant_squareroot_max     (was #53)
COMP_61_GAUSS_A1        7        GAUSS fit type A, 1 moment  (was #61)
COMP_62_GAUSS_A2        8        GAUSS fit type A, 2 moments (was #62)
COMP_64_GAUSS_A4        9        GAUSS fit type A, 4 moments (was #64)
COMP_71_GAUSS_B1        10       GAUSS fit type B, 1 moment  (was #71)
COMP_72_GAUSS_B2        11       GAUSS fit type B, 2 moments (was #72)
COMP_74_GAUSS_B4        12       GAUSS fit type B, 4 moments (was #74)
COMP_81_PRIM_1          13       simple GAUSS fit, 1 moment  (was #81)
COMP_82_PRIM_2          14       simple GAUSS fit, 2 moments (was #82)
COMP_84_PRIM_4          15       simple GAUSS fit, 4 moments (was #84)
COMP_PL_ADD             16       add intensities
COMP_PL_5OF3            17       five moments / three lines

ROT_COMP_OFF           -1.0      rotation compensation OFF
ROT_COMP_STD            0.0      standard rotation compensation

SPHEL_TERM_NONE         0        spectrohelio1 not sensitive
SPHEL_TERM_IIF          1        spectrohelio1 sensitive to IIF
SPHEL_TERM_TC           2        spectrohelio1 sensitive to repoint TC
SPHEL_TERM_IIF_TC       3        spectrohelio1 sensitive to IIF and TC

STEP_SCALE              2        raster steps per full step of 0.76"

STANDARD_SCHRITT        1        standard stepping mode
SCHMIER_SCHRITT        -4        special stepping mode "Schmierschritt"

FULL_DISK               0        scan full disk
CENTRAL_MERIDIAN        1        scan central meridian only
```

9.3.01 POP 01: High Resolution Line Shifts [B]

9.3.01.1 Description

P.L. 20-May-87 (revised 06-Apr-93, 02-Jun-93, W. Curdt)

Spectroheliogram of a 360*360 pixel field (360"*274") at the momentary position in 0.76" increments. Parameter setup:

Slit2
Line 1031.912 Å
Reference pixel 500
Image format F12 (7 s)
Compression scheme log (5)
Integration time 6 s (total duration 36 min)

Point subsequently to positions 30, 90, 150, 210, 270, 330 and acquire a multiple set of spectra. New parameter setup:

Slit2
Lines 1031.912, 1025.722, 1037.613 Å
Reference pixel 500
Image format 3*F12 (21 s)
Compression scheme log (5)
Integration time 18 s
Repetition 50 (total duration approx. 6*15 min)

Alternate parameter set: Lines 1334.532, 1349.38, 1351.657 Å on pixel 700

Preparations:Point to the starting position.

Notes:POP takes 144 minutes and accumulates 1.1 MB data in the memory. The last 15 minutes are used to transmit the data.
Specific Parameters:3 lines, reference pixel, slit, image format, compression scheme, integration time, repetition rate
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP; Slit 2 (3-8) is compatible with image formats 8, 9, 12, 13 (10, 11, 14, 15); image formats determine the total duration.
Category:B

9.3.01.2 Default Parameters

POP 01 Default Parameters (category B)

High resolution line shifts

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Repetition_Phase_1_2	1
03	I	Slit_Phase_1	SLIT_2_1x300
04	I	Reference_Pixel_Phase_1	500
05	R	Lambda1_Phase_1	1031.912
06	R	Lambda2_Phase_1	LAM_NONE
07	R	Lambda3_Phase_1	LAM_NONE
08	R	Lambda4_Phase_1	LAM_NONE
09	R	Lambda5_Phase_1	LAM_NONE
10	R	Lambda6_Phase_1	LAM_NONE
11	R	Lambda7_Phase_1	LAM_NONE
12	R	Lambda8_Phase_1	LAM_NONE
13	I	Comp_Scheme_Phase_1	COMP_33_LOG_MIN_MAX
14	I	Integration_Time_Phase_1	6*INT_TIME_1_SEC
15	I	Image_Format_Phase_1	12
16	I	Raster_Increment_Phase_1	1*STEP_SCALE
17	I	Raster_Steps_Phase_1	360/1
18	I	Rep_Spectrohelio_Phase_1	1
19	I	Slit_Phase_2	SLIT_2_1x300
20	I	Reference_Pixel_Phase_2	500
21	R	Lambda1_Phase_2	1031.912
22	R	Lambda2_Phase_2	1025.722
23	R	Lambda3_Phase_2	1037.613
24	R	Lambda4_Phase_2	LAM_NONE
25	R	Lambda5_Phase_2	LAM_NONE
26	R	Lambda6_Phase_2	LAM_NONE
27	R	Lambda7_Phase_2	LAM_NONE
28	R	Lambda8_Phase_2	LAM_NONE
29	I	Comp_Scheme_Phase_2	COMP_33_LOG_MIN_MAX
30	I	Integration_Time_Phase_2	18*INT_TIME_1_SEC
31	I	Image_Format_Phase_2	12
32	I	Raster_Increment_Phase_2	60*STEP_SCALE
33	I	Raster_Steps_Phase_2	360/60-1
34	I	Rep_Spectrohelio_Phase_2	50

9.3.01.3 Execution Sequence

```
init_POP_param  1
start_POP       1
```

9.3.02 POP 02: Line Shift Variation/Line Ratios Along A Structure [D]

9.3.02.1 Description

P.L. 20-May-87 (revised 06-Apr-93, 02-Jun-93, W. Curdt)

Spectroheliogram of a 360*360 pixel field (360"*274") at the momentary position in 0.76" increments; parameter setup:

Slit2
Line 1031.912 Å
Reference pixel 500
Image format F12 (7 s)
Compression scheme log (5)
Integration time 6 s (total duration 36 min)

Point to central position 180 and acquire 60 times a multiple spectroheliogram of a 360*5 pixel field; parameter setup:

Slit2
Lines 1031.912, 1037.613 Å
Reference pixel 500
Image format F12 (7 s)
Compression scheme log (5)
Integration time 12 s (total duration 60*1 min)

Repeat part 1 (total duration 36 min)

The program takes 151 minutes and accumulates 1.5 MB data in the memory. The last 18 minutes are used to transmit the data.

Preparations:Point to the starting position, line(s), and reference pixel.
Specific parameters:Slit, image format, compression scheme, integration time, scan, repetition rate
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP; Slit 2 (3-8) is compatible with image formats 8, 9, 12, 13 (10, 11, 14, 15); image formats determine the total duration.
Category:D

9.3.02.2 Default Parameters

```
POP 02 Default Parameters (category D)

Line shift variation

Num Type  Name                       Default

01  R     Rotation_Comp              ROT_COMP_OFF
02  I     Slit                       SLIT_2_1x300
03  I     Compression_Scheme         COMP_33_LOG_MIN_MAX

04  I     Reference_Pixel_Phase_1    500
05  R     Lambda1_Phase_1            1031.912
06  I     Integration_Time_Phase_1   6*INT_TIME_1_SEC
07  I     Image_Format_Phase_1       12
08  I     Raster_Increment_Phase_1   1*STEP_SCALE
09  I     Raster_Steps_Phase_1       360/1

10  I     Reference_Pixel_Phase_2    500
11  R     Lambda1_Phase_2            1031.912
12  R     Lambda2_Phase_2            1037.613
13  R     Lambda3_Phase_2            LAM_NONE
14  I     Integration_Time_Phase_2   12*INT_TIME_1_SEC
15  I     Image_Format_Phase_2       12
16  I     Raster_Increment_Phase_2   1*STEP_SCALE
17  I     Raster_Steps_Phase_2       4
18  I     Repetition_Phase_2         60
```

9.3.02.3 Execution Sequence

```
init_POP_param  2
start_POP       2
```

9.3.03 POP 03: Line Ratios At Fixed Location [D]

9.3.03.1 Description

P.L. 20-May-87 (revised 27-Apr-93, 02-Jun-93, W. Curdt)

Solar rotation compensation is ON. Spectroheliogram of a 360*360 pixel field at the momentary position in 0.76" steps; parameter setup:

Slit2
Line 1031.912 Å
Reference pixel 500
Image format F12 (7 s)
Compression scheme log (5)
Integration time 6 s (total duration 36 min)

Point to central position 180 and acquire 60 times a multiple set of spectra; parameter setup:

Slit2
Lines1031.912, 1037.613 Å
Reference pixel500
Image formatF12 (2*7 s)
Compression schemelog (5)
Integration time12 s (total duration 60*12 s)

Repeat part 1 (total duration 36 min)

The program takes 96 minutes and accumulates 0.9 MB data in the memory. The last 12 minutes are used to transmit the data.

Preparations:Point to the starting position, line(s), and reference pixel.
Specific parameters:Slit, image format, compression scheme, integration time, scan, repetition rate
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP; Slit 2 (3-8) is compatible with image formats 8, 9, 12, 13 (10, 11, 14, 15); image formats determine the total duration.
Category: D

9.3.03.2 Default Parameters

```
POP 03 Default Parameters (category D)

Line ratios at fixed location

Num Type  Name                       Default

01  R     Rotation_Comp              ROT_COMP_STD
02  I     Slit                       SLIT_2_1x300
03  I     Compression_Scheme         COMP_33_LOG_MIN_MAX

04  I     Reference_Pixel_Phase_1    500
05  R     Lambda1_Phase_1            1031.912
06  I     Integration_Time_Phase_1   6*INT_TIME_1_SEC
07  I     Image_Format_Phase_1       12
08  I     Raster_Increment_Phase_1   1*STEP_SCALE
09  I     Raster_Steps_Phase_1       360/1

10  I     Reference_Pixel_Phase_2    500
11  R     Lambda1_Phase_2            1031.912
12  R     Lambda2_Phase_2            1037.613
13  R     Lambda3_Phase_2            LAM_NONE
14  I     Integration_Time_Phase_2   12*INT_TIME_1_SEC
15  I     Image_Format_Phase_2       12
16  I     Raster_Increment_Phase_2   0
17  I     Raster_Steps_Phase_2       0
18  I     Repetition_Phase_2         60
```

9.3.03.3 Execution Sequence

```
init_POP_param  3
start_POP       3
```

9.3.04 POP 04: Off Limb Line Profiles [F]

9.3.04.1 Description

P.L. 20-May-87 (revised 02-Apr-93, W. Curdt)

This POP can be combined with #34 and D. Hasslers proposal 8.1.2.20 in the Red Book!
Note that we can select many simultaneous lines, since the integration times are so long!

Lemaire: 1215.67 (Ly α), 1238.821 (N V) Å
Reference Pixel 900

Hassler: 624.943 (Mg X), 629.729 (O V), 1242.03 (Fe XII), 1238.821 (N V) Å.
Reference Pixel 300

Gabriel: 1031.912 (O VI), 1037.613 (O VI) Å
Reference Pixel 500

Multiple spectroheliogram of a 360*400 pixel field at the momentary position outside the disk in 5 step-increments; parameter setup:

Slit1
Lines Ly α 1215.67, N V 1238.821 Å
Reference pixel 900
Image format F9 (2*28 s)
Compression scheme none
Integration time variable (basic integration time 25 s, leading to variations of, e.g., 1.4x25 s to 150x25 s)

The program accumulates almost no data in the memory, the program duration depends on the initial pointing. (E.g., a start at y=1000'', z=125'' would lead to a program duration of 18 hours, with the integration time of the last picture being approx. 1 hour.)

Preparations:Point to the starting position.
Disk-avoidance check in EGSE.
Specific parameters:Slit, image format, compression scheme, integration time, scan, increment, line(s), reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP
Category:F

9.3.04.2 Default Parameters

```
POP 04 Default Parameters (category F)

Off limb line profiles

Num Type  Name                Default

01  I     Slit                SLIT_1_4x300
02  I     Reference_Pixel     900
03  R     Lambda1             1215.670
04  R     Lambda2             1238.821
05  R     Lambda3             LAM_NONE
06  R     Lambda4             LAM_NONE
07  R     Lambda5             LAM_NONE
08  R     Lambda6             LAM_NONE
09  R     Lambda7             LAM_NONE
10  R     Lambda8             LAM_NONE
11  I     Compression_Scheme  COMP_NONE
12  I     Base_Time           25*INT_TIME_1_SEC
13  I     Image_Format        9
14  I     Raster_Increment    0
15  I     Raster_Steps        400/5
16  I     Displacement        5*STEP_SCALE
17  R     Solar_Radius        986.0
18  R     Int_Time_Factor     0.0156227
```

9.3.04.3 Execution Sequence

```
init_POP_param  4
start_POP       4
```

9.3.05 POP 05: Reference Spectra Along A Structure [E]

9.3.05.1 Description

P.L. 20-May-87 / P.MW. 1990 (revised 05-Apr-93, W. Curdt)

Solar rotation compensation is ON. Spectroheliogram of a 120*158 pixel field (120"*120") at the momentary position in 1 step (0.76") increments; parameter setup:

Slit4
Line 1031.912 Å
Reference pixel 500
Image format F14 (2.5 s)
Compression scheme log (5)
Integration time 3 s (total duration 8 min)

Point to central position 60 and acquire in series the total wavelength range on both detector sections (≈45 spectra). Ly α has to be treated with attenuator; parameter setup:

Slit4
Image format F4 (94 s)
Compression scheme log (5)
Integration time 100 s (total duration 75 min)

The program takes 75 minutes (+ overhead) and accumulates no data in the memory.

Preparations:Point to the starting position.

Specific parameters:Slit, image format, compression scheme, integration time, scan, increment, line(s), reference pixel.
Restrictions:unknown
Category:E

9.3.05.2 Default Parameters

```
POP 05 Default Parameters (category E)

Reference spectra along a structure

Num Type  Name                         Default

01  R     Rotation_Comp                ROT_COMP_STD

02  I     Slit_Phase_1                 SLIT_4_1x120
03  I     Reference_Pixel_Phase_1      500
04  R     Lambda_Phase_1               1031.912
05  I     Compression_Scheme_Phase_1   COMP_33_LOG_MIN_MAX
06  I     Integration_Time_Phase_1     3*INT_TIME_1_SEC
07  I     Image_Format_Phase_1         14
08  I     Raster_Increment_Phase_1     1*STEP_SCALE
09  I     Raster_Steps_Phase_1         158/1

10  I     Compression_Scheme_Phase_2   COMP_33_LOG_MIN_MAX
11  I     Integration_Time_Phase_2     100*INT_TIME_1_SEC
12  I     Image_Format_Phase_2         4
13  R     Lambda_Min_Phase_2           800.0
14  R     Lambda_Delta_Phase_2         18.61
15  I     Steps_Phase_2                43
```

9.3.05.3 Execution Sequence

```
init_POP_param  5
start_POP       5
```

9.3.06 POP 06: Full Sun Imaging [K]

9.3.06.1 Description

P.L. 20-May-87 (revised 24-May-93)

Solar rotation compensation is OFF. On the disk 8 swathes of different length will be performed: 1260", 1750", 1980", 2040", 2040", 1980", 1750 ", 1260". The central meridian divides the swathes symmetrically, the swathes are displaced by 270" to cover the entire disk.

On Pos.1 (-630", 945") spectroheliogram of the 360*1260/0.76 field
On Pos.2 (-875", 675") spectroheliogram of the 360*1750/0.76 field
On Pos.3 (-990", 405") spectroheliogram of the 360*1980/0.76 field
On Pos.4 (-1020", 135") spectroheliogram of the 360*2040/0.76 field
On Pos.5 (-1020",-135") spectroheliogram of the 360*2040/0.76 field
On Pos.6 (-990",-405") spectroheliogram of the 360*1980/0.76 field
On Pos.7 (-875",-675") spectroheliogram of the 360*1750/0.76 field
On Pos.8 (-630",-945") spectroheliogram of the 360*1260/0.76 field

parameter setup:

Slit2
Lines1031.912, 1037.613, 1025.722 Å
Reference pixel 500
Image format F45 (1.5)
Compression scheme (17), see Red Book (3*M0, 1*M1, 1*M2)
Integration time2 s (4 partial exposures per image)
total duration 18500 s

The program takes approximately 5 h 11 minutes and accumulates no data in the memory.

Preparations:none
Specific parameters:slit, image format, integration time, scan, increment, lines, reference pixel.
Restrictions:unknown
Category:K

9.3.06.2 Default Parameters

POP 06 Default Parameters (category K)

Full Sun imaging

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Slit	SLIT_2_1x300
03	I	Compression_Scheme	COMP_PL_5OF3
04	I	Reference_Pixel	500
05	R	Lambda1	1031.912
06	R	Lambda2	1037.613
07	R	Lambda3	1025.722
08	I	Integration_Time	2*INT_TIME_1_SEC
09	I	Image_Format	45
10	I	Raster_Increment	1*STEP_SCALE
11	I	Step	SCHMIER_SCHRITT
12	I	Central_Meridian	FULL_DISK

9.3.06.3 Execution Sequence

init_POP_param	6
start_POP	6

9.3.07 POP 07: Evolution Of Structures [A]

9.3.07.1 Description

P.L. 20-May-87 (revised 02-Apr-93, 02-Jun-93, W. Curdt)

Multiple spectroheliogram of a 360*360 pixel field (360"*274") with moment calculation; parameter setup:

Slit2
Lines 1242.804, 1253.467, 625.130, 629.729 Å
Reference pixel 625
Image format 4*F43 (10 s)
Compression scheme prim4 (15)
Integration time 8 s
Repetition 5

The program takes 264 minutes and accumulates 1.8 MB data in the memory. The last 23 minutes are used to transmit the data.

Preparations:Point to the starting position.
Specific parameters:Slit, image format, repetition rate, integration time, scan,increment, line(s), reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP; slit 2 (3-8) is compatible with image formats 8, 9, 12, 13 (10, 11, 14, 15); image formats determine the total duration.
Category:A

9.3.07.2 Default Parameters

```
POP 07 Default Parameters (category A)

Evolution of structures

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_2_1x300
03  I     Reference_Pixel     625
04  R     Lambda1             1242.804
05  R     Lambda2             1253.467
06  R     Lambda3              625.130
07  R     Lambda4              629.729
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_84_PRIM_4
13  I     Integration_Time    8*INT_TIME_1_SEC
14  I     Image_Format        43
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        360/1
17  I     Repetition          5
```

9.3.07.3 Execution Sequence

```
init_POP_param  7
start_POP       7
```

9.3.08 POP 08: Explosive Events Temporal Analysis [H]

9.3.08.1 Description

O.K.-M. 30-Oct-88 (revised 02-Jun-93, W. Curdt)

The observation program has two phases, search and study. During search two complete 120"*120" spectroheliograms are acquired at minimum. The maximum duration of this phase has to be compatible with the available memory, and a time limit has to be given. Search will finish if the trigger threshold for EE (cf. submode expl_event_search) is exceeded somewhere. The co-ordinates of the EE are candidates for sending an IIF.
During study, the FOV is limited to a 24"*5" area about the EE and spectro-heliograms are acquired with high frequency; parameter setup:

Slit4
Line 1031.912 Å
Reference pixel 500
Image format Search F10 (4.6 s)
Image format Study F31 (1 s)
Compression scheme log (5)
Integration time Search 2 s
Integration time Study 1 s
Trigger threshold 70 %
Repetition Search 2 - 10 (minimum - maximum)
Repetition Study 60

Study takes 25 minutes and accumulates no data in the memory.
Search takes 8 minutes at minimum and 40 minutes at maximum, with the following assumptions. The data accumulation rate is 120*50 Byte/2 s = 3

KB/s, the telemetry rate is 10500/8 Byte/s ≈ 1.2 KB/s.
A single spectroheliogram takes 240 s and produces 720 KB data, of which ≈400 kB have to be accumulated in the memory. Thus, the memory read-out takes 6000 s = 100 min, at maximum.

Preparations:Point to the starting position.
Specific parameters:Slit, image formats, repetition rates, integration time, scan, increment, line(s), reference pixel.
Restrictions:Reduction of available memory shortens search phase.
Category: H

9.3.08.2 Default Parameters

```
POP 08 Default Parameters (category H)

Explosive events temporal analysis

Num Type  Name                          Default

01  R     Rotation_Comp                 ROT_COMP_OFF
02  I     Slit_Phase_1                  SLIT_4_1x120
03  I     Reference_Pixel_Phase_1       500
04  R     Lambda_Phase_1                1031.912
05  I     Compression_Scheme_Phase_1    COMP_33_LOG_MIN_MAX
06  I     Integration_Time_Phase_1      2*INT_TIME_1_SEC
07  I     Image_Format_Phase_1          10
08  I     Raster_Increment_Phase_1      1*STEP_SCALE
09  I     Raster_Steps_Phase_1          158/1
10  I     Level_Phase_1                 70
11  I     Time_Min_Phase_1              8*INT_TIME_1_MIN
12  I     Time_Max_Phase_1              40*INT_TIME_1_MIN

13  I     Slit_Phase_2                  SLIT_4_1x120
14  I     Reference_Pixel_Phase_2       500
15  R     Lambda1_Phase_2               1031.912
16  R     Lambda2_Phase_2               LAM_NONE
17  R     Lambda3_Phase_2               LAM_NONE
18  R     Lambda4_Phase_2               LAM_NONE
19  R     Lambda5_Phase_2               LAM_NONE
20  R     Lambda6_Phase_2               LAM_NONE
21  R     Lambda7_Phase_2               LAM_NONE
22  R     Lambda8_Phase_2               LAM_NONE
23  I     Compression_Scheme_Phase_2    COMP_33_LOG_MIN_MAX
24  I     Integration_Time_Phase_2      1*INT_TIME_1_SEC
25  I     Image_Format_Phase_2          31
26  I     Raster_Increment_Phase_2      1*STEP_SCALE
27  I     Raster_Steps_Phase_2          4
28  I     Rep_Spectrohelio_Phase_2      60
```

9.3.08.3 Execution Sequence

```
IeMaster
init_POP_param  8
```

```
start_POP       8
IeStandBy
```

9.3.09 POP 09: Lyman α 'Calibration' [12*A]

9.3.09.1 Description

J.-C.V. 24-Jan-89 (revised 25-May-93, W. Curdt)

Solar rotation compensation is ON; 12 spectroheliograms of a 360 (or 120, resp.) * 360 pixel field at the momentary position in 0.76"-increments; parameter setup:

Line1215.67 Å
Integration time 1 s
Compression scheme prim1 (13)

special parameter setup:

SlitRef	Pixel	Image format
2	15	F18
3	1009	F20
4	1009	F20
5	1009	F20
3	15	F20
4	15	F20
5	15	F20
8	15	F20
8	500	F20
8	900	F20
8	1009	F20
2	1009	F18

The program takes 74 minutes (12 * approx. 6 min) and accumulates no data in the memory.

Preparations:Point to starting position (quiet region near the equator)
Specific parameters:Slit, image format, integration time, scan, increment, line, reference pixel.
Restrictions:unknown
Category: A ; (batch of 12 spectrohelio's)

9.3.09.2 Default Parameters

```
POP O9 Default Parameters (category A, batch 12*A)

Lyman alpha calibration

Num Type  Name                Default

O1  R     Rotation_Comp       ROT_COMP_STD
O2  I     Slit                2
O3  I     Reference_Pixel     15
O4  R     Lambda1             1215.67O
O5  R     Lambda2             LAM_NONE
O6  R     Lambda3             LAM_NONE
O7  R     Lambda4             LAM_NONE
O8  R     Lambda5             LAM_NONE
O9  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_81_PRIM_1
13  I     Integration_Time    1*INT_TIME_1_SEC
14  I     Image_Format        18
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        360/1
17  I     Repetition          1
```

9.3.09.3 Execution Sequence

This POP is executed by calling G-POP A 12 times and changing the parameters as necessary between the calls.

```
' POP O9 Batch Process
'
' Lyman alpha calibration
'
' the following params of POP category A will be modified:
' param O2 Slit
' param O3 Reference_Pixel
' param 14 Image_Format

 init_POP_param    9                  ' execute POP, step 1 of 12
' change_POP_param  9   2     2
' change_POP_param  9   3    15
' change_POP_param  9  14    18
```

```
 start_POP         9

 change_POP_param  9   2     3        ' execute POP, step 2 of 12
 change_POP_param  9   3  1009
 change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     4        ' execute POP, step 3 of 12
' change_POP_param  9   3  1009
' change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     5        ' execute POP, step 4 of 12
' change_POP_param  9   3  1009
' change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     3        ' execute POP, step 5 of 12
 change_POP_param  9   3    15
' change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     4        ' execute POP, step 6 of 12
' change_POP_param  9   3    15
' change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     5        ' execute POP, step 7 of 12
' change_POP_param  9   3    15
' change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     8        ' execute POP, step 8 of 12
' change_POP_param  9   3    15
' change_POP_param  9  14    20
 start_POP         9

' change_POP_param  9   2     8         ' execute POP, step 9 of 12
 change_POP_param  9   3   500
' change_POP_param  9  14    20
 start_POP         9

' change_POP_param  9   2     8         ' execute POP, step 10 of 12
 change_POP_param  9   3   900
' change_POP_param  9  14    20
 start_POP         9

' change_POP_param  9   2     8         ' execute POP, step 11 of 12
 change_POP_param  9   3  1009
' change_POP_param  9  14    20
 start_POP         9

 change_POP_param  9   2     2        ' execute POP, step 12 of 12
```

```
' change_POP_param  9   3  1009
 change_POP_param  9  14    18
 start_POP         9
```

9.3.10 POP 10: Fine Structure Of A Prominence [9*A]

9.3.10.1 Description

J.-C.V. 24-Jan-89

alternate title: Deuterium abundance ratio D/H

P.M. 31-Oct-88 (revised 04-May-93, 28-May-93, W. Curdt)

9 Spectroheliograms of a 120*120 pixel field at the momentary position in 0.76" increments; parameter setup:

Integration time1 s
Compression scheme log (5)

special parameter setup:

Slit RefPixelLine(s)Image format

710091215.67 ÅF10 (4.6 s)
4900584.334 ÅF14 (2.3 s)
45001025.722 ÅF10 (4.6 s)
4900504.0 ÅF10 (4.6 s)
4500972.537 Å F14 (2.3 s)
4700937.803, 949.743 2*F14 (4.6 s)
4350870.0, 864.0, 858.0 Å3*F14 (6.9 s)
4700920.963, 926.226, 930.748 Å3*F14 (6.9 s)
4350912.0, 906.0, 900 Å 3*F14 (6.9 s)

The study phase takes 9 * (approx. 2) minutes and accumulates 5.45 MB data in the memory. It takes 69 minutes to transmit the data. Total duration: 88 minutes.

Preparations:Point to the starting position. Select prominence near the central meridian.
Specific parameters:Slits, image format, integration time, scan, increment, line(s), reference pixel.
Restrictions: unknown
Category: 9*A, run as batch

9.3.10.2 Default Parameters

```
POP 10 Default Parameters (category A, batch 9*A)

Fine structure of a prominence

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                7
03  I     Reference_Pixel     1009
04  R     Lambda1             1215.670
05  R     Lambda2             LAM_NONE
06  R     Lambda3             LAM_NONE
07  R     Lambda4             LAM_NONE
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
13  I     Integration_Time    1*INT_TIME_1_SEC
14  I     Image_Format        10
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        120/1
17  I     Repetition          1
```

9.3.10.3 Execution Sequence

This POP is executed by calling G-POP A 9 times and changing the parameters as necessary between the calls.

```
' POP 10 Batch Process
'
' Fine structure of a prominence
'
' the following params of POP category A will be modified:
' param 02 Slit
' param 03 Reference_Pixel
' param 04 Lambda1
```

```
' param 05 Lambda2
' param 06 Lambda3
' param 14 Image_Format

 init_POP_param    10                ' execute POP, step 1 of 9
' change_POP_param  10   2  7
' change_POP_param  10   3  1009
' change_POP_param  10   4  4497f571h  ' 1215.670
' change_POP_param  10   5  00000000h  ' 0.0
' change_POP_param  10   6  00000000h  ' 0.0
' change_POP_param  10  14  10
 start_POP         10

 change_POP_param  10   2  4          ' execute POP, step 2 of 9
 change_POP_param  10   3  900
 change_POP_param  10   4  44121560h  ' 584.334
' change_POP_param  10   5  00000000h  ' 0.0
' change_POP_param  10   6  00000000h  ' 0.0
 change_POP_param  10  14  14
 start_POP         10

' change_POP_param  10   2  4          ' execute POP, step 3 of 9
 change_POP_param  10   3  500
 change_POP_param  10   4  4480371bh  ' 1025.722
' change_POP_param  10   5  00000000h  ' 0.0
' change_POP_param  10   6  00000000h  ' 0.0
 change_POP_param  10  14  10
 start_POP         10

' change_POP_param  10   2  4          ' execute POP, step 4 of 9
 change_POP_param  10   3  900
 change_POP_param  10   4  43fc0000h  ' 504.0
' change_POP_param  10   5  00000000h  ' 0.0
' change_POP_param  10   6  00000000h  ' 0.0
' change_POP_param  10  14  10
 start_POP         10

' change_POP_param  10   2  4          ' execute POP, step 5 of 9
 change_POP_param  10   3  500
 change_POP_param  10   4  4473225eh  ' 972.537
' change_POP_param  10   5  00000000h  ' 0.0
' change_POP_param  10   6  00000000h  ' 0.0
 change_POP_param  10  14  14
 start_POP         10

' change_POP_param  10   2  4          ' execute POP, step 6 of 9
 change_POP_param  10   3  700
 change_POP_param  10   4  446a7364h  ' 937.803
 change_POP_param  10   5  446d6f8dh  ' 949.743
' change_POP_param  10   6  00000000h  ' 0.0
' change_POP_param  10  14  14
 start_POP         10
```

```
' change_POP_param  10   2  4          ' execute POP, step 7 of 9
 change_POP_param  10   3  350
 change_POP_param  10   4  44598000h  ' 870.000
 change_POP_param  10   5  44580000h  ' 864.000
 change_POP_param  10   6  44568000h  ' 858.000
' change_POP_param  10  14  14
 start_POP         10

' change_POP_param  10   2  4          ' execute POP, step 8 of 9
 change_POP_param  10   3  700
 change_POP_param  10   4  44663da2h  ' 920.963
 change_POP_param  10   5  44678e77h  ' 926.226
 change_POP_param  10   6  4468afdfh  ' 930.748
' change_POP_param  10  14  14
 start_POP         10

' change_POP_param  10   2  4          ' execute POP, step 9 of 9
 change_POP_param  10   3  350
 change_POP_param  10   4  44640000h  ' 912.000
 change_POP_param  10   5  44628000h  ' 906.000
 change_POP_param  10   6  44610000h  ' 900.000
' change_POP_param  10  14  14
 start_POP         10
```

9.3.11 POP 11: Ephemeral Active Region Correlative Observation [J]

9.3.11.1 Description

F.K. 24-Feb-89 (revised 02-Apr-93, 28-May-93, W. Curdt)

Spectroheliogram of a 120*120 pixel field (120"*91") with moment calculation with Solar rotation compensation ON; parameter setup:

Slit4
Line1260.421, 1258.795 Å
Reference pixel300
Image format2*F42 (0.8 s)
Compression schemeprim2 (14)
Integration time1 s
Duration120 s

This phase is executed up to a maximum of 60 times to allow repointing.

Select position by RT cmd; multiple spectroheliogram of the selected 120*60 pixel field (120"*46") with moment calculation; parameter setup:

Slit4
Lines1260.421, 1242.804, 625.130, 1258.795 Å
Reference pixel300
Image format4*F42 (1.6 s)
Compression schemeprim2 (14)82
Integration time2 s
Duration120 s

Both program parts are repeated 6 times. The full program takes 24 minutes and accumulates no data in the memory. Spectroscope at fixed position for both parts!

Preparations:Point to the starting position, together with ground observations.
Specific parameters:Slit, image format, repetition rate, integration time, scan, increment, line(s), reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP; slit 3-8 is compatible with image formats 20, 21; image formats determine the total duration.
Category:J, 6*[max. 60*(phase1), repoint, (phase2)]

9.3.11.2 Default Parameters

POP 11 Default Parameters (category J)

Empheral active region correlative observation

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_STD
02	I	Spectrohelio_Mode	SPHEL_TERM_TC
03	I	Repetition_Phase_1_2	6
04	I	Slit_Phase_1	SLIT_4_1x120
05	I	Reference_Pixel_Phase_1	300
06	R	Lambda1_Phase_1	1260.421
07	R	Lambda2_Phase_1	1258.795
08	R	Lambda3_Phase_1	LAM_NONE
09	R	Lambda4_Phase_1	LAM_NONE
10	R	Lambda5_Phase_1	LAM_NONE
11	R	Lambda6_Phase_1	LAM_NONE
12	R	Lambda7_Phase_1	LAM_NONE
13	R	Lambda8_Phase_1	LAM_NONE
14	I	Integration_Time_Phase_1	1*INT_TIME_1_SEC
15	I	Compression_Scheme_Phase_1	COMP_82_PRIM_2
16	I	Image_Format_Phase_1	42
17	I	Raster_Increment_Phase_1	1*STEP_SCALE
18	I	Raster_Steps_Phase_1	120/1
19	I	Repetition_Phase_1	60
20	I	Slit_Phase_2	SLIT_4_1x120
21	I	Reference_Pixel_Phase_2	300
22	R	Lambda1_Phase_2	1260.421
23	R	Lambda2_Phase_2	1242.804
24	R	Lambda3_Phase_2	625.130
25	R	Lambda4_Phase_2	1258.795
26	R	Lambda5_Phase_2	LAM_NONE
27	R	Lambda6_Phase_2	LAM_NONE
28	R	Lambda7_Phase_2	LAM_NONE
29	R	Lambda8_Phase_2	LAM_NONE
30	I	Integration_Time_Phase_2	2*INT_TIME_1_SEC
31	I	Reference_Pixel_3_Phase_2	0
32	R	Lambda1_3_Phase_2	LAM_NONE
33	R	Lambda2_3_Phase_2	LAM_NONE
34	R	Lambda3_3_Phase_2	LAM_NONE
35	I	Integration_Time_3_Phase_2	0
36	I	Reference_Pixel_4_Phase_2	0
37	R	Lambda1_4_Phase_2	LAM_NONE
38	R	Lambda2_4_Phase_2	LAM_NONE
39	R	Lambda3_4_Phase_2	LAM_NONE

```
40  I     Integration_Time_4_Phase_2    0

41  I     Reference_Pixel_5_Phase_2     0
42  R     Lambda1_5_Phase_2             LAM_NONE
43  R     Lambda2_5_Phase_2             LAM_NONE
44  R     Lambda3_5_Phase_2             LAM_NONE
45  I     Integration_Time_5_Phase_2    0

46  I     Compression_Scheme_Phase_2    COMP_82_PRIM_2
47  I     Image_Format_Phase_2          42
48  I     Raster_Increment_Phase_2      1*STEP_SCALE
49  I     Raster_Steps_Phase_2          60/1
50  I     Repetition_Phase_2            1
```

9.3.11.3 Execution Sequence

```
IeReceiver
init_POP_param  11
start_POP       11
IeStandBy
```

9.3.12 POP 12: Bright Point Diagnostic [J]

9.3.12.1 Description

O.V. 24-Jan-89 / 25-Feb-93 (revised 05-Apr-93, W. Curdt)

Assumes simultaneous X-ray and magnetic field observations, pointing position near the centre of the disk covering a bright point. RT Cmd Capability.

Phase 1:
Multiple spectroheliogram of a 360*158 pixel field (360"*120") with moment calculation and Solar rotation compensation; parameter setup:
Slit2
Lines 11253.467 (C I), 1242.804 (N V), 625.130 (O VI),
1242.01 (Fe XII), 1238.821 (N V),
1218.406 (O V) Å
Reference pixel110
Image format6*F42 (2.4 s)
Compression schemeprim2 (14)
Integration time4 s

This phase is executed up to a maximum of 10 times to allow repointing.

Phase 2:
Multiple spectroheliogram of a 360*33 pixel field (360"*25") with moment calculation and Solar rotation compensation; parameter setup:
Lines 11253.467, 1242.804, 625.130, 1242.01, 1238.821,
1218.406 Å
Reference pixel110

Image format11*F30 (11*0.5 s)
Compression schemelog (5)
Integration time1 s

Lines 21175.711 Å (C III)
Reference pixel400
Integration time1 s

Lines 3977.020 Å (C III)
Reference pixel500
Integration time1 s

Lines 41533.432 (Si III), 1550.774 (C IV),
1542.177 (C I) Å
Reference pixel738
Integration time1 s

This phase is executed 100 times.

The full program takes 10*158*8 s (3.5 h) and accumulates no data in the memory. If a dynamical event is diagnosed in the EOF, a flag and the scan position have to be commanded. Following this, the POP switches to a small scan mode, i.e., the new pointing position is taken and only 24*0.76" steps will be scanned. Spectra will be transmitted in format F30 (11*0.5 s) and the integration time is 1 s each. The small scan mode takes 60 minutes and requires 4 MByte of memory.

Specific parameters:Slit, image format, repetition rate, integration time, scan, increment, line(s), reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP.
Category:J, [max. 10*(phase1), repoint, 100*(phase2)]

9.3.12.2 Default Parameters

POP 12 Default Parameters (category J)

Bright point diagnostic

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Spectrohelio_Mode	SPHEL_TERM_TC
03	I	Repetition_Phase_1_2	1
04	I	Slit_Phase_1	SLIT_2_1x300
05	I	Reference_Pixel_Phase_1	110
06	R	Lambda1_Phase_1	1253.467
07	R	Lambda2_Phase_1	1242.804
08	R	Lambda3_Phase_1	625.130
09	R	Lambda4_Phase_1	1242.010
10	R	Lambda5_Phase_1	1238.821
11	R	Lambda6_Phase_1	1218.406
12	R	Lambda7_Phase_1	LAM_NONE
13	R	Lambda8_Phase_1	LAM_NONE
14	I	Integration_Time_Phase_1	4*INT_TIME_1_SEC
15	I	Compression_Scheme_Phase_1	COMP_82_PRIM_2
16	I	Image_Format_Phase_1	42
17	I	Raster_Increment_Phase_1	1*STEP_SCALE
18	I	Raster_Steps_Phase_1	158/1
19	I	Repetition_Phase_1	10
20	I	Slit_Phase_2	SLIT_2_1x300
21	I	Reference_Pixel_Phase_2	110
22	R	Lambda1_Phase_2	1253.467
23	R	Lambda2_Phase_2	1242.804
24	R	Lambda3_Phase_2	625.130
25	R	Lambda4_Phase_2	1242.010
26	R	Lambda5_Phase_2	1238.821
27	R	Lambda6_Phase_2	1218.406
28	R	Lambda7_Phase_2	LAM_NONE
29	R	Lambda8_Phase_2	LAM_NONE
30	I	Integration_Time_Phase_2	1*INT_TIME_1_SEC
31	I	Reference_Pixel_3_Phase_2	400
32	R	Lambda1_3_Phase_2	1175.711
33	R	Lambda2_3_Phase_2	LAM_NONE
34	R	Lambda3_3_Phase_2	LAM_NONE
35	I	Integration_Time_3_Phase_2	1*INT_TIME_1_SEC

```
36  I     Reference_Pixel_4_Phase_2     500
37  R     Lambda1_4_Phase_2             977.020
38  R     Lambda2_4_Phase_2             LAM_NONE
39  R     Lambda3_4_Phase_2             LAM_NONE
40  I     Integration_Time_4_Phase_2    1*INT_TIME_1_SEC

41  I     Reference_Pixel_5_Phase_2     738
42  R     Lambda1_5_Phase_2             1533.432
43  R     Lambda2_5_Phase_2             1550.774
44  R     Lambda3_5_Phase_2             1542.177
45  I     Integration_Time_5_Phase_2    1*INT_TIME_1_SEC

46  I     Compression_Scheme_Phase_2    COMP_33_LOG_MIN_MAX
47  I     Image_Format_Phase_2          30
48  I     Raster_Increment_Phase_2      1*STEP_SCALE
49  I     Raster_Steps_Phase_2          32
50  I     Repetition_Phase_2            100
```

9.3.12.3 Execution Sequence

```
IeReceiver
init_POP_param  12
start_POP       12
IeStandBy
```

9.3.13 POP 13: Active Structure Dynamics [J]

9.3.13.1 Description

P.Mn. 24-Jan-89 (revised 28-May-93)

Solar rotation compensation is ON.

Part 1: Reference image with moment calculation; parameter setup:

Field360*360 pixel with 0.76" raster
Slit 2
Lines 1533.432, 1548.202 Å
Reference pixel 738
Image format 2*F41 (2.5 s)
Compression scheme prim2 (14)
Integration time 2.5 s

This phase is executed up to a maximum of 10 times to allow repointing.

Part 2: Selection of the pointing position. Observation with moment calculation; parameter setup:

Field120*150 pixel with 5*0.76" raster
Slit 4
Lines 1533.432, 1548.202, 1550.774 Å
Reference pixel 738
Image format 3*F42 (1.2 s)
Compression scheme prim2 (14)
Integration time 2 s

Repetition 100, starting point shifts by n*0.76" mod 5 !

The program takes 15 + 300 minutes and accumulates no data in the memory.

Alternate line set: 1025.722, 1031.912, 1037.613 Å on 650

Preparations:cf. text
Specific parameters:Slits, image format, repetition rate, integration time, scan, increment, line(s), reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP; Slit 3-8 is compatible with image formats 20, 21; image formats determine the total duration.
Category:J, [max. 10*(phase1), repoint, 100*(phase2)]

9.3.13.2 Default Parameters

```
POP 13 Default Parameters (category J)

Active structure dynamics

Num Type  Name                          Default

01  R     Rotation_Comp                 ROT_COMP_STD
02  I     Spectrohelio_Mode             SPHEL_TERM_TC
03  I     Repetition_Phase_1_2          1

04  I     Slit_Phase_1                  SLIT_2_1x300
05  I     Reference_Pixel_Phase_1       738
```

```
06  R     Lambda1_Phase_1              1533.432
07  R     Lambda2_Phase_1              1548.202
08  R     Lambda3_Phase_1              LAM_NONE
09  R     Lambda4_Phase_1              LAM_NONE
10  R     Lambda5_Phase_1              LAM_NONE
11  R     Lambda6_Phase_1              LAM_NONE
12  R     Lambda7_Phase_1              LAM_NONE
13  R     Lambda8_Phase_1              LAM_NONE
14  I     Integration_Time_Phase_1     25*INT_TIME_1_SEC/10
15  I     Compression_Scheme_Phase_1   COMP_82_PRIM_2
16  I     Image_Format_Phase_1         41
17  I     Raster_Increment_Phase_1     1*STEP_SCALE
18  I     Raster_Steps_Phase_1         360/1
19  I     Repetition_Phase_1           10

20  I     Slit_Phase_2                 SLIT_4_1x120
21  I     Reference_Pixel_Phase_2      738
22  R     Lambda1_Phase_2              1533.432
23  R     Lambda2_Phase_2              1548.202
24  R     Lambda3_Phase_2              1550.774
25  R     Lambda4_Phase_2              LAM_NONE
26  R     Lambda5_Phase_2              LAM_NONE
27  R     Lambda6_Phase_2              LAM_NONE
28  R     Lambda7_Phase_2              LAM_NONE
29  R     Lambda8_Phase_2              LAM_NONE
30  I     Integration_Time_Phase_2     2*INT_TIME_1_SEC

31  I     Reference_Pixel_3_Phase_2    0
32  R     Lambda1_3_Phase_2            LAM_NONE
33  R     Lambda2_3_Phase_2            LAM_NONE
34  R     Lambda3_3_Phase_2            LAM_NONE
35  I     Integration_Time_3_Phase_2   0

36  I     Reference_Pixel_4_Phase_2    0
37  R     Lambda1_4_Phase_2            LAM_NONE
38  R     Lambda2_4_Phase_2            LAM_NONE
39  R     Lambda3_4_Phase_2            LAM_NONE
40  I     Integration_Time_4_Phase_2   0

41  I     Reference_Pixel_5_Phase_2    0
42  R     Lambda1_5_Phase_2            LAM_NONE
43  R     Lambda2_5_Phase_2            LAM_NONE
44  R     Lambda3_5_Phase_2            LAM_NONE
45  I     Integration_Time_5_Phase_2   0

46  I     Compression_Scheme_Phase_2   COMP_82_PRIM_2
47  I     Image_Format_Phase_2         42
48  I     Raster_Increment_Phase_2     5*STEP_SCALE
49  I     Raster_Steps_Phase_2         -150/5
50  I     Repetition_Phase_2           100
```

9.3.13.3 Execution Sequence

```
IeReceiver
init_POP_param  13
start_POP       13
IeStandBy
```

9.3.14 POP 14: Vector Velocity Fields In Structures Above The Limbs [B]

9.3.14.1 Description

V.B. 24-Jan-89 (revised 25-May-93; revised 04-Aug-94, K. Wilhelm)

A west-limb observation requires for 7 days a day-to-day image of the target (at least a 360*2000 pixel field) in O VI and Ly β. For an east-limb observation this image has to be taken after the observation.

2 spectroheliograms across the limb; parameter setup:

Field120*120 pixel in 0.76" raster
Slit 4
Lines 1025.722 (Ly ß), 1031.912, 1037.613 Å
Reference pixel 500
Image format 3*F14 (6.9 s)
Compression scheme log (5)
Integration time 7 s

Repetition with line 1215.67 Å on reference pixel 950 (on BCP).
Integration time3 s

total duration 20 minutes without accumulation of data in the memory.

Preparations:initial pointing just inside the limb
Specific parameters:Slit, image formats, integration times, scan, increment, line(s), reference pixel.
Category: B

9.3.14.2 Default Parameters

POP 14 Default Parameters (category B)

Vector velocity fields in structures above the limbs

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Repetition_Phase_1_2	1
03	I	Slit_Phase_1	SLIT_4_1x120
04	I	Reference_Pixel_Phase_1	500
05	R	Lambda1_Phase_1	1025.722
06	R	Lambda2_Phase_1	1031.912
07	R	Lambda3_Phase_1	1037.613
08	R	Lambda4_Phase_1	LAM_NONE
09	R	Lambda5_Phase_1	LAM_NONE
10	R	Lambda6_Phase_1	LAM_NONE
11	R	Lambda7_Phase_1	LAM_NONE
12	R	Lambda8_Phase_1	LAM_NONE
13	I	Comp_Scheme_Phase_1	COMP_33_LOG_MIN_MAX
14	I	Integration_Time_Phase_1	7*INT_TIME_1_SEC
15	I	Image_Format_Phase_1	14
16	I	Raster_Increment_Phase_1	1*STEP_SCALE
17	I	Raster_Steps_Phase_1	120/1
18	I	Rep_Spectrohelio_Phase_1	1
19	I	Slit_Phase_2	SLIT_4_1x120
20	I	Reference_Pixel_Phase_2	950
21	R	Lambda1_Phase_2	1215.670
22	R	Lambda2_Phase_2	LAM_NONE
23	R	Lambda3_Phase_2	LAM_NONE
24	R	Lambda4_Phase_2	LAM_NONE
25	R	Lambda5_Phase_2	LAM_NONE
26	R	Lambda6_Phase_2	LAM_NONE
27	R	Lambda7_Phase_2	LAM_NONE
28	R	Lambda8_Phase_2	LAM_NONE
29	I	Comp_Scheme_Phase_2	COMP_33_LOG_MIN_MAX
30	I	Integration_Time_Phase_2	3*INT_TIME_1_SEC
31	I	Image_Format_Phase_2	14
32	I	Raster_Increment_Phase_2	1*STEP_SCALE
33	I	Raster_Steps_Phase_2	120/1
34	I	Rep_Spectrohelio_Phase_2	1

9.3.14.3 Execution Sequence

```
init_POP_param  14
start_POP       14
```

9.3.15 POP 15: Star Spectra And Coronal Streamers [G]

9.3.15.1 Description

P.L. 24-Jan-89 (revised 02-Jun-93, W. Curdt (see also POPs 5 and 27))

Detection and tracking of a star across the full FOV, i.e. 12 px*64'. For star observations the orbital drift of 0.76" per 18.5 s has to be compensated. Acquire in series the full wavelength range onto both detector sections (≈45 spectra);

parameter setup for detection phase:

Slit1
Integration time 10 s
Level 100 (2*dark signal)

parameter setup for study phase:

Slit1
Integration time 18.5 s
compression scheme none
image format 1024*12 (pixels index-5 to index+6)
5052 raster steps!

The program takes 25.9 hours at maximum and accumulates no data in the memory

Preparations:Initial pointing according to orbit predictions at the extreme position of the FOV. Avoid disk !

Specific parameters:Image format, integration time.
Restrictions:The FOV has to cover the orbital drift of 550" in total.
Category:G

9.3.15.2 Default Parameters

```
POP 15 Default Parameters (category G)

Star spectra and coronal streamers

Num Type  Name                 Default

O1  I     Slit                 SLIT_1_4x300
O2  I     Maximum_Search_Time  3600
O3  R     Time_Step            18.5
O4  I     Images_Acquired      6
O5  I     Dark_Signal          -1
O6  R     Lambda_Start         800.0
O7  R     Lambda_Step          18.61
O8  I     Images_Refspec       43
```

9.3.15.3 Execution Sequence

```
init_POP_param  15
start_POP       15
```

9.3.16 POP 16: Turbulences And Flows [J]

9.3.16.1 Description

K.W. 25-Sep-88 (revised 12-May-93, W. Curdt)

Solar rotation compensation is ON.
Reference image with moment calculation; parameter setup:
Field360*360 pixel in 0.76" step raster
Slit2
Lines1253.467 (C I), 1242.01 (Fe XII),
1238.821 (N V) Å
Reference pixel110
Image format3*F18 (1.8 s)
Compression schemeprim1 (13)
Integration time2 s

This phase is executed up to a maximum of 10 times to allow repointing.

Selection of pointing. Observation with new parameter setup:
Field120*120 pixel in 0.76" step raster
Slit4
Lines1253.467 (C I), 1218.406 (O V), 1242.804 (N V), 1242.01 (Fe XII), 1238.821 (N V), 625.13 (O IV)Å
Reference pixel110
Image format6*F14 (6*2.3 s)
Compression schemelog (5)
Integration time6 s

The program takes 9 + 12 minutes and accumulates temporally some KByte

in the memory. No net accumulation of data in the memory.

Preparations:Pointing for the start position from EIT or full Sun image. Co-alignment with CDS, if possible.
Specific parameters:Slits, image formats, integration times, scan, increment, line(s), reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP;
Category:J, [max. 10*(phase1), repoint, (phase2)]

9.3.16.2 Default Parameters

POP 16 Default Parameters (category J)

Turbulences and flows

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_STD
02	I	Spectrohelio_Mode	SPHEL_TERM_TC
03	I	Repetition_Phase_1_2	1
04	I	Slit_Phase_1	SLIT_2_1x300
05	I	Reference_Pixel_Phase_1	110
06	R	Lambda1_Phase_1	1253.467
07	R	Lambda2_Phase_1	1242.010
08	R	Lambda3_Phase_1	1238.821
09	R	Lambda4_Phase_1	LAM_NONE
10	R	Lambda5_Phase_1	LAM_NONE
11	R	Lambda6_Phase_1	LAM_NONE
12	R	Lambda7_Phase_1	LAM_NONE
13	R	Lambda8_Phase_1	LAM_NONE
14	I	Integration_Time_Phase_1	2*INT_TIME_1_SEC
15	I	Compression_Scheme_Phase_1	COMP_81_PRIM_1
16	I	Image_Format_Phase_1	18
17	I	Raster_Increment_Phase_1	1*STEP_SCALE
18	I	Raster_Steps_Phase_1	360/1
19	I	Repetition_Phase_1	10
20	I	Slit_Phase_2	SLIT_4_1x120
21	I	Reference_Pixel_Phase_2	110
22	R	Lambda1_Phase_2	1253.467
23	R	Lambda2_Phase_2	1218.406
24	R	Lambda3_Phase_2	1242.804
25	R	Lambda4_Phase_2	1242.010
26	R	Lambda5_Phase_2	1238.821
27	R	Lambda6_Phase_2	625.130
28	R	Lambda7_Phase_2	LAM_NONE
29	R	Lambda8_Phase_2	LAM_NONE
30	I	Integration_Time_Phase_2	6*INT_TIME_1_SEC
31	I	Reference_Pixel_3_Phase_2	0
32	R	Lambda1_3_Phase_2	LAM_NONE
33	R	Lambda2_3_Phase_2	LAM_NONE
34	R	Lambda3_3_Phase_2	LAM_NONE
35	I	Integration_Time_3_Phase_2	0
36	I	Reference_Pixel_4_Phase_2	0
37	R	Lambda1_4_Phase_2	LAM_NONE
38	R	Lambda2_4_Phase_2	LAM_NONE
39	R	Lambda3_4_Phase_2	LAM_NONE

```
40  I     Integration_Time_4_Phase_2    0

41  I     Reference_Pixel_5_Phase_2     0
42  R     Lambda1_5_Phase_2             LAM_NONE
43  R     Lambda2_5_Phase_2             LAM_NONE
44  R     Lambda3_5_Phase_2             LAM_NONE
45  I     Integration_Time_5_Phase_2    0

46  I     Compression_Scheme_Phase_2    COMP_33_LOG_MIN_MAX
47  I     Image_Format_Phase_2          14
48  I     Raster_Increment_Phase_2      1*STEP_SCALE
49  I     Raster_Steps_Phase_2          120/1
50  I     Repetition_Phase_2            1
```

9.3.16.3 Execution Sequence

```
IeReceiver
init_POP_param  16
start_POP       16
IeStandBy
```

9.3.17 POP 17: Sunspot Velocity Field And Line Profiles [6*A]

9.3.17.1 Description

P.M. 31-Oct-88 (revised 28-May-93, W. Curdt)

6 Spectroheliograms (acquire in series) of a Sun spot area.

Field120*120 pixel in 0.76" step raster
Slit4
Lines1401.156, 1393.755 Å
Reference pixel325
Image format2*F10 (2*4.6 s)
Compression schemelog (5)
Integration time5 s

Repetition with
Line 1302.169 Å on reference pixel 500, integration time 2 s
Line 1031.912 Å on reference pixel 500, integration time 5 s
Line 977.020 Å on reference pixel 500, integration time 5 s
Line 790.199 Å on reference pixel 900, integration time 15 s
Line 770.409 Å on reference pixel 900, integration time 15 s

The program takes 10 + 4 + 10 + 10 + 30 + 30 min (94 min) and accumulates temporarily 1.08 MByte data in the memory. No net accumulation.

Preparations:Point to the starting position.
Specific parameters:Slit, image format, integration times, scan, increment, line(s), reference pixel.

Restrictions:Lines (scan 1) must be covered simultaneously. Sufficient memory must be available.
Category:6*A, run as batch

9.3.17.2 Default Parameters

```
POP 17 Default Parameters (category A, batch 6*A)

Sunspot velocity field and line profiles

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_4_1x120
03  I     Reference_Pixel     325
04  R     Lambda1             1401.156
05  R     Lambda2             1393.755
06  R     Lambda3             LAM_NONE
07  R     Lambda4             LAM_NONE
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
13  I     Integration_Time    5*INT_TIME_1_SEC
14  I     Image_Format        10
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        120/1
17  I     Repetition          1
```

9.3.17.3 Execution Sequence

This POP is executed by calling G-POP A 6 times and changing the parameters as necessary between the calls.

```
' POP 17 Batch Process
'
' Sunspot velocity field and line profiles
'
' the following params of POP category A will be modified:
' param 03 Reference_Pixel
' param 04 Lambda1
' param 05 Lambda2
```

```
' param 13 Integration_Time

 init_POP_param    17                ' execute POP, step 1 of 6
' change_POP_param  17   3  325
' change_POP_param  17   4  44af24feh  ' 1401.156
' change_POP_param  17   5  44ae3829h  ' 1393.755
' change_POP_param  17  13  20
 start_POP         17

 change_POP_param  17   3  500        ' execute POP, step 2 of 6
 change_POP_param  17   4  44a2c568h  ' 1302.169
 change_POP_param  17   5  00000000h  ' 0.0
 change_POP_param  17  13  8
 start_POP         17

' change_POP_param  17   3  500        ' execute POP, step 3 of 6
 change_POP_param  17   4  4480fd2fh  ' 1031.912
' change_POP_param  17   5  00000000h  ' 0.0
 change_POP_param  17  13  20
 start_POP         17

' change_POP_param  17   3  500        ' execute POP, step 4 of 6
 change_POP_param  17   4  44744148h  ' 977.020
' change_POP_param  17   5  00000000h  ' 0.0
' change_POP_param  17  13  20
 start_POP         17

 change_POP_param  17   3  900        ' execute POP, step 5 of 6
 change_POP_param  17   4  44458cbch  ' 790.199
' change_POP_param  17   5  00000000h  ' 0.0
 change_POP_param  17  13  60
 start_POP         17

' change_POP_param  17   3  900        ' execute POP, step 6 of 6
 change_POP_param  17   4  44409a2dh  ' 770.409
' change_POP_param  17   5  00000000h  ' 0.0
' change_POP_param  17  13  60
 start_POP         17
```

9.3.18 POP 18: MHD Waves In Corona [2*A/2*F]

9.3.18.1 Description

P.M. 31-Oct-88 (revised 28-May-93, W. Curdt)

2 multiple spectroheliograms (acquire in series) off limb at the pole and at the equator.

Starting position 240" above the polar limb; parameter setup:

Field360*360 pixel in 60*0.76" raster (7 scans)
Slit1
Lines1025.722, 1031.912, 1037.613 Å
Reference pixel600
Image formatF3 (562 s)
Compression schemelog (5)
Integration time1800 s

Repetition with line 1215.67 Å on reference pixel 500, integration time 900 s.

Starting position 130" above equatorial limb; parameter setup

Field360*360 pixel in 60*0.76" raster (7 scans)
Slit1
Line1025.722, 1031.912, 1037.613 Å
Reference pixel600
Image formatF3 (562 s)
Compression schemelog (5)
Integration timeinitially 1800 s, variable (off-limb)

Repetition with line 1215.67 Å on reference pixel 500, integration time 450 s.

The program takes 5 + 1.25 + 3.5 + 0.875 h (10.625 h) and accumulates no data in the memory. When finished the program still sends data for 10 min.

Preparations:None
Specific parameters:Pointing position for observations, slit, image format, integration times, scan, increment, lines, ref.-pixel.
Restrictions:Avoid disk imaging.
Category:A, A, F, F; run as batch

9.3.18.2 Default Parameters

The default parameters of POP 18 should not be used as this POP is executed using the pseudo-POPs 35 and 36 and the respective parameter sets.

```
POP 35 Default Parameters (pseudo-POP for POP 18, part 2*A)

MHD waves in corona

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_1_4x300
03  I     Reference_Pixel     600
04  R     Lambda1             1025.722
05  R     Lambda2             1031.912
06  R     Lambda3             1037.613
07  R     Lambda4             LAM_NONE
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
13  I     Integration_Time    1800*INT_TIME_1_SEC
14  I     Image_Format        3
15  I     Raster_Increment    60*STEP_SCALE
16  I     Raster_Steps        360/60
17  I     Repetition          1


POP 36 Default Parameters (pseudo-POP for POP 18, part 2*F)

Num Type  Name                Default

01  I     Slit                SLIT_1_4x300
02  I     Reference_Pixel     600
03  R     Lambda1             1025.722
04  R     Lambda2             1031.912
05  R     Lambda3             1037.613
06  R     Lambda4             LAM_NONE
07  R     Lambda5             LAM_NONE
08  R     Lambda6             LAM_NONE
09  R     Lambda7             LAM_NONE
10  R     Lambda8             LAM_NONE
11  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
12  I     Base_Time           1800*INT_TIME_1_SEC
13  I     Image_Format        3
14  I     Raster_Increment    0
15  I     Raster_Steps        360/60
```

```
16  I     Displacement        60*STEP_SCALE
17  R     Solar_Radius        986.0
18  R     Int_Time_Factor     0.0156227
```

9.3.18.3 Execution Sequence

This POP is executed by calling G-POP A twice, followed by calling G-POP F twice, and changing the parameters between the calls as necessary.

This POP is an exception to the usual calling scheme as it executes two different G- POPs (A and F). This singular problem is solved by introducing two pseudo-POPs (35 and 36) to perform the different parts.

```
' POP 18 Batch Process
'
' MHD waves in corona
'
' the following params of POP category A will be modified:
' param 03 Reference_Pixel
' param 04 Lambda1
' param 05 Lambda2
' param 06 Lambda3
' param 13 Integration_Time
'
' the following params of POP category F will be modified:
' param 02 Reference_Pixel
' param 03 Lambda1
' param 04 Lambda2
' param 05 Lambda3
' param 12 Base_Time
' param 17 Solar_Radius

 init_POP_param    35                 ' execute POP, step 1 of 4
' change_POP_param  35   3  600
' change_POP_param  35   4  4480371bh  ' 1025.722
' change_POP_param  35   5  4480fd2fh  ' 1031.912
' change_POP_param  35   6  4481b39eh  ' 1037.613
' change_POP_param  35  13  7200
 start_POP         35

 change_POP_param  35   3  500        ' execute POP, step 2 of 4
 change_POP_param  35   4  4497f571h  ' 1215.670
 change_POP_param  35   5  00000000h  ' 0.0
 change_POP_param  35   6  00000000h  ' 0.0
 change_POP_param  35  13  3600
 start_POP         35

 init_POP_param    36                 ' initialize pseudo-POP 36
 change_POP_param  36  17  986.0      ' give actual solar radius here!
```

```
' change_POP_param  36   2  600        ' execute POP, step 3 of 4
' change_POP_param  36   3  4480371bh  ' 1025.722
' change_POP_param  36   4  4480fd2fh  ' 1031.912
' change_POP_param  36   5  4481b39eh  ' 1037.613
' change_POP_param  36  12  7200
 start_POP         36

 change_POP_param  36   2  500        ' execute POP, step 4 of 4
 change_POP_param  36   3  4497f571h  ' 1215.670
 change_POP_param  36   4  00000000h  ' 0.0
 change_POP_param  36   5  00000000h  ' 0.0
 change_POP_param  36  12  1800
 start_POP         36
```

9.3.19 POP 19: Forbidden/Allowed Line Widths By DEM Analysis [5*A]

9.3.19.1 Description

P.MW. 24-Jan-89 (revised 28-May-93, W. Curdt)

5 Spectroheliograms (acquire in series) at the momentary position, solar rotation compensation ON; parameter setup:

Field360*25 pixel in 5*0.76" raster (5 scans)
Slit 1
Line 977.020 Å
Reference pixel 500
Image format F11 (9.2 s, 3-fold binning)
Compression scheme log (5)
Integration time 2 s

Repetition with lines
1175.711 Å on reference pixel 500, integration time 5 s.
923.220 Å on reference pixel 500, integration time 10 s.
765.143 Å on reference pixel 900, integration time 10 s; repeat 6 times.
1218.406 Å on reference pixel 960, integration time 10 s.

The program takes 10 + 25 + 50 + 300 + 50 s (435 s) and accumulates 82 KByte data in memory. No net accumulation.

Preparations:Point to a position in a quiet-Sun region.
Specific parameters:Slit, image format, repetition rates, integration time, scan, increment, lines, reference pixel.
Restrictions:Ly α and KBr/BCP problem.

Category:5*A

9.3.19.2 Default Parameters

```
POP 19 Default Parameters (category A, batch 5*A)

Forbidden/allowed line widths by DEM analysis

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_STD
02  I     Slit                SLIT_1_4x300
03  I     Reference_Pixel     500
04  R     Lambda1             977.020
05  R     Lambda2             LAM_NONE
06  R     Lambda3             LAM_NONE
07  R     Lambda4             LAM_NONE
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
13  I     Integration_Time    2*INT_TIME_1_SEC
14  I     Image_Format        11
15  I     Raster_Increment    5*STEP_SCALE
16  I     Raster_Steps        4
17  I     Repetition          1
```

9.3.19.3 Execution Sequence

This POP is executed by calling G-POP A 5 times and changing the parameters as necessary between the calls.

```
' POP 19 Batch Process
'
' Forbidden/allowed line widths by DEM analysis
'
' the following params of POP category A will be modified:
' param 03 Reference_Pixel
' param 04 Lambda1
' param 13 Integration_Time
```

```
' param 17 Repetition

 binning  1  3                        ' 3-fold spatial binning

 init_POP_param    19                 ' execute POP, step 1 of 5
' change_POP_param  19   3  500
' change_POP_param  19   4  44744148h  ' 977.020
' change_POP_param  19  13  8
' change_POP_param  19  17  1
 start_POP         19

' change_POP_param  19   3  500        ' execute POP, step 2 of 5
 change_POP_param  19   4  4492f6c1h  ' 1175.711
 change_POP_param  19  13  20
' change_POP_param  19  17  1
 start_POP         19

' change_POP_param  19   3  500        ' execute POP, step 3 of 5
 change_POP_param  19   4  4466ce14h  ' 923.220
 change_POP_param  19  13  40
' change_POP_param  19  17  1
 start_POP         19

 change_POP_param  19   3  900        ' execute POP, step 4 of 5
 change_POP_param  19   4  443f4927h  ' 765.143
 change_POP_param  19  13  40
 change_POP_param  19  17  6
 start_POP         19

 change_POP_param  19   3  960        ' execute POP, step 5 of 5
 change_POP_param  19   4  44984cfeh  ' 1218.406
' change_POP_param  19  13  40
 change_POP_param  19  17  1
 start_POP         19

 binning  1  1                        ' turn off binning
```

9.3.20 POP 20: TR/Corona Studies [J]

9.3.20.1 Description

H.M. 24-Jan-89 (revised 28-May-93, W. Curdt)

2 Spectroheliograms (acquire in series) at the momentary position. The FOV focusses on a small field. For area selection RT cmd capability is required; parameter setup

Field120*60 pixel in 0.76" raster
Slit 4
Lines 991.579, 499.405, 1006.0, 507.683 Å
Reference pixel 720
Image format 4*F14 (9.2 s)
Compression scheme log (5)
Integration time 10 s
This phase is executed up to a maximum of 12 times to allow repointing.

Select new position by RT cmd and repeat 10 times with field 120*10.

The program takes 10 + 16 min and accumulates no data in the memory.

Preparations:Point to the starting position.
Specific parameters:Slit, image format, repetition rates, integration time, scan, increment, lines, reference pixel.
Restrictions:Ly α and KBr/BCP problem.
Category:J, [max. 12*(phase1), repoint, 10*(phase2)]

9.3.20.2 Default Parameters

POP 20 Default Parameters (category J)

TR/corona studies

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Spectrohelio_Mode	SPHEL_TERM_TC
03	I	Repetition_Phase_1_2	1
04	I	Slit_Phase_1	SLIT_4_1x120
05	I	Reference_Pixel_Phase_1	720
06	R	Lambda1_Phase_1	991.579
07	R	Lambda2_Phase_1	499.405
08	R	Lambda3_Phase_1	1006.000
09	R	Lambda4_Phase_1	507.683
10	R	Lambda5_Phase_1	LAM_NONE
11	R	Lambda6_Phase_1	LAM_NONE
12	R	Lambda7_Phase_1	LAM_NONE
13	R	Lambda8_Phase_1	LAM_NONE
14	I	Integration_Time_Phase_1	10*INT_TIME_1_SEC
15	I	Compression_Scheme_Phase_1	COMP_33_LOG_MIN_MAX
16	I	Image_Format_Phase_1	14
17	I	Raster_Increment_Phase_1	1*STEP_SCALE
18	I	Raster_Steps_Phase_1	60/1
19	I	Repetition_Phase_1	12
20	I	Slit_Phase_2	SLIT_4_1x120
21	I	Reference_Pixel_Phase_2	720
22	R	Lambda1_Phase_2	991.579
23	R	Lambda2_Phase_2	499.405
24	R	Lambda3_Phase_2	1006.000
25	R	Lambda4_Phase_2	507.683
26	R	Lambda5_Phase_2	LAM_NONE
27	R	Lambda6_Phase_2	LAM_NONE
28	R	Lambda7_Phase_2	LAM_NONE
29	R	Lambda8_Phase_2	LAM_NONE
30	I	Integration_Time_Phase_2	10*INT_TIME_1_SEC
31	I	Reference_Pixel_3_Phase_2	0
32	R	Lambda1_3_Phase_2	LAM_NONE
33	R	Lambda2_3_Phase_2	LAM_NONE
34	R	Lambda3_3_Phase_2	LAM_NONE
35	I	Integration_Time_3_Phase_2	0
36	I	Reference_Pixel_4_Phase_2	0
37	R	Lambda1_4_Phase_2	LAM_NONE
38	R	Lambda2_4_Phase_2	LAM_NONE
39	R	Lambda3_4_Phase_2	LAM_NONE

```
40  I     Integration_Time_4_Phase_2    0

41  I     Reference_Pixel_5_Phase_2     0
42  R     Lambda1_5_Phase_2             LAM_NONE
43  R     Lambda2_5_Phase_2             LAM_NONE
44  R     Lambda3_5_Phase_2             LAM_NONE
45  I     Integration_Time_5_Phase_2    0

46  I     Compression_Scheme_Phase_2    COMP_33_LOG_MIN_MAX
47  I     Image_Format_Phase_2          14
48  I     Raster_Increment_Phase_2      1*STEP_SCALE
49  I     Raster_Steps_Phase_2          10/1
50  I     Repetition_Phase_2            10
```

9.3.20.3 Execution Sequence

```
IeReceiver
init_POP_param  20
start_POP       20
IeStandBy
```

9.3.21 POP 21: TR/Coronal Emission Relationship Using Si III [A]

9.3.21.1 Description

H.M. Jan-89/Feb-90 (revised 12-Jan-93, 02-Apr-93, W. Curdt)

Single spectroheliogram at the momentary position (disk or limb); parameter setup:

Lines1242.03,1242.804,1247.383,624.617,624.95,625.130,629.730,1238.8 Å
Ions Fe XII, N V, C III, O IV, Mg X, O IV, O V, N V
except N V, the lines are very weak!

Field360*120 pixel in 1 step raster (360"*91" FOV)
Slit 2
Reference pixel 600
Image format 8*F12 (56 s)
Compression scheme log
Integration time 60 s

The program takes 120 min and accumulates no data in the memory.

Preparations:Point to the starting position (disk and limb).
Specific parameters:Slit, image format, integration time, raster scan, increment, lines, reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP;
Category:A

Alternate line set and title (to be used as default!):

N_e diagnostic using Si III, H.M. 24-Jan-89

Lines1294.543,1296.726,1298.960,1301.146,1303.320,1312.590 Å
Ions Si III, Si III, Si III, Si III, Si III, Si III

Reference pixel 720

9.3.21.2 Default Parameters

```
POP 21 Default Parameters (category A)

TR - coronal emission relationship using SiIII

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_2_1x300
03  I     Reference_Pixel     720
04  R     Lambda1             1294.543
05  R     Lambda2             1296.726
06  R     Lambda3             1298.960
07  R     Lambda4             1301.146
08  R     Lambda5             1303.320
09  R     Lambda6             1312.590
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
13  I     Integration_Time    60*INT_TIME_1_SEC
14  I     Image_Format        12
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        120/1
17  I     Repetition          1
```

9.3.21.3 Execution Sequence

```
init_POP_param  21
start_POP       21
```

9.3.22 POP 22: N_e Diagnostic Using O IV, Si IV [A]

9.3.22.1 Description

H.M. 24-Jan-89 (revised 12-Jan-93, 02-Apr-93, W. Curdt)

Program similar to POP #21.

Single spectroheliogram at the momentary position (disk); parameter setup:

Lines1393.755,1397.20, 1399.774, 1401.156, 1402.770, 1404.812, 1406.06,1407.386 Å
Ions Si IV, O IV, O IV, O IV, Si IV, O IV, S IV, O IV
some lines are very weak!

Field120*120 pixel in 1 step raster (120"*91" FOV)
Slit4
Reference pixel700
Image format8*F15 (37 s)
Compression schemenone
Integration time60 s

The program takes 120 min and accumulates no data in the memory.

Preparations:Point to the starting position (Disk).
Specific parameters:Slit, image format, integration time, raster scan, increment, lines, reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP.

Category:A

9.3.22.2 Default Parameters

```
POP 22 Default Parameters (category A)

Ne diagnostic using OIV, SiIV

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_4_1x120
03  I     Reference_Pixel     700
04  R     Lambda1             1393.755
05  R     Lambda2             1397.200
06  R     Lambda3             1399.774
07  R     Lambda4             1401.156
08  R     Lambda5             1402.770
09  R     Lambda6             1404.812
10  R     Lambda7             1406.060
11  R     Lambda8             1407.386
12  I     Compression_Scheme  COMP_NONE
13  I     Integration_Time    60*INT_TIME_1_SEC
14  I     Image_Format        15
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        120/1
17  I     Repetition          1
```

9.3.22.3 Execution Sequence

```
init_POP_param  22
start_POP       22
```

9.3.23 POP 23: N_e Diagnostic Using Ar VIII, Si VIII, And Fe XI Off Limb [A]

9.3.23.1 Description

H.M. 24-Jan-89 (revised 12-Jan-93, 02-Apr-93, W. Curdt)

Program similar to POP #21.

Single spectroheliogram at the momentary position (off limb, covering edge of disk); parameter setup:

Lines713.812,1428.75,1440.49,1445.76 Å
IonsAr VIII, Fe X, Si VIII, Si VIII
Some lines are very weak! There is no reference for the 1428.75, must be verified

Field360*360 pixel in 6 step raster (360"*274" FOV)
Slit1
Reference pixel781
Image format4*F13 (56 s)
Compression schemenone
Integration time60 s

The program takes 60 min and accumulates no data in the memory.

Preparations:Point to the starting position (off limb, covering edge of disk).
Specific parameters:Slit, image format, integration time, raster scan, increment, lines, reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or

KBr/BCP.
Category:A

9.3.23.2 Default Parameters

POP 23 Default Parameters (category A)

Ne diagnostic using ArVIII, SiVIII, FeXI off limb

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Slit	SLIT_1_4x300
03	I	Reference_Pixel	781
04	R	Lambda1	713.812
05	R	Lambda2	1428.750
06	R	Lambda3	1440.490
07	R	Lambda4	1445.760
08	R	Lambda5	LAM_NONE
09	R	Lambda6	LAM_NONE
10	R	Lambda7	LAM_NONE
11	R	Lambda8	LAM_NONE
12	I	Compression_Scheme	COMP_NONE
13	I	Integration_Time	60*INT_TIME_1_SEC
14	I	Image_Format	13
15	I	Raster_Increment	6*STEP_SCALE
16	I	Raster_Steps	360/6
17	I	Repetition	1

9.3.23.3 Execution Sequence

```
init_POP_param  23
start_POP       23
```

9.3.24 POP 24: Explosive Events At Different Temperatures [H]

9.3.24.1 Description

O.K.-M. / W.C. (revised 02-Jun-93, W. Curdt)

Triggers on explosive events in N V (1242.804 Å) employing trigger algorithm and threshold I. Then, 25" around triggering pixel are studied in N V (1242.804 Å / 150000 K), C I (1253.467 Å / 10000 K), Mg X (625.130 Å / 1100000 K), and O V (629.729 Å / 250000 K) simultaneously for 20 min. Pre-trigger data are stored in the memory and dumped after the study;

parameter setup search phase:
Field120*120 pixel in 0.76" step raster
Slit 4
Line 1242.804 Å
Reference pixel 600
Image format F14 (2.3 s)
Compression scheme log (5)
Integration time 1 s
Maximum duration 24 minutes (12 fields)

The minimum duration is 8 minutes (4 full scans). Only every third image is transmitted, i.e. always actual images available. The memory acts as a 1.44 MByte FIFO for the last 4 full scans, i.e. field 5 will overwrite field 1., etc. If the minimum duration is over and a trigger occurs, an inter-experiment flag will be raised (position y, z, event type). The program now enters the study phase and acquires with high frequency spectroheliograms about the found position (y,z).
If the maximum duration for search is over, the program will stop, since obviously an error occurred; most likely the trigger threshold is too high. The

study phase takes 20 minutes. Then all data from search and study is transmitted.

Changes in parameter setup study phase:
Field120*15 pixel in 0.76" step raster
Lines 1242.804, 625.130, 1253.467, 629.729 Å
Image format 4*F30 (2 s)
Repetition 90

The program takes 28 minutes at minimum and 44 minutes at maximum. 1.44 MByte are accumulated during search and 0.8 MByte during study. This corresponds to a waiting time of 29 minutes.
Category:H

9.3.24.2 Default Parameters

```
POP 24 Default Parameters (category H)

Explosive events at different temperatures

Num Type  Name                         Default

01  R     Rotation_Comp                ROT_COMP_OFF
02  I     Slit_Phase_1                 SLIT_4_1x120
03  I     Reference_Pixel_Phase_1      600
04  R     Lambda_Phase_1               1242.804
05  I     Compression_Scheme_Phase_1   COMP_33_LOG_MIN_MAX
06  I     Integration_Time_Phase_1     1*INT_TIME_1_SEC
07  I     Image_Format_Phase_1         14
08  I     Raster_Increment_Phase_1     1*STEP_SCALE
09  I     Raster_Steps_Phase_1         120/1
10  I     Level_Phase_1                70
11  I     Time_Min_Phase_1             8*INT_TIME_1_MIN
12  I     Time_Max_Phase_1             24*INT_TIME_1_MIN

13  I     Slit_Phase_2                 SLIT_4_1x120
14  I     Reference_Pixel_Phase_2      600
15  R     Lambda1_Phase_2              1242.804
16  R     Lambda2_Phase_2               625.130
17  R     Lambda3_Phase_2              1253.467
18  R     Lambda4_Phase_2               629.729
19  R     Lambda5_Phase_2              LAM_NONE
20  R     Lambda6_Phase_2              LAM_NONE
21  R     Lambda7_Phase_2              LAM_NONE
22  R     Lambda8_Phase_2              LAM_NONE
23  I     Compression_Scheme_Phase_2   COMP_33_LOG_MIN_MAX
24  I     Integration_Time_Phase_2     1*INT_TIME_1_SEC
25  I     Image_Format_Phase_2         30
26  I     Raster_Increment_Phase_2     1*STEP_SCALE
27  I     Raster_Steps_Phase_2         14
28  I     Rep_Spectrohelio_Phase_2     90
```

9.3.24.3 Execution Sequence

```
IeMaster
init_POP_param  24
```

```
start_POP       24
IeStandBy
```

9.3.25 POP 25: Limb Scans For CME Onset Correlative Studies [I]

9.3.25.1 Description

R.A.H. 01-Dec-88 (revised 14-Jan-93, W. Curdt)

Typical program which acts as a receiver of an inter-instrument flag or during campaigns with CDS or LASCO.

Quasi-continuous spectroheliograms at a pre-determined location.

Acquires at the momentary position (or position received per flag) near the limb a spectroheliogram with moment calculation (2 moments); parameter setup:

Field360*120 pixel in 2 step raster (360"*91" FOV)
Slit 2
Lines 1238.821 (N V), 1242.01 (Fe XII),
1253.467 (C I) Å
Reference pixel 700
Image format 3*F41 (3.6 s)
Compression scheme prim2 (14)
Integration time4 s
Repetition 90 (6 h)

One spectroheliogram takes 240 s = 4 minutes.
The program takes 6 h by definition and accumulates no data in the memory.

Preparations:Pointing for the starting position near limb. If possible, co-alignment with CDS.

Specific parameters:Slit, image formats, integration times, raster scan, increment, lines, reference pixel.
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP
Remarks:Automatic re-pointing during the imaging mode must be possible. I.e., when a new location is determined and received either by command or by IIF, the instrument completes the momentary image, re-points the telescope, and continues at the new location.
Category:I

9.3.25.2 Default Parameters

```
POP 25 Default Parameters (category I)

Limb scans for CME onset correlative studies

Num Type  Name               Default

01  R     Rotation_Comp      ROT_COMP_OFF
02  I     Spectrohelio_Mode  SPHEL_TERM_IIF
03  I     Slit               SLIT_2_1x300
04  I     Reference_Pixel    700
05  R     Lambda1            1238.821
06  R     Lambda2            1242.010
07  R     Lambda3            1253.467
08  I     Comp_Scheme        COMP_82_PRIM_2
09  I     Integration_Time   4*INT_TIME_1_SEC
10  I     Image_Format       41
11  I     Raster_Increment   2*STEP_SCALE
12  I     Raster_Steps       120/2
13  I     Repetition         90
```

9.3.25.3 Execution Sequence

```
IeReceiver
init_POP_param  25
start_POP       25
IeStandBy
```

9.3.26 POP 26: Source Of Solar Wind In A Coronal Hole [L]

9.3.26.1 Description

S.J. 01-Dec-88 (revised 02-Jun-93, W. Curdt)

Solar rotation compensation is ON.
Reference image: spectroheliogram with moment calculation at the momentary position in 1 step increments; parameter setup:

Field360*180 pixel in 0.76" step raster
Slit2
Lines1031.912, 1037.613 Å
Reference pixel500
Image format2*F43 (4.8 s)
Compression schemeprim4 (15)
Integration time5 s (15 min)

Point to position 90 in the FOV and acquire pairs of multiple spectra (spectrohelio2); parameter setup:

Slit4
Lines1031.912, 1037.613609.794, 624.943 Å
Reference pixel500960
Image format2*F14 (4.6 s)2*F14 (4.6 s)
Compression schemelog (5)
Integration time10 s
Repetition 120

The program takes 15 + 60 min and accumulates no data in the memory.

Preparations:Point to the starting position.
Notes:For line adjustment 5 s are included. In case of low count rates select integration times 10 s/30 s, image format 2*F10 and repetition rate 72.
Specific parameters:4 lines, reference pixel, slits, image format, compression scheme, integration time, repetition rate
Restrictions:When overwriting lines or reference pixel the lines must be within an instantaneous window on the detector, additional check for Ly α or KBr/BCP.
Category: L

9.3.26.2 Default Parameters

POP 26 Default Parameters (category L)

Source of solar wind in a coronal hole

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_STD
02	I	Slit_Phase_1	SLIT_2_1x300
03	I	Reference_Pixel1_Phase_1	500
04	R	Lambda11_Phase_1	1031.912
05	R	Lambda12_Phase_1	1037.613
06	R	Lambda13_Phase_1	LAM_NONE
07	I	Comp_Scheme_Phase_1	COMP_84_PRIM_4
08	I	Integration_Time_Phase_1	5*INT_TIME_1_SEC
09	I	Image_Format_Phase_1	43
10	I	Raster_Increment_Phase_1	1*STEP_SCALE
11	I	Raster_Steps_Phase_1	180/1
12	I	Rep_Spectrohelio_Phase_1	1
13	I	Slit_Phase_2	SLIT_4_1x120
14	I	Reference_Pixel2_Phase_2	500
15	R	Lambda21_Phase_2	1031.912
16	R	Lambda22_Phase_2	1037.613
17	R	Lambda23_Phase_2	LAM_NONE
18	I	Reference_Pixel3_Phase_2	960
19	R	Lambda31_Phase_2	609.794
20	R	Lambda32_Phase_2	624.943
21	R	Lambda33_Phase_2	LAM_NONE
22	I	Comp_Scheme_Phase_2	COMP_33_LOG_MIN_MAX
23	I	Integration_Time_Phase_2	10*INT_TIME_1_SEC
24	I	Image_Format_Phase_2	14
25	I	Raster_Increment_Phase_2	0
26	I	Raster_Steps_Phase_2	0
27	I	Rep_Spectrohelio_Phase_2	120

9.3.26.3 Execution Sequence

```
init_POP_param  26
start_POP       26
```

9.3.27 POP 27: Sun Grazing Comet Observation [G]

9.3.27.1 Description

W.H.I./W.C. 24-Oct-90 (cf. POP 15) (revised 02-Jun-93, W. Curdt)

Handle similar to POP #15!

Orbital drift will differ from star observations.

Transmit wavelength band 1024 to 1560 Å

Category:G

9.3.27.2 Default Parameters

```
POP 27 Default Parameters (category G)

Sun grazing comet observation

Num Type  Name                Default

O1  I     Slit                 SLIT_1_4x3OO
O2  I     Maximum_Search_Time  36OO
O3  R     Time_Step            18.5
O4  I     Images_Acquired      6
O5  I     Dark_Signal          -1
O6  R     Lambda_Start         1024.0
O7  R     Lambda_Step          18.61
O8  I     Images_Refspec       29
```

9.3.27.3 Execution Sequence

```
init_POP_param  27
start_POP       27
```

9.3.28 POP 28: Chromospheric Network Investigation [A]

9.3.28.1 Description

W.H.I./W.I.A./W.C. 24-Oct-90 (revised 04-May-93, 02-Jun-93, W. Curdt)

Single spectroheliogram of category A of a 120*120 pixel FOV with 0.76" increments; parameter setup:

slit:4 (1"*120")
lines: 1548.202, 1550.774, 1561.340 Å
reference pixel 700
compression scheme: log (5)
image format: 3*F14 (6.9 s)
exposure time: 8 s
duration: 720 s (=12 min)

storage requirements:none
initial pointing:supergranular cell in the telescope fov
ground co-observation:magnetogram network, Hα image
SOHO co-observation:EIT image
Category:A

9.3.28.2 Default Parameters

POP 28 Default Parameters (category A)

Chromospheric network investigation

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Slit	SLIT_4_1x120
03	I	Reference_Pixel	700
04	R	Lambda1	1548.202
05	R	Lambda2	1550.774
06	R	Lambda3	1561.340
07	R	Lambda4	LAM_NONE
08	R	Lambda5	LAM_NONE
09	R	Lambda6	LAM_NONE
10	R	Lambda7	LAM_NONE
11	R	Lambda8	LAM_NONE
12	I	Compression_Scheme	COMP_33_LOG_MIN_MAX
13	I	Integration_Time	8*INT_TIME_1_SEC
14	I	Image_Format	14
15	I	Raster_Increment	1*STEP_SCALE
16	I	Raster_Steps	120/1
17	I	Repetition	1

9.3.28.3 Execution Sequence

```
init_POP_param  28
start_POP       28
```

9.3.29 POP 29: Prominences/CMEs Diagnostic [5*A]

9.3.29.1 Description

W.H.I./W.C. 24-Oct-90 (revised 04-May-93, W. Curdt)

5 groups of spectroheliograms of a 360*360 pixel FOV with 0.76" increments; parameter setup:

slit:2 (1"*360")

lines (1):1533.432 ÅSi IIreference pixel 725
1548.202 Å C IV
1548.978 Å Si I
1550.774 Å C IV

lines (2):1025.722 ÅLy βreference pixel 700
1031.912 Å O VI
1037.018 Å C II

lines (3):624.943 ÅMg Xreference pixel 400
629.729 Å O V

lines (4):1215.67 ÅLy αreference pixel 16
1206.510 Å Si III

lines (5):1302.169 ÅO Ireference pixel 700
1304.858 Å O I
1309.277 Å Si II

image format:F43 (n*2.4 s)
compression scheme: prim4 (15)
exposure time: 10 s
duration: 30 minutes per group of lines, 2.5 h total

storage requirements:none
initial pointing: slit positioned at the limb anywhere from pole to pole
category: 5*A, run as batch

9.3.29.2 Default Parameters

```
POP 29 Default Parameters (category A, batch 5*A)

Prominences/CMEs diagnostic

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_2_1x300
03  I     Reference_Pixel     725
04  R     Lambda1             1533.432
05  R     Lambda2             1548.202
06  R     Lambda3             1548.978
07  R     Lambda4             1550.774
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_84_PRIM_4
13  I     Integration_Time    10*INT_TIME_1_SEC
14  I     Image_Format        43
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        360/1
17  I     Repetition          1
```

9.3.29.3 Execution Sequence

This POP is executed by calling G-POP A 5 times and changing the parameters as necessary between the calls.

```
' POP 29 Batch Process
'
' Prominences/CMEs diagnostic
'
' the following params of POP category A will be modified:
' param 03 Reference_Pixel
' param 04 Lambda1
' param 05 Lambda2
```

```
' param 06 Lambda3
' param 07 Lambda4

 init_POP_param    29                  ' execute POP, step 1 of 5
' change_POP_param  29   3  725
' change_POP_param  29   4  44bfadd3h  ' 1533.432
' change_POP_param  29   5  44c18677h  ' 1548.202
' change_POP_param  29   6  44c19f4ch  ' 1548.978
' change_POP_param  29   7  44c1d8c5h  ' 1550.774
 start_POP         29

 change_POP_param  29   3  700         ' execute POP, step 2 of 5
 change_POP_param  29   4  4480371bh  ' 1025.722
 change_POP_param  29   5  4480fd2fh  ' 1031.912
 change_POP_param  29   6  4481a093h  ' 1037.018
 change_POP_param  29   7  00000000h  ' 0.0
 start_POP         29

 change_POP_param  29   3  400         ' execute POP, step 3 of 5
 change_POP_param  29   4  441c4852h  ' 624.943
 change_POP_param  29   5  441d6ea8h  ' 629.729
 change_POP_param  29   6  00000000h  ' 0.0
' change_POP_param  29   7  00000000h  ' 0.0
 start_POP         29

 change_POP_param  29   3  16          ' execute POP, step 4 of 5
 change_POP_param  29   4  4497f571h  ' 1215.670
 change_POP_param  29   5  4496d052h  ' 1206.510
' change_POP_param  29   6  00000000h  ' 0.0
' change_POP_param  29   7  00000000h  ' 0.0
 start_POP         29

 change_POP_param  29   3  700         ' execute POP, step 5 of 5
 change_POP_param  29   4  44a2c568h  ' 1302.169
 change_POP_param  29   5  44a31b75h  ' 1304.858
 change_POP_param  29   6  44a3a8ddh  ' 1309.277
' change_POP_param  29   7  00000000h  ' 0.0
 start_POP         29
```

9.3.30 POP 30: Sub-Second Oscillations And Photon Statistics [B]

9.3.30.1 Description

W.C. 14-Mar-91 (revised 23-Mar-93, 02-Apr-93, W. Curdt)

Single spectroheliogram as reference image at the momentary position (disk);
parameter setup:
Field360*360 pixel in 1 step raster
(360"*274" FOV)
Slit 2
Line 1238.821 Å
Ion N V
Reference pixel 700
Image format F12 (7 s)
Compression scheme log (5)
Integration time 7 s

The reference image takes 42 minutes and accumulates no data in the memory.

Go back to the start position, acquire with high frequency single spectra at this momentary position and dump them to the memory; parameter setup:
Field120*1
Slit 4
Line 1238.821 Å
Ion N V
Reference pixel 700
Image format F30 (0.5 s)
Compression scheme log (5)

Integration time 60 ms
Repetition 4000 (240 s)

The acquisition phase takes 4 minutes and accumulates 6.15 MByte of data in the memory (24*25*2 Bytes*4000 images*1.536/1.2 Cluster overhead = 6.15 MB).

Preparations:Point to the starting position.
Notes: Data reduction for memory readout would be useful.
Specific parameters:lines, reference pixel, slit, image format, integration time, repetition rate
Restrictions:Enough memory has to be available. Sufficient count rates only with strong lines.
Category: B

9.3.30.2 Default Parameters

```
POP 30 Default Parameters (category B)

Sub-second oscillations + photon statistics

Num Type  Name                       Default

01  R     Rotation_Comp              ROT_COMP_OFF
02  I     Repetition_Phase_1_2       1

03  I     Slit_Phase_1               SLIT_2_1x300
04  I     Reference_Pixel_Phase_1    700
05  R     Lambda1_Phase_1            1238.821
06  R     Lambda2_Phase_1            LAM_NONE
07  R     Lambda3_Phase_1            LAM_NONE
08  R     Lambda4_Phase_1            LAM_NONE
09  R     Lambda5_Phase_1            LAM_NONE
10  R     Lambda6_Phase_1            LAM_NONE
11  R     Lambda7_Phase_1            LAM_NONE
12  R     Lambda8_Phase_1            LAM_NONE
13  I     Comp_Scheme_Phase_1        COMP_33_LOG_MIN_MAX
14  I     Integration_Time_Phase_1   7*INT_TIME_1_SEC
15  I     Image_Format_Phase_1       12
16  I     Raster_Increment_Phase_1   1*STEP_SCALE
17  I     Raster_Steps_Phase_1       360/1
18  I     Rep_Spectrohelio_Phase_1   1

19  I     Slit_Phase_2               SLIT_4_1x120
20  I     Reference_Pixel_Phase_2    700
21  R     Lambda1_Phase_2            1238.821
22  R     Lambda2_Phase_2            LAM_NONE
23  R     Lambda3_Phase_2            LAM_NONE
24  R     Lambda4_Phase_2            LAM_NONE
25  R     Lambda5_Phase_2            LAM_NONE
26  R     Lambda6_Phase_2            LAM_NONE
27  R     Lambda7_Phase_2            LAM_NONE
28  R     Lambda8_Phase_2            LAM_NONE
29  I     Comp_Scheme_Phase_2        COMP_33_LOG_MIN_MAX
30  I     Integration_Time_Phase_2   INT_TIME_60_MS
31  I     Image_Format_Phase_2       30
32  I     Raster_Increment_Phase_2   0
33  I     Raster_Steps_Phase_2       4000
34  I     Rep_Spectrohelio_Phase_2   1
```

9.3.30.3 Execution Sequence

```
init_POP_param  30
start_POP       30
```

9.3.31 POP 31: Synoptic Sequence, Intensities, And Velocities [K]

9.3.31.1 Description

J.-C.V. 26-Oct-90 (revised 25-Mar-93, 06-Apr-93; now in line with Red Book 7-20!)

Solar rotation compensation is OFF.

8 Spectroheliograms of a 360*316 pixel field (360"*240") in 0.76" step increments are taken along the central meridian; they are displaced by 270" to cover the entire disk (for the telescope elevation, cf. POP 06).

Parameter setup:

Slit2
Lines1025.722 (Ly ß), 1031.912 (O VI),
1037.613 (O VI) Å
Reference pixel 700
Integration time 3.5 s
Image format 3*F41 (approx. 3.5 s)
Compression scheme prim2 (14)

The program takes 75 minutes and accumulates no data in memory.

Category:K

9.3.31.2 Default Parameters

```
POP 31 Default Parameters (category K)

Synoptic sequence, intensities, and velocities

Num Type  Name                Default

O1  R     Rotation_Comp       ROT_COMP_OFF
O2  I     Slit                SLIT_2_1x3OO
O3  I     Compression_Scheme  COMP_82_PRIM_2
O4  I     Reference_Pixel     7OO
O5  R     Lambda1             1025.722
O6  R     Lambda2             1031.912
O7  R     Lambda3             1037.613
O8  I     Integration_Time    35*INT_TIME_1_SEC/1O
O9  I     Image_Format        41
1O  I     Raster_Increment    1*STEP_SCALE
11  I     Step                SCHMIER_SCHRITT
12  I     Central_Meridian    CENTRAL_MERIDIAN
```

9.3.31.3 Execution Sequence

```
 init_POP_param    31
 start_POP         31
```

9.3.32 POP 32: Transition Region Line Intensities [2*9*A]

9.3.32.1 Description

E.H. 26-Oct-90 / 19-Nov-92 (revised 13-Jan-93, W. Curdt)

Acquire 9 spectroheliograms of a 120*60 pixel FOV at the disk center and near the limb; parameter setup:

		Pixel:
Lines 1	765.148 (N IV), 770.409 (Ne VIII), integration time 30 s 1548.202 (C IV) Å	900
Lines 2	923.220 (N IV), 933.38 (S VI) Åintegration time 30 s	700
Lines 3	977.020 (C III), 989.790 (N III) Åintegration time 20 s	700
Lines 4	1031.924 (O VI) Åintegration time 5 s	500
Lines 5	1175.711 (C III) Åintegration time 5 s	500
Lines 6	1206.533 (Si III) Åintegration time 5 s	60
Lines 7	1238.821 (N V) Åintegration time 3 s	600
Lines 8	1296.726 (Si III), 1301.146 (Si III) Åintegration time 30 s	500
Lines 9	1393.755 (Si IV) Åintegration time 10 s	500

Field120*60 pixel in 1 step raster (120"*45" FOV),
all scans except scan 4
Field120*180 pixel in 1 step raster (120"*136" FOV),
scan 4 extended to have a reference image
Reference pixel900
Slit 4
Image format F15 (4.6 s) or 2*F15 (9.2 s) or 3*F15 (13.2 s)
Compressionlog (5)

The 9 spectroheliograms take 148 minutes; no net accumulation of data in the memory. For reasons of simplification and code minimization it is

suggested that the full program is broken up into two identical parts which have to be run twice. The following steps have to be performed:1 point to central disk
2 run POP
3 point to limb
4 re-run POP
The full program takes 2*148 minutes.

Preparations:initial pointing and re-pointing
Specific parameters:lines, reference pixel, slit, image format, integration time, scan
Restrictions: none
Category: 2 (9*A)

9.3.32.2 Default Parameters

```
POP 32 Default Parameters (category A, batch 2*9*A)

Transition region line intensities

Num Type  Name                Default

01  R     Rotation_Comp       ROT_COMP_OFF
02  I     Slit                SLIT_4_1x120
03  I     Reference_Pixel     900
04  R     Lambda1             765.148
05  R     Lambda2             770.409
06  R     Lambda3             1548.202
07  R     Lambda4             LAM_NONE
08  R     Lambda5             LAM_NONE
09  R     Lambda6             LAM_NONE
10  R     Lambda7             LAM_NONE
11  R     Lambda8             LAM_NONE
12  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
13  I     Integration_Time    30*INT_TIME_1_SEC
14  I     Image_Format        15
15  I     Raster_Increment    1*STEP_SCALE
16  I     Raster_Steps        60
17  I     Repetition          1
```

9.3.32.3 Execution Sequence

This POP is executed by calling G-POP A 18 times and changing the parameters as necessary between the calls.

```
' POP 32 Batch Process
'
' Transition region line intensities
'
' the following params of POP category A will be modified:
' param 03 Reference_Pixel
' param 04 Lambda1
' param 05 Lambda2
```

```
' param 06 Lambda3
' param 13 Integration_Time
' param 16 Raster_Steps

 init_POP_param    32
' change_POP_param  32   3  900        ' execute POP, step 1 of 18
' change_POP_param  32   4  443f4979h  ' 765.148
' change_POP_param  32   5  44409a2dh  ' 770.409
' change_POP_param  32   6  44c18677h  ' 1548.202
' change_POP_param  32  13  120
' change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  700        ' execute POP, step 2 of 18
 change_POP_param  32   4  4466ce14h  ' 923.220
 change_POP_param  32   5  44695852h  ' 933.380
 change_POP_param  32   6  00000000h  ' 0.0
' change_POP_param  32  13  120
' change_POP_param  32  16  60
 start_POP         32

' change_POP_param  32   3  700        ' execute POP, step 3 of 18
 change_POP_param  32   4  44744148h  ' 977.020
 change_POP_param  32   5  4477728fh  ' 989.790
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  80
' change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  500        ' execute POP, step 4 of 18
 change_POP_param  32   4  4480fd91h  ' 1031.924
 change_POP_param  32   5  00000000h  ' 0.0
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  20
 change_POP_param  32  16  180
 start_POP         32

' change_POP_param  32   3  500        ' execute POP, step 5 of 18
 change_POP_param  32   4  4492f6c1h  ' 1175.711
' change_POP_param  32   5  00000000h  ' 0.0
' change_POP_param  32   6  00000000h  ' 0.0
' change_POP_param  32  13  20
 change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  60         ' execute POP, step 6 of 18
 change_POP_param  32   4  4496d10eh  ' 1206.533
' change_POP_param  32   5  00000000h  ' 0.0
' change_POP_param  32   6  00000000h  ' 0.0
' change_POP_param  32  13  20
' change_POP_param  32  16  60
 start_POP         32
```

```
 change_POP_param  32   3  600        ' execute POP, step 7 of 18
 change_POP_param  32   4  449ada46h  ' 1238.821
' change_POP_param  32   5  00000000h  ' 0.0
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  12
' change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  500        ' execute POP, step 8 of 18
 change_POP_param  32   4  44a2173bh  ' 1296.726
 change_POP_param  32   5  44a2a4ach  ' 1301.146
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  120
' change_POP_param  32  16  60
 start_POP         32

' change_POP_param  32   3  500        ' execute POP, step 9 of 18
 change_POP_param  32   4  44ae3829h  ' 1393.755
 change_POP_param  32   5  00000000h  ' 0.0
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  40
' change_POP_param  32  16  60
 start_POP         32

'----------
' change pointing to coordinates near the Sun's limb, e.g.:
 point 16000 0                       ' include actual values here!
'----------

 init_POP_param    32                ' execute POP, step 10 of 18
 start_POP         32

 change_POP_param  32   3  700        ' execute POP, step 11 of 18
 change_POP_param  32   4  4466ce14h  ' 923.220
 change_POP_param  32   5  44695852h  ' 933.380
 change_POP_param  32   6  00000000h  ' 0.0
' change_POP_param  32  13  120
' change_POP_param  32  16  60
 start_POP         32

' change_POP_param  32   3  700        ' execute POP, step 12 of 18
 change_POP_param  32   4  44744148h  ' 977.020
 change_POP_param  32   5  4477728fh  ' 989.790
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  80
' change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  500        ' execute POP, step 13 of 18
 change_POP_param  32   4  4480fd91h  ' 1031.924
 change_POP_param  32   5  00000000h  ' 0.0
' change_POP_param  32   6  00000000h  ' 0.0
 change_POP_param  32  13  20
```

```
 change_POP_param  32  16  180
 start_POP         32
' change_POP_param  32   3  500         ' execute POP, step 14 of 18
 change_POP_param  32   4  4492f6c1h   ' 1175.711
' change_POP_param  32   5  00000000h   ' 0.0
' change_POP_param  32   6  00000000h   ' 0.0
' change_POP_param  32  13  20
 change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  60          ' execute POP, step 15 of 18
 change_POP_param  32   4  4496d10eh   ' 1206.533
' change_POP_param  32   5  00000000h   ' 0.0
' change_POP_param  32   6  00000000h   ' 0.0
' change_POP_param  32  13  20
' change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  600         ' execute POP, step 16 of 18
 change_POP_param  32   4  449ada46h   ' 1238.821
' change_POP_param  32   5  00000000h   ' 0.0
' change_POP_param  32   6  00000000h   ' 0.0
 change_POP_param  32  13  12
' change_POP_param  32  16  60
 start_POP         32

 change_POP_param  32   3  500         ' execute POP, step 17 of 18
 change_POP_param  32   4  44a2173bh   ' 1296.726
 change_POP_param  32   5  44a2a4ach   ' 1301.146
' change_POP_param  32   6  00000000h   ' 0.0
 change_POP_param  32  13  120
' change_POP_param  32  16  60
 start_POP         32

' change_POP_param  32   3  500         ' execute POP, step 18 of 18
 change_POP_param  32   4  44ae3829h   ' 1393.755
 change_POP_param  32   5  00000000h   ' 0.0
' change_POP_param  32   6  00000000h   ' 0.0
 change_POP_param  32  13  40
' change_POP_param  32  16  60
 start_POP         32
```

9.3.33 POP 33: Coronal MHD Turbulence [B]

9.3.33.1 Description

E.M. 26-Oct-90 (revised 13-Jan-93, 02-Apr-93, W. Curdt)

Acquire 2 spectroheliograms at the momentary position; parameter setup:

Lines 11274.984 (C I), 629.729 (O V), 624.943 (Mg X) Å
Reference pixel300

Lines 21025.722 (Ly β), 1037.614 (O VI), 520.66 (Si XII) Å
Reference pixel600

Field120*150 pixel field in 1 step raster (120"*120" FOV)
Slit4
Image format3*F15 (3*4.6 s)
Compressionlog (5)
Integration time15 s

The program takes 75 minutes and accumulates no data in the memory.

Preparations:Point to the starting position. CDS co-observation.
Specific parameters:lines, reference pixel, slit, image format, integration time, repetition rate
Restrictions: none
Remarks:Lines 1 have been modified from the original proposal: In the original proposal 1218.4, must be a MgF_2 line, while 625.2 and 1253.4 are KBr lines. In this configuration the strong Si II line at 1250.5 will overrule the Mg line. A similar argument holds for the 1253.47 line which sits in the wing

of the strong Si II line at 1253.79!
Category: B

9.3.33.2 Default Parameters

POP 33 Default Parameters (category B)

Coronal MHD turbulence

Num	Type	Name	Default
01	R	Rotation_Comp	ROT_COMP_OFF
02	I	Repetition_Phase_1_2	1
03	I	Slit_Phase_1	SLIT_4_1x120
04	I	Reference_Pixel_Phase_1	300
05	R	Lambda1_Phase_1	1274.984
06	R	Lambda2_Phase_1	629.729
07	R	Lambda3_Phase_1	624.943
08	R	Lambda4_Phase_1	LAM_NONE
09	R	Lambda5_Phase_1	LAM_NONE
10	R	Lambda6_Phase_1	LAM_NONE
11	R	Lambda7_Phase_1	LAM_NONE
12	R	Lambda8_Phase_1	LAM_NONE
13	I	Comp_Scheme_Phase_1	COMP_33_LOG_MIN_MAX
14	I	Integration_Time_Phase_1	15*INT_TIME_1_SEC
15	I	Image_Format_Phase_1	15
16	I	Raster_Increment_Phase_1	1*STEP_SCALE
17	I	Raster_Steps_Phase_1	150/1
18	I	Rep_Spectrohelio_Phase_1	1
19	I	Slit_Phase_2	SLIT_4_1x120
20	I	Reference_Pixel_Phase_2	600
21	R	Lambda1_Phase_2	1025.722
22	R	Lambda2_Phase_2	1037.614
23	R	Lambda3_Phase_2	520.660
24	R	Lambda4_Phase_2	LAM_NONE
25	R	Lambda5_Phase_2	LAM_NONE
26	R	Lambda6_Phase_2	LAM_NONE
27	R	Lambda7_Phase_2	LAM_NONE
28	R	Lambda8_Phase_2	LAM_NONE
29	I	Comp_Scheme_Phase_2	COMP_33_LOG_MIN_MAX
30	I	Integration_Time_Phase_2	15*INT_TIME_1_SEC
31	I	Image_Format_Phase_2	15
32	I	Raster_Increment_Phase_2	1*STEP_SCALE
33	I	Raster_Steps_Phase_2	150/1
34	I	Rep_Spectrohelio_Phase_2	1

9.3.33.3 Execution Sequence

```
init_POP_param  33
start_POP       33
```

9.3.34 POP 34: Temperature Gradient In A Coronal Hole [F]

9.3.34.1 Description

A.G. 26-Oct-90, compatible with Red Book section 8.1.2.7
(revised 14-Jan-93, 02-Apr-93, W. Curdt)

Acquires a spectroheliogram of a 360*400 pixel FOV at the momentary position; starting position is 10" outside the limb at the north or south coronal hole; parameter setup:

Field360*400 pixel in 5 step raster (360"*304")
Slit1 (slit 2 inside limb)
Lines1031.912 (O VI), 1037.613 (O VI) Å
Reference pixel500
Image format2*F9 (2*28 s)
Compression schemelog (5)
Integration time25 s, growing above limb to 2500 s

The program takes 13 h and accumulates no data in the memory.

Preparations:POP#34 should be run in batch mode, preceded by a simple spectrohelio program, starting 10" inside the limb to 10" outside the limb, using slit 2, 25 s exposure time and 0.38" increments (53 exposures). Point to the starting position. CDS co-observation. SOHO roll angle of 90° to have slit parallel to the pole.
Specific parameters:lines, reference pixel, slit, image format, integration time, repetition rate
Notes:integration time increase by fall off function
Restrictions:none

Category:F

9.3.34.2 Default Parameters

```
POP 34 Default Parameters (category F)

Temperature gradient in a coronal hole

Num Type  Name                Default

01  I     Slit                SLIT_1_4x300
02  I     Reference_Pixel     500
03  R     Lambda1             1031.912
04  R     Lambda2             1037.613
05  R     Lambda3             LAM_NONE
06  R     Lambda4             LAM_NONE
07  R     Lambda5             LAM_NONE
08  R     Lambda6             LAM_NONE
09  R     Lambda7             LAM_NONE
10  R     Lambda8             LAM_NONE
11  I     Compression_Scheme  COMP_33_LOG_MIN_MAX
12  I     Base_Time           25*INT_TIME_1_SEC
13  I     Image_Format        9
14  I     Raster_Increment    0
15  I     Raster_Steps        400/5
16  I     Displacement        5*STEP_SCALE
17  R     Solar_Radius        986.0
18  R     Int_Time_Factor     0.0156227
```

9.3.34.3 Execution Sequence

```
init_POP_param  34
start_POP       34
```

9.3.35 Pseudo-POP 35 [A]

9.3.35.1 Description

The pseudo-POP 35 is used to execute the first part of POP 18. It is not intended to be executed on its own.

POP 18 is an exception to the usual calling scheme as it executes two different G-POPs (A and F). This singular problem is solved by introducing two pseudo- POPs (35 and 36) to perform the different parts.

For a description, please refer to section 9.3.18.1.

9.3.35.2 Default Parameters

For the default parameters, please refer to section 9.3.18.2.

9.3.35.3 Execution Sequence

For the execution sequence, please refer to section 9.3.18.3.

9.3.36 Pseudo-POP 36 [F]

9.3.36.1 Description

The pseudo-POP 36 is used to execute the second part of POP 18. It is not intended to be executed on its own.

The POP 18 is an exception to the usual calling scheme as it executes two different G-POPs (A and F). This singular problem is solved by introducing two pseudo- POPs (35 and 36) to perform the different parts.

For a description, please refer to section 9.3.18.1.

9.3.36.2 Default Parameters

For the default parameters, please refer to section 9.3.18.2.

9.3.36.3 Execution Sequence

For the execution sequence, please refer to section 9.3.18.3.