SPACE TELESCOPE SCIENCE INSTITUTE

FOS Geomagnetic Image Motion Problem

Flight Readiness Review

16 December 1992

V. Balzano
16 December 1992

Outline of FRR

- Summary of the Problem (V. Balzano)
- Flight Software Changes (G. Foley)
- SOGS Changes (D. Chance)
- SOGS Testing (D. Chance)
- CTA Testing (R. Schneider)
- PASS Software Changes (T. Adams)
- FOS GIMP Test and Analysis (J. Fitch)

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What is GIMP?

GIMP is the cyclical drift of the FOS image due to inadequate magnetic shielding
- ~2 cycles/orbit in both the X (dispersion) and Y directions
- Amplitude is ±0.6 diodes (±0.2") on the A side, ±0.15 diodes on the B side.
- Maximum drift rate ~0.1 diode/min on the A side

Why do we need to correct for GIMP?

- GIMP degrades spectral resolution in uncorrected observations

- GIMP reduces photometric accuracy
  - Image motion in Y can result in loss of signal at diode array

- GIMP make spectropolarimetry on the A side impossible
  - Small flux variations between two polarized spectra produce a false polarization signal

- GIMP reduces target acquisition accuracy
  - Binary search TAs can fail due to target motion during search

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SO...

FOS x and y deflections are time dependent because the telescope is moving through the Earth's magnetic field

THEREFORE...

We need to add a time dependent term to each FOS deflection

Data show that x and y offsets should be updated about every 40 seconds

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Summary of Implementation

- Deflection pattern characteristics are uplinked from the ground
- Actual x and y deflections are controlled by the FOS firmware
- Firmware patch was developed by R. Hier to add an offset to every deflection
- Patch must be reloaded after every microprocessor reset
- SOGS knows:
  - the basic telescope pointing
  - the time of the FOS exposure
  - the detector being used

This information is given to PASS through new data block, FOSGIMP

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- PASS knows:
  - the telescope position
  - the Earth's magnetic field

- PASS calculates:
  - time dependent x and y deflection offsets
  - third order polynomial fit for maximum of 30 minute duration

  Polynomial coefficients given to NSSC-1 through new table, YFGIMPCB

- NSSC-1 calculates:
  - x and y deflection offsets every 30 seconds

  Deflection offsets given to FOS firmware through two "new" commands, YX_DGIMP and YY_DGIMP

- FOS firmware adds offsets to every deflection

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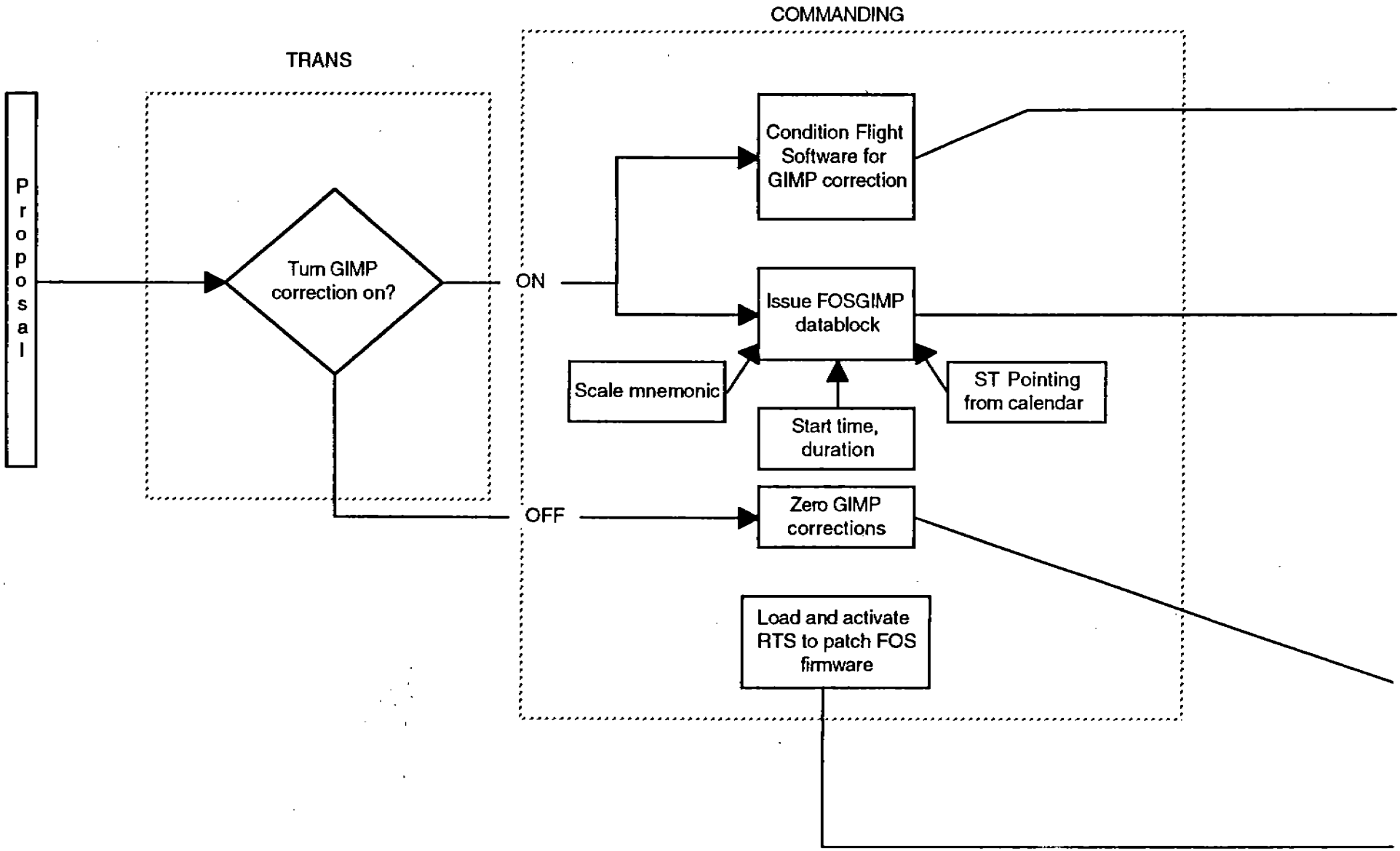
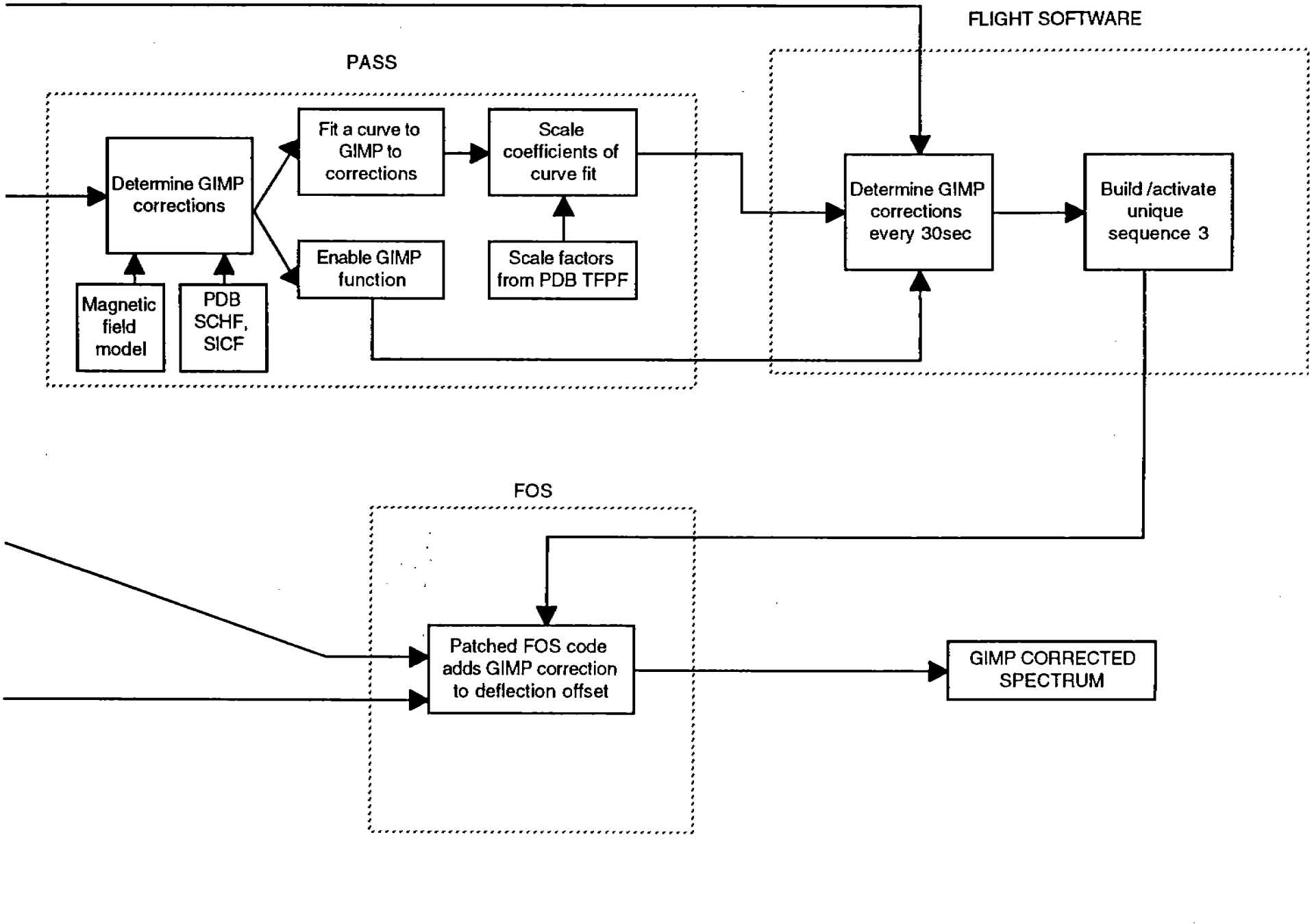
Ground Elements Involved:

- PDB
- Trans
- SCS
- IM
- 10.2 reconfigurations
- PASS
- IMTOOL
- PODPS

Onboard Elements Involved:

- NSSC-1 flight software
- FOS firmware


COMMANDING
TRANS
Proposal
Turn GIMP correction on?
ON
OFF
Condition Flight Software for GIMP correction
Issue FOSGIMP datablock
Scale mnemonic
Start time, duration
ST Pointing from calendar
Zero GIMP corrections
Load and activate RTS to patch FOS firmware


FLIGHT SOFTWARE
PASS
Determine GIMP corrections
Fit a curve to GIMP to corrections
Scale coefficients of curve fit
Enable GIMP function
Scale factors from PDB TFPF
Magnetic field model
PDB SCHF, SICF
Determine GIMP corrections every 30sec
Build /activate unique sequence 3
FOS
Patched FOS code adds GIMP correction to deflection offset
GIMP CORRECTED SPECTRUM

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SOGS Changes

PEP
GIMP correction is not user selectable

Transformation (OPRs 23288, 23521)
- Determine if GIMP correction should be turned on (normally, it will be on for all modes except ACQ/PEAK)

mode	GIMP correction
ACCUM	ON
IMAGE	ON
RAPID	ON
PERIOD	ON
ACQ	ON
ACQ/FIRM	ON
ACQ/BIN	ON
ACQ/PEAK	OFF

- Increase alignment time to accommodate GIMP correction
- Do not allow slews during FOS internals
- Do not allow sync start and GIMP correction for the same exposure

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Commanding (OPRs 22396, 22726, 23070)

Upward transitions

- Hold --> Low Voltage

  - Load RTS (PYGIMP) to patch FOS software for GIMP correction "YKEY commands"

- Low Voltage --> Operate

  - Load table to disable sending of GIMP corrections (YFGMPCRE)

  - Load table to disable GIMP function (YFGMPFCE)

  - Load table to set GIMP status bit in SHP to indicate GIMP correction is OFF (YFGMPSTA)

  - Issue group PY_DGIMP to zero out GIMP offsets

  - Activate RTS (PYGIMP) to load patch to FOS firmware

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Excerpts from the 93004 SMS:

```
SMS00GF   :TEXT,TIME=(ORB,14732,EASCNCR,01H03M46.000S);
          BEGINTEXT;
                RECON- FOS BLUE Hold To Low Voltage
          ENDTEXT                                                    ;;
          ;SMSTIME=1993.006:07:16:37.000
SMS00GG   :RTS,PYDMPUDL,RTSID(YCEAU2XL),LOADBY=(ORB,14732,EASCNCR    ;;
          ,01H03M46.000S)                                            ;;
          ;SMSTIME=1993.006:07:16:37.000
SMS00GH   :RTS,PYSEPO,RTSID(YSEPO2XL),LOADBY=(ORB,14732,EASCNCR      ;;
          ,01H03M48.000S)                                            ;;
          ;SMSTIME=1993.006:07:16:39.000
SMS00GI   :RTS,PYTDFNP,INDEX('YTDF'N),RTSID(YTDF2XL),LOADBY=(ORB     ;;
          ,14732,EASCNCR,01H03M50.000S)                              ;;
          ;SMSTIME=1993.006:07:16:41.000
SMS00GJ   :RTS,PYTO_HLD,INDEX('YOFFP'N),RTSID(YOFFP2XL),LOADBY=(ORB;;
          ,14732,EASCNCR,01H03M52.000S)                              ;;
          ;SMSTIME=1993.006:07:16:43.000
SMS00GK     :RTS,PYGIMP,RTSID(YGIMP2XL),LOADBY=(ORB,14732,EASCNCR      ;;
            ,01H03M54.000S)                                          ;;
            ;SMSTIME=1993.006:07:16:45.000
SMS00GL   :RTS,PYCLON,RIU2(B),RTSID(YCLON2XM),LOADBY=(ORB,14732       ;;
          ,EASCNCR,01H03M56.000S)                                    ;;
```

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```
SMS00IV   :TEXT,TIME=(ORB,14732,EASCNCR,01H13M31.000S);
          BEGINTEXT;
                RECON- FOS BLUE Low Voltage To High Voltage
          ENDTEXT                                                    ;;
          ;SMSTIME=1993.006:07:26:22.000
SMS00KU   :GROUP,PYHV_22,TIME=(ORB,14732,EASCNCR,01H17M58.000S)      ;;
          ;SMSTIME=1993.006:07:30:49.000
             .
             .
             .
SMS00KY    :TABLE,YFGMPCRE,SENDCMDS(NO),TIME=(ORB,14732,EASCNCR      ;;
          ,01H19M51.000S)                                            ;;
          ;SMSTIME=1993.006:07:32:42.000
SMS00KZ   :TABLE,YFGMPFCE,GIMPFUNC(DISABLE),TIME=(ORB,14732,EASCNCR;;
          ,01H19M52.000S)                                            ;;
          ;SMSTIME=1993.006:07:32:43.000
SMS00L0   :TABLE,YFGMPSTA,STATUS(DISABLE),TIME=(ORB,14732,EASCNCR    ;;
          ,01H19M53.000S)                                            ;;
          ;SMSTIME=1993.006:07:32:44.000
SMS00L1   :GROUP,PY_DGIMP,X_DGIMP(0),Y_DGIMP(0),TIME=(ORB,14732      ;;
          ,EASCNCR,01H19M54.000S)                                    ;;
          ;SMSTIME=1993.006:07:32:45.000
SMS00L2   :RTSCTRL,FUNC(ACT),RTSID(YGIMP2XL),TIME=(ORB,14732         ;;
          ,EASCNCR,01H19M56.000S)                                    ;;
          ;SMSTIME=1993.006:07:32:47.000
```

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Science Commanding

If GIMP correction is to be turned on:

- Load table to set GIMP status bit in SHP to indicate GIMP correction is on (YFGMPSTA)

- Turn off de-gaussing

- Load table to enable GIMP correction (YFGMPCRE)

- Issue FOSGIMP data block
  A new FOSGIMP data block will be issued every 29 minutes during an exposure

- At the end of the exposure, disable GIMP function and corrections (YFGMPFCE and YFGMPCRE)

If GIMP correction is to be turned off:

- Set status bit to indicate GIMP correction is turned off (YFGMPSTA)

- Zero out GIMP offsets (PY_DGIMP)

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FOS GIMP Data Block

[label] FOSGIMP,OPMODE(mnemonic),ORIENT(decimal,decimal,decimal)
[,TICK(integer)]
[,COMPDUR(integer)]
[,ENABLE]
, TIME = absolute time [;]

R	KEYWORD	DESCRIPTION	TYPE	UNITS	RANGE	RESOLUTION
*	OPMODE	Data acquisition mode	mnemonic	n/a	1-8 char	n/a
*	ORIENT	HST attitude				
	(ra,	right ascension	decimal	degrees	0-360	10^7
	dec,	declination	decimal	degrees	-90,90	10^7
	roll)	roll phase angle	decimal	degrees	0-360	10^7
	TICK	First GIMP tick for FOS use	integer	n/a	0-120 (default=0)	2
	COMPDUR	Duration range of computation	integer	seconds	0-1800 (default=1800)	30 secs
	ENABLE	Enable GIMP computation in NSSC1	n/a	n/a	n/a	n/a
*	TIME	Reference time for table load and computation start	absolute time	UTC	n/a	n/a

```
18H02001  :TEXT,TIME=(ORB,14738,EASCNCR,01H27M50.000S);
          BEGINTEXT;
          START PROP=04495 ,PROG=18H ,OBSET=02 ,ALIGN=01 ,EXP=01    ;;
          WAVE       , FOS/BL , RAPID , 2880.00S                    ;;
          A0_3 , A4_3 , G270H , G130H ,    , CW1                    ;;
                 Begin Observation
          ENDTEXT                                                   ;;
          ;SMSTIME=1993.006:17:18:33.000
             .
             .
             .
18H02008   :TABLE,YFGMPSTA,STATUS(ENABLE),TIME=(ORB,14738,EASCNCR    ;;
           ,01H30M54.000S)                                          ;;
           ;SMSTIME=1993.006:17:21:37.000
          ;BEGINNING A&V COMMAND BLOCK YSPTRNS
          ;BEGINNING A&V COMMAND BLOCK YSDEFL
18H02009  :GROUP,PYDEFLEC,XOFFSET(0),X_BASE(BSCG270H),X_PITCH(1584);;
          ,YOFFSET(0),Y_BASE(BSCG270H),Y_PITCH(1846),Y_RANGE(0)     ;;
          ,TIME=(ORB,14738,EASCNCR,01H30M55.000S)                   ;;
          ;SMSTIME=1993.006:17:21:38.000
          ;BEGINNING A&V COMMAND BLOCK YSDEFP
             .
             .
             .
```

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```
18H0200S  :GROUP,PYSD_EN,DMP_TYPE(AUTO),TIME=(ORB,14738,EASCNCR      ;;
          ,01H32M19.000S)                                           ;;
          ;SMSTIME=1993.006:17:23:02.000
18H0200T   :TABLE,YFGMPCRE,SENDCMDS(YES),TIME=(ORB,14738,EASCNCR    ;;
           ,01H32M20.000S)                                          ;;
           ;SMSTIME=1993.006:17:23:03.000
18H0200U   :FOSGIMP,COMPDUR(1800),ENABLE,OPMODE(BSCALE)             ;;
           ,ORIENT(1.6611383333333E+02,3.820875E+01                 ;;
           ,2.698842121793316E+02),TIME=(ORB,14738,EASCNCR          ;;
           ,01H32M21.000S)                                          ;;
           ;SMSTIME=1993.006:17:23:04.000
          ;BEGINNING A&V COMMAND BLOCK YSCOL
18H0200V  :RTSCTRL,FUNC(ACT),RTSID(YCLSB2XM),TIME=(ORB,14738        ;;
          ,EASCNCR,01H33M01.000S)                                   ;;
          ;SMSTIME=1993.006:17:23:44.000
18H0200W  :RTSCTRL,FUNC(ACT),RTSID(YCLON2XM),TIME=(ORB,14738        ;;
          ,EASCNCR,01H33M02.000S)                                   ;;
          ;SMSTIME=1993.006:17:23:45.000
18H0200X  :GROUP,PYEFILL,TIME=(ORB,14738,EASCNCR,01H33M10.000S)     ;;
          ;SMSTIME=1993.006:17:23:53.000
18H0200Y  :GROUP,PYIFUP,TIME=(ORB,14738,EASCNCR,01H33M11.000S)      ;;
          ;SMSTIME=1993.006:17:23:54.000
18H0200Z  :RTSCTRL,FUNC(ACT),RTSID(YBEGD2XM),TIME=(ORB,14738        ;;
          ,EASCNCR,01H33M12.000S)                                   ;;
          ;SMSTIME=1993.006:17:23:55.000
```

```
18H02010  :FOSGIMP,COMPDUR(1230),ENABLE,OPMODE(BSCALE)                    ;;
          ,ORIENT(1.6611383333333E+02,3.820875E+01                        ;;
          ,2.6988421217933l6E+02),TIME=(ORB,14738,EASCNCR                 ;;
         ,02H01M21.000S)                                              ;;
          ;SMSTIME=1993.006:17:52:04.000
18H02011  :RTSCTRL,FUNC(ACT),RTSID(YCLOF2XM),TIME=(ORB,14738        ;;
          ,EASCNCR,02H21M12.000S)                                     ;;
          ;SMSTIME=1993.006:18:11:55.000
18H02012  :RTSCTRL,FUNC(ACT),RTSID(YENDD2XM),TIME=(ORB,14738        ;;
          ,EASCNCR,02H21M25.000S)                                     ;;
          ;SMSTIME=1993.006:18:12:08.000
18H02013  :RTSCTRL,FUNC(ACT),RTSID(YENDD2XM),TIME=(ORB,14738        ;;
          ,EASCNCR,02H21M26.000S)                                     ;;
          ;SMSTIME=1993.006:18:12:09.000
18H02014  :GROUP,PYIFDOWN,TIME=(ORB,14738,EASCNCR,02H21M27.000S)    ;;
          ;SMSTIME=1993.006:18:12:10.000
18H02015  :GROUP,PYSTPDMP,TIME=(ORB,14738,EASCNCR,02H21M28.000S)    ;;
          ;SMSTIME=1993.006:18:12:11.000
18H02016  :GROUP,PYIFUP,TIME=(ORB,14738,EASCNCR,02H21M31.000S)      ;;
          ;SMSTIME=1993.006:18:12:14.000
18H02017  :GROUP,PYSD_EN,DMP_TYPE(AUTO),TIME=(ORB,14738,EASCNCR     ;;
          ,02H21M32.000S)                                             ;;
          ;SMSTIME=1993.006:18:12:15.000
```

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```
18H02018   :TABLE,YFGMPCRE,SENDCMDS(NO),TIME=(ORB,14738,EASCNCR      ;;
           ,02H21M35.000S)                                          ;;
           ;SMSTIME=1993.006:18:12:18.000
18H02019   :TABLE,YFGMPFCE,GIMPFUNC(DISABLE),TIME=(ORB,14738,EASCNCR;;
           ,02H21M36.000S)                                          ;;
           ;SMSTIME=1993.006:18:12:19.000
             .
             .
             .
```

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Downward transitions

- Operate --> Low Voltage
  - Load table to disable sending of GIMP corrections (YFGMPCRE)
  - Load table to disable GIMP function (YFGMPFCE)
  - Load table to set GIMP status bit in SHP to indicate GIMP correction is OFF (YFGMPSTA)
- Low Voltage --> Hold
  - Erase/inhibit PYGIMP RTS

Safing recovery

- Halt and inhibit, then enable unique sequence 3
- No other management of unique sequence 3 is done by the commanding

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```
SMS00MN   :TEXT,TIME=(ORB,14738,EASCNCR,07H07M27.000S);
          BEGINTEXT;
                RECON- FOS BLUE High Voltage To Low Voltage
          ENDTEXT                                                    ;;
          ;SMSTIME=1993.006:22:58:10.000
SMS00MO     :TABLE,YFGMPCRE,SENDCMDS(NO),TIME=(ORB,14738,EASCNCR      ;;
            ,07H07M27.000S)                                          ;;
            ;SMSTIME=1993.006:22:58:10.000
SMS00MP     :TABLE,YFGMPFCE,GIMPFUNC(DISABLE),TIME=(ORB,14738,EASCNCR;;
            ,07H07M28.000S)                                          ;;
            ;SMSTIME=1993.006:22:58:11.000
SMS00MQ     :TABLE,YFGMPSTA,STATUS(DISABLE),TIME=(ORB,14738,EASCNCR  ;;
            ,07H07M29.000S)                                          ;;
            ;SMSTIME=1993.006:22:58:12.000
          ;BEGINNING A&V COMMAND BLOCK YSHVSET
```

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```
SMS00MT   :TEXT,TIME=(ORB,14738,EASCNCR,07H08M27.000S);
          BEGINTEXT;
                RECON- FOS BLUE Low Voltage To Hold
          ENDTEXT                                                    ;;
          ;SMSTIME=1993.006:22:59:10.000
SMS00MU   :GROUP,PYIFDOWN,TIME=(ORB,14738,EASCNCR,07H08M27.000S)     ;;
             .
             .
             .
SMS00NJ   :RTSERASE,RTSID(YTDF2XL),EXPIRE=(ORB,14738,EASCNCR         ;;
          ,07H13M28.000S)                                            ;;
          ;SMSTIME=1993.006:23:04:11.000
SMS00NK   :RTSERASE,RTSID(YOFFP2XL),EXPIRE=(ORB,14738,EASCNCR        ;;
          ,07H13M30.000S)                                            ;;
          ;SMSTIME=1993.006:23:04:13.000
SMS00NL     :RTSERASE,RTSID(YGIMP2XL),EXPIRE=(ORB,14738,EASCNCR          ;;
            ,07H13M32.000S)                                            ;;
            ;SMSTIME=1993.006:23:04:15.000
```

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PDB Changes (OPRs 21592, 22813)

CMDS - new commands YX_DGIMP and YY_DGIMP
used by flight software and commanding to send GIMP corrections to FOS

TFPF, PTLD, TIDF - new tables:
YFGIMPCB - used by PASS to load GIMP coefficients
YFGMPFCE - used to enable/disable the GIMP function in the housekeeping AP
YFGMPCRE - used to enable/disable the GIMP corrections
YFGMPSTA - used to load a status bit in the SHP indicating GIMP correction is turned ON/OFF

PLCP - new groups:
PY_DGIMP - used to issue the YX_DGIMP and YY_DGIMP commands
PYGIMP - used to send the YKEY commands to patch FOS software

SICF - new scale factors used by PASS to scale the GIMP coefficients

PDB Changes (continued)

SHPF - new GIMP error flag (YFGIMPER) and GIMP enable flag (YFGIMPEN)

SOIF - new index number for unique sequence #3

SCHF - PASS updated the spacecraft characteristics file with values needed for the GIMP calculation

SCS (OPR 23183)

Added definition of the new datablock FOSGIMP

PODPS, IMTOOL (OPRs 23758, 23112)

New FOS keywords YFGIMPER and YFGIMPEN

SCIOPSDB (OPRs 22514, 23071)

- Added the definition of FOSGIMP datablock
- Increased the reconfiguration times

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Commanding Testing

- Bit validation was done on the two new PLCP groups PYGIMP and PY_DGIMP.
- The FOS commanding instructions were re-certified.
- The GIMP corrections derived from the GIMP coefficients in the PASS products were checked against the corrections independently arrived at by the FOS team.
- Code 512 reviewed the test SMS.

Example PASS products (CTREPORT.RPT):

```
0.02122  13N011Z3  :FOSGIMP,COMPDUR(1800),ENABLE,OPMODE(ASCALE),              ;;S120320400
 0.02123       ORIENT(1.0674732580138E+01,8.5237244624262E+01,                ;;S120320400
 0.02124       3.525901982245846E+02),TIME=(ORB,13255,EASCNCR,04H45M40.000S),  S120320400
                    MMLWDSSW  020000A          92:273 15:44:56   1284945    S1203204**  N   ATP   NS TABLE
                              0001906
                              003FF95
                              00001C2
                              003F3D8
                              000077F
                              003F2FE
                              00008F5
                              003EF60
                              003FDA3
                              0000000
                    MMLWDSSW  0200002          92:273 15:44:57   1284946    S1203204**  N   ATP   NS TABLE
                              000188D
                              0000001
                    .
                    .
                    .
0.02135  13N011Z4  :FOSGIMP,COMPDUR(1140),ENABLE,OPMODE(ASCALE),              ;;S120320800
0.02136       ORIENT(1.0674732580138E+01,8.5237244624262E+01,                ;;S120320800
0.02137       3.525901982245846E+02),TIME=(ORB,13255,EASCNCR,05H14M40.000S),  S120320800
                    MMLWDSSW  020000A          92:273 16:13:56   1286685    S1203208**  N   ATP   NS TABLE
                              0001906
                              003FE29
                              003FFF2
                              00002D6
                              000007B
```

Example PASS products (CTREPORT.RPT) (continued):

```
1COMMAND REQUEST TRANSLATION REPORT FOR THE PERIOD:  92.271 23:48:22.000  TO  92.278 23:40:14.000
PAGE   947

NT.LINE        MNEMONIC  COMMAND  CRIT FLAG  EXECUTION TIME    S/C CLOCK    TRACE ID    OBC/TYPE  DESCRIPTION
-------        --------  -------  ---------  --------------    ---------    ----------  --------  -----------

                         0000223
                         003FEB8
                         003FA67
                         0002642
                         0000000
               MMLWDSSW  0200002            92:273 16:13:57   1286686    S1203208**  N   ATP   NS TABLE
                         000188D
                         0000001
```

.MTL

Dave Taylor
code → close
Pass products
on Wed
3 Rev weeks

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16 December 1992

Deriving GIMP corrections from the PASS products

X-gimp = $A*TICK^3*2^{-24} + B*TICK^2*2^{-16} + C*TICK*2^{-12} + D*2^{-8}$
Y-gimp = $Z*TICK^3*2^{-24} + Y*TICK^2*2^{-16} + X*TICK*2^{-12} + W*2^{-8}$

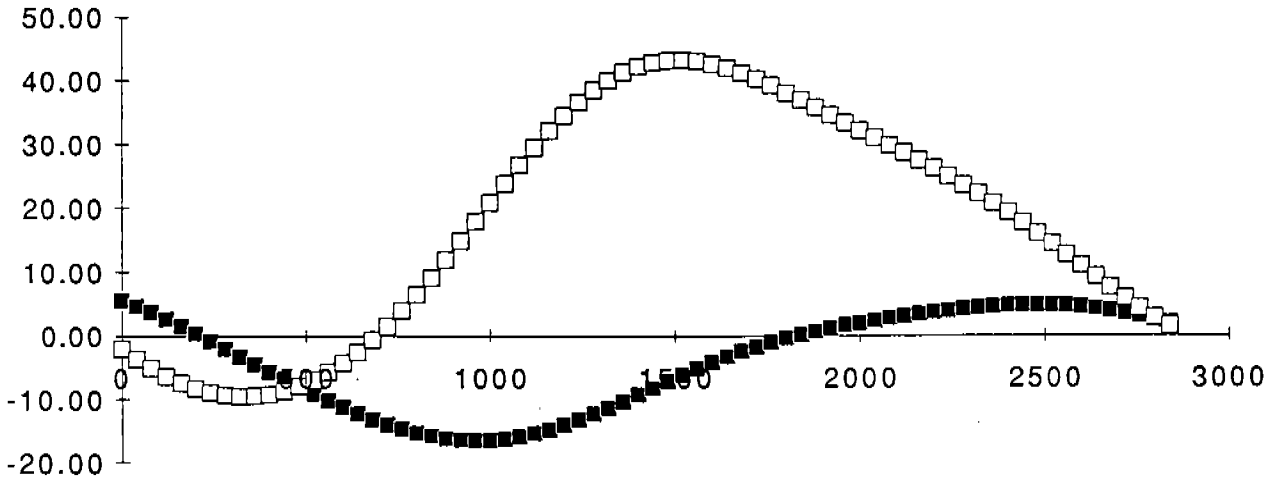
where TICK is GIMP ticks measured in integer multiples of 15sec. TICK = 0 occurs at the time of the YFGIMPCB table load. The coefficients A,B, C, D, Z, Y, X, and W come from the YFGIMPCB table load and appear in the table in that order.

In the case of the first FOSGIMP datablock listed above:

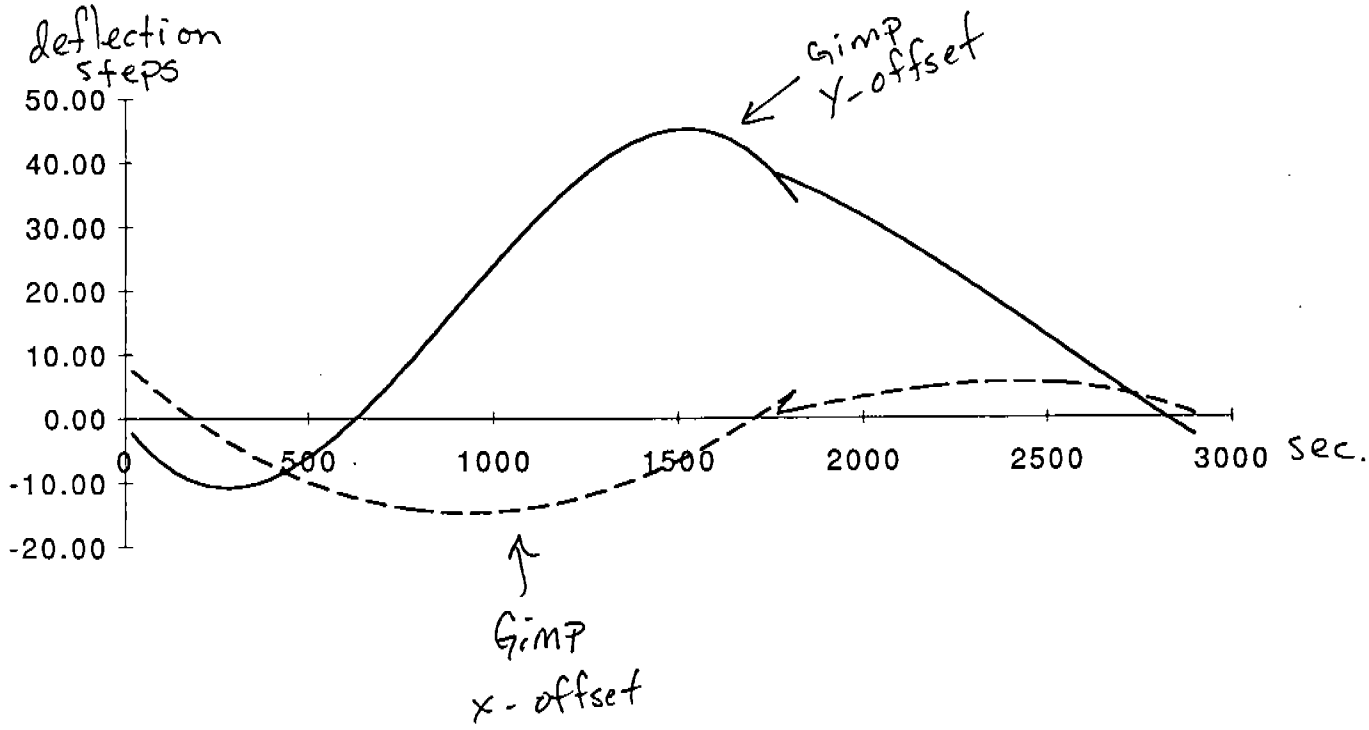
A = 003FF95 hex = -107 dec
B = 00001C2 hex = 458 dec
C = 003F3D8 hex = -3112 dec
D = 000077F hex = 1919 dec
Z = 003F2FE hex = -3330 dec
Y = 00008F5 hex = 2993 dec
X = 003EF60 hex = -4256 dec
W = 003FDA3 hex = -605 dec

if $N_{hex} > 20000_{hex}$
$\Rightarrow N_{dec} = -40000_{hex} + N_{hex}$
$= -262144 + dec(N_{hex})$
/
$\Psi_{,16}$

Chart2



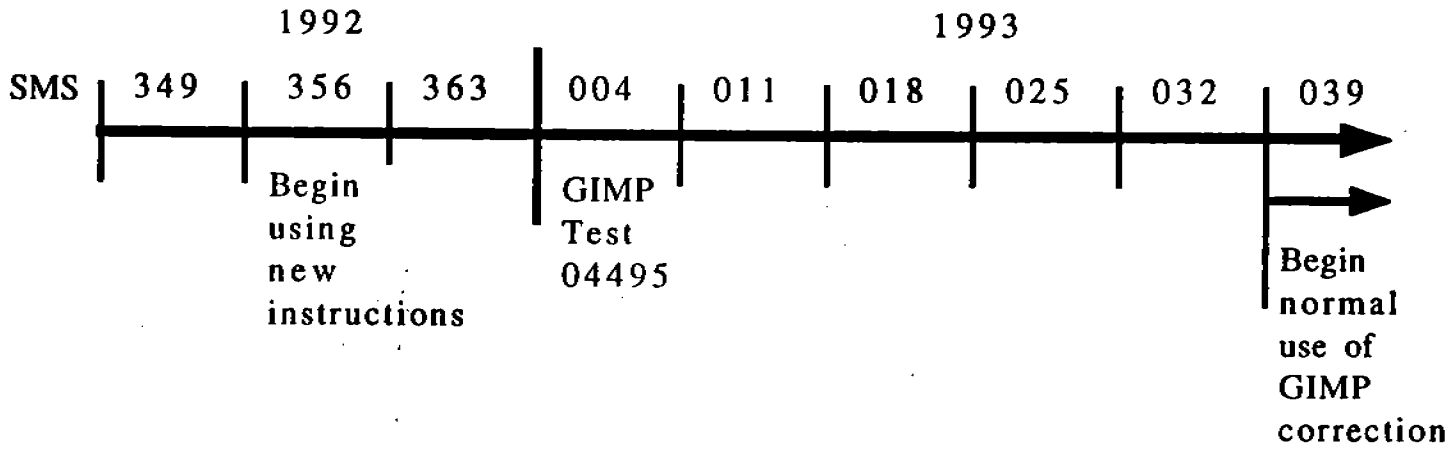
Proposal 4242



Gimp corrections derived from PASS products

D. Chance
16 December 1992

GIMP Timeline



John Fitch
December 16, 1992

FOS GIMP Test and Analysis

- FOS GIMP Test schedule;
  - Blue side 93.006:07 - 93.006:24
  - Red side 93.007:17 - 93.007:23

- Test Description for proposal 4495
  - Designed to verify all aspects of GIMP correction Software for FOS
    - Commanding
      - FOS Microprocessor reconfiguration
      - GIMP correction flags and coefficients to PASS
    - PASS
      - Magnetic field modeling
      - Commanding and parameters to FSW
    - NSSCI
      - Proper FSW expansion of polynomial
      - Proper timing of serial magnitude commanding to SI
      - No interferance with other FOS FSW
      - Proper cleanup
      - Proper telemetry and data logging
    - FOS
      - Proper microprocessor response to commanding
      - Proper correction of data
    - PODOPS
      - Proper handling of SHP data flags

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December 16, 1992

FOS GIMP Test and Analysis

- Test Description for proposal 4495 (continued)
  - Each side of the FOS consistist of the following exposures

1: 48 minute rapid readout calibration lamp observation through the G270H grating. Demonstrates GIMP correction which requires two FSW table loads due to length of observation.

2: 48 minute rapid readout calibration lamp observation through the G270H grating. Demonstrates consecutive observations which can occur using the same Polynomials. May require greater than two table loads.

3: 32, 32 second Taled observations (Image mode) spaced approximately 4 minutes apart. Demonstrates mode independance of correction, as well as supporting closely spaced exposures. Provides Y measurement of GIMP correction.

4: 1 32 second Image mode observation with GIMP correction disabled. Demonstrates ability to properly interleave corrected and uncorrected exposures.

5: 1 15 minute Rapid mode calibration lamp measurement through the G270H grating. Demonstrates repeatability of measurement as well as reenabling of GIMP.

6: 1 15 minute Rapid mode calibration lamp measurement through the G270H grating. This shows continuity with a single table load.

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FOS GIMP Test and Analysis

- Test Analysis

1. Monitor Microprocessor reconfiguration which includes the YDATA commands to the FOS microprocessor. Y536-Y541 F/W Stat 1 - 6. Should read back ASCII "OK" (79,75 Dec) after proper thread implimentation in FOS microprocessor.

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2. Monitor flags YGIMPFE (GIMP function enable) and YGIMPCE (GIMP commanding enable) . Should read 'Disable' and 'Don't Send' on initial activation of AP.

3. Monitor YGIMPERR flag thoughout. Should always read 'Ok'.

4. Monitor YGIMPTIK for reseting corresponding to new table loads.

5. Monitor YGIMPXC and YGIMPYC for correspondence from predicted values.

6. Check SHP for GIMP Enabled flag (word 175 bit 15 should be 1 for enabled, 0 for disabled.)

7. Check SHP for GIMP Error flag (word 175 bit 16 should be zero for no error, 1 for error.)

8. Analyze Science data to show total movement in X becomes approximately 0.1 Diodes, total movement in Y approximately 8-9 YBase units.

9. Analyze Science data to show absolute image position between sets dominated by FGWH non-repeatability. (No positional hysterisis greater than 0.1 diodes or 8-10 Ybase units.)

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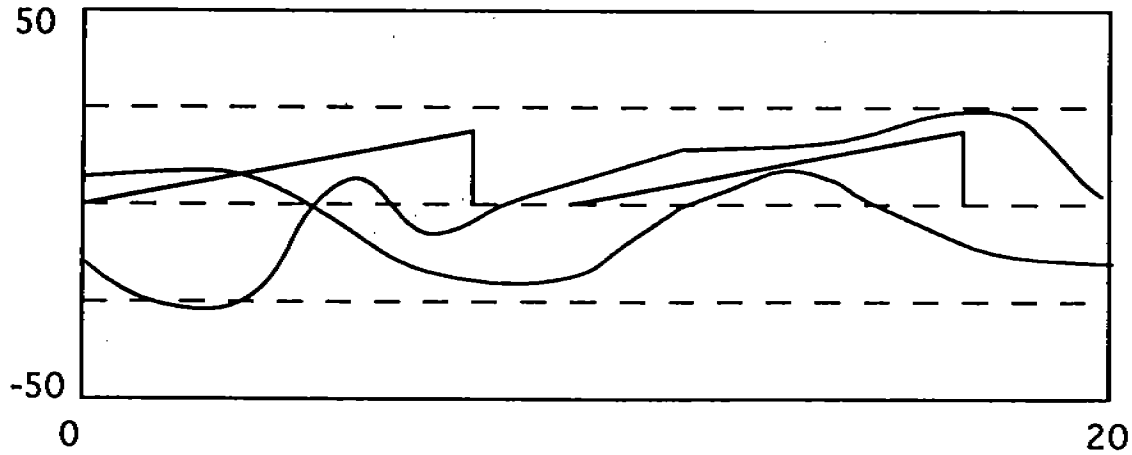
FOS GIMP Test and Analysis- YGIMPMON PORTS Page

YGIMPMON
FOS GIMP Correction
YGIMPCE Don't Send X^XS
YGIMPFE Disable X^XS
YGIMPERROk X^XS

F/W Status
YFWSTAT1 0 X^XS
YFWSTAT2 0 X^XS
YFWSTAT3 0 X^XS
YFWSTAT4 0 X^XS
YFWSTAT5 0 X^XS
YFWSTAT6 0 X^XS

YGIMPXC 0 X^XS
YGIMPYC 0 X^XS
YGIMPTIK 0 X^XS



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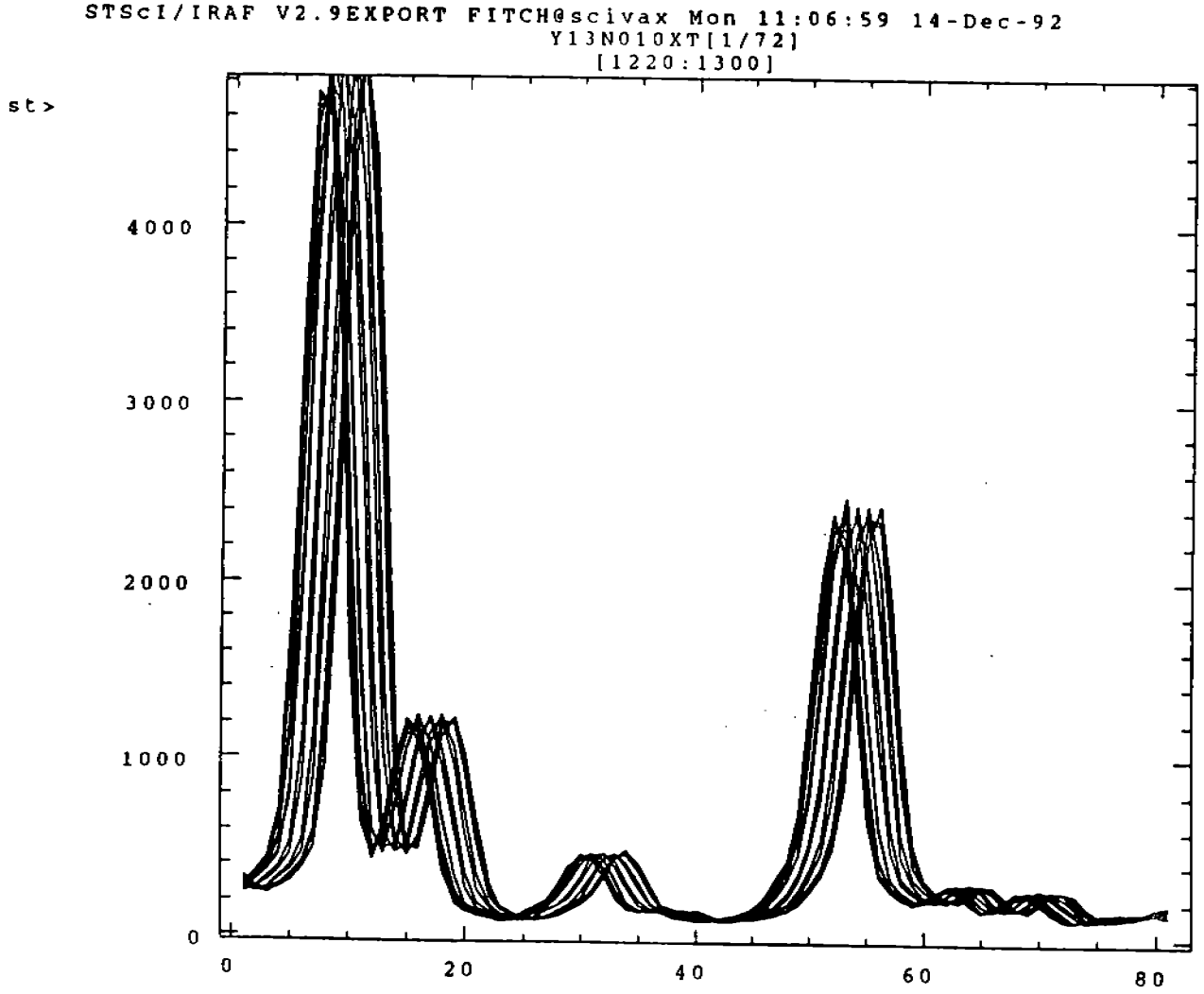

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