Proposed Run-by-Run Automatic Calibration Algorithm for TeV SBD and FBI:

**DCCT is *the* absolute measure of total beam current.**

Look at data from DCCT, SBD and FBI some time soon after flattop..
Calculate DCCT/SBD total (p + pbar) wide gate -> calibrates SBD
Calculate SBDPIS/FBIPNG & SBDAIS/FBIANG -> calibrates FBI.

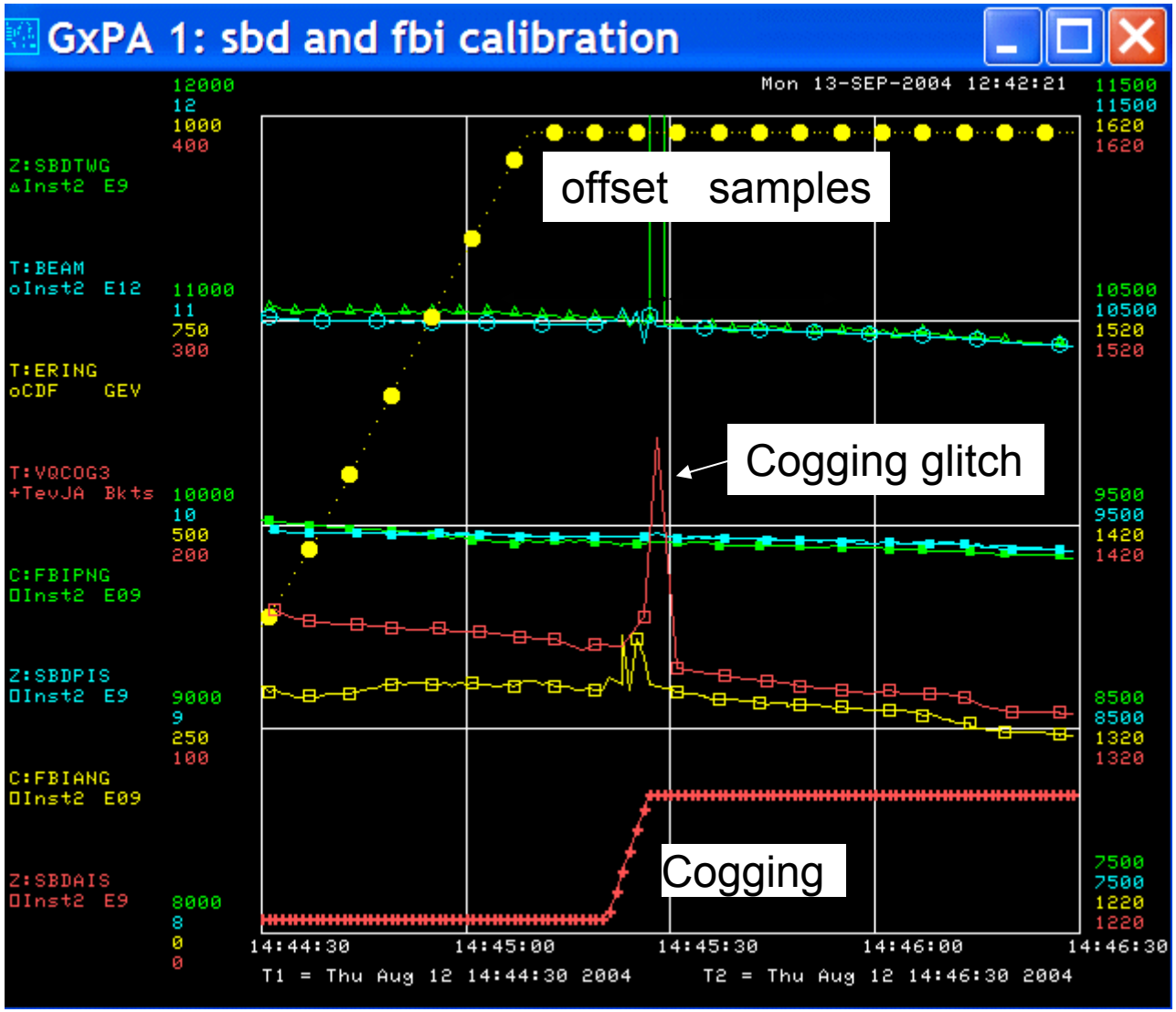
Do this **at start of following store**..ie use data from previous store.

Details: need to take enough samples at `good time'
need to implement filter to remove glitches..
only change if uncertainty (dispersion/root(N)) < 2 x projected change
no changes > 5% -> something probably wrong
*(these numbers are all parameters)*

Note: in figures following:
SBD values come from new SBD system using RWCM #2
FBI values come from FBI system using RWCM #1
Plots show beginning of flat-top, ratios thru the store
and the calculated value of SBD/BEAM

Store 3725

SBD/BEAM = 1.001




Yellow = ERING

Green = SBDTWG
Blue = BEAM

Green = FBIPNG
Blue = SBDPIS

Red = SBDAIS
Yellow = FBIANG

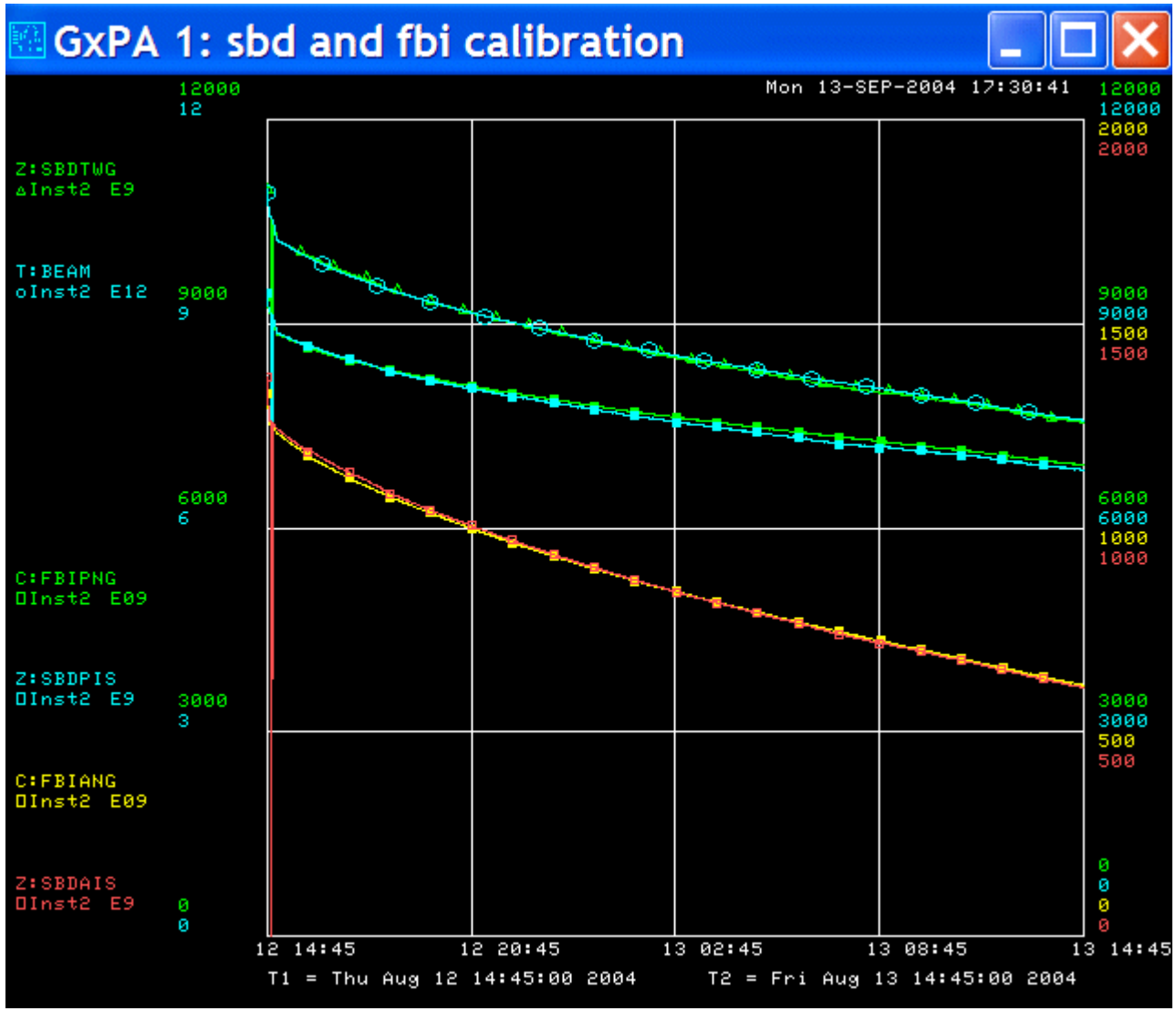
Red = Cogging

T:BMICLF (Tevatron Beam Intensities Calibration Function)

| Element | Alias | Values | Meaning |
|---|---|---|---|
| 0 | | <0.5 | do not perform calibration |
| 1 | SBDRMN | 0.95 | minimum of <BEAM/SBDTWG> |
| 2 | SBDRMX | 1.05 | maximum of <BEAM/SBDTWG> |
| 3 | FBIRMN | 0.95 | minimum of <SBDPIS/FBIPNG> & <SBDAIS/FBIANG> |
| 4 | FBIRMX | 1.05 | maximum of <SBDPIS/FBIPNG> & <SBDAIS/FBIANG> |
| 5 | none | 1.025 | max difference from average in filter |
| 6 | SBDSFF | 2.0 | SBDSFF x [error on mean] > change |
| 7 | BMIDEL | 25.0 | secs after flat-top before 1st sample |
| 8 | BMINSM | 20.0 | no. of samples (1/second) |

| | | | |
|---|---|---|---|
| T:SBDCLF | | ~1 | correction to SBD calibration |
| T:FBIPNS | | ~600 | FBI narrow gate proton beam/volt |
| T:FBIANS | | ~600 | FBI narrow gate antiproton beam/volt |
| T:FBIPWS | = FBIPNS | | FBI wide gate proton beam/volt |
| T:FBIAWS | = FBIPWS | | FBI wide gate antiproton beam/volt |

# Overview of intensity measurements through a store…store 3725



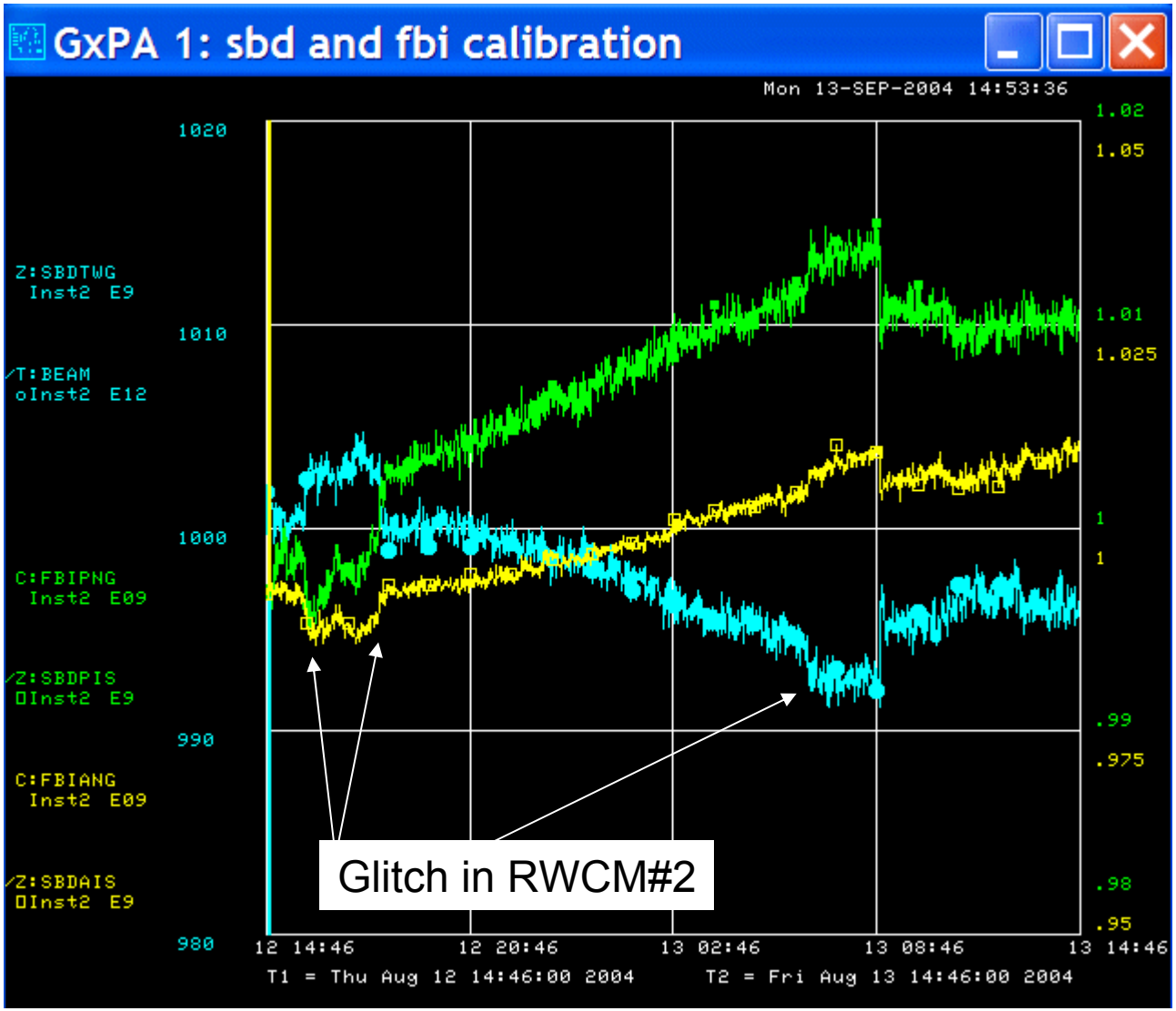

Green = SBDTWG
Blue = BEAM

Green = FBIPNG
Blue = SBDPIS

Red = SBDAIS
Yellow = FBIANG

Store 3725

SBD/BEAM = 1.001



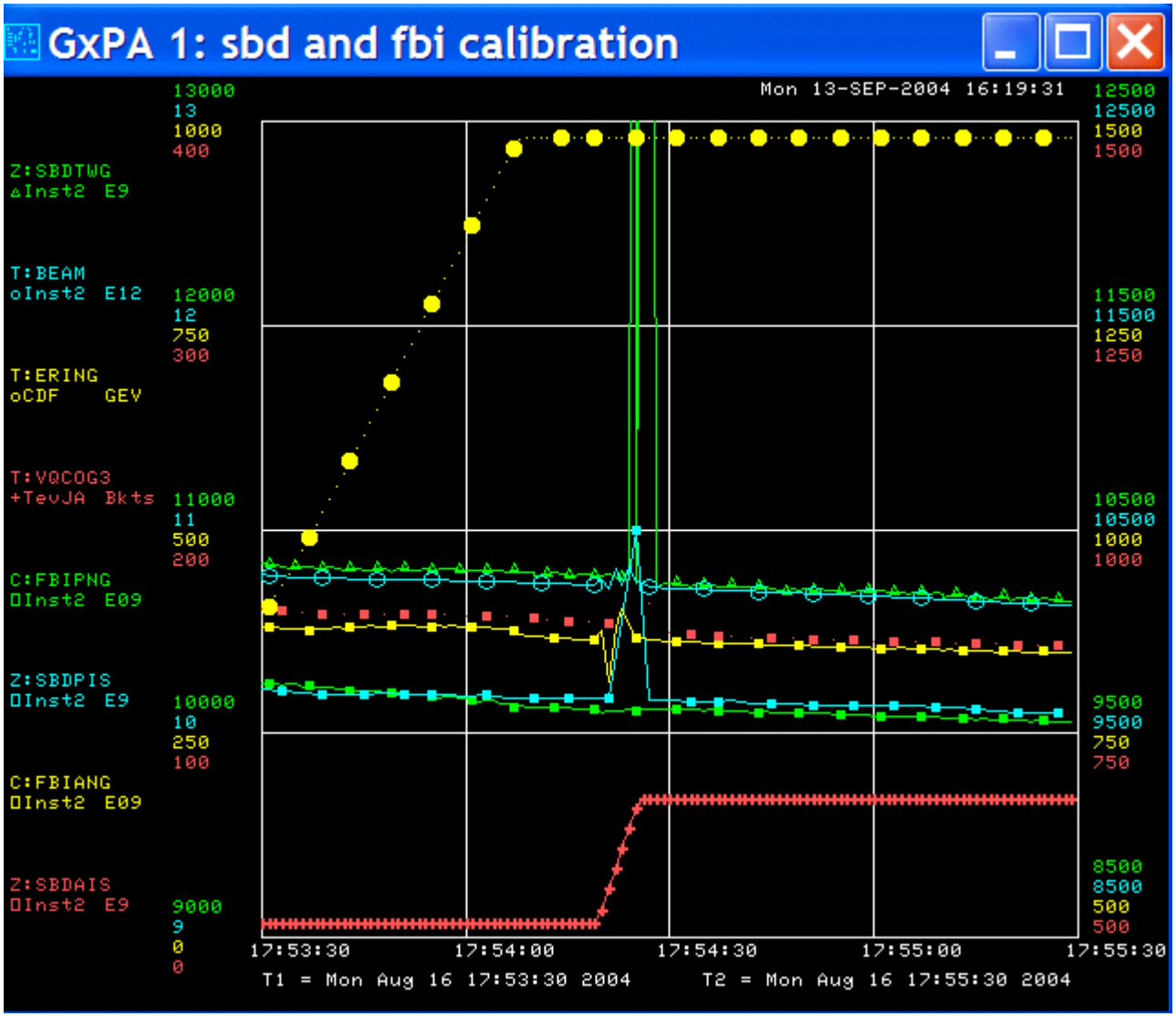

Green = fbip/sbdp
1% per box

Yellow = fbia/sbda
2.5% per box

Blue = sbd/beam
1% per box

Store 3736

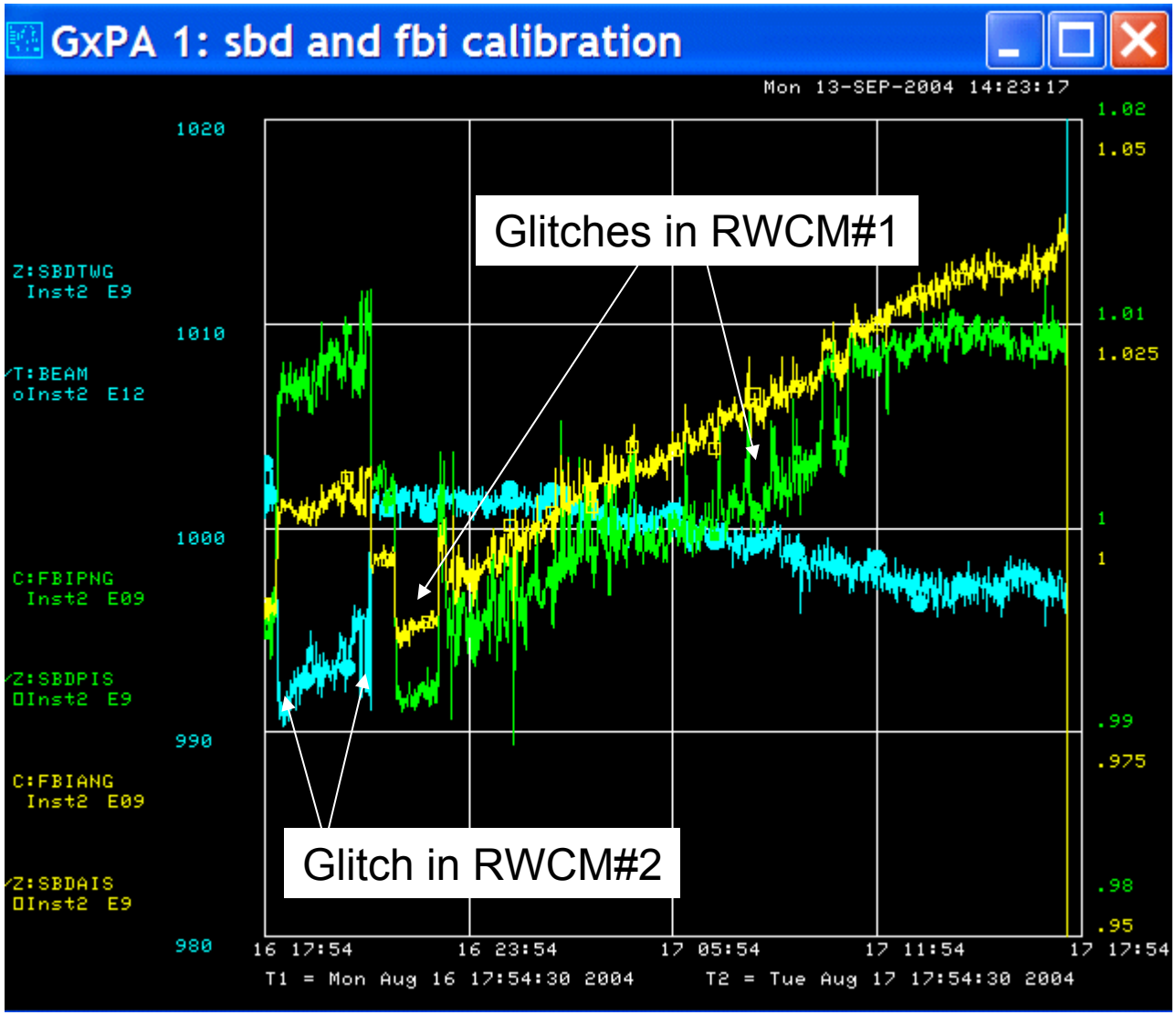
SBD/BEAM = 1.002




SBD & BEAM

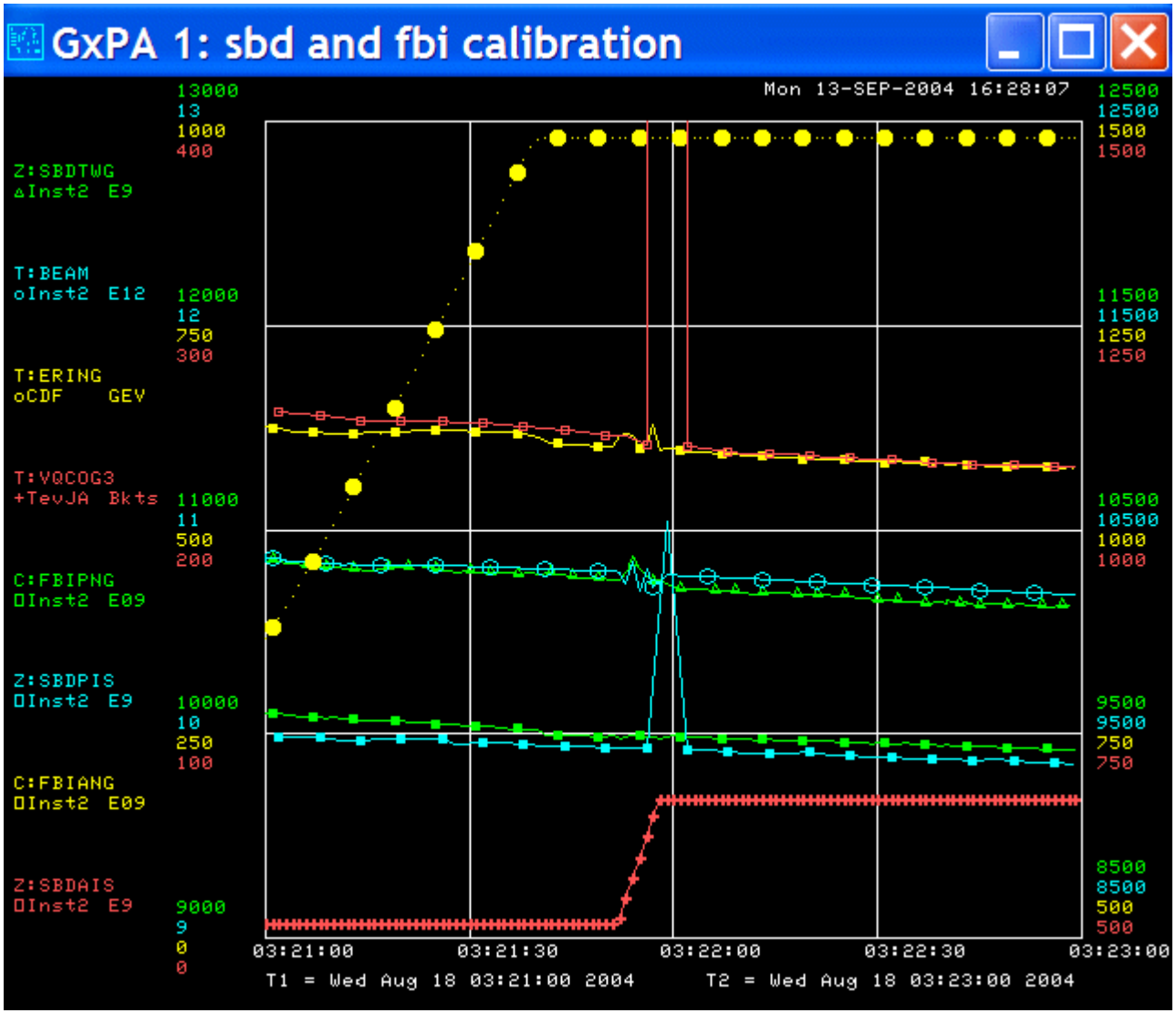
Store 3736

SBD/BEAM = 1.002



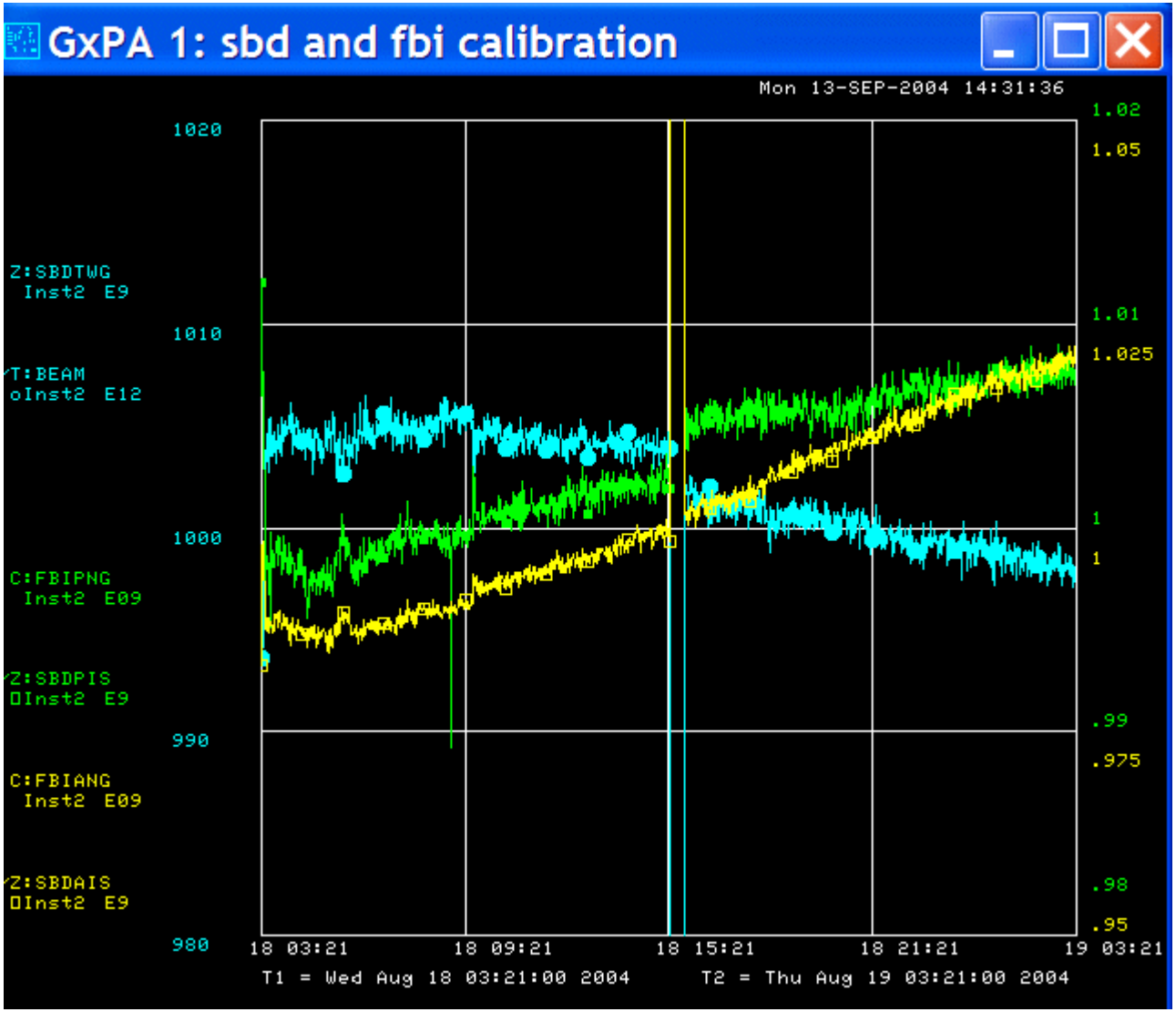
Store 3739

SBD/BEAM = 1.004



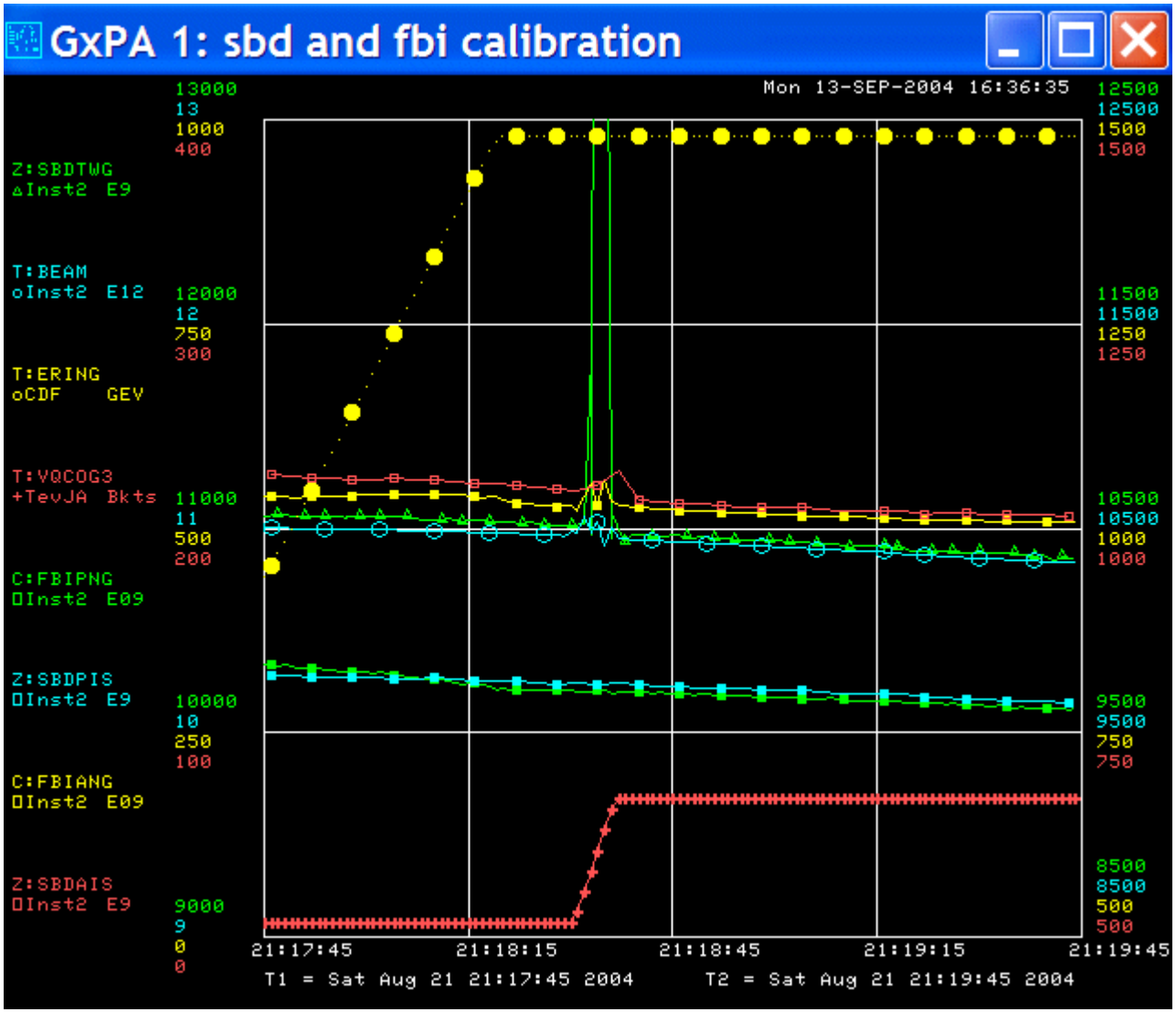

SBD & BEAM

Store 3739 SBD/BEAM = 1.004



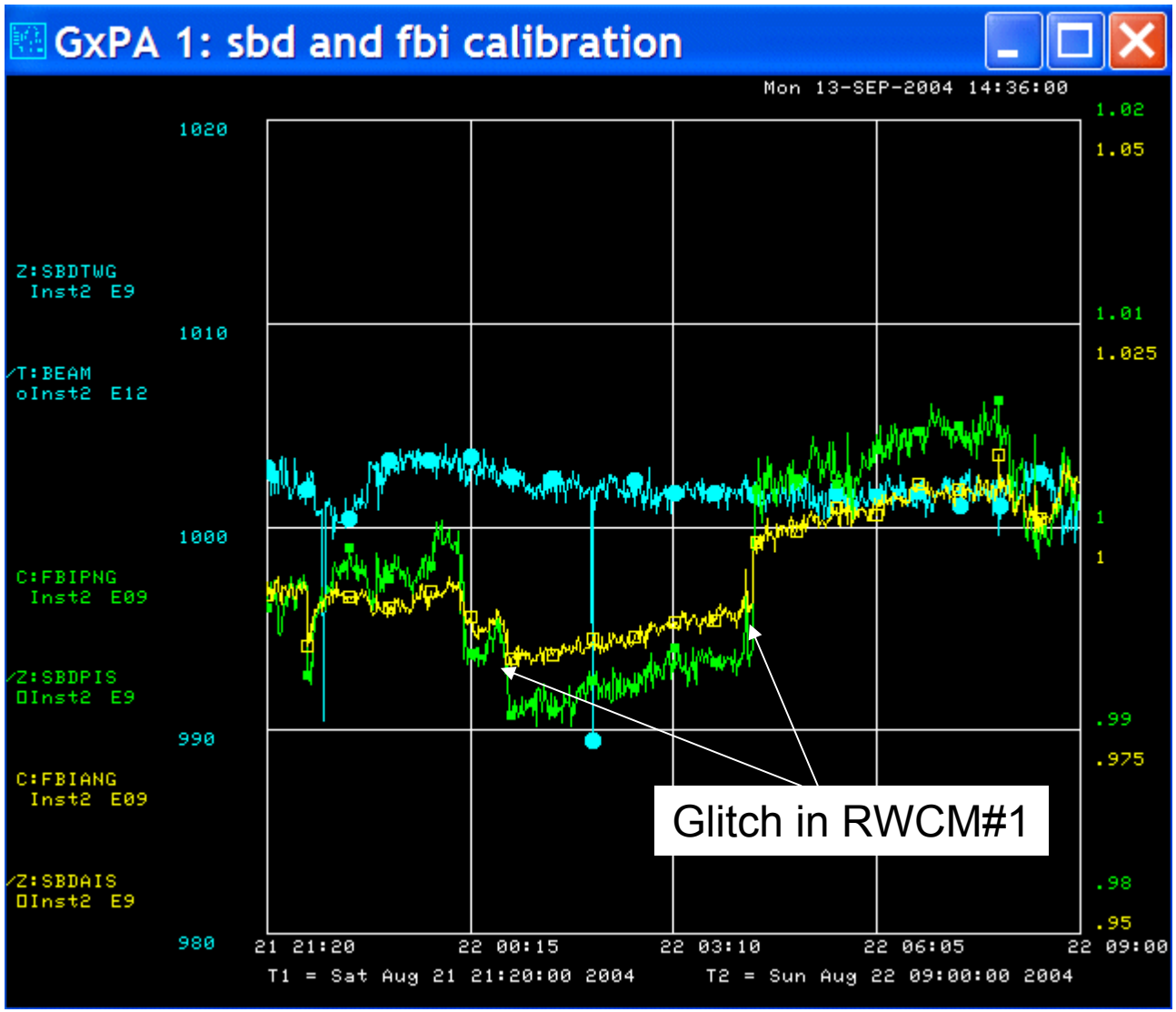
Store 3744

SBD/BEAM = 1.002



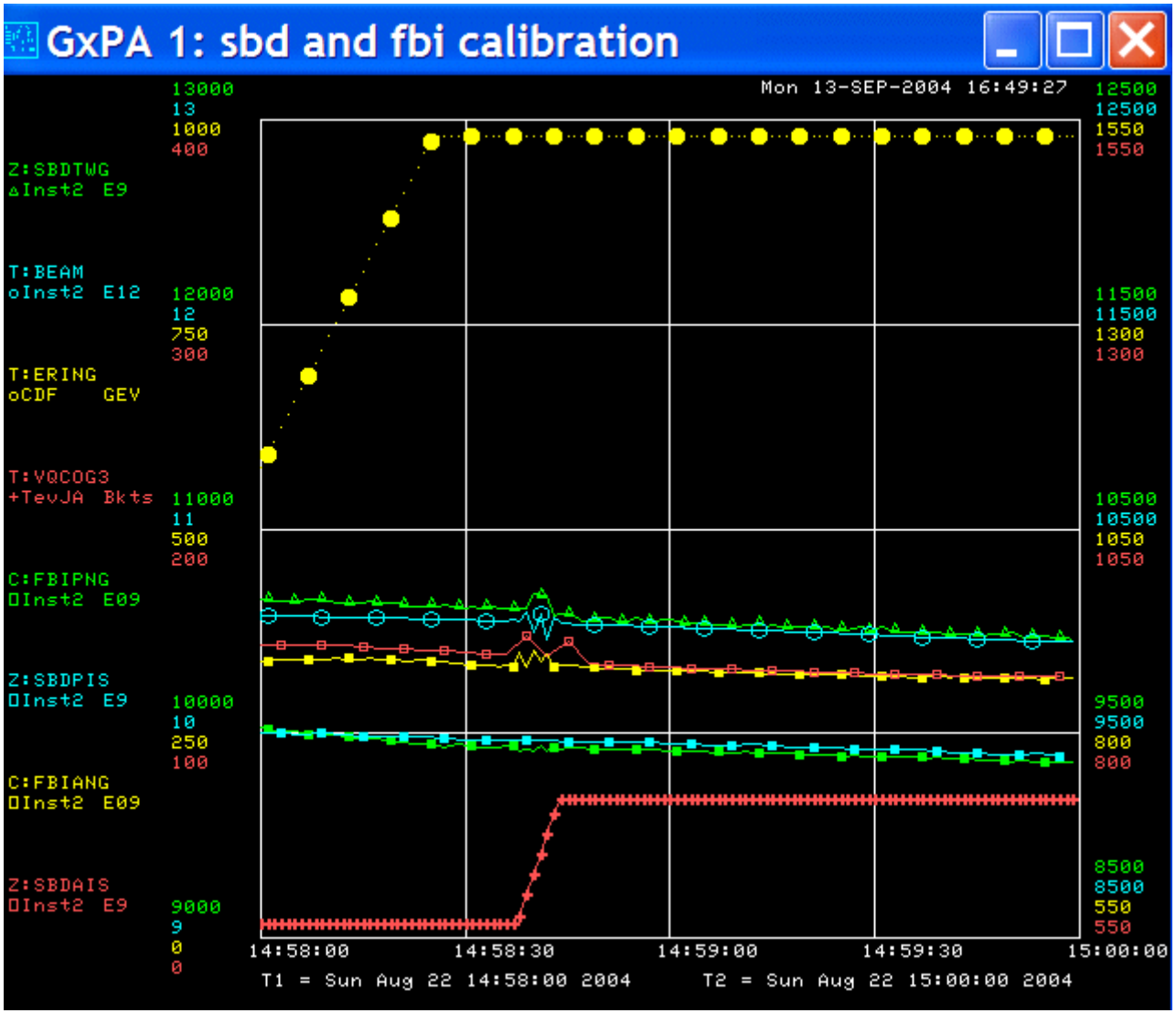

SBD & BEAM

Store 3744 SBD/BEAM = 1.002

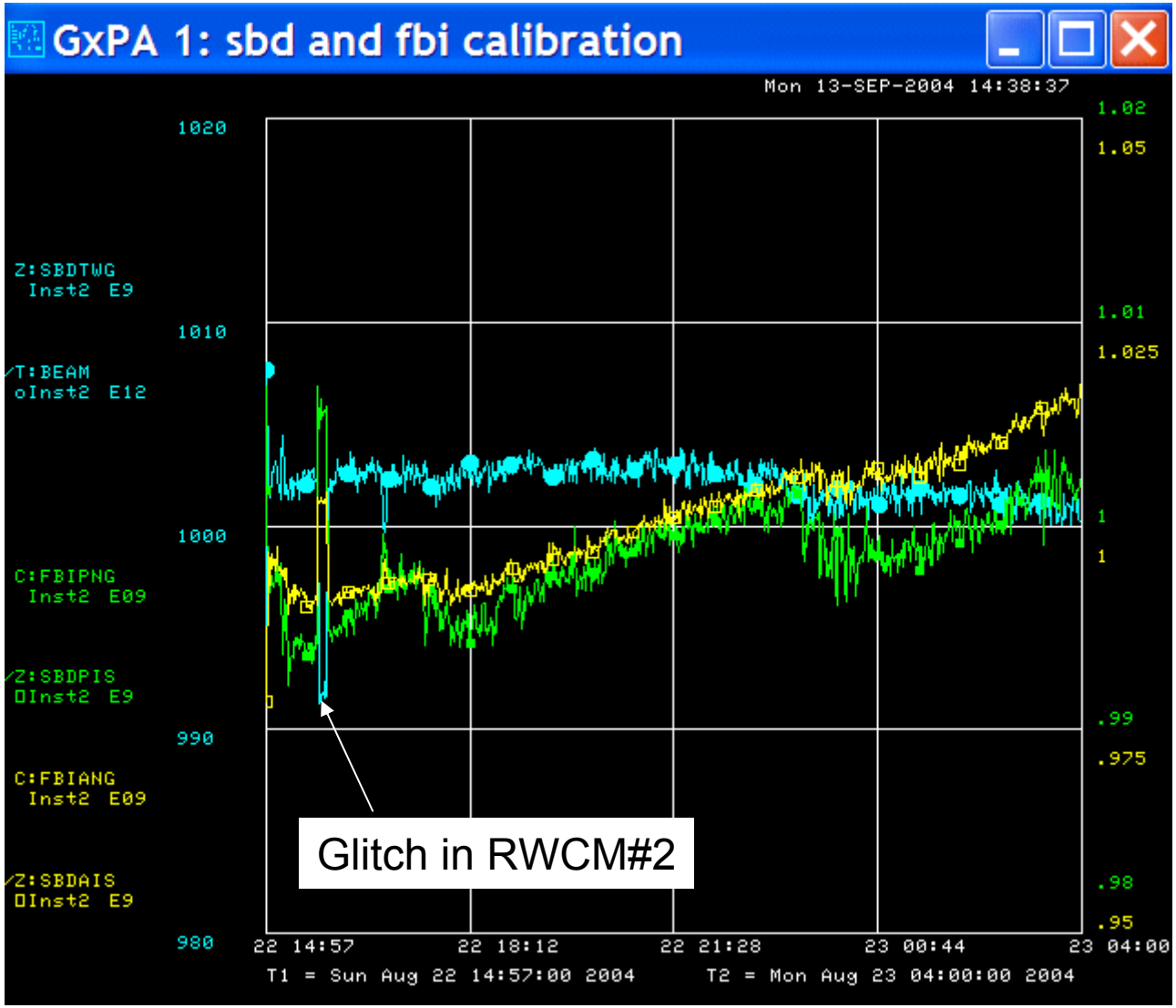


Store 3745

SBD/BEAM = 1.002




SBD & BEAM

Store 3745

SBD/BEAM = 1.002