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# Algorithm

Read T:BEAM,  
T:SBD Totals and  
T:FBI Totals at  
start of Flattop,

Scale T:SBDTWG  
to T:BEAM

Calculate scale  
factors C:FBI  
Proton and Pbar  
totals to T:SBD  
Totals

*from Tom Meyer's presentation on March 6*

**SBD and FBI Calibration for store -1**

Generated on Thu Apr 09 15:10:00 CDT 2009

**Algorithm Parameters**

Parameter	Value	Parameter	Value
Offset from beginning of Flattop	9.0 seconds	Period	10.0 seconds
SBD Minimum allowed change	0.9800000190734863	SBD Maximum allowed change	1.0199999809265137
SBD Maximum allowed change	0.9800000190734863	SBD Maximum allowed change	1.0199999809265137
Change Factor (brave factor)	2.0	Filter Percentage	102.49999761581421 %
set SBD	0	set FBI	0

Flattop start time: Thu Apr 09 02:02:56 CDT 2009

**Old scaling factors**

Parameter	Value	Parameter	Value
T:SBDCLF	1.0054999589920044		
C:FBIPWS	-654.0	C:FBIAWS	-647.0
C:FBIPNS	-654.0	C:FBIAWS	-647.0

Computation of coefficient of BEAM TOTAL over SBD TOTAL for shot 6961 is  
 1.0044789422548908 dispersion/sqrt(N) 2.682905650865557E-4

Computation of coefficient of SBD over FBI TOTAL for shot 6961 are:  
 protons=1.0013160638820682 dispersion/sqrt(N) 1.0776143209635647E-4  
 pbars=1.003842535939834( dispersion/sqrt(N) 8.521716493849013E-5)

Summary for Store 6961

# Relevant ACNET Devices

```

PB T43 INSTRUMT PARAMS<NoSets>
T43 TEV SBD/FBI CALIBRATION SET D/A A/D Com-U ♦PTools♦
-<FTP>+ *SA♦ X-A/D X=TIME Y=L:V1SQ ,L:LV3MON,L:T5PREF,L:V4SQ
COMMAND ---- Eng-U I= 0 I=-28 , 115 , -1 , -31
-<12>+ rSUP 15_Hz F= 63 F=-32.5 , 120 , 1 , -35
SBD bpm flywir ibeams fbi blt blm ipm slight
!T:BMICLF[0 - 8] ---SEE BEAMS DOC 1462
-T:BMICLF CALIBRATION CONTROL 0 0
-T:SBDRMN lower limit of SBD facto .98 .98
-T:SBDRMX upper limit of SBD facto 1.02 1.02
-C:FBIRMN lower limit of FBI facto .98 .98
-C:FBIRMX upper limit of FBI facto 1.02 1.02
-T:BMICLF[5] CALIBRATION CONTROL 1.025 1.025
-T:SBDSFF safety factor for SBDCAL 2 2
-T:BMIDEL delay from Flattop (SECS 9 9
-T:BMINSM number of seconds data 10 10

!T:BMIRES[0 - 8]
T:SBDTCC change/uncertainty SBD 1.004 NONE
T:SBDTCC[1] change/uncertainty SBD 0 NONE
C:FBIPCC change/uncertainty FBIP. 1.001
C:FBIPCC[1] change/uncertainty FBIP. 0
C:FBIACC change/uncertainty FBIA. 1.004
C:FBIACC[1] change/uncertainty FBIA. 0
T:SBDTCF SBD changed status 0
C:FBIPCF FBIP changed status 0
C:FBIACF FBIA changed status 0

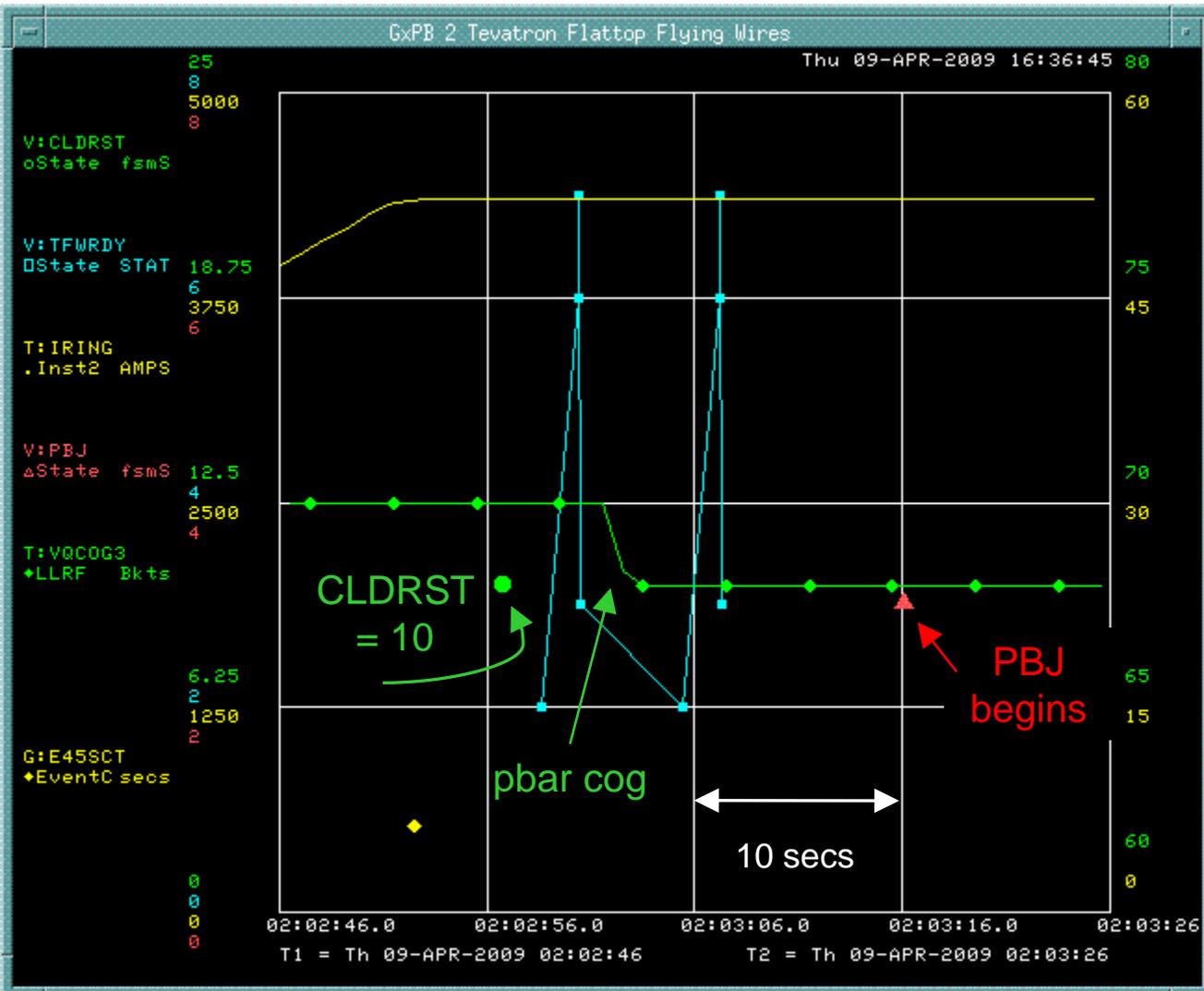
!CALIBRATION CONSTANTS
-T:SBDCLF SBD CALIBRATION FACTO 1.0055 1.0055 NONE
-C:FBIPNS Prot Narrow Scale Factor -654 -654 E9/V
-C:FBIPWS Prot Wide Scale Factor -654 -654 E9/V
-C:FBIANS Pbar Narrow Scale Factor -647 -647 E9/V
-C:FBIAWS Pbar Wide Scale Factor -647 -647 E9/V

-C:FBIANG TFBI Pbar NaroGate Inten 0 11.4 E09
T:SBDAIS SBD pbar intensity -.00013065 E9
-C:FBIPNG TFBI Prot NaroGate Inten 0 23.17 E09
T:SBDPIS SBD prot intensity 304.20792 E9
T:BEAM TeV Beam Current * .327 E12

```



# When the data is gathered



Want a “clean” window without cogging, wire flies, jacking...

- added a “WAIT FOR 10 sec” in sequencer after the 2<sup>nd</sup> wire fly

Since store 6907, use...

- 9 sec delay from flattop CLDRST transition
- 10 sec duration



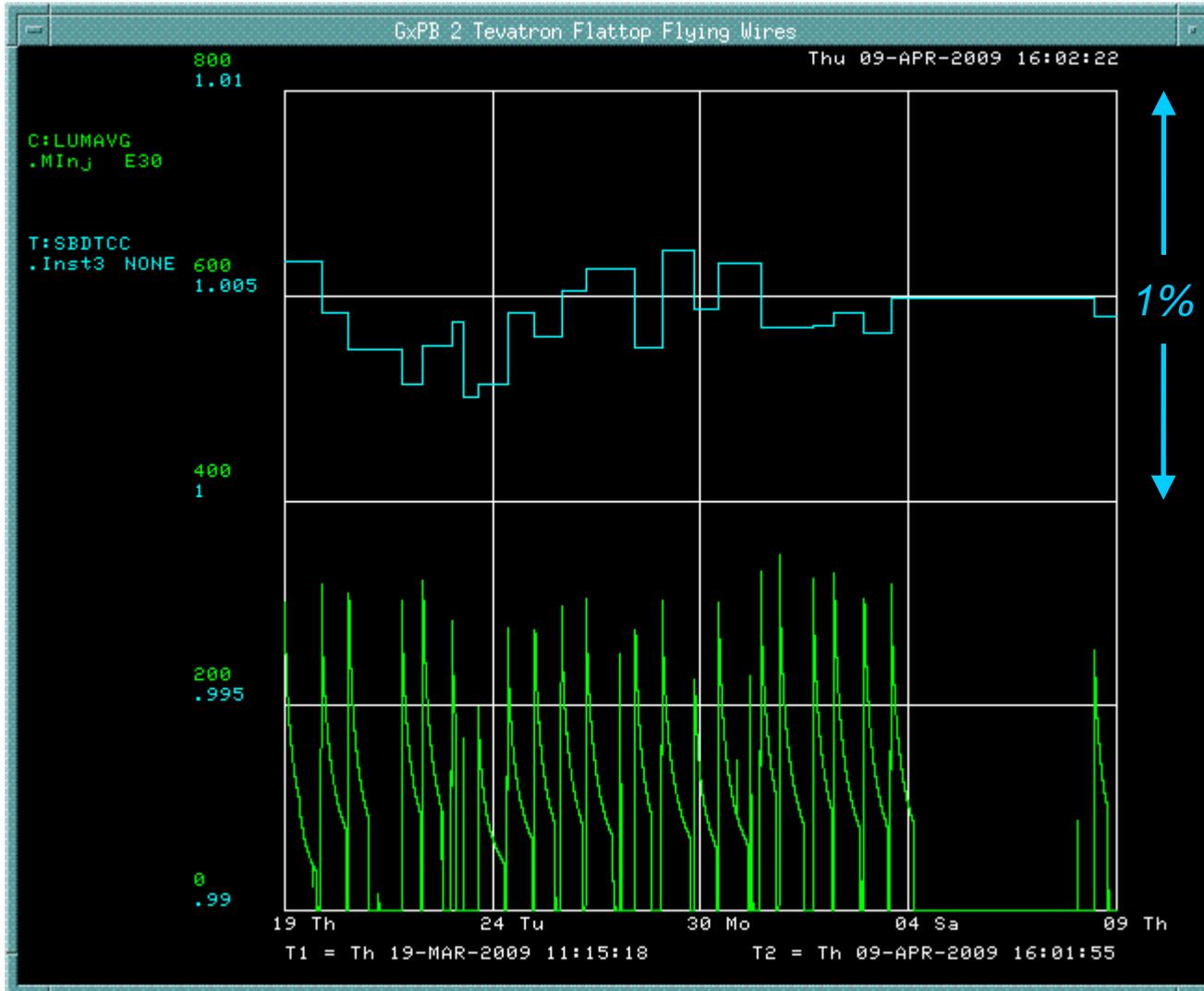
# Sequencer Change



```
PB C48 Sequencer<NoSets>
C48 COLLIDER SEQUENCER LOCKED DB 09-APR-09 15:44:38 Pgm_Tools
mode edit log status files help
aggregate commands Accelerate
::: Setup and Inject Protons p
::: Injection Closure (For & Rev)
::: Tune, Chrom, Coupling tuneup
::: Inject Final Protons
ERR Open Helix
::: Inject Pbars
ERR Prepare to Ramp
ERR Accelerate
-> Goto Low Beta
::: Remove Halo
::: HEP store
::: Document store
::: Turn off HEP
::: Un-Squeeze
::: Decelerate, Goto Inj Porch
-----
::: Document Quench n
1:20 of 38 +
Messages
::: COPY_SCREEN 0 SC p
::: SHOT_LOG IMAGE ?
::: ACL VSAMCRGETWTRACE1_RAMP_PO ?
::: START_PGM TEV_TUNES ?
::: SET_DEVICE T:LDM1GF 0 ?
::: COG ABSOLUTE 67.96 .
::: SET_DEVICE T:LDM1GF -6.2 ?
::: SET_DEVICE T:SBDACC 1 .
::: SET_DEVICE C:FBIABS 1073 .
::: SET_SEQ_FILE 66 .
::: EVENT CF TRIGGER .
::: WAIT_FOR SECS 10 .
::: ACL PBjatFlattop ?
::: CTL_DEVICE T:VTICK OFF .
::: CTL_DEVICE T:HIDAMP RESET .
::: EVENT CF TRIGGER .
::: STEP_MOTOR T:SYNCL1 1500 ?
ERR SEQ_PGM CHECK C23_Acceler ? n
45:64 of 64 +
```



# Calculated SBD Scaling Factor

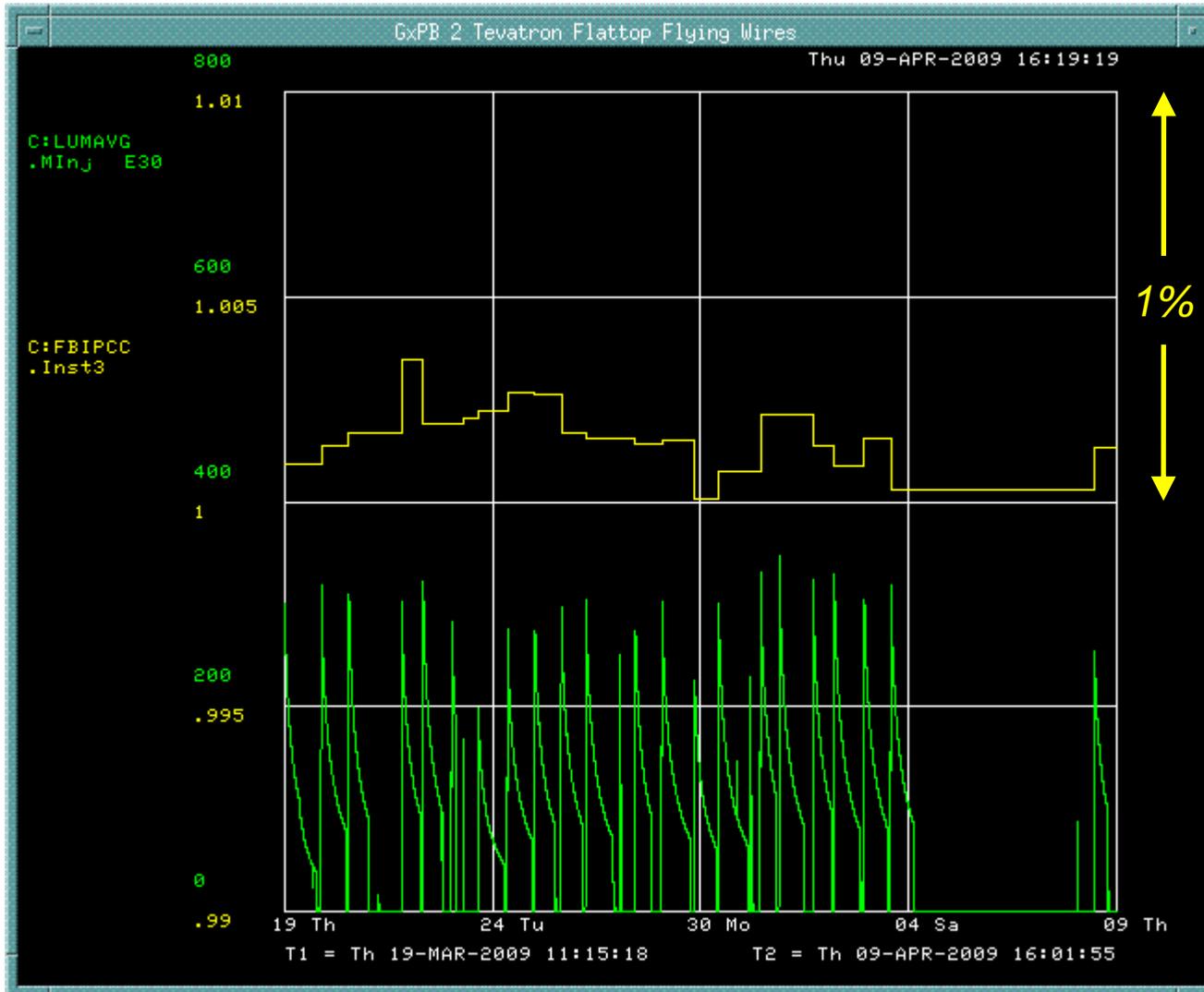


*since Store 6907*

Thanks Tom Meyer  
for putting the  
devices into  
datalogger



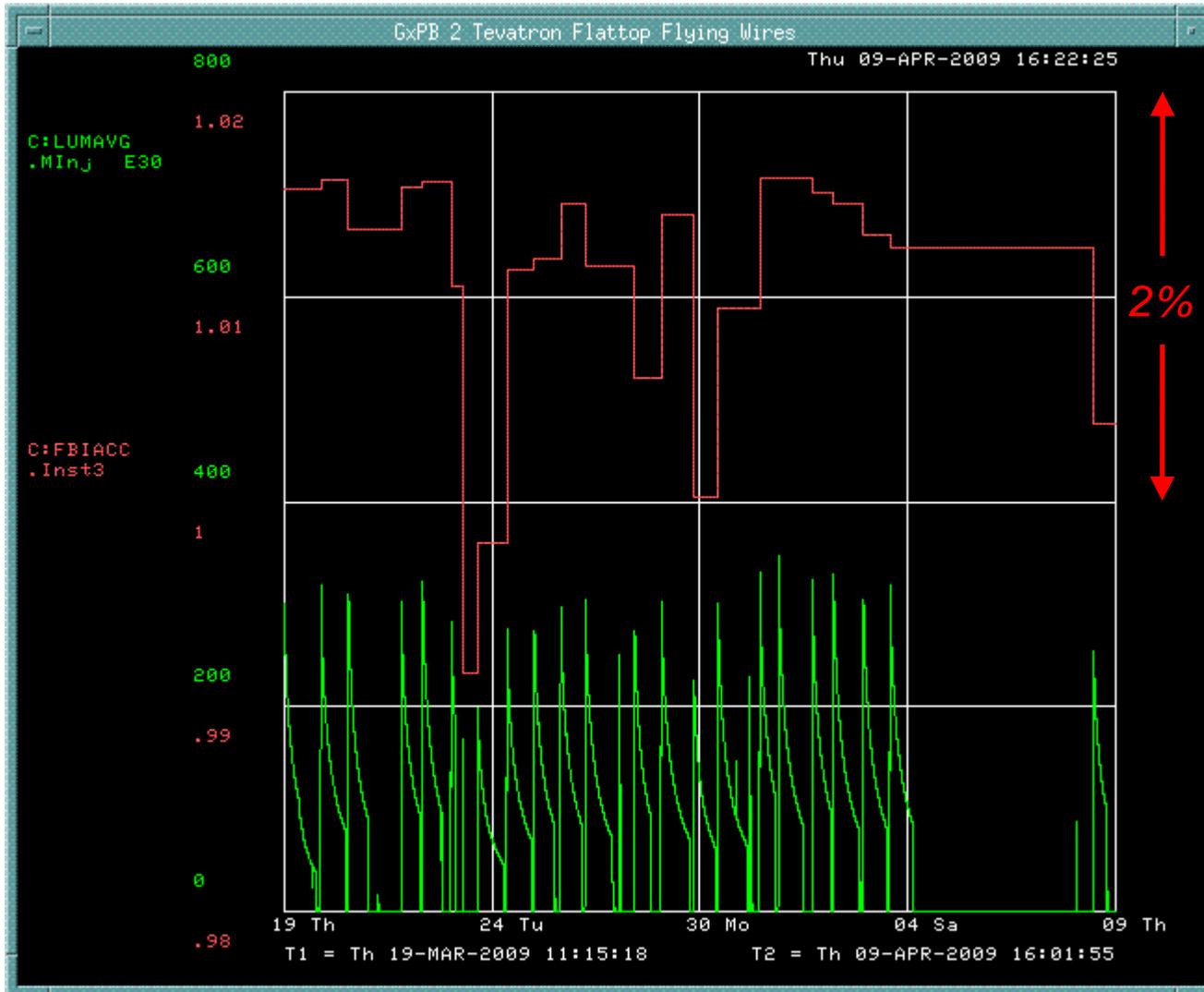
# Calculated proton FBI "Scaling Factor"



*since Store 6907*



# Calculated pbar FBI "Scaling Factor"



*since Store 6907*

*greater scatter  
correlated with smaller  
pbar intensities?*



# Summary



- Set up a “calibration window” at flattop before jacking for data
  - only looking at calibration calculation, not sending changes
- Since store 6907, scatter in SBD and proton FBI calculated calibration changes  $< 0.5\%$
- Pbar FBI changes up to 2%
  - Correlated with pbar intensity?
  - Needs additional investigation
- Reasonable to enable SBD changes
  - Maybe with smaller limit on allowed changes  $< 1\%$ ? (Currently 2%)