



CCTF/01-37



**Innovative
Solutions
International**
Satellite Navigation Division



TWSTFT Report



Innovative
Solutions
International
Satellite Navigation Division

W. J. Klepczynski

Chairman

BIPM Working Group on TWSTFT

ISI

1608 Spring Hill Road

Vienna, VA

703-841-2669

703-465-9158 (Fax)

Wklepczy@aol.com

Bill.CTR.Klepczynski@faa.gov

W. Lewandowski

Secretary

BIPM Working Group on TWSTFT

BIPM

Pavillon de Breteuil

F-92312 SEVRES Cedex, France

33-1-45-077063

33-1-45-077059 (Fax)

wlewandowski@bipm.org



TWSTFT Report to CCTF



**Innovative
Solutions
International
Satellite Navigation Division**

- Review of 8th Meeting of BIPM WG on
TWSTFT**
- Highlights of Activities**
- Conclusions and Recommendations**



TWSTFT Working Group Meetings



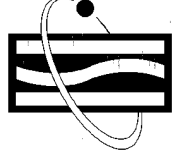
Innovative
Solutions
International
Satellite Navigation Division

Meeting	Dates	Host Laboratory	Location
1	20 OCT	NPL	Teddington, England
2	26 OCT	OCA	Grasse, France
3	29 SEP	PTB	Braunschweig, Germany
4	3-4 OCT 96	IEN	Turino, Italy
5	8-9 DEC 97	NIST	Boulder, Colorado
6	29-30 OCT 98	ROA	San Fernando, Spain
7	13-14 DEC 99	USNO	Washington, DC
8	5-6 OCT 00	BIPM	Sevres, France
9	OCT 01	CSAO	Lintong, China



TWSTFT WG 8

Meeting Highlights



Innovative
Solutions
International
Satellite Navigation Division

- Reports on Current Operations by Participating Stations
- Discussions on Uncertainties of TWSTFT Links
- Extension of TWSTFT Observing Sessions from 3 to 5 or 7 per week
- Introduction of additional links into TAI
- Expansion of TWSTFT Links in the Pacific Rim



Participating Stations



Innovative
Solutions
International
Satellite Navigation Division

→ European Active Participating Stations

PTB VSL NPL OCA

ROA IEN

→ No Longer Active European Stations

TUG DTAG

→ Active North American Stations

NIST USNO



Introduction of Additional Links into TAI



Innovative
Solutions
International
Satellite Navigation Division

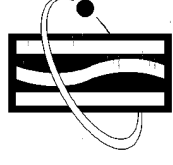
→ **GPS is NO LONGER THE SOLE technique used to bring clocks into TAI**

→ **Current TWSTFT Links for TAI**

- **USNO - NPL**
- **PTB - NPL**
- **PTB - VSL**
- **USNO - AMC**
- **NIST-PTB**



TWSTFT Observing Sessions



Innovative
Solutions
International
Satellite Navigation Division

- **2 Sets of Observations**
 - **within Europe**
 - **Europe to North America**
- **Three 30 minute sessions per week for each set**
- **Total Observing Time = 90 minutes/week for each set**
- **Minimum Cost Unit = 10 minutes**
- **Not all stations totally automated**
- **Proposed to go to five 20 minute sessions during week**
- **In the future, will go to seven 20 minute sessions/week**
- **Cost is a factor**

Calibration of TWSTFT Stations



- **Use of a Portable Station**
 - **USNO Portable X-Band antenna**
 - **Use of Transportable TUG Station**
- **Calibration via GPS Common View**
 - **3 times per year**
- **deJong type Satellite Simulator**

Expansion of TWSTFT Stations in the Pacific Rim



→ Active Stations in Pacific Rim

- CRL AUS NRLM CSAO TL KRIS

→ Proposed Links for TAI

- CRL - AUS
- CRL - NRLM
- CRL - CSAO

→ Future additions

- CRL - TL



Action Items



Innovative
Solutions
International
Satellite Navigation Division

- **Extend number of weekly TWSTFT sessions**
- **Establish a Working Group on Pacific Rim/European Link**
- **Thrice yearly GPS calibrations of TWSTFT Stations**
- **X-band Calibrations of TWSTFT Stations**
- **Develop Uncertainty Budget for TWSTFT**
- **Introduction of additional TWSTFT Links into TAI**



Use of INTELSAT 706



Innovative
Solutions
International
Satellite Navigation Division

- Routine observations for the Transatlantic link were upset early in the year when INTELSAT changed the East-West transponder and, consequently, the frequencies used for TWSTFT between USA and Europe had to change significantly
- Stations with sufficient frequency agile equipment were able to react
- Some stations required additional effort and help to recover
- Observations are now back to a somewhat normal schedule



Innovative
Solutions
International
Satellite Navigation Division