

REFERENCE-CELL CALIBRATION ACTIVITIES

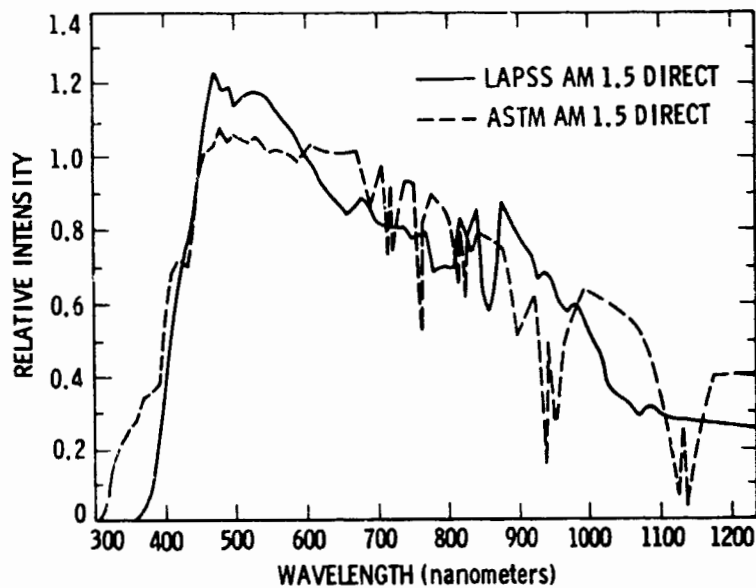
JET PROPULSION LABORATORY

R. Mueller

Reference-Cell Calibration Method

1. TYPE II (SECONDARY) CALIBRATION USING ASTM 130
2. LIGHT SOURCE IS THE JPL AM 1.5 FILTERED LAPSS
3. PRIMARY REFERENCE CELLS CALIBRATED IN SUNLIGHT BY COMPARISON WITH A PYRHELIOMETER USING ASTM 130
4. TEMPERATURE OF DEVICE AND REFERENCE CONTROLLED

Spectral Irradiance (AM1.5 Direct)



MODULE DEVELOPMENT AND ENGINEERING SCIENCES

Why Use Secondary Calibration in LAPSS?

1. PRIMARY CALIBRATION IN SUNLIGHT IS TIME CONSUMING
2. ONLY A LIMITED SUN CALIBRATION OF A SET OF PRIMARY REFERENCE CELLS IS REQUIRED
3. THE LAPSS LIGHT SOURCE IS FILTERED TO CLOSELY MATCH THE AM1.5 DIRECT SPECTRUM
4. TEMPORAL STABILITY OF THE FILTERED LAPSS IS EXCELLENT
5. PRIMARY REFERENCE CELL NEED NOT BE SPECTRALLY MATCHED TO DEVICE UNDER CALIBRATION
6. LOWER COST AND TIMELY METHOD OF PROVIDING REFERENCE CELLS
7. POSSIBLY LOWER ERROR THAN USING A SPECTRALLY MATCHED, SUN CALIBRATED REF CELL WITH UNFILTERED LAPSS.

List of Organizations Provided Secondary Calibration of Reference Cells

ARCO SOLAR
BRITISH PETROLEUM
CLEMSON UNIVERSITY
COMMISSION OF THE EUROPEAN COMMUNITIES
JET PROPULSION LABORATORY
KYOCERA INTERNATIONAL
MASSACHUSETTS INST. OF TECHNOLOGY
ONTARIO RESEARCH FOUNDATION, CANADA
SANYO
SOLAR ENERGY RESEARCH INSTITUTE
SOLAREX CORP.
SOLAR POWER CORP.
SOLAVOLT
SOLEC INTERNATIONAL
SOLENERGY CORP.
SPIRE
TIDELAND CO.
YALE UNIVERSITY

MODULE DEVELOPMENT AND ENGINEERING SCIENCES

CEC Round Robin

MANAGED BY: COMMISSION OF THE EUROPEAN COMMUNITIES
JOINT RESEARCH CENTRE
ISPRA ESTABLISHMENT
21020 ISPRA (VARESE) ITALY

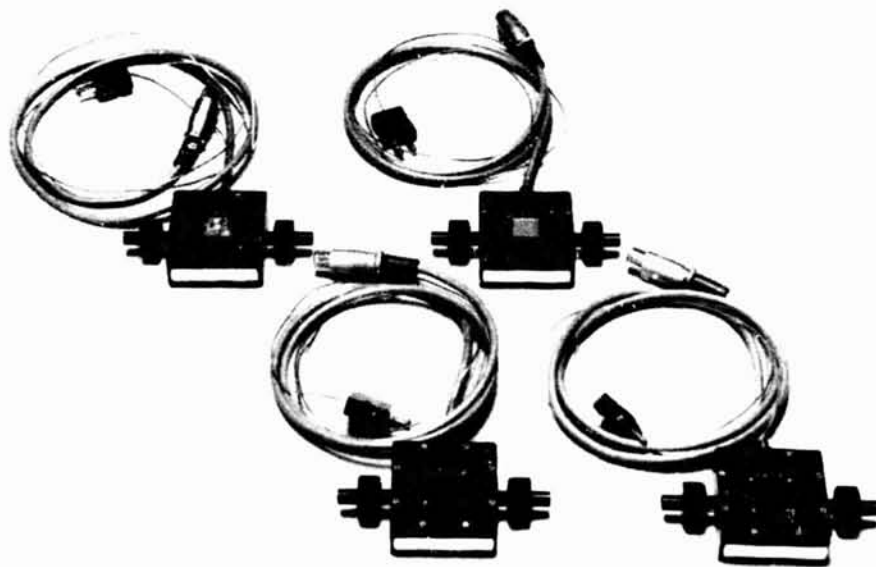
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OBJECT: TO RESOLVE DISAGREEMENT IN MEASUREMENTS

REFERENCE CELLS PROVIDED BY:

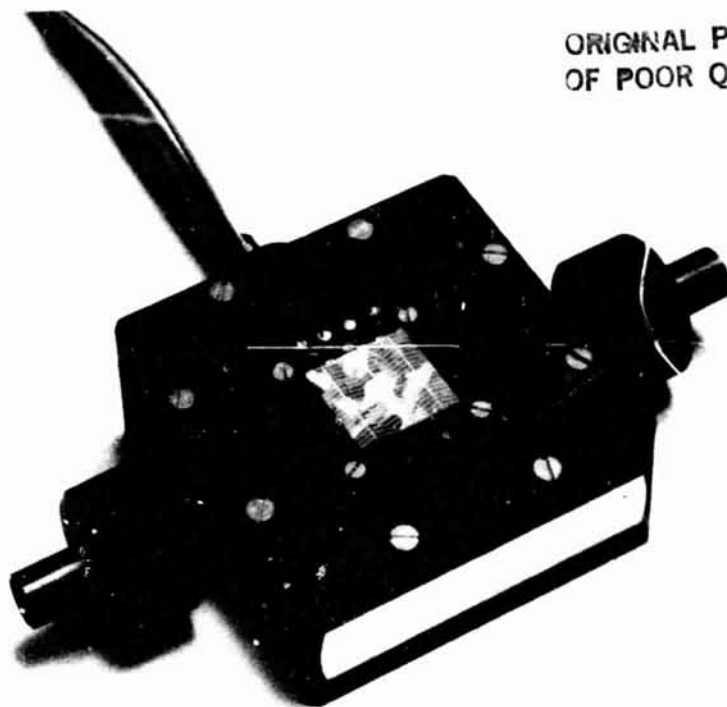
4 CELLS	AMORPHOUS SILICON	JMI (JAPAN MACHINERY & METALS INSPECTION INSTITUTE)
5 CELLS	MONO & POLYCRYSTALLINE	ENEA (NUCLEAR & ALTERNATIVE ENERGY AGENCY), ITALY
2 CELLS	POLYCRYSTALLINE SILICON	AEG (TELEFUNKEN) GERMANY
3 CELLS	MONOCRYSTALLINE SILICON	PW (PHOTOWATT ORGANIZATION), FRANCE
4 CELLS	MONO & POLYCRYSTALLINE	JPL (JET PROPULSION LABORATORY), USA

18 CELLS TOTAL



MODULE DEVELOPMENT AND ENGINEERING SCIENCES

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CEC Round Robin Measurements Time Table

UNTIL AUG 7, 1984	JRC (JOINT RESEARCH CENTRE) ISPRA, ITALY
AUG 15 - SEPT 15, 1984	RAE (ROYAL AIRCRAFT ESTABLISHMENT), UNITED KINGDOM
SEPT 15 - OCT 15, 1984	CNES (NATIONAL CENTRE FOR SOLAR ENERGY), FRANCE
OCT 15 - NOV 15, 1984	ENEA (NUCLEAR AND ALTERNATIVE ENERGY AGENCY), ITALY
NOV 15 - DEC 15, 1984	DFVLR (RESEARCH & EXPERIMENT INSTITUTE FOR AIR & SPACE TRAVEL), GERMANY
JANUARY 1985	NRC (NATIONAL RESEARCH CENTRE), CANADA
FEBRUARY 1985	JPL (JET PROPULSION LABORATORY), USA
MARCH 1985	JMI (JAPAN MACHINERY & METALS INSPECTION INSTITUTE), JAPAN
APRIL 1985	JRC (JOINT RESEARCH CENTRE) ISPRA, ITALY

MODULE DEVELOPMENT AND ENGINEERING SCIENCES

BPC Round Robin

MANAGED BY: BRITISH PETROLEUM COMPANY P.L.C.
BP RESEARCH CENTRE
MIDDLESEX, ENGLAND

OBJECT: TO RESOLVE DISAGREEMENT IN MEASUREMENT

6 MODULES AND 1 REFERENCE CELL PROVIDED BY:

PHOTOWATT
PHOTON TECHNOLOGY
TIDELAND
ARCO SOLAR
HELIOS
KYOCERA INTERNATIONAL

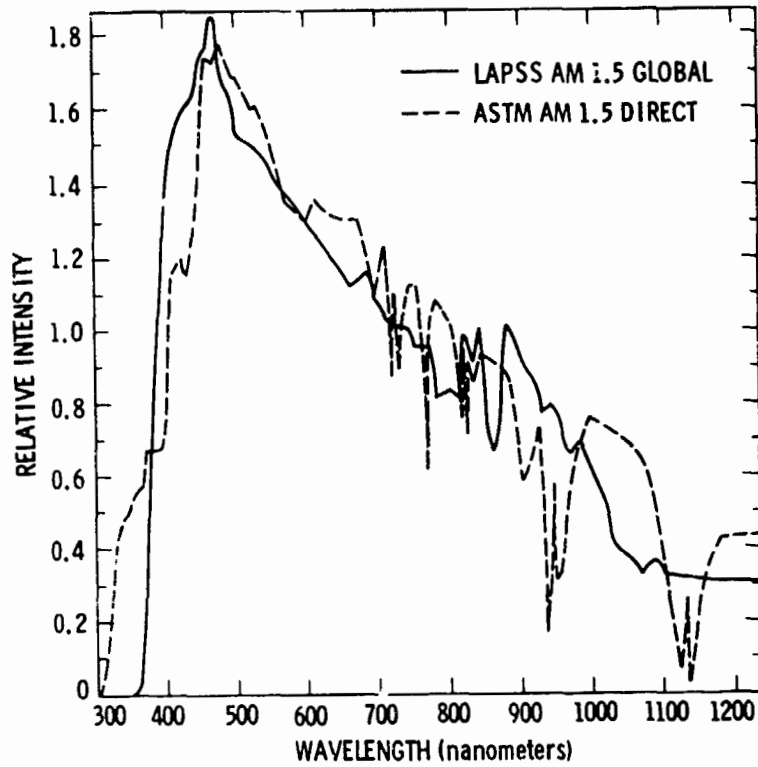
MEASUREMENTS TIMETABLE:

≈ AUGUST 1984	RAE (ROYAL AIRCRAFT ESTABLISHMENT), U.K.
SEPT - OCT 1984	JPL (JET PROPULSION LABORATORY), USA
OCT - NOV 1984	JRC (JOINT RESEARCH CENTRE), ISPRA, ITALY

Amorphous Silicon Activities

1. DEFINED A LAPSS MODIFICATION TO PROVIDE AM 1.5 GLOBAL SIMULATION
2. DEFINED A REFERENCE CELL FOR USE WITH AMORPHOUS SILICON MODULES

Spectral Irradiance (AM1.5 Global)



Spectral Response (Amorphous Silicon)

