

N85-32401

BLOCK V MODULE PROGRAM

JET PROPULSION LABORATORY

M.I. Smokler

Program Configuration

- Perform module design
- Manufacture 10 modules
- Conduct Block V qualification test sequence
- Modify design to correct problems, as necessary
- Conduct design review
- Manufacture 10 modules
- Conduct Block V qualification test sequence
- Modify design, as necessary, and supply modules for retest
- Prepare final report

Program Status: Remaining Events

<u>Item</u>	<u>Expected</u>
Qualification tests completed	12/84
Final reports submitted	2/85
JPL user handbook issued	3/85

PLENARY SESSIONS

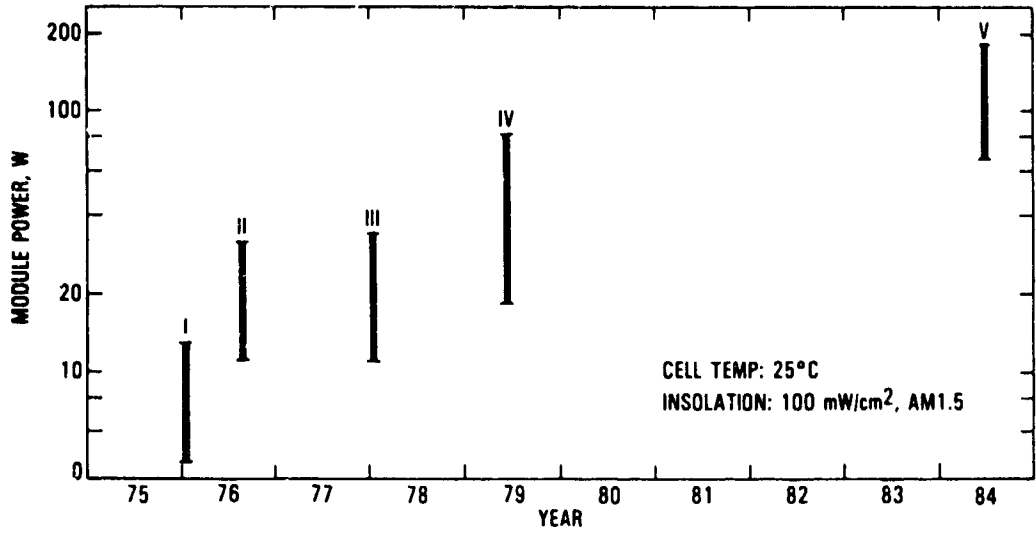
Test Experience

- **Negligible problems**
 - Hail damage**
 - Unacceptable cell cracks**
 - Interconnect failure**
 - Hot spot failure**
- **Continuing problems**
 - Uncured encapsulant**
 - Delamination**
 - Frame/mounting degradation**
 - High-voltage breakdown**
 - Inadequate ground continuity**
 - Junction box warp**

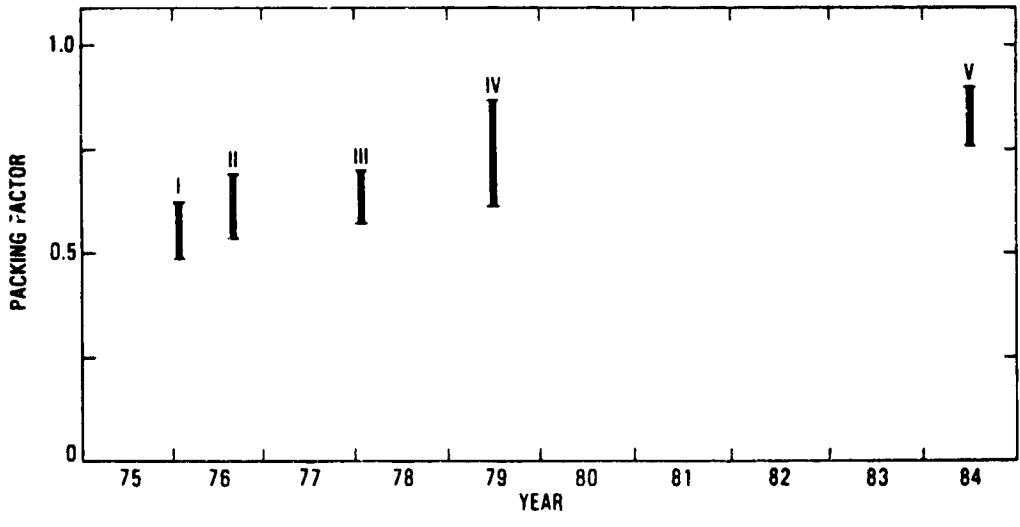
Measurement Problems Solved

<u>Problem</u>	<u>Solution</u>
Current up to 27A	High current electronic load (to 50 A nominal)
Module diagonal up to 2.2 m	Uniform irradiance field ($< 2\%$ non-uniformity)
No custom-made reference cells	AM1.5 simulator spectrum (1% max mismatch)

Module Power Trend



Packing Factor Trend



PLENARY SESSIONS

Cell and Circuit Characteristics

	Cell				Circuit	
	Qty	Size, mm	Shape	Base Material	Parallel Cells	Bypass Diodes
ARCO	72	97 × 97	"Square"	Cz	6	0
GE	72	100 × 100	"Square"	Cz	2	3
MSEC	432	48 × 95	Rect.	EFG	12	0
SOLAREX	117	101 × 101	Square	Sem.	9	0
SPIRE	72	91 × 91	"Square"	Cz	2	3

Module Physical Characteristics

	Size, m		Super-Strate	Encap.	Bottom Cover	Pack. Fctr
	Length	Width				
ARCO	1.22	0.61	Glass	EVA	TED/POLY/TED	0.90
GE	1.85 ^a	0.81 ^a	↓	↓	TED/POLY/AlTED	0.90
MSEC	1.79	1.20	↓	↓	POLY/AlTED	0.89
SOLAREX	1.39	0.96	↓	↓	POLY/MYLAR/TED	0.88
SPIRE	1.13	0.60	↓	↓	TEDLAC	0.76

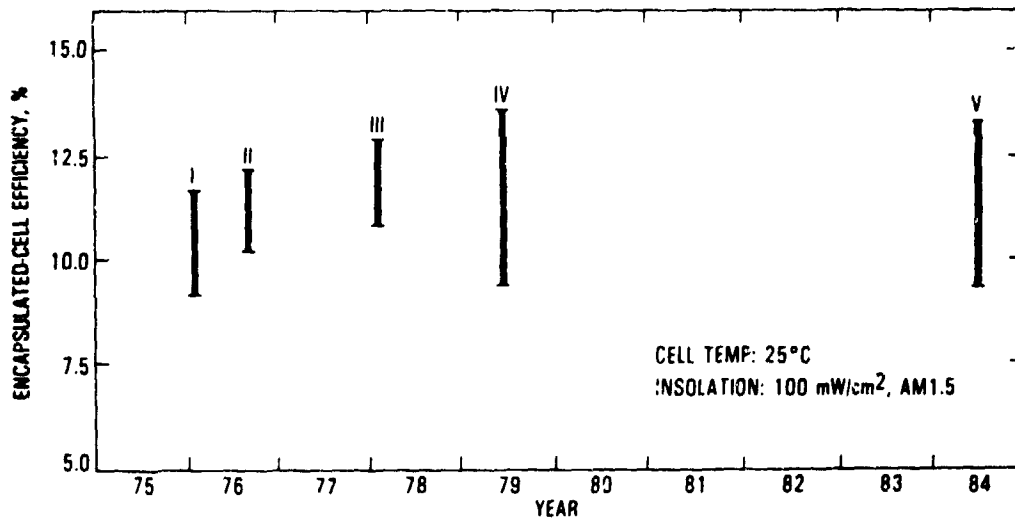
^aIncludes roofing material

Electrical Performance

INSOLATION: 100 mW/cm ² CELL TEMP: 25°C					
	P _{max} , W	V _{p max} , V	I _{p max} , A	Mod. Eff., %	Cell ^a Eff., %
ARCO	84.1	5.82	14.4	11.3	12.6
GE	81.4	16.9	4.82	10.5	11.7
MSEC	182	15.3	11.9	8.3	9.3
SOLAREX	139	5.84	23.8	10.3	11.7
SPIRE	71	16.1	4.38	10.1	13.3

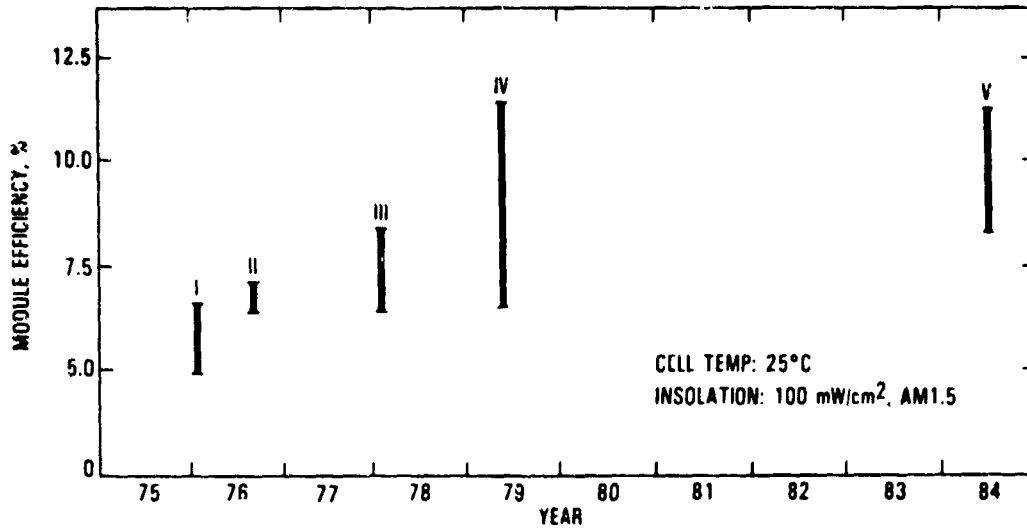
^aEncapsulated

Cell Efficiency Trend

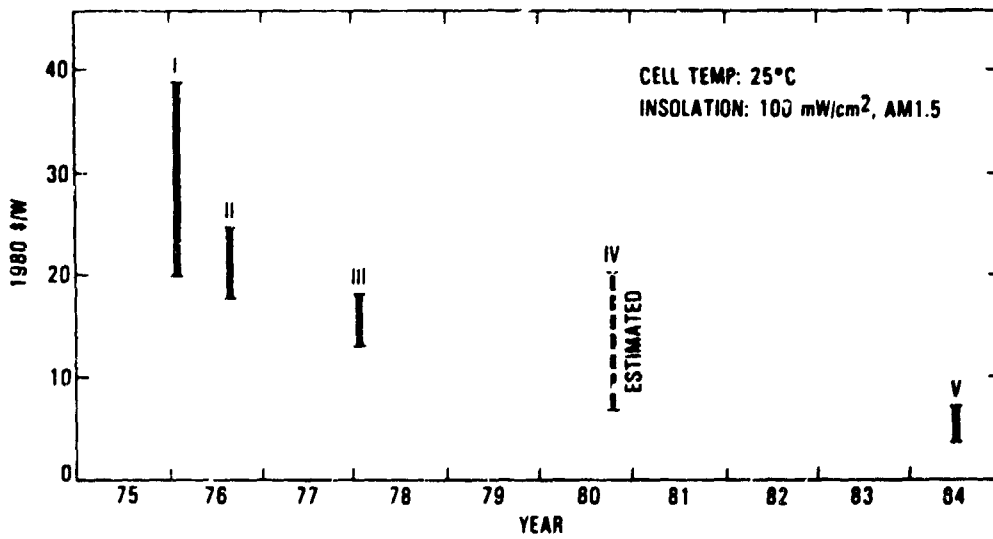


PLENARY SESSIONS

Module Efficiency Trend



Module Cost Trend



Summary

- The Block V Module Program will be completed in early 1985
- The principal improvements are
 - Large modules
 - High performance more common
 - Several former design problems solved