

Absolutely Calibratable Broadband Divertor Bolometer System for 2D Tomography During Transport and CHI Experiments

C. E. Bush¹, R. Maingi¹, H. Kugel²

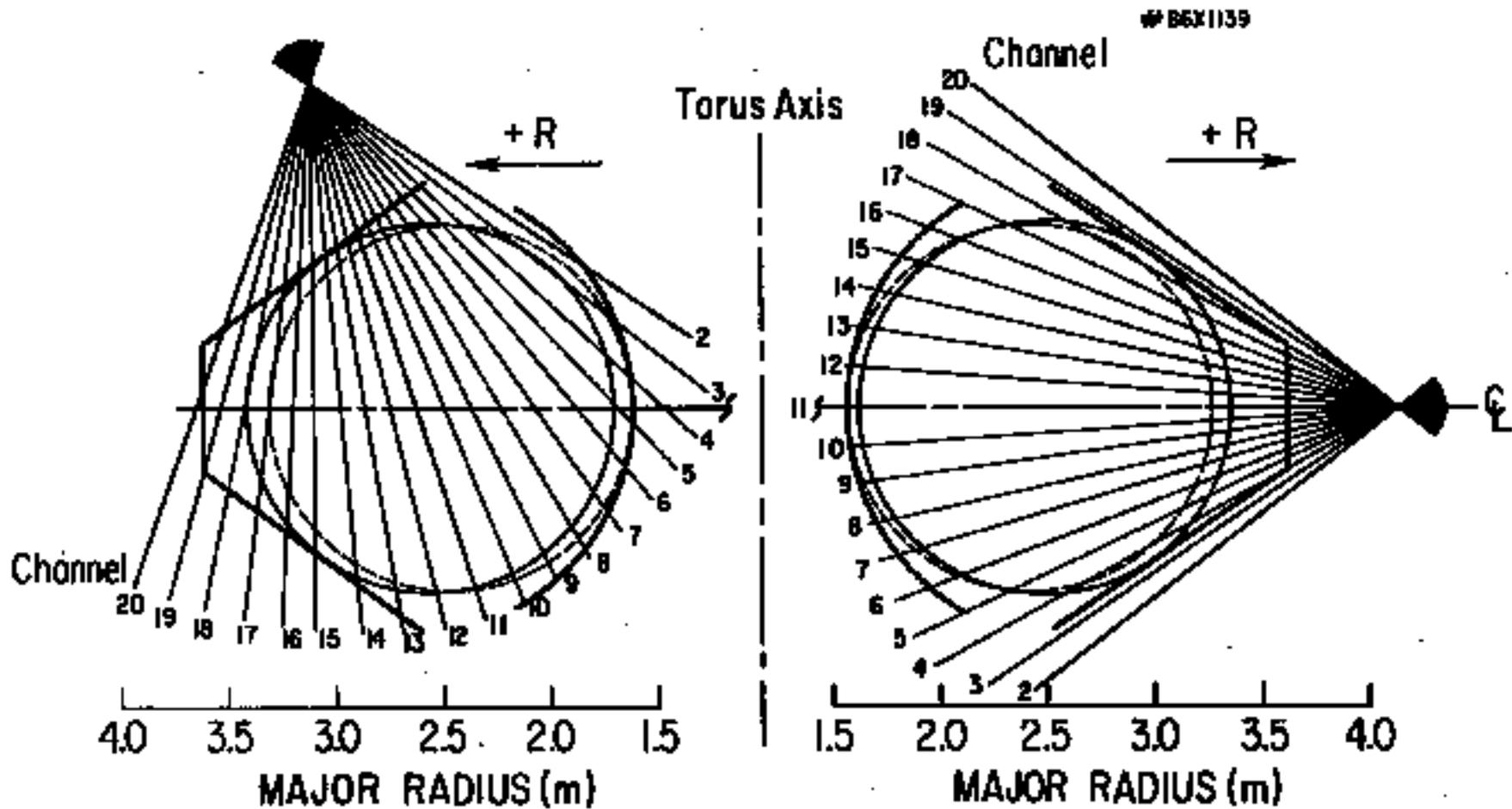
1. Oak Ridge National Laboratory
2. Princeton Plasma Physics Laboratory

NSTX Research Forum 2001
Princeton Plasma Physics Laboratory
Princeton, January 15, 2001

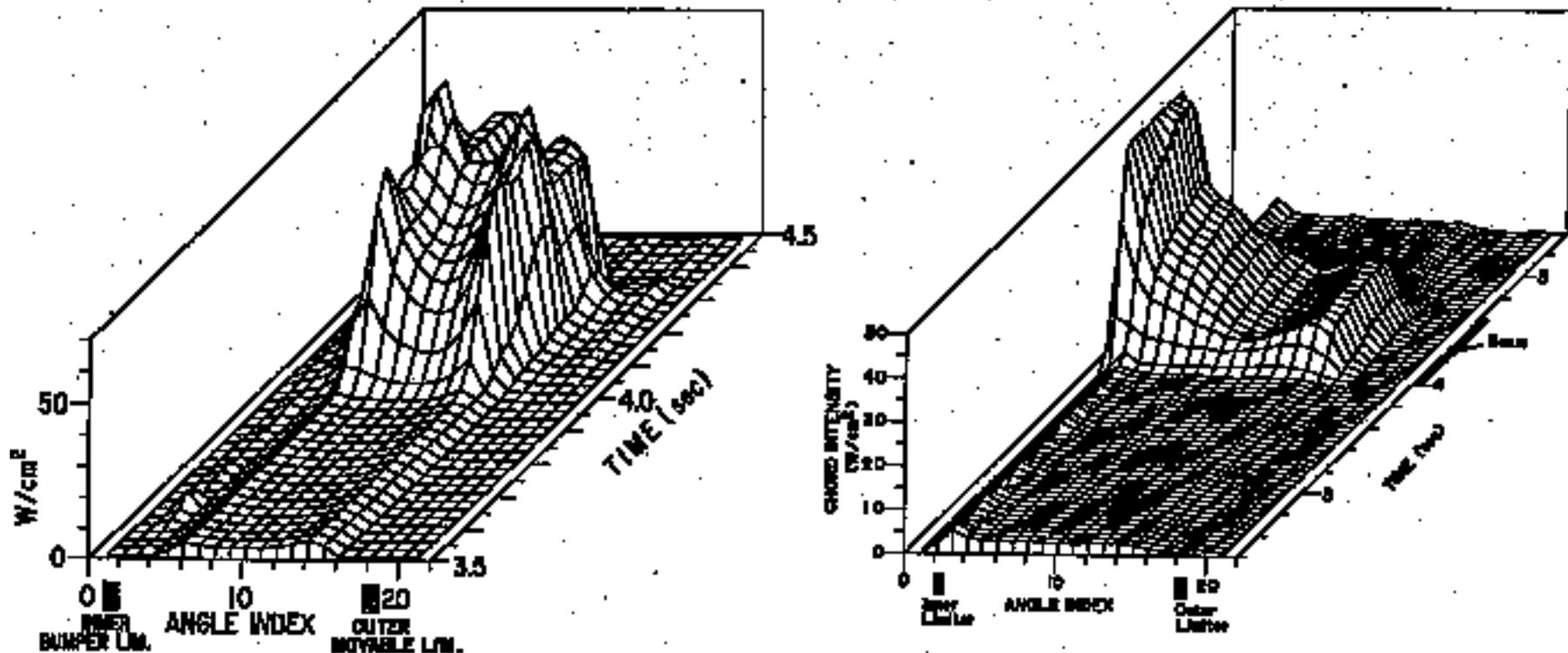
Motivation

- The low aspect ratio high performance NSTX plasmas require new operational and physics regimes.
- Accurate spatio/temporal measurements of radiated power will be required to understand the new physics and operational techniques (e.g. CHI).
- Total power balances are required including the main chamber and the divertor.
- There is a good chance the TFTR legacy bolometer system can be used for the divertor region of NSTX - before the end of this run year.

TFTR Vertical and Horizontal Bolometer Arrays (19 Channels Each)

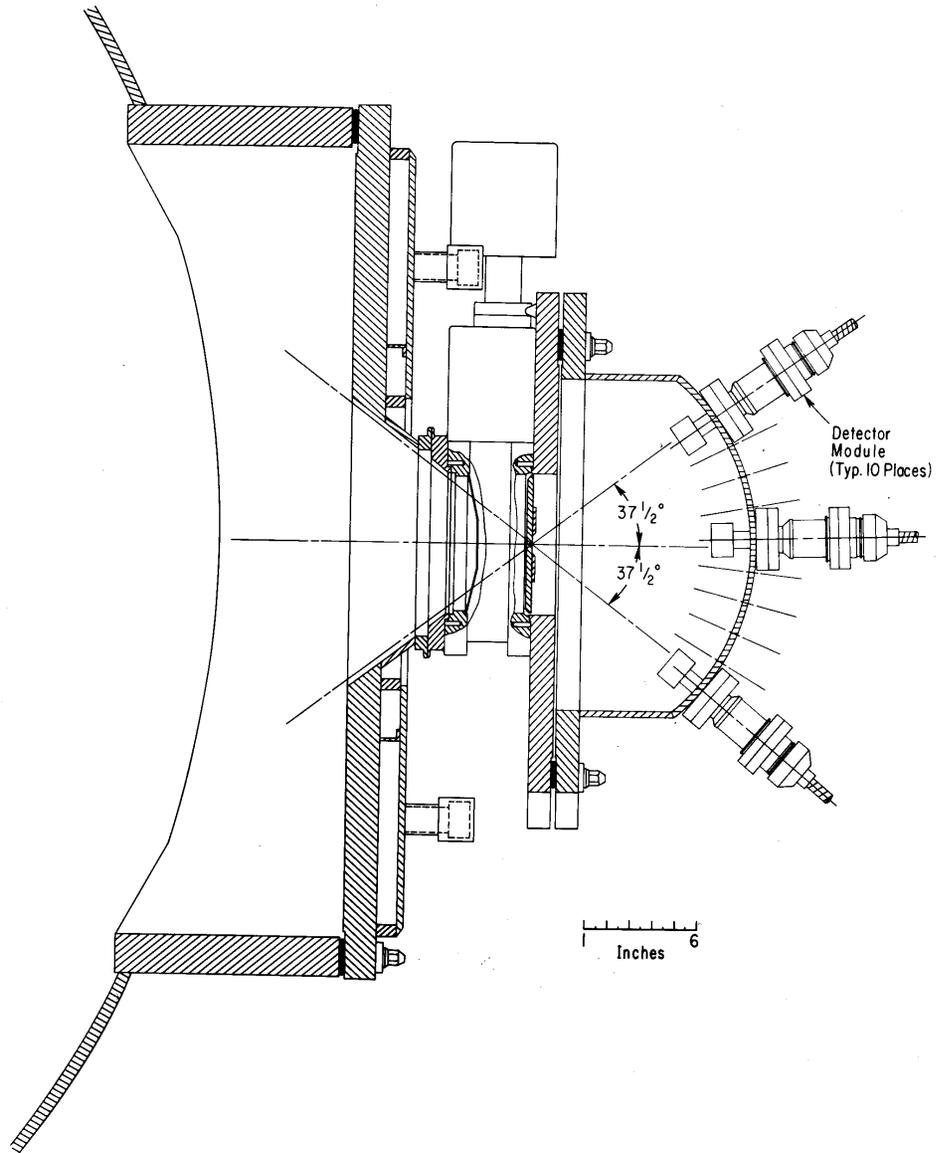


Chord Integrated data for a detached plasma and an inner bumper limited plasma

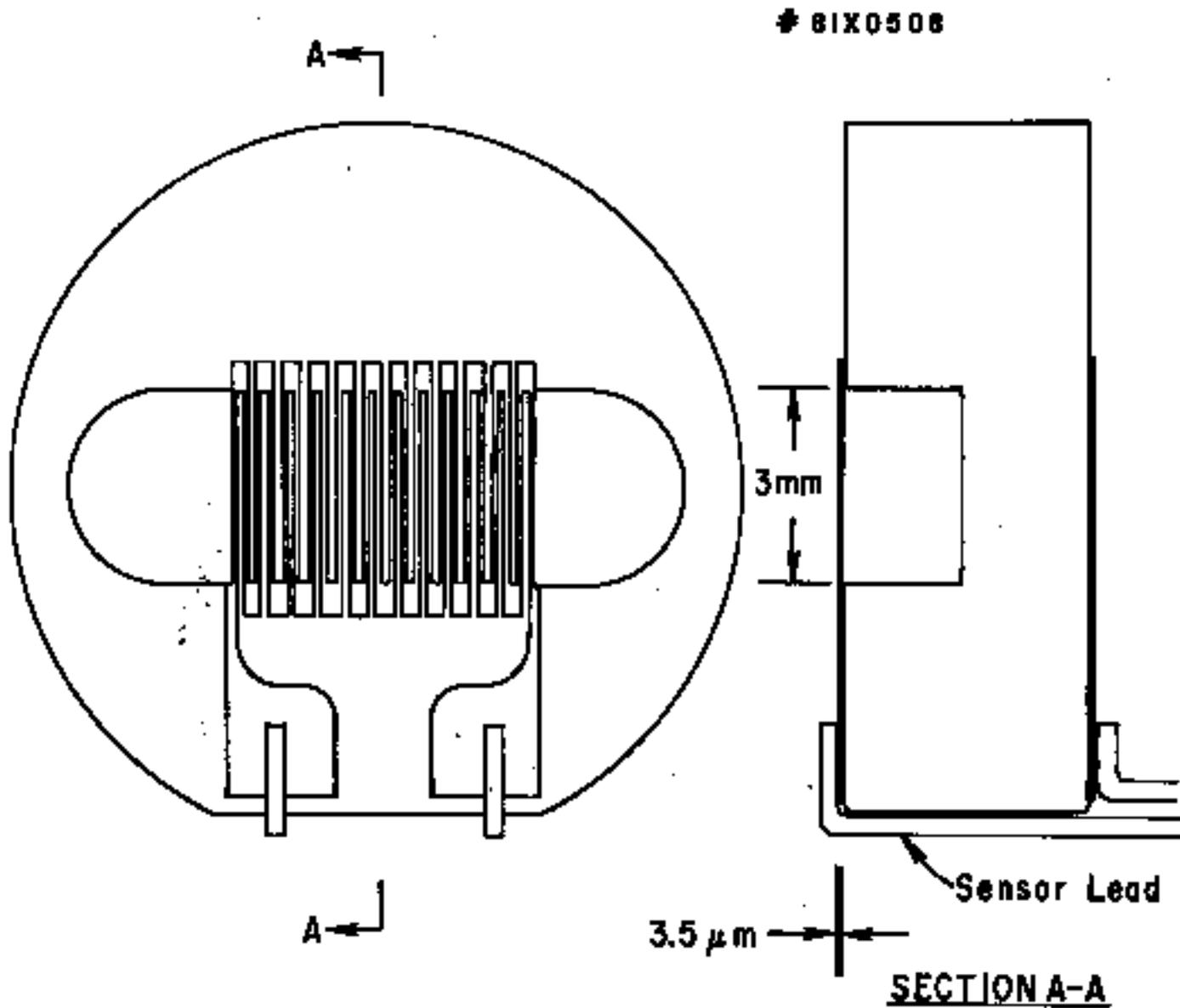


3-D plots of chord integrated vertical bolometer array data. (a) For an 8.5 MW NBI heated detached plasma and (b) A 12 MW co-NBI heated plasma run on the inner bumper limiter. Note the difference in in/out symmetry for the two cases.

Modular Bolometer Arrangement for TFTR



Platinum Resistance Sensor



Bolometer Electronics for TFTR

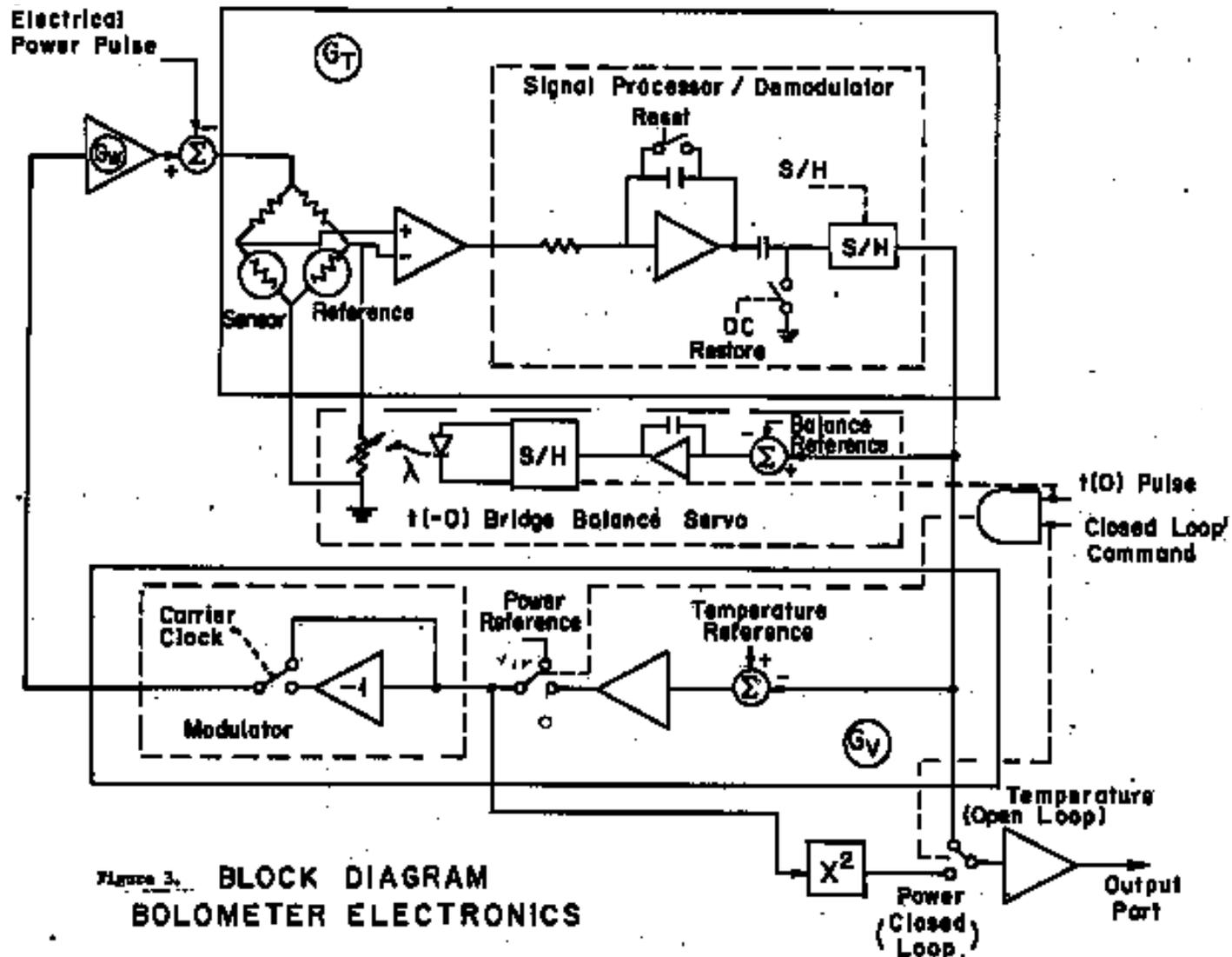
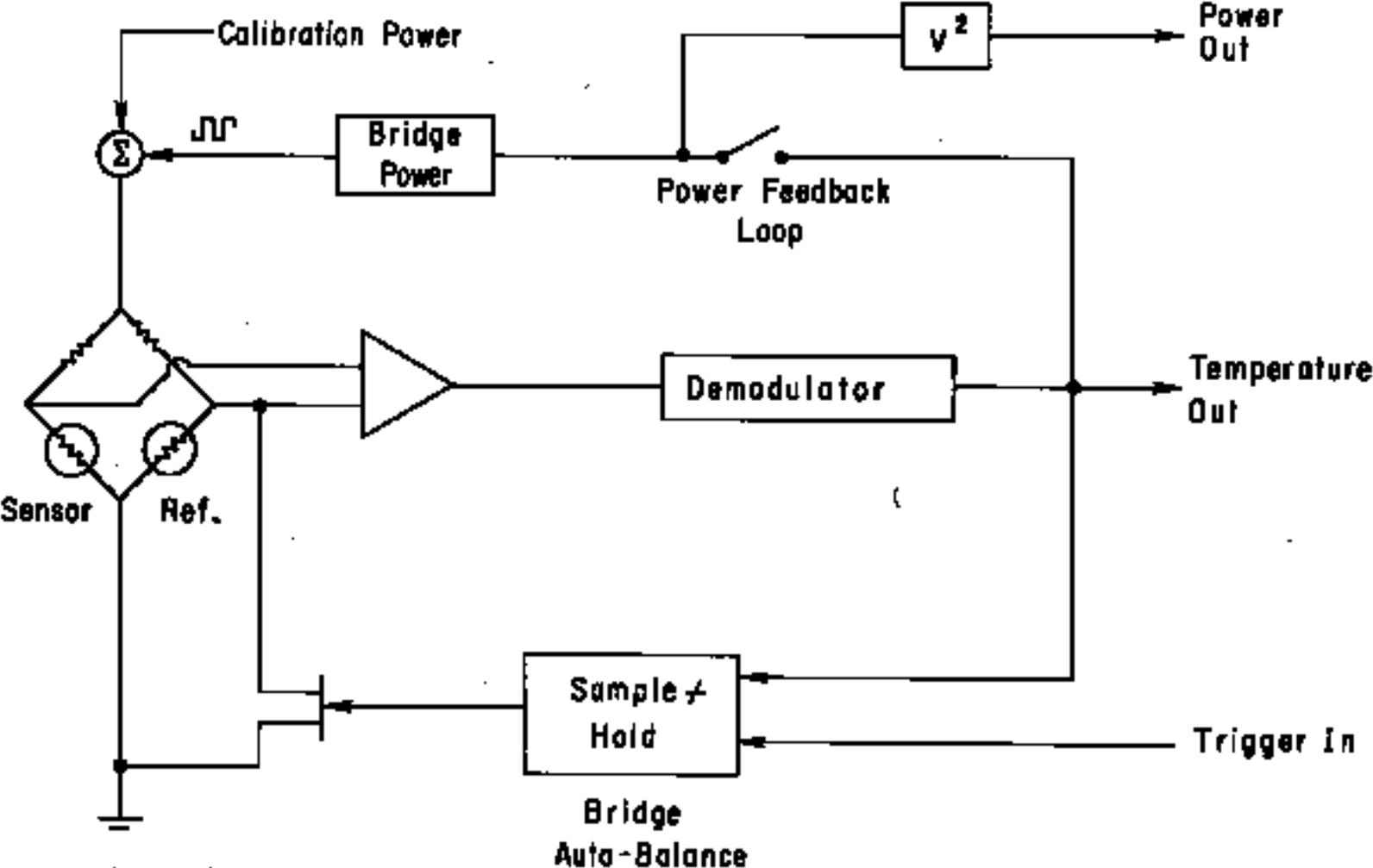


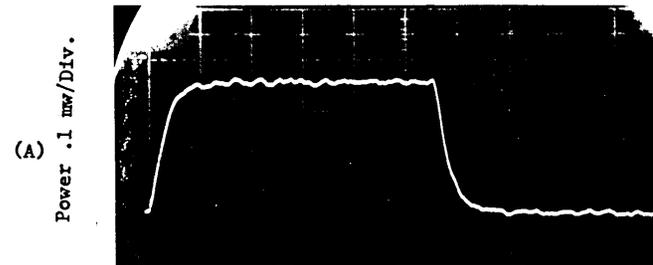
Figure 3. BLOCK DIAGRAM
BOLOMETER ELECTRONICS

Block Diagram of Electronics for TFTR Bolometer



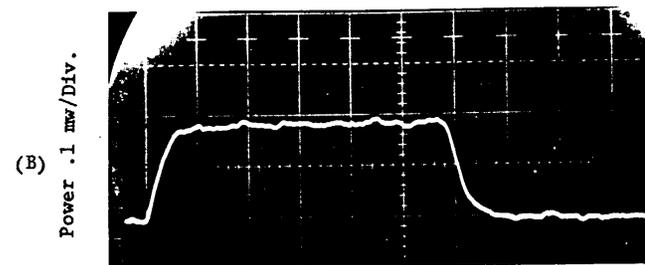
BOLOMETER ELECTRONICS BLOCK DIAGRAM

Oscilloscope Signals for a TFTR Bolometer Comparing Modes of Operation



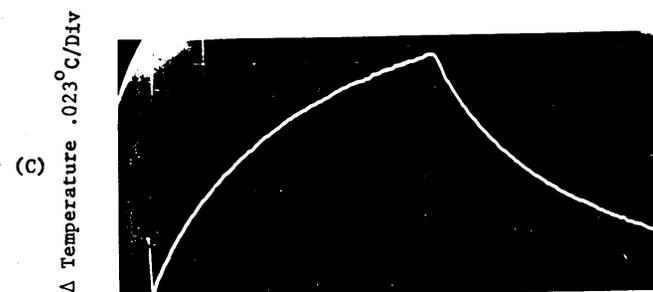
Electrical
Calibration
Pulse
(power mode)

Time 10 ms/Div.



Radiated
Power
Pulse
(power mode)

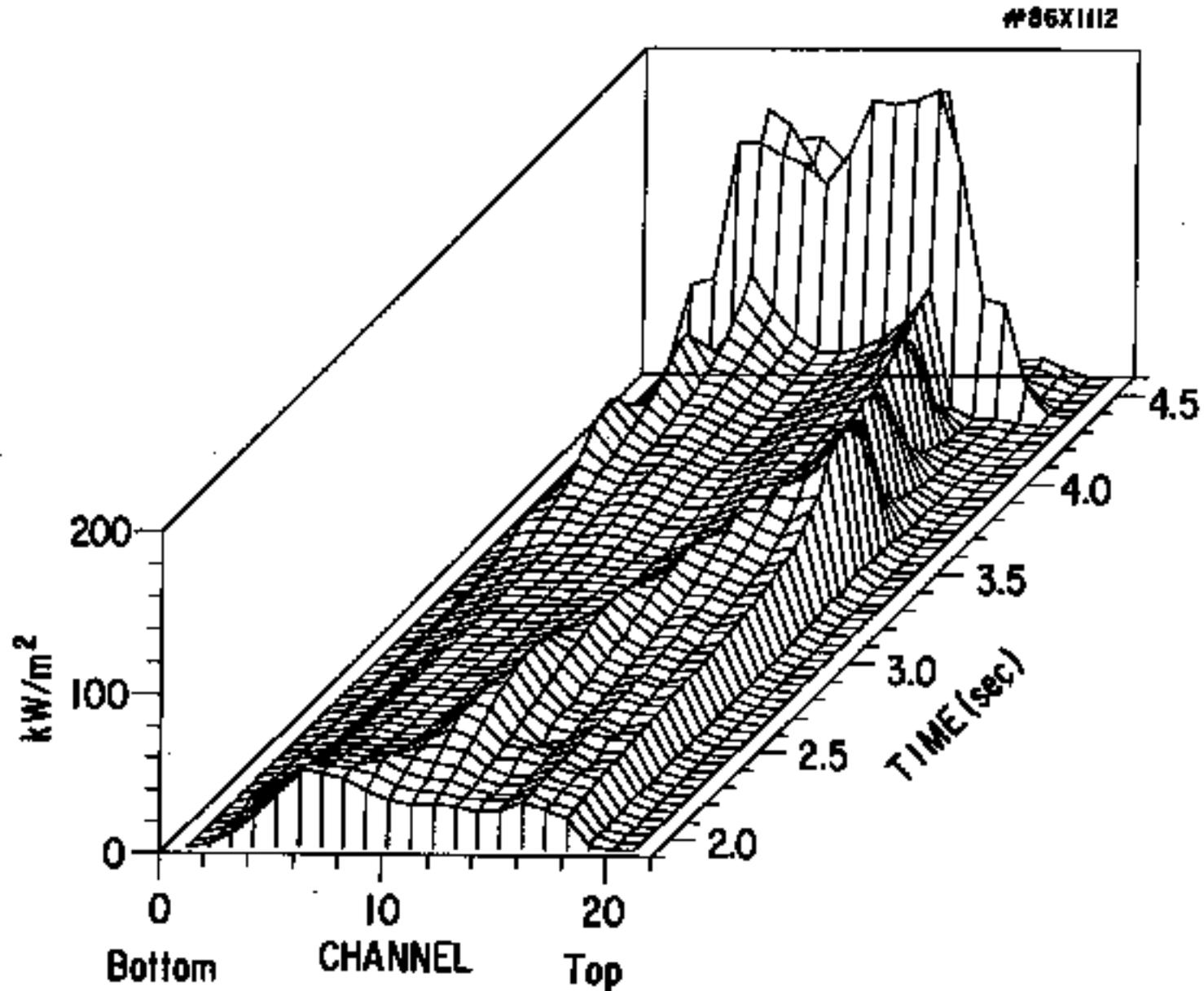
Time 10 ms/Div.



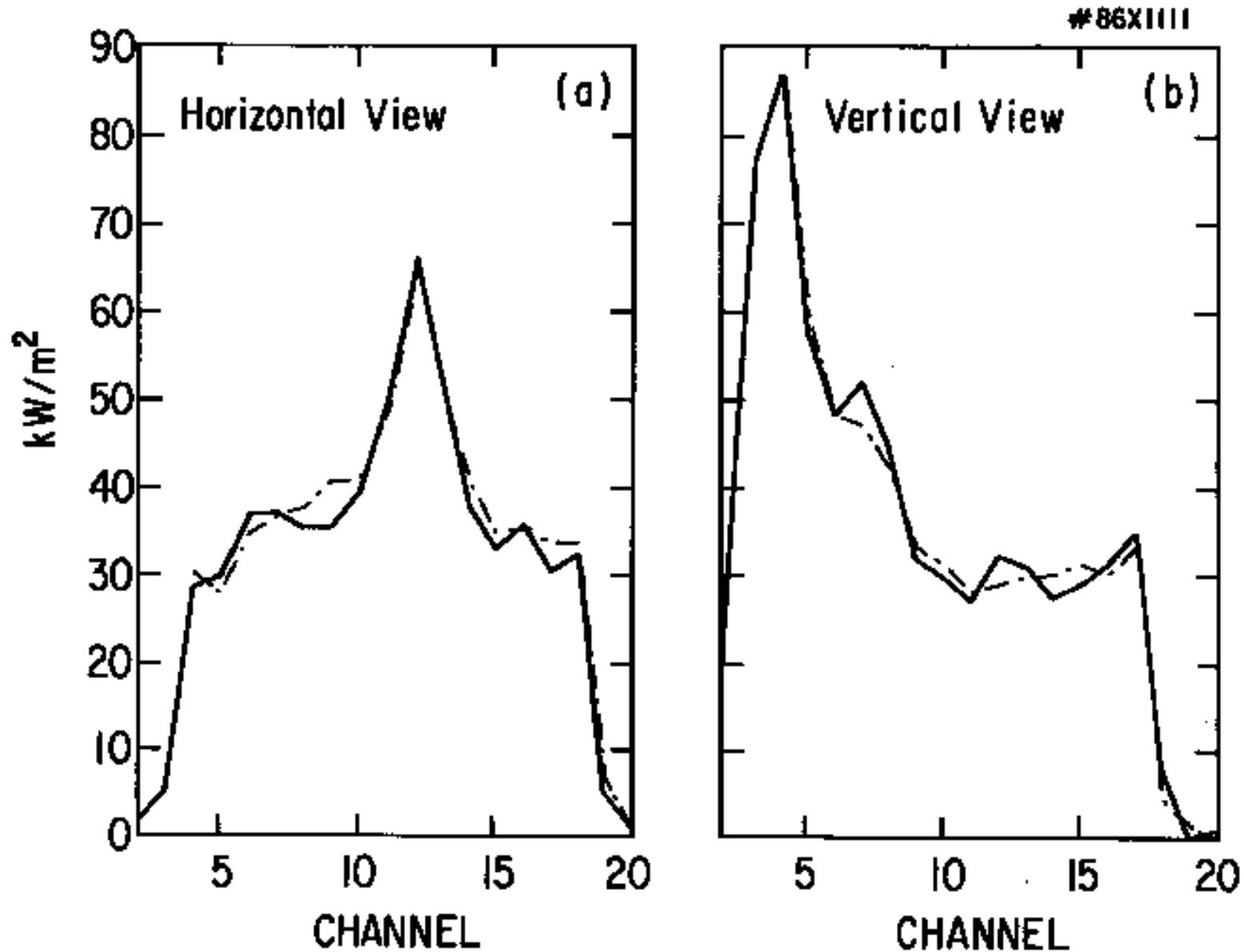
Electrical
Calibration
Pulse
(temperature
mode)

Time 10 ms/Div.

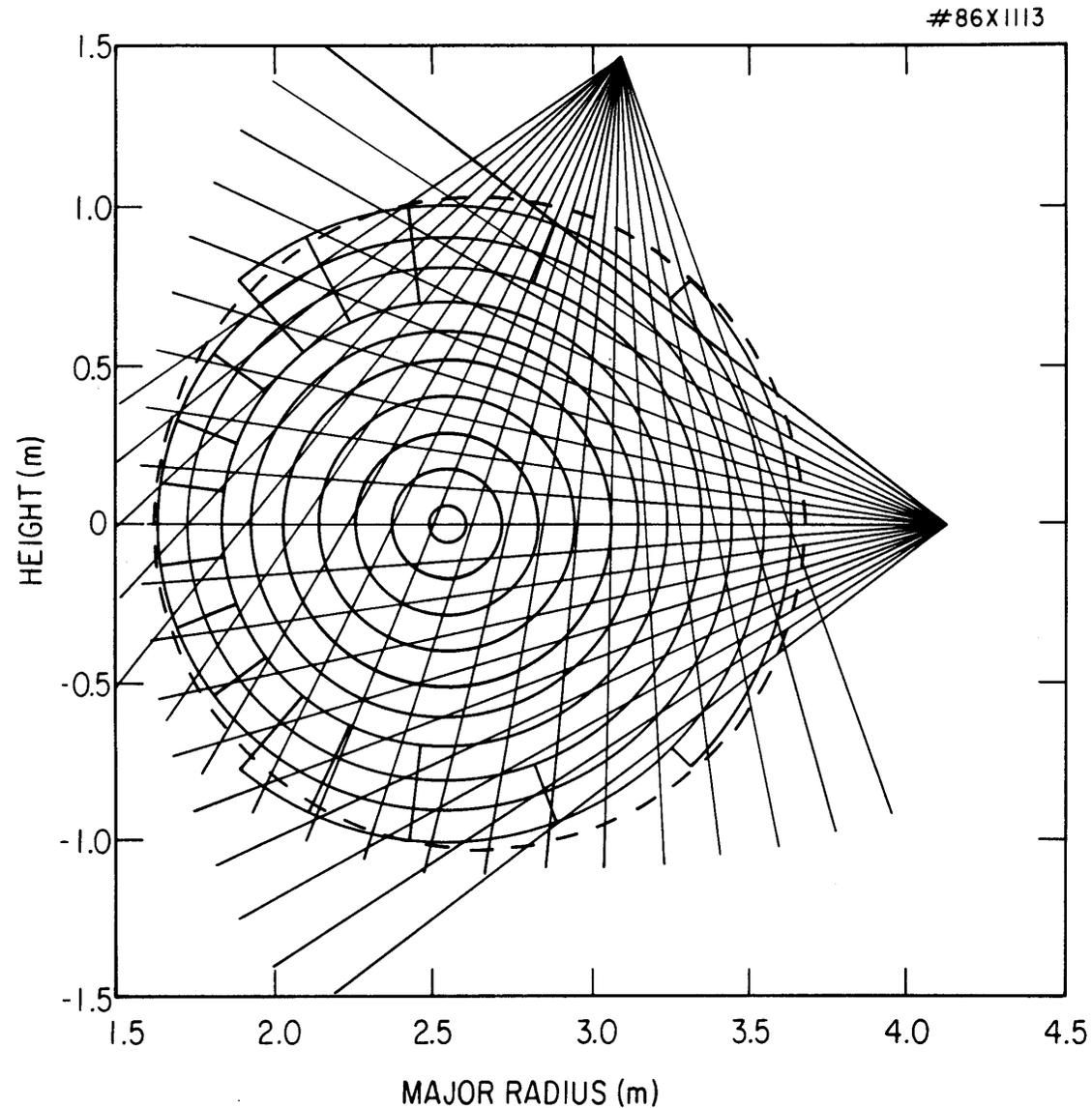
2D Plot Showing a Moving Marfe



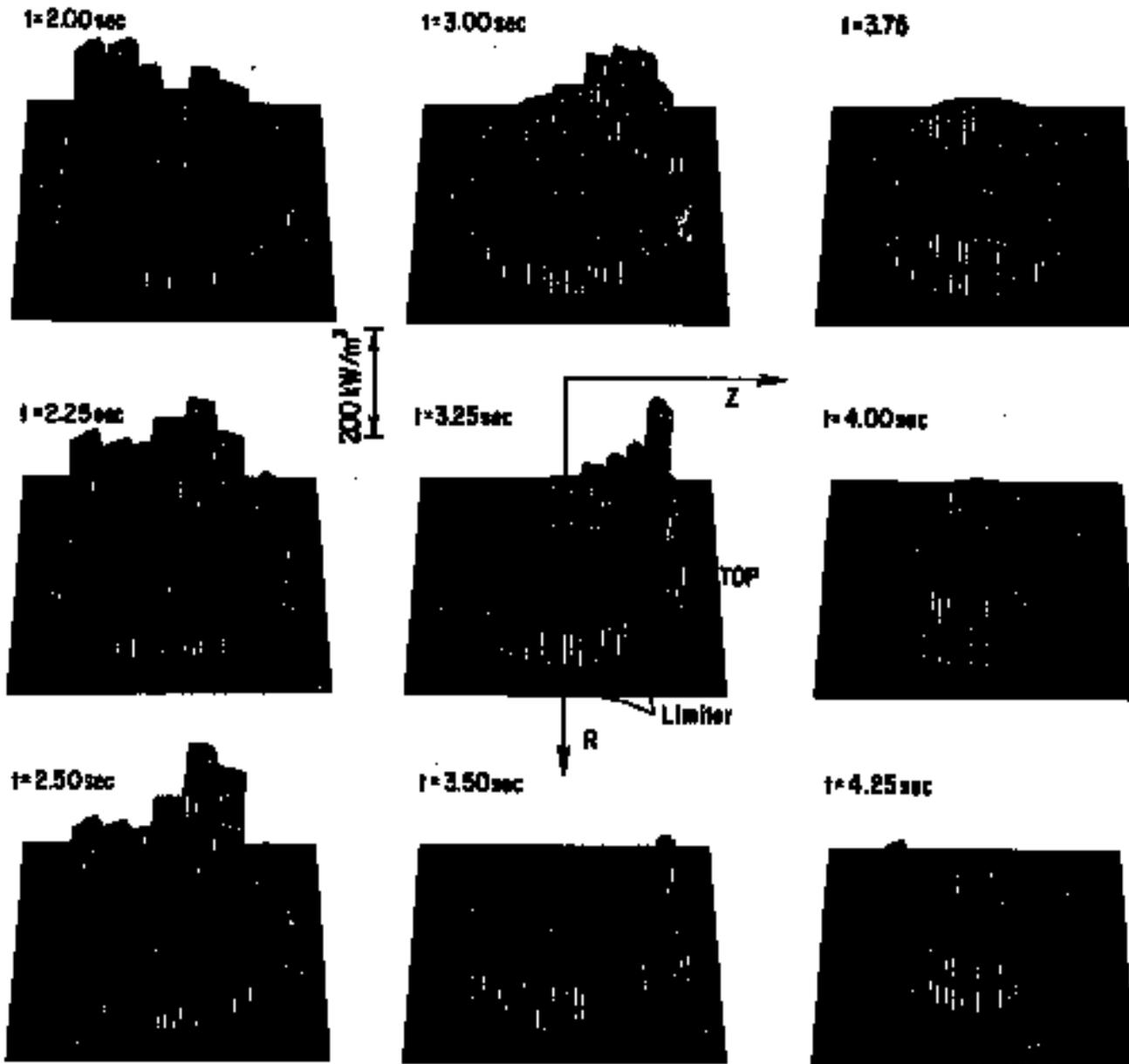
Horizontal and Vertical Profiles for Moving Marfe: Chordal Data



Grid for 2D Tomography of TFTR Two-Camera System

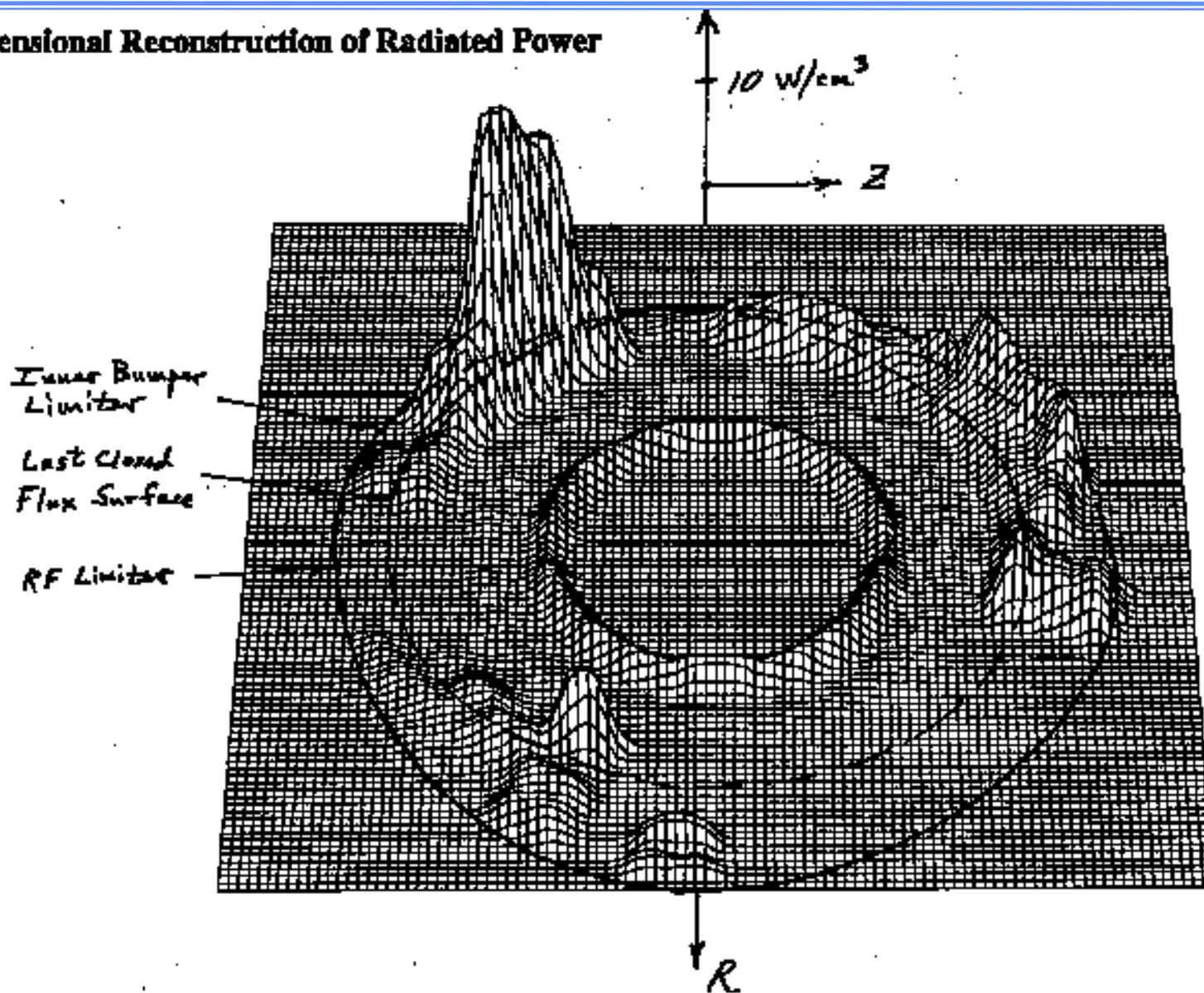


Time Resolved Tomography for Moving Marfe in TFTR



2D Reconstruction of Radiated Power Showing Highly Emitting Localized Region

2-Dimensional Reconstruction of Radiated Power



Two-Camera Array for NSTX (15 Channels Each)

