1. Purpose of Experiments
Include immediate goal of the experiments, scientific importance and/or programmatic relevance. Refer to any relevant program milestones.

After initial conditioning and testing of the transmitters and RF system in general (see MP 214 and 215), we need to characterize and document the performance of the 4 strap antenna (J port). At this point the antenna is assumed to behave sufficiently well (conditioned) in order to move to much higher power. This will lead directly to J-port antenna milestone which calls for a fully operational antenna (scheduled for Aug. 2001).

2. Background
Discuss Physics basis of the proposed research, Prior results at Alcator or elsewhere, and any related work being carried out separately.

Previous campaigns have shown severe limitations in the antenna power handling and behavior. While the problems are too many to list here, interactions with plasma and arcing were found to be the principal problems. Maximum power was found to be approximately 2.5 MW in a 4 strap configuration, and corner interaction with the plasma induced plasma disruptions at higher power as well.

J-port antenna performance will be studied in great detail in order to assess the effectiveness of the design changes. To this end an array of diagnostics has been added to the J-port antenna system including six B-dot probes, two additional voltage probes, eight directional couplers, an optical diagnostic, and a pressure measurement.

3. Approach
Describe the methodology to be employed; explain the rationale for the choice of parameters, etc. Describe the analysis techniques to be employed in interpreting the data, if applicable. If the approach is standard or otherwise self-evident, this section may be absorbed into the Experimental Plan.

See experimental plan.
4. Resources

4.1 Machine and Plasma Parameters

Give values or range for:

Toroidal Field: scan
Plasma Current: scan
Working gas species: D(H)
Density: scan

Equilibrium configuration (if possible, refer to database equilibria): standard lower null, a few upper null (L-mode) and possibly some inner wall limited as well

Pulse length, typical current & density waveforms, etc. Refer to database or sketch desired waveforms:

4.2 Auxiliary Systems

RF Power, pulse length, phasing: scan
Pellet Injection (species): none
Impurity blow-off injection: none
Diagnostic Neutral Beam: not needed but can certainly piggy-back
Special gas puffing: hydrogen if required
Other:

4.3 Diagnostics

List required diagnostics, and any special setup or configuration, e.g. non-standard digitization rate.

standard set

5. Experimental Plan

Both sections must be filled in.

5.1 Run sequence plan

Specify total number of runs required, and any special requirements, such as consecutive days, no Monday runs, extended run period (10 hours maximum), etc.

A total of 5 run days is expected for completion of this MP.
5.2 Shot sequence plan
For each run day, give detailed specification for proposed shot sequence: number of shots at each condition, specific parameters and auxiliary systems requirements, etc. Include contingency plans, if appropriate.

In order to fully characterize the antenna we need to do the following scans (ordered by priority):

1) Density scan (approximately 10 good shots meaning good tune- 1 day)
2) Current scan (vary loading) 3-4 different currents
3) Toroidal field scan (4.3 to 5.9 T)
4) Shape, including gap scan, triangularity and vertical height position.

6. Anticipated Results
Discuss possible experimental outcomes and implications. Indicate if the program may be expected to lead to publications, milestone completions, improved operating techniques, etc. Indicate if the experiments are intended to contribute to a joint research effort, or an external database.

If this MP is successful, it would mean that we fully commissioned the 4 strap antenna at high power (above 3 MW), with positive impact on plasma performance. Otherwise, we may learn enough to make necessary changes or iteration on the antenna design during the next shutdown.

7. References
Include references both to external and internal literature or communications which bear on this proposal. See Section 2.


G. Schilling et al., 14th Topical Conference on RF Power in Plasma, Oxnard, CA (May, 2001).