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Title:	805 Stepped Plan Project Description
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The project deliverables are set in progressive steps towards a deliverable unit for testing by AOT-RFE at the Los Alamos Neutron Science Center.

The 805 MHz system utilizes 1.25 MW class klystron amplifiers. The Solid-State Amplifier (SSA) technology has been utilized in the SC accelerator technology, but more powerful sources are needed for use in the NC accelerator facilities such as LASNCE. The SSA topologies that are widely used need to be scaled and tested for reliability and operation in a high impact accelerator facility, such as the 805 MHz SCCL in Los Alamos. Operational experience with high power SSA needs to be assessed prior to installation of an SSA unit at LANSCE. The RFE group at LANSCE is looking for collaboration in the development of the Solid-State Amplifier. The following points summarize the steps through the project.

1. Market Study
    a. The aim of the study is to identify the possible sources of semiconductor technology for implementation into the 805 MHz RF power amplifier module.
    b. Decide on the most reliable future sources (is there a way to rank these) of the chosen transistors.
    c. Initiate communications with the vendors (involve LANL in this step?) and incorporate their feedback into the market study.
2. System Modeling (remember Los Alamos is at a 7,000 ft elevation!)
    a. RF Amplifier and Circuit Design
        i. The RF amplifier design is to take a modular architecture. Although the basic structure of choice may be well known, this part of the work should be de-risked by following a classical engineering product design cycle.
        ii. If multiple viable transistor options are identified, these options should be pursued in parallel.
        iii. Once the basic cell design is completed, the lattice design should be accomplished by engineering calculations for proper power and phase RF combinations.
        iv. The design must implement phase, amplitude, and thermal stability study.
        v. Design the telemetry and instrumentation.
        vi. Model and design the closed loop control behavior and comment on the system instabilities and propose options to avoid these operating regions.
    b. Power Supply
        i. Design or chose an appropriate power supply for this unit. A market study may be needed to consider scale production and implementation of the SS RF amplifier.
    c. EMC/EMI
        i. Forecasted EMC issues (internal & external) need be mitigated using best practices. This needs to be implemented into the design and be part of the acceptance/performance testing.
3. Ordering and Procurement
    a. Procurement of components is to follow the initial stages of design for prototyping.

    b. Procurement for full scale device can follow after a prototype has been successfully tested and any proposed design changes has been implemented.
4. Assembly and quality control
    a. Assembly of the prototype must establish quality control procedures, documenting the components utilized, and the history of these components to ensure reproducibility.
    b. Assembly of full-scale unit must follow the established quality control practice for successful assembly and component tracking.
5. Testing (FAT)
    a. Prototype testing must have telemetry set for recording of events, including failure and operation. Appropriate interlocks and safety protocols must be implemented prior to testing.
6. Delivery
    a. Project is considered completed after on-site delivery (at LANL) and upon successful on-site testing.