

# **HIGH POWER S-BAND SOLID-STATE TRANSMITTER TECHNOLOGY ASSESSMENT**

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## **ABSTRACT**

Transmitters currently being used throughout the Satellite Space Ground Link System (SGLS) network are TWTA types installed in the late 1960's. These systems are approaching the limit of their life expectancy and are contracting high maintenance and operating costs. The major disadvantages of these devices are the long lead time for procurement or repair, limited life time, and single point catastrophic failure. A definite need now exists to examine alternative approaches to implement a more reliable and low life-cycle cost system to replace TWTs. Currently, solid-state power transistors and low loss power combining technology have reached a stage where S-band CW transmitters of several kilowatt power are possible. This paper presents the results of an extensive technology survey made to determine: (1) the state-of-the-art of solid-state RF power devices operating in the lower S-band frequency region, (2) the current power-combining technology for developing medium/high power solid-state transmitters, and (3) conceptual design approaches for a 2 kW, S-band solid-state transmitter aimed at replacing the existing transmitter for SGLS application.

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The survey was conducted by The Aerospace Corporation in support of the Air Force Satellite Control Facilities (AFSCF). The purpose of the survey was to assist in modernizing and improving the AFSCF Remote Tracking Stations (RTS) and the future planned capability of other similar programs.