4A - List of operating frequencies

Frequency Number	Frequency (GHz)
1	3.1075
2	3.1225
3	3.1375
4	3.1525
5	3.1675
6	3.1825
7	3.1975
8	3.2125
9	3.2275
10	3.2425
11	3.2575
12	3.2725
13	3.2875
14	3.3025
15	3.3175
16	3.3325
17	3.3475
18	3.3625
19	3.3775
20	3.3925

4B - Maximum RF Power at the transmitter terminals
Each row transmitter will have a Maximum RF Power of 1280 Watts Peak
The prototype will employ four row transmitters for a total of 5120 Watts Peak

4C - Maximum Effective Radiated Power (ERP) from the antenna
The antenna gain for the initial four row system is 25 dB Max, yielding an ERP = 1,618 kW Peak.

4D - Insert "MEAN" or "PEAK"
All emissions are pulsed and therefore all power listed is "PEAK"

4E - List type of emission
All emissions are type Q3N.

4F - (4) Pulse duration and repetition rate
Pulse duration varies from 24 to 196 μsec and the PRF varies from 458 to 3870 Hz.

4G - Necessary Bandwidth (kHz) Describe how the necessary bandwidth was determined.
15M0
Two linear – FM (chirp) pulses, each one 3 MHz wide are separated by 12 MHz in the frequency domain.

10a – The complete program of research and experimentation proposed including description of equipment and theory of operation.

The requested Advanced Development Model (ADM) is a notional concept directed at proving the feasibility of target of opportunity (from this point on the term "target" is directly associated with a target of opportunity) detection and tracking incorporating various radar antennas (Integrated Waveguide or Phase – Phase Array) and waveforms.
The antenna is based on a number of concepts developed by Sensis, in one instance it could feature lightweight and low cost integrated waveguide. Another concept being explored is a phase-phase array radar and associated antenna structure. In either case the ADM provides dual plane monopulse, which allows 3D search and track accuracy on single dwells. It is rotated at up to 30 rpm to provide extended firm track range.
A solid-state transceiver module, consisting of an RF transmitter, receiver and integral power supply, is cabled to each waveguide or phased array row. The RF transmit power is achieved with efficient solid state power amplifier modules. The resulting 1.28 kW row power is required to meet the threshold firm track requirements for ADM evaluation. A solid-state LNA receiver module is also packaged in each transceiver, also reducing losses and providing the required detectability on the specified RCS targets.
The ADM concept employs pencil beam elevation scanning as the antenna rotates to cover the surveillance volume. New detections from search beams are associated from scan to scan to maintain tracks. High priority tracks are updated with boresight, range gated track beams that are interleaved within the search beams. Beams that intercept long range weather and ground clutter use medium PRF adaptive Doppler waveforms. By alternating the PRF over multiple coherent dwells within an azimuth beamwidth, and from scan to scan, simultaneous range and velocity coverage of all RCS targets in stressing ground and weather clutter is provided to the required ranges. The highly stable exciter, transmitter and receiver chain, developed for the detection of very low radar cross section targets will meet the stressing target track requirements in a variety of weather conditions.

10b – The specific objectives sought to be accomplished:

Objectives include but are not limited to the following:

- Determination of performance of Integrated Waveguide array antenna given various waveform, target, weather and clutter environments.
- Determination of performance of phase array antennas given various waveform, target, weather and clutter environments.
- Feasibility of lightweight antenna design over various operational conditions (targets of opportunity, clutter).
- Verification of operational lifecycle estimates for specific equipment.
- Verification of long term operational capability of solid state power modules.

10c – How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.

Radio art expansion consists of determining optimal radar performance that meets the following criteria;

- Lightweight and mobility.
- Target detection and tracking performance incorporating integrated waveguide antenna structures.
- Optimal beamforming templates required.
- Optimal signal processing techniques associated with Integrated Waveguide technology.