Additional Notes in Support of Application

Section 4

(A) Center operating frequency is 7.5 Mhz but can be changed before final design is constructed.

(B) The revised output power from the transmitter will be 1000 watts peak. A 50% duty cycle will be used, thus the average transmit power is 500 watts.

(C) Over a perfectly conducting earth, the antenna gain (or directionality) is estimated to be 8.14 dB. From (B), the peak envelope power (PEP) from the transmitter is given as 1000 watts. This translates to a value of 30 dBW. System losses due to filtering and cabling are estimated to be a maximum of 3.0 dB. Thus, 27 dBW is presented at the antenna (or 500 watts PEP). Please reference figure 1 for the antenna's radiating pattern.

$$\frac{speed\ of\ light}{2\,x\,range\ cell\ resolution} = \frac{3.0x10^{8}\,m/s}{2400m} = 125{,}000\ Hz$$

(D) Given the reference of (B), it is most likely the FCC will be concerned about the peak power transmitted.

(E) For the type of radio emission, please reference the radar pulse description given in (F).

(F) The radar will operate at a center frequency of 7.5 Mhz with a bandwidth of 125 KHz. Thus, the frequency deviation around the center frequency of 7.5 Mhz is ±62.5 KHz. The modulation technique that will be used is referred to a frequency modulated interrupted continuous wave (FMICW).

For this application, the radar will linearly sweep through the 125 KHz bandwidth in 64 milliseconds. During each sweep, the transmitter will be gated "on" for 2 milliseconds and then "off" for two milliseconds. Hence, 16 pulses will be transmitted per radar sweep.

(G) The necessary bandwidth for a HFGWR system directly depends on the desired range cell resolution. For an application intended to monitor sea-state conditions, a range cell resolution of 1.2 kilometers has been chosen.

A HF GWR system uses a FMICW waveform such that target discrimination is directly dependent on the radar's total operating bandwidth. If we consider that two radar targets are separated by 1.2 kilometers, there is a two way travel time of 2.4 kilometers. In order to separately resolve these targets, a radar bandwidth of 125 KHz is required, as indicated below.

Section 6

An antenna array consisting of 16 doublet elements is proposed. Each doublet element consists of two sub-elements separated by a distance of one quarter wavelength ($\lambda/4$). Adjacent doublets are separated by a distance of $\lambda/2$. The selection of a doublet element has been favored in consideration of its ability to provide a front to back ratio. This minimizes the transmission of radar power in an undesired direction. Whereas only one doublet element will act as the transmitting element at one time, figure 1 represents the radiating pattern of transmit antenna structure. The maximum antenna gain is expected to be 8.14 dB, the half power beam width will be 120°, while the front to back ratio is better than 15 dB.

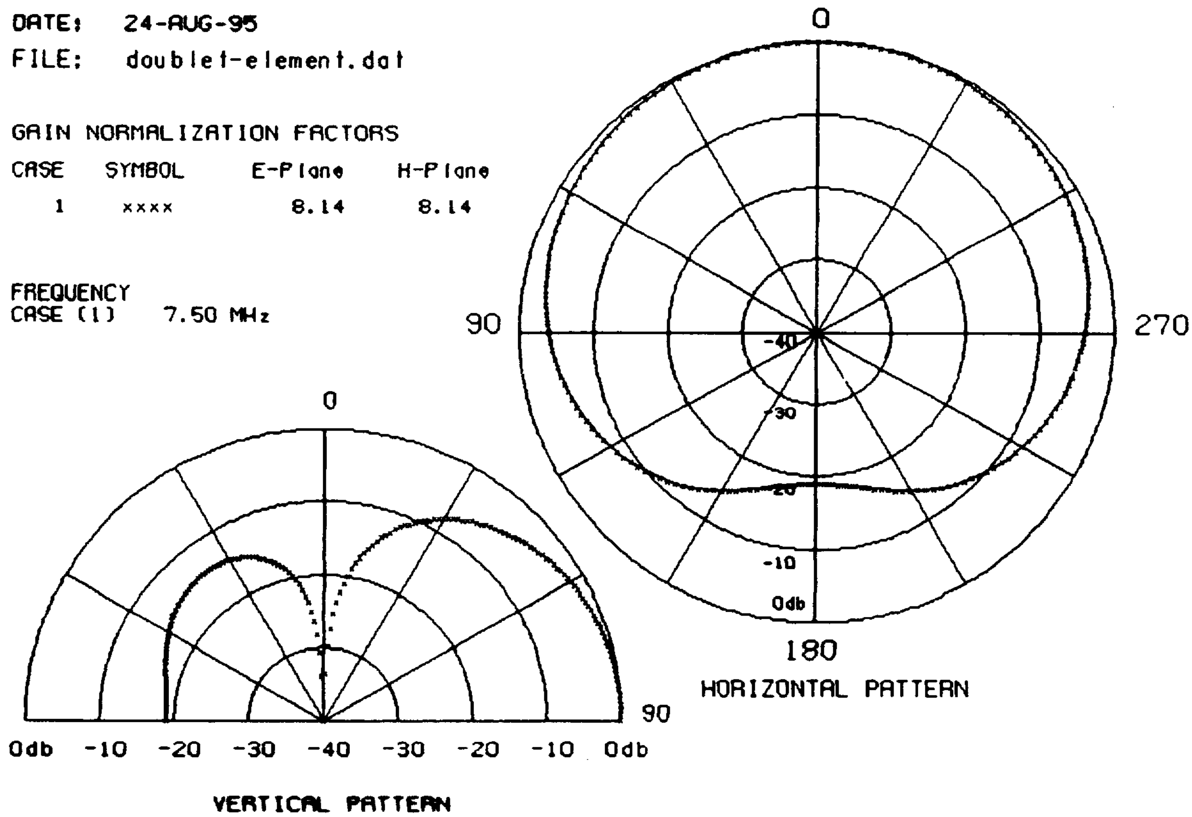

Figure 1

Section 13

A single pulse amplifier will be used for this application. Our present specification will be met by a LA2000H1 Pulse Amplifier manufactured by Kalmus Engineering Incorporated, Woodinville, WA.

Section 15

While many of the details in this section are site specific, it can be said the height of the antenna structure will be 9 meters. This is dependent on the chosen operating frequency, which can be changed if required by the FCC. The principle concern of this FCC section appears to be based on excessively high structures which may be deemed a hazard to low flying aircraft. In this instance, no problems are anticipated.