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DECISION

THE COMPTROLLER GENERAL
OF THE UNITED STATES
WASHINGTON, D.C. 20548

FILE: B-189081 DATE: April 27, 1978

MATTER OF: Alpha Industries, Inc.

DIGEST:

Record does not show that agency failed to properly evaluate protester's proposal. Rather, offer did not conform to RFP requirements, and, agency was not persuaded that approach proposed by protester was feasible, resulting in determination that proposal could not be made acceptable without being completely revised.

Alpha Industries, Inc. (Alpha) protests the rejection, as technically unacceptable, of its proposal under RFP E33615077-R-1120 issued by the Air Force Systems Command, Wright-Patterson AFB (Air Force). The solicitation sought to award a cost-plus-fixed-fee contract to develop design and fabrication techniques for the practical application of developments in millimeter wave devices and components. As stated in the RFP, the Air Force desires to finance an effort directed toward expanding "millimeter wave component state-of-the-art from the 'one of a kind' laboratory model to a level suitable for system application." The Air Force envisions use of the technology in extremely high frequency radio equipment suitable for avionics (aircraft navigation and communications) applications.

In this regard, the solicitation noted, current millimeter wave component technology is limited to a number of commercially available products meant to be used for laboratory test and experimental purposes, many of which reflect 10 year old technology. Recent development efforts indicate that it may be possible to produce components demonstrating an improvement in performance levels. As stated in the solicitation, the Air Force anticipates that it should be possible to

achieve significant improvements regarding waveguide circulators and low noise mixers, and that:

> "Past and ongoing efforts in the millimeter area *** [by the Air Force] include 94 GHz parametric amplifiers, 94 GHz all solid state radiometers, millimeter wave IMPATT diodes, varactor multipliers, 60 Hz high data rate PIN modulators, 35 GHz microstrip integrated radiometers, and millimeter wave receiver protectors. ***."

As stated in the RFP, "The present effort is being established to alleviate some of the limitations in performance encountered in the previous development programs due to the lack of available state of the art components."

Specifically, the Air Force sought offers to develop improved component technology in five design areas: (1) local oscillators, (2) wideband mixers, (3) wideband circulators, (4) waveguide switches, and (5) electronic phase shifters. The solicitation anticipated that the contractor would develop compatible components, demonstrating their feasibility in certain specified operating ranges.

Alpha's proposal was rejected, without discussions, as technically unacceptable. The Air Force determined that its proposal was not susceptible of being made acceptable without being completely rewritten.

Alpha questions how the Air Force could have reached that result because its TRG Division is entirely engaged in the development and manufacture of millimeter wave devices. As we understand the dispute, Alpha's technical competence is not in issue. The record shows that the Air Force found Alpha acceptable as to its understanding of the devices proposed and their operation. Moreover, Alpha scored well on special technical factors, presumably reflecting the particular technical advantages it was in a position to offer.

Contrary to Alpha's belief, the Air Force did not reject it on the basis of the scores given through a competitive evaluation, but because it found the approach proposed to be unacceptable and because it concluded that

Alpha had failed to comply with mandatory requirements of the RFP. Specifically, the Air Force rejected Alpha's proposal because:

1. Alpha proposed a subharmonically pumped mixer operating at half the specified mixer frequency. Alpha's proposed alternate local oscillator would have been capable of driving the mixer if it could be built, but the approach required the use of perfectly matched diodes. Alpha's principal oscillator design was not intended to operate in the frequency range which would be required to drive the mixer. In the circumstances the Air Force concluded that it would have to fund both designs, contrary to what it intended in the RFP.

2. Alpha proposed to develop a millimeter switching device using beam lead diodes. It did not adequately demonstrate acceptable insertion loss and noise levels as required by the RFP.

3. Alpha's proposal to investigate use of bulk silicon conductivity modulation phase shifters was considered unsound. Its proposed alternate--like its design for the circulator--required use of uniaxial ferrites, which the Air Force viewed as a completely undeveloped and unproven technology. In this regard, also, Alpha's proposal was considered to be at variance with the intent expressed in the RFP.

Regarding the acceptability of alternate proposals, the solicitation provided that "Offerors submitting responsive basic proposals may submit alternate proposals as complete separate offers, if the alternate proposals offer technical improvements or modifications which are to the overall benefit of the Government." Although this language did not require, without qualification, that the Air Force consider Alpha's alternate approaches insofar as Alpha did not conform to this requirement, it appears that the Air Force has considered the various possible combinations of approaches proposed and nevertheless remains of the opinion that Alpha's proposal was unacceptable.

Section 4.2 of the Technical Requirements of the solicitation stated that the contractor would fabricate, test and deliver two prototype mixer packages having a local oscillator mechanical tuning range of 90-100 GHz, among other requirements, which would result from a design and development effort using an approach applicable to the 20 to 200 GHz range. The design was to permit the techniques demonstrated to be applied at frequencies throughout this range, with proper scaling. Moreover, the cross bar configuration using a ridged waveguide was to be used, along with Schottky barrier gallium arsenide devices, preferably of the beam lead type, yielding a conversion loss approaching theoretical performance limits.

Analogous requirements were placed on local oscillator development. The brassboard (prototype) models were to be designed to operate in the 90-100 GHz range. However, "analysis and design of the local oscillator package [was] to be performed for a wide range of frequencies with different devices to take advantage of their most favorable operating range[s]." Oscillators were expressly required to be of the fundamental harmonic type, where feasible, and the contractor was not to rely upon the use of separate multipliers to achieve the frequencies required.

Alpha included in its technical proposal a direct oscillator approach, to meet the 90-100 GHz oscillator requirement. It indicates that it did so because it was informed that its proposal otherwise would be viewed as nonconforming. It is clear, however, from its proposal, that Alpha preferred to develop lower frequency devices, for a number of technical reasons, using those devices to drive its proposed subharmonically pumped mixer. In that regard, Alpha rejected use of the crossbar configuration, stating in its proposal that although aware of it,

> "* * * we feel the developments of the subharmonic approach have established its feasibility as virtually equivalent in performance to the crossbar type (with a slight edge to the latter). * * * having

> worked with both, it seems impossible to believe the waveguide construction will ever be able to compete economically with the suspended substrate in quantity manufacture. * * *."

Indeed, Alpha's proposal shows that Alpha not only departed from the statement of work in this regard, but that it intentionally proposed direct (as distinguished from fundamental harmonic) oscillation to avoid possible patent infringement problems, among other reasons, which might impact upon commercial applications of its product.

Alpha also concedes that its proposed approach would have required diodes which would remain matched over the broad bandwidth required, but argues that this is no longer a problem, because "the diodes we * * * proposed have now been developed," evidently while this protest was pending. Assuming, arguendo, that this one facet of the case would have had any bearing on the outcome, we do not agree that developments which may have occurred after the Air Force's evaluation and decision, and regarding which it does not appear that the Air Force had or should have had any knowledge, should have any bearing on our decision in this matter.

Section 4.4 of the Technical Requirements regarding waveguide switches states that:

> "* * * The critical parameters such as switching time, insertion loss, isolation, bandwidth, and switch noise will be evaluated and compared for the various approaches to determine the most feasible means for electronically operated waveguide switches. Conventional PIN diode techniques will not be considered acceptable unless it can be sufficiently demonstrated that they can be designed for low noise performance. * * *."

Alpha recognized in its proposal that much of the work in switch design had centered around use of switchable

circulators, and reflection-type PIN shunt elements in coupled waveguide circuits. Rather than proposing an investigation and evaluation of these and related solutions, as the Air Force anticipated, Alpha proposed to pursue one particular approach, which it characterizes as a "simple, unique, [and] practical" solution using high quality beam lead diodes making "the switchable circulator * * * a completely unnecessary complication for systems using the suspended image guide approach."

In response to the Air Force's expressions of doubt regarding anticipated loss and noise levels, Alpha explains:

> "* * * In the time allowed for proposal preparation, we were forced to rely on a low frequency model where virtually all developments in the media began * * *. The experiment demonstrated that little effort would be required to achieve the theoretical limit. We also * * * [found] that circuit changes were necessary to achieve a lower loss, and explained the origin of noise in the device [in the proposal]."

Although the switches to be developed are required to be designed and tested for operation at selected frequencies in the 20-100 GHz range, with emphasis on 90 GHz, the data submitted with Alpha's proposal related to performance in the 1-4 GHz range. Alpha attempted to distinguish its approach from conventional PIN diode solutions. In the circumstances, however, we cannot say that the Air Force's evaluation was unreasonable. The limited empirical evidence offered did not adequately demonstrate that Alpha's approach, which was supported by theoretically founded claims, would overcome loss and noise problems which had characterized other diode based approaches in the frequency ranges required.

Finally, Alpha proposed two approaches to the phase shifter design requirement. It placed principal emphasis on development of ferrite devices primarily proposing to develop usable uniaxial materials. Similarly, Alpha proposed to use uniaxial ferrites in the

design and development of its proposed circulators, notwithstanding that Section 4.3 of the Technical Requirements stated that the Air Force sought development of "a low risk approach based on known and existing ferrite characteristics" (emphasis added).

In the Air Force's view, use of uniaxial ferrites was unproven and would require excessive basic development of uniaxial ferrites simply to demonstrate that such materials could perform satisfactorily at the high operating frequencies required. Alpha devoted considerable attention in its proposal toward what it asserts is a need to do just that. Alpha believes that its proposed approach in this regard affords the best solution to various technical problems. The Air Force, however, was not arbitrary in finding that use of uniaxial ferrite devices would entail substantially greater effort and risk than it was willing to take on.

Alternatively, Alpha expressed willingness to undertake an empirical study to determine what losses might be involved assuming reasonable optimization of bulk conductivity phase shifter devices. Although "deemphasizing" this approach, Alpha argued that it was possible "by selecting the length to carrier recombination ratio at an appropriate optimized value, that * * * [modulation losses] could be reduced." Nevertheless, Alpha recognized that substantial insertion losses have been experienced with use of bulk conductivity devices. The Air Force asserts that for that reason use of such devices was unacceptable, and the Air Force omitted bulk conductivity devices from its listing of acceptable device types (ferrite or diode) in paragraph 4.5 of the Technical Requirements.

We recognize that Alpha believes strongly that it proposed a superior overall approach, which at least should have been treated as acceptable. Nevertheless, the record provides reasonable support for the Air Force's view that Alpha's proposal was seriously at variance with the development program described in the RFP. Indeed, it could not have been made to conform to the standards established by the solicitation without

being completely rewritten. Although Alpha attempts to traverse the issues, arguing that direction of the program should be left to the judgment of the contractor, the scope of the intended effort was clearly described in the RFP.

Accordingly, we find that the Air Force's rejection of the Alpha proposal as technically unacceptable has not been shown to have been unreasonable. Alpha's protest is denied.

R. F. Keller

Deputy Comptroller General
of the United States