

# AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE  
DO-C9

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2. AMENDMENT/MODIFICATION NO. 0001		3. EFFECTIVE DATE 25 July 2002	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
6. ISSUED BY CONTRACTING OFFICER NAVAL RESEARCH LABORATORY 4555 OVERLOOK AVENUE SW WASHINGTON, DC 20375-5326 ATTN: CODE 3220.AT		CODE N00173	7. ADMINISTERED BY (If other than Item 6) CODE	

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)  TO ALL OFFERORS		(X)	9A. AMENDMENT OF SOLICITATION NO. N00173-02-R-AT03
		X	9B. DATED (SEE ITEM 11) 20 June 2002
			10A. MODIFICATION OF CONTRACT/ORDER NO.
			10B. DATED (SEE ITEM 11)
CODE	FACILITY CODE		

## 11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:  
 (a) By completing items 8 and 15, and returning 2 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

## 12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A

## 13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

## 14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE PAGE 2

Any questions concerning this amendment should be directed to:  
 Evangelina R. Toledo, Contract Specialist (202) 767-2021

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		(Signature of Contracting Officer)	

The purpose of this amendment is to extend closing date and to answer questions raised by potential offerors.

1. Closing date is extended to 12 August 2002.

2. Questions and answers:

(1) Statement of Work (SOW) item 3.1.c states that the engine output shall be 20 hp + or - 10 percent with the final drive rotating at 8000 rpm.

(a) At what flight condition (altitude, flight speed) is the 20 hp requirement?

Answer: The 20 hp power requirement is at sea level standard conditions. Flight conditions will be 5,000 - 10,000 feet at a speed of approximately 165 kt.

(b) Can you provide a profile of power required at several conditions (altitude and flight speed) such as cruise and loiter?

Answer: At cruise condition (5,000 - 10,000 feet, 165 kt) the power required is 20 hp after correcting to sea level standard. At loiter conditions (5,000 ft, 65-75 kt) the power required is less, 10 hp after correcting to sea level standard.

(c) Is the 8000-rpm a firm maximum requirement or could the propeller design speed be increased by going to a higher power-loading propeller with more blades?

Answer: The 8000 rpm is not a firm maximum but is an estimate based on using a variable pitch propeller that can be folded during supersonic launch and deployed below supersonic speeds.

(2) SOW item 3.2.b refers to an electrical power requirement of 2.25 kW.

(a) Is there a requirement that the contractor provide the power electronics to condition the electrical signal out of the generator?

Answer: The starter/generator must provide at least 2.25 kW at a DC voltage of 28 V or greater.

(b) What type of electrical power output is required, i.e. 28 volt DC? Other?

Answer: The electrical output power will be used for the avionics at 28 V DC, other electronics at 12 V DC, and the payload which does not have a defined voltage at this time. Power conditioning will be done by NRL after

delivery of the generator. The starter/generator must provide at least 2.25 kW at a DC voltage of 28 V or greater.

- (3) SOW item 3.1.c and 3.2.b refer to the engine power requirement.

(a) Please clarify whether the engine must deliver 20 horsepower including the electrical power generated plus the propeller shaft power, or, is the electrical power requirement (2.25 kW, which is 3 horsepower) in addition to 20 shaft horsepower, thus making a total engine power of 23 horsepower.

Answer: The 20 horsepower includes both the electrical power generated and the propeller shaft power. During the cruise mode, most of the engine power will be used for the propeller with the generator providing only avionics power. During the loiter mode, about half of the engine power will be used for the propeller and the other half for the generator to provide payload power in addition to the avionics.

- (4) SOW 3.2.e states a maximum weight of 3 pounds for the starter/generator.

(a) Does the weight include electrical power conditioning?

Answer: No, the weight does not include electric power conditioning, see 2 (a) and (b).

- (5) SOW item 3.1.b states a fuel consumption requirement of 1.25 lb/hp/hr at 20 hp.

(a) To what altitude and flight speed does this requirement pertain?

Answer: This requirement pertains to sea level standard conditions at 165 kt.

(b) Is the fuel consumption at specific flight points a requirement and if so, what are the critical flight conditions including altitude, flight speed, power to the propeller, and power from the electrical generator?

Answer: The fuel consumption requirement of 1.25 lb/hp/hr or less was given assuming sea level standard conditions and 20 hp. Test reports should include calculations scaling to 5,000 and 10,000 ft and 65 and 165 kt.

- (6) Will the vehicle have a flush engine inlet or can a ram air inlet be used to achieve maximum engine power?

Answer: A ram air inlet may be used but will add complexity to the fuselage design in the supersonic conditions that may preclude its use.

- (7) The primary mission of the ALICE program is of interest to us. Will you provide us with a mission description that will allow us to calculate the fuel consumption for our turboshaft engine in this application?

Answer: ALICE (Air Launched Integrated Countermeasure, Expendable) is an NRL project to develop the technologies for an Unmanned Air Vehicle to be air launched from a tactical aircraft at speeds up to 1.2 Mach. It will glide using tail control surfaces until it reaches a speed of approximately 250 kt. The cruise wing and propeller then deploy and the JP-8 fueled engine starts. ALICE will cruise approximately 165 kt for one hour before the outer wing panels deploy for loiter. In the loiter mode, it will operate at 65 kt with a two hour endurance and carry a 25 lb payload.

- (8) SOW item 3.1.f requires that the engine drive a front mounted, clockwise rotating propeller.

(a) Does the term "front mounted" refer to the propeller being mounted to the front of the airframe? Or does it refer to the propeller orientation relative to the engine; for example does this require a cold-end drive in the case of a turboshaft engine?

Answer: Preliminary design goals included keeping the engine forward of the aircraft center of gravity, a short drive train, and the ability to stow the propeller during supersonic flight conditions. As long as these conditions are met, propeller orientation relative to the engine is not critical.

(b) Does the "clockwise" rotation refer to the propeller rotation when viewed from the front of the aircraft or the rear of the aircraft?

Answer: Clockwise refers to the propeller rotation as viewed from the rear of the aircraft.

- (9) SOW item 5.0, Testing, states that test data are required to verify performance of the engine and starter/generator prior to delivery.

(a) Does this require that the engine and starter/generator be tested at -50 to -55 deg F and a density altitude of 15,000 feet in order to verify the requirement of SOW item 3.1.a? Or can the cold start requirement be satisfied through design and analysis?

Answer: The cold start requirement may be done at sea level pressure with analysis to extrapolate to the 15,000 foot density altitude. The engine and all associated components necessary for an operational configuration must be cold soaked.

- (10) The SOW, page 2, para. 3.2 provided information regarding the requirements for the starter/generator. What are the voltage requirements for the generator? Is a voltage regulator to be supplied with the generator and if so what are its requirements? Will you require 28 V, 12 V or 270 V capabilities and if so at what loads?

Answer: The electrical output power will be used for the avionics at 28 V DC, other electronics at 12 V DC, and the payload which does not have a defined voltage at this time. Power conditioning will be done by NRL after delivery of the generator. The starter/generator must provide at least 2.25 kW at a DC voltage of 28 V or greater.

- (11) Sub paragraph 'e' specifies that the weight of the unit, including all components, e.g. batteries, shall not exceed 3 lb. Does this weight include any/all voltage regulation? Does it include the air vehicle's primary battery used to power the engine starter and/or pre-heater? If not, is there a weight limit assigned to a "starting battery"?

Answer: This weight does include any voltage regulation. This does not include a 28 V primary battery of no more than 5 lbs, which also powers the avionics prior to engine start.

- (12) Is there or can there be any electrical power provided to the ALICE vehicle while it is attached to the pylon of the mother aircraft? If so, is there a specified or limited amount?

Answer: No significant electrical power will be provided via the pylon of the mother aircraft, i.e. 28 V, 1 A maximum.

- (13) Sub paragraph 'a' states that the concept allows for an air start. Will the propeller be deployed prior to starting the vehicle engine? If so, can it possibly be used to "windmill" the engine during the starting process?

Answer: The propeller may be deployed prior to start as long as the airspeed is less than 350 kt at which point it may be used to "windmill" the engine during the starting process.