SPECIFICATIONS AND SCOPE OF WORK

1.0 Purpose: The purpose of this contract is to replace the Hydraulic Power Unit (HPU) in the Naval Research Laboratory's (NRL) Central Target Simulator (CTS) Facility with new equipment that has been tailored to meet the hydraulic and electronic requirements of the CTS Three-Axis Flight Simulator (TAFS). The scope of work to be performed consists of the removal of the present HPU, the design, construction, delivery and installation of a new HPU and the integration of the new HPU with the TAFS and its MADES digital control system.

2.0 HPU Description: The HPU shall be a single assembly consisting of an integrally mounted electric motor, hydraulic pump, oil cooling system, oil filter(s), oil pressure regulation, vibration isolation, control, interlocks and oil reservoir. The vendor shall design, build, document, deliver and install at the NRL a HPU that will satisfy all of the hydraulic and electrical requirements specified below. The vendor shall completely remove the existing HPU and hydraulic oil from NRL and dispose of both in a proper manner. All proposals shall show how the vendor will meet the requirements, specifications and scope of work outlined in the following paragraphs.

3.0 Relevant Experience: The vendor shall have experience in the design, construction, delivery and installation of HPUs for Carco Electronics Series #S-458 Multi-Axis Flight Motion Simulators. The vendor shall also have experience in electrically interfacing the HPU to Carco Electronics MADES DR3200 digital control systems. Experience shall be clearly identified in all proposals.

4.0 HPU Specifications:

Parameter	Value
Pump type	Pressure compensated, variable volume, vane flow
Number of pumps	1
Constant operating pressure as measured at the TAFS	1,800 PSI, nominal
Hydraulic fluid flow rate	55 to 65 gallons per minute
Hydraulic supply line to TAFS	1 inch OD
Hydraulic return line from TAFS	1.25 inches OD
Steady state operating temperature of hydraulic fluid in HPU tank	105 degrees F, nominal
Maximum hydraulic fluid operating temperature	125 degrees F
Hydraulic fluid type	MOBIL DTE-25
Hydraulic fluid return line filter size	25 micron
Check valves in hydraulic fluid pressure and return lines	Yes
Pump suction line sump strainer	as required by pump
Prime electric power	3-phase AC, 480 volts, 200 amp service
Electrical connections around the HPU and in the HPU room	oil tight type

4.1 Pressure Fluctuations: The vendor shall use the best industry practices to minimize pressure fluctuations at the CTS TAFS. Proposals should clearly identify the mechanism(s) for reducing pressure fluctuations at the TAFS.

4.2 Vibration Isolation: The vendor shall use the best industry practices to minimize noise and isolate the HPU from the building floor and walls, as well as and the hydraulic and chilled water pipes. Proposals should clearly identify the mechanism(s) for reducing noise and vibration.

4.3 Hydraulic Fluid Cooling: Under normal operating conditions the HPU shall maintain the hydraulic fluid in the tank at the steady state operating temperature listed in Section 4.0. NRL-supplied chilled water shall be used to cool the hydraulic fluid; convection heat transfer from the HPU tank may be considered in heat transfer calculations. There shall be no chilled water consumption by the HPU. The chilled water shall only be allowed to flow through the heat exchanger when it is needed to cool the hydraulic fluid. The NRL chilled water is supplied via an auxiliary pump that need to be activated when MADES tells the HPU to turn on. NRL building 210 chilled water specifications are as follows:

Parameter	Value
Nominal temperature	45 – 48 degrees F
Flow rate	2 – 3 gallons per minute
Nominal Static Pressure	90 – 100 PSI
Maximum Static Pressure	150 PSI
Chilled Water Supply Line	1 inch OD
Chilled Water Return Line	1 inch OD

4.4 Interface to TAFS MADES DR3200: The new HPU shall use the existing electrical starter control, indicator line and interlock loop for the Carco Electronics MADES DR3200 TAFS/HPU digital control system. The MADES interface is self contained and powered via the same prime power available for the HPU. All high voltage/high current switching and conditioning required to interface the HPU to the existing MADES system shall be done by the vendor. The interlocks for MADES are connected in series as a single loop. The MADES control, indicator and interlock lines are as follows:

Motor Starter Coil Start (control from MADES) – DPST relay closure with 2 contacts in parallel that switch 120 volts AC @ 15 Amps that is fused with a 2 Amp fuse from the MADES Interface box to the HPU. The hot side is switched and the neutral side is not switched. MADES will close the connection to start the HPU. This connection is also used to close a relay that needs to control the auxiliary pump for the chilled water line.

High Hydraulic Fluid Temperature (indicator to MADES) – High side of a coil/diode for a SPST +24 DC volt relay. When +24 volts DC is applied to this connection, MADES is told that the HPU is in a high temperature state.

MADES Stop Interlock (interlock loop to MADES) – The MADES Interface supplies +24 volts DC on the 'supply' side of the interlock. For normal operation, MADES expects to 'see' this +24 volts DC on the 'return' side of the interlock to know that the HPU is 'ready'. When this path is opened, MADES knows to shut down the HPU, so the HPU should use a switch closure to perform this function. It is not a direct connection to the HPU to shut it down. If any of the Stop Interlock conditions listed below activate, this switch closure should open.

Low Hydraulic Fluid Level: The HPU shall be automatically shut down when the hydraulic fluid level is low. Low is defined to be when the level of hydraulic fluid in the tank indicates that there is a loss of approximately 5 to 10 gallons of hydraulic fluid.

High Hydraulic Fluid Temperature: The HPU shall be automatically shut down when the temperature of the hydraulic fluid in the reservoir equals or exceeds the maximum safe operating temperature listed in Section 4.0.

High Chilled Water Temperature: The HPU shall be automatically shut down when the temperature of the NRL supplied chilled water exceeds 65 degrees Fahrenheit.

Electric HPU Motor Overload: The HPU shall be automatically shut down when the overload heaters for the electric HPU motor engage.

Emergency HPU Cut-Off: A latching, pushbutton emergency shut-off switch shall be located at the front of the HPU room to shut down the HPU via the MADES Stop Interlock.

4.5 HPU Local Status Displays:

The HPU shall display status for the following parameters:

- Hydraulic fluid temperature (tank)
- Supply line hydraulic pressure
- Hydraulic fluid level (tank)
- Supply chilled water temperature
- Filter(s) replacement status
- Nitrogen pressure of any device requiring nitrogen

The HPU shall display the status of the following interlocks:

- Low hydraulic fluid level
- High hydraulic fluid temperature
- High chilled water temperature
- Electric motor overload
- Emergency cut-off

All interlocks shall be latched. A reset for the latched interlocks shall be present at the local status display. All controls, gauges, displays and indicators shall be viewable from the HPU room doorway. All controls, gauges, displays and indicators physically mounted on the HPU shall be vibration isolated from the HPU motor and pump. All parameters shall be displayed in units of degrees, PSI or gallons per minute, as appropriate.

4.6 Spare Hydraulic Fluid: The vendor shall provide a full 55-gallon drum of spare MOBIL DTE-25 hydraulic fluid.

4.7 Hydraulic Fluid Safety Berm: The HPU installation shall include a berm capable of holding 1.25 times the maximum volume of hydraulic fluid in the HPU tank. The existing berm may be used if it meets this volume requirement. At a minimum, the berm shall be able to contain leaks from the tank. It is desirable that the berm contain leakage from burst hoses, pipes, gauges and other hydraulic components to the greatest extent possible and practical.

4.8 Removal of Existing HPU: The existing HPU shall be completely drained of hydraulic fluid, disconnected (electrical, chilled water and hydraulic) and removed from the NRL property. Removal should be done in a manner that minimizes modifications to the existing HPU room (any modifications required shall be performed by the vendor). If the HPU room must be modified by the Vendor for removal of the existing HPU and/or for installation of the new HPU, the Vendor shall restore the room to a state that will retain its current insulation and sound dampening properties.

4.9 Schedule for On-Site Work: The vendor shall contact the NRL technical manager within 30 calendar days of contract award to discuss the on-site aspects of this work and allow sufficient time for coordination with NRL facilities personnel. The on-site work shall meet all NRL Fire & Safety and Navy Occupational Safety & Health (NAVOSH) regulations. The vendor and the technical manager for the contract will jointly develop the schedule for the on-site work. The schedule will consider the vendor's business obligations as well as Navy program requirements for use of CTS. The on-site work schedule shall be finalized at least one (1) week prior to the start of on-site work. Total downtime for the CTS Facility shall be minimized and shall be 30 consecutive calendar days or less.

5.0 Other Requirements

5.1 Hydraulic Line, HPU and TAFS Flushing Procedures: The vendor shall provide a detailed flushing procedure within one (1) month of Contract award. Flushing shall remove debris from the HPU and hydraulic lines before allowing the oil to flow through the TAFS actuators. This procedure shall be performed using industry standard best practices, and shall include the replacement of the TAFS filters (Purolator Part #63560-0 and Purolator Part #63560-3) and HPU filter(s) at the end of the procedure. The vendor shall provide all required flushing blocks and all of the hydraulic filters required for this procedure. The NRL technical manager will review this procedure relative to the existing OEM procedure and coordinate any necessary changes with the vendor.

5.2 Tools, Clean-Up and Cleanliness: The vendor shall supply all tools necessary to perform the work. The vendor shall remove all debris from the work area, clean-up the site and de-mobilize tools & equipment prior to final acceptance by NRL. While work is being performed, the vendor shall take all necessary precautions to prevent the spread of oil and dirt throughout building 210.

5.3 Security Requirements: NRL is a secure base and vendor personnel will be performing their work in a secure environment within NRL's building 210. All vendor personnel working at NRL shall be US citizens and shall present proper photo identification each day to NRL's Visitor Control Center. Vendor personnel will be escorted at all times while within building 210.

5.4 Acceptance Testing: The HPU shall be tested after installation at the NRL to verify that it meets all of the requirements of this specification. The vendor shall demonstrate the operation of the displays and interlocks. The HPU will be run for up to 8 hours to verify that the TAFS performs in accordance with its specifications and error conditions are not generated.

6.0 Inspection: The Vendor shall provide an on-site inspection of the HPU five (5) months after system acceptance. The inspection shall, at a minimum, verify that all hydraulic connections are tight and verify that the HPU is operating within all specifications.

7.0 Certificate of Compliance: The vendor shall provide a Certificate of Compliance guaranteeing that all the requirements of this specification have been met.

8.0 Warranty: The vendor shall, at a minimum, provide a six (6) month parts and labor warranty that covers all of the hydraulic, electrical and mechanical components of the new HPU. The warranty period shall begin on the date of system acceptance at NRL.

9.0 Options: Proposals may include options for additional one (1) and two (2) year parts and labor warranties that include an inspection one (1) month prior to the end of the warranty periods. NRL shall be able to exercise one of these optional warranties during the primary warranty period.

CONTRACT DATA REQUIREMENTS LIST
(2 Data Items)

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The public reporting burden for this collection of information is estimated to average 220 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to the above address. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP ____ TM ____ OTHER ____
0002		

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
CTS TAFS HPU Replacement	57-6011-09	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A001	Acceptance Test Plan		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
		NRL Code 5762

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	n/a	once	See Remarks
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
No		See Remarks	n/a

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
COR		1	
15. TOTAL →		1	

16. REMARKS

The Contractor shall provide an acceptance test plan for the HPU, at least 30 days prior to installation for approval.

The plan shall be delivered via E-Mail to: andy.thompson@nrl.navy.mil as an Adobe Acrobat PDF file.

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A002	System Operational Manual		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
		NRL Code 5762

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	n/a	once	See Remarks
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
No		See Remarks	n/a

14. DISTRIBUTION

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COR		1	
15. TOTAL →		1	

16. REMARKS

At the time of system installation, the Contractor shall provide sufficient information pertaining to the following: a) System Description; b) Operation Instructions; and c) Calibration Procedures (if applicable).

The above shall be delivered on a Microsoft Windows, PC-compatible closed CD-ROM or DVD-ROM media as one or more Adobe Acrobat PDF files.

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
COR Code	20081208		

CONTRACT DATA REQUIREMENTS LIST
(2 Data Items)

Form Approved
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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP ____ TM ____ OTHER ____
0002		

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
CTS TAFS HPU Replacement	57-6011-09	

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A003	System Maintenance Manual		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
		NRL Code 5762

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	n/a	once	See Remarks
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
No		See Remarks	n/a

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
COR		1	
15. TOTAL →		1	

16. REMARKS

Within 30 days after the system is installed, the Contractor shall provide a system maintenance manual.

The manual shall include a schedule of periodic and preventative maintenance tasks and the frequency with which they should be performed.

The manual shall also include a list of one or more DC region vendors that are qualified and recommended to perform the periodic maintenance on the new HPU.

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A004	Hardware Documentation		18. ESTIMATED TOTAL PRICE

4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
		NRL Code 5762

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	n/a	once	See Remarks
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
No		See Remarks	n/a

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
COR		1	
15. TOTAL →		1	

16. REMARKS

The Contractor's hardware documentation package shall include the following information within 30 days after the system is installed: a) Functional Block Diagrams; b) Theory of Operation; c) System-Level Block Diagrams, Figures and Drawings; d) Wiring Diagrams; e) Hydraulic Schematics; f) Connector Pin-Outs; g) Complete list of all Commercial-off-the-Shelf (COTS) sub-components, with Model Numbers, Serial Numbers, Manufacturers Name and Manufacturers Contact Information; and h) Complete set of Manufacturers Documentation on all COTS sub-components, with Model Number, Serial Numbers, manufacture and manufacturer Contact Information.

The above shall be delivered on a Microsoft Windows, PC-compatible closed CD-ROM or DVD-ROM media as one or more Adobe Acrobat PDF files.

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
COR Code	20081205		