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This document specifies the work to be accomplished for the upgrade of a Cine-sextant tracking mount from any of the variations that exist on government test ranges to the standard Optical Systems Group Advanced Technology (AT) metric tracker configuration.

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OPTICAL SYSTEMS GROUP

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SPECIFICATIONS FOR THE UPGRADE AND REFURBISHMENT OF PHOTO-SONICS CINE-SEXTANT TRACKING MOUNTS

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for the
UPGRADE AND REFURBISHMENT
of
PHOTO-SONICS
CINE-SEXTANT TRACKING MOUNTS

MAY 1998

Prepared by

OPTICAL SYSTEMS GROUP
RANGE COMMANDER'S COUNCIL

TEST RANGE IMPROVEMENT
AND
STANDARDIZATION COMMITTEE

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U.S. Army White Sands Missile Range
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CINE SEXTANT TRACKING MOUNT REPAIR & REFURBISHMENT SPECIFICATIONS

CINE-SEXTANT
ADVANCED TECHNOLOGY TRACKER
REPAIR & REFURBISHMENT
SPECIFICATIONS

1.0 SCOPE

This document specifies the work to be accomplished for the upgrade of a Cine-Sextant tracking mount from any of the variations that exist on government test ranges to the standard Optical Systems Group Advanced Technology (AT) metric tracker configuration. Most of these instruments are 30 years old and all the primary systems and many subassemblies of these instruments require replacement or refurbishment. The effort to be accomplished will include all the items listed herein. In the event that a catastrophic failure of a major casting, bearing or other significant subassembly is found which is not included in these specifications, the vendor will notify the customer of the additional cost to repair or replace the damaged components(s).

2.0 EFFECTS

The repair and refurbishment will effect the following subsystems and components of the Cine-Sextants.

2.1 Replaces the hydraulic elevation actuators with direct-drive, DC torque motors.

2.2 Converts the rotary amplifier (motor generator) that provides DC drive to the azimuth torque motor to solid state.

2.3 Replaces the electronic drawer and power amplifier with an all new electronic control and pulse width-modulated power amplifier integrated in a single package.

2.4 Replaces the elevation tachometer with the current design.

2.5 Installs optical encoders to provide cameras with azimuth and elevation data and feedback for the auto tracker system.

2.6 Installs a Film Data Recording System (FDRS) to supply properly formatted azimuth, elevation, range, and IRIG B timing information to film and video cameras. Must be compatible with the FDRS equipped instrumentation cameras provided to the Air Force by the Hill AFB depot.

2.7 Replaces the existing guide scope with dual power, lighted reticule units.

2.8 Replaces the existing rapid acquisition sight with new acquisition aid employing lighted lines for night operation.

2.9 Installs lifting eyes on the trailer and fabricates a spreader bar to permit hoisting of the tracking mount with an overhead crane without damage to the mount or the payload. Spreader bar shall be equipped with bridal chains and safety hooks that may be adjusted to accommodate the weight, balance, and center of gravity of the Cine-Sextant tracking mount.

2.10 Replaces the mount cover and installs operator windbreaks.

2.11 Refurbishes the trailer to accommodate refurbished systems and to bring it in compliance with Department of Transportation (DOT) regulations (axles, tires, and brakes).

2.12 Replaces the manual leveling jacks with electrically operated jacks.

2.13 Repositions the spare tire storage to the tongue of the trailer.

2.14 Installs auto focus systems

2.15 Installs an Octec Adept auto tracker

2.16 Installs a GPS timing system

2.17 Installs an Operator Hand Heater

3.0 BENEFITS

The repair and refurbishment of the Cine-Sextants will provide the following benefits.

3.1 Performance. This upgrade will provide higher performance and bandwidth resulting from new electronics. Neodymium direct-drive torque motors will provide exceptionally smooth, quiet and ripple-free, high acceleration rates for large instrumentation payloads.

3.2 Dumping Capability. This upgrade will provide the Cine-Sextant with a dumping capability which will allow calibrations to be performed to determine systematic accuracies for data reduction.

3.3 Increased Reliability. The electronic torque motors and solid state electronics will replace the hydraulics and vintage electronics and will provide a much greater degree of reliability.

3.4 Elimination of Non-Linearities. Non-linearities associated with the elevation actuators in the hydraulic system will be eliminated.

3.5 No Hydraulic Contamination or Leakage. Hydraulic contamination and leakage, which adversely effect overall system performance and reliability, will be eliminated.

3.6 Lower Maintenance Costs. Lower maintenance costs will be achieved by replacing the hydraulics and obsolete electronics with newly designed torque motors and solid state electronics.

3.7 Improved Night Mission Performance. The illuminated reticule guide scope and the rapid acquisition site will improve tracking performance, especially at night.

3.8 Time-Space-Position Information (TSPI). The optical encoders and the film data recording system, when used in conjunction with slant range data and data equipped film cameras, can provide TSPI data.

3.9 Auto Focus. The system will accept range data from radars or other ranging devices and use it to automatically focus the camera lenses during the mission.

3.10 Improved Safety. Bringing the mounts into compliance with current DOT safety standards, installing electrical leveling jacks, and repositioning the spare tire, will add measurably to the operators safety while towing and setting up the mount.

3.11 Auto Tracker. Enhances the ability to track high speed test targets such as missiles and aircraft with long focal length telescopes for the purpose of gathering optical data. In addition, this device eliminates jitter and smoothes the tracking of the test subject.

3.12 Lifting System. Permits the lifting of the Cine-Sextant with a crane for maintenance or loading on a trailer or ship for transportation.

3.13 GPS Timing System. Acquiring IRIG timing from GPS frees the tracking mounts from connections to land lines and eliminates timing propagation delays.

3.14 Operator Hand Heater. This unit provides a warm airflow over the operator's hands greatly enhancing manual performance during cold weather operation.

4.0 REQUIREMENTS

The following removal and rework will be necessary.

4.1 Removal. In order to accomplish the repair/refurbishment, the following equipment will be removed:

4.1.1 Electronic control drawer

4.1.2 Heat exchanger assembly

4.1.3 Servo valves

4.1.4 Hydraulics - entire system

4.1.5 Power amplifier and drawer

4.1.6 Rotary joints

4.2 Rework. The vendor will verify the structural integrity of the trailer and perform required repairs and specified modifications. The carriage, base, and the platform/motor/bridge-scope assembly will be reworked as specified and painted with Military Specification MIL-TT-E-490E paint.

4.2.1 Trailer Rework

4.2.1.1 Restore basic trailer structure. The structural integrity of the trailer will be verified using industry standard nondestructive testing methods (NDT). All structures, including the steel mainframe and subframe, aluminum skin, decking, compartment doors and other external panels will be checked and repaired as necessary to restore the trailer to a like new condition. Trailer side panels and other skin will be modified as necessary to allow for the installation of new equipment.

4.2.1.2 Update trailer running light harness and running gear. The safety equipment on the trailer will consist of items which provide highway safety and include the lights, reflectors and warning systems. The trailer suspension will consist of four wheels, leaf springs and two axles with equalizer beams. All wheels will have electric brakes controlled by the towing vehicle or an emergency breakaway switch. The trailer running light assembly will include clearance lights and reflectors on all four sides of the trailer. A combination tail/turn/stop light assembly, license plate light and safety chain will be included.

4.2.1.3 Relocate the spare tire. The spare tire will be relocated under the trailer hitch.

4.2.1.4 Rework trailer for new front and rear air conditioners. The front air conditioner will be mounted in the bulkhead near the electronics compartment and circulate the air to keep the compartment cool. A similar unit will be mounted in the rear compartment. All electronic compartments will be covered with a nonabrading insulation material to maintain an acceptable temperature.

4.2.1.5 Add wiring access to trailer channel. Access holes in the interior of the trailer will provide space for user installed electrical wiring.

4.2.1.6 Rework structure to include lifting eyes. Four lifting eyes will be added to the trailer to provide a means of lifting the system by crane or helicopter. Two of the lifting eyes will be bolted to the tongue and two shall screw into the aft deck of the trailer.

4.2.1.7 Rework doors. The left front door will be reworked to allow clearance for the folding platforms. Rubber seals will be added to all doors to make them weatherproof.

4.2.1.8 Install new power panel assembly. The main power panel will be mounted in a compartment on the front of the trailer. Located on the panel will be the master power circuit breaker, line voltage meter, phase select switches and indicators, circuit breakers for the following: light panels, rear bays, exhaust fan, I/O and jacks, and the front and rear air conditioners.

4.2.1.9 Update interconnection and termination area. Terminal boards will be replaced by an updated taper pin configuration which will allow more versatility of interconnection of electronic signals in a more compact manner. The taper pin assembly will mount in a compartment at the front of the left side of the trailer. The frame will contain 12 taper pin blocks and serve as the main electrical interconnects area for all control circuits. Termination points will be point-to-point in order to bring the functions from the front of the trailer to the rear with the associated termination assembly in the trailer interconnection area.

4.2.1.10 Install new electronic rack. The new electronic racks will include the I/O panel, power amplifier, light panels, blank panels, output panel space for GFE, FDRS controller and keyboard, sync generator, video amplifier and interface wiring in carriage.

4.2.1.10.1 Install new I/O panel. The main I/O panel will include the connectors for range input, encoder output, remote input 1 & 2, IRIG B timing, communications, video, and two duplex 115 VAC outlets.

4.2.1.10.2 Install new light panels. Three light panels will illuminate the front panels of the electronic bays and provide duplex 115 VAC outlets for servicing.

4.2.1.11 Service cable reel brush holder assembly. The cable reel will be disassembled and the brush holder assembly inspected and serviced as required.

4.2.1.12 Rework/replace leveling jack assembly. The four, manually operated, two-speed leveling jack assemblies will be reworked or replaced as necessary to permit electrical operation (locally and/or remotely controlled). Jacks must be capable of manual operation in case of electrical failure. One 6-minute circular level will be installed on each jack for use in leveling of the trailer. Replace wooden jack pads with lightweight metal ones for metric use.

4.2.2 Base Rework.

Update slip ring assembly and tape cables. Three tape cables will mount in the housing subassembly with the base assembly. The tape cables will carry circuits to the azimuth carriage assembly. New slip rings and brushes will be mounted on the drive tube above the tape cables in the housing and carry 208 VAC, 60 Hz, 3-phase power to the carriage assembly and DC power to the elevation torque motors.

4.2.3 Carriage Rework.

4.2.3.1 Update electronic control. The dual axis servo amplifier will be a compact 19-inch, rack mounted assembly. The amplifier will be powered by 208 VAC, 60 Hz, 3-phase supplied externally. MIL-STD connectors for the AC power, DC torque motors and control inputs and outputs will provide for ready installation or removal of the amplifier from the trailer. This integrated control will accept extreme travel limit input, control stick inputs and an auxiliary speed control input for each axis. The control circuitry will send speed control to the tracking mount in response to this input. The dual amplifier will employ modular construction with common buss and control power supplies for each axis. Control and driver boards for the two axes will be similar in appearance but not interchangeable. All adjustable parameters and the diagnostic test point for each axis will be brought out on a common test connector. Extensive fault protection, including over current, over spend, over temp, output ground fault, and short circuit protection will be provided. All fault protection circuits will be latching and LED indicated. The servo amplifier will be 5 kHz, pulse width modulated, four-quadrant control, rated at 250 VDC at 50 amps. Both axes will operate from a common 280 VDC buss derived from 208 VAC line input through a bridge rectifier. An inductive input filter will be used to minimize 5 kHz feedback to the AC line.

4.2.3.2 Modify carriage side panels. The carriage side panels will provide utility duplex outlets and switches which control power to connectors on the trunion. The utility outlets will not be for use in the operating mode, but for testing/maintenance purposes. The right hand panel will house the keypad panel, encoder null switch panel and switches to operate auxiliary equipment which is connected to the right front and rear connectors on the trunion. The left-hand panel will house the dump breaker panel, communications panel and switches to operate auxiliary equipment which is connected to the left front and rear connectors on the trunion. Three camera control panels will be installed. A 4E and a 10RL panel will be located on the encoder side and a 4E and a blank panel on the other side. Courtesy lights will be installed to illuminate each side panel.

4.2.3.2.1 Install new communications panel. The communications panel will include a speaker and microphone to allow communication between the operator and off-mount personnel. A volume control and microphone switch will be included. The tone module will provide the means for off-mount personnel to send a tone to the operator's earphone to indicate an event, warning, etc. A disable switch will prevent remote control operation.

4.2.3.2.2 Modify dump breaker panel. The dump breaker panel assembly will incorporate a 25-amp circuit breaker for moving the elevation axis in the manual dump mode and an audible alert for warning personnel that the system is in the dump mode.

4.2.3.2.3 Rework keypad panel. The keypad panel will provide a location for the scope lens drive. A backlit keypad assembly will be located on this panel. A switch will be provided for the backlit keypad.

4.2.3.3 Update seat. The seat assembly, located in the center of the carriage, will position the operator over the azimuth center of rotation, with centerline projection of elevation axis passing through a point slightly below the operator's ear. The seat assembly will slide on tracks and provide an adjustment for positioning the seat in a fore and aft position. For the access to carriage service area, the seat stop will be pulled outward, allowing the seat to travel to the extreme rear of the carriage. The seat can then be lifted straight up and removed from the mounting rails. Foam rubber cushions will be provided in 1-, 2-, and 3-inch heights to position an operator vertically with respect to the sighting scope.

4.2.3.4 Install new electronics casting (rear of carriage). The encoder electronics housing will be mounted at the rear of the carriage assembly. Included will be a 28-volt power supply providing power for lamps, relays and other carriage and trailer functions. A fan will be provided which gives filtered, cross air ventilation. A card cage assembly provides mounting for encoder electronics and other printed circuit assemblies.

4.2.3.5 Provide auto focus capability. Install an auto focus control system which provides user configurable automatic focusing for long focal length lenses (10" to 400" focal length) for film and video cameras.

4.2.3.6 Provide foot switch assembly. Provisions will be made to include the necessary wiring for the installation of the two foot-switch assemblies on the carriage which can be used to operate the remote auto track and motorized scope lens drive.

4.2.3.7 Mount cover and operator windbreak. A soft mount cover shall be provided that will protect the carriage and payload during adverse weather. Cover will repel rain and withstand wind up to 60 MPH without tearing. Operator windbreaks shall be installed on the front and rear of the carriage to protect the operator from direct wind to the hands and feet.

4.2.3.8 Provide transit locks. Both the azimuth and elevation assemblies shall be provided with positive transit locks to prevent damage to their respective bearing assemblies during towing under specified operating conditions.

4.2.4 Platform/Motor/Bridge-Scope Assembly.

4.2.4.1 Provide new elevation drive motor assembly. Two direct-drive, DC torque motors will provide a minimum of 500 foot-pounds of torque each and will be driven by a dual axis, solid state servo amplifier. The two permanent magnet motors, located in the motor housing assembly, will supply torque for the elevation drive of the payload platforms. The elevation bearing systems will provide smooth rotation under specified operating and environmental conditions. The ball bearings will be stainless steel to prevent corrosion and sealed to prevent contamination. A tach-generator will be mounted to the right motor and its output voltage will sense the elevation velocity and provide elevation feedback to the control servo system. The encoder system will be mounted to the left motor. An elevation position display, graduated in increments of 5°, will be located on the motor housing and visible to the operator while seated in operating position. Each motor assembly will contain a boresight lock. The boresight lock can

be engaged at any position to prevent movement of the instrument platforms during optical alignment and setup operations.

4.2.4.2 Provide new scope and reticule. The bridge-scope assembly will include two electrically switchable motorized objective lenses which magnify at 8 or 24 power. Operator must be able to switch from 8 to 24 power without moving his eye from the eyepiece. The scope mounting plates will provide a means of attachment for the tracking scope to the bridge. The tracking scope assembly will contain the eyepiece, eye guard, headrest, edge-lit reticule and lamps. An illuminating reticule light will cause the reticule cross-hair to glow as an aid for night tracking. To aid target acquisition, an open sight with illuminating reticule lines will be mounted on top of the scope assembly. A desiccator assembly will be mounted on the bridge to remove moisture from trapped air and prevent damage to internal scope optics.

4.2.4.3 Rework platforms to provide for counter balances. The elevation tracking assembly will include provisions for balancing the instrument load about the elevation axis. Bolt-on counterbalance weights will be furnished for correcting gross imbalance. Fine balance adjustment (up to 25 foot-pounds) will be accomplished by adjusting a sliding weight incorporated within the structure of each instrument mounting platform. The shafts which carry these sliding weights will allow the weight to be locked at any point to achieve a precisely balanced condition.

4.2.4.4 Provide for dumping capability. The dump mode will allow the elevation axis to be rotated up to 180° in reference to the forward facing 0° position for camera boresighting and mount encoder calibration. Dump mode may be used to secure cameras to the lower side of the platforms. When dump mode is activated, there will be two warning devices to caution personnel: a warning beeper will sound in the trunion area and the red strobe lights at the top of the elevation motors will begin blinking. An electric dump mode will be available for operation from a remote control location.

4.2.4.5 Install new control stick. The control stick assembly will be mounted on a support column which attaches to the front of the carriage assembly. The hemispherical control knob will occupy the top of the housing and produce the control signals for azimuth and elevation. On the knob will be a momentary trigger switch that will be wired to the I/O panel. On the stick housing there will be four toggle switches for camera ON/OFF control and one momentary toggle switch for SLEW to allow for a faster-than-normal operation when used in conjunction with the control stick knob. An elevation reversal switch will be mounted on the housing and when pushed, the direction of operation (elevation) will be reversed. The housing will also include a courtesy light controlled by an adjacent switch. A heater will be provided to keep the operator's hands warm during cold weather.

4.2.4.6 Install optical encoders. Optical encoders will be installed in the elevation and azimuth motors. These shall be 20-bit and accurate to the least significant bit. Output from the encoders shall be fed into the FDRS to provide azimuth and elevation data for recording on the cameras. In addition, the encoder output shall be routed to a standard interface that will provide a closed loop for an auto tracking system or remote operation of the tracking mounts .

5.0 SPECIFICATIONS

Once the repair and refurbishment has been accomplished, the following specifications shall exist when the Cine-Sextant is loaded with a balanced 1200 pound (300 pounds per mounting platform) performance test payload.

5.1 Pedestal.

5.1.1 Elevation.

5.1.1.1 Acceleration - 3.4 rad/sec2

5.1.1.2 Velocity - .1 to 100 °/sec

5.1.1.3 Tracking angle - 100° (-5° declination to +95° inclination)

5.1.1.4 Bearing wobble - no greater than +5 arc seconds

5.1.2 Azimuth.

5.1.2.1 Acceleration - 1.3 rad/sec2

5.1.2.2 Velocity - .1 to 100 °/sec

5.1.2.3 Travel - 3 revolution total (+ 1.5 turns)

5.1.2.4 Bearing wobble - no greater than +5 arc seconds

5.1.3 Orthogonality - +5 arc seconds

5.1.4 Instrument Platforms.

5.1.4.1 Parallax bars - Adjustable to +1° azimuth

5.1.4.2 Platforms - Adjustable to +2° elevation

5.1.4.3 Adjustment vernier - Graduated to 0.25° increments

5.1.4.4 Instrumentation payload - 1,200 pounds total

5.1.4.5 Payload per platform – 300 pounds per camera station

5.1.5 Leveling-Pedestal - 3 level screws with 6-minute arc course level at each base support and 1 master level with 10-second arc range in carriage detects level within 2 seconds of arc.

5.1.6 Optical Encoders - Two 20-bit optical encoders (one each for azimuth and elevation), accurate to the least significant bit, electrically nullable (reset to zero).

5.1.7 Video Noise Suppression – The system shall be designed to prevent the interference of tracking mount electrical and electronic components with NTSC and RS-170 compliant video signals (1/2 volt peak to peak) of television cameras mounted on the instrument platforms.

5.2 Trailer

5.2.1 Construction - Steel frame and subframe, aluminum skin.

5.2.2 Wheel - 0/ Dish, 71 inches wide; rated 5050 pounds each.

5.2.3 Tire - 8.25R15XZZ (14 ply); 120 psi maximum tire pressure.

5.2.4 Brakes - 121 x 31 rated at 5,000 pounds each and operated with storage battery triggered by a breakaway switch.

5.2.5 Suspension - Tandem axle with leaf springs rated at 20,000 pounds total (minimum requirement).

5.2.6 Tongue Weight - Tongue weight shall be adjusted by vendor to provide the best road handling characteristics.

5.2.7 Road Clearance - 12.5 inches minimum

5.2.8 Turning Radius - 20 feet minimum

5.2.9 Electric Leveling Jacks.

5.2.9.1 Turning Ratio - 5 turns equal 1 inch of travel (hi speed); 30 turns equal 1 inch of travel (low speed).

5.2.9.2 Torque Capacity - 10 foot-pounds at 30:1, maximum.

5.2.9.3 Leveling Capacity - Level on 10° grade.

5.2.9.4 Enclosure - Metal enclosure with access panel, flexible boot at movable shaft.

5.2.10 Spreader Bar, Lifting Eyes, and Bridal Chains - Spreader bar, lifting eyes, bridal chains, and hooks must be designed and certified to lift the full weight of the Cine-Sextant with a 1000 pound payload plus a 100 percent safety margin.

5.2.10.1 Spreader Bar - 30,000 pound lift capacity.

5.2.10.2 Bridal Chains and Hooks.

5.2.10.2.1 - Lift capacity each -15,900 pounds.

5.2.10.2.2 - Length of fore chains - 14 feet.

5.2.10.2.3 - Length of aft chains - 12 feet.

6.0 MAINTAINABILITY

All operational controls will be accessible for maintenance while the Cine-Sextant is operating. Any special tools required for maintenance will be furnished with the system. The design will utilize the most reliable parts and components to minimize and facilitate maintenance. Electrical and electronic parts will be accessible. Components and subassemblies within a unit will have a close functional relationship. All circuit components will be clearly and permanently marked for identification in conformance with the schematic designation. Removable and replaceable modular plug-in assemblies will be used wherever practical. Input and output test points will be labeled to facilitate circuit evaluation. Cables between units will have connectors which prevent mating of all but the desired units. Internal wiring will be color coded or numbered, then laced or otherwise secured in a safe and orderly manner. Extenders, cables, and extractors for circuit boards and plug-in modules will also be supplied. Panels or covers will be furnished for access to all units of the equipment for cleaning, adjustment and maintenance.

7.0 FINISH

The finish will be in accordance with Military Specification MIL-TT-D-490E. The steel undercarriage of the trailer will be finished with gloss black, low VOC acrylic urethane over primer. The outer surfaces and compartment interiors will be finished with white, low VOC acrylic urethane over GPB primer. A non-skid, deck paint will cover the decking.

8.0 DISSIMILAR METALS

Dissimilar metals will not be used in intimate contact unless protected against galvanic corrosion.

9.0 HUMAN FACTORS ENGINEERING

Human factors engineering and practices will be adhered to as set forth in Human Engineering Guide for Equipment Designers.

10.0 MATERIALS AND WORKMANSHIP

The Cine-Sextant, including all parts and subassemblies, will be constructed and finished in accordance with requirement 9, Workmanship, of MIL-STD-454, and will have a uniform appearance in color, type of finish, hardware and trim.

11.0 ENVIRONMENTAL

11.1 Operating Conditions - After a warm-up period of 15 minutes, the Cine-Sextant will operate within performance requirements under all combinations of the following:

11.1.1 Ambient temperature – O to 130 °F.

11.1.2 Wind velocity - 30 mph with gusts to 60 mph.

11.1.3 Relative humidity - 5 to 95 percent sustained and effects due to condensation caused by temperature change shall be included.

11.2 Non-Operating Conditions - The Cine-Sextant will sustain no damage when subjected to the following conditions and when covered with the protective cover.

11.2.1 Ambient temperatures - -30 to +130 °F, and a rate of temperature change of 20° F per hour between these two limits.

11.2.2 Wind velocity - 100 mph.

11.2.3 Sand and dust – 75 percent of which can pass through a 325- mesh screen (U.S. Standard Sieve Series), propelled by winds of 50 mph.

11.2.4 Sustained towing speed - 55 mph on paved highways.

12.0 DOCUMENTATION

12.1 Vendor Requirements. Vendor will furnish customer with a either a commercial user's and maintenance manual or a USAF Operation and Maintenance Manual TO-10A3-22-1 Cine-Sextant Mobile Tracking Mount. After completion of the repairs and refurbishment, an acceptance test procedure (ATP) will be performed to verify the proper functioning of the Cine-Sextant and to confirm that all specifications have been met. Copies of all test results will be furnished to the customer upon delivery.

12.2 Acceptance Test Procedure. The government reserves the right to have a representative present during the performance of the ATP. Two weeks prior written notification of the ATP is required. Government points of contact for the ATP or any technical questions concerning this project are (insert requester's technical POC name)

13.0 APPLICABLE SPECIFICATIONS AND DOCUMENTS

The following documents will be applicable to this project:

13.1 Military Specifications

13.1.1 MIL-E-4158E - Electronic Equipment: General Requirements for

13.1.2 MIL-M-8090F - Mobility Towed Aerospace Ground Equipment: General Requirement for

13.1.3 MIL-PR-F-24635 - White Enamel, Silicon Alkyd Copolymer, Semi-gloss: for exterior and interior use

13.2 Military Standards

13.2.1 MIL-STD-454E - Standard for Electronic Equipment, General

13.2.2 Range Commanders Council Document 200-98, IRIG Serial Time Code Formats.

13.3 Other Documents

Human Engineering Guide for Equipment Designers, by Wesley E. Woodson Interstate Commerce Commission Motor Carrier Safety Regulations Library of Congress Catalog Number 54-8698

14.0 WARRANTY

The vendor shall provide a full trailer-hitch-to-tail-light warranty for a period of 12 months from date of delivery and agrees to perform such repairs as are necessary to restore the system to operation at no cost to the government. The manufacturer shall not be held responsible if the Cine-Sextant is used under conditions that exceed the specifications described herein.

15.0 POINTS OF CONTACT

15.1 For technical information (insert local technical point of contact (POC) as indicated on next page.)

Organization
ATTN: Local POC
Street Address
City/State/Zip Code

Phone - DSN
- Commercial
FAX - DSN
- Commercial

Email - user email address

15.2 Contracting Office

Organization
Attn: Local POC
Street Address
City/State/Zip Code

Phone - DSN
- Commercial
FAX - DSN
- Commercial
Email - user email address