OSGCS Overview

The OSGCS accommodates two operators: an Aerial Vehicle Operator (AVO) that navigates, monitors, and controls the AV flight, and a Mission Payload Operator (MPO) that controls the payload Line Of Sight (LOS), monitors the video and data received from the AV.

OSGCS Primary Functions

The OSGCS performs the following main functions:

a. Organizing all operators' commands and route them to the Ground Data link Terminal (GDT) for uplink transmission to the AV.

b. Receiving the downlink from the GDT, distribution of the received AV reports and video signal to all operator's displays.

c. Mission planning and execution, flying and navigating the AV as planned, and in-flight monitoring of AV sub-systems.

d. Control and monitor of the communication and AV tracking system

e. Controlling of the IMINT payload reconnaissance, surveillance and other mission modes of operation.

f. Controlling and monitoring of pre-flight checks, take-off and landing.

g. Operators training using MUSE simulator.

OSGCS Ancillary Functions

a. Fiber optic communication with external components

b. Back-up and interchangeability of workstations

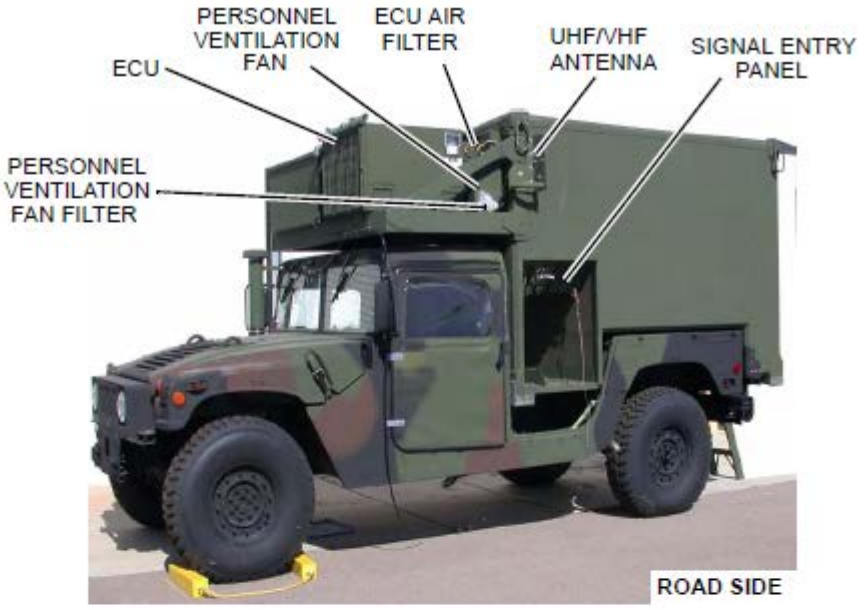
c. Record, distribution, and play-back the downlink data and video

d. Tactical communications management

e. Electrical Power supply and distribution

f. Air-conditioning, ventilation and lighting system operation and control.

g. Simulating the system operation for AVO/MPO training purpose.


PERSONNEL VENTILATION FAN
ECU AIR FILTER
UHF/VHF ANTENNA
SIGNAL ENTRY PANEL
ECU
PERSONNEL VENTILATION FAN FILTER
ROAD SIDE


SHELTER LIFTING EYES
UHF/VHF ANTENNA EGRESS PANEL
STORAGE BIN
SHELTER STEPS
FUEL TANK
SHELTER TUNNEL
CURB SIDE

OSGCS Exterior Layout

External Curb Side Components

Refer to **Figure above**

a.**Storage Bin**. The storage bin is used to store loose equipment (wire line adapters, cable reels, external power cables, etc.).

b.**UHF/VHF Antenna Egress Panel**. The antenna egress panel (MP3) is used as a bulkhead connection for the Ultra High Frequency (UHF) / Very High Frequency (VHF) antenna cable assemblies.

c.**Shelter Lifting Eyes**. The shelter lifting eyes allow for shelter emplacement or removal from the HMMWV. There are two lifting eyes on the top corners of the curb side of the OSGCS. There are two additional shelter lifting eyes on the road side.

d.**Fuel Tank**. The fuel tank stores diesel fuel and supports motor operations for the HMMWV.

e.**Shelter Steps**. There four hinged type steps for roof access. The shelter steps are located near the rear of the curb side of the OSGCS.

f.**Shelter Tunnel.** The shelter tunnel is used to store the OSGCS power cord and other miscellaneous equipment.

External Road Side Components

a.**Environmental Control Unit**. The Environmental Control Unit (ECU) (A70) is mounted to the shelter equipment rack on the front road side. The ECU provides heating and cooling air through a plenum to the inside of the OSGCS. Operation of the ECU is controlled by the ECU Control Panel (A72).

b.**Environmental Control Unit Filter Assembly**. The ECU filter assembly (A71) is mounted on the top side of the ECU. The filter assembly provides filtration of particles during ECU operation. The filter assembly has a handle to allow easy filter removal and replacement. There are two removable filters attached to the ECU filter assembly.

c.**UHF/VHF Antenna Bracket Assemblies**. The UHF/VHF (E102, E104) antenna bracket assemblies are attached to the shelter and equipment rack.

d.**Signal Entry Pane**l. The Signal Entry Panel (SEP -A50) (**fig. 2-4**) is located in the upper portion of the shelter tunnel. The SEP is the interface between the OSGCS and external system equipment.

OSGCS Interior Layout

The interior of the OSGCS provides a controlled environment for two operators, electronic equipment, and peripherals to perform the mission. It also provides control of electrical power generation and distribution to consumers for proper operation. The OSGCS is divided into following functional systems:

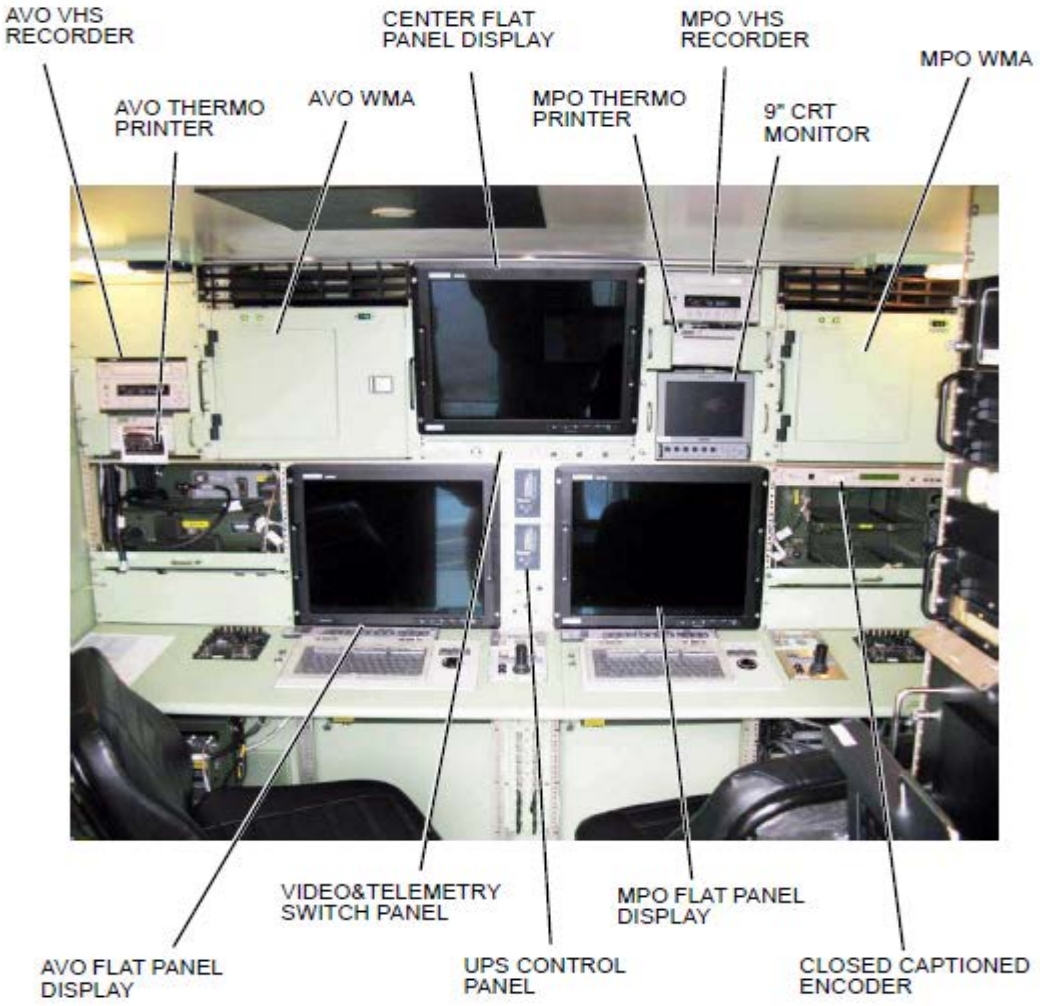
a. Mission Operation, Control, and Monitor

b. Auxiliary Systems

c. Ancillary Systems

d. Tactical Communication Systems

e. Multiple Unified Simulation Environment (MUSE)



DATA LINK SYSTEM

GENERAL

The data link system consists of the Downsized Airborne Data link Terminal (DADT), the Ground Data link Terminal (GDT), and Launch and Recovery data link Terminal (LRT).

a. The Data Link System interfaces and provides RF communication between the Air Vehicle (AV) and One System Ground Control Station (OSGCS). The data link is used for commanding the AV navigation and mission performance, receiving the AV reports on the airborne systems functionality, and for transmitting the onboard payload information to the system operators and other authorized consumers.

b. The data link uses a C-band transmitter/receiver that manages all signals and message traffic between the AV and the ground terminal. The system is redundant, utilizing two separate transceivers, one as the primary link, and the other for backup.

c. The Data Link main functions are:

(1)Carry out the communication between AV and OSGCS

(2)Tracking AV position in elevation and azimuth axis

(3)Measurement of range between AV and GDT

(4)Monitoring and displaying failures and status report of the GDT/LRT.

3-2.DATA LINK FUNCTIONAL DESCRIPTION

a. Commands from the OSGCS are transferred to the GDT/LRT through a Fiber Optics (F/O) network, or to the LRT through hardwire cable. In the GDT/LRT the commands are encoded and arranged in a UPL message frame format, doubled for the two UPL transmitters (Primary and Secondary-back-up) and transmitted to the AV.

b. The AV receives the transmission through its antennas in its Downsize Airborne Data Terminal (DADT) that decodes the data and communicates with the Modular Central Processing Assembly (MCPA) uses this data to control the UAV subsystems and the on board MOSP. The DADT receives two UPL command channels and transmits one DNL channel. The UPL commands are generated in the OSGCS and contain operators commands. Simultaneously, the DADT receives from AV systems status, data reports, and payload video signals. These signals are encoded (separately) in the DNL transmitter and transmitted to the OSGCS in a DNL message frame format.

c. In the OSGCS, the AV systems status data report, and payload video signal, are delivered to the Versa-module Eurobus (VME) to be processed and displayed to the operators.

d. The GDT/LRT uses the C-Band antenna, driven by Azimuth Drive and Elevation Drive to track AV position in elevation and azimuth axis.

e. The GDT/LRT measures the range between the AV and the ground terminal, and reports the range measurement together with the azimuth data that has been derived from the tracking system. The tracking system is based on amplitude mono-pulse principle in the azimuth axis and on OSGCS calculations in the elevation axis.

f. The data link includes three functional groups, the Primary Transmitter/Receiver, with 14 selectable preset channels, a Backup Transmitter/Receiver with six selectable preset channels, and the Air Data Relay Transmitter/Receiver.

g. The system carries message traffic such the command telemetry from the controlling antenna, normally the GDT/LRT antenna, to the AV, as well as report telemetry and video signals from the AV to the controlling antenna. The optical payload video data is also transmitted on the downlink to any authorized video consumer that uses the appropriate receiving equipment.

h. The system functions are implemented in the data link modules located in the airborne data link communication racks, a.k.a DADT baskets (**fig. 3-1**), and in the GDT/LRT RF Box.

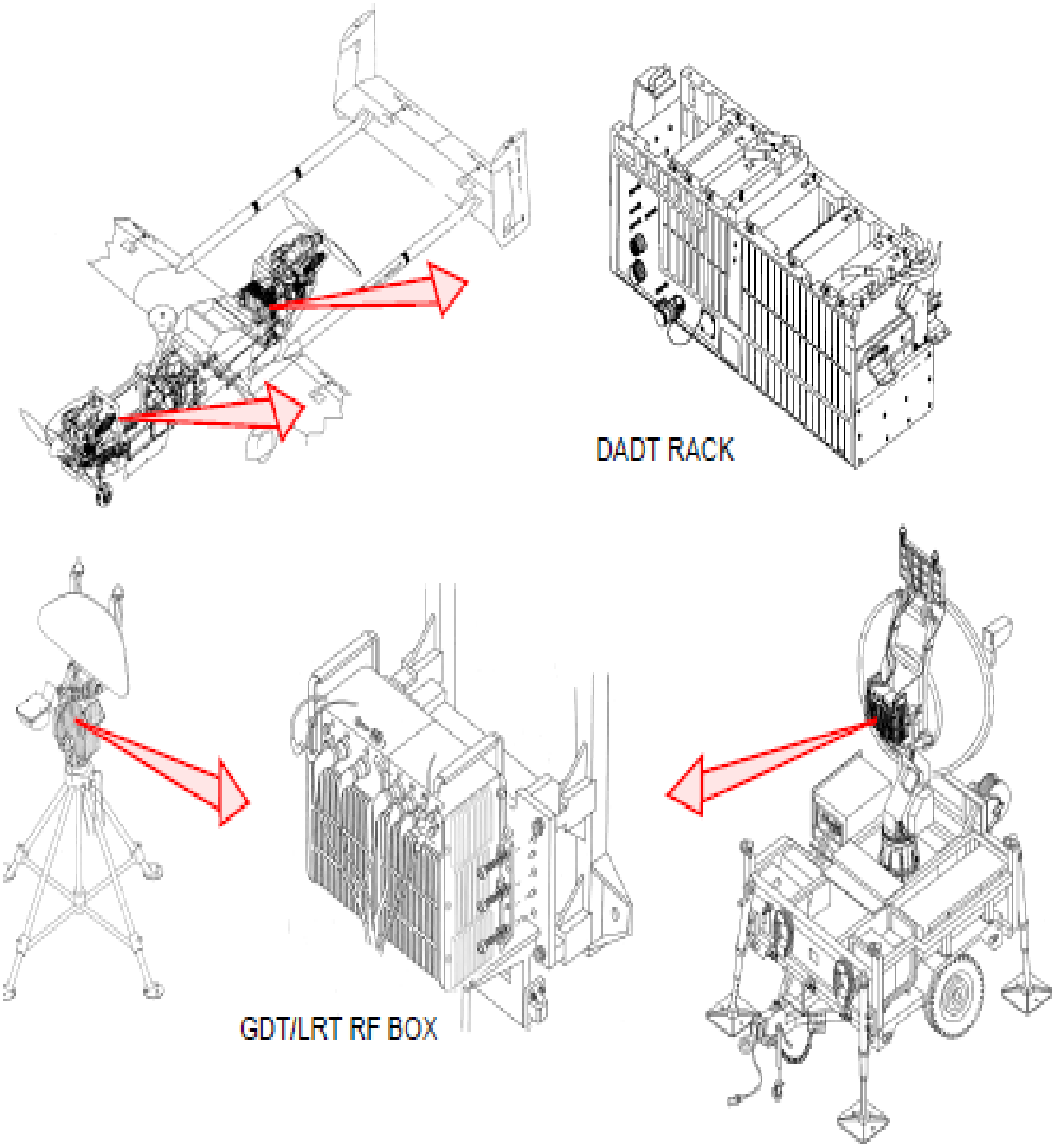


Figure 3-1. Data Link Main Components.

MULTI-OPTRONIC STABILIZED PAYLOAD SYSTEM

SYSTEM OVERVIEW

The Multi-Optronic Stabilized Payload (MOSP) system (**fig. 8-1**) is an airborne mission payload for surveillance and target identification. It is installed on the MQ-5B Hunter Air Vehicle (AV) and it is controlled remotely from the One System Ground Control Station (OSGCS) by the Mission Payload Operator (MPO) through the data link communication. The MOSP provides optical, real-time Infra Red (IR) image, or TV camera video image of the target area during day and night missions. The system includes an Automatic Target-Tracking and a Laser Designation/Range Finder (LDR) capabilities, depending on the system configuration.

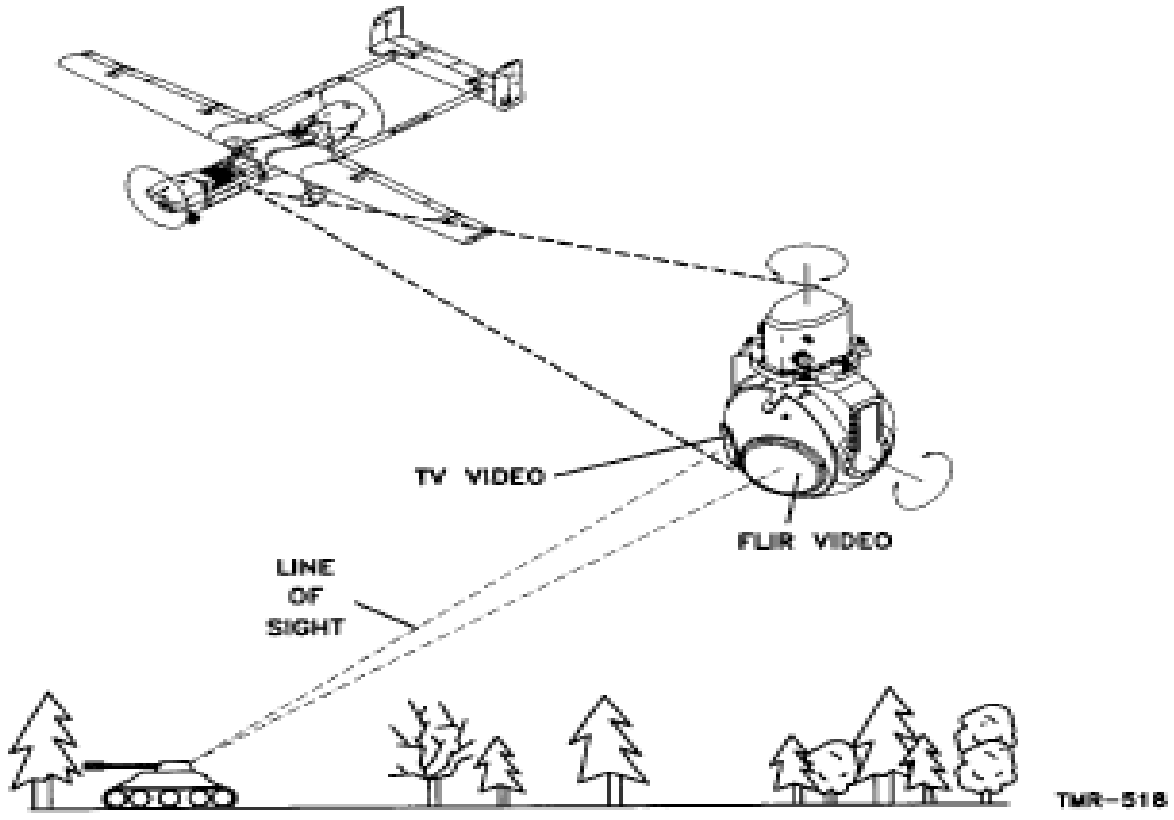


Figure 8-1. MOSP - General View.

MOSP COMPONENTS

The MOSP system consists of the following major components :

a. Stabilized Platform Assembly (SPA) includes the TV, IR cameras, and Laser sensors and the stabilization gimbal system. The SPA is installed on the payload elevator assembly.

b. Payload Control and Logic (PCL) Box is the MOSP main controller. It controls the MOSP system functions and interface with the MCPA. The PCL is installed in the AV forward compartment bay.

c. Payload Elevator Assembly carries the SPA. The Elevator Assembly is located in the AV payload compartment.

d. Yoke Electronic Assembly (YEA) controls the TSU and processes the IR signal to the TV video image. The YEA is a integral part of the SPA.

e. Harnesses and electrical cables that interface the SPA with the PCL and the AV system

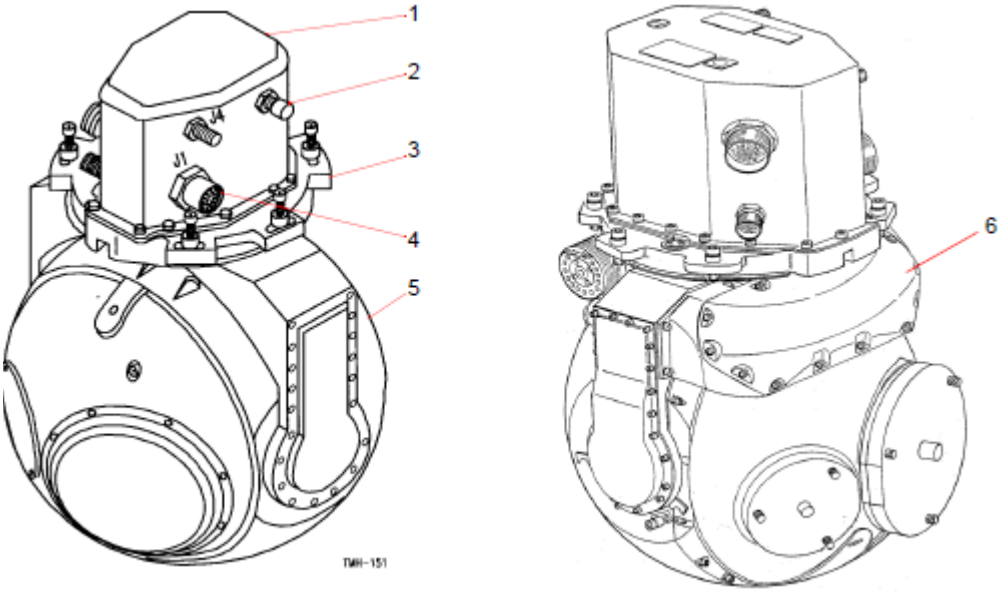


Table 8-2. MOSP System Physical Characteristics.

1. PCL		
a. Length	12.8 inches	32.5 cm
b. Width	4.7 inches	12.0 cm
c. Height	10.4 inches	26.5 cm
d. Weight	10.2 lbs	4.6Kg
(1) With Autotracker	(1) 11.1 lbs.	5.0 Kg.
(2) Without Autotracker	(2) 9.9 lbs.	4.5 Kg.
2. MOSP System		
a. MOSP w/Container Weight	215.7 lbs.	97.8 Kg
b. SPA Weight		
(1) D/N 770mm	(1) 54.3 lbs	24.6 Kg.
(2) D/L 360/L	(2) 58.3 lbs.	26.4 Kg.
(3) N/L IR/L	(3) 59.3 lbs.	26.9 Kg.
c. SPA Diameter	23.9 inches	35.4 cm
d. SPA Height	21.57 inches	54.8 cm
e. Harness Set Weight		
(1) D/N 770mm	(1) 3.3 lbs.	1.5 Kg.
(2) D/L 360/L	(2) 3.3 lbs.	1.5 Kg.
(3) N/L IR/L	(3) 3.3 lbs.	1.5 Kg.
3. MOSP Container Characteristics		
a. Length	30.0 inches	76.2 cm
b. Width	30.0 inches	76.2 cm
c. Height	40.0 inches	102.6 cm
d. Weight	135.5 lbs.	61.4 Kg

MOSP SYSTEM	PERFORMANCE
1. Stabilized Platform Assembly (SPA)	
a. SPA Minitune Gyro Dynamic range	
b. Pitch range	+10°±2° to Nadir ±1°
c. Pitch high rate	30°/sec±15%
d. Pitch low rate	3°/sec±20%
e. Yaw range (Azimuth)	n x 360° (unlimited)
f. Yaw high rate	30°/sec±15%
g. Yaw low rate	3°/sec±20%
h. TV Video output	RS-170 (option NTSC)
i. IR Video output	CCIR 624-4
2. Thermal Sensor Unit (TSU)	
a. TSU cooler type	Cryogenic sterling cooler, closed cooling sys.
b. TSU cooler down time	Approximately 12 minutes
c. Electronic Zoom (Super Narrow):	0.46 X 0.34°
d. Narrow FOV Lenses	
(1) Effective focal length	600 mm (23.61 inches)
(2) Electronic zoom	2:1
(3) FOV	0.92 X 0.68°
e. Medium FOV Lenses	
(1) Effective focal length	150 mm
(2) FOV	6 X 2.7°
f. Wide FOV Lenses	
(1) Effective focal length	32 mm
(2) FOV	6.5 X 12.5°
3. Camera	
a. Nominal focal length (mm)	20 ÷ 770
b. F number (Iris open)	17
c. FOVs (HxV)	
(1) Narrow (HxV)	0.92° x 0.96° ±10%
(2) Medium (HxV)	3.6° x 2.7° ±10%
(3) Wide (HxV)	16° x 12° ±5%
4. Environmental Characteristics	
a. Operating temperature	-35° to 40°C (-31°F to 104°F)
b. Storage and transportation temperature	-35° to 71°C (-31°F to 159°F)