3.1 GEOMETRIC RELATIONSHIPS

3.1.1 Coordinate Systems

3.1.1.1 Orbiter
The Orbiter coordinate system shall be in conformance with Figure 3.1.1.1-1.

3.1.1.2 (Reserved)

3.1.1.3 (Reserved)

3.1.1.4 (Reserved)

3.1.1.5 (Reserved)

3.1.1.6 (DELETED)

3.1.2 (Reserved)

3.1.3 Visual Interfaces

3.1.3.1 Lateral Field of View
The Orbiter shall provide the capability of exposing the entire length and full width of the cargo bay as defined in Figure 3.1.3.1-1. With the cargo bay doors and radiators open, the Orbiter shall provide an unobstructed 180-degree lateral field of view for any point along the line Yo=0, Zo=429.5 between Xo=582 and Xo=1302 (as shown in Figure 3.1.3.1-1) without such mechanisms as the docking module, manipulator arm, rendezvous sensor, payload retention guides, the TV/light, bracket and EDO pallet installed.

3.1.3.2 Cargo Bay Lighting
The Orbiter shall provide lighting within the cargo bay to support Orbiter/payload operations both internal and external to the cargo bay, including the modes of payload operations that are supported by the Remote Manipulator System (RMS). The cargo bay lighting shall consist of sources of illumination within the cargo bay, nominally located as shown in Figure 3.1.3.2-1.

3.1.3.3 Television Viewing
The Orbiter shall provide closed circuit television viewing. Up to four cameras shall be mounted on the forward and aft cargo bay bulkheads (2 each) in positions identified in Figure 3.1.3.2-1, and two cameras (operated one at a time) can be installed on the RMS. Additionally, one camera may be installed along the keel on a given flight. The cameras require a space 22 inches in length and, when installed, can protrude into the cargo dynamic envelope. The view of the aft bulkhead cameras is restricted when EDO pallet is utilized, however.

Up to two cameras can be displayed in the Orbiter crew compartment (up to four if split screen). One camera (two if split screen) can be recorded for subsequent play back to the ground, and one camera (two if split screen) can be transmitted to the ground in real time (when not playing back recorded data to the ground).

3.2 INTERFACE LOCATION AND DIMENSIONING

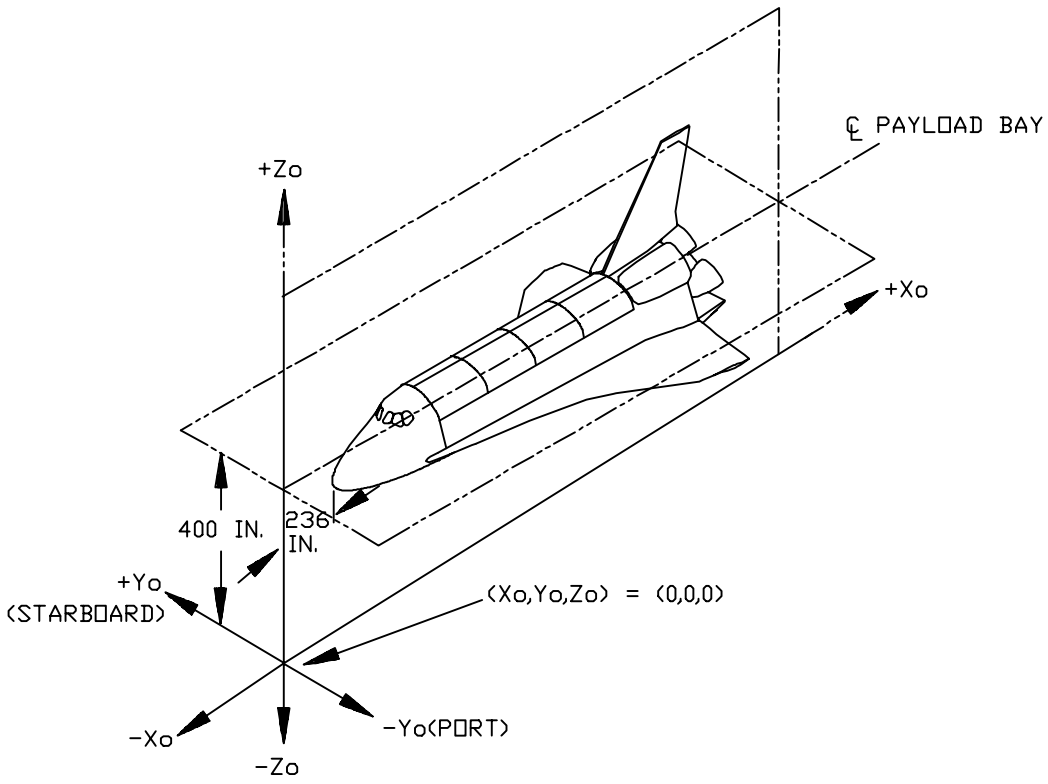
3.2.1 (Reserved)

3.2.2 Dimensions and Tolerances
Unless otherwise specified, all linear dimensions are in inches, all angular dimensions are in degrees, and the tolerances for these are as follows:

Decimal:	X.X	= ± 0.1
	X.XX	= ± 0.03
	X.XXX	= ± 0.010
Fractions:		± 1/16
Angles:		± 0°30′

3.3 PAYLOAD BAY NOT APPLICABLE

3.4 (Reserved)



ORIGIN: IN THE ORBITER PLANE OF SYMMETRY, 400 INCHES BELOW THE CENTERLINE OF THE PAYLOAD BAY AND AT ORBITER X STATION = 0.

ORIENTATION: THE Xo AXIS IS THE VEHICLE PLANE OF SYMMETRY, PARALLEL TO AND 400 INCHES BELOW THE PAYLOAD BAY CENTERLINE. POSITIVE SENSE IS FROM THE NOSE OF THE VEHICLE TOWARD THE TAIL.

THE Zo AXIS IS IN THE VEHICLE PLANE OF SYMMETRY, PERPENDICULAR TO THE Xo AXIS, AND POSITIVE UPWARD IN THE LANDING ATTITUDE.

THE Yo AXIS COMPLETES A RIGHT-HANDED SYSTEM.

CHARACTERISTICS: RIGHT-HANDED CARTESIAN COORDINATE SYSTEM. THE STANDARD COORDINATE DESIGNATION IS o (E.G., Xo, Yo, Zo).

FIGURE 3.1.1.1-1 ORBITER COORDINATE SYSTEM

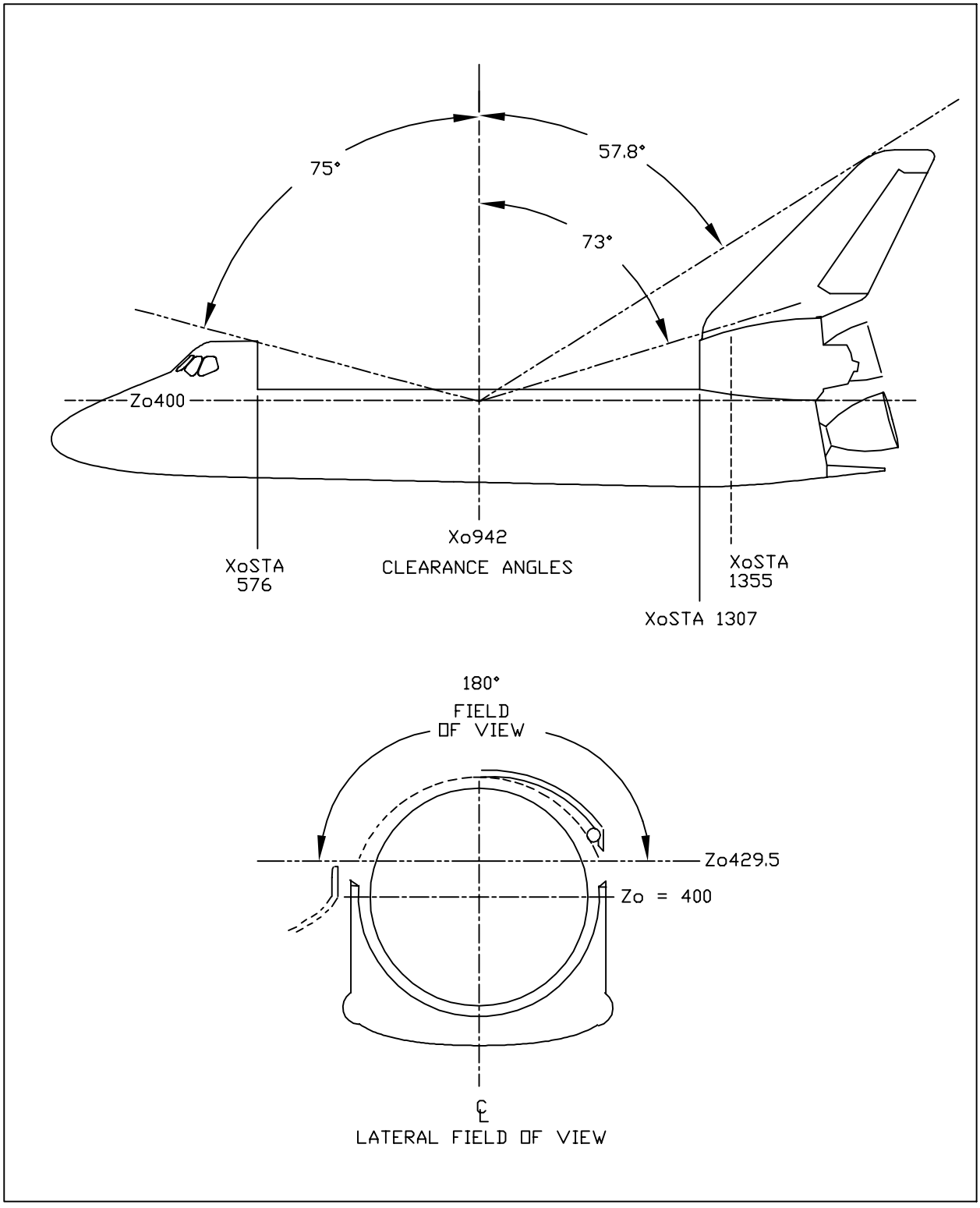


FIGURE 3.1.3.1-1 CARGO ELEMENT FIELD OF VIEW

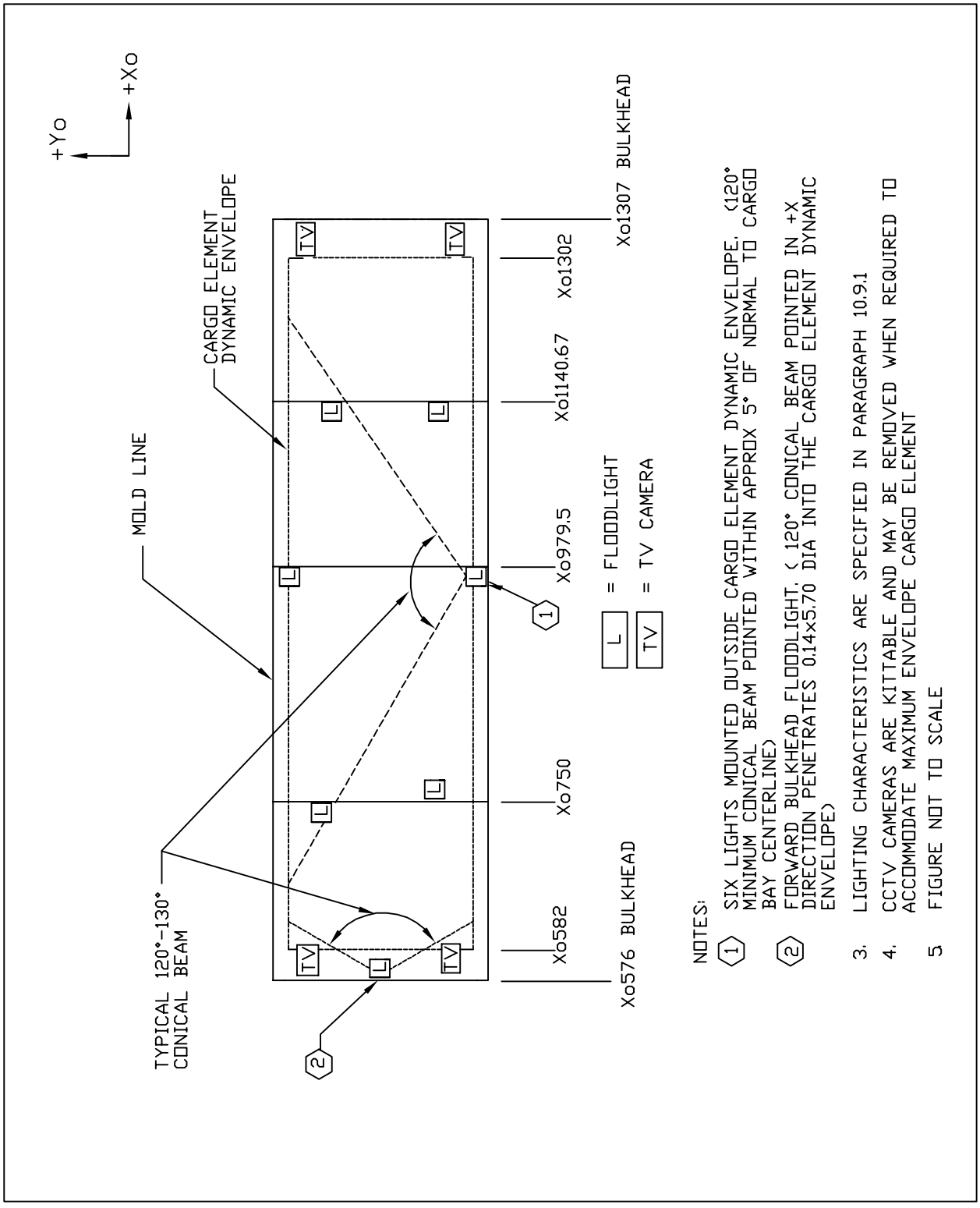


FIGURE 3.1.3.2-1 CARGO BAY LIGHTING AND TV CAMERA LOCATIONS
(SHEET 1 OF 3)

LOCATION OF LIGHTS (**)	ATTACHMENT LOCATION		FIXTURE CENTERLINE	
	X_o	SIDE	Y_o	Z_o
	576	Aft	0	484.2
	750	Forward	56	325.2
	750	Aft	-48	320.0
	979.5	Forward	54.3	323.9
	979.5	Forward	-54.3	323.9
	1140.67	Forward	56	324.9
	1140.67	Forward	-56	324.9

BULKHEAD TV CAMERA LOCATIONS (**)	ATTACHMENT BULKHEAD X_o	LENS EXTREME POSITION X_o	CAMERA CENTERLINE	
			Y_o	Z_o
	576	598	71.5	446
	576	598	-71.5	446
	1307	1285	87	446
	1307	1285	-87	446

KEEL CAMERA LOCATIONS (**) (***)				
BAY	NO. OF LOCATIONS IN BAY	Xo CENTERLINE OF CAMERA (AT 3.93 INCREMENTS)	Yo CENTERLINE OF CAMERA	Zo CAMERA LENS (EXTENDED)
1	2	616.67 TO 620.60	-1.40	316.14
2	8	648.13 TO 675.67	-1.40	316.14
3	7	711.07 TO 734.67	-1.40	316.14
4	7	770.07 TO 793.67	-1.40	316.14
5	7	825.13 TO 848.73	-1.40	316.14
6	7	880.20 TO 903.80	-1.40	316.14
6	1	892.00	-4.00	317.19
7	8	935.27 TO 962.80	-1.40	316.14
8	8	998.20 TO 1025.73	-1.40	316.14
9	6	1057.20 TO 1076.87	-1.40	316.14
10	6	1108.33 TO 1128.00	-1.40	316.14
10	1	1104.40	-2.80	317.19
11	5	1159.47 TO 1175.20	-1.40	316.14
	73 TOTAL LOCATIONS			

(**) REPRESENTS STATIC POSITION ONLY.

(***) SELECTED LOCATION (S) WILL BE AFFECTED BY MISSION UNIQUE THERMAL CHARACTERISTICS AND WILL BE NEGOTIATED IN THE PIP.

FIGURE 3.1.3.2-1 CARGO BAY LIGHTING AND TV CAMERA LOCATIONS
(SHEET 2 OF 3)

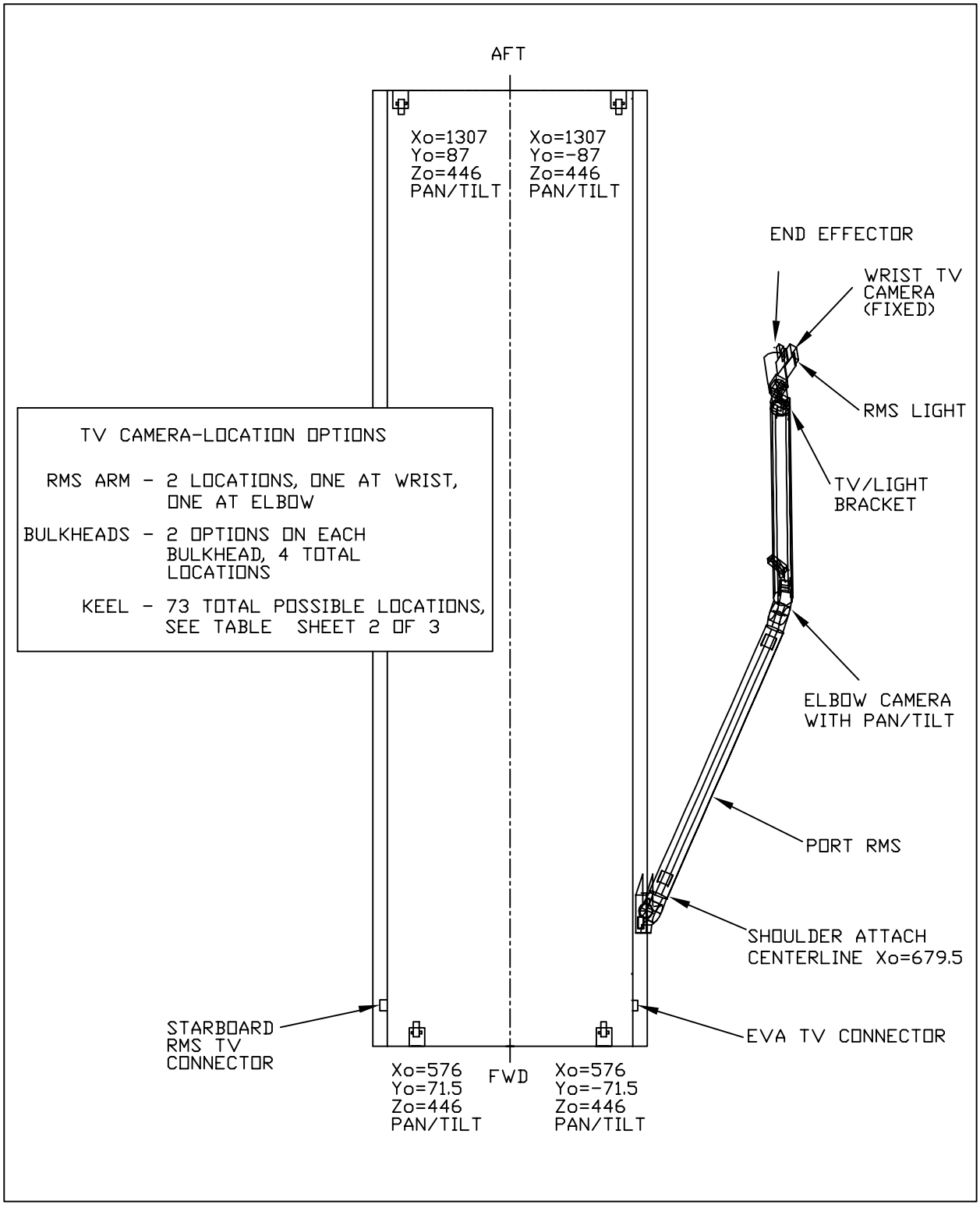


FIGURE 3.1.3.2-1 CARGO BAY LIGHTING AND TV CAMERA LOCATIONS
(SHEET 3 OF 3)

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