

## COMMUNICATIONS MODULE CONSTRUCTION

The Communications Module can be constructed by machining an ingot of steel to precise dimensions at some cost and difficulty, or it can be created by assembling relatively inexpensive ‘1-2-3 Blocks’ that are normally used as an aid in positioning parts to be shaped on a milling machine.

The IARC Official Rules contain details about the construction of the Communications Module using ‘1-2-3 Blocks’. Additional information can be found in the Team Resources section at the IARC website, including assembly instructions, painting instructions, and details about the Mast interface. This information is provided to assist the teams in construction of Communication Modules for testing that are similar in size and weight to the ones used within the IARC arena. Note that the Communications Modules and the Mast interface are items supplied for use by the teams in the arena. This assures that the teams are using the same components with the same dimensional resolution, weight, and color.

Of particular importance is the resolution of the Mast interface pins (diameter, spacing, and orientation) and the Communications Module. Similarly, the gross outer dimensions of the Communication Module (to a lesser degree) will be important to how the teams grasp the Communications module during transport to the Hunter-Killer mast 3 km away from the launch point.

## MAST MOTION

The specific motion of the Hunter-Killer mast will not be known to the teams, nor should it be predictable beforehand. The mast motion will simulate what would be encountered by a boat with a mast of a certain height in a Sea State 2 - 3 scenario.

In oceanography, sea state is the general condition of the free surface on a large body of water—with respect to wind, waves, and swell—at a certain location and moment. A sea state is characterized by statistics, including the wave height, period, and power spectrum. The sea state varies with time, as the wind conditions or swell conditions change.

In the MISSION 9 scenario, the Hunter-Killer boat will be assumed to be temporarily at rest (not moving under power in either the forward or backward direction). Further, to simplify the scenario, only pitch and roll motions will be simulated. The “heave” (vertical thrust) will not be simulated. The pitch and roll in the IARC simulation will be largely sinusoidal, but will change slowly in frequency, amplitude, and the pitch/roll phase relationship.

The World Meteorological Organization Sea State Code is as follows:

Sea State	Wave height	Characteristics
0	0 meters (0 ft)	Calm (glassy)
1	0 to 0.1 meters (0.00 to 0.33 ft)	Calm (rippled)
2	0.1 to 0.5 meters (3.9 in to 1 ft 7.7 in)	Smooth (wavelets)
3	0.5 to 1.25 meters (1 ft 8 in to 4 ft 1 in)	Slight

# MISSION 9 COLORS

Two colors are defined in MISSION 9. The color of the words, **модули иртибот** found above the mast-mounted communications module are black on a white background.

The mast-mounted communications module mounting plate and the Hunter-Killer's communications module are a blue color defined by AMS-STD-595 number 15177.

Approximations of AMS-STD-595 : 15177 are defined as follows:

RGB: 96 128 149

HEX: #608095

(Note that screen renditions are not reliable due to the difference in screen intensities and color balance.)

Approximations that can be used are:

- Rust-Oleum Painter's Touch  
"334080 satin Wildflower Blue",  
No. 20066 38707.

- Glidden

- QTCOLOR.com and WeChat Color:



AMS-STD  
15177

颜色属性

名称: Clear blue

RGB: 96 128 149

HEX: #608095

CMYK: CMYK值不可



扫微信存色彩

STR#8413


GLIDDEN

BASE: GLN6212N

Glidden Prem Int Lt /SATIN  
{CM}Custom Color Match

CLRNT	DL	EL	KXL	RL			
0Z	0	5	0	3			
384th	176	144	248	192			

GALLON- 10/7/2019 (HDP)



841319412529

<https://www.qtcclor.com/Color/C-83091.aspx>



Above: Communications Module in Place on Mast Block Receiver

## Module Manipulation

### Communications Module (CNC machined version)

Weight: **2.00 kg  $\pm$  0.25%**

Magnetic Break-Away Force: **2.50 - 3.25 kg**

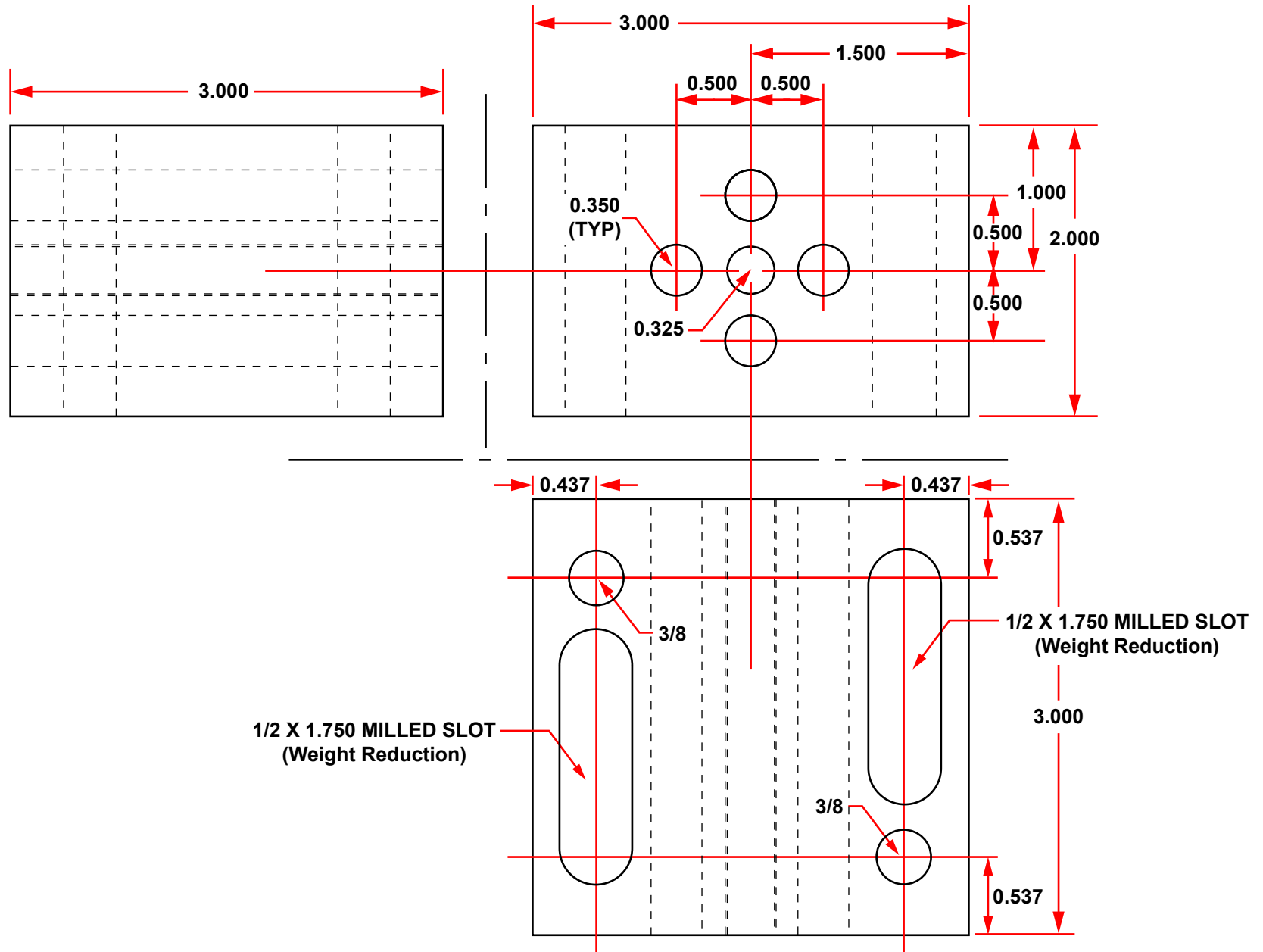
(based on 12 tests with pull force parallel to Mast Block Receiver rod axis, and applied separately at each of the junctions of the aluminum antennas and the central Communications Module steel block body)

Insertion Force: **0.20 - 0.30 kg**

(but magnetically assisted within 0.5 cm of full insertion)

**NOTES:** Removal and Insertion Forces will be affected slightly by the motion and angle of the Mast at the time of Insertion/Removal.

The Communications Module can be inserted upside down, and the antenna arming switch will not be activated. When the module is correctly placed, this switch will be activated and the red and green navigation lights will illuminate. The Communications Module can also be inserted in the wrong front-to-back orientation. If so, the magnet system will oppose the module from completely seating.

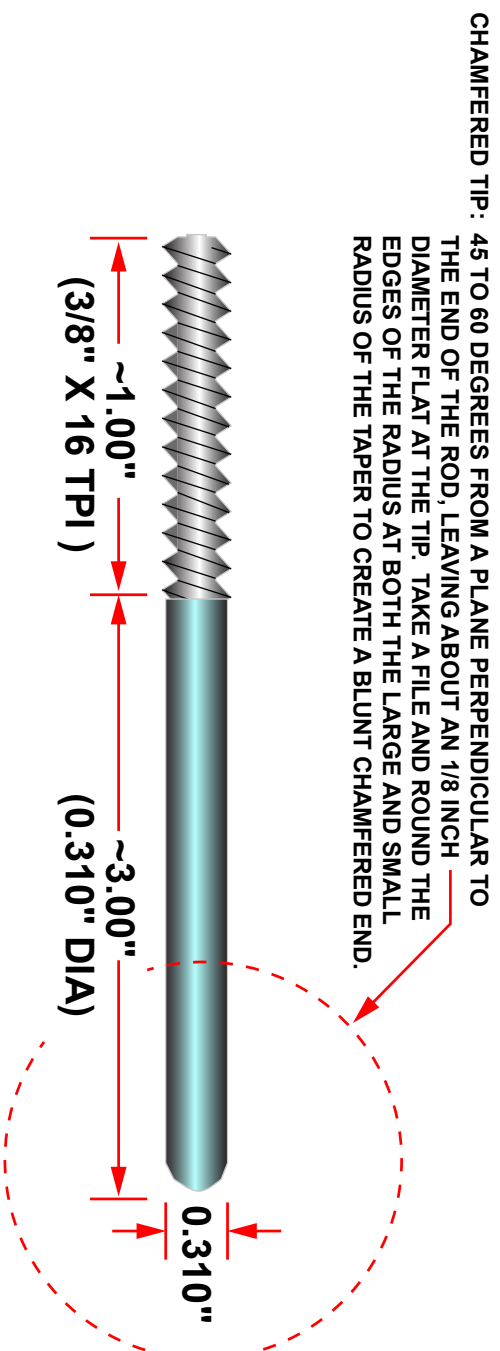


ALL DIMENSIONS ARE INCHES  
 MATERIAL: 1018 COLD ROLLED STEEL  
 QTY = 2

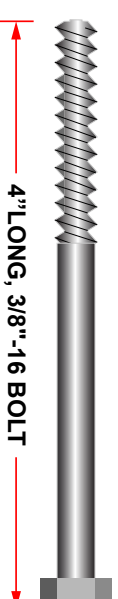
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 v. 10-9-2019

# COMMUNICATIONS MODULE BLOCK





**ALIGNMENT RODS ARE MACHINED FROM 4-INCH LONG 3/8" X 16 TPI STAINLESS STEEL BOLTS**  
 校准杆由4英寸长的3/8英寸X 16 TPI不锈钢螺栓制成



**ALL DIMENSIONS ARE INCHES**  
**MATERIAL: 3/8" X 16 TPI STAINLESS STEEL BOLTS**  
**QTY = 4**

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# ALIGNMENT RODS