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**Responsible Organization:** GOES-R/Code 417

**417-R-RAD-0061**
**Baseline Version 2.0**

## Geostationary Operational Environmental Satellite (GOES)

# GOES-R Series

# PAYLOAD RESOURCE ALLOCATION DOCUMENT (PRAD)

**August 6, 2007**


National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

**Effective Date:** Date of Last Signature
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**Responsible Organization:** GOES-R/Code 417

**417-R-RAD-0061**

# Geostationary Operational Environmental Satellites (GOES)
# GOES-R Series
# Payload Resource Allocation Document

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## PRAD

417-R-RAD-0061, RM Version, Payload Resource Allocation Document

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# Contents

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
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| PRAD1 | 1 | **1 Scope** |
| PRAD2 | 1.0-1 | This document defines the instrument resource allocation for the GOES-R satellite. The resources covered by this document are: mass, power, image navigation and registration (INR), pointing, and disturbance requirements. Resource allocations for the magnetometer instrument and Auxiliary Communication Services are not included since they are provided by the spacecraft contractor and are part of the spacecraft resource budget. |

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|
| PRAD3 | 2 | # 2 Documents |
| PRAD4 | 2.1 | ## 2.1 Applicable Documents |
| PRAD5 | 2.1.0-1 | The latest approved versions of the following documents are applicable to this document. |

1. GOES-R General Interface Requirements Document (GIRD), 417-R-GIRD-0009
2. ABI Unique Instrument Interface Document (UIID), 417-R-ABIUIID-0010
3. GLM Unique Instrument Interface Document (UIID), 417-R-GLMUIID-0058
4. SUVI Unique Instrument Interface Document (UIID), 417-R-SUVIUIID-0112
5. EXIS Unique Instrument Interface Document (UIID), 417-R-EXISUIID-0117
6. SEISS Unique Instrument Interface Document (UIID), 417-R-SEISSUIID-0031
7. Reserve
8. GOES-R Series Mission Requirements Document (MRD), P417-R-MRD-0070
9. ABI Performance and Operational Requirements Documents (PORD), 417-R-ABIPORD-0017
10. SUVI Performance and Operational Requirements Documents (PORD), 417-R-SUVIPORD-0111
11. EXIS Performance and Operational Requirements Documents (PORD), 417-R-EXISPORD-0116
12. SEISS Performance and Operational Requirements Documents (PORD), 417-R-SEISSPORD-0030
13. GLM Performance Operational Requirements Documents (PORD), 417-R-GLMPORD-0057

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|---|---|---|
| PRAD6 | 3 | # 3 Overview |
| PRAD7 | 3.0-1 | This document describes the approach for margin management of mass, power, image navigation and registration (INR) and interface disturbance requirements being used for GOES-R. While mass and power are self-explanatory, INR requirements are elaborated below.<br><br>INR is a set of end-to-end, system-level performance requirements that apply to the Level-1b instrument data for the Advanced Baseline Imager (ABI). Level-1b data is defined to be radiometrically calibrated and geolocated data. Other instruments may have only certain aspects of INR requirements.<br><br>INR requirements include: navigation, within frame registration (line-to-line and pixel-to-pixel), frame to frame registration, and channel to channel registration.<br><br>The government holds a percentage reserve from the end-to-end INR requirements that appear in the Mission Requirements Document (MRD) and allocates the remainder to the instruments in the Performance and Operational Requirements Documents (PORDs). The instrument contractors are responsible for meeting the end-to-end INR requirements in the PORDs, given the spacecraft interface characteristics defined in the General Interface Requirements Document (GIRD). The instruments must meet the instrument disturbance requirements in the Unique Instrument Interface Document (UIIDs). The spacecraft must meet the interface requirements in the presence of the UIID instrument disturbances.<br><br>The instrument contractors are not expected to maintain significant INR performance margin, since some of the INR requirements are very challenging, and the government is holding reserve. However, the contractors will have to rigorously justify all of their INR performance estimates. |

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PRAD8 4

# 4 Instrument Mass Allocation

PRAD9 4.0-1

The maximum mass allocation per instrument (including all contingency) **shall** be in accordance with the Instrument Mass Allocation Table below.

**Instrument Mass Allocation Table**

| Instrument | Maximum Mass | Government Reserve | | UIID Allocation |
|---|---|---|---|---|
| | kg | kg | % | kg |
| ABI | 359 | 21 | 6% | 338 |
| Advanced Instrument | 260 | 50 | 24% | 210 |
| GLM | 81 | 16 | 25% | 65 |
| SUVI | 81 | 14 | 21% | 67 |
| EXIS | 35 | 6 | 21% | 29 |
| SEISS | 84 | 21 | 33% | 63 |

Note: % reserve is shown as % of UIID allocation.

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|---|---|---|

PRAD10 5

# 5 Instrument Power Allocation

PRAD11 5.1

## 5.1 Average Power (Operational)

PRAD12 5.1.0-1

The average operational power allocation, averaged over a 5 minute period including eclipse, per instrument (including all contingency) **shall** be in accordance with the Instrument Average Power (Operational) Allocation Table given below.

**Instrument Average Power (Operational) Allocation Table**

| Instrument | Average Power (Operational) | Government Reserve | | UIID Allocation |
|---|---|---|---|---|
| | W | W | % | W |
| ABI | 563 | 113 | 25% | 450 |
| Advanced Instrument | 481 | 96 | 25% | 385 |
| GLM | 325 | 65 | 25% | 260 |
| SUVI | 129 | 22 | 21% | 107 |
| EXIS | 57 | 14 | 33% | 43 |
| SEISS | 115 | 23 | 25% | 92 |

Note: % reserve is shown as % of UIID allocation.

PRAD13 5.2

## 5.2 Maximum Power (Operational)

PRAD14 5.2.0-1

The maximum operational power allocation, power averaged over a 20 msec period per instrument (including all contingency) **shall** be in accordance with the Instrument Maximum Power (Operational) Allocation Table below.

**Instrument Maximum Power (Operational) Allocation Table**

| Instrument | Maximum Power (Operational) | Government Reserve | | UIID Allocation |
|---|---|---|---|---|
| | W | W | % | W |
| ABI | 702 | 140 | 25% | 562 |
| Advanced Instrument | 531 | 106 | 25% | 425 |
| GLM | 407 | 82 | 25% | 325 |
| SUVI | 181 | 36 | 25% | 145 |
| EXIS | 69 | 14 | 25% | 55 |
| SEISS | 125 | 25 | 25% | 100 |

Note: % reserve is shown as % of UIID allocation.

PRAD15 5.3

## 5.3 Average Power (Survival)

PRAD16 5.3.0-1

The average survival power allocation, power averaged over a 72 minute period, per instrument (including all contingency) **shall** be in accordance with Instrument Average Power (Survival) Allocation Table below.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD16 5.3.0-1

**Instrument Average Power (Survival) Allocation Table**

| Instrument | Average Power (Survival) | Government Reserve | | UIID Allocation |
|---|---|---|---|---|
| | W | W | % | W |
| ABI | 195 | 25 | 15% | 170 |
| Advanced Instrument | 144 | 29 | 25% | 115 |
| GLM | 115 | 23 | 25% | 92 |
| SUVI | 112 | 22 | 24% | 90 |
| EXIS | 32 | 7 | 28% | 25 |
| SEISS | 44 | 9 | 26% | 35 |

Note: % reserve is shown as % of UIID allocation.

PRAD17 5.4

## 5.4 Maximum Power (Survival)

PRAD18 5.4.0-1

The maximum survival power allocation, power averaged over a 20 msec period, per instrument (including all contingency) **shall** be in accordance with Instrument Maximum Power (Survival) Allocation Table given below.

**Instrument Maximum Power (Survival) Allocation Table**

| Instrument | Maximum Power (Survival) | Government Reserve | | UIID Allocation |
|---|---|---|---|---|
| | W | W | % | W |
| ABI | 282 | 37 | 15% | 245 |
| Advanced Instrument | 200 | 40 | 25% | 160 |
| GLM | 162 | 32 | 25% | 130 |
| SUVI | 156 | 31 | 25% | 125 |
| EXIS | 44 | 9 | 26% | 35 |
| SEISS | 62 | 12 | 24% | 50 |

Note: % reserve is shown as % of UIID allocation.

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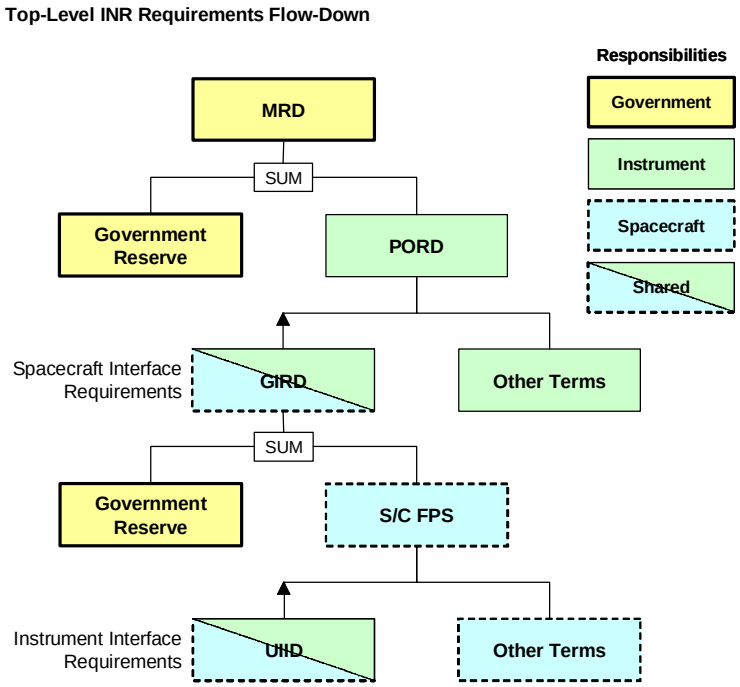
|---|---|---|

PRAD19 6

# 6 INR, Pointing, and Disturbance Requirements Allocation

PRAD20 6.0-1

The following figure shows the conceptual flow-down of INR and pointing requirements, including responsibilities for meeting the allocated requirements.




Notes:

1. PORD reserve can be used for:
   a) Instrument INR problems
   b) Observatory problems
2. PORD reserve would only be needed for spacecraft problems if all of the GIRD reserve is exhausted.
3. GIRD reserve can be used to:
   a) Increase allocation to observatory while UIID requirements are held constant
   b) Increase UIID allocation(s) with corresponding observatory relief
   c) Give instrument relief by decreasing GIRD levels
4. Uncertainties in GIRD-specified levels include:
   a) Spacecraft model
   b) Mission architecture
   c) Validity of Root Sum Square (RSS) assumption used in making UIID allocations

PRAD21 6.1

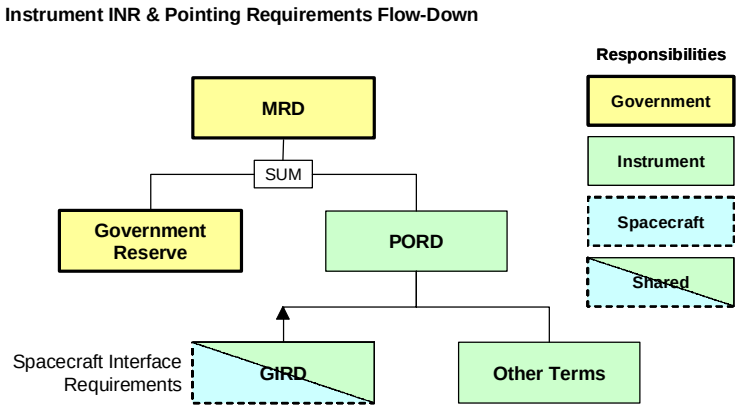
## 6.1 Instrument INR and Pointing Requirements

PRAD22 6.1.0-1

The following figure shows the conceptual instrument INR and Pointing requirements flow-down.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD22 6.1.0-1




PRAD23 6.1.1

## 6.1.1 ABI INR Requirements Allocation

PRAD24 6.1.1.0-1 The instrument portion of the ABI INR requirement **shall** be in accordance with the ABI INR Allocations Table given below.

**ABI INR Allocations Table**

| INR Requirement | MRD | | Government Reserve | | PORD |
|---|---|---|---|---|---|
| | km @SSP | µrad | µrad | % | µrad |
| Navigation | 1 | 28 | 7 | 25% | 21 |
| Navigation (eclipse) | 1.5 | 42 | 10 | 24% | 32 |
| Frame-to-Frame Registration | | | | | |
| 0.5-km & 1-km | 21 µrad | 21 | 5 | 24% | 16 |
| 2-km | 28 µrad | 28 | 7 | 25% | 21 |
| Within-Frame Registration | 1 | 28 | 7 | 25% | 21 |
| Line-to-Line Registration | 0.25 | 7 | 1.8 | 26% | 5.2 |
| Co-registration | | | | | |
| 2-km to 2-km | 0.3 | 8.4 | 2.1 | 25% | 6.3 |
| 2-km to 0.5-km | 0.3 | 8.4 | 2.1 | 25% | 6.3 |
| 2-km to 1-km | 0.3 | 8.4 | 2.1 | 25% | 6.3 |
| 1-km to 1-km | 0.25 | 7 | 1.8 | 26% | 5.2 |
| 1-km to 0.5-km | 0.25 | 7 | 1.8 | 26% | 5.2 |

**Notes:**

1. All INR requirements shown above apply to Level-1b data; that is, they are end-to-end.
2. All INR requirements are 3-sigma, East-West and North-South.
3. SSP = Sub Satellite Point (nadir)
4. Spacecraft does not get an explicit allocation of INR error, instead, it has to meet interface requirements.

PRAD25 6.1.2

## 6.1.2 Reserve

PRAD27 6.1.3

## 6.1.3 GLM INR Requirements Allocation

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD28 6.1.3.0-1 The instrument portion of the GLM INR requirement allocation **shall** be in accordance with the GLM INR Allocations Table given below.

**GLM INR Allocations Table**

| INR Requirement | Units | MRD | Government Reserve | | PORD |
|---|---|---|---|---|---|
| | | | Value | % | |
| Navigation | µrad | 140 | 28 | 20% | 112 |

PRAD29 6.1.4 ## 6.1.4 SUVI Pointing Requirements Allocation

PRAD30 6.1.4.0-1 The instrument portion of the SUVI pointing requirement allocation **shall** be in accordance with the SUVI Pointing Allocations Table given below.

**SUVI Pointing Allocations Table**

| Pointing Requirement | Units | MRD | Government Reserve | | PORD | UIID |
|---|---|---|---|---|---|---|
| | | | Value | % | | |
| Pointing Accuracy 3σ N/S & E/W | arcmin | 3 | 1.5 | 50% | - | 1.5 |
| Pointing Stability 3σ radial over any 60 sec | arcsec | 6 | 0 | 0% | - | 6 |
| Pointing Knowledge 3σ radial | arcsec | 2.5 | 0.0 | 0% | 2.5 | - |

Notes:

1. Spacecraft does not get an explicit allocation of SUVI pointing error; instead, it has to point the SUVI sun sensor LOS to the specified pointing accuracy and stability values.
2. The pointing accuracy levied in the UIID is due to the limited (± 1.5 arcmin) FOV of the SUVI sun sensor in each of the East-West and North-South directions, and the 42 arcmin square detector FOV.

PRAD31 6.1.5 ## 6.1.5 EXIS Pointing Requirements Allocation

PRAD32 6.1.5.0-1 The instrument portion of the EXIS pointing requirement allocation **shall** be in accordance with the EXIS Pointing Allocations Table given below.

**EXIS Pointing Allocations Table**

| Requirement | Units | MRD | Government Reserve | | PORD | UIID |
|---|---|---|---|---|---|---|
| | | | Value | % | | |
| Spatial Coverage | arcmin | 40 | 0 | 0% | 40 | - |
| Pointing Knowledge | arcmin | 2 | 0.5 | 25% | - | 1.5 |

PRAD33 6.1.6 ## 6.1.6 SEISS Pointing Requirement Allocation

PRAD34 6.1.6.0-1 There are currently no pointing requirements for the SEISS.

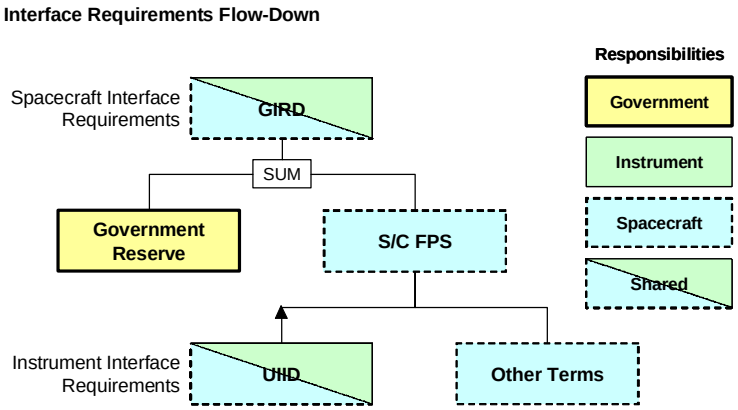
PRAD35 6.2 ## 6.2 Spacecraft Pointing and Disturbance Allocations

PRAD36 6.2.1 ## 6.2.1 Nadir Pointing Instruments

PRAD37 6.2.1.0-1 The following figure shows the flow-down of spacecraft interface requirements, including responsibility for meeting the nadir pointing instrument interface requirements.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD37 6.2.1.0-1




PRAD38 6.2.1.1

## 6.2.1.1 Pointing Requirements

PRAD39 6.2.1.1.0-1 The spacecraft interface pointing requirements for nadir pointing instruments **shall** be in accordance with the Pointing Requirements for Nadir-Pointing Instruments Table given below.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD39 6.2.1.1.0-1 **Pointing Requirements for Nadir-Pointing Instruments Table**

| Requirement | Units | GIRD | Government Reserve | | S/C FPS | ABI | Adv Instr | GLM | Other |
|---|---|---|---|---|---|---|---|---|---|
| | | | Value | % | | | | | |
| Attitude Error | µrad 3-sigma, per axis | 360 | 90 | 25% | 270 | N/A | | | |
| Attitude Stability | µrad peak-to-peak, per axis, per 60 sec | 500 | 200 | 40% | 300 | 200 | 200 | 0 | 100 |
| Attitude Rate Error (<15Hz) | µrad/sec per axis | ±100 (Note 2) | ±20 | 20% | ±80 | ±20 | ±15 | 0 | ±76 |
| Attitude Knowledge Bias (pre-cal) | µrad 3-sigma, per axis | 1200 | 0 | 0% | 1200 | N/A | | | |
| Attitude Knowledge Diurnal | µrad 3-sigma, per axis | 45 | 0 | 0% | 45 | N/A | | | |
| Attitude Knowledge Dynamic | µrad 3-sigma, per axis | 30 | 0 | 0% | 30 | N/A | | | |
| Attitude Knowledge Error Stability 30 sec | µrad not to exceed, per axis over any 30 second window | 5 | 1 | 20% | 4 | N/A | | | |
| Attitude Knowledge Error Stability 300 sec | µrad not to exceed, per axis over any 300 second window | 10 | 2 | 20% | 8 | N/A | | | |
| Attitude Knowledge Error Stability 600 sec | µrad not to exceed, per axis over any 600 second window | 15 | 2 | 13% | 13 | N/A | | | |
| Attitude Knowledge Error Stability 900 sec | µrad not to exceed, per axis over any 900 second window | 19 | 2 | 11% | 17 | N/A | | | |
| Integrated Rate Error 1 sec | µrad 3-sigma, per axis over any 1 sec window | 1 | 0 | 0% | 1 | N/A | | | |
| Integrated Rate Error 30 sec | µrad 3-sigma, per axis over any 30 sec window | 2 | 0 | 0% | 2 | N/A | | | |
| Integrated Rate Error 300 sec | µrad 3-sigma, per axis over any 300 sec window | 7 | 0 | 0% | 7 | N/A | | | |
| Integrated Rate Error 900 sec | µrad 3-sigma, per axis over any 900 sec window | 20 | 1.5 | 8% | 18.5 | N/A | | | |

Notes:

1. "Attitude Error" will have contributions from attitude knowledge, low-frequency control, and 0-peak stability (i.e., high-frequency jitter):

**Notional Attitude Error Budget**

| Error Term | Value (µrad, 3-sigma) | Source |
|---|---|---|
| Knowledge | 60 | S/C FPS |
| Control (low frequency) | 60 | Implicit |
| Stability (high frequency | 150 | S/C FPS |
| **Sum** | **270** | **S/C FPS** |
| **Government Reserve** | **90** | **PRAD** |
| **Sum** | **360** | **GIRD** |

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD39 6.2.1.1.0-1

2. Attitude rate error:
   a. GIRD level shown corresponds to absolute rate error limit of 100 μrad/sec and is provided for reference. Allowable level depends on total spacecraft gyro signal phase delay as per GIRD155. For a given GIRD level, reserve, and specified instrument allocations, the allocation to all other sources is computed using the following formula:

$$\dot{\theta}_{S/C\ FPS} = \dot{\theta}_{GIRD} - \dot{\theta}_{Reserve}$$

$$\dot{\theta}_{Other} = \sqrt{\dot{\theta}^2_{\text{S/C FPS}} - \dot{\theta}^2_{ABI} - \dot{\theta}^2_{AdvInstr} - \dot{\theta}^2_{GLM}}$$

   b. GLM uncompensated angular momentum is limited to ≤0.001 N-m-sec, corresponding to an attitude rate error limit of 0 ≤rad/sec when rounded to an integer value.
3. Reserve is deducted from the GIRD value on a sum (not RSS) basis.
4. GIRD and MRD requirements apply at the mounting interfaces of each nadir-pointed instrument with all instruments operating.
5. The allocations to ABI and GLM are reflected in the corresponding UIIDs. These allocations are assumed to RSS.
6. The allocations of attitude error, attitude stability, and attitude rate error are represented in the ABI and GLM UIIDs as requirements on exported instrument angular momentum and/or integrated angular momentum, which are independent of the spacecraft dynamics. The constraints on exported instrument disturbances in the UIIDs were calculated assuming a government strawman spacecraft model, based on the allocations shown below.
7. SUVI/EXIS contribution to pointing error at the nadir instrument mounting interfaces will be determined by the s/c contractor and is included under “other.”
8. "Other" allocations are with no instruments operating except SUVI/EXIS. The value shown is the RSS remainder of MRD Goal minus the RSS of the ABI, and GLM. “Other” allocations will be derived by prime contractor such that spacecraft-to-instrument interface pointing and disturbance requirements under the “GIRD” and “S/C FPS” columns in the tables below are met.

PRAD40 6.2.1.2

### 6.2.1.2 Linear Acceleration Limits

PRAD41 6.2.1.2.0-1 The linear acceleration limits for Nadir-Pointing instruments **shall** be in accordance with the Linear Acceleration Limits Table given below.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|
| PRAD41 | 6.2.1.2.0-1 | |

**Linear Translational Acceleration Limits Table**

| | | | Government Reserve | | | ABI | | | Adv | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $f_1$ (Hz) | $f_2$ (Hz) | GIRD (milli-g) | (milli-g) | (%) | S/C FPS (milli-g) | Total (milli-g) | "hats" (milli-g) | w/o (milli-g) | Instr (milli-g) | GLM (milli-g) | Other (milli-g) |
| 0.0 | 512.0 | 18.44 | 7.37 | 40% | 11.07 | 8.80 | 6.44 | 6.00 | 6.00 | 0 | 3.00 |
| 0.9 | 10.1 | 1.50 | 0.60 | 40% | 0.90 | 0.60 | | 0.60 | 0.60 | 0 | 0.30 |
| 6.3 | 32.0 | 1.00 | 0.40 | 40% | 0.60 | 0.40 | | 0.40 | 0.40 | 0 | 0.20 |
| 20.2 | 101.6 | 4.29 | 1.71 | 40% | 2.58 | 2.20 | 1.84 | 1.20 | 1.20 | 0 | 0.60 |
| 64.0 | 322.5 | 10.55 | 4.22 | 40% | 6.33 | 5.50 | 4.73 | 2.80 | 2.80 | 0 | 1.40 |
| 203.2 | 512.0 | 15.16 | 6.06 | 40% | 9.10 | 6.60 | 3.49 | 5.60 | 5.60 | 0 | 2.80 |
| 9.0 | 10.1 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 9.5 | 10.7 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 10.1 | 11.3 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 10.7 | 12.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 11.3 | 12.7 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 12.0 | 13.5 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 12.7 | 14.3 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 13.5 | 15.1 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 14.3 | 16.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 15.1 | 17.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 16.0 | 18.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 17.0 | 19.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 18.0 | 20.2 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 19.0 | 21.4 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 20.2 | 22.6 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 21.4 | 24.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 22.6 | 25.4 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 24.0 | 26.9 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 25.4 | 28.5 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 26.9 | 30.2 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 28.5 | 32.0 | 0.40 | 0.16 | 40% | 0.24 | 0.16 | | 0.16 | 0.16 | 0 | 0.08 |
| 30.2 | 33.9 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 32.0 | 35.9 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 33.9 | 38.1 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 35.9 | 40.3 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 38.1 | 42.7 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 40.3 | 45.3 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 42.7 | 47.9 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 45.3 | 50.8 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 47.9 | 53.8 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 50.8 | 57.0 | 3.18 | 1.27 | 40% | 1.91 | 1.80 | 1.71 | 0.56 | 0.56 | 0 | 0.28 |
| 53.8 | 60.4 | 3.18 | 1.27 | 40% | 1.91 | 1.80 | 1.71 | 0.56 | 0.56 | 0 | 0.28 |
| 57.0 | 64.0 | 3.18 | 1.27 | 40% | 1.91 | 1.80 | 1.71 | 0.56 | 0.56 | 0 | 0.28 |
| 60.4 | 67.8 | 3.18 | 1.27 | 40% | 1.91 | 1.80 | 1.71 | 0.56 | 0.56 | 0 | 0.28 |
| 64.0 | 71.8 | 3.18 | 1.27 | 40% | 1.91 | 1.80 | 1.71 | 0.56 | 0.56 | 0 | 0.28 |
| 67.8 | 76.1 | 3.18 | 1.27 | 40% | 1.91 | 1.80 | 1.71 | 0.56 | 0.56 | 0 | 0.28 |
| 71.8 | 80.6 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 76.1 | 85.4 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 80.6 | 90.5 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 85.4 | 95.9 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 90.5 | 101.6 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 95.9 | 107.6 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 101.6 | 114.0 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 107.6 | 120.8 | 2.40 | 0.96 | 40% | 1.44 | 1.30 | 1.17 | 0.56 | 0.56 | 0 | 0.28 |
| 114.0 | 128.0 | 2.40 | 0.96 | 40% | 1.44 | 1.30 | 1.17 | 0.56 | 0.56 | 0 | 0.28 |
| 120.8 | 135.6 | 2.40 | 0.96 | 40% | 1.44 | 1.30 | 1.17 | 0.56 | 0.56 | 0 | 0.28 |
| 128.0 | 143.7 | 2.40 | 0.96 | 40% | 1.44 | 1.30 | 1.17 | 0.56 | 0.56 | 0 | 0.28 |
| 135.6 | 152.2 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 143.7 | 161.3 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 152.2 | 170.9 | 1.40 | 0.56 | 40% | 0.84 | 0.56 | | 0.56 | 0.56 | 0 | 0.28 |
| 161.3 | 181.0 | 3.02 | 1.21 | 40% | 1.81 | 1.70 | 1.61 | 0.56 | 0.56 | 0 | 0.28 |
| 170.9 | 191.8 | 3.02 | 1.21 | 40% | 1.81 | 1.70 | 1.61 | 0.56 | 0.56 | 0 | 0.28 |
| 181.0 | 203.2 | 3.02 | 1.21 | 40% | 1.81 | 1.70 | 1.61 | 0.56 | 0.56 | 0 | 0.28 |
| 191.8 | 215.3 | 3.02 | 1.21 | 40% | 1.81 | 1.70 | 1.61 | 0.56 | 0.56 | 0 | 0.28 |
| 203.2 | 228.1 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 215.3 | 241.6 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 228.1 | 256.0 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 241.6 | 271.2 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 256.0 | 287.4 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 271.2 | 304.4 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 287.4 | 322.5 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 304.4 | 341.7 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 322.5 | 362.0 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 341.7 | 383.6 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 362.0 | 406.4 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 383.6 | 430.5 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 406.4 | 456.1 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 430.5 | 483.3 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |
| 456.1 | 512.0 | 2.56 | 1.03 | 40% | 1.53 | 1.40 | 1.28 | 0.56 | 0.56 | 0 | 0.28 |

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD41 6.2.1.2.0-1

Notes:

1. The linear accelerations do not follow across-the-board percentage allocations, due to allowances given to the ABI for its cryocooler disturbances (denoted as "hats" in the table).
2. ABI disturbance allocations are shown under the "ABI total" column. This is further decomposed for clarity as "ABI hats" and "ABI w/o hats." "ABI hats" shows the additional RSS allocations given to the ABI to accommodate its cryocooler disturbances.

PRAD42 6.2.1.3

## 6.2.1.3 Shock Response Spectra

PRAD43 6.2.1.3.0-1

The shock response spectra requirements for nadir-pointing instruments **shall** be in accordance with the Shock Response Spectra Table given below.

**Shock Response Spectra (÷Q)**

| $f_1$ (Hz) | GIRD / MRD Threshold (milli-g) | Reserve (milli-g) | Reserve (%) | F/Pspec / MRD Goal (milli-g) | ABI total (milli-g) | ABI "hats" (milli-g) | ABI w/o "hats" (milli-g) | Advanced Instru-ment (milli-g) | GLM (milli-g) | Other (milli-g) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0.20 | 0.08 | 40% | 0.12 | 0.08 | 0 | 0.08 | 0.08 | 0 | 0.04 |
| 30 | 0.20 | 0.08 | 40% | 0.12 | 0.08 | 0 | 0.08 | 0.08 | 0 | 0.04 |
| 30 | 0.60 | 0.24 | 40% | 0.36 | 0.24 | 0 | 0.24 | 0.24 | 0 | 0.12 |
| 52 | 0.60 | 0.24 | 40% | 0.36 | 0.24 | 0 | 0.24 | 0.24 | 0 | 0.12 |
| 59 | 2.70 | 1.08 | 40% | 1.62 | 1.60 | 1.58 | 0.24 | 0.24 | 0 | 0.12 |
| 66 | 2.70 | 1.08 | 40% | 1.62 | 1.60 | 1.58 | 0.24 | 0.24 | 0 | 0.12 |
| 73 | 0.60 | 0.24 | 40% | 0.36 | 0.24 | 0 | 0.24 | 0.24 | 0 | 0.12 |
| 90 | 0.60 | 0.24 | 40% | 0.36 | 0.24 | 0 | 0.24 | 0.24 | 0 | 0.12 |
| 90 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 112 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 118 | 2.05 | 0.82 | 40% | 1.23 | 1.16 | 1.10 | 0.36 | 0.36 | 0 | 0.18 |
| 132 | 2.05 | 0.82 | 40% | 1.23 | 1.16 | 1.10 | 0.36 | 0.36 | 0 | 0.18 |
| 138 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 165 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 177 | 2.81 | 1.13 | 40% | 1.69 | 1.64 | 1.60 | 0.36 | 0.36 | 0 | 0.18 |
| 198 | 2.81 | 1.13 | 40% | 1.69 | 1.64 | 1.60 | 0.36 | 0.36 | 0 | 0.18 |
| 210 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 225 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 236 | 2.08 | 0.83 | 40% | 1.25 | 1.18 | 1.12 | 0.36 | 0.36 | 0 | 0.18 |
| 264 | 2.08 | 0.83 | 40% | 1.25 | 1.18 | 1.12 | 0.36 | 0.36 | 0 | 0.18 |
| 275 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 285 | 0.90 | 0.36 | 40% | 0.54 | 0.36 | 0 | 0.36 | 0.36 | 0 | 0.18 |
| 295 | 1.64 | 0.66 | 40% | 0.99 | 0.90 | 0.82 | 0.36 | 0.36 | 0 | 0.18 |
| 300 | 1.64 | 0.66 | 40% | 0.99 | 0.90 | 0.82 | 0.36 | 0.36 | 0 | 0.18 |

Notes:

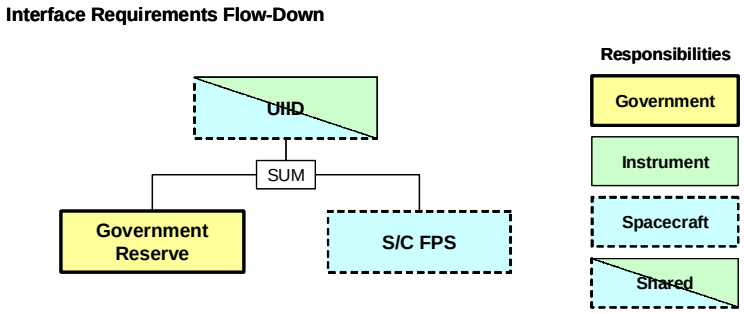
1. The shock response spectra do not follow across-the-board percentage allocations, due to allowances given to the ABI for its cryocooler disturbances (denoted as "hats" in the tables).
2. Values shown are divided by Q=50 to compensate for amplification by the narrowband filter specified in the GIRD and UIIDs.
3. The Shock Response Spetra requirement is defined by the curve formed by connecting consecutive data points whose x coordinates are given in the "f (Hz)" column and whose y coordinates ar shown in the other columns.
4. ABI disturbance allocations are shown under the "ABI total" column. This is further decomposed for clarity as "ABI hats" and "ABI w/o hats." "ABI hats" shows the additional RSS allocations
given to the ABI to accommodate its cryocooler disturbances.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD44 6.2.2

## 6.2.2 Sun Pointing Instruments

PRAD45 6.2.2.0-1 The following figure shows the flow-down of spacecraft interface requirements, including responsibility for meeting the sun pointing instrument interface requirements.




PRAD46 6.2.2.1

### 6.2.2.1 Spacecraft Pointing Requirements Allocation for SUVI

PRAD47 6.2.2.1.0-1 The spacecraft portion of the SUVI pointing allocation **shall** be in accordance with the Spacecraft Pointing Allocation for SUVI Table given below.

**Spacecraft Pointing Allocation for SUVI Table**

| Pointing Requirement | Units | UIID | Government Reserve | | S/C FPS |
|---|---|---|---|---|---|
| | | | Value | % | |
| Pointing Accuracy 3σ N/S & E/W | arcmin | 1.5 | 0.5 | 33% | 1 |
| Pointing Stability 3σ radial over any 60 sec | arcsec | 6 | 0.5 | 8% | 5.5 |

PRAD48 6.2.2.2

### 6.2.2.2 Spacecraft Pointing Requirements Allocation for EXIS

PRAD49 6.2.2.2.0-1 The spacecraft portion of the EXIS pointing allocation **shall** be in accordance with the Spacecraft Pointing Allocation for EXIS Table given below.

**Spacecraft Pointing Allocation for EXIS Table**

| Pointing Requirement | Units | UIID | Government Reserve | | S/C FPS |
|---|---|---|---|---|---|
| | | | Value | % | |
| Pointing Accuracy 3σ N/S & E/W | arcmin | 5 | 2.5 | 50% | 2.5 |
| Pointing Stability 3σ N/S & E/W over any 60 sec | arcsec | 20 | 5.0 | 25% | 15 |
| Pointing Knowledge 3σ N/S & E/W | arcsec | 90 | 30.0 | 33% | 60 |

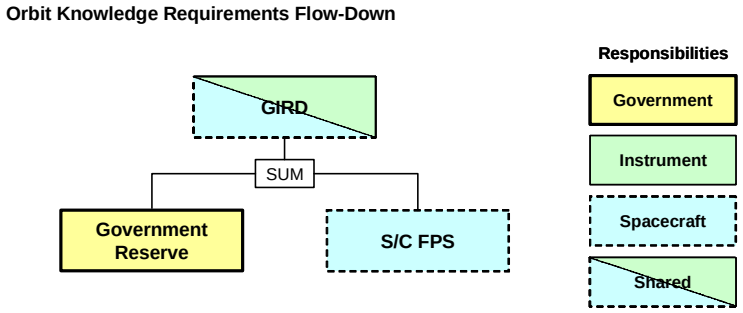
1. Reserve is deducted from the UIID value on a sum (not RSS) basis.
2. UIID and S/C FPS requirements apply at the Sun Pointing Platform (SPP), with all instruments operating.
3. SPP pointing stability requirements are significantly tighter than those for Earth pointing instruments. The spacecraft is responsible for the SPP interface performance shown here.

PRAD50 6.2.3

## 6.2.3 Orbit Knowledge Requirement Allocation

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD51 6.2.3.0-1 The following figure shows the conceptual spacecraft orbit knowledge requirements flow-down.




PRAD52 6.2.3.0-2 The spacecraft orbit knowledge requirement **shall** be in accordance with the Orbit Knowledge Table given below.

**Orbit Knowledge Table**

| Requirement | Units | GIRD | Government Reserve | | S/C FPS |
|---|---|---|---|---|---|
| | | | Value | % | |
| Position Accuracy 3σ: In-Track, Cross-Track | m | 100 | 25 | 25% | 75 |
| Position Accuracy 3σ: Radial | m | 100 | 0 | 0% | 100 |
| Velocity Accuracy 3σ: Per Axis | cm/sec | 6 | 0 | 0% | 6 |

PRAD53 6.2.3.0-3 The spacecraft orbit position knowledge error stability **shall** not exceed the levels specified in the Orbit Position Knowledge Error Stability Table given below. No margin is held.

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD53 6.2.3.0-3

**Orbit Position Knowledge Error Stability Table**

| Requirement | Units | GIRD | Government Reserve | | S/C FPS |
|---|---|---|---|---|---|
| | | | Value | % | |
| In-Track Error Stability over any 30 sec window | m | 3 | 0 | 0% | 3 |
| In-Track Error Stability over any 300 sec window | m | 20 | 0 | 0% | 20 |
| In-Track Error Stability over any 600 sec window | m | 30 | 0 | 0% | 30 |
| In-Track Error Stability over any 900 sec window | m | 35 | 0 | 0% | 35 |
| Cross-Track Error Stability over any 30 sec window | m | 3 | 0 | 0% | 3 |
| Cross-Track Error Stability over any 300 sec window | m | 20 | 0 | 0% | 20 |
| Cross-Track Error Stability over any 600 sec window | m | 30 | 0 | 0% | 30 |
| Cross-Track Error Stability over any 900 sec window | m | 35 | 0 | 0% | 35 |
| Radial Error Stability over any 30 sec window | m | 7 | 0 | 0% | 7 |
| Radial Error Stability over any 300 sec window | m | 40 | 0 | 0% | 40 |
| Radial Error Stability over any 600 sec window | m | 60 | 0 | 0% | 60 |
| Radial Error Stability over any 900 sec window | m | 70 | 0 | 0% | 70 |

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD54 7

# 7 Instrument Thermal Backload Allocation

PRAD55 7.0-1

The spacecraft imposed backload on the instrument radiators **shall** not exceed that listed in the tables below.

PRAD56 7.1

## 7.1 Thermal Backload Allocation for SUVI

PRAD57 7.1.0-1

The spacecraft maximum thermal backloading on the SUVI instrument radiator **shall** be in accordance with the SUVI Radiator Backloading Table given below.

**SUVI Radiator Backloading Table**

| Instrument Radiator | Spacecraft Maximum Instrument Backload | Government Reserve | | UIID Backload Allocation |
|---|---|---|---|---|
| | $W/m^2$ | $W/m^2$ | % | $W/m^2$ |
| SUVI-X / (anti-sun) | 80 | 15 | 16% | 95 |
| SUVI +Z aft 35cm | 130 | 25 | 16% | 155 |

PRAD58 7.2

## 7.2 Thermal Backload Allocation for EXIS

PRAD59 7.2.0-1

The spacecraft maximum thermal backloading on the EXIS instrument radiator **shall** be in accordance with the EXIS Radiator Backloading Requirement Table given below.

**EXIS Radiator Backloading Table**

| Instrument Radiator | Spacecraft Maximum Instrument Backload | Government Reserve | | UIID Backload Allocation |
|---|---|---|---|---|
| | $W/m^2$ | $W/m^2$ | % | $W/m^2$ |
| EXIS-X / (anti-sun) | 80 | 15 | 16% | 95 |
| EXIS -Z aft 35cm | 130 | 25 | 16% | 155 |

| ID | Object Number | 417-R-RAD-0061, RM Version, Payload Resource Allocation Document |
|---|---|---|

PRAD60 8

# 8 Acronyms

PRAD61 8.0-1

| | |
|---|---|
| ABI | Advanced Baseline Instrument |
| E/W | East -West |
| EXIS | EUVS XRS Irradiance Sensors |
| FOV | Field-of-View |
| GIRD | General Interface Requirements Document |
| GLM | Geostationary Lightning Mapper |
| GOES | Geostationary Operational Environmental Satellite |
| INR | Image Navigation and Registration |
| LOS | Line-of-Sight |
| MRD | Mission Requirements Document |
| N/S | North - South |
| PORD | Performance and Operational Requirements Document |
| PSD | Power Spectral Density |
| RAD | Resource Allocation Document |
| RSS | Root Sum Square |
| SEISS | Space Environment In-Situ Suite |
| SSP | Sub Satellite Point |
| SUVI | Solar Ultraviolet Imager |
| UIID | Unique Instrument Interface Document |
| W | Watts |

# 417-R-RAD-0061 DCR

**CCR #: 00088** Rev:
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CCB Status: **Approved**
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**Title: GOES-R Payload Resource Allocation Document Baseline**
GOES S/C: R Effectivity: S/C
CCR Summary: Baselines 417-R-RAD-0061
Doc #: 417-R-RAD-0061 Rev -
Doc Section #: ALL
DOORS Version: N/A
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**ECR #: 00018** Rev:
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CCB Status: **Approved**
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**Title: Update to GOES-R Payload Resource Allocation Document (RAD) SEISS Mass Allocation**
GOES S/C: R Effectivity: S/C
Doc #: 417-R-RAD-0061 Rev A
Doc Section #: RAD 4.0
DOORS Version: N/A
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Contract # NNG0 - 5HY06C
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**Title: SEISS Mass Increase**
GOES S/C: R Effectivity: SEISS Instrument
Doc #: 417-R-SEISSUIID-0031, 417-R-RAD-0061 Rev B
Doc Section #: SEISSUIID 3.3.1, RAD 4.0
DOORS Version: SEISSUIID 2.0
DOORS ID #: SEISSUIID44 (3.3.1.0-1)

**CCR #: 00133** Rev:
Contract # NNG0 -
CCB Status: **Approved**
CCB Date: 11/2/2005
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Doc Change Date: 11/16/2005

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GOES S/C: R Effectivity:
Doc #: 417-R-RAD-0061 Rev C
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**CCR #: 00153** Rev:
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Doc Change Date: 12/27/2005

**Title: Update to ABI UIID and GOES-R RAD for ABI mass increase.**
GOES S/C: R Effectivity: ABI Instrument
Doc #: 417-R-ABIUIID-0010, 417-R-RAD-0061 Rev D
Doc Section #: 3.3.1 (UIID), 4.0 (RAD)
DOORS Version: ABIUIID 2.0, RAD N/A
DOORS ID #: ABIUIID28 (3.3.1-1)

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CCB Date: 12/22/2005
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Doc Change Date: 12/27/2005

**Title: Update to SIS UIID and GOES-R RAD for SIS mass increase.**
GOES S/C: R Effectivity: SIS Instrument
Doc #: 417-R-SISUIID-0034, 417-R-RAD-0061 Rev D
Doc Section #: 3.3.1 (UIID), 4.0 (RAD)
DOORS Version: SISUIID 1.0, RAD N/A
DOORS ID #: N/A

**CCR #: 00241** Rev:
Contract # NNG0 - 4HZ07C,
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GOES S/C: R Effectivity: S/C & ABI, HES, GLM Instruments
CCR Summary:
Doc #: 417-R-RAD-0061 Rev E
Doc Section #: 6.2.1
DOORS Version: N/A
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Contract # NNG0 - 4HZ07C
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Contract Mod#: N/A

**Title: PRAD Power Changes**
GOES S/C: R Effectivity: ABI & SIS Instrument
Doc #: 417-R-RAD-0061 Rev E
Doc Section #: 4.0, 5.0

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GOES S/C: R Effectivity:

Doc #: 417-R-RAD-0061 Rev F
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DOORS Version: N/A
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GOES S/C: R Effectivity:

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DOORS Version: 2.0
DOORS ID #: All