

# aircraft

Tight Rope v0.6

October 31, 2015

## 1 Network

**section** *NetworkChannels* **parents** *scj\_prelude, MissionId, MissionIds, SchedulableId, SchedulableIds, MissionChan, SchedulableChan, TopLevelMissionSequencerFWChan, FrameworkChan, SafeletChan*

**channelset** *TerminateSync* ==  
    { *schedulables\_terminated, schedulables\_stopped, get\_activeSchedulables* }

**channelset** *ControlTierSync* ==  
    { *start\_toplevel\_sequencer, done\_toplevel\_sequencer, done\_safeletFW* }

**channelset** *TierSync* ==  
    { *start\_mission ., done\_mission ., done\_safeletFW, done\_toplevel\_sequencer* }

**channelset** *MissionSync* ==  
    { *done\_safeletFW, done\_toplevel\_sequencer, register, signalTerminationCall, signalTerminationRet, activate\_schedulables, done\_schedulable, cleanupSchedulableCall, cleanupSchedulableRet* }

**channelset** *SchedulablesSync* ==  
    { *activate\_schedulables, done\_safeletFW, done\_toplevel\_sequencer* }

**channelset** *ClusterSync* ==  
    { *done\_toplevel\_sequencer, done\_safeletFW* }

**channelset** *AppSync* ==  
    { *SafeltAppSync, MissionSequencerAppSync, MissionAppSync, MTAppSync, OSEHSync, APEHSync, getSequencer, end\_mission\_app, end\_managedThread\_app, setCeilingPriority, requestTerminationCall, requestTerminationRet, terminationPendingCall, terminationPendingRet, handleAsyncEventCall, handleAsyncEventRet* }

**channelset** *ObjectSync* ==  
    { }

**channelset** *ThreadSync* ==  
    { }

**channelset** *LockingSync* ==  
    { *lockAcquired, startSyncMeth, endSyncMeth, waitCall, waitRet, notify* }

```

channelset Tier0Sync ==
    { done_toplevel_sequencer, done_safeletFW,
      start_mission . , done_mission . ,
        initializeRet . , requestTermination . . ,
      start_mission . , done_mission . ,
        initializeRet . , requestTermination . . ,
      start_mission . , done_mission . ,
        initializeRet . , requestTermination . . }

```

**section** *Program* **parents** *scj\_prelude, MissionId, MissionIds,*  
*SchedulableId, SchedulableIds, MissionChan, SchedulableMethChan, MissionFW,*  
*SafeletFW, TopLevelMissionSequencerFW, NetworkChannels, ManagedThreadFW,*  
*SchedulableMissionSequencerFW, PeriodicEventHandlerFW, OneShotEventHandlerFW,*  
*AperiodicEventHandlerFW, ACSafeletApp, MainMissionSequencerApp,*  
*ObjectFW, ThreadFW, MainMissionApp, ACModeChangerApp, ControlHandlerApp, CommunicationsHandlerApp*

**process** *ControlTier*  $\hat{=}$   

$$\left( \begin{array}{l} \text{SafeletFW} \\ \llbracket \text{ControlTierSync} \rrbracket \\ \text{TopLevelMissionSequencerFW}(\text{MainMissionSequencer}) \end{array} \right)$$

**process** *Tier0*  $\hat{=}$   

$$\left( \begin{array}{l} \text{MissionFW}(\text{MainMission}) \\ \llbracket \text{MissionSync} \rrbracket \\ \left( \begin{array}{l} \text{SchedulableMissionSequencerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \left( \begin{array}{l} \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \left( \begin{array}{l} \text{PeriodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{PeriodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{PeriodicEventHandlerFW}() \end{array} \right) \end{array} \right) \end{array} \right)$$

**process** *Tier1*  $\hat{=}$   

$$\left( \begin{array}{l} \text{MissionFW}(\text{TakeOffMission}) \\ \llbracket \text{MissionSync} \rrbracket \\ \left( \begin{array}{l} \left( \begin{array}{l} \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{PeriodicEventHandlerFW}() \end{array} \right) \\ \llbracket \text{ClusterSync} \rrbracket \end{array} \right) \\ \left( \begin{array}{l} \text{MissionFW}(\text{CruiseMission}) \\ \llbracket \text{MissionSync} \rrbracket \\ \left( \begin{array}{l} \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{PeriodicEventHandlerFW}() \end{array} \right) \\ \llbracket \text{ClusterSync} \rrbracket \end{array} \right) \\ \left( \begin{array}{l} \text{MissionFW}(\text{LandMission}) \\ \llbracket \text{MissionSync} \rrbracket \\ \left( \begin{array}{l} \left( \begin{array}{l} \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{AperiodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \left( \begin{array}{l} \text{PeriodicEventHandlerFW}() \\ \llbracket \text{SchedulablesSync} \rrbracket \\ \text{PeriodicEventHandlerFW}() \end{array} \right) \end{array} \right) \end{array} \right)$$

**process** *Framework*  $\hat{=}$   

$$\left( \begin{array}{l} \text{ControlTier} \\ \llbracket \text{TierSync} \rrbracket \\ \left( \begin{array}{l} \text{Tier0} \\ \llbracket \text{Tier0Sync} \rrbracket \end{array} \right) \\ \text{Tier1} \end{array} \right)$$

**process** *Application*  $\hat{=}$

(*ACSafeletApp*  
 |||  
*MainMissionSequencerApp*  
 |||  
*MainMissionApp*(*hijac.tools.tightrope.environments.VariableEnv* • 71c27ee8, *hijac.tools.tightrope.environments.VariableEnv* • 71c27ee8)  
 |||  
*ACModeChangerApp*(*MainMission*, *MainMission*)  
 |||  
*ControlHandlerApp*  
 |||  
*CommunicationsHandlerApp*  
 |||  
*EnvironmentMonitorApp*(*MainMission*)  
 |||  
*FlightSensorsMonitorApp*(*MainMission*)  
 |||  
*AperiodicSimulatorApp*(*AperiodicEventHandler*)  
 |||  
*TakeOffMissionApp*(*hijac.tools.tightrope.environments.VariableEnv* • 6e950bcf, *hijac.tools.tightrope.environments.VariableEnv* • 6e950bcf)  
 |||  
*LandingGearHandlerTakeOffApp*(*TakeOffMission*)  
 |||  
*TakeOffFailureHandlerApp*(*TakeOffMission*)  
 |||  
*TakeOffMonitorApp*(*TakeOffMission*, *AperiodicEventHandler*)  
 |||  
*CruiseMissionApp*(*hijac.tools.tightrope.environments.VariableEnv* • 46dffd3, *hijac.tools.tightrope.environments.VariableEnv* • 46dffd3)  
 |||  
*BeginLandingHandlerApp*(*Mission*)  
 |||  
*NavigationMonitorApp*(*CruiseMission*)  
 |||  
*LandMissionApp*(*hijac.tools.tightrope.environments.VariableEnv* • 53dbe163, *hijac.tools.tightrope.environments.VariableEnv* • 53dbe163)  
 |||  
*LandingGearHandlerLandApp*(*LandMission*)  
 |||  
*SafeLandingHandlerApp*(*LandMission*)  
 |||  
*GroundDistanceMonitorApp*(*LandMission*)  
 |||  
*InstrumentLandingSystemMonitorApp*(*LandMission*))

$$\begin{aligned}
\text{Locking} \hat{=} & \left( \begin{array}{l} \text{ThreadFW}(\text{LandingGearHandlerLandThread}, \text{MinPriority}) \\ \quad \llbracket \text{ThreadSync} \rrbracket \\ \text{ThreadFW}(\text{SafeLandingHandlerThread}, \text{MinPriority}) \\ \quad \llbracket \text{ThreadSync} \rrbracket \\ \text{ThreadFW}(\text{GroundDistanceMonitorThread}, \text{MinPriority}) \\ \quad \llbracket \text{ThreadSync} \rrbracket \\ \text{ThreadFW}(\text{InstrumentLandingSystemMonitorThread}, \text{MinPriority}) \end{array} \right) \\
& ||| \\
& \left( \begin{array}{l} \text{ObjectFW}(\text{ACSafeletObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{MainMissionObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{TakeOffMissionObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{CruiseMissionObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{LandMissionObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{ACModeChangerObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{EnvironmentMonitorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{ControlHandlerObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{FlightSensorsMonitorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{CommunicationsHandlerObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{AperiodicSimulatorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{LandingGearHandlerTakeOffObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{TakeOffMonitorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{TakeOffFailureHandlerObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{BeginLandingHandlerObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{NavigationMonitorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{GroundDistanceMonitorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{LandingGearHandlerLandObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{InstrumentLandingSystemMonitorObject}) \\ \quad \llbracket \text{ObjectSync} \rrbracket \\ \text{ObjectFW}(\text{SafeLandingHandlerObject}) \end{array} \right)
\end{aligned}$$

$$\text{process Program} \hat{=} \text{Framework} \llbracket \text{AppSync} \rrbracket \text{Application} \llbracket \text{LockingSync} \rrbracket \text{Locking}$$

## 2 ID Files

### 2.1 MissionIds

**section** *MissionIds* **parents** *scj\_prelude, MissionId*

*MainMission* : *MissionID*  
*TakeOffMission* : *MissionID*  
*CruiseMission* : *MissionID*  
*LandMission* : *MissionID*

---

*distinct*(*nullMissionId*, *MainMission*,  
*TakeOffMission*,  
*CruiseMission*,  
*LandMission*)

### 2.2 SchedulablesIds

**section** *SchedulableIds* **parents** *scj\_prelude, SchedulableId*

*MainMissionSequencer* : *SchedulableID*  
*ACModeChanger* : *SchedulableID*  
*EnvironmentMonitor* : *SchedulableID*  
*ControlHandler* : *SchedulableID*  
*FlightSensorsMonitor* : *SchedulableID*  
*CommunicationsHandler* : *SchedulableID*  
*AperiodicSimulator* : *SchedulableID*  
*LandingGearHandlerTakeOff* : *SchedulableID*  
*TakeOffMonitor* : *SchedulableID*  
*TakeOffFailureHandler* : *SchedulableID*  
*BeginLandingHandler* : *SchedulableID*  
*NavigationMonitor* : *SchedulableID*  
*GroundDistanceMonitor* : *SchedulableID*  
*LandingGearHandlerLand* : *SchedulableID*  
*InstrumentLandingSystemMonitor* : *SchedulableID*  
*SafeLandingHandler* : *SchedulableID*

---

*distinct*(*nullSequencerId*, *nullSchedulableId*, *ACModeChanger*,  
*EnvironmentMonitor*,  
*ControlHandler*,  
*FlightSensorsMonitor*,  
*CommunicationsHandler*,  
*AperiodicSimulator*,  
*LandingGearHandlerTakeOff*,  
*TakeOffMonitor*,  
*TakeOffFailureHandler*,  
*BeginLandingHandler*,  
*NavigationMonitor*,  
*GroundDistanceMonitor*,  
*LandingGearHandlerLand*,  
*InstrumentLandingSystemMonitor*,  
*SafeLandingHandler*)

### 2.3 ThreadIds

**section** *ThreadId* **parents** *scj\_prelude, GlobalTypes*

*ACModeChangerThread* : *ThreadID*  
*EnvironmentMonitorThread* : *ThreadID*  
*ControlHandlerThread* : *ThreadID*  
*FlightSensorsMonitorThread* : *ThreadID*  
*CommunicationsHandlerThread* : *ThreadID*  
*AperiodicSimulatorThread* : *ThreadID*  
*LandingGearHandlerTakeOffThread* : *ThreadID*  
*TakeOffMonitorThread* : *ThreadID*  
*TakeOffFailureHandlerThread* : *ThreadID*  
*BeginLandingHandlerThread* : *ThreadID*  
*NavigationMonitorThread* : *ThreadID*  
*GroundDistanceMonitorThread* : *ThreadID*  
*LandingGearHandlerLandThread* : *ThreadID*  
*InstrumentLandingSystemMonitorThread* : *ThreadID*  
*SafeLandingHandlerThread* : *ThreadID*

---

*distinct*(*SafeletThreadId*, *nullThreadId*,  
*ACModeChangerThread*,  
*EnvironmentMonitorThread*,  
*ControlHandlerThread*,  
*FlightSensorsMonitorThread*,  
*CommunicationsHandlerThread*,  
*AperiodicSimulatorThread*,  
*LandingGearHandlerTakeOffThread*,  
*TakeOffMonitorThread*,  
*TakeOffFailureHandlerThread*,  
*BeginLandingHandlerThread*,  
*NavigationMonitorThread*,  
*GroundDistanceMonitorThread*,  
*LandingGearHandlerLandThread*,  
*InstrumentLandingSystemMonitorThread*,  
*SafeLandingHandlerThread*)

## 2.4 ObjectIds

**section** *ObjectIds* **parents** *scj\_prelude*, *GlobalTypes*

*ACSafeletObject : ObjectID*  
*MainMissionObject : ObjectID*  
*TakeOffMissionObject : ObjectID*  
*CruiseMissionObject : ObjectID*  
*LandMissionObject : ObjectID*  
*ACModeChangerObject : ObjectID*  
*EnvironmentMonitorObject : ObjectID*  
*ControlHandlerObject : ObjectID*  
*FlightSensorsMonitorObject : ObjectID*  
*CommunicationsHandlerObject : ObjectID*  
*AperiodicSimulatorObject : ObjectID*  
*LandingGearHandlerTakeOffObject : ObjectID*  
*TakeOffMonitorObject : ObjectID*  
*TakeOffFailureHandlerObject : ObjectID*  
*BeginLandingHandlerObject : ObjectID*  
*NavigationMonitorObject : ObjectID*  
*GroundDistanceMonitorObject : ObjectID*  
*LandingGearHandlerLandObject : ObjectID*  
*InstrumentLandingSystemMonitorObject : ObjectID*  
*SafeLandingHandlerObject : ObjectID*

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*distinct*⟨*ACSafeletObject*,  
*MainMissionObject*,  
*TakeOffMissionObject*,  
*CruiseMissionObject*,  
*LandMissionObject*,  
*ACModeChangerObject*,  
*EnvironmentMonitorObject*,  
*ControlHandlerObject*,  
*FlightSensorsMonitorObject*,  
*CommunicationsHandlerObject*,  
*AperiodicSimulatorObject*,  
*LandingGearHandlerTakeOffObject*,  
*TakeOffMonitorObject*,  
*TakeOffFailureHandlerObject*,  
*BeginLandingHandlerObject*,  
*NavigationMonitorObject*,  
*GroundDistanceMonitorObject*,  
*LandingGearHandlerLandObject*,  
*InstrumentLandingSystemMonitorObject*,  
*SafeLandingHandlerObject*⟩



### 3 Safelet

**section** *ACSafeletApp* **parents** *scj\_prelude, SchedulableId, SchedulableIds, SafeletChan*

**process** *ACSafeletApp*  $\hat{=}$  **begin**

*InitializeApplication*  $\hat{=}$   
 $\left( \begin{array}{l} \textit{initializeApplicationCall} \longrightarrow \\ \textit{initializeApplicationRet} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*GetSequencer*  $\hat{=}$   
 $\left( \begin{array}{l} \textit{getSequencerCall} \longrightarrow \\ \textit{getSequencerRet} ! \textit{MainMissionSequencer} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*Methods*  $\hat{=}$   
 $\left( \begin{array}{l} \textit{GetSequencer} \\ \square \\ \textit{InitializeApplication} \end{array} \right); \textit{Methods}$

•  $(\textit{Methods}) \triangle (\textit{end\_safelet\_app} \longrightarrow \mathbf{Skip})$

**end**

## 4 Top Level Mission Sequencer

**section** *MainMissionSequencerApp* **parents** *TopLevelMissionSequencerChan*,  
*MissionId*, *MissionIds*, *SchedulableId*, *MainMissionSequencerClass*

**process** *MainMissionSequencerApp*  $\hat{=}$  **begin**

<i>State</i> <i>this</i> : <b>ref</b> <i>MainMissionSequencerClass</i>
---

**state** *State*

<i>Init</i> <i>State</i> '
<i>this</i> ' = <b>new</b> <i>MainMissionSequencerClass</i> ()

*GetNextMission*  $\hat{=}$  **var** *ret* : *MissionID* •  
 $\left( \begin{array}{l} \textit{getNextMissionCall} . \textit{MainMissionSequencer} \longrightarrow \\ \textit{ret} := \textit{this} . \textit{getNextMission}(); \\ \textit{getNextMissionRet} . \textit{MainMissionSequencer} ! \textit{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*Methods*  $\hat{=}$   
 $(\textit{GetNextMission}) ; \textit{Methods}$

•  $(\textit{Init} ; \textit{Methods}) \triangle (\textit{end\_sequencer\_app} . \textit{MainMissionSequencer} \longrightarrow \mathbf{Skip})$

**end**

**class** *MainMissionSequencerClass*  $\hat{=}$  **begin**

<b>state</b> <i>State</i> <i>returnedMission</i> : $\mathbb{B}$
--

**state** *State*

<b>initial</b> <i>Init</i> <i>State</i> '
<i>returnedMission</i> ' = <i>false</i>

**protected** *getNextMission*  $\hat{=}$  **var** *ret* : *MissionID* •

$$\left( \begin{array}{l} \text{if } (\neg \text{returnedMission} = \mathbf{True}) \longrightarrow \\ \quad \left( \begin{array}{l} \text{returnedMission} := \mathbf{True}; \\ \text{ret} := \text{MainMission} \end{array} \right) \\ \parallel \neg (\neg \text{returnedMission} = \mathbf{True}) \longrightarrow \\ \quad \left( \text{ret} := \text{nullMissionId} \right) \\ \text{fi} \end{array} \right)$$

• **Skip**

**end**

## 5 Missions

### 5.1 MainMission

**section** *MainMissionApp* **parents** *scj\_prelude*, *MissionId*, *MissionIds*,  
*SchedulableId*, *SchedulableIds*, *MissionChan*, *SchedulableMethChan*, *MainMissionClass* , *MainMissionMethChan*

**process** *MainMissionApp*  $\hat{=}$  *storageParameters* : *MissionID*, *storageParametersSchedulable* : *MissionID*, *aCModeChange*

*State*

*this* : **ref** *MainMissionClass*

**state** *State*

*Init*

*State'*

*this'* = **new** *MainMissionClass*()

*InitializePhase*  $\hat{=}$

$$\left( \begin{array}{l} \textit{initializeCall} . \textit{MainMission} \longrightarrow \\ \textit{register} ! \textit{ACModeChanger} ! \textit{MainMission} \longrightarrow \\ \textit{register} ! \textit{EnvironmentMonitor} ! \textit{MainMission} \longrightarrow \\ \textit{register} ! \textit{ControlHandler} ! \textit{MainMission} \longrightarrow \\ \textit{register} ! \textit{FlightSensorsMonitor} ! \textit{MainMission} \longrightarrow \\ \textit{register} ! \textit{CommunicationsHandler} ! \textit{MainMission} \longrightarrow \\ \textit{register} ! \textit{AperiodicSimulator} ! \textit{MainMission} \longrightarrow \\ \textit{initializeRet} . \textit{MainMission} \longrightarrow \\ \textbf{Skip} \end{array} \right)$$

*CleanupPhase*  $\hat{=}$

$$\left( \begin{array}{l} \textit{cleanupMissionCall} . \textit{MainMission} \longrightarrow \\ \textit{cleanupMissionRet} . \textit{MainMission} ! \textbf{False} \longrightarrow \\ \textbf{Skip} \end{array} \right)$$

*getAirSpeedMeth*  $\hat{=}$  **var** *ret* : *double* •

$$\left( \begin{array}{l} \textit{getAirSpeedCall} . \textit{MainMission} \longrightarrow \\ \textit{ret} := \textit{this} . \textit{getAirSpeed}(); \\ \textit{getAirSpeedRet} . \textit{MainMission} ! \textit{ret} \longrightarrow \\ \textbf{Skip} \end{array} \right)$$

*getAltitudeMeth*  $\hat{=}$  **var** *ret* : *double* •

$$\left( \begin{array}{l} \textit{getAltitudeCall} . \textit{MainMission} \longrightarrow \\ \textit{ret} := \textit{this} . \textit{getAltitude}(); \\ \textit{getAltitudeRet} . \textit{MainMission} ! \textit{ret} \longrightarrow \\ \textbf{Skip} \end{array} \right)$$

*getCabinPressureMeth*  $\hat{=}$  **var** *ret* : *double* •

$$\left( \begin{array}{l} \textit{getCabinPressureCall} . \textit{MainMission} \longrightarrow \\ \textit{ret} := \textit{this} . \textit{getCabinPressure}(); \\ \textit{getCabinPressureRet} . \textit{MainMission} ! \textit{ret} \longrightarrow \\ \textbf{Skip} \end{array} \right)$$

$$\text{getEmergencyOxygenMeth} \hat{=} \mathbf{var} \text{ ret} : \text{double} \bullet \left( \begin{array}{l} \text{getEmergencyOxygenCall} . \text{MainMission} \longrightarrow \\ \text{ret} := \text{this} . \text{getEmergencyOxygen}(); \\ \text{getEmergencyOxygenRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getFuelRemainingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{double} \bullet \left( \begin{array}{l} \text{getFuelRemainingCall} . \text{MainMission} \longrightarrow \\ \text{ret} := \text{this} . \text{getFuelRemaining}(); \\ \text{getFuelRemainingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getHeadingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{double} \bullet \left( \begin{array}{l} \text{getHeadingCall} . \text{MainMission} \longrightarrow \\ \text{ret} := \text{this} . \text{getHeading}(); \\ \text{getHeadingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{setAirSpeedMeth} \hat{=} \left( \begin{array}{l} \text{setAirSpeedCall} . \text{MainMission} ? \text{airSpeed} \longrightarrow \\ \text{this} . \text{setAirSpeed}(\text{airSpeed}); \\ \text{setAirSpeedRet} . \text{MainMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{setAltitudeMeth} \hat{=} \left( \begin{array}{l} \text{setAltitudeCall} . \text{MainMission} ? \text{altitude} \longrightarrow \\ \text{this} . \text{setAltitude}(\text{altitude}); \\ \text{setAltitudeRet} . \text{MainMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{setCabinPressureMeth} \hat{=} \left( \begin{array}{l} \text{setCabinPressureCall} . \text{MainMission} ? \text{cabinPressure} \longrightarrow \\ \text{this} . \text{setCabinPressure}(\text{cabinPressure}); \\ \text{setCabinPressureRet} . \text{MainMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{setEmergencyOxygenMeth} \hat{=} \left( \begin{array}{l} \text{setEmergencyOxygenCall} . \text{MainMission} ? \text{emergencyOxygen} \longrightarrow \\ \text{this} . \text{setEmergencyOxygen}(\text{emergencyOxygen}); \\ \text{setEmergencyOxygenRet} . \text{MainMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{setFuelRemainingMeth} \hat{=} \left( \begin{array}{l} \text{setFuelRemainingCall} . \text{MainMission} ? \text{fuelRemaining} \longrightarrow \\ \text{this} . \text{setFuelRemaining}(\text{fuelRemaining}); \\ \text{setFuelRemainingRet} . \text{MainMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{setHeadingMeth} \hat{=} \left( \begin{array}{l} \text{setHeadingCall} . \text{MainMission} ? \text{heading} \longrightarrow \\ \text{this} . \text{setHeading}(\text{heading}); \\ \text{setHeadingRet} . \text{MainMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$



$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{MainMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{MainMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$



•  $(Init ; Methods) \triangle (end\_mission\_app . MainMission \longrightarrow \mathbf{Skip})$

**end**

**class** *MainMissionClass*  $\hat{=}$  **begin**

**state** *State*

---

*ALTITUDE\_READING\_ON\_GROUND* : *double*  
*cabinPressure* : *double*  
*emergencyOxygen* : *double*  
*fuelRemaining* : *double*  
*altitude* : *double*  
*airSpeed* : *double*  
*heading* : *double*

---

**state** *State*

**initial** *Init*

---

*State*'

---

*ALTITUDE\_READING\_ON\_GROUND*' = 0.0

---

**public** *getAirSpeed*  $\hat{=}$  **var** *ret* : *double* •  
(*ret* := *airSpeed*)

**public** *getAltitude*  $\hat{=}$  **var** *ret* : *double* •  
(*ret* := *altitude*)

**public** *getCabinPressure*  $\hat{=}$  **var** *ret* : *double* •  
(*ret* := *cabinPressure*)

**public** *getEmergencyOxygen*  $\hat{=}$  **var** *ret* : *double* •  
(*ret* := *emergencyOxygen*)

**public** *getFuelRemaining*  $\hat{=}$  **var** *ret* : *double* •  
(*ret* := *fuelRemaining*)

**public** *getHeading*  $\hat{=}$  **var** *ret* : *double* •  
(*ret* := *heading*)

**public** *setAirSpeed*  $\hat{=}$   
(*this* . *this* . *airSpeed* := *airSpeed*)

**public** *setAltitude*  $\hat{=}$   
(*this* . *this* . *altitude* := *altitude*)

**public** *setCabinPressure*  $\hat{=}$   
(*this* . *this* . *cabinPressure* := *cabinPressure*)

**public** *setEmergencyOxygen*  $\hat{=}$   
(*this* . *this* . *emergencyOxygen* := *emergencyOxygen*)

```
public setFuelRemaining  $\hat{=}$   
(this.this.fuelRemaining := fuelRemaining)
```

```
public setHeading  $\hat{=}$   
(this.this.heading := heading)
```

- **Skip**

```
end
```

**section** *MainMissionMethChan* **parents** *scj\_prelude, GlobalTypes, MissionID, SchedulableId*

**channel** *getAirSpeedCall* : *MissionID*  
**channel** *getAirSpeedRet* : *MissionID*  $\times$  *double*

**channel** *getAltitudeCall* : *MissionID*  
**channel** *getAltitudeRet* : *MissionID*  $\times$  *double*

**channel** *getCabinPressureCall* : *MissionID*  
**channel** *getCabinPressureRet* : *MissionID*  $\times$  *double*

**channel** *getEmergencyOxygenCall* : *MissionID*  
**channel** *getEmergencyOxygenRet* : *MissionID*  $\times$  *double*

**channel** *getFuelRemainingCall* : *MissionID*  
**channel** *getFuelRemainingRet* : *MissionID*  $\times$  *double*

**channel** *getHeadingCall* : *MissionID*  
**channel** *getHeadingRet* : *MissionID*  $\times$  *double*

**channel** *setAirSpeedCall* : *MissionID*  $\times$  *double*  
**channel** *setAirSpeedRet* : *MissionID*

**channel** *setAltitudeCall* : *MissionID*  $\times$  *double*  
**channel** *setAltitudeRet* : *MissionID*

**channel** *setCabinPressureCall* : *MissionID*  $\times$  *double*  
**channel** *setCabinPressureRet* : *MissionID*

**channel** *setEmergencyOxygenCall* : *MissionID*  $\times$  *double*  
**channel** *setEmergencyOxygenRet* : *MissionID*

**channel** *setFuelRemainingCall* : *MissionID*  $\times$  *double*  
**channel** *setFuelRemainingRet* : *MissionID*

**channel** *setHeadingCall* : *MissionID*  $\times$  *double*  
**channel** *setHeadingRet* : *MissionID*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*



**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

## 5.2 Schedulables of

**section** *ACModeChangerApp* **parents** *TopLevelMissionSequencerChan*,  
*MissionID*, *MissionIds*, *SchedulableId*, *ACModeChangerClass*

**process** *ACModeChangerApp*  $\hat{=}$  *controllingMission* : *MissionID*, *controllingMission* : *MissionID* • **begin**

*State*

---

```

modesLeft :  $\mathbb{Z}$ 
ref currentModeClass : ModeClass
ref launchModeClass : ModeClass
ref cruiseModeClass : ModeClass
ref landModeClass : ModeClass
modesLeft :  $\mathbb{Z}$ 
ref currentModeClass : ModeClass
ref launchModeClass : ModeClass
ref cruiseModeClass : ModeClass
ref landModeClass : ModeClass

```

---

**state** *State*

*Init*

---

```

State'

modesLeft' = 3
ref currentModeClass' = new ModeClass()
ref launchModeClass' = new ModeClass()
ref cruiseModeClass' = new ModeClass()
ref landModeClass' = new ModeClass()
modesLeft' = 3
ref currentModeClass' = new ModeClass()
ref launchModeClass' = new ModeClass()
ref cruiseModeClass' = new ModeClass()
ref landModeClass' = new ModeClass()

```

---

*GetNextMission*  $\hat{=}$  **var** *ret* : *MissionID* •  
 $\left( \begin{array}{l} \text{getNextMissionCall} . \text{ACModeChanger} \longrightarrow \\ \text{ret} := \text{this} . \text{getNextMission}(); \\ \text{getNextMissionRet} . \text{ACModeChanger} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$

*changeToMeth*  $\hat{=}$   
 $\left( \begin{array}{l} \text{changeToCall} . \text{ACModeChanger} ? \text{newMode} \longrightarrow \\ (\text{this} . \text{currentMode} := \text{newMode}); \\ \text{changeToRet} . \text{ACModeChanger} \longrightarrow \\ \text{Skip} \end{array} \right)$

$$\begin{aligned}
& \text{getNextMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionID} \bullet \\
& \left( \begin{array}{l}
\text{getNextMissionCall} . \text{ACModeChanger} \longrightarrow \\
\left( \begin{array}{l}
\mathbf{if} (\text{modesLeft} = 3) \longrightarrow \\
\quad \left( \begin{array}{l} \text{modesLeft} := \text{modesLeft} - 1; \\ \text{ret} := \text{TakeOffMission} \end{array} \right) \\
\Box \neg (\text{modesLeft} = 3) \longrightarrow \\
\quad \mathbf{if} (\text{modesLeft} = 2) \longrightarrow \\
\quad \quad \left( \begin{array}{l} \text{modesLeft} := \text{modesLeft} - 1; \\ \text{ret} := \text{CruiseMission} \end{array} \right) \\
\Box \neg (\text{modesLeft} = 2) \longrightarrow \\
\quad \mathbf{if} (\text{modesLeft} = 1) \longrightarrow \\
\quad \quad \left( \begin{array}{l} \text{modesLeft} := \text{modesLeft} - 1; \\ \text{ret} := \text{LandMission} \end{array} \right) \\
\Box \neg (\text{modesLeft} = 1) \longrightarrow \\
\quad \quad (\text{ret} := \text{nullMissionId}) \\
\mathbf{fi} \\
\mathbf{fi} \\
\mathbf{fi}
\end{array} \right) ; \\
\text{getNextMissionRet} . \text{ACModeChanger} ! \text{ret} \longrightarrow \\
\mathbf{Skip}
\end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{changeToMeth} \hat{=} \\
& \left( \begin{array}{l}
\text{changeToCall} . \text{ACModeChanger} ? \text{newMode} \longrightarrow \\
(\text{this} . \text{currentMode} := \text{newMode}) ; \\
\text{changeToRet} . \text{ACModeChanger} \longrightarrow \\
\mathbf{Skip}
\end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{getNextMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionID} \bullet \\
& \left( \begin{array}{l}
\text{getNextMissionCall} . \text{ACModeChanger} \longrightarrow \\
\left( \begin{array}{l}
\mathbf{if} (\text{modesLeft} = 3) \longrightarrow \\
\quad \left( \begin{array}{l} \text{modesLeft} := \text{modesLeft} - 1; \\ \text{ret} := \text{TakeOffMission} \end{array} \right) \\
\Box \neg (\text{modesLeft} = 3) \longrightarrow \\
\quad \mathbf{if} (\text{modesLeft} = 2) \longrightarrow \\
\quad \quad \left( \begin{array}{l} \text{modesLeft} := \text{modesLeft} - 1; \\ \text{ret} := \text{CruiseMission} \end{array} \right) \\
\Box \neg (\text{modesLeft} = 2) \longrightarrow \\
\quad \mathbf{if} (\text{modesLeft} = 1) \longrightarrow \\
\quad \quad \left( \begin{array}{l} \text{modesLeft} := \text{modesLeft} - 1; \\ \text{ret} := \text{LandMission} \end{array} \right) \\
\Box \neg (\text{modesLeft} = 1) \longrightarrow \\
\quad \quad (\text{ret} := \text{nullMissionId}) \\
\mathbf{fi} \\
\mathbf{fi} \\
\mathbf{fi}
\end{array} \right) ; \\
\text{getNextMissionRet} . \text{ACModeChanger} ! \text{ret} \longrightarrow \\
\mathbf{Skip}
\end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{advanceModeSyncMeth} \hat{=} \\
& \left( \begin{array}{l}
\text{advanceModeCall} . \text{ACModeChanger} ? \text{thread} \longrightarrow \\
\left( \begin{array}{l}
\text{startSyncMeth} . \text{ACModeChangerObject} . \text{thread} \longrightarrow \\
\text{lockAcquired} . \text{ACModeChangerObject} . \text{thread} \longrightarrow \\
\left( \begin{array}{l}
; \\
\text{if } (\text{modesLeft} = 3) \longrightarrow \\
\quad \left( \begin{array}{l}
\text{modesLeft} := \text{modesLeft} - 1; \\
\text{changeTo}(\text{launchMode})
\end{array} \right) \\
\Box \neg (\text{modesLeft} = 3) \longrightarrow \\
\quad \text{if } (\text{modesLeft} = 2) \longrightarrow \\
\quad \quad \left( \begin{array}{l}
\text{modesLeft} := \text{modesLeft} - 1; \\
\text{changeTo}(\text{cruiseMode})
\end{array} \right) \\
\Box \neg (\text{modesLeft} = 2) \longrightarrow \\
\quad \text{if } (\text{modesLeft} = 1) \longrightarrow \\
\quad \quad \left( \begin{array}{l}
\text{modesLeft} := \text{modesLeft} - 1; \\
\text{changeTo}(\text{landMode})
\end{array} \right) \\
\Box \neg (\text{modesLeft} = 1) \longrightarrow \\
\quad \quad (\text{changeTo}(\mathbf{null})) \\
\mathbf{fi} \\
\mathbf{fi} \\
\mathbf{fi}
\end{array} \right) ; \\
\text{endSyncMeth} . \text{ACModeChangerObject} . \text{thread} \longrightarrow \\
\text{advanceModeRet} . \text{ACModeChanger} . \text{thread} \longrightarrow \\
\mathbf{Skip}
\end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{Methods} \hat{=} \\
& \left( \begin{array}{l}
\text{GetNextMission} \\
\Box \\
\text{changeToMeth} \\
\Box \\
\text{getNextMissionMeth} \\
\Box \\
\text{changeToMeth} \\
\Box \\
\text{getNextMissionMeth} \\
\Box \\
\text{advanceModeSyncMeth}
\end{array} \right) ; \text{Methods}
\end{aligned}$$

$$\bullet (\text{Init} ; \text{Methods}) \triangle (\text{end\_sequencer\_app} . \text{ACModeChanger} \longrightarrow \mathbf{Skip})$$

**end**

**class** *ACModeChangerClass*  $\hat{=}$  **begin**

◦ **sync** *advanceMode*  $\hat{=}$

$$\left( \begin{array}{l} ; \\ \textbf{if} (modesLeft = 3) \longrightarrow \\ \quad \left( \begin{array}{l} modesLeft := modesLeft - 1; \\ changeTo(launchMode) \end{array} \right) \\ \parallel \neg (modesLeft = 3) \longrightarrow \\ \quad \textbf{if} (modesLeft = 2) \longrightarrow \\ \quad \quad \left( \begin{array}{l} modesLeft := modesLeft - 1; \\ changeTo(cruiseMode) \end{array} \right) \\ \parallel \neg (modesLeft = 2) \longrightarrow \\ \quad \textbf{if} (modesLeft = 1) \longrightarrow \\ \quad \quad \left( \begin{array}{l} modesLeft := modesLeft - 1; \\ changeTo(landMode) \end{array} \right) \\ \parallel \neg (modesLeft = 1) \longrightarrow \\ \quad \quad (changeTo(\textbf{null})) \\ \textbf{fi} \\ \textbf{fi} \\ \textbf{fi} \end{array} \right)$$

• **Skip**

**end**

**section** *ACModeChangerMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *changeToCall* : *SchedulableID* ×  
**channel** *changeToRet* : *SchedulableID*

**channel** *getNextMissionCall* : *SchedulableID*  
**channel** *getNextMissionRet* : *SchedulableID* × *MissionID*

**channel** *changeToCall* : *SchedulableID* ×  
**channel** *changeToRet* : *SchedulableID*

**channel** *getNextMissionCall* : *SchedulableID*  
**channel** *getNextMissionRet* : *SchedulableID* × *MissionID*

**channel** *advanceModeCall* : *SchedulableID* × *ThreadID*  
**channel** *advanceModeRet* : *SchedulableID* × *ThreadID*



**section** *ControlHandlerApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds*

**process** *ControlHandlerApp*  $\hat{=}$  **begin**

*handlerAsyncEvent*  $\hat{=}$   
 $\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{ControlHandler} \longrightarrow \\ \text{handleAsyncEventRet} . \text{ControlHandler} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  
 $\left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{ControlHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{ControlHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{Methods} \hat{=} \left( \begin{array}{l} \text{handlerAsyncEvent} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \end{array} \right) ; \text{Methods}$$

$$\Delta(\text{end\_aperiodic\_app} . \text{ControlHandler} \longrightarrow \mathbf{Skip})$$

**end**

**class** *ControlHandlerClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *ControlHandlerMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**section** *CommunicationsHandlerApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds*

**process** *CommunicationsHandlerApp*  $\hat{=}$  **begin**

*handlerAsyncEvent*  $\hat{=}$   

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{CommunicationsHandler} \longrightarrow \\ \text{handleAsyncEventRet} . \text{CommunicationsHandler} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{CommunicationsHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{CommunicationsHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{Methods} \hat{=}$$

$$\left( \begin{array}{l} \text{handlerAsyncEvent} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \end{array} \right) ; \text{Methods}$$

$$\triangle(\text{end\_aperiodic\_app} . \text{CommunicationsHandler} \longrightarrow \mathbf{Skip})$$

**end**

**class** *CommunicationsHandlerClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *CommunicationsHandlerMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*



**section** *EnvironmentMonitorApp* **parents** *PeriodicEventHandlerChan*, *SchedulableId*, *SchedulableIds* ,  
*MainMissionMethChan*

**process** *EnvironmentMonitorApp*  $\hat{=}$  *controllingMission* : *MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{EnvironmentMonitor} \longrightarrow \\ ; \\ \text{setCabinPressureCall} . \text{controllingMission0} \longrightarrow \\ \text{setCabinPressureRet} . \text{controllingMission} \longrightarrow \\ \mathbf{Skip}; \\ \text{setEmergencyOxygenCall} . \text{controllingMission0} \longrightarrow \\ \text{setEmergencyOxygenRet} . \text{controllingMission} \longrightarrow \\ \mathbf{Skip}; \\ \text{setFuelRemainingCall} . \text{controllingMission0} \longrightarrow \\ \text{setFuelRemainingRet} . \text{controllingMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \text{handleAsyncEventRet} . \text{EnvironmentMonitor} \longrightarrow$$

**Skip**

*Methods*  $\hat{=}$   
(*handlerAsyncEvent*) ; *Methods*

$\triangle(\text{end\_periodic\_app} . \text{EnvironmentMonitor} \longrightarrow \mathbf{Skip})$

**end**

**class** *EnvironmentMonitorClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *FlightSensorsMonitorApp* **parents** *PeriodicEventHandlerChan, SchedulableId, SchedulableIds* ,  
*MainMissionMethChan*

**process** *FlightSensorsMonitorApp*  $\hat{=}$  *controllingMission* : *MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{FlightSensorsMonitor} \longrightarrow \\ ; \\ \text{setAirSpeedCall} . \text{controllingMission0} \longrightarrow \\ \text{setAirSpeedRet} . \text{controllingMission} \longrightarrow \\ \mathbf{Skip}; \\ \text{setAltitudeCall} . \text{controllingMission0} \longrightarrow \\ \text{setAltitudeRet} . \text{controllingMission} \longrightarrow \\ \mathbf{Skip}; \\ \text{setHeadingCall} . \text{controllingMission0} \longrightarrow \\ \text{setHeadingRet} . \text{controllingMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \text{handleAsyncEventRet} . \text{FlightSensorsMonitor} \longrightarrow \\ \mathbf{Skip}$$

*Methods*  $\hat{=}$   
(*handlerAsyncEvent*) ; *Methods*

$\triangle(\text{end\_periodic\_app} . \text{FlightSensorsMonitor} \longrightarrow \mathbf{Skip})$

**end**

**class** *FlightSensorsMonitorClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *AperiodicSimulatorApp* **parents** *PeriodicEventHandlerChan*, *SchedulableId*, *SchedulableIds*

**process** *AperiodicSimulatorApp*  $\hat{=}$  *event* : *MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$   

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{AperiodicSimulator} \longrightarrow \\ \left( \begin{array}{l} ; \\ \text{releaseCall} . \text{event} \longrightarrow \\ \text{releaseRet} . \text{event} ? \text{release} \longrightarrow \end{array} \right) \text{handleAsyncEventRet} . \text{AperiodicSimulator} \longrightarrow \\ \mathbf{Skip} \\ \mathbf{Skip} \end{array} \right)$$

*Methods*  $\hat{=}$   
 $(\text{handlerAsyncEvent}) ; \text{Methods}$

$\triangle(\text{end\_periodic\_app} . \text{AperiodicSimulator} \longrightarrow \mathbf{Skip})$

**end**

```
class AperiodicSimulatorClass  $\hat{=}$  begin
```

- **Skip**

```
end
```

### 5.3 TakeOffMission

**section** *TakeOffMissionApp* **parents** *scj\_prelude*, *MissionId*, *MissionIds*,  
*SchedulableId*, *SchedulableIds*, *MissionChan*, *SchedulableMethChan*, *TakeOffMissionClass* , *TakeOffMissionMethC*

**process** *TakeOffMissionApp*  $\hat{=}$  *storageParametersSchedulable* : *MissionID*, *landingGearHandler* : *MissionID*, *takeOffMon*

<i>State</i> <i>this</i> : <b>ref</b> <i>TakeOffMissionClass</i>
---

**state** *State*

<i>Init</i> <i>State'</i>
<i>this'</i> = <b>new</b> <i>TakeOffMissionClass</i> ()

*InitializePhase*  $\hat{=}$   
 $\left( \begin{array}{l} \text{initializeCall} . \text{TakeOffMission} \longrightarrow \\ \text{register} ! \text{LandingGearHandlerTakeOff} ! \text{TakeOffMission} \longrightarrow \\ \text{register} ! \text{TakeOffMonitor} ! \text{TakeOffMission} \longrightarrow \\ \text{register} ! \text{TakeOffFailureHandler} ! \text{TakeOffMission} \longrightarrow \\ \text{initializeRet} . \text{TakeOffMission} \longrightarrow \\ \text{Skip} \end{array} \right)$

*CleanupPhase*  $\hat{=}$   
 $\left( \begin{array}{l} \text{cleanupMissionCall} . \text{TakeOffMission} \longrightarrow \\ \text{cleanupMissionRet} . \text{TakeOffMission} ! \text{False} \longrightarrow \\ \text{Skip} \end{array} \right)$

*abortMeth*  $\hat{=}$   
 $\left( \begin{array}{l} \text{abortCall} . \text{TakeOffMission} \longrightarrow \\ \text{this} . \text{abort}(); \\ \text{abortRet} . \text{TakeOffMission} \longrightarrow \\ \text{Skip} \end{array} \right)$

*getControllingMissionMeth*  $\hat{=}$  **var** *ret* : *MissionID* •  
 $\left( \begin{array}{l} \text{getControllingMissionCall} . \text{TakeOffMission} \longrightarrow \\ \text{ret} := \text{this} . \text{getControllingMission}(); \\ \text{getControllingMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$

*setControllingMissionMeth*  $\hat{=}$   
 $\left( \begin{array}{l} \text{setControllingMissionCall} . \text{TakeOffMission} ? \text{controllingMission} \longrightarrow \\ \text{this} . \text{setControllingMission}(\text{controllingMission}); \\ \text{setControllingMissionRet} . \text{TakeOffMission} \longrightarrow \\ \text{Skip} \end{array} \right)$

*cleanUpMeth*  $\hat{=}$  **var** *ret* :  $\mathbb{B}$  •  
 $\left( \begin{array}{l} \text{cleanUpCall} . \text{TakeOffMission} \longrightarrow \\ \text{ret} := \text{this} . \text{cleanUp}(); \\ \text{cleanUpRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$

$$\begin{aligned}
& \text{stowLandingGearMeth} \hat{=} \\
& \left( \begin{array}{l} \text{stowLandingGearCall} . \text{TakeOffMission} \longrightarrow \\ \text{this} . \text{stowLandingGear}(); \\ \text{stowLandingGearRet} . \text{TakeOffMission} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\
\\
& \text{isLandingGearDeployedMeth} \hat{=} \mathbf{var} \text{ ret} : \mathbb{B} \bullet \\
& \left( \begin{array}{l} \text{isLandingGearDeployedCall} . \text{TakeOffMission} \longrightarrow \\ \text{ret} := \text{this} . \text{isLandingGearDeployed}(); \\ \text{isLandingGearDeployedRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \\
& \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \\
& \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \\
& \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \\
& \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \\
& \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \\
& \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \\
& \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

$$\begin{aligned}
& \text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \\
& \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$



$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{TakeOffMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{TakeOffMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{deployLandingGearSyncMeth} \hat{=} \left( \begin{array}{l} \text{deployLandingGearCall} . \text{TakeOffMission} ? \text{thread} \longrightarrow \\ \left( \begin{array}{l} \text{startSyncMeth} . \text{TakeOffMissionObject} . \text{thread} \longrightarrow \\ \text{lockAcquired} . \text{TakeOffMissionObject} . \text{thread} \longrightarrow \\ ( \text{this} . \text{landingGearDeployed} := \text{true} ) ; \\ \text{endSyncMeth} . \text{TakeOffMissionObject} . \text{thread} \longrightarrow \\ \text{deployLandingGearRet} . \text{TakeOffMission} . \text{thread} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \end{array} \right)$$

*InitializePhase*  
☐  
*CleanupPhase*  
☐  
*abortMeth*  
☐  
*getControllingMissionMeth*  
☐  
*setControllingMissionMeth*  
☐  
*cleanUpMeth*  
☐  
*stowLandingGearMeth*  
☐  
*isLandingGearDeployedMeth*  
☐  
*getMissionMeth*  
☐  
*getSequencerMeth*  
☐  
*requestTerminationMeth*  
☐  
*terminationPendingMeth*  
☐  
*getMissionMeth*  
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*getSequencerMeth*  
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*terminationPendingMeth*  
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*terminationPendingMeth*  
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*getMissionMeth*  
☐  
*getSequencerMeth*  
☐  
*requestTerminationMeth*  
☐  
*terminationPendingMeth*  
☐

•  $(Init ; Methods) \triangle (end\_mission\_app . TakeOffMission \longrightarrow \mathbf{Skip})$

**end**

**class** *TakeOffMissionClass*  $\hat{=}$  **begin**

**state** *State*

---

*SAFE\_AIRSPPEED\_THRESHOLD* : *double*  
*TAKEOFF\_ALTITUDE* : *double*  
*abort* :  $\mathbb{B}$   
*landingGearDeployed* :  $\mathbb{B}$

---

**state** *State*

**initial** *Init*

---

*State'*  
  
*SAFE\_AIRSPPEED\_THRESHOLD'* = 10.0  
*TAKEOFF\_ALTITUDE'* = 10.0  
*abort'* = *false*

---

**public** *abort*  $\hat{=}$   
(*this* . *abort* := *true*)

**public** *getControllingMission*  $\hat{=}$  **var** *ret* : *MissionID* •  
(*ret* := *controllingMission*)

**public** *setControllingMission*  $\hat{=}$   
(*this* . *this.controllingMission* := *controllingMission*)

**public** *cleanUp*  $\hat{=}$  **var** *ret* :  $\mathbb{B}$  •  
(  
;   
*ret* := ( $\neg$  *abort* = **True**)  
)

**public** *stowLandingGear*  $\hat{=}$   
(*this* . *landingGearDeployed* := *false*)

**public** *isLandingGearDeployed*  $\hat{=}$  **var** *ret* :  $\mathbb{B}$  •  
(*ret* := *landingGearDeployed* = **True**)

• **Skip**

**end**

**section** *TakeOffMissionMethChan* **parents** *scj\_prelude, GlobalTypes, MissionID, SchedulableId*

**channel** *abortCall* : *MissionID*  
**channel** *abortRet* : *MissionID*

**channel** *getControllingMissionCall* : *MissionID*  
**channel** *getControllingMissionRet* : *MissionID*  $\times$  *MissionID*

**channel** *setControllingMissionCall* : *MissionID*  $\times$  *MissionID*  
**channel** *setControllingMissionRet* : *MissionID*

**channel** *cleanUpCall* : *MissionID*  
**channel** *cleanUpRet* : *MissionID*  $\times$   $\mathbb{B}$

**channel** *stowLandingGearCall* : *MissionID*  
**channel** *stowLandingGearRet* : *MissionID*

**channel** *isLandingGearDeployedCall* : *MissionID*  
**channel** *isLandingGearDeployedRet* : *MissionID*  $\times$   $\mathbb{B}$

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

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**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

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**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

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**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

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**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

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**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

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**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*



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**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
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**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

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**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

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**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

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**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

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**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

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**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *deployLandingGearCall* : *MissionID*  $\times$  *ThreadID*  
**channel** *deployLandingGearRet* : *MissionID*  $\times$  *ThreadID*

## 5.4 Schedulables of

**section** *LandingGearHandlerTakeOffApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds* ,  
*TakeOffMissionMethChan*, *ObjectIds*, *ThreadIds*

**process** *LandingGearHandlerTakeOffApp*  $\hat{=}$  *mission* : *MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{isLandingGearDeployedCall} . \text{mission} \longrightarrow \\ \text{isLandingGearDeployedRet} . \text{mission} ? \text{isLandingGearDeployed} \longrightarrow \\ \\ \mathbf{var} \text{landingGearIsDeployed} : \mathbb{B} \bullet \text{landingGearIsDeployed} := \text{isLandingGearDeployed} \\ \mathbf{if} \text{landingGearIsDeployed} = \mathbf{True} \longrightarrow \\ \quad \left( \begin{array}{l} \text{stowLandingGearCall} . \text{mission} \longrightarrow \\ \text{stowLandingGearRet} . \text{mission} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\ \quad \parallel \neg \text{landingGearIsDeployed} = \mathbf{True} \longrightarrow \\ \quad \quad \left( \begin{array}{l} \text{deployLandingGearCall} . \text{mission} . \text{LandingGearHandlerTakeOffThread} \longrightarrow \\ \text{deployLandingGearRet} . \text{mission} . \text{LandingGearHandlerTakeOffThread} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\ \mathbf{fi} \\ \mathbf{Skip} \end{array} \right) \text{handleAsyncEventRet} . \text{LandingGearHandlerTakeOff}$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerTakeOff} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerTakeOff} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{Methods} \hat{=} \left( \begin{array}{l} \text{handlerAsyncEvent} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \end{array} \right) ; \text{Methods}$$

$\Delta(\text{end\_aperiodic\_app} . \text{LandingGearHandlerTakeOff} \longrightarrow \mathbf{Skip})$

**end**



**class** *LandingGearHandlerTakeOffClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *LandingGearHandlerTakeOffMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**section** *TakeOffFailureHandlerApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds* ,  
*TakeOffMissionMethChan*

**process** *TakeOffFailureHandlerApp*  $\hat{=}$  *takeoffMission* : *MissionID* • **begin**

<i>State</i>
<i>threshold</i> : <i>double</i>

**state** *State*

<i>Init</i>
<i>State</i> ′
<i>threshold</i> ′ = <i>threshold</i>

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{TakeOffFailureHandler} \longrightarrow \\ \left( \begin{array}{l} \text{getControllingMissionCall} . \text{takeoffMission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{takeoffMission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \end{array} \right) \\ \\ \mathbf{var} \text{currentSpeed} : \text{double} \bullet \text{currentSpeed} := \text{getAirSpeed} \\ \mathbf{if} (\text{currentSpeed} < \text{threshold}) \longrightarrow \\ \quad \left( \begin{array}{l} ; \\ \text{abortCall} . \text{takeoffMission} \longrightarrow \\ \text{abortRet} . \text{takeoffMission} \longrightarrow \\ \mathbf{Skip}; \\ \text{requestTerminationCall} . \text{takeoffMission} \longrightarrow \\ \text{requestTerminationRet} . \text{takeoffMission} ? \text{requestTermination} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\ \quad \square \neg (\text{currentSpeed} < \text{threshold}) \longrightarrow \\ \quad \quad ) ( \\ \mathbf{fi} \mathbf{Skip} \end{array} \right) \text{handleAsyncEventR}$$

**Skip**

*releaseMeth*  $\hat{=}$   $\mathbf{var} \text{ret} : \text{void} \bullet$

$$\left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$   $\mathbf{var} \text{ret} : \text{void} \bullet$

$$\left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$   $\mathbf{var} \text{ret} : \text{void} \bullet$

$$\left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{TakeOffFailureHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{TakeOffFailureHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$Methods \hat{=}$   
 $\left( \begin{array}{l} handlerAsyncEvent \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \end{array} \right) ; Methods$

$\triangle(end\_aperiodic\_app . TakeOffFailureHandler \longrightarrow \mathbf{Skip})$

**end**

**class** *TakeOffFailureHandlerClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *TakeOffFailureHandlerMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**section** *TakeOffMonitorApp* **parents** *PeriodicEventHandlerChan*, *SchedulableId*, *SchedulableIds* ,  
*TakeOffMissionMethChan*

**process** *TakeOffMonitorApp*  $\hat{=}$  *takeoffMission* : *MissionID*, *landingGearHandler* : *MissionID* • **begin**

*State*

*takeOffAltitude* : double

**state** *State*

*Init*

*State'*

*takeOffAltitude'* = *takeOffAltitude*

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{TakeOffMonitor} \longrightarrow \\ \left( \begin{array}{l} ; \\ \text{getControllingMissionCall} . \text{takeoffMission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{takeoffMission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \\ \\ \mathbf{var} \text{altitude} : \text{double} \bullet \text{altitude} := \text{getAltitude} \\ \mathbf{if} (\text{altitude} > \text{takeOffAltitude}) \longrightarrow \\ \left( \begin{array}{l} ; \\ \text{releaseCall} . \text{landingGearHandler} \longrightarrow \\ \text{releaseRet} . \text{landingGearHandler} ? \text{release} \longrightarrow \\ \text{requestTerminationCall} . \text{takeoffMission} \longrightarrow \\ \text{requestTerminationRet} . \text{takeoffMission} ? \text{requestTermination} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\ \parallel \neg (\text{altitude} > \text{takeOffAltitude}) \longrightarrow \mathbf{Skip} \\ \mathbf{fi} ; \\ \mathbf{Skip} \end{array} \right) \end{array} \right) \text{handleAsyncEventR}$$

*Methods*  $\hat{=}$

(*handlerAsyncEvent*) ; *Methods*

$\triangle(\text{end\_periodic\_app} . \text{TakeOffMonitor} \longrightarrow \mathbf{Skip})$

**end**



**class** *TakeOffMonitorClass*  $\hat{=}$  **begin**

- **Skip**

**end**

## 5.5 CruiseMission

**section** *CruiseMissionApp* **parents** *scj\_prelude*, *MissionId*, *MissionIds*,  
*SchedulableId*, *SchedulableIds*, *MissionChan*, *SchedulableMethChan*, *CruiseMissionClass* , *CruiseMissionMethChan*

**process** *CruiseMissionApp*  $\hat{=}$  *storageParametersSchedulable* : *MissionID*, *beginLandingHandler* : *MissionID*, *navigationM*

*State*

*this* : **ref** *CruiseMissionClass*

**state** *State*

*Init*

*State'*

*this'* = **new** *CruiseMissionClass*()

*InitializePhase*  $\hat{=}$

$$\left( \begin{array}{l} \text{initializeCall} . \text{CruiseMission} \longrightarrow \\ \text{register} ! \text{BeginLandingHandler} ! \text{CruiseMission} \longrightarrow \\ \text{register} ! \text{NavigationMonitor} ! \text{CruiseMission} \longrightarrow \\ \text{initializeRet} . \text{CruiseMission} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*CleanupPhase*  $\hat{=}$

$$\left( \begin{array}{l} \text{cleanupMissionCall} . \text{CruiseMission} \longrightarrow \\ \text{cleanupMissionRet} . \text{CruiseMission} ! \text{False} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*getControllingMissionMeth*  $\hat{=}$  **var** *ret* : *MissionID* •

$$\left( \begin{array}{l} \text{getControllingMissionCall} . \text{CruiseMission} \longrightarrow \\ \text{ret} := \text{this} . \text{getControllingMission}(); \\ \text{getControllingMissionRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*getMissionMeth*  $\hat{=}$  **var** *ret* : *Mission* •

$$\left( \begin{array}{l} \text{getMissionCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*getSequencerMeth*  $\hat{=}$  **var** *ret* : *MissionSequencer* •

$$\left( \begin{array}{l} \text{getSequencerCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*requestTerminationMeth*  $\hat{=}$  **var** *ret* : *boolean* •

$$\left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{CruiseMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{CruiseMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$



$$\begin{aligned}
\textit{terminationPendingMeth} \hat{=} & \mathbf{var} \textit{ ret} : \textit{boolean} \bullet \\
& \left( \begin{array}{l} \textit{terminationPendingCall} . \textit{CruiseMission} \longrightarrow \\ ; \\ \textit{terminationPendingRet} . \textit{CruiseMission} ! \textit{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)
\end{aligned}$$

*InitializePhase*  
☐  
*CleanupPhase*  
☐  
*getControllingMissionMeth*  
☐  
*getMissionMeth*  
☐  
*getSequencerMeth*  
☐  
*requestTerminationMeth*  
☐  
*terminationPendingMeth*  
☐  
*getMissionMeth*  
☐  
*getSequencerMeth*  
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*getSequencerMeth*  
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*requestTerminationMeth*  
☐  
*terminationPendingMeth*  
☐  
*getMissionMeth*  
☐

•  $(Init ; Methods) \triangle (end\_mission\_app . CruiseMission \longrightarrow \mathbf{Skip})$

**end**

**class** *CruiseMissionClass*  $\hat{=}$  **begin**

**public** *getControllingMission*  $\hat{=}$  **var** *ret* : *MissionID* •  
(*ret* := *controllingMission*)

• **Skip**

**end**

**section** *CruiseMissionMethChan* **parents** *scj\_prelude, GlobalTypes, MissionID, SchedulableId*

**channel** *getControllingMissionCall* : *MissionID*  
**channel** *getControllingMissionRet* : *MissionID*  $\times$  *MissionID*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

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## 5.6 Schedulables of

**section** *BeginLandingHandlerApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds*

**process** *BeginLandingHandlerApp*  $\hat{=}$  *controllingMission* : *MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$   

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{requestTerminationCall} . \text{controllingMission} \longrightarrow \\ \text{requestTerminationRet} . \text{controllingMission} ? \text{requestTermination} \longrightarrow \\ \text{Skip} \end{array} \right) \text{handleAsyncEventRet} . \text{BeginLandingHandler} \longrightarrow$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •  

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$



$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet$$

$$\left( \begin{array}{l} \text{releaseCall} . \text{BeginLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{BeginLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{Methods} \hat{=}$$

$$\left( \begin{array}{l} \text{handlerAsyncEvent} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \end{array} \right) ; \text{Methods}$$

$$\triangle(\text{end\_aperiodic\_app} . \text{BeginLandingHandler} \longrightarrow \mathbf{Skip})$$

**end**

**class** *BeginLandingHandlerClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *BeginLandingHandlerMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

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**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**section** *NavigationMonitorApp* **parents** *PeriodicEventHandlerChan, SchedulableId, SchedulableIds* ,  
*CruiseMissionMethChan*

**process** *NavigationMonitorApp*  $\hat{=}$  *mission : MissionID* • **begin**

*handleAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{NavigationMonitor} \longrightarrow \\ \left( \begin{array}{l} \text{getControllingMissionCall} . \text{mission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{mission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \end{array} \right) \\ \\ \text{var heading : double} \bullet \text{heading} := \text{getHeading} \\ \text{getControllingMissionCall} . \text{mission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{mission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \\ \\ \text{var airSpeed : double} \bullet \text{airSpeed} := \text{getAirSpeed} \\ \text{getControllingMissionCall} . \text{mission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{mission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \\ \\ \text{var altitude : double} \bullet \text{altitude} := \text{getAltitude} \\ \text{Skip} \end{array} \right) \text{handleAsyncEventRet} . \text{NavigationMonitor} \longrightarrow \text{Skip}$$

*Methods*  $\hat{=}$

*(handleAsyncEvent)* ; *Methods*

$\triangle(\text{end\_periodic\_app} . \text{NavigationMonitor} \longrightarrow \text{Skip})$

**end**

**class** *NavigationMonitorClass*  $\hat{=}$  **begin**

- **Skip**

**end**

## 5.7 LandMission

**section** *LandMissionApp* **parents** *scj\_prelude, MissionId, MissionIds, SchedulableId, SchedulableIds, MissionChan, SchedulableMethChan, LandMissionClass* , *LandMissionMethChan*

**process** *LandMissionApp*  $\hat{=}$  *storageParametersSchedulable : MissionID, groundDistanceMonitor : MissionID, landingHar*

*State*

*this* : **ref** *LandMissionClass*

**state** *State*

*Init*

*State'*

*this'* = **new** *LandMissionClass*()

*InitializePhase*  $\hat{=}$

$$\left( \begin{array}{l} \text{initializeCall} . \text{LandMission} \longrightarrow \\ \text{register} ! \text{GroundDistanceMonitor} ! \text{LandMission} \longrightarrow \\ \text{register} ! \text{LandingGearHandlerLand} ! \text{LandMission} \longrightarrow \\ \text{register} ! \text{InstrumentLandingSystemMonitor} ! \text{LandMission} \longrightarrow \\ \text{register} ! \text{SafeLandingHandler} ! \text{LandMission} \longrightarrow \\ \text{initializeRet} . \text{LandMission} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*CleanupPhase*  $\hat{=}$

$$\left( \begin{array}{l} \text{cleanupMissionCall} . \text{LandMission} \longrightarrow \\ \text{cleanupMissionRet} . \text{LandMission} ! \text{False} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*stowLandingGearMeth*  $\hat{=}$

$$\left( \begin{array}{l} \text{stowLandingGearCall} . \text{LandMission} \longrightarrow \\ \text{this} . \text{stowLandingGear}(); \\ \text{stowLandingGearRet} . \text{LandMission} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*isLandingGearDeployedMeth*  $\hat{=}$  **var** *ret* :  $\mathbb{B}$  •

$$\left( \begin{array}{l} \text{isLandingGearDeployedCall} . \text{LandMission} \longrightarrow \\ \text{ret} := \text{this} . \text{isLandingGearDeployed}(); \\ \text{isLandingGearDeployedRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*getControllingMissionMeth*  $\hat{=}$  **var** *ret* : *MissionID* •

$$\left( \begin{array}{l} \text{getControllingMissionCall} . \text{LandMission} \longrightarrow \\ \text{ret} := \text{this} . \text{getControllingMission}(); \\ \text{getControllingMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \text{Skip} \end{array} \right)$$

*abortMeth*  $\hat{=}$

$$\left( \begin{array}{l} \text{abortCall} . \text{LandMission} \longrightarrow \\ \text{this} . \text{abort}(); \\ \text{abortRet} . \text{LandMission} \longrightarrow \\ \text{Skip} \end{array} \right)$$

$$\text{cleanUpMeth} \hat{=} \mathbf{var} \text{ ret} : \mathbb{B} \bullet \left( \begin{array}{l} \text{cleanUpCall} . \text{LandMission} \longrightarrow \\ \text{ret} := \text{this} . \text{cleanUp}(); \\ \text{cleanUpRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

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$$\text{getMissionMeth} \hat{=} \mathbf{var} \text{ ret} : \text{Mission} \bullet \left( \begin{array}{l} \text{getMissionCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getMissionRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{getSequencerMeth} \hat{=} \mathbf{var} \text{ ret} : \text{MissionSequencer} \bullet \left( \begin{array}{l} \text{getSequencerCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{getSequencerRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{requestTerminationMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{requestTerminationCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{requestTerminationRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{terminationPendingMeth} \hat{=} \mathbf{var} \text{ ret} : \text{boolean} \bullet \left( \begin{array}{l} \text{terminationPendingCall} . \text{LandMission} \longrightarrow \\ ; \\ \text{terminationPendingRet} . \text{LandMission} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{deployLandingGearSyncMeth} \hat{=} \left( \begin{array}{l} \text{deployLandingGearCall} . \text{LandMission} ? \text{thread} \longrightarrow \\ \left( \begin{array}{l} \text{startSyncMeth} . \text{LandMissionObject} . \text{thread} \longrightarrow \\ \text{lockAcquired} . \text{LandMissionObject} . \text{thread} \longrightarrow \\ (\text{this} . \text{landingGearDeployed} := \text{true}); \\ \text{endSyncMeth} . \text{LandMissionObject} . \text{thread} \longrightarrow \\ \text{deployLandingGearRet} . \text{LandMission} . \text{thread} \longrightarrow \end{array} \right) \\ \mathbf{Skip} \end{array} \right)$$

*InitializePhase*  
☐  
*CleanupPhase*  
☐  
*stowLandingGearMeth*  
☐  
*isLandingGearDeployedMeth*  
☐  
*getControllingMissionMeth*  
☐  
*abortMeth*  
☐  
*cleanUpMeth*  
☐  
*getMissionMeth*  
☐  
*getSequencerMeth*  
☐  
*requestTerminationMeth*  
☐  
*terminationPendingMeth*  
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*requestTerminationMeth*  
☐  
*terminationPendingMeth*  
☐  
*getMissionMeth*  
☐

•  $(Init ; Methods) \triangle (end\_mission\_app . LandMission \longrightarrow \mathbf{Skip})$

**end**

**class** *LandMissionClass*  $\hat{=}$  **begin**

**state** *State*

*SAFE\_LANDING\_ALTITUDE* : *double*

*abort* :  $\mathbb{B}$

*landingGearDeployed* :  $\mathbb{B}$

**state** *State*

**initial** *Init*

*State'*

*SAFE\_LANDING\_ALTITUDE'* = 10.0

*abort'* = *false*

**public** *stowLandingGear*  $\hat{=}$

(*this* . *landingGearDeployed* := *false*)

**public** *isLandingGearDeployed*  $\hat{=}$  **var** *ret* :  $\mathbb{B}$  •

(*ret* := *landingGearDeployed* = **True**)

**public** *getControllingMission*  $\hat{=}$  **var** *ret* : *MissionID* •

(*ret* := *controllingMission*)

**public** *abort*  $\hat{=}$

(*this* . *abort* := *true*)

**public** *cleanUp*  $\hat{=}$  **var** *ret* :  $\mathbb{B}$  •

(  
;  
*ret* := ( $\neg$  *abort* = **True**)  
)

• **Skip**

**end**

**section** *LandMissionMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *stowLandingGearCall* : *MissionID*  
**channel** *stowLandingGearRet* : *MissionID*

**channel** *isLandingGearDeployedCall* : *MissionID*  
**channel** *isLandingGearDeployedRet* : *MissionID*  $\times$   $\mathbb{B}$

**channel** *getControllingMissionCall* : *MissionID*  
**channel** *getControllingMissionRet* : *MissionID*  $\times$  *MissionID*

**channel** *abortCall* : *MissionID*  
**channel** *abortRet* : *MissionID*

**channel** *cleanUpCall* : *MissionID*  
**channel** *cleanUpRet* : *MissionID*  $\times$   $\mathbb{B}$

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**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *getMissionCall* : *MissionID*  
**channel** *getMissionRet* : *MissionID*  $\times$  *Mission*

**channel** *getSequencerCall* : *MissionID*  
**channel** *getSequencerRet* : *MissionID*  $\times$  *MissionSequencer*

**channel** *requestTerminationCall* : *MissionID*  
**channel** *requestTerminationRet* : *MissionID*  $\times$  *boolean*

**channel** *terminationPendingCall* : *MissionID*  
**channel** *terminationPendingRet* : *MissionID*  $\times$  *boolean*

**channel** *deployLandingGearCall* : *MissionID*  $\times$  *ThreadID*  
**channel** *deployLandingGearRet* : *MissionID*  $\times$  *ThreadID*

## 5.8 Schedulables of

**section** *LandingGearHandlerLandApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds* ,  
*LandMissionMethChan*, *ObjectIds*, *ThreadIds*

**process** *LandingGearHandlerLandApp*  $\hat{=}$  *mission* : *MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{isLandingGearDeployedCall} . \text{mission} \longrightarrow \\ \text{isLandingGearDeployedRet} . \text{mission} ? \text{isLandingGearDeployed} \longrightarrow \\ \\ \mathbf{var} \text{landingGearIsDeployed} : \mathbb{B} \bullet \text{landingGearIsDeployed} := \text{isLandingGearDeployed} \\ \mathbf{if} \text{landingGearIsDeployed} = \mathbf{True} \longrightarrow \\ \quad \left( \begin{array}{l} \text{stowLandingGearCall} . \text{mission} \longrightarrow \\ \text{stowLandingGearRet} . \text{mission} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\ \quad \parallel \neg \text{landingGearIsDeployed} = \mathbf{True} \longrightarrow \\ \quad \quad \left( \begin{array}{l} \text{deployLandingGearCall} . \text{mission} . \text{LandingGearHandlerLandThread} \longrightarrow \\ \text{deployLandingGearRet} . \text{mission} . \text{LandingGearHandlerLandThread} \longrightarrow \\ \mathbf{Skip} \end{array} \right) \\ \mathbf{fi} \\ \mathbf{Skip} \end{array} \right) \text{handleAsyncEventRet} . \text{Landin}$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*releaseMeth*  $\hat{=}$  **var** *ret* : *void* •

$$\left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$



$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{LandingGearHandlerLand} \longrightarrow \\ ; \\ \text{releaseRet} . \text{LandingGearHandlerLand} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{Methods} \hat{=} \left( \begin{array}{l} \text{handlerAsyncEvent} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \\ \square \\ \text{releaseMeth} \end{array} \right) ; \text{Methods}$$

$\triangle(end\_aperiodic\_app . LandingGearHandlerLand \longrightarrow \mathbf{Skip})$

**end**

**class** *LandingGearHandlerLandClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *LandingGearHandlerLandMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**section** *SafeLandingHandlerApp* **parents** *AperiodicEventHandlerChan*, *SchedulableId*, *SchedulableIds*, *LandMissionMethChan*

$$\text{process } \textit{SafeLandingHandlerApp} \hat{=} \textit{landMission} : \textit{MissionID} \bullet \text{begin}$$

State \_\_\_\_\_  
 threshold : double

state *State*

<i>Init</i>	
<i>State'</i>	
<i>threshold' = threshold</i>	

$$\text{handlerAsyncEvent} \triangleq \left( \begin{array}{l} \text{handleAsyncEventCall} . \text{SafeLandingHandler} \longrightarrow \\ \left( \begin{array}{l} \text{getControllingMissionCall} . \text{landMission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{landMission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \end{array} \right) \\ \mathbf{var} \textit{altitude} : \textit{double} \bullet \textit{altitude} := \textit{getAltitude} \\ \mathbf{if} (\textit{altitude} < \textit{threshold}) \longrightarrow \\ \quad )(\phantom{\text{getControllingMission}}) \\ \quad \Box \neg (\textit{altitude} < \textit{threshold}) \longrightarrow \\ \quad )(\phantom{\text{getControllingMission}}) \\ \mathbf{fi} \\ \mathbf{Skip} \end{array} \right) \text{handleAsyncEventRet}$$
$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$
$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$
$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$
$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \mathbf{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$$\text{releaseMeth} \hat{=} \mathbf{var} \text{ ret} : \text{void} \bullet \left( \begin{array}{l} \text{releaseCall} . \text{SafeLandingHandler} \longrightarrow \\ ; \\ \text{releaseRet} . \text{SafeLandingHandler} ! \text{ret} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

$Methods \hat{=}$   
 $\left( \begin{array}{l} handlerAsyncEvent \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \\ \square \\ releaseMeth \end{array} \right) ; Methods$

$\triangle(end\_aperiodic\_app . SafeLandingHandler \longrightarrow \mathbf{Skip})$

**end**

**class** *SafeLandingHandlerClass*  $\hat{=}$  **begin**

- **Skip**

**end**



**section** *SafeLandingHandlerMethChan* **parents** *scj\_prelude, GlobalTypes, MissionId, SchedulableId*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**channel** *releaseCall* : *SchedulableID*  
**channel** *releaseRet* : *SchedulableID*  $\times$  *void*

**section** *GroundDistanceMonitorApp* **parents** *PeriodicEventHandlerChan*, *SchedulableId*, *SchedulableIds* ,  
*LandMissionMethChan*

**process** *GroundDistanceMonitorApp*  $\hat{=}$  *mission* : *MissionID* • **begin**

<i>State</i> <i>readingOnGround</i> : double
---

**state** *State*

<i>Init</i> <i>State</i> '
<i>readingOnGround</i> ' =

*handlerAsyncEvent*  $\hat{=}$

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{GroundDistanceMonitor} \longrightarrow \\ \left( \begin{array}{l} ; \\ \text{getControllingMissionCall} . \text{mission} . \text{getControllingMission}() \longrightarrow \\ \text{getControllingMissionRet} . \text{mission} . \text{getControllingMission}() ? \text{getControllingMission} \longrightarrow \\ \\ \text{var distance} : \text{double} \bullet \text{distance} := \text{getAltitude} \\ \text{if } (\text{distance} = \text{readingOnGround}) \longrightarrow \\ \left( \begin{array}{l} ; \\ \text{requestTerminationCall} . \text{mission} \longrightarrow \\ \text{requestTerminationRet} . \text{mission} ? \text{requestTermination} \longrightarrow \\ \text{Skip} \end{array} \right) \\ \parallel \neg (\text{distance} = \text{readingOnGround}) \longrightarrow \text{Skip} \\ \text{fi} ; \\ \text{Skip} \end{array} \right) \end{array} \right) \text{handleAsyncEventRet} . \text{Gro}$$

*Methods*  $\hat{=}$   
(*handlerAsyncEvent*) ; *Methods*

$\triangle(\text{end\_periodic\_app} . \text{GroundDistanceMonitor} \longrightarrow \text{Skip})$

**end**

**class** *GroundDistanceMonitorClass*  $\hat{=}$  **begin**

- **Skip**

**end**

**section** *InstrumentLandingSystemMonitorApp* **parents** *PeriodicEventHandlerChan, SchedulableId, SchedulableIds*

**process** *InstrumentLandingSystemMonitorApp*  $\hat{=}$  *mission : MissionID* • **begin**

*handlerAsyncEvent*  $\hat{=}$   

$$\left( \begin{array}{l} \text{handleAsyncEventCall} . \text{InstrumentLandingSystemMonitor} \longrightarrow \\ \text{handleAsyncEventRet} . \text{InstrumentLandingSystemMonitor} \longrightarrow \\ \mathbf{Skip} \end{array} \right)$$

*Methods*  $\hat{=}$   
 $(\text{handlerAsyncEvent}) ; \text{Methods}$

$\triangle(\text{end\_periodic\_app} . \text{InstrumentLandingSystemMonitor} \longrightarrow \mathbf{Skip})$

**end**

**class** *InstrumentLandingSystemMonitorClass*  $\hat{=}$  **begin**

- **Skip**

**end**