Appendix 3

PRODEX EXPERIMENT ARRANGEMENT CHANGE NOTICE

PEA: **4000119373** CN No: **1**
Institute: **Institute of Atmospheric Physics, Czech Academy of Sciences**
Project: **JUICE RPWI Low Frequency Receiver – Phase C/D**

Title of area affected:	Article(s) of the Arrangement:
Funds & Term	**2 & 3** Initiator of change: **ESA**

Description of change:

Reshuffling of funds and delay of deliverables.

Reason for change:

Changes in the project schedule result in a different distribution of expenses over time. The required work and budget remains unchanged.

Cost Neutral CN

See updated Financial Plan in annex.

Total amount LoL including present CN: **639'600 EURO**

Effect on other Arrangement provisions: N/A	Commencement of Term: **01.01.2017** End of Term: **31.12.2022**

Institute

Institute's representative(s):	Date 15.12.2020

ESA

PRODEX Office representative(s): M. Haag V. Dowson M. Lazerges	Date 9.12.2020 10.12.2020 10.12.2020

1. WORK DESCRIPTION

The programme of work remains as written in the PEA.

2. WORK BREAKDOWN STRUCTURE (WBS)

N/A

3. WORK PACKAGES

N/A

4. DELIVERABLES

4.1. Documentation

	Periodic (monthly)	MRR (EM/ PFM/ FS)	TRR (EM/ PFM/ FS)	DRB (EM/PFM/FS)	ICDR
Management Documentation					
Progress report (monthly)	X				
Schedule	X				
Action Items List	X				
Deliverable Items List	X	X	X	X	X
Technical Documentation					
Inputs to System AIV/AIT plan		X			x
LFR Design report		X			x
GSE Design Report					
Test Plan			X	X	X
Test Specifications			X	X	
Test Procedure (Functional, Thermal, Vibration, EMC) QM, FM			X	X	X
Test report				X	
Technical notes (ad hoc)		X	X	X	X
Inputs to EICD		X			x
Inputs to MICD		X			x
Electrical drawings (schematics)	X	X			x
End Item Datapack* (for each of the Deliverable Items)				X	
DRB Minutes of Meeting				X	

Certificate of Conformance (part of EIDP*)				X	
Logbook (part of EIDP*)				X	
Transportation plan (part of EIDP*)				X	
As-Built Configuration List (part of EIDP*)				X	
PA Documentation					
LLI list	X			X	
Non Conformance Report(s)				x	x
NCR Status list				x	x
Request for Waiver				x	x
Request for Deviation				x	x
DML		X		X	X
DPL		X		X	X
DCL for EM/QM/FM		X		X	X
Part Stress Analysis (PSA)					X
FMEA (or inputs to RPWI FMEA)					X
Worst Case Analysis					X
Critical Items List					X

4.2. Hardware

The following hardware are to be developed, manufactured and delivered. All models except for the Flight Spare have already been completed and delivered (where applicable as of Nov 9th 2020)

EM1.5- Engineering Model 1.5:

A prototype developed primarily for FPGA firmware development and validation, but also for verification of the EM design. Built from a mix of proto-flight and commercial parts. Shall include a re-programmable FPGA, all interfaces to the FPGA shall be fully representative. Shall be built and tested before EM2 PCB is procured and before EM2 FPGA firmware is programmed in the RTAX-PROTO.

Note: This model remains at IAP for internal testing, used for interface tests

EM2 - Engineering Model 2: Delivered to IRFU in April 2017 and later to ESA/Airbus. Built from representative parts in compliance with EID-A. Parts were be mostly ordered via PRODEX/CPPA, with the exception of passive parts.

Note: Deliverable model (to be delivered to IRFU and to ESA)

EM3 -Engineering Model 3: Final engineering model similar to QM, will stay at IAP. EM3 will be built from representative parts in a similar quality standard as EM2. Parts will be mostly ordered via PRODEX/CPPA, with the exception of passive parts.

Note: This model, originally meant to remain at IAP, has been delivered to IRFU and is used for software testing and for calibration.

EM0.5 (Software test model):

A minimum version of LF, containing only digital circuits and interfaces, built from commercial components. This was delivered to IRFU to provide an additional model for software development.

STM: For STM, IAP provided a fully representative PCB with dummy weights and resistor loads, to simulate mechanical and thermal properties of LF.

PFM: A proto-flight model, built from flight parts and fully tested. Now integrated in PFM EBOX delivered to Airbus in August 2020.

FS (Flight Spare): A flight spare model, identical to the flight model. Will be integrated in flight spare box by IRFU. This mode will be most likely swapped for the PFM and used for flight. Board is scheduled to be delivered to IRFU before the end of 2020.

4.3. Computer programmes and models

The following software shall be delivered in the frame of the contract:

Flight software: A LF data processing module for RPWI flight software is under development and it is continuously integrated in the RPWI software running on the RPWI DPU. This software is developed according to ECSS flow. Multiple releases are planned, first release 1.0 already delivered in 2020.

Test scripts for RPWI LF flight software. The developed software requires a tect bench to validate its functionality.

Data visualization tool: A set of MATLAB scripts for visualization and parsing of LF data to be used in testing and calibration.

Ground calibration software: A software package to process raw LF telemetry into calibrated scientifically useful data products, which will be eventually delivered to the JUICE science archive. This package will apply the transfer functions obtained in ground calibration of LF and RPWI.

5. SCHEDULE

The following table list the schedule of the LF project. Light green lines indicate tasks which have already been achieved as of 9th November 2020.

Milestone	Scheduled/actual date
EM2 MRR	March 23, 2017
Order of long lead PFM/FS parts	September 2017
EM2 Delivery to IRFU	October 30, 2017
RPWI CDR	June 2018
PFM programming start	November 14, 2019
PFM DRB	April 1st 2020
PFM delivery to IRFU	24th February 2020
Flight software version 1.0 release	1st August 2020
STM delivery to IRFU	April 2019
FS FPGA programming	Finished in June 2020
FS manufacturing	June-September 2020
FS testing and calibration	October 2020
FS MIP	November 10-14, 2020
FS delivery to IRFU (remote, via DHL)	Early December 2020

Flight software implementation completed	June 2021
LF FS DRB	TBD (probably January 2021)
Flight software V2.0 validation completed	End 2021

6. INVOICING

The Contractor will be asked to submit invoices when the corresponding costs are accrued and the following conditions are met.

- The last invoice of the year will be paid only when the deliverables planned for that year - as defined in section 4 here above, or in a another Change Notice (CN) signed by both parties (Contractor and ESA) -have been accepted by ESA.
- The final invoice will be paid upon acceptance by ESA of all the deliverables of the activity - as defined in section 4 here above, or in another Change Notice (CN) signed by both parties (Contractor and ESA) - have been accepted by ESA.

Note that the expenses for the period from January 2017 to October 2018 have already been invoiced.

7. PROJECT CHECK POINTS

Project progress and deliverables will be checked according to Table 3.

Table 1: Check points for deliverables readiness.

Check-Point number	**Planned date**	**Description**
1	September 2021	Check of FS delivery (after all tests and FS delivery to ESA)
2	February 2022	Check of the status of software delivery and validation.
3	End of 2022	Check of completion of all deliveries

OSTATNÍ STRANY NEJSOU URČENY KE ZVEŘEJNĚNÍ