

Approved per signature page

PROGRESS CARGO VEHICLE  
**TRANSFER OPERATIONS**  
**TKF.1**

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## INTRODUCTION

This book is intended for performing cargo transfer operations in Progress and on stowing equipment in SM and Progress

This book is intended for trained crew members who have completed the full training course and simulations

This document may change pending SM and Progress modification and procedure validation at simulators

The procedures for next Progress will be issued as a Supplement

Equipment will be stowed into Progress containers in Soyuz in accordance with the documentation

The flight procedure will be updated to reflect Soyuz current stowage status

## ACRONYMS AND ABBREVIATIONS

б/и	- crew procedure
бл	- unit
БКС	- onboard cable network
БЛТ	- switch unit
ВЕНТ	- fan
ВнеКД	- EVA
в/ч	- high-frequency, HF
ГА	- gas analyzer
ГрО	- Progress cargo compartment
ГЖТ	- gas-liquid heat exchanger
<b>ДнаЗ</b>	- <b>report to MCC</b>
<b>поУЗ</b>	- <b>on MCC Go</b>
ЕДВ	- water container
КСД	- depress valve
р/г	- radiogram
КТО	- solid waste container
н/ч	- low-frequency, LF
ОТКЛ	- OFF
пан	- panel
п	- step
ПВХ	- PVC (Polyvinyl Chloride plastic)
пл	- orientation plane
ПТО	- IFM
рзм	- connector
СЛГ	- Personal Hygiene Items
СМ	- Service Module
СПП	- utensils
стр	- page
СтА	- docking assembly
СУ	- docking volume
→←	- connect (mate)
←→	- disconnect (demate)
ТКГ	- Progress
ук-ка	- kit
х/б	- cotton
ЭВТИ	- multilayer insulation

## 1. GENERAL INSTRUCTIONS

### 1.1. CARGO TRANSFER OPERATIONS PREPARATION

Prepare: cotton gloves, goggles, respirator, waste bag

Perform operations per this procedure after performing RODF: ACTIVATION/DEACTIVATION: OPERATIONS AFTER DOCKING WITH PROGRESS. For 2A.2B — after performing RODF: 2A.2B RUSSIAN SEGMENT OPERATIONS, PROGRESS INGRESS and PROGRESS EGRESS.

Unstow Progress tool belt containing the tools for Progress cargo transfer operations

Cargo transfer operations in Progress are performed per RODF: TRANSFER OPERATIONS and per decals provided on containers and equipment

During cargo transfer operations, one crew member works in Progress, the other — in SM.

### 1.2. CARGO TRANSFER OPERATIONS

To locate cargo items, use provided location diagrams.

When necessary, don gloves, goggles, and/or respirator.

Install units into nominal locations according to RODF:SM IFM EVA, record the time spent on each operation.

Avoid unrestrained drift of units and equipment when passing hands.

During transfer, preclude transferred items from hitting station structures, especially control panels.

When removing unit: first start with all custom bolts, then sequentially untighten them avoiding skew.

Make use of available restraints.

Used tools should be tethered to hands or to structures within working area.

While unloading, whenever possible, install removed launch fasteners into mounting holes becoming available in the result of equipment or frame removal.

Stow all fasteners and disposables used to secure delivered cargo items in waste bag.

Regularly brief **MCC** on all performed transfer operations.

### 1.3. USED EQUIPMENT STOWAGE IN PROGRESS

During used equipment stowage, preserve free access to КСД valve (located on plane IV).

Equipment stowage along plane IV must be performed at the very latest.

Securing and stowage of removed items in Progress cargo compartment (ГрО) must be performed with a view to preserve the vehicle mass-centering characteristics.

All operations on equipment stowage in ГрО and transfer of liquid waste to Rodnik tanks are performed by the crew per **MCC** instructions.

Stowage of removed items is performed only after all delivered items have been unloaded and transferred to ISS.

√**MCC** for removed items stowage sequence.

Video-taping is performed to:

confirm that all removed items are positioned as required;

provide visual confirmation that all removed items are reliably restrained.

Crew must take video record of the removed items actual stowage configuration.

Video-taping is performed per **MCC** instructions throughout the whole duration of removed items stowage sequence and must be accompanied by a detailed crew commentary. It must include:

- confirmation for beginning of stowage operations (when ГрО is completely unloaded);
- confirmation for completion of each container loading;
- confirmation for installation of large-sized unit and kits on various planes of cargo vehicle and above the upper row containers (with crew commentary).

Every container must be video-taped after it has been filled with removed items in accordance with provided instructions.

When removed items are stowed in the cells between containers located along stabilization planes, every large-sized unit (or kit) with a mass more than 10 kg must be video-taped by the crew.

Video-taping of specific units and performance of any vehicle-specific operations must be performed per **MCC** instructions.

After video-taping is complete, the recorded video must be downlinked to **MCC**.

All the tools used during transfer operations must be stowed in their nominal locations.

Report the results of used equipment stowage in Progress to **MCC**.

Stow all remaining unused leftovers from food rations into one container for food rations and place this box into designated location, making a corresponding record in Flight Log.

Fill up all removable and non-removable Progress containers with used equipment and solid waste as indicated per radiogram.

## 1.4. FASTENERS AND TOOLS OPERATION

The following types of fasteners are used to secure containers, assemblies and units in Progress:  
custom bolts and bolt locks

MAKITA power driver (Tool Kit #3) may be used in SM (with socket S12 via adapter)

To remove bolt:

- unstow custom wrench (“анкерный”) from Progress Tool belt;
- install custom wrench onto bolt head;
- secure custom wrench on bolt head, by depressing the lock pin on custom wrench;
- remove bolt;
- release custom wrench grip on bolt by pulling out the lock pin.

Install and tighten bolt in a similar fashion

For difficult accessed bolts, use custom wrench extension tool

To open bolt lock, do the following:

- install custom wrench onto bolt lock nut
- engage grip by depressing the lock pin
- turn wrench 30°
- remove bolt lock shaft together with nut

If there are nonstandard fasteners, use tools from SM tool kits.

## 1.5. REMOVAL/ INSTALLATION OF CONTAINERS

After unloading containers in zone III (Figure 1.5.-2), they need to be removed as follows:

- remove custom bolts (two) inside container top (fastening container to bulkhead)
- remove custom bolts (two) on container upper angle plates
- move angle plates aside after loosening custom bolts on bulkhead
- remove custom bolts (three) on container bottom (fastening the container to container in zone II)

Remove the container and secure it to frame in a convenient location

Having unloading the containers of zone II, repeat operations for container removal (if required)

During stowage of used cargo items, perform container installation in the reverse order

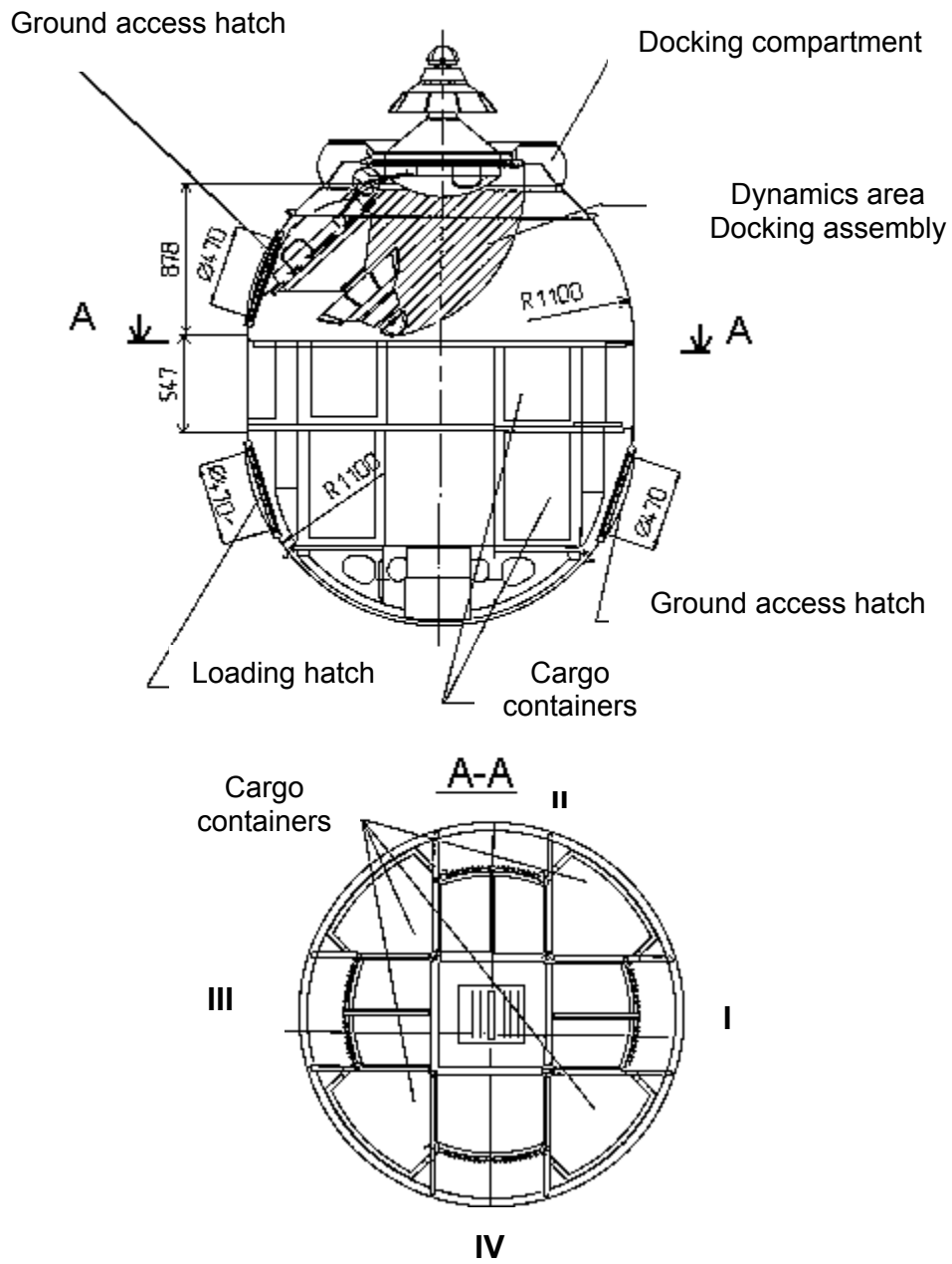


Figure 1.5-1 PROGRESS ГрО

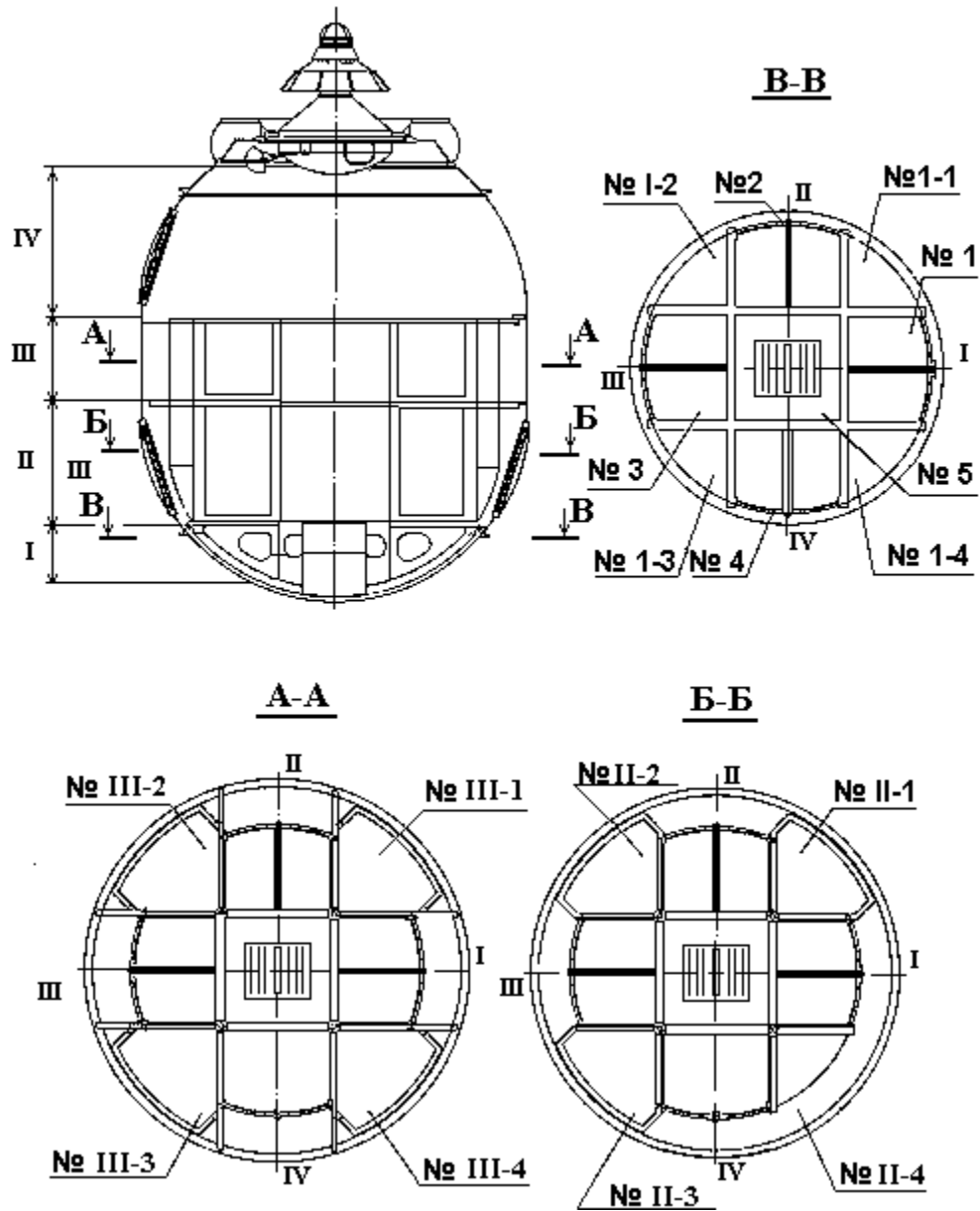


Figure 1.5-2 Areas and Containers for Cargo Location in Progress

## 2. REMOVAL OF PROGRESS DOCKING MECHANISM AND TRANSFER HATCH COVER

Remove docking mechanism **on MCC GO**, and also if large-sized delivered equipment are stowed in ГрО or special experiments need be conducted. It is recommended not to remove docking mechanism during subsequent Progress redocking.

Required Tools and Hardware: 10 mm Combo Wrench  
12 mm Combo Wrench  
10 mm Spanner  
Wire Cutters  
Scissors  
Standard Screwdriver (0.7x7x180 mm)  
PVC Tape (from Progress Tool belt)  
Custom Wrench (from Progress Tool belt)  
Waste Bag  
Portable Lamp  
Vacuum Cleaner

### 2.1. DOCKING MECHANISM REMOVAL FROM TRANSFER HATCH

(01:30:00)

#### **WARNING**

Prior to docking mechanism removal,  
deactivate docking and internal transfer system (CCBT)

Remove captive screws (four) located in the center of hatch from the ГрО side  
Remove protective cover  
Connector Г11/201 ↔ cable connector  
Plug 11Ф732 Г5501А6-90 →← cable connector (plug is tethered to the cable)  
Open transfer hatch  
Secure the hatch in the open position  
Roll up edges of multilayer insulation on docking mechanism cone  
Move multilayer insulation aside from hatch, untightening docking mechanism fastening bolts  
Secure multilayer insulation (PVC tape)

#### NOTE

Place all removed fasteners for safe stowage when  
performing docking mechanism removal from hatch

Remove lockwire (Wire Cutters) and remove bolts (seventeen) (10 mm Spanner) that secure docking mechanism to hatch  
Temp stow removed bolts in waste bag  
Stow remaining lockwire in waste bag  
Remove docking mechanism from interface guide pins by prying docking mechanism flange (Screwdriver)

Move docking mechanism away from hatch as far as cable length would allow (do not overtighten cables)  
Connectors Г9/201, Г10/201, Г11/201, Г64/201 ↔ corresponding cable connectors of docking mechanism on the hatch exterior  
Tether demated connectors to disconnected docking mechanism (PVC Tape)  
Cap corresponding hatch and cables connectors Г9/201, Г10/201, Г11/201, Г64/201  
Clean hatch interfaces (Vacuum Cleaner)

Stow removed docking mechanism in ГpO and secure to frame (Nylon Band)

## 2.2. DOCKING MECHANISM INSTALLATION ONTO HATCH

(00:60:00)

Remove PVC tape that tethers cables to docking mechanism  
Remove protective caps from cable and hatch connectors

Move docking mechanism to hatch at a distance allowing proper connector mating and alignment of docking mechanism flanges with the openings and guide pins on hatch  
Connectors Г9/201, Г10/201, Г11/201, Г64/201 →↔← corresponding cable connectors of docking mechanism

Install docking mechanism on guide pins (four) and secure with bolts (seventeen)  
Return multilayer insulation edges to nominal position  
Plug 11Φ732 Г5501A6-90 ↔ cable  
Cable →↔← connector Г11/201 (from the ГpO side)

## 2.3. TRANSFER HATCH REMOVAL

(00:40:00)

Hatch removal may be performed with removed or installed docking mechanism  
Connectors 40/201-1, 40/201-11 ↔ sensors on hatch  
Cable ↔ hatch rotation mechanism by either removing snap-outfitted straps (seven) or by cutting the straps or three band clamps  
Cap demated connectors  
Fold cable in harness, securing it to ГpO frame (PVC tape)  
Remove bolts (four), that secure hatch rotation mechanism to docking assembly (10 mm Combo Wrench)  
Remove hatch with attached rotation mechanism from guide pins (two) by prying rotation mechanism (Screwdriver)  
Stow hatch with attached rotation mechanism in ГpO and secure (Nylon Band)

Stow all removed parts for later use

Connector 39/201 ↔ contact device of hatch sealing mechanism drive  
Plug 11Φ732 Г5501A6-150 →↔← cable connector 11Φ732 Г5501A5-160 (plug is tethered to cable)  
Tether cable to cable harness (PVC tape)

## 2.4. TRANSFER HATCH INSTALLATION

(00:40:00)

Hatch installation may be performed with or without removing docking mechanism

Detach cable with connector 39/201 from the cable harness

Plug 11Φ732 Γ5501A6-150 ↔ cable connector 11Φ732 Γ5501A5-160 (plug is tethered to cable)

Connector 39/201 →|← contact device of hatch sealing mechanism drive

Install hatch with attached rotation mechanism onto guide pins (two)

Tighten bolts (four), that secure hatch rotation mechanism to docking assembly

(10 mm Combo Wrench)

Release cable previously folded in harness

Connectors 40/201-1, 40/201-11 →|← sensors on hatch

### 3. KURS A SYSTEM UNITS REMOVAL

(03:00:00)

Required Tools and Hardware: 7 mm Combo Wrench  
 8 mm Combo Wrench  
 14 mm Combo Wrench  
 19 mm mm Combo Wrench  
 Scissors  
 PVC Tape (from Progress Tool belt)  
 Connector Caps  
 Custom Wrench (from Progress Tool belt)  
 Antistatic Wrist Strap  
 Fluoroplastic Tape  
 Waste Bag

#### WARNING

Prior to removal operations, such as БР9ЦУ3 modes as НП (*Direct Transmission*), ЗАПИСЬ (*Record*), ВОСПРОИЗВЕДЕНИЕ (*Playback*) must be deactivated via КРЛ

#### 3.1. REMOVAL OF K1-BKA-03 ЯУ2.000.031-03 UNIT (≠34Ю=A1) WITH PT-BKA TEMPERATURE REGULATOR (≠34Ю=A2)

#### CAUTION

1. Handle K1-BKA-03 unit with extreme care, because:
  - a) the unit walls are thin
  - b) small-sized fans (two) are located on the unit side walls

#### NOTE

While performing all subsequent operations, temp stow all removed fasteners and other consumables in waste bag

Remove custom bolts (six) that secure upper protective panel of K1-BKA-03 unit  
 Remove custom bolts (five) that secure side protective panel of K1-BKA-03 unit  
 Tether removed protective panels to ГрО frame structures (PVC tape)  
 Release cables, leading to the unit, from cable harnesses  
 Remove seals from connector of PT-BKA unit (attached to K1-BKA-03 unit)  
 Demate cable connectors from unit connectors and cap

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
X61Ю34	X61Ю34	1-M14x0.75-3П	2-M14x0.75-3П
X62Ю34	X62Ю34	1-M18x1-3П	2-M18x1-3П
X345Ю34	X345Ю34	1-M10x0.75-3П	2-M10x0.75-3П

Tether released cables to ГрО frame structures (PVC tape)  
 Remove seals from high-frequency connectors of the unit  
 Release high-frequency cables from from tethers and clamps, starting from the closest cable

High-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP701, XP702, XP703, XP704, XP705, XP706, XP707, XP708, XP709, X13Ю43, X23Ю34	XP702, XP702, XP703, XP704, XP705, XP706, XP707, XP708, XP709, X13Ю43, X23Ю34	1-M12x0.75-3П - “ - - “ - - “ - - “ - - “ -	1P-M12x0.75-3П - “ - - “ - - “ - - “ - - “ -

Attach cables to ГpO frame structures (PVC tape)

Release low-frequency cables from tethers

Low-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
X37Ю34, X11Ю34 X21Ю34, X10Ю34	X37Ю34, X11Ю34 X21Ю34, X10Ю34	1-M22x1-3П - “ -	2-M22x1-3П - “ -
X09Ю34, X01Ю34 X36Ю34	X09Ю34, X01Ю34 X36Ю34	1-M14x0.75-3П 1-M18x1-3П	2-M14x0.75-3П 2-M18x1-3П
X358Ю34, X359Ю34 X360Ю34, X361Ю34 X362Ю34, X31Ю34	X358Ю34, X359Ю34 X360Ю34, X361Ю34 X362Ю34, X31Ю34	1-M27x1-3П - “ - - “ -	2-M27x1-3П - “ - - “ -
X02Ю34	X02Ю34	1-M14x0.75-3П	2-M12x0.75-3П

Attach cables to ГpO frame structures (PVC tape)

Remove nuts M4 (two) (7 mm wrench) to remove the ground strap from container

Remove bolt M5x10 (8 mm wrench) to remove the ground strap (located between frame and truss) from the frame

Remove M10 custom bolts (two) to remove frame with attached K1-BKA-03 unit

Remove custom bolts (four) to remove the unit

### 3.2. 2AOK1-BKA ЯУ2.008.050 UNITS REMOVAL

**2Φ4-BKA № 1, №2, №3, №4, №5 ЯУ3-468-011**

**(≠34Ю=W1, ≠34Ю=W2, ≠34Ю=W3, ≠34Ю=W4, ≠34Ю=W5)**

2AOK1-BKA (one unit) and 2Φ4-BKA (five units) units are installed on the same frame

Remove custom bolts (two) that secure Б 1830A59-170 beam to remove the beam

For 2AOK1-BKA unit:

Low-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP41	XP41	1-M27x1-3П	2-M27x-3П
XP42	XP42	1-M18x1-3П	2-M18x1-3П
XP43	XP43	1-M22x1-3П	2-M22x1-3П

For 2Φ4-BKA units:

a) for 2Φ4-BKA № 1 unit:

High-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP601, XP602, XP603	XP601, XP602, XP603	1-M12x0.75-3Π - “ -	1P-M12x0.75-3Π - “ -
X103Ю34-1 (LF)	X103Ю34-1	1-M14x0.75-3Π	2-M14x0.75-3Π

b) for 2Φ4-BKA № 2 unit:

High-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP601, XP602, XP603	XP601, XP602, XP603	1-M12x0.75-3Π - “ -	1P-M12x0.75-3Π - “ -
X103Ю34-2 (LF)	X103Ю34-1	1-M14x0.75-3Π	2-M14x0.75-3Π

c) for 2Φ4-BKA № 3 unit:

High-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP601, XP602, XP603	XP601, XP602, XP603	1-M12x0.75-3Π - “ -	1P-M12x0.75-3Π - “ -
X103Ю34-3 (LF)	X103Ю34-1	1-M14x0.75-3Π	2-M14x0.75-3Π

d) for 2Φ4-BKA № 4 unit:

High-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP601, XP602, XP603	XP601, XP602, XP603	1-M12x0,75-3Π - “ -	1P-M12x0,75-3Π - “ -
X103Ю34-4 (LF)	X103Ю34-1	1-M14x0,75-3Π	2-M14x0,75-3Π

e) for 2Φ4-BKA № 5 unit:

High-frequency cable connectors ↔ unit connectors and cap (all)

Cable Connector	Unit Connector	Unit Connector Cap	Cable Connector Cap
XP601, XP602, XP603	XP601, XP602, XP603	1-M12x0.75-3Π - “ -	1P-M12x0.75-3Π - “ -
X103Ю34-5 (LF)	X103Ю34-1	1-M14x0.75-3Π	2-M14x0.75-3Π

Remove M5x10 (8 mm wrench) bolt (one) to remove the ground strap (located between frame 11Φ615 Б1830А59-300 and truss) from the frame

Remove M6 custom bolts (three) and remove frame with attached units

#### NOTE

1. If none of the above-mentioned methods succeeds to demate connectors or disconnect ground straps from any of Kurs units, it is recommended to cut cables and ground straps at a distance of 80-100 mm from the units (with the exception of X358Ю34, X359Ю34, X360Ю34, X361Ю34, X362Ю34 connectors)
2. Safe the cut edges of cables (Fluoroplastic Tape)

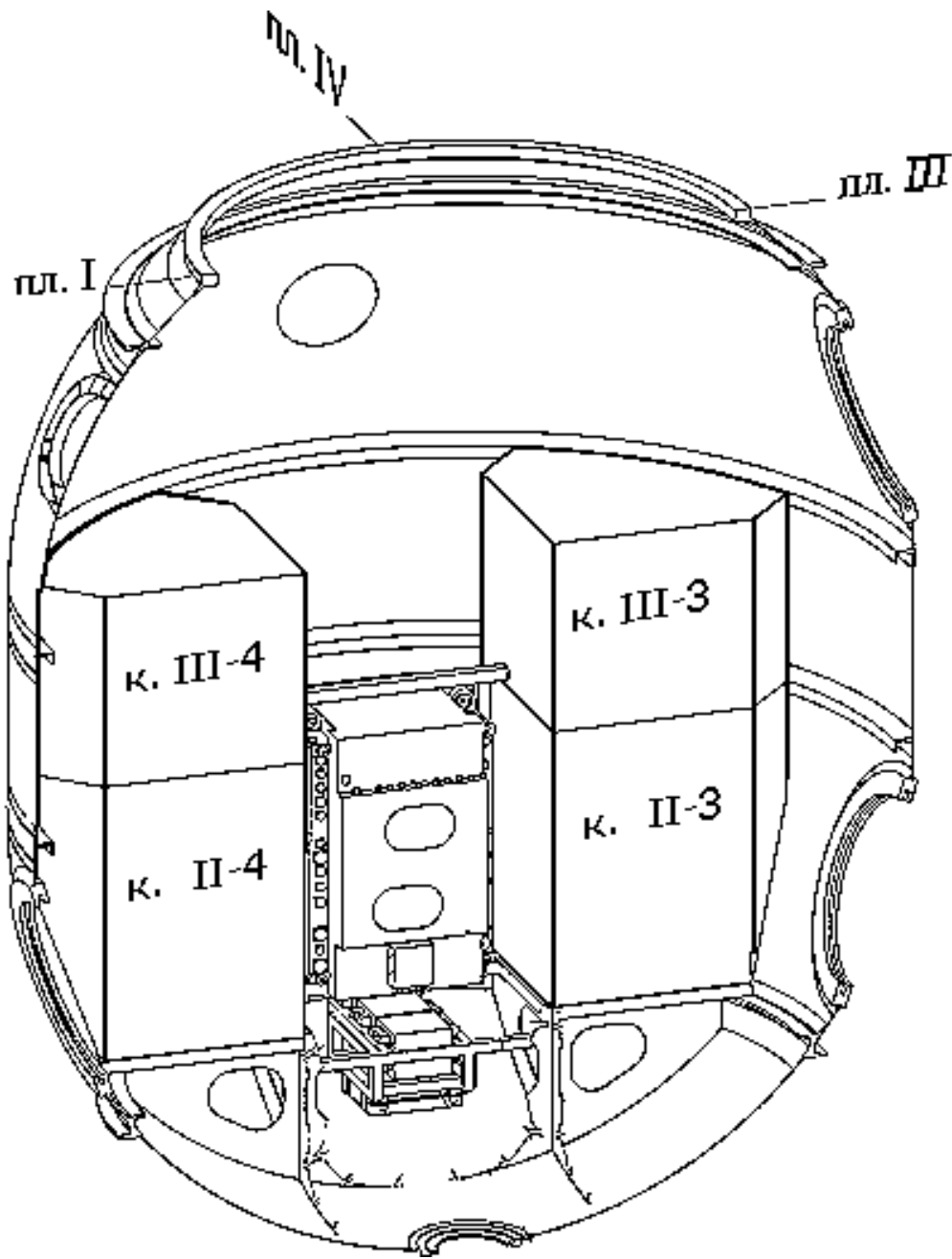


Figure 3.1-1. Kurs System Units Location Diagram

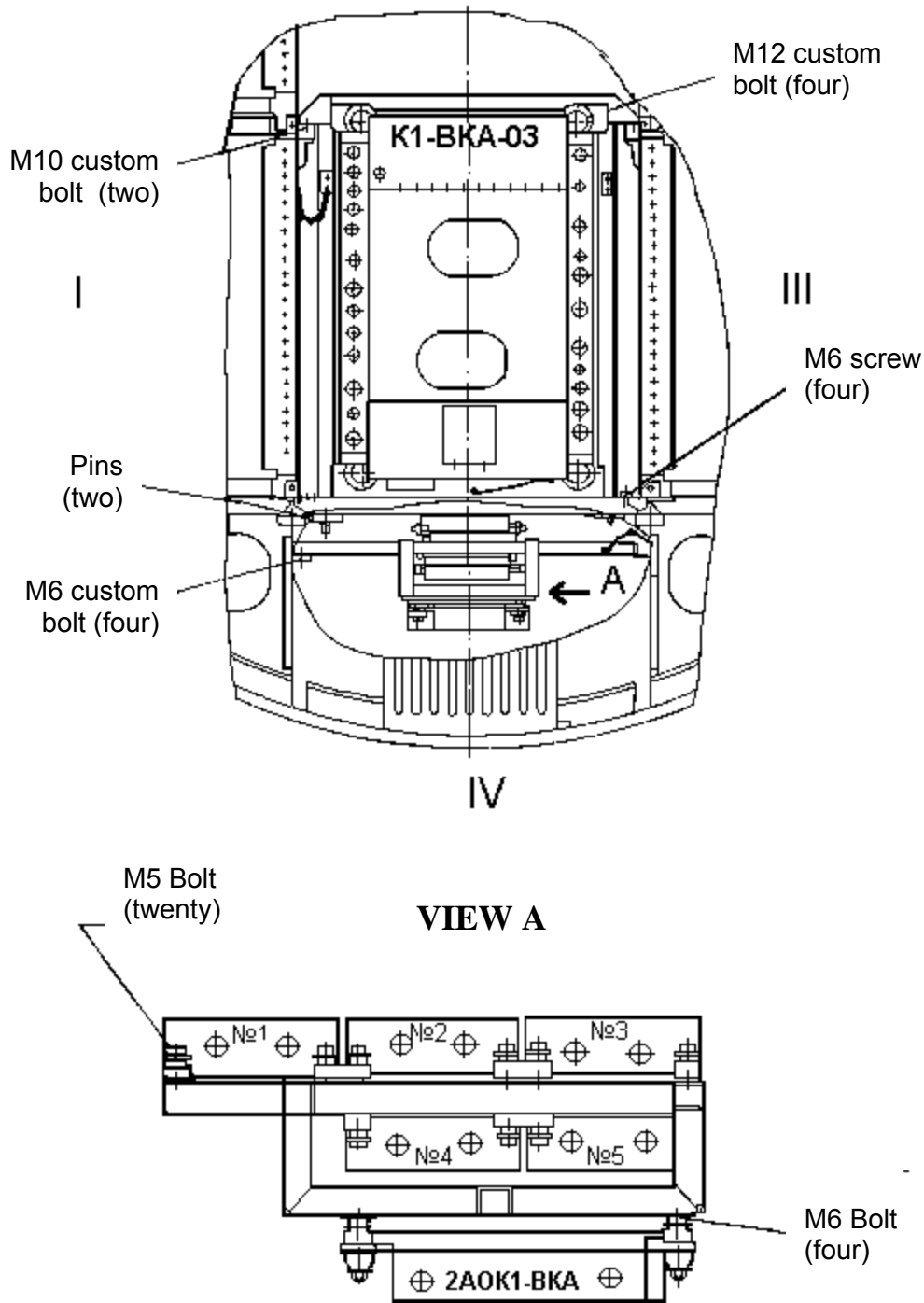


Figure 3.1-2. Kurs Units Removal Diagram

## 4. YC-21 MATCHING UNIT INSTALLATION/REMOVAL

### 4.1. YC-21 MATCHING UNIT INSTALLATION

(00:60:00)

Perform all operations on **MCC GO**

Required Tools and Hardware: YC-21 matching unit  
Progress tool belt

Loosen custom bolts (four) that fasten solid waste container [KTO] holder (plane IV, area IV)  
(if available)

Remove KTO holder and temp stow

Secure YC-21 unit with captive screws 'B' (three) to the upper truss structures (see Figure 4-1)

Remove caps from YC-21 unit connectors

Stow removed caps in soft bag on the YC-21 unit wall

Remove caps from cable connectors (retain removed caps for later use)

Remove static charge from connectors (static charge removal plugs)

(see RODF: IFM IVA, REFERENCE MATERIALS, 2.7)

Unit Connector	Static Charge Removal Plug
513/30, 514/30, 515/30	33Y.5512.032X2
520/30, 521/30	33Y.5512.018X4
519/30	33Y.5512.045X4

YC-21 unit connectors →← corresponding cable connectors:

118/10 →← 118/10

517/10 →← 517/10

518/10 →← 518/10

519/10 →← 519/10

513/30 →← 513/30

514/30 →← 514/30

515/30 →← 515/30

517/30 →← 517/30

519/30 →← 519/30

520/30 →← 520/30

521/30 →← 521/30

## 4.2. YC-21 MATCHING UNIT REMOVAL

(00:60:00)

Demate cable connectors from YC-21 unit connectors

118/10↔118/10

517/10↔517/10

518/10↔518/10

519/10↔519/10

513/30↔513/30

514/30↔514/30

515/30↔515/30

517/30↔517/30

519/30↔519/30

520/30↔520/30

521/30↔521/30

Cap demated cable connectors

Cap YC-21 unit connectors

Loosen captive screws 'B' (three) and remove YC-21 unit (see Figure 4-1)

Transfer YC-21 unit to permanent storage location in SM

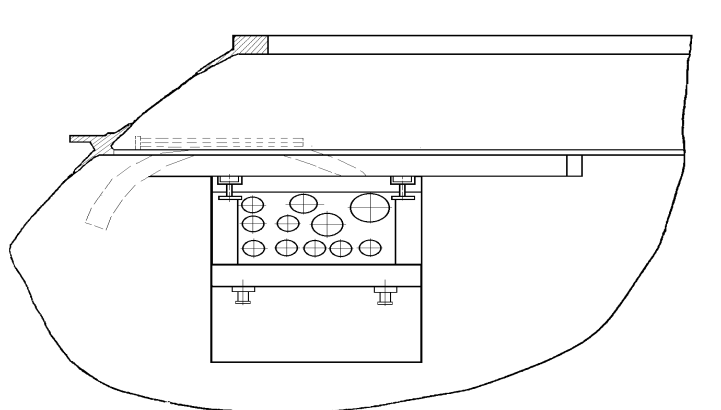
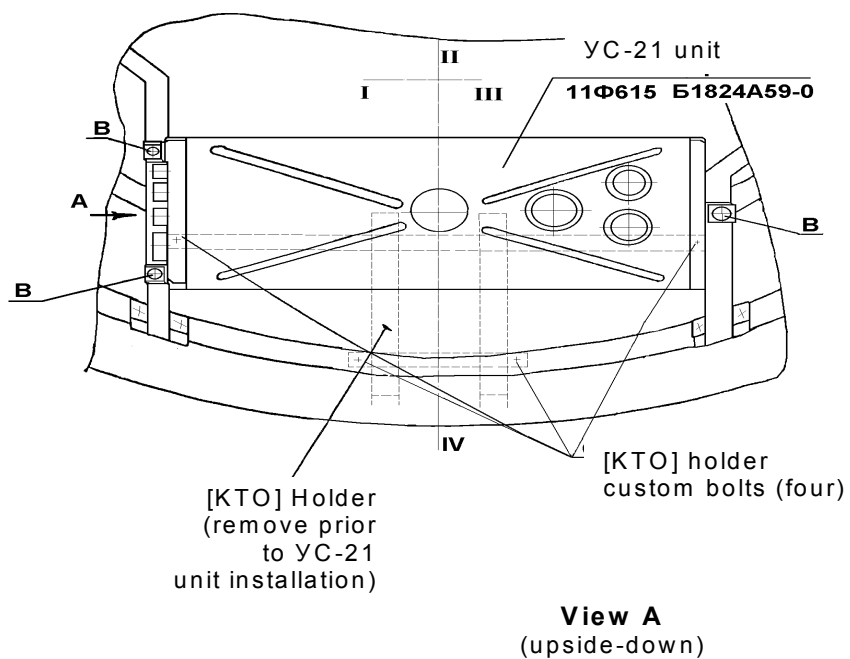


Figure 4-1. YC-21 Matching Unit Installation/Removal Diagram