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PROGRESS CARGO VEHICLE

TRANSFER OPERATIONS
TKГ.1

2000
### Page Revision Log

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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
ДнаЗ - report to MCC
поУЗ - on MCC Go
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\rightarrow (mate)
←\disconnect← (demate)
ТКГ - Progress
ук-ха - 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
Ground access hatch

Docking compartment

Dynamics area

Docking assembly

Loading hatch

Cargo containers

Figure 1.5-1 PROGRESS ГрO
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 (0.7х7х180 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 (ССВП)

Remove captive screws (four) located in the center of hatch from the ГрО side  
Remove protective cover  
Connector Г11/201 ↔ cable connector  
Plug 11Φ732 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 ГрО 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 ГрО 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 ГрО 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 ГрО 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 Г5501А6-150 ˧˧˧ cable connector 11Φ732 Г5501А5-160 (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 ˧˧槿 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 БРЦУЗ modes as НП (Direct Transmission), ЗАПИСЬ (Record), ВОСПРОИЗВЕДЕНИЕ (Playback) must be deactivated via КРЛ

3.1. REMOVAL OF K1-BKA-03ЯУ2.000.031-03 UNIT (≠34Ю=А1) WITH PT-BKA TEMPERATURE REGULATOR (≠34Ю=А2)

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

<table>
<thead>
<tr>
<th>Cable Connector</th>
<th>Unit Connector</th>
<th>Unit Connector Cap</th>
<th>Cable Connector Cap</th>
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</thead>
<tbody>
<tr>
<td>X61Ю34</td>
<td>X61Ю34</td>
<td>1-М14х0.75-3П</td>
<td>2-М14х0.75-3П</td>
</tr>
<tr>
<td>X62Ю34</td>
<td>X62Ю34</td>
<td>1-М18х1-3П</td>
<td>2-М18х1-3П</td>
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<tr>
<td>X345Ю34</td>
<td>X345Ю34</td>
<td>1-М10х0.75-3П</td>
<td>2-М10х0.75-3П</td>
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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)

<table>
<thead>
<tr>
<th>Cable Connector</th>
<th>Unit Connector</th>
<th>Unit Connector Cap</th>
<th>Cable Connector Cap</th>
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<td>X13I043, X23I034</td>
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<td>X23I034</td>
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Attach cables to ГpO frame structures (PVC tape)

Release low-frequency cables from tethers
Low-frequency cable connectors ⟷ unit connectors and cap (all)

<table>
<thead>
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<th>Unit Connector</th>
<th>Unit Connector Cap</th>
<th>Cable Connector Cap</th>
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</thead>
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<td>1-M22x1-3П</td>
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<td>1-M14x0.75-3П</td>
<td>2-M12x0.75-3П</td>
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</table>

Attach cables to ГpO frame structures (PVC tape)

Remove nuts Μ4 (two) (7 mm wrench) to remove the ground strap from container
Remove bolt Μ5x10 (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 К1-BKA-03 unit
Remove custom bolts (four) to remove the unit

3.2. 2АОК1-ВКА ЯУ2.008.050 UNITS REMOVAL

2Φ4-BKA № 1, №2, №3, №4, №5 ЯУ3-468-011
(≥34ΙΟ=W1, ≥34ΙΟ=W2, ≥34ΙΟ=W3, ≥34ΙΟ=W4, ≥34ΙΟ=W5)

2АОK1-ВКА (one unit) and 2Φ4-BKA (five units) units are installed on the same frame
Remove custom bolts (two) that secure Б1830А59-170 beam to remove the beam

For 2АОK1-ВКА unit:

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

<table>
<thead>
<tr>
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<th>Unit Connector Cap</th>
<th>Cable Connector Cap</th>
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<td>XP43</td>
<td>XP43</td>
<td>1-M22x1-3П</td>
<td>2-M22x1-3П</td>
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</tbody>
</table>
For 2Ф4-BKA units:
a) for 2Ф4-BKA № 1 unit:
High-frequency cable connectors ↔ unit connectors and cap (all)

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<th>Cable Connector</th>
<th>Unit Connector</th>
<th>Unit Connector Cap</th>
<th>Cable Connector Cap</th>
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</thead>
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<td>XP601, XP602, XP603</td>
<td>1-M12x0.75-3П</td>
<td>1P-M12x0.75-3П</td>
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<td>X103И034-1 (LF)</td>
<td>X103И034-1</td>
<td>1-M14x0.75-3П</td>
<td>2-M14x0.75-3П</td>
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b) for 2Ф4-BKA № 2 unit:
High-frequency cable connectors ↔ unit connectors and cap (all)

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<th>Cable Connector Cap</th>
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c) for 2Ф4-BKA № 3 unit:
High-frequency cable connectors ↔ unit connectors and cap (all)

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<td>XP601, XP602, XP603</td>
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d) for 2Ф4-BKA № 4 unit:
High-frequency cable connectors ↔ unit connectors and cap (all)

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<th>Cable Connector Cap</th>
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<td>XP601, XP602, XP603</td>
<td>XP601, XP602, XP603</td>
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<td>1P-M12x0.75-3П</td>
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<td>X103И034-4 (LF)</td>
<td>X103И034-1</td>
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e) for 2Ф4-BKA № 5 unit:
High-frequency cable connectors ↔ unit connectors and cap (all)

<table>
<thead>
<tr>
<th>Cable Connector</th>
<th>Unit Connector</th>
<th>Unit Connector Cap</th>
<th>Cable Connector Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>XP601, XP602, XP603</td>
<td>XP601, XP602, XP603</td>
<td>1-M12x0.75-3П</td>
<td>1P-M12x0.75-3П</td>
</tr>
<tr>
<td>X103И034-5 (LF)</td>
<td>X103И034-1</td>
<td>1-M14x0.75-3П</td>
<td>2-M14x0.75-3П</td>
</tr>
</tbody>
</table>

Remove M5х10 (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 X358И034, X359И034, X360И034, X361И034, X362И034 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)

<table>
<thead>
<tr>
<th>Unit Connector</th>
<th>Static Charge Removal Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>513/30, 514/30, 515/30</td>
<td>33Y.5512.032X2</td>
</tr>
<tr>
<td>520/30, 521/30</td>
<td>33Y.5512.018X4</td>
</tr>
<tr>
<td>519/30</td>
<td>33Y.5512.045X4</td>
</tr>
</tbody>
</table>

**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