TRAINEE - HANDBOOK for the MIR

Version of 2008

Preface

In Spring 1999 I made my first voyage on the MIR as trainee. I immediately liked it on board and was thrilled by the ship and her crew. Only two days after returning home I booked my next trip. More followed and the more often I sailed on her the more I wanted to know about how this all works.

During this time the first issue of the Handbook of the MIR was written. It was a patch work of chapters written by different people such as Nicole Graf who sailed on board for two summers as trainee leader, Leonin Ill'yinsky, who was sail maker and wrote the chapters about the sails, Sergey Timoshkov, who was chief mate and later became master and who added the chapters about safety, Professor Gennady Milkin, who sailed as teacher and had written a Russian handbook of which he allowed me to use and translate chapters and me who collected all kind of information about the ship, translated it from Russian to English and German and added own experiences and views.

Now, some years have gone by. I have meanwhile made seafaring my profession. After collecting experiences on a variety of other tall ships and cargo ships and studying Nautical Sciences in Germany I returned on the MIR in Spring 2007 for a couple of day sails on the river Elbe and a voyage from Rostock around Skagen to Bremerhaven.

I found most things as they had been when I last sailed on her, but some details had changed what made an update of the trainee related chapters necessary. Additionally I got a different view on the ship seeing her now through the eyes of a navigational officer. Thus I added some new chapters of which I hope that they are informative and not too academic.

A huge thank you to the master and crew of the MIR who helped me on my way to become a professional mariner and who allowed my to try out and learn so much on board.

Baerbel Beuse, July 2007

The Trainees on Board MIR

What awaits a Trainee on MIR.

All trainees have the chance to take part in sea watches and on-board-routines, to do navigation, to go aloft, to learn fancy work and the Russian language, to be guided around the inside of the ship, etc. Please speak about your wishes with your liaison officer, the watch officers, chief mate or the captain. Participation in the work on board is **voluntary** for the trainees. But if you decide to take part there are also some obligations to fulfill to make life on board easier.

Watch system

The whole crew (also engineers) and all cadets are divided into three watches all through the day. One watch is working four hours, is free for eight hours and works again four hours. We have therefore a four-eight-watch (04-08, 16-20, called first watch), an eight-twelve-watch (08-12, 20-24, called third watch) and a twelve-four-watch (00-04, 12-16, called second watch). You can join the watch if you like, but you should always keep to the watch you chose.

Be ready at least five minutes before your watch starts and join the cadets on upper deck on the port side. Your responsible bosun will show you what job has to be done. If your helm watch starts at this moment, don't join the cadets on deck, but go directly to the bridge. Inform the watch officer that you want to go on helm watch.

For any watch, always keep in mind:

- Don't leave your watch, before your substitute has appeared.
- Relieve the fellow on watch before you in good time (be there five minutes before your watch begins)
- If you arrange a special awakening-service for Trainees that follow you, do it with continuity. Get to know beforehand where your substitute is sleeping (which kubrick, which berth)

Maintenance

Most of the work that has to be done is maintenance of the ship. That can be working with ropes and sails, painting, repairing, cleaning, etc. either on deck or in the rigging.

Helm watch

During helm watch you steer the ship under command of the watch officer and the cadets on watch. When you take over the helm, you get a course in degrees or a special angle to the wind, which you have to repeat loudly (for example 215° on the compass; you have to say: "The course is two one five."). The same when somebody takes over from you: give all important information to the next

helmsman. If you receive a command, repeat it loudly, so that the one, who gave it, knows that you understood it correctly and will follow it. The helming commands will be in English. Never leave the helm before being relieved. If you are cold, want a break or a rest, inform your watch officer and he will relieve you.

Lookout

Lookout means you observe the horizon for other ships, buoys and floating things that might disturb or influence our sailing. All information goes to the watch officer.

By the way, if you might think lookout was not necessary on modern ships any more (a trainee once said to me: "lookout is an anachronism and only made to annoy me!" and went to bed...), should know the following:

- The sails produce blind patches on the radar. Thus distant objects will be seen clearly, but not so the ones really near to the ship.
- The radar shows 90% to the front and the sides of the ship. That means that ships coming from behind, even really big ones, appear too late for a safe reaction.
- In fair weather and with only little traffic we normally switch the radar on stand by position and navigate after sight.
- Due to repairs it can be necessary to switch off the entire electricity of the ship. So no radar and no navigation computer will be available any more. Not to speak of situations when instruments fail, collapse or refuse to work...
- Last not least: drifting containers, sleeping yachtsmen, life rafts, pieces of wreckage and whales do not appear on the radar.

Either during your watch time or outside, we will organize ship excursions, navigation, rig training, instructions about sails or rigging, fancy work with ropes, Russian lessons, Video film, etc. depending on your interest.

Duties outside of the watch system:

Pantry service (normally done by the cadets only)

Together with the cadets, you have to prepare the dishes for meal times, help serving the trainees and later wash the dishes and tables. Usually you start half an hour before mealtime – unless the cadets tell you something different. Use the entrance door on starboard side (number 121) and knock loudly if it is closed. Remember: you help the cadets, you don’t wash everything alone – if they just decided to have a break while you work, ask them, when you can come back to help. Whenever there arises a problem, inform your liaison officer or the officer on watch.

Cleaning kubricks, toilets and shower room

The cleaning of these facilities is done by the permanent crew and cadets. If you find something not working or dirty, please give notice to your liaison officer who will mend the problem.

Sails alarm

No matter what you are doing at the moment when you hear the sails alarm ("dr-dr, dr-dr, dr-dr, parusny avral, parusny avral, vsye na vyerkh gatovy") you get dressed for outside, eventually fitted out with your harness and go to the assembly point of your watch (1st watch at the fore mast, 2nd watch at the main mast, 3rd watch at the mizzen mast) on the deck and wait for further instructions. You will meet your bosun and your officer of the watch there who will coordinate the manoeuvre together with the bridge. Helmsman and lookout as a rule also get sent to their assembly place, as during the manoeuvre certain crewmembers will take over helm and lookout. Nevertheless do not leave these posts without the command of the watch officer. He might just have decided that today you are the "certain person".

Even if you think after a while, the maneuvered is over; you have to wait until the end will be announced over the loudspeakers from the bridge ("adboy"). After this you either return to the work you had been doing or help to clear the deck and only then retire.

Food supply:

All meals are prepared in the galley. It is not possible to take care of special diets or personal meal-habits. You cannot prepare you own meals anywhere on board. If you need a special diet due to medical causes, discuss this with the ship's surgeon.

Drinks outside mealtimes:

There is a kettle available to boil tea- or coffee-water. It is recommended to bring tea and coffee (instant) on board with you. Alcohol is banned at sea, but will be "overseen" among the trainees as long as you do not appear drunk for the watch or climb into the rigging still under influence of alcohol. Actually there is a "bar" every evening in the crew's mess room, where beer and soft drinks are sold.

Going on shore:

Trainees going on shore have to be back in the time indicated at the gangway or stated by the gangway watch. The Ship cannot wait for late Trainees, as the pilot and tug boats have been ordered for a special time.

Best time for a trip:

Although it might be rather cold and maybe rainy, I would recommend the spring. The cadets will normally only get collected in June, when MIR returns home to take part in the town anniversary of her home port St. Petersburg. The sailing season starts earlier - around Easter. Therefore in April and May there are special voyages. Due to a lack of cadets the trainees are needed to help wherever they can. Because of working together with the permanent crew, one can find - if one is open for this - a very close contact between the sailors and their "guests". The atmosphere is more relaxed and the ship is not as crowded as in summer. On the other hand, often not all sails will be up on the yards.

If you wish to see MIR under full sails, you should go in summer, especially during the race-season. In that time the trip often includes harbour days with thrilling festivals in the race ports and on board there is the certain regatta atmosphere...

In autumn another kind of very nice trips follow. The race is run, the cadets have passed their exams, and we're sailing "for fun". As a rule during these weeks the first sails get taken away, the crew starts to prepare the ship for the winter. Whoever feels not only angry about this, gets the opportunity to help doing some unusual work, gets good contact with the cadets, who improved their English and lost their shyness they had in the beginning, and maybe he sees a bit of dolce vita in form of swimming days, angling or just relaxing on the deck.

Motor ship MIR?

Unfortunately it is not always possible to be under sails. Tight schedules and the necessity to bring the trainees into port and collect the new ones in time combined with no or only little wind (or from the wrong direction) too often leads to the fact, that MIR proceeds under engine. Sometimes some maintenance work in the rigging or on the deck makes safe manoeuvres impossible. Who wants to climb freshly painted shrouds? Or the cadets need to prepare for some important exams and have no time for manoeuvres. Is zigzagging needed because of the wind from the front, often the diesel gets used to give the boys (and the crew) a rest. Maybe there is a weather warning on the radio, so the captain decides to set only a few or even no sails due to precaution. Mind that there are 199 lives to be taken care of on the MIR.

Nevertheless the ship's management tries to set sails and to sail only by the power of the wind whenever it is possible.

In other cases mind the following:
Trainees have not booked a sailing cruise on a windjammer, but want to take part in the live and work of a sail training ship - even if this means to proceed under engine or even stay at the anchor and paint the deck houses for several days. If you see this differently, think closely before you board on MIR. There are cruise ships under sails, too...

Packing-List

What to take with you for a trip.

I Ships are dirty places and even if you are not working with the crew it is possible that you get into contact with things like grease, tar, rust or paint. Do not wear your best clothes on board. Nobody cares what you are looking like once the ship has left the port. However, I normally also take one set of smarter clothes in case of taking part in official occasions like crew parades, etc.

If you own a mobile phone it can make sense to take it. Phone calls from on board are possible, but expensive. Whenever the ship is in sight of land you can use your mobile to keep the contact to your friends and family alive if you wish to do so.

To give you an idea about what to pack for a voyage on MIR or another tall ship here you find my personal packing-list:

2 jeans
fleece jacket
Gore-Tex jacket
2 pairs of good shoes
hat
gloves
woollen pullover
underwear, socks, t-shirts
shorts
swimsuit, towel, sun cream
sunglasses
ear plugs
pocket knife
cork screw
paper and pen
bandana for the hair
camera and enough films
torch
alarm clock
wrist watch
sailing gloves (biker's gloves will do)
soap, toothbrush, comb, hairbrush, etc
Nescafe, chocolate, some cans of coke
a cup
little money (coins)
something to read
English/Russian pocket dictionary
photo of the family

And one last hint. You have absolutely no space in your cabin for suitcases. So take either a sailor bag or other inflatable baggage.

Language Chart

a little help against the language barrier

Russian (transcription)	Deutsch	Englisch	Francais
pràvyj bort	Steuerbord	starbord	tribort
ljèvyj bort	Backbord	portside	babord
pàrus	Segel	sail	voile
pàrusnij avral	Segelalarm	sailing alarm	pare pour le manoeuvre
paschòll vsje na vjerch	alle Mann an Deck	all hands on deck	tout les mondes sur le pont
vibiraj	ziehen	pull	tirez
tràvith	fieren	let loose	laisser firez
stàwith	setzen	put/set	hisser les voiles
nìschnij	unter	lower	en dessous
vjèrchnij	ober	upper	en dessus
gatòv	fertig/bereit	ready	pret
bròssili	loslassen	let go/ leave/ give up	laisser tomber
krèpith	belegen	make fast	fixer, amarrer
stop tak	stop, genug	stop, enough	arretez, assez
ubiràth	einholen (Segel)	haul (sail)	affaler
na gitòvi i gordèni	aufgeien	clew up	drisser
bràssopith, brass	brassen	to brass	brasser
uklàdiwath snàsti	Taue festmachen	make fast (ropes)	fixer, amarrer les cordages
uklàdiwath pàrus	Segel packen	stow sails	serrer les voiles
derzhàth	festhalten	hold	rangez
adbòj	beendet	finished	termine
kapitàn	Kapitän	master	capitaine
kursànt, kadet	Kadett	cadet	
ekipàzh	Mannschaft	crew	equipage
pamòshnik kapitana	Offizier	officer	lieutenant

Useful Phrases

sdràwstwuitje	Grüß dich	hello	bonjour
privjèt	hallo	hello	salut
pakà	tschüss	see you	à plus tard

dobròe ùtra	guten Morgen	good morning	bonjour
prijàtnava apetìta	guten Appetit	have a nice meal	bon apetit
dòbrij vjètsher	guten Abend	good evening	bonsoir
spakòinoi nòtshi	gute Nacht	good night	bonne nuit
spassìba	danke	thanks	merci
pazhàluysta	bitte	please /you're welcome	s'il vous plaît
kharashò	gut	good	bien
kak djèla?	wie geht's	how are you?	comment ça va
normàlna	gut	nice	ça va
garjàtschi	heiss	hot	chaud
khòlodno	kalt	cold	froid
mòzhno?	kann ich, darf ich?	may I?	est-ce que je peux...?
do svidànja	auf Wiedersehen	good bye	a bientôt
kak tebjà zavùt?	Wie heißt du?	what is your name?	comment tu t'appelle?
menjà zavùt...	Ich heiße...	my name is...	je m'appelle...
atkùda ty?	Woher kommst du?	where do you come from?	
ja iz...	Ich komme aus...	I am from...	
vapròs	Frage	question	question
iswinìtje	Entschuldigung	excuse me	excusez moi
(otshen) vkùsno	schmackhaft	delicious	delicieux
pagòda	Wetter	weather	temps
krassìvo	schön	nice	bon
plòcho	schlecht	bad	mal
teplò	warm	warm	chaud
vjèter	Wind	wind	vent
dozhd	Regen	rain	pluie
zhàrko	heiß	hot	chaud
da	ja	yes	oui
njet	nein	no	non
astaròzhna!	pass auf!	watch out!	attention!
ràs, dva, tri...		two-six-heave	
ponyàtno	verstanden	aye-aye	
pòzhe	später	later	
popòzhe	etwas später	a little later	
ceychàs	gleich, einen Moment	immediately, just a moment	un moment, s.v.p.

The Ship

History and description of the MIR

MIR was built as the third of six almost similar sister ships at the Lenin-shipyard in Gdansk/Poland that later became famous for the 'Solidanocz' activities lead by Lech Valensa. This man, who later became President of Poland, was actually one of the shipyard workers who helped to build the MIR. In 1981 the nearly unknown ships constructor Zygmunt Choren had designed a brand-new type of square-rigged sail training vessels (M108-Type). The first ship of this family, the DAR MLODZIEZY was built to replace the old sail training ship DAR POMORZA for the Polish merchant navy. Being a clever construction, the USSR decided, they, too, wanted such a ship. Not only one – five! First came DRUZHBA and the in 1987 the MIR.

For the MIR Choren altered the rigging and so he made a ship that could be brought extremely high to the wind. MIR is also a bit longer than DAR MLODZIEZY. While she was still under construction, one could see, that this brought some inconveniences: she is rolling quite heavily in seas coming from behind. So for the following vessels PALLADA, KHERSONES and NADEZHDA the construction was changed again. Their waterline is longer by the same length of the hull. Actually this should mean, they are faster than the MIR – but they are not.

In December 1987 Captain Viktor Antonov sailed her home safely to Saint-Petersburg/Russia, at that time called Leningrad. The ship was built and always used as sail training ship. She served for the education of cadets from the State Maritime Academy. Being a very fast ship from the beginning she took part in several regattas which she as a rule won, first time winning overall in the OPERATION SAIL 1989. Unfortunately after the break down of the communistic system in Russia hard times hit the ship. Her new owner became the Baltic Shipping Company and the ship had to struggle financially. A solution seemed to be to invite foreigners to sail as trainees on MIR, to make day sailings with passengers, to rent salons for incentives and parties. All these things not being normal activities for a sail training ship helped to keep the ship afloat. By the end of 1993 MIR again became the property of the Admiral Makarov State Maritime Academy who still owns the ship.

MIR is nowadays regarded as one of the finest racing vessels. Her major triumph was winning the GRAND REGATTA CLOUMBUS 1992 that crossed the Atlantic Ocean twice. MIR is also the only class A vessel in the world that won the Cutty-Sark-Tallships-Races twice, not only in her class, but also all over the entire field of racing ships of all classes. Another remarkable voyage took place during the C.S.T.S.R. 1996 when MIR sailed the race leg Rostock-Saint Petersburg in only 2 days 6 hours. All this brought her the unofficial title "Fastest Sailing Vessel in the World".

What makes her so fast? After a time of testing, the positions of the lifeboats were altered, making it possible to bring her up to 30° to the wind. This is very unusual for a square-rigger. Most of them can only cope with up to 60°. MIR's masters know how to use the advantages of his ship perfectly. They

sail MIR like a yacht, using an almost parallel position between square sails and staysails. So quite often zigzagging can be avoided in favour of following a direct course. Running before the wind MIR has already logged up to 19 knots, some of the crew say, even more.

The engine, too, is constructed in a very sophisticated way. Two identical Cegielski-Sulzer-Diesel-Motors on only one propeller make her go at up to 11 knots under ideal conditions. MIR can be brought safely into port with either of them on it's own.

Additionally MIR is one of the safest sailing vessels ever built. She is extremely stabile. According to her constructor, if all bulleyes were closed, healing over to 90° would not be a problem for her. Normally the critical point is 45°, the end is reac hed y 60° on traditional windjammers.

Without having any kind of luxuries, she can be called very comfortable. Normally you can drink the water that is coming out of her taps, the heating works very well. Everybody has got enough space in the cabin. Only the direction of the bed could have been different. In heavy seas it can happen that you fall out of your bed if you do not use the leeboards attached to them.

The ship has got drying rooms to dry your clothes when you came in from the watch soaked from the rain, a microwave in the crew's mess room, very convenient if the captain decides to make a tack during your mealtime, board loudspeakers, so one need not search the entire ship for a person. Charming details are a piano in the cadet's schoolroom and a chessboard on the capstan.

Helm watch is more fun on the MIR than on traditional ships. Why? First of all, the hydraulic system makes it possible, that one person can steer on his own, second, and it is possible to steer from the inside with a joystick. The main reason is that the helmsman stands on a high position in front of the bridge house. So he can see not only almost all sails, but also the entire ship and the sea.

By rigging MIR is a ship. Up to 26 sails can be set. See the rigging plans for the names of them in English, in German and in Russian. The trick is that the Russians use Dutch terminology, which is not so different from the German. The masts are fore-, main-, and mizzenmast, but most time the mizzen is also called "Besanmast".

The maximum crew is 199 men; the ship can be sailed by only 30. But that means that absolutely everybody without exception has to go to the braces. The winter-crew consists of even less people. That means: no sails.

Admiral Makarov State Maritime Academy

St. Petersburg/Russia

In 1876 by Decree of the Tsar Alexander II the nautical classes of the River Yacht Club were opened in St. Petersburg. These classes started the world's biggest scientific and educational center of training specialists for Russia's Merchant Navy. The history of the famous maritime higher educational institution is marked by several significant events, which concluded in 1990, when it got the status of the State Maritime Academy.

There are six faculties in the Academy: the Navigational Faculty, the Faculty of International Transport Management, the Marine Engineering Faculty, the Electric Engineering Faculty, the Radio Engineering Faculty and the Arctic Faculty.

Admiral Makarov State Maritime Academy is an educational institution of a boarding-school type.

The Navigational Faculty is the oldest in the Academy. The history of the Academy started with the establishment of this Faculty. The navigational training provided by the Faculty is internationally recognized as one of the best in the world. The Admiral Makarov State Maritime Academy maintains partnerships and student exchange programmes with maritime academies all over the world.

At present the Faculty trains some 100 graduates annually. In addition to navigational training the cadets get a basic higher education, radio communication training and also have special classes of English, which is the international maritime language. The teaching process at the faculty includes both the classical and modern methods of training with the use of up-to-date simulators and computers in accordance with the requirements of the International STCW Convention.

In the course of their studies the cadets have shipboard training on board the STS "MIR" (between four and six months) as well as on vessels of the leading Russian and foreign shipping companies.

The level of the cadets' training at the Faculty fully corresponds to the highest international standards and its graduates are in great demand. The course of training lasts five years.

Data File:

Technical data and facts about the MIR.

Name of Vessel: S.T.S MIR (Peace)
Owner: Admiral Makarov State Maritime Academy, St. Petersburg, Russia
Call sign: UFPV

Rig: ship
Used as: active sail training vessel
Homeport: St. Petersburg/ Russia
When launched: 1.12.87
Commissioned: 1988

Length extreme: 108,9m
Length of the hull: 94,8m
Length in the waterline: 79,65m
Beam: 14m
Height above waterline: 52m
Deck above waterline: 4,6m
Draught: 6,6m

Sailarea: 2257 square meters
Displacement: 2285 BRT
Netto: 677 NRT

Watertank: 300t
Fueltank: 200t
Electric service: 380 / 220 V

Engine: 2 x 570 HP (SULZER)
Max. speed under sails: 20 knots (over a longer time 18 knots)
Max. speed under engine: 11 knots (8 knots)
Drive: 3-Blade-Propeller with variable pitch
Radius of action: 50 days

Endurance:
Fuel for generating systems: 60 days
Fuel for main engine: 15 days
Fresh water: 17 days
Dry provisions: 120 days
Meat, fish, potatoes: 60 days
Remaining provisions: 30 days

Crew: 50 crew, 95 cadets, 60 trainees, 4 teachers
Minimum crew: 24 men (no sails possible)

Permanent Crew:

master,
chief-mate,
2nd – 5th mate
doctor
chief-engineer
2nd – 4th engineer
radio navigator
radio mate
electrician
chief bosun
3 bosuns (main-, fore- and mizzen-)
sailmaker, carpenter, bosun's mate
6 able seamen
6 motor men
5 cooks
4 stewardesses,
1 purser

The ship's mail address:

Admiral Makarov State Academy
Sail Training Ship "MIR"
Kosaya Linia, 15-a,
St. Petersburg, 199106,
RUSSIA

www.tallshipmir.ru

Who is who on MIR

Who works on board and what is his/her job

NAVIGATION DEPARTMENT

Master
(Капитан)

The master on any ship is the „boss“ on board. He manages the ship, decides the routes to sail, the course, which sails get set when, etc. He mends all the business issues of the vessel, deals with authorities, represents the owner in his absence. The master does not take part in the daily watch routines of the vessel and normally does not go any navigational watches. When the vessel is under pilotage and when entering or leaving port his place is on the bridge. On sailing vessels as a rule the master commands the sailing manoeuvres. The correct way to address a master is „Sir“ or “Captain”. However, most sailing ship masters I met do not intend in this but prefer to be called their first names or on the Russian ships by their first name and fathersname.

Chief Mate
(Старпом = Старший поиощник капитана)

Chief Mate is the right hand of the master. He is his substitute in his absence and takes over his duties in case the master is hindered to do so. Chief mate is in charge of the deck crew (including the cadets and the trainees). He decides about the work on deck and takes care that the maintenance works on deck and in the rigging are done. For this he instructs his bosuns.

The galley also belongs to his responsibilities. Together with the cook and the ship's surgeon he decides about the menue and he checks the cleanliness of the galley and stores.

Chief mate is the head of the 4-8-watch. That means he stands a navigational watch from 04:00 to 08:00 and 16:00 to 20:00 when the ship is at sea. During the manoeuvres of when entering or leaving port is position is the bridge where he does the navigation and collision avoidance while the master commands the manoeuvers.

Because of the great variety of duties on board a ship like the MIR it is habitual that he hands over some of his duties to other officers, so the trainees are now in the responsibility of the 2nd mate and the cadet education is taken over by a chief trainings mate (see below). If there is a 4th mate on board he might also hand over some of his bridge watch keeping duties to him.

On MIR chief mate has the trainees and the other officers call him by the first name. The cadets call him «Starpom» what is Russian for chief mate.

2nd Mate

("Второй", 2 помощник капитана)

The 2nd mate is head if the 0-4 watch. That means he stands a navigational watch from 00:00 to 04:00 and from 12:00 to 16:00. On MIR he is responsible for the trainees and all issues connected with them. During manoeuvres his position is at the main mast. When entering or leaving port he is on the fock's'le to command the lines crew there. Apart from watch keeping he is responsible for the safety on board, does all the safety instructions, prepares all safety drills and is responsible for all safety equipment on board.

3rd Mate

(3 помощник капитана)

The 3rd mate is head of the 8-12 watch. That means he stands a navigational watch from 08:00 to 12:00 and from 20:00 to 24:00. He is responsible for all navigational equipment, sea charts, nautical books and almanacs. He corrects the sea charts and prepares them for every new voyage. His manoeuvre position is the mizzen mast. When entering or leaving port he commands the lines crew at the stern manoeuvre position.

4th Mate

(4 поиощник капитана)

This position is not filled in every voyage. It is mainly a position for young officers on their first voyages so that they can collect experiences while still being backed up by an experienced officer. As a rule the 4th mate takes the watch together with the chief mate. During a manoeuvre his position is the fore mast where he coordinated the works on the fore mast and the head sails.

DECKSCREW

Bosuns

(chief bosun and bosuns of mast)

Bosuns are experienced deck workers who lead and instruct the deck crew and cadets. On other tall ships you would rather call them watch leaders. They are A.B.s with sound knowledge and many years of experience in square rig. They know not only how to work the rigging, but also how to maintain it. Every bosun is in charge of the maintenance of his mast. The bosun is responsible for the execution of the orders from the watch officer, chief mate or master. He knows which lines to work and attaches the members of his watch to their positions. He is able to do all works on deck and in the rigging and if necessary he takes part in all those works.

Podschkiper

The Podschkiper is responsible for the maintenance on the deck and the superstructures and all parts that do not belong to the rigging. He is also responsible for the paint locker. His job is actually that what on a cargo ship would be the job of a bosun.

Carpenter

The carpenter is responsible for all wooden parts on and inside the ship. He also instructs the cadets about these works.

Sail Maker

The sail maker repairs all wear and tear in the sails while the ship is underway. He has got a work shop inside the ship but sometimes is also seen stitching aloft.

Able Seaman, Ordinary Seamen

A.B.‘s or O.S.‘s are normally no cadets but deck workers who have undergone a practical apprenticeship and collected experiences. An A.B. can steer a ship under all circumstances, is an able lookout, knows how to work all sails, is able to do all kind of maintenance works needed and can keep a gangway watch. On MIR his job is mainly to instruct and control the cadets in all those things. At the end of the voyage the cadets pass an exam which also makes them A.B. or O.S. Thus in summer one always finds a certain number of cadets from higher courses who work on MIR as A.B.

ENGINE DEPARTMENT

Chief Engineer
("Стармех" - старший механик)

The chief engineer is the head of the engine department. He reports directly to the master and is responsible for everything connected with the engine and all powered systems on board. Under him work 3 engineers, 1 electric officer, several motor men and some engine cadets. The chief does not go any watches, but co-ordinates all. He is sometimes inside the engine room and supervises the works there. During a sailing alarm and when entering or leaving port his place is the engine control room while all others working there go and help on deck.

2nd Engineer, 3rd Engineer, 4th Engineer

The 2^{nd}, 3^{rd} and 4^{th} engineer lead the watches in the engine room. Their working place is the engine control room. They are responsible for all technical devices on board, not only the engines, but also pumps, water systems, refrigerators, air conditioning, etc.

Electric Engineer

The electric engineer is responsible for all electricity on board. This goes from changing bulbs in the cabins up to doing the same at night time on the mast top if a position lamp went off.

Joiner

Motorman with special education

Motorman

Motormen are engine workers who have undergone a special apprenticeship in this profession. They maintain the ship’s engine and control all systems due to the orders of the engineers.

OTHER OFFICERS

Doctor
(Ship's surgeon, "доктор" - судовой врач)

Because of the size of the crew the MIR has to carry a doctor. This is a surgeon with special knowledge of accidents and first aid. He has got a complete surgery and small hospital. Additionally to caring for the health of the crew he also is there for other ships who seek medical advice via radio, so called MEDICO calls.

Radio Mate
("радист" - помощник капитана по радио електроник)

Unlike most modern cargo ships the MIR still employs a radio mate who is responsible for all communication matters. While the every day VHF communication on the bridge is done by the watch officer, the radio mate cares for weather forecasts, fax, telex, Inmarsat. He furtheron maintains the hardware of all communication tools and on board he is also responsible for the video exchange and the satellite TV. With him work 2 or 3 radio cadets, who eventually are girls.

Radio Engineer
(радио навгатор)

Maintains the radar and the ECDIS plus all other technology on the bridge.

HOUSEKEEPING DEPARTMENT

5th Mate

(Purser, Хозяйнный помощник капитана)

The 5th mate is the head of the housekeeping department. He is boss of the stewardesses. Furtheron he is responsible for all moneys from the bar or the food and drinks during day sailings as well as the moneys for the provisions and everything needed for cleaning and washing. He reports directly to the master.

Chief Cook

The chief cook decides the menu and calculates the amount of provisions need for this. He also takes part in the daily cooking and supervises the cooks and the cadets that are on galley duty.

Cooks

4 cooks work in 2 shifts to provide a meal every 4 hours. During the night hours they bake the bread for the ship.

Stockman

(Завпрод)

He is responsible for the provisions. He reports to the 5th mate.

Stewardesses

There are 4 stewardesses on board. One for every mess plus one who is responsible for the linnen locker.

SCHOOL

Chief Instructor

(Chief Trainings Mate, Учебный помощник капитана)

The chief instructor (if he is originally a teacher) or chief trainings mate (if he is originally a navigational officer) is the leader of the cadets. He organises the education, both, the practical and the theoretical part. The chief trainings mate sometimes also takes part in the watch keeping duties on the bridge to relieve the chief mate or to stand watch together with a junior officer who is not yet ready to stand a watch on his own.

Teachers

(руководитель практики)

As a rule there are 4 teachers of the academy accompanying the cadets during their summer voyage. They teach navigation, English language, maritime law, collision avoidance, ship theory and seamanship. Some of them are professors from the academy who themselves have been ship masters for many years.

Cadets

The cadets are students of the Admiral Makarov State Maritime Academy who serve their first sea practice on board MIR. Although having studied already more than one year, when they come on board it is normally their first experience of actually working on board a seagoing vessel. They stay 4-6 months receiving both – practical training and lessons. Most of the cadets belong to the navigational department and will become navigational officers once they finish their studies. 6-8 of them are engineering cadets who go for a carreer as ship engineers. 2-3 belong to the radiocommunication faculty.

There are also students of other maritime academies for training on board MIR as there are a number of exchange programmes running.

Navigation Trainees
(Dublors)

Dublors are also cadets, but those who have almost completed their education and now take over the duties of the watch officer under supervision of the watch officer. There are not always dublors on the ship as many students prefer to do this part of their education on board cargo ships.

Apprentices
(Praktikanty)

Apprentices are people who are not students at the academy but receive some other practical training on board, e.g. to become A.B.‘s.

OTHERS

Trainees

Practically everybody who does not belong to the former is a „trainee“. Those are paying guests who sail with the ship to experience board life and seamanship and who can take part in all routines and shipboard duties as long as they are fit for it.

Trainee Leader
(Liaison Officer)

This is a crew member – not necessarily with a nautical background – who cares for the trainees while they are on board. The trainee leader is the connecting link between the trainees and the crew, hence

the name „liaison officer“. A main part of the job is to translate and to organise everything the trainees need.

Guests

Eventually there are also guests sailing with the ship, such as family members or good friends of the crew.

The Announcements

standard phrases which you might hear over the public announcement system on MIR

On MIR and on most other Russian ships the crew, trainees and eventually visitors are informed about important things via loudspeaker. These announcements are normally held in Russian and English language. As sometimes - e.g. due to noise, wind or other things - the transmission or the messages happens to be not very clear and maybe confusing for people who hear them for the first time here a short list of the main phrases that you might hear while on board.

1. Доброе утро. Комманде подъем. Сегодня ... июля, день недели. Погода: ... (ветер: сила, направление; волнение; облачность, давление в мм рт. ст.

Good Morning! The crew are requested to get up. Today is the (date, day of week), Weather: outdoor temperature is:... degrees; wind: direction (e.g. Wind: easterly, southerly, etc.); speed ...meters per second; sea: ... (e.g. sea state 3); ist is cloudy (or dull, or fine); pressure: ... mm of mercury column.

2. Судовое время 7:30. Экипаж приглашается на завтрак. Приятного аппетита.

Ship's time is 7:30. The crew are invited for breakfast. Bon appetit!

3. Судовое время 11:30. Экипаж приглашается на обед. Приятного аппетита.

Ship's time is 11:30. The crew are invited for lunch. Bon appetit!

4. Судовое время 15:30. Экипаж приглашается на вечерный чай. Приятного аппетита.

Ship's time is 15:30. The crew are invited for afternoon tea. Bon appetit!

5. Судовое время 19:30. Экипаж приглашается на ужин. Приятного аппетита.

Ship's time is 19:30. The crew are invited for supper. Bon appetit!

6. Внимание! По судну объявляется морской распорядок дпя.

Attention, please! The daily routine on board while at sea is announced.

7. Внимание! По судну объявляется береговой распорядок дпя.

Attention, please! The daily routine on board while on ashore is announced.

8. Внимание! Приход судна в порт ... в ... (время, дата, месяц)

Attention, please! The ship is expected to arrive at the port of ... at ... (time, date)

9. Внимание! Отход судна из порта ... в ... (время, дата, месяц)

Attention, please! The ship is expected to leave the port of ... at ... (time, date)

10. Внимание! По судну объявляется режим экономного разхода прежной воды. Прачечные, душевые закрыт до особого распоряжения.

Attention. please! The economical consumption regime of fresh water is announced on board. Laundries and shower rooms are to be closed until further notice.

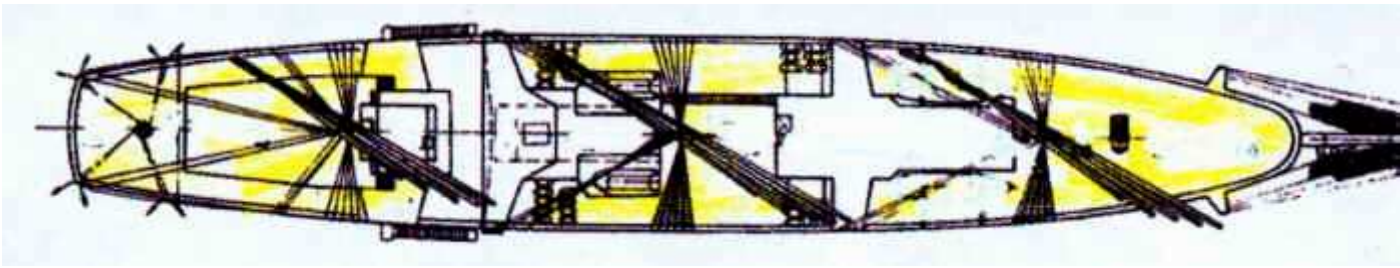
11. Внимвние! По судну объявляется санитарный день. Произвести большую приборку по заведованиям.

Attention, please! Change of bed linen on board today announced. General cleaning up is to be carried out in all areas of responsibility.

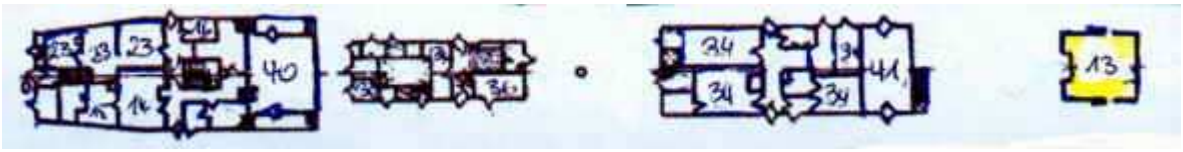
12. Внимание! (Должность, имя) просьба прибыть (позвонить) к (в) .....

Attention, please! Position or name or both (e.g. electrical engineer, the doctor, etc.) is requested to come (or to ring) to ... (e.g. the bridge, the chief mate's cabin, the master's saloon, etc.).

Deck Plans



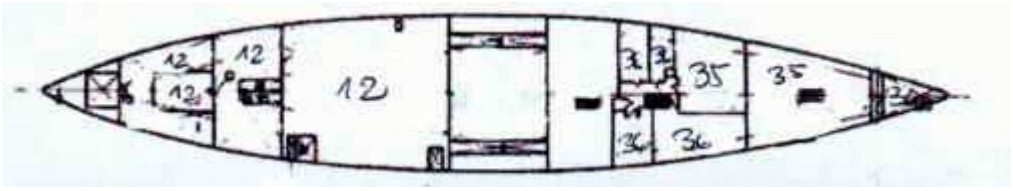
Main deck



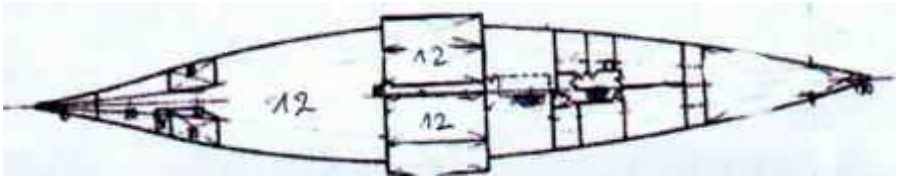
Deck's houses

Upper deck

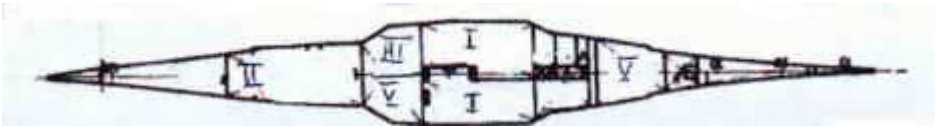
Tweendeck



Platform



Bottom



Double bottom

1 master ##	17 laundry room	33 officers recreation room #
2 chief mate	18 drying room ***	34 workshops
3 chief engineer #	19 sauna #	35 sailmaker
4 chief trainings mate #	20 owner's cabin	36 stores
5 officer's cabin #	21 hospital	37 office
6 teacher's cabin (2 berths) #	22 surgery	38 cadets reception ***
7 crew cabin (2 berths) #	23 isolation ward	39 captain's salon ###
8 cadets' kubriks (12 berths) #	24 toilets	40 navigation room
9 trainee kubricks (12 berths) ***	25 shower rooms	41 gymnasium
10 cooks (2 berths) #	26 pantry	
11 engine control room **	27 cadets mess room ***	
12 engine ###	28 officers mess room #	I ballast
13 bridge **	29 crew mess room #	II fresh water
14 radio room	30 auditorium	III diesel oil
15 telex room	31 galley *	IV lubricating oil
16 transmitters room	32 crew recreation room #	V setting tanks

** means that trainees have free access at any time. (areas marked yellow on the plans)

means private zone of the permanent crew. Access only after invitation.

The Watch System on MIR

The complete crew of the MIR is divided into 3 watches: The 1st Watch - "Fore Watch" - from 04:00 to 08:00 and 16:00 to 20:00 h, the 2nd Watch - "Main Watch" - from 00:00 to 04:00 and 12:00 to 16:00 h and the 3rd Watch - "Mizzen Watch" - from 08:00 to 12:00 and 20:00 to 24:00 h. Every crew member belongs to one of these 3 watches. Only the master also does not belong to a watch.

The crew of any ship is divided into the deck crew and the engine crew and the auxiliary crew. The auxiliary crew has different working schedules than their watch. E.g. the cooks or the stewardesses who are working in accordance with the meal times, or the doctor who opens his surgery during day hours. The engine crew organizes their watches themselves. On MIR they have the same watch hours as the deck crew. Since the trainees belong to the deck crew (what means they may but do not have to stand watches), I will try to explain the organization of the watches of the deck crew here:

SEA WATCHES

The main job of the deck crew are the sea watches. A sea watch consists of the watch officer, a bosun, some able seamen and about 30 cadets plus the trainees who volunteered for this watch. All members of the sea watch gather on the starboard side of the deck 5 minutes before the beginning of

their watch. Then the bosun decides who will do which work during the watch. There are several teams built for all jobs necessary to keep the ship going:

- helping in the galley
- washing the dishes and serving the other cadets in the mess room
- cleaning and tidying up in the sanitary tracts
- walking through the ship to control if there is a fire or water coming in
- helm watch and lookout

The cadets can volunteer for these jobs. Those who go to the helm and lookout in the morning watch will also have to do this during the afternoon watch. Everybody who is not in one of these teams will have to do maintenance work (painting, rust removal, washing the deck, repairing sails, etc.) on the deck or aloft.

Whenever the ship is under sails there will be full sea watches. However, this does not necessarily mean that the entire deck watch has to work during this time. Especially at night time it can also be that the cadets must only do standby for sail manoeuvres and may relax. Often the cadets then sit together on the fore deck and talk or play guitar and sing songs about the sea, about Russia or just some pop or folk music, or they read books or learn for their next exams.

If trainees volunteer for the deck watches it is sometimes a bit difficult. Sometimes there is barely enough work to keep all cadets busy and the bosun does not really know what work he can give the trainees. The best is to look what works the cadets are doing and ask them then if you can help. Normally they will invite you gladly to join them.

HELM WATCH

All cadets must go helm watches regularly. Helming is an important part of their education. You can only understand how an automatic steering gear works if you once had a wheel in your hand. Every day in every watch 2 cadets must go to the bridge and take the wheel and make lookout. They take turns every hour as helming needs a lot of attention and after 1 hour the concentration tends to go down. With them is an able seaman who instructs the cadets in helming and who must control them so that they don't make any mistakes dangerous to the ship. While one cadet stands at the helm the other one is looking out for ships, buoys, landmarks, etc. Whenever he sees something he takes the bearing of it and reports it to the watch officer. This is also a very important training for the cadets who once they finished their education will work as watch officers themselves - only that they will be all alone on the bridge and have to do navigation and lookout at the same time.

The trainees are very welcome to take part in the helming and the lookout. If they do, they can come to the bridge for 1 hour and either take the helm together with one cadet or if they dare steer alone under the control of a sailor. Afterwards they can try to make lookout, too. This is not such an easy

task as one might think first, but it is a good opportunity to get into contact with the cadets. You can talk about what you see and the cadets are normally happy to teach the trainees.

ALL HANDS

Some sail manoeuvres require "all hands". This means that the entire crew has to work together to work all lines. If "all hands" is announced everybody reports to the meeting point of his watch - even those who normally do not belong to the deck watch. The "Fore Watch" meets at the fore mast, the "Main Watch" at the main mast and the "Mizzen Watch" at the mizzen mast. They are working the lines of this mast during the manoeuvre.

Some people do not work in the deck gang during the manoeuvre. They have special manoeuvre positions: The master is on the bridge and so is chief mate. Chief engineer stays in the engine control room and the radio mate stays in the radio room. The best helmsman plus up to 3 more sailors take the helm during the manoeuvre as the wheel has to be turned very quickly and exactly then.

HARBOUR WATCHES

To give the crew the possibility to explore foreign ports sometimes "long watches" get announced for the port days. This means that the watches work 8 hours and are free for 16 hours afterwards. The watch officers are even in charge for 24 hours then and have a rest of 2 days afterwards.

ANCHOR WATCH

When the ship is at the anchor during the night the crew is allowed to sleep except for the anchor watch. Those are the watch officer and one sailor on the bridge and one engineer and one motor man in the engine room.

WATCH SYSTEMS COMMON ON OTHER SHIPS

Especially on British ships a different watch system is common. The watches are rotating due to the 16-20 h watch being split into two "dog watches" of only 2 hours durance. These two watches are called the "first dog watch" and the "last dog watch". So there are altogether 7 watch times done by 3 or 4 watch groups who are on at different times every day.

Another rotating watch system is the so-called "Swedish Watch System". This system is used on ships with small crews who can only form 2 watch groups. To guarantee sufficient rest hours the day is divided into two watch periods of 6 hours (08-14 and 14-08 h) while the nights follow the 8-12, 0-4 and 4-8 rhythm.

Yet another two-watch-system is used on German ships with small crews. Here the watch groups go six-on-six watches what means 06-12, 12-18, 18-24 and 00-06 h daily. This watch system is e.g. used in smaller cargo ships during the port calls when only 2 navigational officers share the duties of the cargo watch.

Daily Routine for Crew and Cadets

(as far as not interruped by sailing alarms)

Wake-up call	07.00
Personal hygiene	07.00 - 07.30
Breakfast 3rd watc	07.30 - 08.00
Assembling for the watches of 3rd and 1st watch, instruction 3rd watch	07.50 - 08.00
3rd Watch in charge	08.00 - 12.00
Breakfast 1st watch	08.00 - 08.30
Daily round over the ship chief mate/ bosun	08.30 - 09.00
Handing out of tools for 1st watch	08.30 - 09.00
Free time 1st watch	09.15 - 11.00
Daily round ship surgeon and chief instructor	10.00 - 11.00
Lunch 1st and 2nd watch	11.30 - 12.00
Assembling for watch 3rd watch and 2nd watch	11.50 - 12.00
2nd watch in charge	12.00 - 16.00
Lunch 3rd watch	12.00 - 12.30
Handing out of tools for 2nd watch	12.30 - 13.00
Lessons cadets 1st and 3rd watch	13.15 - 15.00
Smoko	14.00 - 14.15
Afternoon tea 1st and 3rd watch	15.30 - 16.00
Assembling for watch 2nd and 1st watch	15.50 - 16.00
1st watch in charge	16.00 - 20.00
Free time 3rd watch	16.00 - 19.50
Afternoon tea 2nd watch	16.00 - 16.30
Handing out of tools 1st watch	16.30 - 17.00
Lessons cadets 2nd watch	17.15 - 19.00
Smoko	18.00 - 18.15
Dinner 2nd and 3rd watches	19.30 - 20.00
Evening round chief mate and bosun	20.00 - 20.30
3rd watch in charge	20.00 - 24.00
Night time	22.00 - 07.00
2nd watch in charge	00.00 - 04.00
Breakfast 2nd watch *)	04.00 - 04.30

*) 2nd watch can sleep after this until 11.30 h

Food on Board

Buckwheat, Kasha, Beet Root...

There are always people among the trainees who complain about the food on board Russian ships and especially the MIR. Personally not finding anything wrong with the food on board I wonder if the main problem is to have wrong expectations. As said already at other places, the MIR is no cruise ship with buffet and captain's dinner. The main idea of the food on a sail training ship is to feed 200 hard working people in a cost cutting way. Yet it should be tasty, easy to prepare and healthy. And it should suit the taste of the majority of the people on board, which – with any respect for the foreign trainees – are the Russian cadets and permanent crew who live there not only a few days, but many consecutive months.

To give the trainees a short insight in what to expect, here comes an authentic menue of 3 days on board MIR:

Day 1:
Breakfast: 4 big slices of bacon, white bread, jam, tea
Lunch: chicken soup, beef stew, buckwheat, tomato, juice
Afternoon Tea: cheese cake with cream, tea with lemon, 1 orange
Dinner: chicken soup, red pepper stuffed with rice and meat, lamb ragout, salad, juice

Day 2:
Breakfast: Porridge, white bread, jam, tea
Lunch: vegetable soup, pork chop, sourkraut, fresh salad, juice
Afternoon Tea: fish with onions and carrots, tea, 1 apple
Dinner: vegetable soup, pilaw, cauliflower salad, kompot (brew of dried fruit)

Day 3:
Breakfast: mortadella, white bread, jam, tea
Lunch: Schtschi (russian soup), steak, noodles, cucumber, juice
Afternoon Tea: eggs in mayonese lemon tea
Dinner: beefsteak, herb pancakes, juice

This is not five stars, but surely eatable. All in all the Russian cuisine is tasty and filling without stuffing you up. However, if you think this is not for you, feel free to bring your own provisions.

It is recommended to bring additional fluid, as between meals there are no further drinks available. However, there is a kettle next to your accommodation so that if you bring tea bags or instant coffee and a mug you will be able to prepare something whenever you like. In the evenings the bar opens (ask the liaison officer about times) where you can buy supplies for the next day if you want.

If you like sweets, bring them with you. It is also nice if you have some to share them with the cadets during night watches.

Milk or cream is not served on board. If you need some, bring it.

If you need a special diet for health reasons, please discuss this with the ship's doctor. I emergencies it is possible to heat special portions (for which you need to supply yourself) in the microwave in the crew mess.

Safety at Sea - a Lifestyle

.Safety on Board MIR and other sailing ships

Going to sea always has been and remains inherently dangerous. Sailing a complex square-rigger can be particularly dangerous unless every member of the crew – including the trainees, develops an attitude of safety consciousness. For example, one must automatically make sure that doors are properly secured either open or closed so that they will not swing out of control when the ship rolls or tacks and that portholes are properly dogged to prevent flooding. Particular attention must be paid to housekeeping: a coke can left on deck can easily cause a bad fall if stepped on during a roll and a book not secured can easily become a missile hazard. What might be harmless horseplay ashore becomes potentially dangerous behavior at sea. In short, safety at sea is a way of life.

There are several safety rules that are particularly important on a sailing ship:

SAFETY IN DAILY LIFE ON BOARD

Some important regulations to avoid problems while sailing on MIR:

- No electric appliance with the effect of heating is allowed to be used unless you have the permission of the responsible officer. The reason for this is that your harmless hair drier might be misunderstood as a fire by the smoke detector in your cabin and therefore cause a general alarm every time you use it.
- Smoking is prohibited below decks except for special areas about which your liaison officer will inform you. On deck it is only allowed around the deckhouses behind the foremast. Always smoke on the lee-side of the wind. Never throw a cigarette overboard. There are green baskets on deck where you can dispose of your completely extinguished cigarettes.
- All garbage has to be deposited in a special room opposite the entering door of the men's toilet (inside of the toilet). Absolutely NOTHING goes into the sea! All garbage will be burned in our incinerator; except glass and metal will be disposed of on shore.

- The toilets and pipes seem to be the most sensitive installations on board. Remember: NOTHING GOES INTO THE TOILET THAT HAS NOT BEEN EATEN BEFORE! Don't even put any soap inside, because the toilet water is being cleaned and the soap would destroy the helpful bacteria.
- The fresh water on the ship is limited. Please use water economically; otherwise there will have to be restrictions.
- Entering the engine room is permitted only with permission and accompanied by a member of the engine crew.
- The quarters of the crewmembers, their mess rooms and living rooms (= "carpet area") are absolutely off limits, unless you receive an invitation. This is valid for you even though there might be other trainees (who have been sailing with MIR for long time or are personal friends of the crew) who are allowed into these areas at any time.
- Don't manipulate any lever, switch or button without permission.
- Don't use a flashlight on deck during the night. You might blindfold the lookout for minimum 15 minutes if he accidentally looks into it.
- Don't shout, cry or whistle. Noises could be dangerous in real cases of emergency, because orders will not be heard.
- Never open a porthole at sea without permission.
- Never step on ropes, because they are round and could roll.
- Never sit on the main rail or the bulwark, on bollards or the pin rail.
- "Common sense " is a sailor's best protection. Even if you only THINK that something is not correct, inform your officer of the watch.
- Long fingernails don't last long on a sailing ship. Please cut them short, before they break which may cause an inflammation.
- Personal things have to be stowed away, so that they cannot cause any danger even with a rough sea.

SAFETY IN THE RIGGING:

- Never climb into the rigging without permission of the watch officer and the watch bosun.
- Lay aloft only on the weather side. If a ratline carries away or you lose your grip, the wind will blow you onto the shrouds instead of overboard.

- When laying aloft, you must hold on to the shrouds or other standing rigging and not to the ratlines. The ratlines, which are of light material, occasionally carry away even with the best of preventative maintenance.

- Gear that can be dropped, possibly injuring someone, should not be brought aloft. Watches, ballpoint pens, lighters, knife, hats, and the like must be left below. Gear (also photo cameras and handy cams) that is brought aloft must be secured.

- Safety harnesses must be worn aloft at all times. Until aloft, the clip should be hooked into the belt so that it cannot foul. In going aloft, running rigging should never be used for support nor for hooking on with a safety belt since it may become slack. Standing rigging, jackstays, safety stays and fixed pieces of gear should be used instead.

- The traditional rule of one hand for the ship and one hand for you still applies, even with safety harnesses. When working, both feet should be on the footropes or flemish horses. Always move only either one hand or one foot, so that 3 points or you are always having a secure stand or grip.

- Unless instructed otherwise, no one is allowed to sit or stand on the yards.

- Inform the watch bosun and the bridge when you have safely returned from the rigging.

- As a rule you will always be accompanied by a member of the crew when aloft. What he or she says is valid, no matter how strange it sounds to you.

SAFETY DURING MANOEUVERS:

- Be careful during manoeuvres. The blocks on the sheet, if not controlled, may easily gyrate and hit someone on deck; hence the name widow block.

- Don’t step into loops of ropes, because they might tighten around your leg – and pull you down or even hurt you badly.

- When working with lines, a sufficient number of people must be assigned according to wind conditions. Bad rope burns can easily occur if a line is undermanned, not to mention damage to the sails. Be especially careful with pulling halyards and downhauls – if you run with these ropes over the deck beware you may damage your hands when the movement comes to an immediate

- stop! The important command “brosili” in Russian language orders you to let the rope go instantly.

- It is particularly important to keep hands away from blocks when hauling and to stand clear of bights. Such lines often run so fast that one can be caught without warning in the block or bight.

- In all shipboard manoeuvres, and especially sailing manoeuvres, absolute silence must be maintained except for necessary commands and reports.

Last but not least two personal hints:

- If you have got long hair, wear a bandana or a hat at sea, but at least aloft. Getting caught in the rigging with your hair is not only very inconvenient but also funny for everybody except you.
- Always wear good shoes at sea. Even if you only go to the toilet at nighttime. The ship might do a sudden move and you hurt yourself.

DISTRESS CALL:

In an emergency the master will order the watch officer or the radio officer to send out a distress call on the ship's radio. The most urgent call is a MAYDAY call. This is a distress call of the highest priority. It is used when a person or the ship is in grave or eminent danger and requires immediate assistance. The proper way to issue a MAYDAY call is:

- The distress signal "MAYDAY" is spoken three times.
- The words "THIS IS" spoken once
- The name of the vessel spoke three times
- The distress signal "MAYDAY" spoken once
- The name of the vessel spoken once
- The position of your vessel (if you don't know that, look for a landmark, "We are just passing the Bay Bridge"
- The nature of your distress "we are taking on water" or "we have a fire in the engine room"...
- State the kind of help needed "we need a helicopter to airlift our Captain who is unconscious and bleeding severely"
- Any other info that might help (approximate length or tonnage of your vessel, amount of people on board, number of people needing medical assistance)
- When you are through, say, "I will be listening on Channel 16"
- End your message by saying "This is (your ship name) OVER".

GMDSS:

Yes, the ship has a DSC controller with the red SOS button with which a distress call can be sent automatically. Don’t try it. The only one who is to push that button is the captain!

Emergency Cases

What to do in case of an alarm.

I hope, that you will never need the following knowledge, but no matter if you travel on MIR, on another sailing ship, a cruise liner or maybe just a ferry between the shore and your holiday resort, it is good to know what to do in case of emergency. Only too often uninformed passengers or even crewmembers panic through the ship and tend to stupid behavior that can be avoided by a simple instruction. On MIR you get such an instruction on the very first day on board either by the 2nd mate who is the ship's designated safety officer, so that everyone should know at least where to assemble if the alarm rings. Additionally test alarms are made regularly and the reaction time of the crew will be checked closely. The following instructions have been worked out by MIR's chief mate and MIR's liaison officer for a new trainees' handbook in Summer 2000 to give the trainees an idea of what to do in case of emergency. It is mainly the same for any ship, as due to the S.O.L.A.S. rule the way to the assembly places and the life rafts must be marked clearly throughout the ship.

FIRE ALARM

Always remember that fire is the greatest hazard aboard ship. If you hear the alarm bell ring seven times short and once long – repeatedly – you have to do the following things immediately:

- Close the portholes and their covers in your kubrik (russ. for berthing compartment)
- Dress so that you will not get cold even after many hours in a life raft (depending on the weather condition in your sailing area) that may mean woolen clothes, long-sleeved shirts/jackets, long trousers.
- Take a cap or a hat.
- Take with you your passport/other important documents, articles of value, spectacles and medicine if necessary.
- Take your life jacket from above your berth, also your blanket, and go on deck to your assembly station as quickly as possible.
- Do not return to your cabin to collect your property.

Once on deck, put on your life jacket (pull it over your head, be sure that the lamp is outside, pull the strings around your waist and tie in front), gather with all your roommates of the same kubrik to see if anyone is missing. If one person of your room is missing, you have to inform the liaison officer or any officer close to you. Team spirit is very important in such a situation.

There is no time to be lost, because 15 to 25 minutes after the fire started, the ship would be burned out without any fire fighting measures!

During the fire-fighting maneuver, the command center will be on the bridge. All important information has to go there. On deck, there are special units busy with controlling the fire fighting itself and rescuing people that didn't manage to get on deck. Special units check the kubriks for lost Cadets or Trainees. If you miss one of your roommates, inform the liaison officer or any person around you wearing a radio set.

Anyone, that is closed in by smoke or fire and cannot get on upper deck by themselves, should try to reach a secure place (even if that means to go to a lower deck). As there will be no electricity anymore (lights are switched off, all connecting doors held by magnetic power will automatically close), an inexperienced person might have difficulties finding his way out. The most important thing is always, to close all doors behind you. Don't breath smoke – use a wet towel or handkerchief against it. There are telephones in many localities (mess rooms, living rooms, engine control room, officer's cabins), which you could use to inform the bridge (phone number 10) about your position. Rescue-units equipped with breathing apparatus will walk through the ship and rescue locked up people.

If the Captain decides to abandon the ship, the same rules as mentioned in the boat alarm will apply.

All rooms are equipped with fire alarms or smoke-alarms. In many places you can find alarm-buttons for the case of fire. If you are the person that detects a fire or smoke of a fire, do the following things immediately:

- Call out "Fire!"
- Inform the officer on duty by
- Hitting the nearest alarm button
- Using the telephone on the cadets desk and dialing the phone-number 10 (navigating bridge)
- If possible, try to fight the fire directly (there are fire-extinguishers all over the ship – have their positions in your mind)
- Close all doors and portholes next to the fire to avoid additional oxygen
- Inform the crew about the location of the fire

BOAT ALARM

If you hear the alarm bell ring seven times short and once long – repeatedly – you have to do the

following things immediately:

- Close the portholes and their covers in your kubrik (russ. for berthing compartment).
- Dress so that you will not get cold even after many hours in a life raft (depending on the weather condition in your sailing area) that may mean woolen clothes, long-sleeved shirts/jackets, long trousers.
- Take a cap or a hat.
- Take with you your passport/other important documents, articles of value, spectacles and medicine if necessary.
- Take your life jacket from beneath your berth, also your blanket, and go on deck to your assembly station as quickly as possible.
- Do not return to your cabin to collect your property.

Once on deck, put on your life jacket (pull it over your head, be sure that the lamp is outside, pull the strings around your waist and tie in front), gather with all your roommates of the same kubrik to see if anyone is missing. If one person of your room is missing, you have to inform the liaison officer or any officer close to you. Team spirit is very important in such a situation.

In cold weather conditions, the crew will distribute special immersion suits on deck, one of which you have to put on instead of the life jacket. With this immersion suit you can survive a long time even in very cold water.

The number written above your berth in red color is also the number of your life raft. Learn this number by heart. Each life raft has a commander, who is responsible to launch it into the water. As soon as your life raft is ready (put into water, blown up and secured to the ship with a rope) and your commander orders it, enter the life raft. Clear the entrance of the life raft when entering. Do not push each other and sit down in the life raft immediately. Assist those who need help. Keep your lifejackets on.

If you cannot avoid going into the water, try to climb into any life raft close to you. Our life rafts have a capacity of twenty people – we planned to fill them with only ten – so we have double space for each person!

Once in the life raft, strictly obey all instruction given by your commander. Discipline in the life raft is of vital importance. Do not remove your shirts, long trousers or head covering. If needed, bail the water from the raft.

Everybody will get the same ration of provisions and water, which will last for 48 hours at least. Warning! Do not drink seawater whatever the situation.

Keep calm. There is no reason to panic. The commander of your life raft knows exactly what to do.

If you have to stay in the water for some time, try to assemble with other survivors. Don't move unnecessarily, because you would lose energy and that means to lose body-heat, which is to be avoided. Connect your immersion suits with those of the others to build a small fleet.

FLOODING

The same rules apply as during Boat-Alarm.

MAN OVERBOARD

Any person seeing anybody fall overboard must shout *"Man overboard"* ("chelovjek sa bort") and must ensure that his report reaches the bridge. As many lifebuoys as possible are thrown to the person. Crewmembers will lay to the tops as soon as possible and point to the person with outstretched arms. Similarly, any personnel on deck not otherwise engaged should point at the person to help the navigation officers in case they lose sight of the person.

If you are the person who has fallen over board, don't move unnecessarily, because you would lose energy and that means to lose body-heat, which is to be avoided. Keep your arms and legs close to your body.

If you should find yourself in the water...

If at all possible you must get yourself as much out of the water as you can. You need to conserve heat by restricting all unnecessary movement.

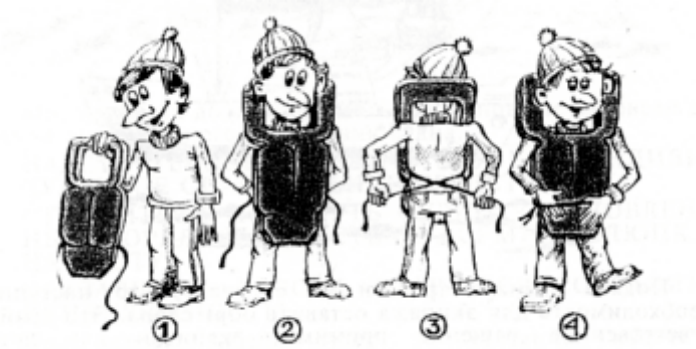
Remaining still if possible, assuming the foetal, or, heat escape lessening posture (HELP), will increase your survival time. About 50% of the heat is lost from the head. It is therefore important to keep the head out of the water. Other areas of high heat loss are the neck, the sides, and the groin. If there are several people in the water, huddling side to side in a circle will also preserve body heat.

Should you swim to shore? This is a most difficult decision. It depends on many things. Some good swimmers have been able to swim 8/10 's of a mile in 50 F. water before being overcome by hypothermia. Others have not been able to swim one hundred yards. Furthermore, distances on the water are very deceptive. Therefore, stay with the boat. Even a capsized boat is easier to see than a person in the water. This will make it easier for rescuers to spot you.

Do not swim unless there is absolutely no chance of rescue and you are absolutely certain that you can make it. If you do swim, use a PFD or some other flotation aid. You may be able to swim or tread water for hours but hypothermia is the number one killer of people lost overboard.

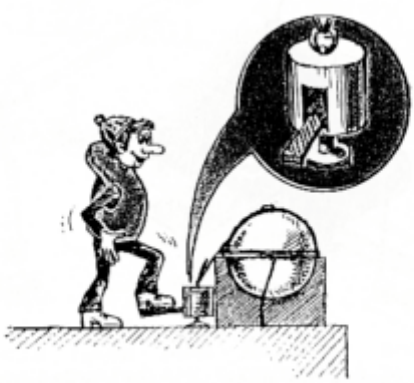
How to Use a Life Raft

Having found the following pictures in a Russian handbook about the abandoning of the ship that according to the SOLAS rule has got to be in every cabin and every mess room of seagoing ships, I think that it is almost not necessary to translate the text. Most pictures are self-explaining. Therefore I dare copying them into here for the sake of more safety for every trainee and passenger not only on the MIR but also on all ships. An emergency can happen on any ship at any time and it might happen that YOU are the one who has to organize the evacuation of yourself and others. In the tragedy of the German sail training ship PAMIR half a century ago a cook's mate proved to be the only one left alive to help himself and his mates survive.

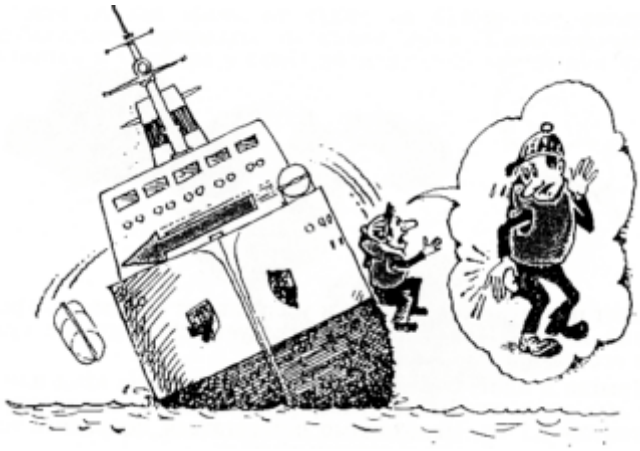


The first thing you should know is where to find the life vests and how to use them. As a trainee on MIR you find your life vest next to your bunk. Additional ones are stored next to all exits to the main deck, so that nobody who is already on deck when the alarm is given has to return into his cabin to pick up his safety gear. Put on the life vest in the way you can see in the picture above. It may be a good idea to practise this together with your cabin mates if you have never worn a life vest before.

MIR also carries on board for every person modern immersion suits that keep the body from hypothermia and make a long survival possible even in very cold waters. They are stored in special places on the deck and will be given to everybody if necessary.



Now your are fitted out and have found your or the nearest rescue station. But how to handle a life raft??? Normally there should be an easy mechanism to expose them to the water.



No comment!

The life raft is now still fixed to the ship with a line. Take this line and pull the raft as near to the ship as possible and belay the line to keep the raft from drifting away again.

In the water the container of the raft opens automatically and the life raft inflates.

Now you can enter the raft over an embarkation ladder. Those already inside the raft should help them who follow.

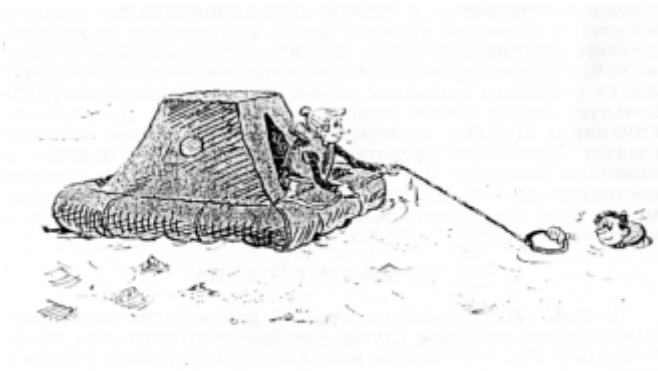
If everybody has entered the life raft cut the line that connects the raft with the ship to avoid it following the ship when she goes down.

Sometimes it is not possible to leave the ship by an embarkation ladder. In this case you should jump over board in the way you can see in the picture - feet first and hands crossed over your breast. This helps to avoid trauma when hitting the water with your life vest.

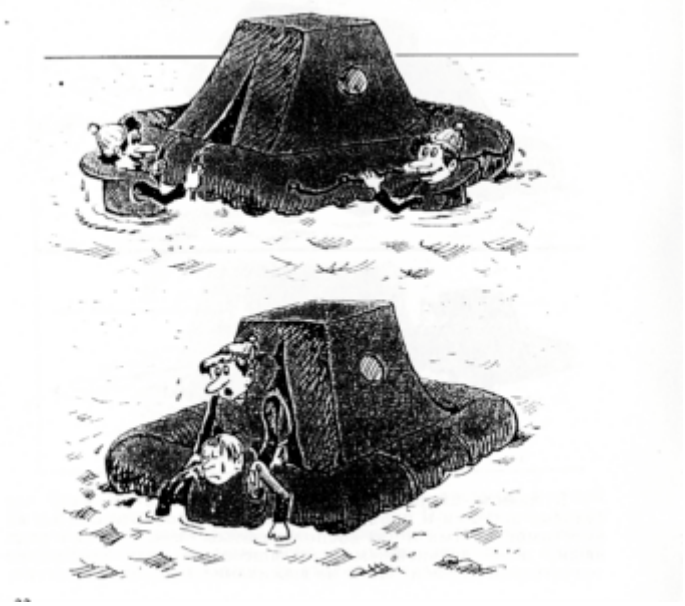
Draw attention to others with the whistle that is attached to your life vest. A whistle can be heard over a much longer distance than any human voice.

If you have to stay in the water for a longer time take on a foetal or heat escape-lessening posture (HELP) that minimizes the cooling down of your body in the water. Try to keep your head out of the water as 50% of your body heat escapes over the head. Do not move more than absolutely necessary.

Try to assemble with others. So you can take care for each other and will be easier to find through rescuers.



If you see somebody swimming in the water from your life raft, throw a rope with a handle towards him and tow him to the raft.



The life raft has got a little ladder over which it can be entered from the water. Unconscious or weak persons should be assisted as shown in the picture.

Inside the life raft is space for 20 persons. Normally there is one person in charge for every life raft. If the one who is responsible for your raft - normally an officer - for any reason should not be inside the raft with you choose one person who can do the job instead and follow his/her orders.

All that you have read should help you to know what to do if nobody else is there to tell you what to do or to understand what happens around you. Don't forget that after reading this you are not an expert in safety matters, but there are normally professional seamen and officers on the ship to instruct you. Even if their orders sound illogical or strange to you do what they say! They know what they are doing! In case of an emergency DISCIPLINE is needed more than in any other time.

Drawings from

Руководство по оставлению судна
РД 31.60.25-97

Stability of big sailing vessels

If going to sea under sails it is necessary always to bear in mind that all forces that work on the sails relate to the squared velocity of the apparent wind. If the wind gains force (aka speed) the aerodynamic forces grow even faster and are liable to become means of disaster. Masts that carry a huge area of sail may break, the ship heels over more and more and she might even capsize. The latter being most dangerous as the capsizing of a sailing vessel in most cases happens within seconds and there is a great chance that she will go down together with the entire crew.

There is a simple method to achieve more safety: reducing of sails in relation to the speed of the wind. That means reefing or taking away sails to reduce the sail area or de-powering sails by bracing (or sheeting) them less sharply. As a rule reducing the sails starts from the mast tops down to the deck thus not only reducing the all-over sail area but also moving the centre of windage more down and thus reducing the heeling moment of the wind in the sails.

On the MIR there are 5 standard variants which will be chosen accordingly to the wind velocity:

Sails set	Up to ... app. Wind [kt]	Sail area [m2]	Height [m] centre of windage above keel
all sails	<15	2881	30.97
without royals, flying jib	15	2359	28.97
as before without t'gallants, upper layer of staysails, outer jib, mizzen	17	1704	25.6
as before without courses, lowest layer staysails,	20	980	29.31
only with lower topsails	23	459	26.14
under bare poles (no sails set)	>30	920	15.98

Additionally to these the figures the windage of the hull and the bare rigging (see last row of the table) must be taken into account and the moment added to moment from the sails.

Whether the forces of the wind in the sails lead to more speed or to more heel is a matter of the aerodynamic forces in the sail. Without going too much into detail here it can be said that the heeling moment is maximal on close-hauled courses where the wind not pushes the ship but the aerodynamic forces suck her into a direction rectangular to the yard arm that means on closed-hauled courses approx. 60° leeward of the bow. Thus you receive a heeling moment which results of the wind force times the sail area working (both sails and hull) times the height of the centre of windage (minus middle draught) squared times the cosinus of the heeling angle.

$$M_{heel} = (F_{hull} + F_{sail}) \times (Z_{windage} - T/2) \times \cos \Theta$$

with

$$F_{hull} + F_{sail} = C_y \times \rho/2 \times W^2 (A_{sail} + A_{hull}) \times \cos \Theta$$

M_{heel} = heeling moment
$F_{hull} + F_{sail}$ = wind forces on sails and hull (and standing rigging)
$Z_{windage}$ = Height of the centre of windage
T = middle draught
Θ = heeling angle
C_y = aerodynamic coefficent (roughly 1.3)
ρ = barometrical air pressure
W = velocity of the apparent wind
$A_{sail} + A_{hull} \times \cos \Theta$ = working area of sails and hull

The next question is now what does this heeling moment with our ship? For this we must understand what actually is stability.

Under stability we understand the ability of the ship to return into an upright position after a disturbance (e.g. squalls, high waves, steering errors). This works trough the equilibrium of the forces of gravity (the weight of the ship) and buoyancy (the weight of the water displaced by the ship).

Now keep in mind that a big tall ship is not a yacht and does not behave like a yacht. While on yachts the centre of gravity is normally at or near the keel and thus always below the centre of buoyancy, a tall ship is – despite being fitted with a keel – a cargo ship with sails and thus behaves like a cargo ship. That means that the centre of gravity is always situated higher than the centre of buoyancy and she is liable to capsizing like a dinghy if we do not treat her with the necessary care.

To make the fun complete differently than on cargo ships where once the cargo is lashed and given that there are no changes in the ballasting the centre of gravity remains in one place for the durance of the voyage, it can move on sailing ships due to the weight of the sails set or dowsed and the relatively large number of crew on board moving around. Send 100 cadets aloft to furl sails and you have moved 6 tons 30 m up and 20 m out from the centre line...

But let's return to the wind force in the sails. It attacks in the centre of windage and heels the ship around a point above the keel called the metacentre. On one side of it act the heeling forces as seen in the equation above and on the other side we have the righting forces from the hull. Without wind those would act to return the ship into an upright position but now the wind forces are counteracting this and so the righting moments (M_{static}) will only work up to an equilibrium with the heeling moments from the wind (M_{heel}). You now achieve a new "zero-position" into which the ship wants to return due to her buoyancy. That means the ship sails with a certain heel angle and the waves will make her roll from this position on. E.g. this can mean that in a heeling angle of 15° starboard she will actually r oll from 5° port to 35° starboard where a cargo ship of the same size would roll from 20° port to 20° starboard.

So let's find out about the righting moment (M_{static}). A first estimate on it can be done by calculation the distance between the centre of gravity (G) and the metacentre (M), the so called GM. If you imagine a triangle spanning between G, M and the centre of buoyancy (B) you will easily understand that a righting lever between B and G can only work satisfactorily if GM has a minimum length.

Unfortunately the metacentre is only static in small heeling angles (up to 15°). If the ship heels fur ther it moves upwards and to windward. To make things still calculable all big ships have tables where the distance of the metacentre from the keel is listed. If we now want to find out about the righting moment our ship has to return into an upright position under the given circumstances we need to calculate the righting lever between the centre of gravity (G) and the centre of buoyancy (B), which also moves due to the form of the hull. (B is always in the centre of the submerged space of the hull.) This righting lever GZ is a function of the heeling angle and the distance between the centre of gravity and the keel. If calculating this for different heeling angles you receive a characteristic curve which represents the intact stability of the vessel.

$GZ = (KN – KG) \times \sin \Theta$

$M_{static} = GZ \times Dg$

With
GZ = righting lever between G and the horizontal component of B (Z)
KN = distance between the keel and the vertical component of the metacentre (N)
Dg = weight of the ship

As for cargo ships there exist certain limits in which this static stability must be. As for sailing ships these limits do not work. Remember, she does not return to an upright position after a disturbance, but to the “zero-position” which belongs to the heeling forces of the wind in the rigging which depends on the sail area and angle of attack which you have in that very moment. Therefore there must be an added safety range. While on cargo ships the margin of stability (where there is still a positive righting lever) is normally 60° on sailing ships the minimum should be 90°. On MIR it is 110°.

To find out how much heel the ship will have under the influence of a certain wind impact both equations – the righting moment M_{static} and the heeling moment of the wind M_{heel} - must be compared. This is normally done by calculating the work needed to heel and right the ship for certain heel angles and drawing the curves into one diagram. At the point where the curves cut each other you can read the angle of heel that belongs to this wind impact.

Another important figure is the heeling angle where the righting lever is maximal. It normally represents the angle when the edge of the deck comes to water. On MIR with a freeboard of 4.6 m this happens only near 60° and with her having all openings in the deck near the ship’s middle her righting lever still grows after this until 90°.

But this is all blind theory. In the famous cases of capsizing of tall ships in the past (ALBATROSS, MARQUES, PRIDE OF BALTIMORE, NIOBE, PAMIR) hatches or companionways were wide open at the time of the incident and downflooding happened. So keep in mind that the deck-to-water angle is the critical point and set your sails always so that in case of an unexpected squall laying you over no water will enter the inside of your ship. Reduce the sail area at the moment when you think of it. Don’t wait for a moment that might suit better (e.g. at the change of watches) and never assume deteriorating weather to get better after a short while. Always expect the worst.

Sails set	Wind necessary to heel MIR to 45° [m/s]
all sails	14.0
without royals, flying jib	15.8
as before without t’gallants, upper layer of staysails, outer jib, mizzen	19.1
as before without courses, lowest layer staysails,	22.0
only with lower topsails	29.0
under bare poles (no sails set)	42.0

Yet there is another way to reduce the impact of the wind forces on the heeling of our ship. If you feel you cannot reduce the sail area any more, e.g. if otherwise you would loose steerage way or you have already taken away all sails and she is still heeling. Remember, all forces are relative to the squared velocity of the apparent wind. The apparent wind consists of 2 vectors: the true wind and the negative

vector of your own speed. If beating against the wind both add. So if you bear off you will diminish the apparent wind by the rate of your own speed. In the extreme this will mean running before bare poles. In how far this is practicable – that is another question which will be discussed in the chapter about bad weather strategies.

Bad Weather Strategies

A ship like the MIR is underway in all weathers and during all times of the year. She is built for this and normally does not suffer any harm from this. Nevertheless bad weather always puts a test on the seamanship that is carried out on board and this is especially so on sailing ships. The best way to deal with dangerous situations is not to get into dangerous situations at all. For this it is necessary to reduce sail area in good time before the trouble starts and eventually to take away the sails at all. That takes a close observation of the weather situation and planning a passage accordingly. Unfortunately this is not always possible as due to schedules not any storm can be avoided.

THE SQUALL

Most dangerous for any ship under sails are squalls. This is especially so on tall ships where in contrast to a yacht one cannot easily take the sails away if one sees bad weather coming. Here many hands must work together and eventually a part of the crew first needs to be woken up to help take away the sails.

As a rule a ship always sails with all sails that can be set in the prevailing wind. If then the wind gains force unexpectedly with or without a change of direction – a squall – the ship gets laid over seriously. Alone this can lead to problems and injuries, e.g. with crew members who were below decks and tumbled and fell against something, or in kubricks or cabins where suddenly things fly around. Especially dangerous it becomes for those on deck who now try to take away the sails. On the lee side there is serious danger of falling over board.

Heavy gusts out of the blue sky can even capsize a ship, especially if they are connected with wind shifts. Whereas a ship in squalls coming from the same direction as the wind was coming before can usually compensate the increasing heel by luffing up, the situation is much more serious in squalls from other directions. It happens that the ship does not react to the wheel any more and runs completely out of course. Taking away the sails then not only gets difficult but eventually even impossible. If one is lucky the sails tear away. If not, it can be necessary to cut away the sheets.

To avoid such situations it is good seamanship to prepare the ship in good time before the squall hits. The watch officer must be able to anticipate the signs of an oncoming squall. At the first sign (what can be a strange looking cloud, an unusual colour of the sky, ripples on the water in a distance, a significant radar echo, a steep rise or fall of the barometer, something starting to clatter high up in the rigging or even a feeling that all your hairs are rising up on your spine and “something is in the air”)

that a squall might be on the way it is necessary to take away all upper sails. If it gets obvious that this is not enough, also the lower sails and finally all sails get clewed up. For a square rigger especially a squall hitting from dead ahead is problematic. If the square sails come aback it is impossible to clew them up. The watch officer must in any case try to avoid this to happen and must order the helmsman in time to bear off and to take the wind parallel to the yards.

ACTIONS TO TAKE WHEN AWAITING BAD WEATHER

While yachts stay in port in winds of more than 6 Bft, for tall ships the fun only starts then. The ship achieves good speed and in most cases still all sails can remain set. 7-8 Bft is also not worrying much. You take away some sails and the ship starts rolling, but that's it. From 9 Bft on things get serious. The ship prepares for bad weather:

- It is checked that all lines of the running rigging are belayed safely. Their bights must hang free from the deck so that they do not catch any water coming on deck, do not block any scuppers and do not hang over board. Lines that are in readiness for manoeuvres must lie clear so that they can run out easily.
- All sails not set must be stowed storm-proof (harbour stow). That means they get packed very tightly to reduce the windage and get secured by additional gaskets. This is especially important for the yard arm ends.
- On deck safety lines get rigged. Only those working there are allowed to stay on the deck. Anybody else who has no imminent job to do there must remain below deck. Those who need to be on deck wear their safety harnesses and secure the lanyard to the safety lines or other fixed points.
- All openings in the deck get closed. That includes all hatches and bulkheads and all ventilation flaps. The portholes get controlled and eventually secured with the blinds. All sea cocks get closed.
- The crew receives order to make their cabins storm-proof, that means to lash and secure all things that might work loose.

Which sails are now still set depends on the planned strategy to weather off the storm. If it is getting really bad and the storm raises to 12 Bft or more there are 4 main tactics that have proven to make sense over the centuries:

- beat against the wind close-hauled under minimum sail
- run before the wind under bare poles
- heave-to
- lie before a floating anchor

Which of those tactics are chosen depends on the force of the storm, the sea area, the experience of the crew, etc.

As a rule it is always tried to sail against the wind as long as possible, eventually with help of the ship's engine. For this one would set fore stay sail, fore lower topsail, main lower topsail and mizzen sail. Is that not possible and given there is enough sea room available one would try to run before the wind. In any case one would try to avoid taking the seas from the side.

WIND

The wind force can be given in different ways: "Beaufort (Bft.)", "metres per second" or "knots", depending on whom you ask, captain, mate, able seaman... Trainees tend to look at the waves and say something like "if you see foam it must be 6" (6 what?!). So the best is to go to the bridge and ask there. Only problem is that they use different messuring systems, too. So you better ask what they use today. To make it easier to translate this now into the units you feel comfortable with see the following table:

Beaufort-Scale						
wind force		wind speed			sea state	
	Bft	in m/sec	km/h	in knots	waves (m)	
light air	1	0,3 - 1,5	1 - 5	1 - 3	1	calm-rippled
light breeze	2	1,6 - 3,3	6 - 11	4 - 6	2	smooth wavelets
gentle breeze	3	3,4 - 5,4	12 - 19	7 - 10	2,5	...
moderate breeze	4	5,5 - 7,9	20 - 28	11 - 15	3	slight
fresh breeze	5	8 - 10,7	29 - 38	16 - 21	4	moderate
strong breeze	6	10,8 - 13,8	39 - 49	22 - 27	5	rough
near gale	7	13,9 - 17,1	50 - 61	28 - 33	6	very rough
gale	8	17,2 - 20,7	62 - 74	34 - 40	7	high
strong gale	9	20,8 - 24,4	75 - 88	41 - 47	7,5	...
storm	10	24,5 - 28,4	89 - 102	48 - 55	8	very high
violent storm	11	28,5 - 32,6	103 - 117	56 - 63	9	phenomenal
hurricane	12	> 32,7	> 118	> 64	> 10	...

Of course you can, especially when at the helm, read the instruments yourself. But keep in mind that all instruments showing the windforce or direction can only tell the "relative wind" that hits the ship. To find out the "true" wind force it is neccessary in accordance to the course to either add (before-the-wind-courses) or substract (by-the-wind-courses) the speed of the ship, and to ask for currents and drifts that might influence, too. Too difficult? Well, you can always ask in the galley. The cook will tell you that if the pots get carried away from the oven we have storm...

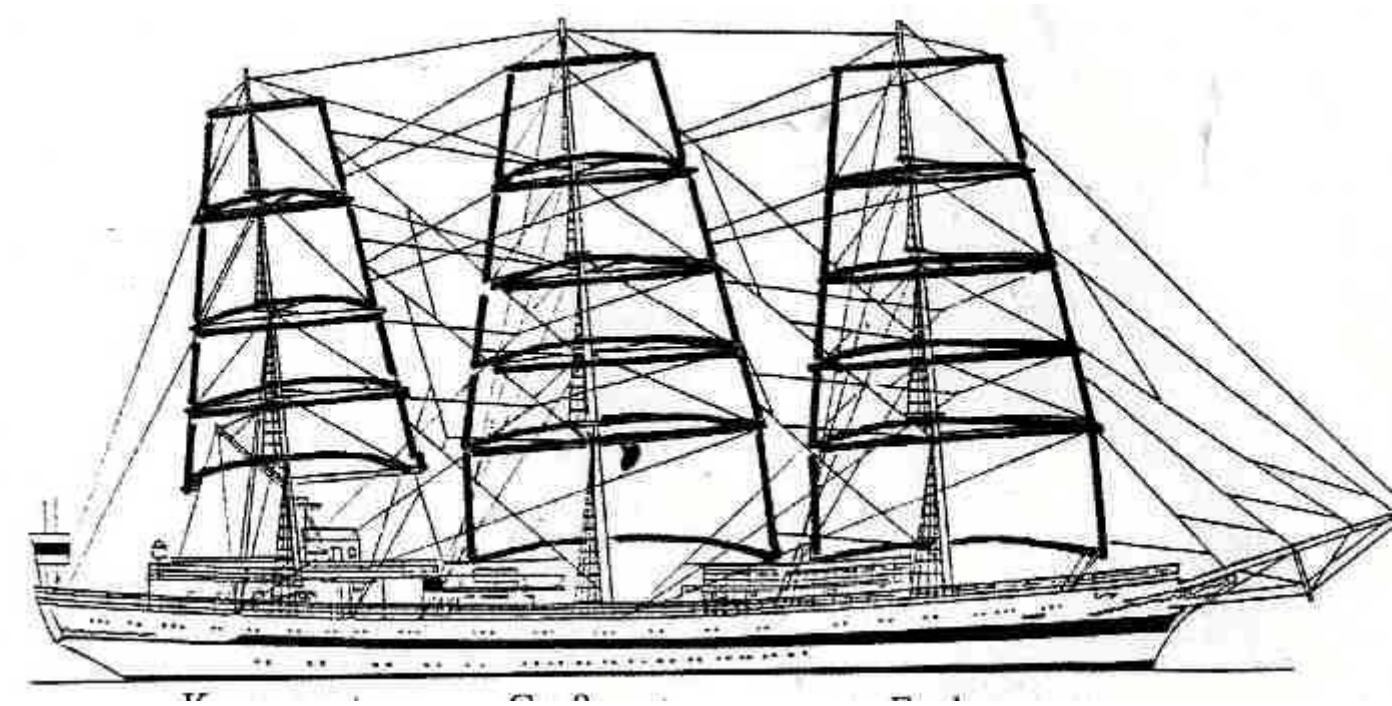
Visibility:

The visibility of course influences sailing, too. Yes, we have a radar. But bad visibility can mean that for safety reasons the sails get stowed away and we proceed under engine.

visibility	
25nm	excellent visibility
10nm	very good visibility
5nm	good visibility
2nm	moderate visibility
1nm	poor visibility
0,5nm	very poor visibility
500m	moderate fog
200m	fog
50m	thick fog
< 50m	dense fog

Rigging Plan

Square sails – Rahsegel – прямые паруса

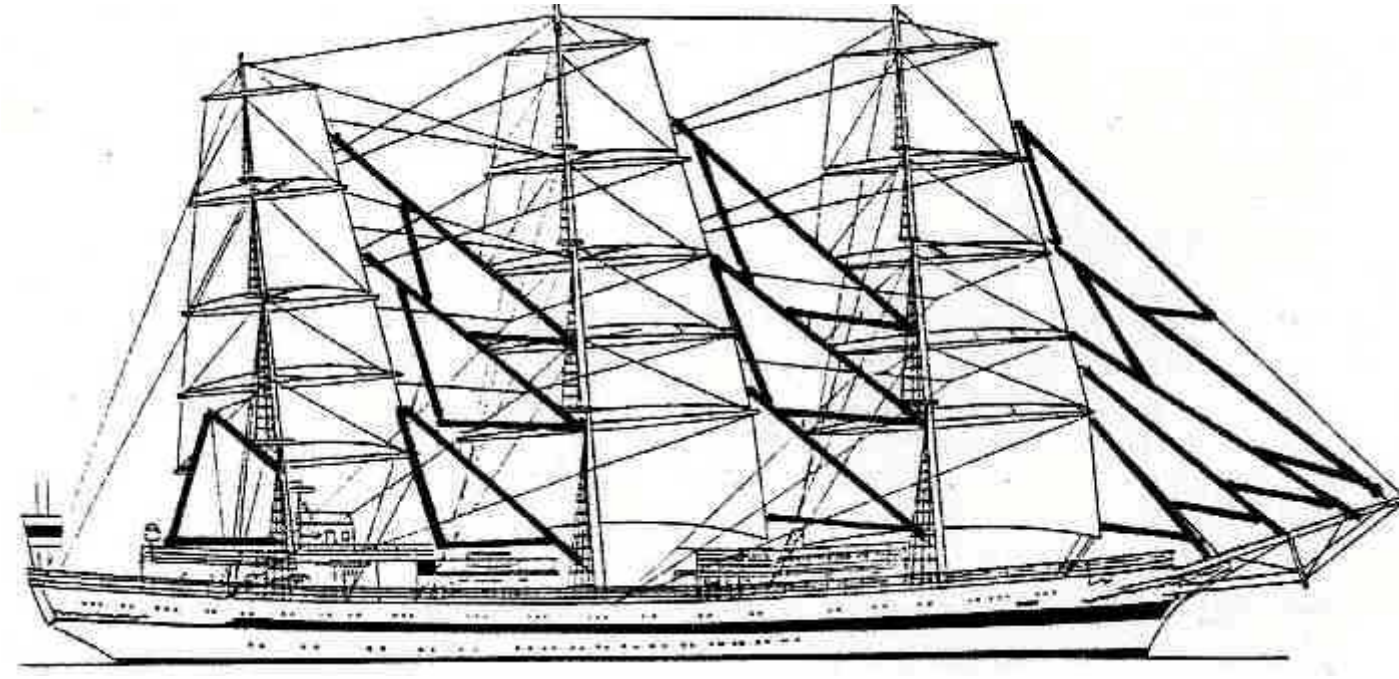


mizzen mast	**main mast**	**fore mast**
mizzen royal sail	main royal sail	fore royal sail
mizzen topgallant sail	main topgallant sail	fore topgallant sail
mizzen upper topsail	main upper topsail	fore upper topsail
mizzen lower topsail	main lower topsail	fore lower topsail
	main sail	fore sail

Kreuzmast	**Grossmast**	**Fockmast**
Kreuz-Royalsegel	Gross-Royalsegel	Fock-Royalsegel
Kreuz-Bramsegel	Gross-Bramsegel	Fock-Bramsegel
Kreuz-Obermarssegel	Gross-Obermarssegel	Fock-Obermarssegel
Kreuz-Untermarssegel	Gross-Untermarssegel	Fock-Untermarssegel
	Grosssegel	Focksegel

Бизань-мачта:	**Грот-мачта:**	**Фок-мачта:**
Крюйс-бом-брамсель	Грот-бом-брамсель	Фор-бом-брамсель
Крюйс-брамсель	Грот-брамсель	Фор-рамсель
Крюйс-верхний марсель	Грот-верхний марсель	Фор-верхний марсель
Крюйс-нижний марсель	Грот-нижний марсель	Фор-нижний марсель
	Грот	Фок

Fore-and aft sails – Stagsegel - косые паруса

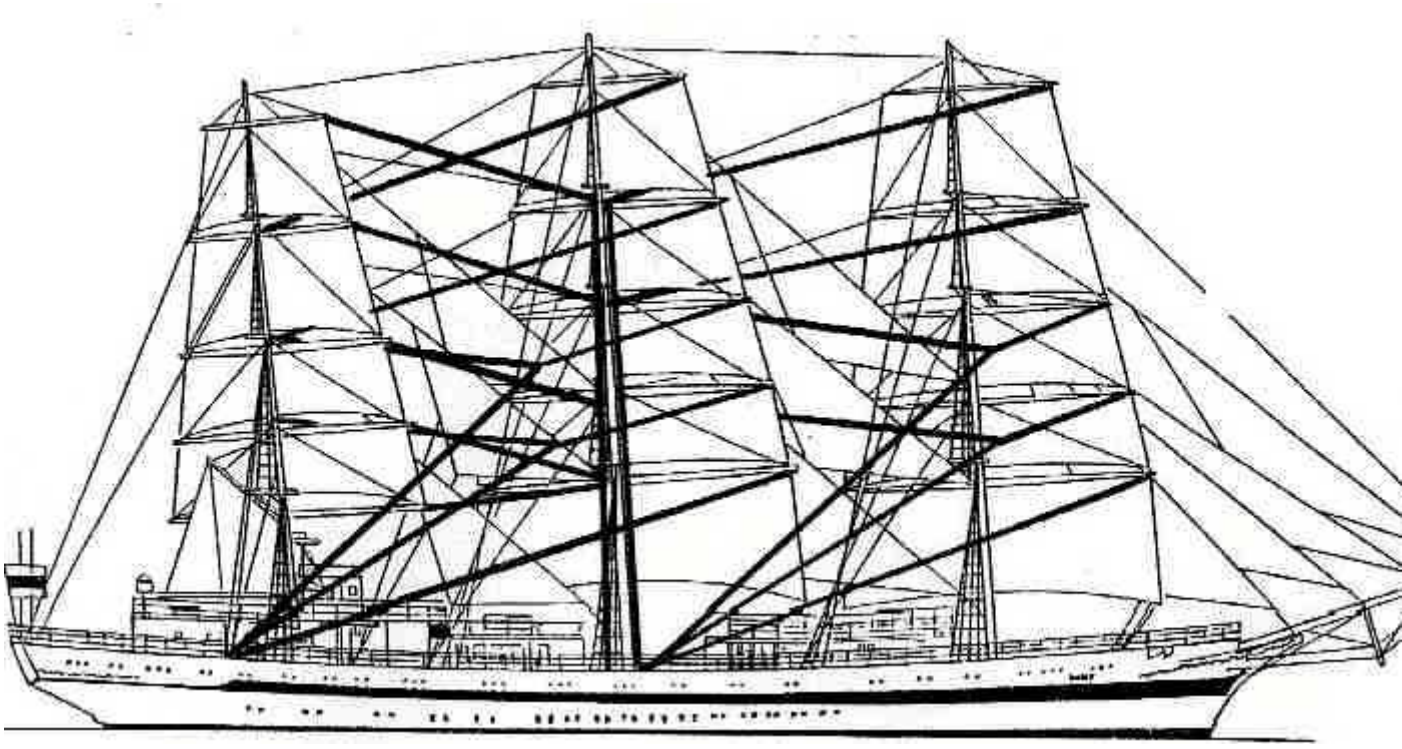


mizzen mast	**main mast**	**fore mast**
		jib-o-jib
mizzen topgallant staysail	main topgallant staysail	flying jib
mizzen topmast staysail	main topmast staysail	outer lib
mizzen staysail	main staysail	jib
spanker/driver		inner jib

Kreuzmast	**Grossmast**	**Fockmast**
Kreuz-Royalstagsegel	Gross-Royalstagsegel	Flieger
Kreuz-Bramstagsegel	Gross-Bramstagsegel	Vorstengestagsegel
Kreuz-Stengestagsegel	Gross-Stengestagsegel	Außenkluever
		Innenkluever
Besansegel		Klueverstagsegel

Крюйс-мачта:	**Грот-мачта:**	**Фок-мачта:**
		Кливер.мопсель
Крюйс-бом-брам-стаксель	Грот-бом-брам-стаксель	Бом-кливер
Крюйс-брам-стаксель	Грот-брам-стаксель	мидель-кливер
Крюйс-стень-стаксель	Грот-стень-стаксель	первый кливер
Контр-бизань		фор-стень-стагсель

Running rigging – laufendes Gut – бегучий такелаж



(starboard side)

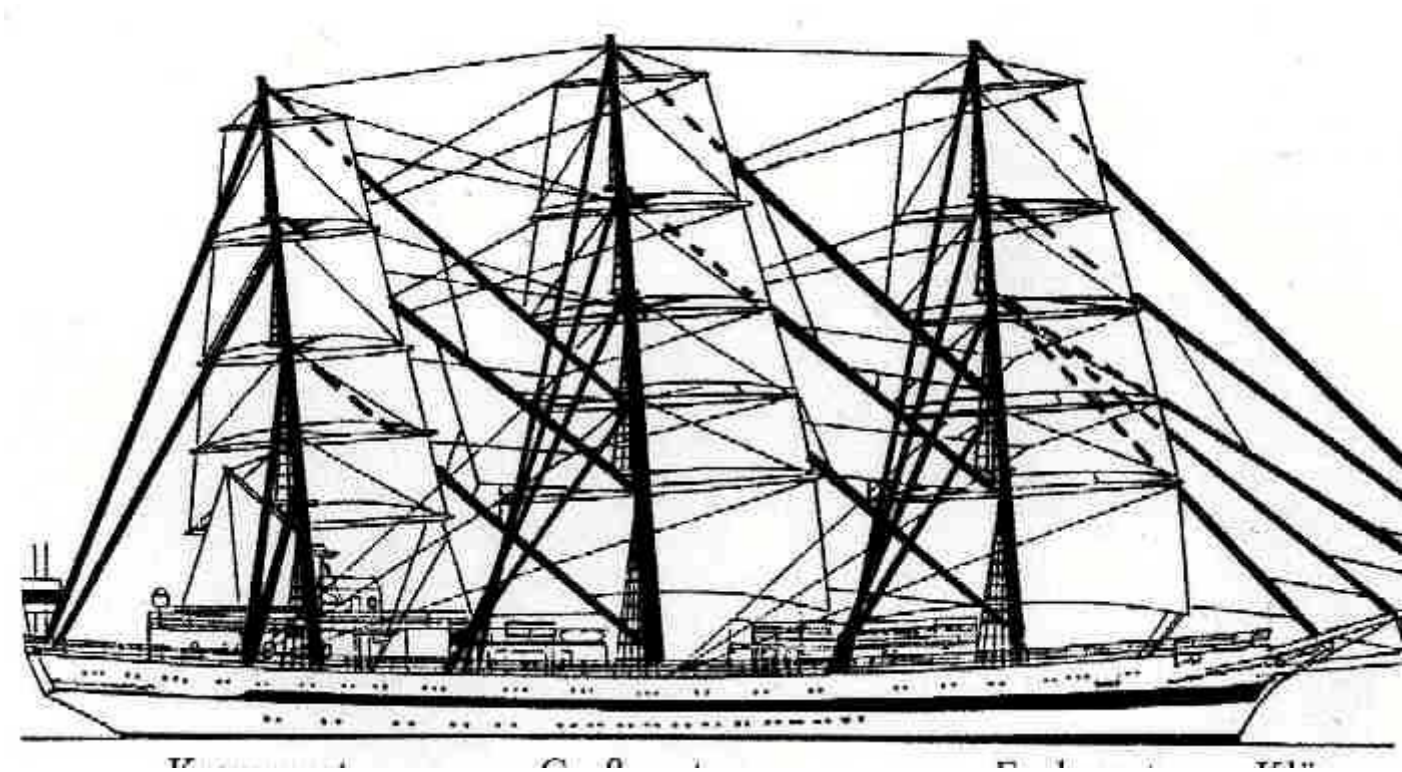
mizzen mast	**main mast (mizzen braces led crosswise and fore braces)**	
main royal yard brace	mizzen royal yard brace	fore royal yard brace
main topgallant yard brace	mizzen topgallant yard brace	fore topgallant yard brace
main upper topyard brace	mizzen upper topyard brace	fore upper topyard brace
main lower topyard brace	mizzen lower topyard brace	fore lower topyard brace
main yard brace	mizzen #### brace	fore yard brace

(Steuerbordbrassen)

Kreuzmast (Grossmastbrassen)	**Grossmast (Kreuzmastbrassen ueber kreuz gefuehrt, Fockmastbrassen)**	
Gross-Royalbrasse	Kreuz-Royalbrasse	Fock-Royalbrasse
Gross-Bram-Brasse	Kreuz-Bram-Brasse	Fock-Bram-Brasse
Gross-Obermars-Brasse	Kreuz-Obermars-Brasse	Fock-Obermars-Brasse
Gross-Untermars-Brasse	Kreuz-Untermars-Brasse	Fock-Untermars-Brasse
Grossbrasse	Bagienbrasse	Fockbrasse

Брасы грота:	**Брасы бизани**	**Брасы фока**
Грот-бом-брам-брасы	Крюйс-бом-брам-брасы	Фор-бом-брам-брасы
Грот-брам-брасы	Крюйс-брам-брасы	Фор-брам-брасы
Грот-верхние-марса-брасы	Крюйс-верхние-марса-брасы	Фор-верхние-марса-брасы
Грот-нижние-марса-брасы	Крюйс-нижние-марса-брасы	Фор-нижний-марс-рей
Грот-брасы	Бегин-брасы	Фок-брасы

Standing rigging – stehendes Gut - стоячий такелаж



mizzen mast	**main mast**	**fore mast**	**bowsprit**
mizzen mast shrouds	main mast shrouds	fore mast shrouds	fore royal stay
2 mizzen mast capstays	4 main mast capstays-	4 fore mast capstays	fore topmast stay
martingalestay	mizzen topgallant stay	main topgallant stay	3 jib stays
backstay	mizzen topstay	main topstay	2 waterstays
	mizzen stay	main stay	spreader

Kreuzmast u. Kreuzmastrahen	**Grossmast u. Grossmastrahen**	**Fockmast u. Fockmastrahen**	**Bugspriet**
Kreuzwanten	Grosswanten	Fockwanten	Vor-Royal-Stag
2 Kreuzmastpardunen	4 Grossmastpardunen	4 Fockmastpardunen	Vor-Mars-Stag
Martinstag	Kreuz-Bram-Stag	Gross-Bram-Stag	3 Klueverstags
Backstag	Kreuz-Mars-Stag	Gross-Mars-Stag	2 Wasserstags
Besangaffel u. Besanbaum	Kreuz-Stag	Gross-Stag	Stampfstag

Крюйс-мачта	**Грот-мачта**	**Фок-мачта**	**Бушприта**
Ванты крюйса	Ванты грота	Ванты фока	Фор-бом-брам-стень-штаг
Фордуны крюйса	Фордуны грота	Фордуны фока	Фор-штаг
Мартин-штаг	Крюйс-бом-брам-стень-штаг	Грот-бом-брам-стень-штаг	Кливер-леер
Бакштаг	Крюйс-брам-стень-штаг	Грот-брам-стень-штаг	Ватерштаг
	Крюйс-грот-стень-штаг	Грот-стень-штаг	Краспица

The Rigging of the MIR

MIR has got 3 steel masts, the fore mast with 49.5 m over the construction water line, the main mast (same dimensions) and the mizzen mast. Every mast consists of mast, top spar and topgallant spar. However, the construction is not like in traditional rigs, but they are flanched together. On every mast there are 3 platforms.

The bowsprit consists of one part. It is 19.2 m long. It is attached to the hull over a martingale stay and waterstays.

Every mast carries 5 fixed steel yards. The yards of the fore and main masts are identical and therefore eventually exchangable. The mizzen mast additionally carries a boom and a gaff.

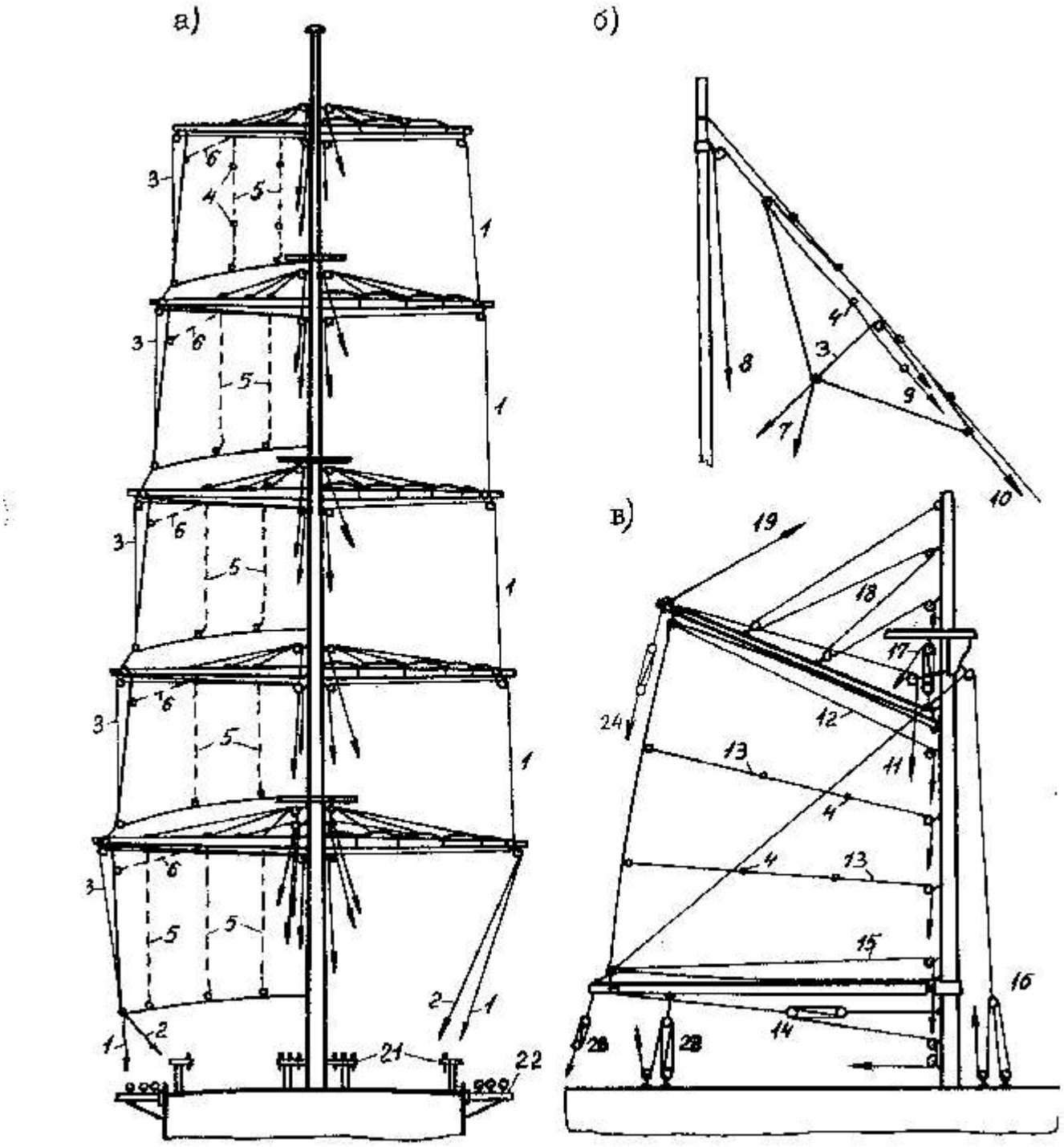
The rigging of the MIR was developed accordingly to the knowledge and state of art of the beginning 20th century. The standing rigging is made of steel wire of which a big part is clad and tarred. The running rigging is made of manmade fibres in suitable diameter for working by hand. The yards are fitted with foot ropes for a safe stand and a safety wire to secure the lanyards of the safety harnesses. Both consists of steel wire.

MIR has got 2 bracing trees. Those are booms at the side over which the braces of the lower 3 yards of the fore and main masts are led.

MIR carries 14 square sails. Those of the fore and main masts are identical and therefore exchangeable. Furtheron there are 4 jibs and 7 staysails and one gaff sail.

Running Rigging

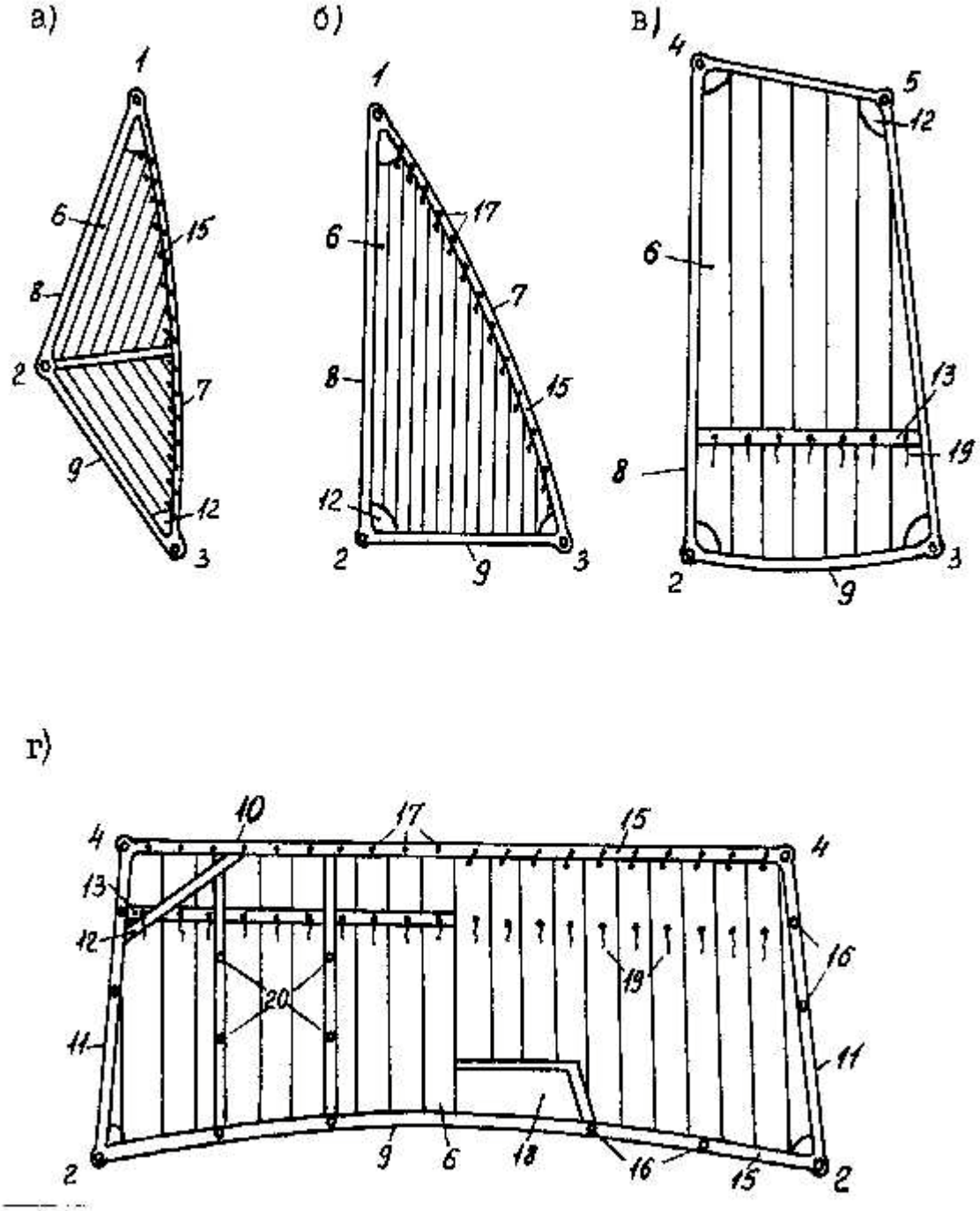
needed to work the sails



a	прямый паруса	Rahsegel	square sails

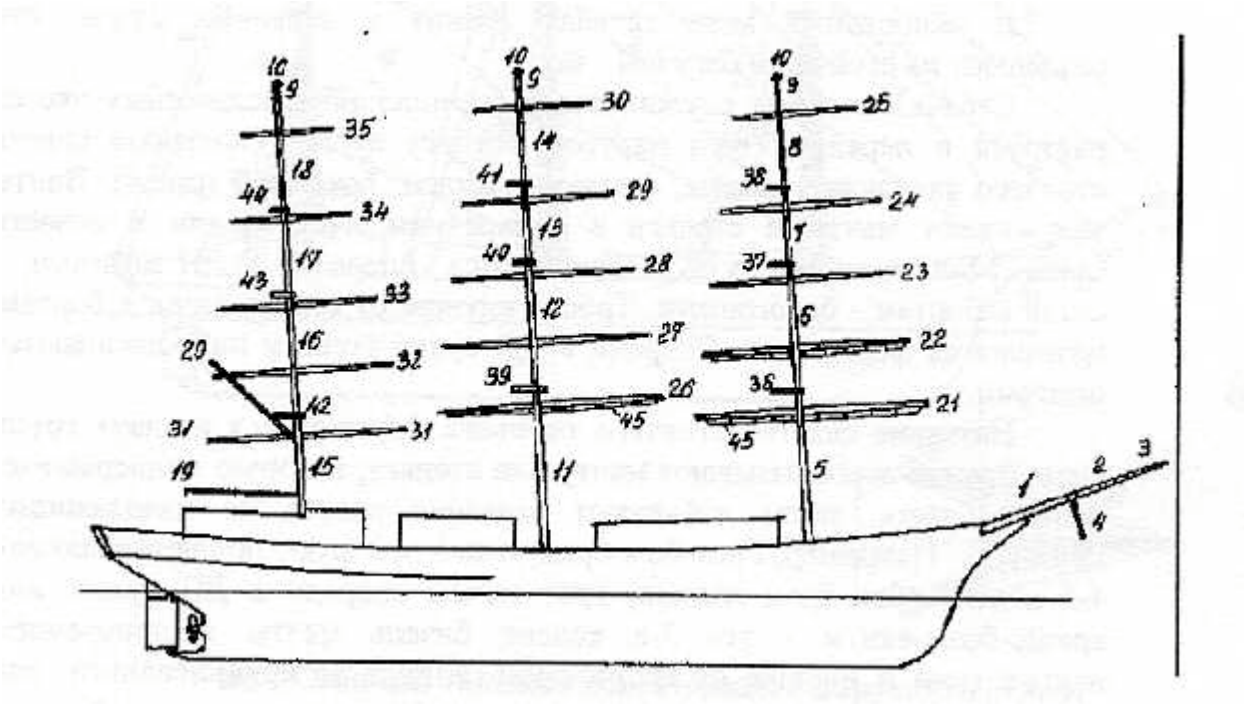
б	косые паруса	Stagsegel	fore-and-aft-sails
в	гафельный парус	Gaffelsegel	gaff-sails
1	шкоты	Schoten	sheets
2	галсы	Halsen	tacks
3	гитовы	Geitau	clewlines
4	беготки		lizards
5	бык-гордени	Bauchgordings	buntlines
6	нок-гордени	Nockgordings	leechlines
7	кливер-шкот	Klueverschot	jib-sheet
8	кливер-фал	Klueverfall	jib-halyard
9	кливер-нирал	Klueverniederholer	jib-downhaul
10	кливер-галс	Klueverhals	jib-outhaul
11	бизань-фал	Besanfall	outhaul
12	бизань-нирал	Besanniederholer	downhaul
13	бизань-гордени	Besangordings	brails
14	бизань-шкот	Besanschot	footouthaul
15	бизан-гитов (контр-шкот)	Konterschot	footinhaul
16	топенант гика	Topnant	lift
17	гардель гафеля		main halyard
18	бизан-дирик-фал	Dierkfall	peak halyard
19	топенант бизань гафеля	Topnant der Besangaffel	gaff lift
20	бизань гика шкот	Besanpiekschot	
21	кофель-нагельные планки	Nagelbank	Pinrail
22	галс-бканцы (брас-выстрелы)	Ausleger, Brassbaum	
23	бизань-завал-тали	Savaltalje	preventer
24	бизань-звавл-тали	Besan-Savaltalje	preventer

Sails in Detail



а	кливер или стаксель	Kluever oder Stagsegel	jibs or staysails
в	гафельный парус	Gaffelsegel	spanker
г	верхный марсель	Obermarssegel	upper topsail
1	фаловый угол	Kopf	head
2	шкотовый угол	Schothorn	clew
3	галсовый угол	Hals	tack
4	нок-бензельный или фаловый угол	Nockhorn	ear
5	верхный галсовый угол	Klauohr	throat
6	полотнище		
7	косая шкаторина	Vorderliek	leech
8	задняя шкаторина	Achterliek	leech
9	нижняя шкаторина	Unterliek, Fussliek	roach
10	верхняя шкаторина	Oberliek	headrope
11	боковая шкаторина	Seitenliek	leech, luff
12	боуты		
13	риф-банты	Reffbaendsel	reef bonds
15	ликтрос	Liektrosse	
16	кренгельсы	Oesen	cringles
17	люверсы	Oesen	
18	стоплат		
19	риф-сезии	Reffzeisings	
20	беготки	Klotje	bullseye

Masts and Spars



1	бушприт	Bugspriet	bowsprit
2	утлегарь	Klueverbaum	jib-boom
3	бом-утлегарь	Klüverbaumstenge	
4	мартин-гик	Martinstag	martingale stay
5	фок-мачта	Fockmast	fore mast
6	фок-стенга	Fockstenge	fore top mast
7	фок-брам-стенга	Fockbramstenge	fore topgallant mast
8	фок-бом-брам-стенга	Fockroyalstenge	
9	флагшток	Flagstock	
10	клотик	Mastsptize	mast head
11	грот-мачта	Grossmast	main mast
12	грот-стенга	Gross-Stenge	main top mast
13	грот-брам-стенга	Gross-Bramstenge	main topgallant mast
14	грот-бом-брам-стенга	Gross-Royalstenge	
15	бизань-мачта	Besanmast, Kreuzmast	mizzen mast

16	крюйс-стенга	Kreuzstenge	mizzen top mast
17	крюйс-брам-стенга	Kreuzbramstenge	mizzen topgallant mast
18	крюйс-бом-брам-стенга	Kreuzroyalstenge	
19	бизань-гик	Besanbaum, Piek	spanker boom
20	бизань-гафель	Besangaffel	spanker gaff
21	фока-рей	Fockrah	fore yard
22	фор-нижний-марса-рей	Fockuntermarsrah	lower fore topsail yard
23	фор-верхний-марса-рей	Fockobermarsrah	upper fore topsail yard
24	фор-брам-рей	Fockbramrah	fore topgallant yard
25	фор-бом-брам-рей	Fockroyalrah	fore royal yard
26	грота-рей	Grossrah	main yard
27	грот-нижний-марса-рей	Grossuntermarsrah	lower main topsail yard
28	грот-верхний-марса-рей	Grossobermarsrah	upper main topsail yard
29	гром-брам-рей	Grossbramrah	main topgallant yard
30	грот-бом-брам-рей	Grossroyalrah	main royal yard
31	бегин-рей	Bagienrah	cross jack
32	крюйс-нижний-марса-рей	Kreuzuntermarsrah	lower mizzen topsail yard
33	крюйс-верхний-марса-рей	Kreuzobermarsrah	upper mizzen topsail yard
34	крюйс-брам-рей	Kreuzbramrah	mizzen topsail yard
35	крюйс-бом-брам-рей	Kreuzroyalrah	mizzen royal yard
36	фор-марс	Fock-Mars	fore cross tree
37	фор-салинг	Fock-(Bram-)Saling	first platform (fore mast)
38	фор-брам-салинг	Fock-Royal-Saling	second platform (fore mast)
39	грота-марс	Gross-Mars	main cross tree
40	грота-салинг	Gross-(Bram-)Saling	first platform (main mast)
41	грота-брам-салинг	Gross-Royal-Saling	second platform (main mast)
42	крюйс-марс	Kreuz-Mars	mizzen cross tree
43	крюйс-салинг	Kreuz-(Bram-)Saling	first platform (mizzen)
44	крюйс-брам-салинг	Kreuz-Royal-Saling	second platform (mizzen)
45	перты	Fusspferde	footropes

MIR's Sails and Running Rigging

Description of MIR's Rigging an how it Works.

The MIR's twenty-six sails drive her, in optimum winds, twice as fast as does her auxiliary engine. The sails are set, doused, and trimmed by means of her running rigging. The task of memorizing the location and use of the more than 230 lines may at first seem overwhelming, but it is actually quite simple. The lines can be grouped into a handful of functions; their locations are logically determined by their functions. In addition, most lines are paired and located similarly on the foremast, the mainmast and the mizzenmast. To understand these functions it will first be necessary to examine the MIR's sails.

SQUARE SAILS

MIR has fourteen square sails. The sails on the foremast, mainmast and mizzenmast are essentially the same and are made of panels of Dacron. The head of the sail is attached to the forward jackstay on the yard by robands. Earrings in the upper comers of the sails are attached to a hook on the earring jackstay and keep the head of the sail taut. The side edges of the sail are the leeches; the bottom edge is the foot; and the lower corners of the sail are the clews. Running along the outer edges of the sails is a wide tabling of Dacron, which helps to shape the sails and give them strength.

The bulk of the running rigging is used to set and douse the sails:

Sheets are attached to the clews of the sails and are used to sheet the sails home, i.e., to haul them down to the next lower yard—or the deck for the courses—when setting. The section of sheet attached to the clew and running through the sheet block at the end of the lower yard is made of chain to reduce chafing; the remainder of the sheet is wire rope with a single sheave runner block attached at the bitter end. A manila line dead-ended on deck is reveted on deck through a block and back to the fife rail.

Clew lines are also attached to the clews of the sails but they oppose the sheets. Clew lines lead up to the yards on which the sails are bent rather than down to the yards below. Just as the sheets are used to haul the sail down when setting, the clew lines (clew garnets on the courses) are used to haul the sail up when dousing.

Buntlines are also used when dousing the sail. If just the clew lines were used, the sails would belly out in the wind so much that they could not be furled. In heavy winds, they would probably luff violently. The buntlines run from the foot of the sails through bull's-eyes in the sails, which allow the line to gather the sail up to the yard in several small bights. The lizards at the head of the sails are fairleads for the buntlines.

Leech lines are used on the courses because their leeches are so long that they are difficult to handle when dousing. The lines lead from the middle of the leeches up to the yard.

Tacks are used only on the courses. Unlike the upper sails, the courses are not set onto a lower yard. Thus, it is impossible to control the foot of the sail by a single line, for when braced sharp, the lead of the weather sheet is excessively long. Tacks, then, serve the same function as sheets but lead forward whereas the sheets lead aft. In setting the courses, the tacks and sheets are balanced so as to hold the foot of the sail directly under the course yard.

HEADSAILS AND STAYSAILS

The MIR has six staysails, named after the part of the mast supported by the stay on which they are bent, and five headsails. Like the square sails, all are made of Dacron. The leading edge of the sail is the luff. Metal hanks are used to bend the luff to its stay. The bottom edge is the foot, as in a square sail, while the aft edge is the leech. The top point of the sail, to which the halyard is bent, is the head; the lower point, at the junction of the foot and the luff, to which the tack pendant is attached, is the tack; and the remaining point at the junction of the foot and the leech, to which the sheet is attached, is the clew. Along the edge of the sail, as with square sails, is a tabling of Dacron.

Three lines control the headsails and staysails. A fourth, the tack pendant, runs from the tack to the mast on the staysails and to the bowsprit on the headsails. It is used to hold the sail at the proper distance up the stay. This pendant is permanently attached and is not adjustable.

Halyards are bent to the heads of the sails and are used for setting them by hauling the luffs up the stay.

Sheets as on square sails, are attached to the sails and are used for trimming them. The headsails and staysails have two sheets each, one for each side, and thus can be shifted without dousing.

The sheets themselves consist of two parts. A wire-rope sheet pendant is permanently shackled to the clew of the sail A sheet tackle, whose size depends on the size of the sail, is shackled to an eye on deck and to the pendant. In shifting the sheets the two shackles are unshackled, and the tackle is carried to the opposite rail. The pendant is hauled up and over any lower stays by a cadet stationed in the top. It is then re-shackled into the tackle.

Downhauls, as the name implies, are used for dousing the sails. They lead from the head of the sails down to the clew. This arrangement allows better control of the sail in dousing. Hauling on the downhaul will pull the clew of the sail up to the head, causing it to spill its wind and lessen its slatting, and will pull the sail bodily down the stay.

SPANKER

The remaining sail, the spanker, although unique, is rigged in a manner analogous to the square sails. The spanker's parts bear the same names as those of the square sail. The upper aft corner of the

spanker is known as the peak, the upper forward corner as the throat, and the lower forward corner at the foot as the tack. The running rigging for the spanker consists of the following:

- The topping lift is used to top (lift) the spanker boom high enough for the sail to set properly. When the sail is not set, the boom is lowered into a gallows and snugged down to keep it from slatting about.

- Outhauls are analogous to the sheets of the square sails and are used to haul the sail out to the end of the boom (foot out-haul) and gaff (peak outhaul).

- Inhauls are analogous to the clew lines of the square sails and are opposed to the outhauls. They are used to haul the head and foot of the sail back to the mast when dousing.

- The brails are analogous to the buntlines on the square sails and are used to control the body of the spanker when dousing. Since the spanker can be set on either tack, the brails are rigged on both sides of the sail.

- The sheet is a three-fold purchase that runs from an eye on the fantail to the end of the boom. It is used to trim the spanker.

- The preventer is a three-fold purchase used to oppose the sheet. As the sheet leads from midships on the fantail, it cannot control the swing of the boom if the ship gets caught aback and the boom starts to swing to weather. The tremendous momentum developed by more than a ton of gear swinging out of control could easily tear the sail or even rip the boom from the mast. The preventer keeps the boom from swinging and thus prevents uncontrolled jibes.

- The vangs are used to control the gaff. In general, they are used only when the sail is not set and prevent the gaff from slatting about. When the spanker is set, the movement of the gaff is controlled by the spanker sheet, to which it is connected through the leech of the sail. In such cases the vangs are used only for trimming.

BRACES

The lines discussed so far are used primarily for setting and dousing the sails. The remaining type of running rigging is used primarily for trimming the square sails and their yards.

Braces are used to adjust the fore and aft trim of the yards. At the foremast and the mainmast, the lower three braces lead directly to the yardarms from the pin rails, via bumpkins on the side of the ship. The upper two braces lead up the shrouds (of the mast) aft of the mast, on which the yards they control are located, to the yardarms. This arrangement results in a more horizontal lead and makes the yards easier to control. All braces are paired. Whenever one brace is hauled, its equivalent on the opposite side of the ship must be eased.
The braces of the mizzenmast lead all to the main mast, then along the mast down on deck and through blocks before being belayed on the pin rail behind the main mast.

How to Work with MIR's Sails and Running Rigging

What to do during the Manoeuvre and on the Yard.

SETTING, DOUSING AND FURLING SAIL

The safety and efficiency of any vessel depends on the close teamwork of every crew member. Nowhere is this more the case than on a square-rigger. The failure of a single cadet to ease a line at the proper time can easily prevent the ship from tacking. Throwing off another line at the wrong time can just as easily injure or kill a shipmate. Perhaps in no other setting is the need for – and importance of – a well ordered chain of command so apparent. Indeed, one of the most important reasons for training aboard a sailing ship is the opportunity given the cadets to organize personnel into a close-knit team responsive to the orders of the commanding officer. The consequences of the failure to organize properly and the great importance of every cadet in the chain of command are reinforced by the extra time and effort needed when an evolution fails. For example, if the ship misses stays (fails to tack), yards have to be re-braced, sails reset and sheeted home, and gear laid out anew. A ten-minute operation can easily grow into an hour’s hard labor.

SETTING SAIL

Although almost all of the 230-odd pieces of running rigging are used when setting and dousing sail on the MIR, the process is actually quite simple. Once the sails are their gear, a good crew can set all sail in less than five minutes and douse all sail in less than three.

The traditional order of setting square sails is from the bottom up, although the courses normally are set after the upper topsails; thus, lower topsail, upper topsail, course, topgallant, and royal. Headsails and staysails are similarly set from the lowest to the highest. Sails are doused in reverse order. This order of setting and dousing reflects the natural order of taking in sails as winds increase. Normally, royals, topgallants, and upper staysails are taken in first since they heel the ship excessively in high winds without adding significantly to speed. Courses are doused before topsails due to their large size and the relative difficulty in handling them. In light winds, all staysails or headsails may be set or doused at once. With a trained crew it is even possible to set two square sails at once.

It makes little difference whether square sails or fore-and-aft sails are set first. The officer of the deck, however, should make sure that sails are balanced among the three masts so that excessive helm will not be needed to hold course.

UNFURLING

Before sails can be set, they must be unfurled. When furled, sails are held in place by gaskets. When all gaskets are loosed, the sail is pushed forward and off the yard and is then in its gear. It is particularly important that all gaskets be clear before putting the sail in its gear. If a gasket is missed, the weight of the sail will make it difficult to loose the gasket and may necessitate cutting it.

SETTING SQUARE SAILS

The first step in setting all square sails is sheeting home, or hauling the sail down to the next yard, like a window shade, by hauling on the sheets and easing the clewline.

Since the sheets are opposed by the clewlines and the bunt of the sail is held up by the buntlines and leechlines or bunt leechlines, these lines must be thrown off. On the courses, tacks and sheets are hauled, as appropriate, to position the sail immediately below the yard. Three cadets are usually sufficient to man each sheet, for the lower topsail is small and easily handled. In strong winds it will probably be necessary to marry the sheets before belaying them to ensure that the leech of the sail remains taut.

The courses are a different matter, since they are the largest sails set. In light winds, three or four cadets will be sufficient to man the tacks and sheets, which take a strain. In strong winds, ten or more cadets may be needed to do the same job and a stopper will have to be passed so that the line may be safely belayed. Common sense is called for in manning course tacks and sheets. When braced up hard, all the strain will be on the weather tack and lee sheet; individual cadets can handle the remaining tack and sheet. When braced square, both sheets will have to be manned equally, with a single cadet tending each tack.

SETTING HEADSAILS AND STAYSAILS

Staysails and headsails are easier to set than the square sails. Due to the danger of whipping blocks, however, they are potentially much more dangerous.

For setting, the downhauls are faked out for running and the halyard hauled until the luff of the sail is taut and no scallops are seen. Normally, at least four or five cadets are needed on a halyard although in high winds twice that number will be needed. As the sail is hauled up, the sheet should be tended and then sheeted home. If the sheet is hauled too tight, it will bind the hanks against the stay and make it difficult to set the sail; if the sheet is slacked the sail will slat around and may tear. Thus, careful attention is needed during the entire process. In light winds one or two cadets are needed on a sheet. In high winds three or four will be needed to tend the sheet and several more to sheet it home when the sail is all the way up the stay. Since headsails and staysails are particularly hard to handle in gusts, insufficient manning may easily result in bad rope burns. The sails must be trimmed in enough so that the sheet of an upper sail does not chafe against a lower sail since such chafing will quickly wear through the sail. Staysail sheets tend to gyrate if not carefully controlled when the sail is set or

doused. As a result, all hands should stand well clear of the staysail (and headsail) blocks which are aptly called "widow makers".

SETTING THE SPANKER

Setting the spanker is quite easy. The boom must first be topped about a foot and a half so that the sail can be set without damaging its leech and the preventer rigged on the lee side (the side opposite the wind). The boom is then positioned for setting by hauling on the preventer while easing the sheet, weather vang, and weather flag halyard. Normally, unless the ship is rolling heavily, three or four cadets will suffice for the preventer and one each for the remaining lines. Once the boom is out, the sail is set by hauling on the outhauls while easing the inhauls and brails. Since the spanker is one of the largest sails aboard the “Мир”, quite a few cadets are needed to set it. A single cadet can handle all of the brails on each side; similarly, one cadet is sufficient for each inhaul. At least three cadets will be needed on the peak outhaul and five cadets on the foot outhaul, although more are preferable.

DOUSING SQUARE SAILS

The procedure for dousing a square sail is the reciprocal of that for setting it: those lines which were eased in setting are hauled upon, those lines that were hauled are now eased.

On the command "Clew down" the halyard is eased and clewlines hauled upon. The sheets for the sail above are thrown off to prevent any possible binding.

When the sail is firmly in its lift, it is necessary to complete dousing by hauling the sail up to the yard. On the command "Clew up," sheets are eased and clewlines, buntlines, and bunt-leechlines are hauled until the sail is up. On the courses the process is the same except that tacks also must be eased and the command usually used is "Rise tacks and sheets." Obviously, the lower topsail, which is on a fixed yard, is merely clewed up for dousing.
The mast captain must carefully monitor the dousing of the sail and order "Avast" on each line as the sail is brought up to the yard. The lines usually come up at different rates and hauling on a line when the sail is already up may tear out the bull's eyes in the buntlines and bunt-leechlines or jam the clew block in the clewlines.

DOUSING HEADSAILS AND STAYSAILS

The headsails and staysails are doused easily by easing the halyard, tending the sheet, and walking away with the down-haul. The sheet must be handled carefully. If slacked, the sail will slat about and perhaps rip, and the sheet blocks will whip around dangerously. On the other hand, if the sheets are kept too tight, it will be difficult to haul the sail down. Moreover, the downhaul runs to the head of the sail, and then to the clew. In dousing, therefore, the halyard should be eased rather than slacked so that the downhaul will pull the clew up to the head of the sail and spill its wind. Obviously, careful control is needed throughout the operation.

A single cadet is needed for the halyards and sheets. As few as two or three cadets can handle the downhauls, although more are preferable to get the sail down quickly. If sufficient personnel are available, all staysails on a mast may be doused at once.

Dousing the spanker is much like chewing up on a topsail: outhauls are eased, in-hauls and brails hauled. After the sail is in, the boom is cradled and the preventer struck.

At least three cadets will be needed on the peak inhaul, five on the foot inhaul. and one for each brail. Due to the great size of the spanker, more cadets are preferred.

FURLING SAIL

In light airs it is permissible to leave the sails in their gear without furling. In stronger winds, the sails would slat around and quickly chafe; thus they must be furled.

Furling is an art more easily learned from practice than described in a text. In heavy winds, the weather side of the sail must be smothered first so that gusts cannot catch the weather leech and cause the sail to bloom out of the hands of the cadets who are trying to furl it.

To achieve a tight furl, the sail must be completely clewed up to the yard. Care must be taken not to jam the clew in the clew block nor to pull the lizards for the buntlines and bunt-leechlines above the yard, where they will impede furling. The leech of the sail should be brought up parallel to the yard and held there until the last bight is dropped (as shown in figure) in case an awkward tangle of sail, which is impossible to furl, is created at the leeches.

In furling, an arm's-length bight of sail is taken simultaneously by all cadets on the yard, is pulled up, and is held against the yard. As subsequent bights are taken, the earlier ones are dropped into it, until the entire sail has been taken up and the last few feet of the sail (at the head) form a tight skin. The entire sail is then rolled up on the yard and set between the jackstay and the safety stay. Gaskets should then be passed over the sail and secured to the safety stay. It is important that cadets not use any hitches that will jam in securing the gaskets, for it will be impossible to loose the gaskets without cutting. Preferably, a slippery clove hitch is used. Care must be taken that there are no deadmen and that gaskets are snug in case the sail works loose and blooms.

FURLING FORE AND AFT SAILS AND SPANKER

All fore and aft sails are furled in basically the same way. Cadets should lay out on the crane lines on either side of the sail and furl the sail into itself until it is tight enough for gaskets to pass and until the remaining sail material can form a protective skin around the rest of the sail. Gaskets are then passed around the sail and secured to the jackstays.

Although two cadets can furl a fore and aft sail, the process is much easier if a cadet is stationed on each crane-line so that the whole sail can be furled simultaneously.

The spanker is furled exactly like a staysail except that there is no miter seam.

"Board the Tack!"

Sail manoeuvres on MIR

Two kinds of sail manoeuvres are quite common on the MIR: tacking and wearing of the ship. Both are complicated affairs on a big square-rigger and need solid preparation, skill, discipline and a well-trained crew - especially when tacking the ship. Let us look at the manoeuvre with the eyes of the commanding officer from the bridge. For that purpose I describe a routine tack in the way it takes place when the ship is beating against the wind. Normally those manoeuvres do not come out of the blue, but are announced in advance. Captain and watch officer have agreed about how long to stay with one course - e.g. until the ship reaches a certain position, a landmark comes in sight or until a certain time like a change of watches when most of the crew are on deck anyway. Normally an announcement is made to inform the crew about the approximate starting time of the manoeuvre: "Tonight at 8 we will board a tack with all hands!" For this text I assume that the tack is planned by geographical means (e.g. crossing a meridian). In this case the watch officer regularly checks the position and as the ship comes closer to the turning point a chain of events starts. Immediately before the entire manoeuvre begins he will call the captain - unless he is not already on the bridge - to hand over the command to him.

PREPERATIONS

Before the deck's crew or the free watch even notices that a manoeuvre is about to start, there are some preparations to be done on the bridge.

- The engine control room gets informed to get ready for pumping the water to the other side.
- The galley gets informed to give them a chance to secure the pots and pans and other materials.
- The bosuns get called to the bridge to get informed about the way the manoeuvre is held today in accordance with the weather or other special problems that might influence their work.
- The position of the ship is checked and plotted into the chart. On the radar and the AIS the positions and courses of the other in this area operating ships get checked and a bearing is taken of objects and ships in sight.
- Eventually other traffic gets informed by radio that a change of course will take place. This might change the right of way for the other ships and it might be important for them to know that the sailing vessel ahead might become very slow and then suddenly very fast again after the tack. This is particularly important for the ships that plan to overtake us. Unfortunately nowadays one cannot assume the watch officers on cargo ships to know what will happen when a sailing ship tacks. Good information is a matter of OUR safety...

- If we are near to the shore or in an area of heavy traffic (German Bight, Straight of Dover...) it might also be necessary to inform land based stations.

- Now the sailing alarm is given. It is also announced what kind of manoeuvre will follow. A tack is almost always done with "all hands", for wearing the ship it is sufficient to have two watches on the deck, e.g. during a change of watches. In this case the free watch will not be disturbed in their sleep.

- After the announcement "vsje navjerkh gatovy" everybody on board appears on the deck in weatherproof working gear and if belonging to those who lay aloft also with the safety harnesses already put on. Everybody reports to his station. Exceptions are the chief engineer who is on watch in the engine control room, the cooks if they have the pots on the fire and the bridge staff. Helmsman and lookout stay on their position until those who will do these jobs during the manoeuvre relieve them.

- All lines needed for the manoeuvre get thrown off.

TACKING

As a rule on the MIR a change of direction will be done through tacking the ship. There is a big crew and MIR is a very handy ship that follows rudder and helm even in strong breezes without problems. During a tack the ship goes through the wind with the bow first "overshtag". With a well trained crew the entire maneuver will take about 20 minutes. Every master has got his own way to sail the tack although it is mainly all the same. In the following the tack is described in the way Captain Antonov sails it.

- The tack is started from a position very high on the wind (30°)

- At first the rudder is laid hard windward (35° rudder position) and at the same time the spanker driven completely to windward.

- By the time when the sails start flapping, the courses and eventually also the royals get clewed up. Now the yards of the mizzen mast are braced around and the sheets of the staysails are eased.

- When the bow goes through the wind, the sheets of the stay sails are thrown off so that they all can fly to the other side on their own.

- When the bow has cut through the wind the helm is laid back into midships position. The ship keeps on turning through the fore sails staying aback in the pressure of the wind. Only in case of a complete stop of turning it might be necessary to steer slightly to the other side.

- Now the ship is already on the new tack - has an angle to the wind of approx. 15-20°. The staysails are fastened to the wind again starting from the stern to the bow.

- The yards of the fore topp are braced together with the turning of the ship so that the sails are all the time flapping but never completely aback. The main topp can be braced either together with the fore topp or with the mizzen or at any time in-between.
- At last the fore sails are taken to the other side they are left aback until the ship has completely gone to the by-the-wind-position on the new tack.
- Then the courses and eventually the royals get set again.
- The sails get trimmed into the new position by the wind.
- The helmsman finds the new zero position of the rudder and steers the new course according to the orders of the captain or commanding officer.

WEARING THE SHIP

Certain weather conditions (minor winds or storms), a reduced number of crew members in the early season when there are no cadets on board, or night manoeuvres when - as the ship is not in a race - the captain does not want to wake up the free watch, or an untrained crew can lead to the decision to wear the ship instead of tacking. This manoeuvre is easier to perform, but needs more time and the ship looses some way in the needed direction as it is forced to describe a circle. The main difference is that when wearing it is not the bow that goes through the wind but the stern. We turn "fordewind".

- It begins simultaneously with clewing up the courses.
- Then the rudder is laid to the leeward side.
- The spanker is clewed up and the mizzen top gets braced around to be taken out of the wind. So the wind hits only the sails on the foreward half of the ship. With these unequal forces the ship turns quickly and the mizzen stays aback.
- During this turning the main and the foretop get braced lively, what means their sails remain filled.
- The foretop remains in a squared position. At the moment when the mizzen is filling with wind again, the main top gets braced around.
- Staysails and head sails get thrown off to be allowed to fly to the other side.
- The foretop gets braced around.
- The courses and the spanker are set again. Stay sails and head sails get sheeted onto the new tack.
- The ship is steered towards the wind.
- The helmsman finds the new zero position of the rudder and steers the new course according to the orders of the captain or commanding officer.

AFTER THE MANOEUVRE

When the ship is already on the new course there remains some work to be done before the free watch gets released again.

- The deck must be cleared up again. That means that all lines have got to be belayed again and everything has to be returned to its normal position. Everything must be prepared ready to start a new manoeuvre immediately.
- The cadets will hear the "manoeuvre critics" to learn what they can do better next time.
- The free watch gets released. "Adboy!"
- The watch returns to their duties.
- Cadets (or trainees) take over helm and lookout again.
- The position gets checked again.
- The new course gets announced and plotted into the sea chart.
- The manoeuvre and possible special entries are noted into the ship's journal (logbook)..
- The engine control room is told to check the trimming ballast again.
- The bosun appears on the bridge and reports about the manoeuvre, the cadets and other things.
- The captain hands over to the watch officer.
- Time for a coffee...

NOTE:

The manoeuvres described here are one way to do it which can be seen as guideline. Each master has his own little preferences and tricks how he does it, which might deviate in some ways from the what is written here. It is that special knowledge, what makes the difference in a race.

MORE SAIL MANOEUVERS

Apart from tacking and wearing the ship a number of other manoeuvres under sails are executed on MIR more or less regularly. Rising harbour fees and costs for tugs and pilots lead to the decision to stay at anchor more often or to employ the sails rather than tugs for mooring assistance. The masters on the MIR execute these manoeuvres with great skill and experience and it seems as if they were not commanding a 110 m long square rigger but a yacht that is just a little big.

HEAVING-TO

Under heaving-to we understand a manoeuvre to stop the vessel but remain manoeuvrable all the time. This requires a positioning of the sails where one part of the sails work forward and the other part at the same time works backwards. Thus the square sails of the fore mast are braced into by-the-wind position and the square sails of the main mast are braced into a squared position. The sheets of staysails and head sails (if set) are belayed in by-the-wind position and the helm is kept hard to windward.

As a rule the ship lays hove-to on the tack on which the manoeuvre has been started. So to get there only the wind is taken out of the main top by bracing her into forewind position and at the same time putting the rudder hard to windward. Is it for any reason necessary to heave-to on the other tack, the manoeuvre starts like tacking with the difference that the rudder is not returned to amidships again and the main top is not braced fully around but only onto the squared (forewind) position.

Hove-to the ship permanently describes parts of a circle forward or backwards with heading changes of roughly 60° according to which part is the sails is predominant now – the forward working or the backward working. One part of the sails always stands aback. The drift is minimal but existing. It is necessary to check it regularly and to make sure that there remains enough open sea room to leeward not to be driven onto a shallow or into areas of heavy traffic. Good seamanship is hove-to only to keep the minimum sail area necessary to keep the ship in position.

For getting underway again it is only needed to brace the main top into by-the-wind position and put the rudder amidships.

As for the Rules of the Road (COLREG) a sailing vessel that is hove-to is underway. Thus the bridge must remain manned, a navigational watch must be kept, VHF must be listened, lookout must be kept and there needs to be a helmsman ready to take the wheel at any time so that if necessary the ship can execute an manoeuvre at once.

ANCHORING UNDER SAILS

To find a place for anchoring certain preparations are necessary. Charts of a biggest possible scale need to be used to find a place that not only provides ground suitable for anchoring but also the space necessary for swinging around the anchor. If available this will be discussed with a pilot or a coastal traffic centre or a place is used where the ship has been successfully anchored before. Official roads are not always the best choice as very often they are too far away from the shore to maintain a shuttle boat traffic or to be seen from the shore.

For anchoring any vessel there are some basic rules to regard:

- An anchoring manoeuvre is executed with as little speed as possible.
- If possible the anchor is dropped while heading against the wind.

- Always use the windward anchor.
- Whenever possible one avoids to anchor while running before the wind.

How is anchoring executed? Let's imagine we sail full and by on port tacks. To reduce speed we would first take away the uppermost sails and then also the big and unhandy courses. The idea is that for the actual manoeuvre we keep only fore staysail, fore lower topsail and main lower topsail. If the ship looses to much speed there might also remain one or two jibs. When closing in to the place chosen for anchoring the rudder is laid to windward (easy, not too much, maybe 10-15°) to make her stop with the bow dead in the wind. The crew stands by the braces and at the moment when the ship starts drifting backwards the yards get braced into forewind position (squared) and the head sails get thrown off and are taken away. The rudder is laid amidships. The ship now starts to move backwards. The fore lower topsail gets clewed up and at the same moment the port anchor is dropped. When the necessary length of chain (min. 5 times the depth of the water) is paid out the last remaining sail – the main lower topsail is clewed up. All sails get stowed very neatly to reduce windage to a minimum and the yards get braced into a position where the wind blows parallel to them.

The ship is now at anchor. As per COLREG she is not underway any more. However the bridge must remain manned by an anchor watch who makes sure that she does not drag her anchor and starts drifting. For this radar bearings or if available visual bearings get checked regularly and the GPS position is compared with the anchor position plotted into the sea chart and noted in the logbook. Every hour or in bad weather more often the anchor chain is checked for vibrations (which would indicate a dragging of the anchor) and the position of the anchor chain is noted. During daytime the anchor ball is set in the rigging and during night time the anchor lights are shown. As a rule additionally the deck lights are on.

LEAVING THE ANCHORAGE UNDER SAILS

At anchor the ship turns in according to wind and current. In the best case we have a strong current with fresh beam winds as it often happens in tidal waters or river estuaries. If there is also enough sea room ahead we only need to brace the yards accordingly and prepare the sails we want to set. Now we start heaving the anchor chain until the ship stands right above the anchor. Then we set sails and while she starts moving we heave the anchor. The rudder remains amidships until the anchor is out of the water. Then a course is announced and steered.

Unfortunately it is not always that easy... If the current and wind work into the same direction or we have no current at all (Baltic Sea, Mediterranean) the ship turns in with the bow dead in the wind. To get underway it is necessary to bear off so that a by-the-wind course can be maintained.

Let's again imagine a situation: the ship stays at port anchor with wind and current on the bow. In this situation – given there is enough sea room – it is best to get off the anchor on port tacks as otherwise the anchor chain would turn around the bow.

The manoeuvre now begins with preparing the sails which the ship shall carry later. At the same time we start heaving the anchor chain. When the chain becomes tight (short stay, 4 points off the bow) the mizzen sail is set and at the same time the yards of the fore mast are braced aback. At the moment when the anchor chain is up-and-down (anchor standing upright underneath the ship) the mizzen sail is hauled close to the starboard side and the fore lower topsail (in light winds also the fore upper topsail) is set. The ship turns to starboard. Now the anchor is hauled up.

Once the anchor is off the ground the head sails get set aback. The ship first moves backwards. The rudder is laid to port (easy, not too much). Now the ship turns quickly. The anchor is now out of the water but kept ready for falling until the ship has left the anchorage and reached open water. Once the ship is about 45° off the wind the fore mast is bra ced around and the rudder is laid amidships. When the square sails are filling also the head sails are flung to the other side and sheeted in. All other sails needed are set and the ship gets steered to the course announced.

LEAVING A BERTH UNDER SAILS

Leaving a berth without tug assistance is only possible if wind and current help or at least do not counteract. Without bow thruster one needs a wind blowing off the berth or at least a current on the bow to get off the pier. In how far the engine gets employed or is only held stand-by depends on the wind situation and the space available. For example in Travemuende July 2003 we had a soft wind blowing from the berth and Captain Antonov decided to use the jibs to push the bow away from the pier. He took away all mooring lines except for the aft spring. Then the square sails were set (the yards had already been braced into halfwind position) and the aft spring was thrown off. Thus we left the port completely under sails.

The Commands

given during the Sailing Manoeures

COMANDS FROM THE BRIDGE FOR THE SAILING ALARM

1. "Парусный аврал" – 3 times
   "Все наверх на постановку парусов"
2. "Парусный аврал" – 3 times
   "Все наверх на уборку парусов"
3. "Парусный аврал" – 3 times
   "Все наверх к повороту "оверштаг"
   "Все наверх к повороту "через фордевинд"

4. "Парусный аврал" – 3 times
"Все наверх, ложиться в дрейф"

The crew appears on deck at the meeting points of their watches. When they are complete the watch leader reports to the bridge:

"Фок в сборе"
"Грот в сборе"
"Бизань в сборе"

The bridge gives the command what exactly will be done (Here the setting of all or some sails):

"Марсовым к левым (правым) вантам, готовить к постановке все паруса
(или такие-то паруса)"

The watch leader instructs his watch and reports to the bridge:

"Марсовые фока (грота, бизани) к подьему готовы"

The bridge gives the command to go aloft:

"Марсовые пошел наверх, готовить все паруса" или
"Марсовые пошел наверх, готовить к постановке такие-то паруса"

The cadets go aloft and unfurl the sails. Then they return to the deck.

When all cadets of one watch have returned the watch leader reports to the bridge:

"Марсовые фока (грота, бизани) на палубе"

Now the bridge commands the crew to man the lines to set sails:

"На постановку таких-то парусов по местам стоять"

The watch leader reports to the bridge when all lines are manned:

"Фок (грот, бизань) готов"

Now the bridge commandsa which sails when to set:

"Такие-то паруса ставить"

The watch leader gives the necessary commands for this to his watch.

TAKING AWAY OF SAILS

The bridge gives the command to take away all or some sails:

"На уборку таких-то парусов стоять"

The watch leader commends the watch to man the necessary lines. When everybody has found his position he reports to the bridge:

"Фок (гротб бизань) готов"

The bridge now gives the concrete command which sail when to take away:

"Такие-то паруса убрать"

The watch leader coordinates the work of his watch for this.

Now the bridge commands the cadets to prepare to go aloft:

"Марсовым к правым (левым) вантам"

The watch leader now decides who goes on which yard and instructs the cadets what to do there.

When the cadets are ready to go he reports to the bridge:

"Марсовые фока (грота, бизани) готовы"

The bridge now gives the command to go aloft:

"Марсовые пошел наверх, укатать паруса по-парадному (по-штормовому)"

The watch leader tells the cadets to go now!

BRACING THE YARDS

The bridge gives the command to man the starboard or portside yards:

"На правые (левые) брасы фоковых, гротовых, левые (правые) контр-брасы бизани"

When everybody of his watch has found his position the watch leader reports ti the bridge:

"Фок (грот, бизань) готов"

The bridge now gives the command to brace the yards and into which postion to brace them:

"Пошел правые (левые) брасы фоковые, гротовые, левые (правые) контр-брасы бизани.
Все реи бейдевинд (галфвинд, бакштаг, фордевинд) такого-то галса"

The watch leader coordinates the action of his watch.

When he has decided that the yards are in the right position he reprots to the bridge:

"Фок (грот, бизань) брасопку закончили"

Now the fore and aft sails get put in position.

The watch leader gives the necessary commands to his watch:

"Перенести шкоты косых на такой-то галс"

When the bridge sees that all sails are in the right position the give the command to clear up the lines::

"Снасти разоьрать, уложить. Отбой аврала!"

Trimming and Steering

"The most prominent job of the helmsman is to steer the ship after wind and sails, but it is the duty of the watch officer to trim the ship in a way that she follows the wheel."

A museum ship in port is normally having the yards braced in a square. Same on paintings and postcards, that normally show square-riggers with such a position of the yards. But to conclude that this is the normal way the yards are positioned on these ships is wrong. It is surely the most impressive way to show a tall ship as is demonstrates the size best, but when sailing the square position of the yards is rather unusual. It is only one possible way to gain propulsion from the wind and actually not even the best one.

The positioning of the square sails and fore-and-aft sails in the best possible angle towards the wind to gain the under the given circumstances most possible propulsion is called trimming of the sails. With a good trim the ship follows the helm easily and fast, lies calm and without heavy rolling but with a certain list in the water. Sailing is safe and the movements of the ship are in a way predictable.

TRIMMING OF THE SQUARE SAILS:

First we must keep in mind that on ships we always deal with two different kinds of wind - the "true wind" which we can see on the flags in port and which the weather report tells us. This wind is important for the planning of the route. For the trimming of the sails it is useless. Here the only wind that is of interest is the "apparent wind". This is the wind how we feel it on board, which we can see on the flags and wimples on board and which we use for steering. Therefore in this text is always meant the "apparent wind" when the term "wind" is used. It is a vector of the "true wind" and the head winds. It relies upon the angle between the course we steer (aka the ship's axis) and the "true wind" and also relies on the speed we have.

Let us first imagine we have only one single mast with one square sail. With wind from astern falling into this sail the ship will move forward. That is logical. The only problem is that at most times the wind is coming from another direction. So there must be other possibilities. Further on sailing with winds from astern is not really perfect as the wind looses speed in the same way as the ship gains speed forward. So even if you forget about currents and waves this means that a ship sailing with winds from astern can maximum reach half of the speed of the true wind that hits the ship. On a ship with more than one mast things are even worse as the sails of the last mast would take all wind away from all other sails that would become absolutely ineffective. So which possibilities do we have to use the wind best with a full rigged ship?

COURSES

- downwind
  The wind hits the ship from astern in an angle between 170-145°.
- quartering winds
  The wind hits the ship half from astern in an angle between 145-110°.
- halfwind
  The wind hits the ship from the side in an angle between 110-80°.
- full and by
  The wind hits half from the front in an angle between 80-60°.
- hard by the wind
  The wind hits from the front in an angle of less than 60°.

For a good trim the yards get braced into a position that cuts the angle between the wind and the ship's axis in half. That way it is guaranteed that all sails are filled from the wind and help to move the ship forward. Unfortunately this is limited to a yard position of 30° (on MIR – other square riggers only 45°) towards the ship's axis as now they already lay on the shrouds. This means that in such a way you cannot sail a square-rigger nearer to the wind than 60°.

FANNING OF THE YARDS

A ship of the size of the MIR now provides 2 further possibilities to optimise the work of the square sails. The first is fanning of the yards. This means that the yards get braced like a fan. The higher the sails are over deck, the more open the yards get braced. This is possible because the direction of the wind changes in accordance to the height above the water. Means the wind in 40m above water comes more from behind than on the deck. Therefore with courses of less than 90° fanning the sails gives you more speed.

TRIMMING THE FORE-AND-AFT SAILS

Another way to optimise the work of the square sails is the additional use of fore-and-aft sails, especially when sailing by the wind. Sailing with winds from astern the fore-and-aft sails are of not much use and as a rule most of them are not set. With courses of more than 110° they add only little to the speed of the ship. More interesting are fore-and-aft sails in halfwind or by-the-wind courses. To understand why we first must look how these sails work. A fore-and-aft sail, e.g. a staysail has almost the shape of a wing of an aeroplane. The aerodynamic powers are also comparable. On the curved lee side of the sail the wind flows faster than on the aerodynamically flat windward side. Thus in lee you find low pressure that tows the sail outward and with the sail the ship. This pressure together with the forces on the hull produce the forward component of the ship’s movement.

THE SO-CALLED JET EFFECT

If we have several parallel fore-and-aft sails (e.g. the head sails) standing in relatively small distance to each other, they produce a special effect, which is particularly important for a good trim. With an optimised trim the wind gets pressed with high speed through the gaps between the sails. This speed leads to a lower pressure between the sails compared with the air streaming along any sail on its own. This low pressure produces propulsion as it practically sucks the ship forward. To achieve it, it is necessary that the leeches of the headsails stand absolutely parallel. In the luffs there shall not be any curvature, as this would produce disturbing turbulences. It is also necessary to check that the downward winds produced by the headsails or staysails do not hinder the work of the square sails standing behind them. As a rule a compromise that suits the very situation must be found. Normally the staysails need correction from time to time.

HARD BY THE WIND

If we cannot brace the yards any tighter, how can it work then that the MIR can sail 30° by the (relative) wind? What else can we change? All would be very easy if we had only fore-and-aft sails. Then we could sail MIR like a schooner. Unfortunately the sail area of these sails alone is not enough to achieve some speed by the wind. So what to do? One could try to integrate the square sails into the system of fore-and-aft sails. Thus we brace the yards as tight as we can. Means they stand in a 30° position towards the ship's axis. Now we trim the headsails and the stay sails into an almost parallel position towards the square sails. Now we steer carefully higher to the wind until the wind starts streaming between the fore-and-aft sails and the square sails. Due to the low pressure the square sails get curved forward and the ship gets sucked forward. The effect hits the entire rigging. Now the helmsman has to steer very carefully in a way that the yards now do not cut the angle between the wind and the ship's axis in half but stand almost parallel towards the wind. The higher the ship sails towards the wind, the faster the (relative) wind becomes and the faster the ship gets. Attention: if the wind falls into the sail in an angle of less than 10°, the ship slows down again as now friction and drift grow.

As sailing that hard by the wind leads to a heavy list, as a rule the royal sails and the courses get clewed up. Taking away the royals lessens the list. This is very necessary if you keep in mind that the underwater lines of the ship produce the more friction the more the ship heals over. To take the courses away is mainly a precaution to avoid damage if they suddenly come aback due to an unexpected squall or a mistake of the helmsman.

HELMING UNDER SAILS

Most important for the sailing capacities of a ship are movements along the vertical axis - the yawing. Only if the sail area before the pivotal point of the ship is the same as the sail area behind it, the ship moves forwards. (When tacking or wearing the ship you alter this to make the ship turn.) The sail area here does not mean the square metres of cloth, but how much of it actually work to move the ship forward. If due to bad trim the forces are unequal, the ship gets a tendency towards or away from the

wind, which has to be corrected by the helm permanently. However, any movement of the rudder slows the ship a little bit. Means if possible the wheel should be turned as little as possible. It is better to trim the ship in a way to keep it on course without much effort. Sometimes the trim is that good that helming can be done with quarter turns of the wheel to either side (1/8 degree rudder position!). As a rule the ship is trimmed in a way that makes her turn slightly towards the wind.

STEERING AFTER WIND AND SAILS

With a good trim the helmsman can steer the ship after wind and sails. This means he does not receive the command to steer a certain course on the compass nor is he told to keep a certain position towards the wind, but he watches the sails. The highest sail on the main mast is the steering sail. If it is completely filled with wind the position of the ship towards the wind is perfect. When steering by the wind, it is possible to steer higher until the windward side leech slightly starts playing. Lee wards the sail then still stands full and drives the ship forward. The angle towards the wind is now between 30° and 35°. The ship almost finds her way alone. It is practically not necessary to check the angle towards the wind on the instruments as one can feel by the movements of the ship if everything is still okay. A change in the sounds of the wind or if the speed goes down - those are signs for a changed angle towards the wind. This can mean that it becomes necessary to bear off a little and then steer higher little by little again.

WHAT HAPPENS IF THE SHIP SAILS UNDER ENGINE WITH STAYSAILS SET?

The ship lies better in the water when the wind streams along the staysails. The sails now get trimmed parallel to the direction of the wind - even if the wind comes directly from the front. They work like stabilizers on big passenger ships - only that they are not below the waterline.

AND IF NO SAILS ARE SET?

Even then it is necessary to brace the yards to keep the centre of gravity of the ship directly above the deck. It also helps to reduce the working surface for the wind and to save fuel.

Helm Watch

On the MIR the trainees have the possibility to take part in the helm watches. This means that they can take over the steering of the vessel for 1/2 hour at day plus 1/2 hour at night. Those who volunteer for this will steer all alone but under supervision of the watch officer and if necessary a person who is experienced in steering. This can be an A.B. or a cadet or sometimes even another trainee who has been on MIR before and has proven to be a good helmsman.

If you want to take over a helm watch your eye vision needs to be okay. It is no problem if you are wearing glasses, but either with or without glasses you should be able to read the compass from a distance of 1 metre as most of the time you will be steering compass courses.

If you volunteer for helming you will be given a time during which you will take the helm. This will be the same time every day and every night (for example from 06.30 to 07.00 and 18.30 to 19.00 hours daily). The watch officer will be informed that you come and will await you. If you cannot come to your helm watch - maybe because you are seasick - it is necessary to inform the watch officer that you will not appear so that he finds a cadet who will substitute you.

For your own experience and to receive a true effect of learning how to steer a ship it is advisable to do the helming during your entire voyage. Every day you will find a different situation, different wind, different sea state so that no watch is like the other. However, if you come to the helm for 5 or 6 days after each other you will get a real good impression of the job of the helmsman.

If it is time for your helm watch:

- come to the bridge 5 minutes before your helm watch begins
- be dressed for the weather conditions. Don't forget a hat or gloves or sunglasses.
- when you arrive on the bridge go to the open door of the wheel house and inform the watch officer that you are there and want to take the helm now.
- when it is time to take over the watch officer will accompany you to the helm and ask the cadet who is there now to hand over the helm to you.
- the cadet will now tell you the course that is to be steered at the moment and eventually give you some more important information such as the weather helm to be maintained or how the ship reacts to the wheel.
- You must repeat what he said and then you can take over the helm.
- If you will hand over the helm to the next cadet the procedure will be the same.
- during the helming repeat every command that you get loud and clear.

So now let's see what you have to do at the helm:

Steering of Compass Courses

The most of the time - and especially when you are a beginner - you will steer compass courses. This means that the watch officer will tell you a compass course. He will do this in English. This will sound like: "The course is two-four-seven!" This information means that you are meant to keep the ship on the course 247° according to the steering compass in front of you.
Your steering compass is a repeater of the ship's gyro compass. It has 2 scales. The outer circle shows the degrees in steps of 1 degrees with every 10 degrees marked. The inner circle gives you 10th of a degree to allow you precise steering. Other than on yachts on the MIR we steer precisely to 1°. If you receive a course of 247° this means 247° and not 245° or 250°. You should try to steer as

precisely as possible. This is no big problem as the MIR has got a hydraulic steering gear.

Steering a given Rudder Angle

If a change of course is necessary you will now receive commands to steer a certain rudder angle. For this you have a rudder angle indicator in front of you. The commands used in this can be seen below in the Standard Wheel Orders.

Steering a given Angle to the Wind

Sometimes we are steering a certain angle to the wind. In front of you is a wind indicator. It shows you the angle and speed of the apparent wind. You will now receive a command to steer for example 55-60° by the wind. In this case the course is not imp ortant for you any more. There is no need to look at the compass for you, but only to the wind indicator. You follow the wind with your steering to maintain the perfect angle to the wind for the trim of sails now.

Steering after Wind and Sails

If you proof to be a really talented helmsman you might receive the order to steer after wind and sails. In this case your job is to steer so that the sails all stand perfectly. It is the way to steer the vessel in hard-by-the-wind courses when you are beating against the wind. The steering sail is the highest set sail on the main mast (e.g. the main royal sail). If it's windward leech is slightly playing you have the minimum angle towards the wind. You now can steer to windward if the wind increases and must bear off if it decreases. You must follow every change of direction and can try to find the perfect point. However, you must steer very carefully and should not turn the wheel more than 1/4 turn to either side as too much rudder angle and too much changing will reduce the speed of the vessel. It is difficult to describe this in words, but maybe we will sail together one day and I will show you what I mean...

Helming during a Sail Manoeuvre

During that you will receive the same commands as during a change of course. Only here it is absolutely important to fulfil them as quickly as possible and as precise as possible. If you act too slowly you might stop the vessel in the tack what might mean that the tack will fail. The crew (and the master) will not be delighted if they have to brace back all yards and do the tack again because of you...

Working with the Pilot

In narrow waters, during approaches or when working with the pilot precision helming is necessary. That means we steer strictly to the given course with no more than 0,5° moving to either side. We normally do this with the tiller steering inside the wheel house. The more precise you keep the course the better. To do this there are 5 secrets to know:

Secret No 1: Do not allow your course to walk out at all.

If the needle starts moving 0,1° - react immediatel y. The longer you wait the more action you have to take and the longer it takes to return to your given course. And the more action you take the bigger the chance that the course walks out to the other side afterwards.

Secret No 2: Do not allow anything to disturb your concentration.

If you take your eyes from the compass your course will start walking. If you have taken the helm during a precision steering situation you must focus all your attention on the course and nothing and nobody else. If you feel tired or unconcentrated have somebody release you.

Secret No 3: Always know where the next buoy is.

Never let a change of course come as a surprise to you. During an approach buoys as a rule mark the changes of course. So by the moment when you pass one the pilot will very probably give you a new course command. If you know where the fairway goes you will be prepared for a smaller or bigger change of course.

Secret No 4: Make your homeworks before you take the helm.

If you know that you will steer during a certain passage or approach it pays to look into the sea chart and the tide tables before. If you know the general directions and conditions during your helm watch it will help you to steer better.

Secret No 5: Know what can disturb your steering.

Big vessels overtaking you, tight fairways with shallow waters on both sides, stony grounds, strong currents, slow speed, changes of tide do have strong effects on the steering abilities of the vessel. If you know what they are doing you can take the right action in the right moment and keep on the course as good as possible under that situation.

Steering after Landmarks

If land is in sight, on rivers or fairways it is possible to steer after landmarks such as prominent buildings, buoys, cliff edges, lighthouses, leading lights, etc. If working with the pilot it can happen that he orders you not a course but to keep course on such a landmark. You then repeat the command as he gave it to you and do not look on the compass, but try to keep the given landmark closely starboard of the fore mast. It takes some experience, but it can be easier to steer this way as one sees a beginning swing of the ship earlier than on the compass.

Steering after a Star

This is not only a romantic phrase but a working method to keep a ship on course while out on the ocean where the compass sometimes swings around wildly. In a starry night it happens that one sees a prominent star near the masts or another well visible part of the rigging. If this matches the course ordered you can for a while take your eyes from the compass and watch out that the star remains in the same position relative to the rigging. This works extremely well with Polaris which remains very

close to the true north direction all night. But be careful, some stars move rapidly during the night. So it is necessary to cross-check the maintained course with the compass on regular intervals.

Standard wheel orders
from the Standard Marine Phrases of the International Maritime Organisation

All wheel orders should be repeated by the helmsman and the officer of the watch should ensure that they are carried out correctly and immediately. All wheel orders should be held until countermanded. The helmsman should report immediately if the vessel does not answer the wheel.
When there is concern that the helmsman is inattentive s/he should be questioned: “What is your heading?” And s/he should respond: “My heading is … degrees.”

Order	Meaning
1. Midships	Rudder to be held in the fore and aft position
2. Port / starboard five	5° of port / starboard rudd er to be held
3. Port / starboard ten	10° of port / starboard rudd er to be held
4. Port / starboard fifteen	15° of port / starboard rudder to be held
5. Port / starboard twenty	20° of port / starboard r udder to be held
6. Port / starboard twenty-five	25° of port / starbo ard rudder to be held
7. Hard-a-port / starboard	Rudder to be held fully over to port / starboard
8. Nothing to port / starboard	Avoid the vessel’s head to go to port / starboard
9. Meet her	Check the swing of the vessel’s head in a turn
10. Steady	Reduce swing as rapidly as possible
11. Easy to five / ten / fifteen / twenty	Reduce the amount of rudder to 5°/10°/15°/20° and hold
12. Steady as she goes	Steer a steady course on the compass heading indicated at the time of the order. The helmsman is to repeat the order and call out the compass heading on receiving the order. When the vessel is steady on that heading, the helmsman is to call out: "Steady on …”
13. Keep the buoy /mark / beacon on the port / starboard side	
14. Report if she does not answer to the wheel	
15. Finished with wheel. No more steering.	

When the officer of the watch requires a course to be steered, the direction which s/he wants should be stated followed by each numeral being said separately including zero, for example:

Order	Course to be steered
Port, steer one-eight-two	182°
Starboard, steer zero-eight-two	082°
Port, steer three-zero-five	305°

On receipt of an order to steer, for example 182°, the helmsman should repeat it and bring the vessel round steadily to the course ordered. When the vessel is steady on the course the helmsman is to call out: “steady on one-eight-two!” The person giving the order should acknowledge the helmsman’s reply.

If it is desired to steer on a selected mark the helmsman should be ordered to “steer on … buoy / … mark / … beacon”. The person giving the order should acknowledge the helmsman’s reply.

Look-out

When trainees are asked to make look-out they very often do not know what they are meant to look out for and why it is necessary to do it at all.

Why keep look-out?

- According to the collision avoidance rules (COLREG) any vessel is required to keep a proper look-out at any time, but especially in reduced visibility.
- It is not true that the watch officer has seen any ship on his radar screen long before a look-out has spotted it. This depends very much on the range that is chosen on the radar screen at the moment. In good weather the visibility - especially with good binoculars - is much better than on the radar. Further on many subjects do not appear on the radar for various reasons. We had big problems with small boats with angling parties which do not reflect at all as the boats were made of wood and so small that they disappeared behind the waves.

What are you meant to look for when on look-out???

From my experiences as watch officer on tall ships I want to tell you what I expect from you if you are my look-out:

Divide the surrounding of the vessel into 3 zones. Inside these zones you will search different things:

Zone A

Is the immediate surrounding of the vessel. It is inside 1-3 miles from the vessel herself. This depends on the size and speed of the vessel you are on. It should cover the distance through which you will sail in between the next 10-15 minutes. In zone A you are meant to look for anything that might disturb our own vessel like **drifting things** (drifting containers), **small boats** (even small sailing yachts can easily be overseen by the navigator as they also tend to not appear in the radar), **fishing nets** (not funny if you get them into the propeller). Also look for anything that does not belong into the sea. Some floating furniture or rubbish can be remains of a shipwreck or other accident. Whatever you see, describe it to me as clear as you can and don't forget to tell me the bearing of it and the approximate distance from us.

Zone B

Goes from the end of zone A until the visible horizon. Inside this zone look for **any vessel** that appears. If you come and give notice of a new vessel, please tell me what you see, where you see it and in which direction it moves. "ship on starboard" is not enough. It is better than nothing, but really useful would be: "fishing vessel ahead, 35° to star board, approximate distance 10 miles, moving slowly northward"

If you should be on look-out at night time and you see any position lights of other vessels there are two possibilities to give notice. If you are able to identify what you see, so please do it: "motorized vessel ahead. I can see the red position light". If you are not sure, just tell me what you see. "I see two white lights and a red light. The bearing is 25° to starboard."

But there is more than ships what you are to look-out for in zone B:

- **distress signals**.
  If you see any red flare, smoke, blinking light in ... - - - ... sequences, etc. give immediate notice. Somebody's life is in danger.
- **buoys**
  Any buoy you see anywhere is of high importance for the navigator. He might just be waiting for this buoy to find an approach or a deepwater route. There might be a new buoy which is not noted in his sea chart. There is also the possibility that he made a mistake and a buoy that should appear to starboard now shows on the port side. If you don't give notice it can mean that you sit on the rocks few minutes later.
- **high waves with foam on top**
  They might indicate a squall or a change of wind direction and they also might indicate a reef or sandbank.

Zone C:

It goes over the horizon. Here you look for a **change of weather**, e.g. a front coming nearer or clouds which might contain gusts.

Also divide your attention to different directions. 60-70% or you attention goes forward to 60° of eit her side of the vessel. 20-30% cover up 60°-120° of eit her side. Only 10° of you attention goes to what is behind you. As for vessels coming up from behind we mainly need information about all ships that are faster than us and might overtake us in near future.

Look-out is not restricted to what you see. It also includes you ears. The lookout should also keep his ears open to listen to **sound signals** from other vessels.

Also listen for **strange sounds** that had not been there before**.** This can be from our ship hitting some drifting object or from the rigging where some sail or line starts slacking due to a change of wind direction or force.

And the look-out is normally the only person who hears the **shouts** of a person fallen over board...

Everything clear? Okay, now go and keep look-out.

Collision Avoidance

Collision Avoidance is the main job of the watch officer during his sea watch. At any time he needs to know what is happening around his ship and who else is there. The traditional way of doing this is to watch the sea surface and the horizon closely at all time. Even if one or two lookouts are posted on the bridge wings the watch officer remains responsible to detecting all other ships and possible dangers around him. If he has spotted a target he must find out if there is a risk of collision and if so he needs to react to avoid collision. He can do this through a change of course or a change of speed or a combination of both. Whatever he does must be in accordance with the Rules of the Road.

COLREG

The Rules of the Road (COLREG) are an international convention to avoid collisions at sea. They consist of 38 rules grouped into 5 parts. Part B is about the steering and sailing rules and there you find the rules about the lookout, safe speed, how to detect a risk of collision and how to react if such a risk exists. It also includes rules about the conduct of vessels in bad visibility and the responsibilities between different kinds of vessels. It tells how to behave in head on situations, crossing situations, when overtaking another vessel or if being overtaken.

RADAR:

Radar is very important on the bridge. In bad visibility it is the only means to detect another vessel or other target in time for efficient collision avoidance. It can also be used for navigation purposes and to receive weather information by seeing wave or rain echoes.

The radar is placed in the rigging of MIR and sends electromagnetic waves to the front and the sides of the ship. If these waves meet metal they get reflected and return to MIR where the radar collects them again. In accordance to the time and intensity of the refection the computer calculates the size and distance of the object. In case of no other ship inside the chosen radius the radar switches on standby modus, but returns automatically if any reflection appears. In the case of a possible collision an acoustical alarm is given. Unfortunately there is one problem with this useful instrument if it is used on square-rigged ships. Their own sails produce blind patches in accordance to the position of sails. This is a reason why very often no sails are set in misty weather.

Having worked a lot with ARPA during my last voyage I want to give those who are no professional navigators a short inside into this technique.

ARPA stands for Automatic Radar Plotting Aid. It is a radar system of the high end of technology.

On MIR we have an ARPA which allows us to change between different projections so that every watch officer can choose the one he likes best. If working with ARPA in connection with ECDIS (Electronic chart display and information system) the "Relative Motion / North Up / off-centre / true vectors" projection has proved to be most handy and so this was the projection which was normally installed when we were on the watch.

The system we use on MIR also allows us to choose between different ranges. This starts from 0,5 miles and goes as far as 96 miles. However, in the waters where we were sailing 96 miles is absolutely useless as radar cannot "look around corners". I really doubt that it is of any use anywhere because anything 96 miles away is not really relevant for navigation except for a landfall towards a very distinctive coastline after crossing an ocean. I have no experience on it being used in connection with weather forecasts, but maybe it is possible to receive some information about bad weather ahead from the 96 miles picture.

For our voyage we normally used a range of 12 miles. However, when in narrow waters often 6 Miles or for an approach even 3 miles seemed to be more handy. In the open sea speeding with 15+ Kt. we sometimes use the 24 miles screen. On a radar screen the own ship normally appears in the centre. However with modern tools this is not the rule any more. So we also had our radar screen decentralised to give us more information of what is going on ahead.

The ARPA now shows us the targets not only like a green spot or azimuth as traditional radars do. It already shows the direction of movement so that we can decide whether a target is of interest for us or not. Those which might come near to us or might cross our track can acquired with a track ball and we can receive further information about them: speed, course, how close they will come, how long this will last. Additionally every target we acquire will appear on the ECDIS so that we can watch it's moving

not only while standing directly in front of the radar screen but also from the chart desk. Having an ECDIS-display in his cabin the master can watch it while he is working on his desk. Another display is standing on the training bridge so that everybody on board can at any time see where we are and what is going on in our surrounding.

However, if you are not near the display and not near the radar screen the ARPA also gives acoustic warnings for each vessels that comes into the chosen closest passing distance. While in relative motion projections any satnding bearings can easily be seen in true motion you need to take bearings to find out if there is a risk of collision. You can do this directly on the ARPA screen and it is actually not much different from taking bearings to vessels in sight. However, being a school ship MIR also has a normal radar set on the bridge to give the students the possibility to train working with simpler technology. This is a north up projection which is only connected with the gyro compass and works just in the same way as the radar on any yacht. It is also used as backup in case the ARPA does not work.

After 2 weeks in good weather with good visibility we one morning were anchoring in deep mist. We could not see the main mast from the bridge. As I knew from radio contact KRUZENSHTERN was anchoring just 3 cables from us. However, on the radar she looked not different than a buoy and if I had not known she was there I would have never thought it from what information the ARPA gave me. It takes a lot of experience to interpret a radar picture correctly and it is the same with ARPA. Only if you permanently practice this during times with good visibility you will be able to see something on the screen in bad weather. Professional navigators are only allowed to navigate with ARPA in bad visibility if they have had some special ARPA training.

Navigation

I think that everybody who goes to the sea should know some basics about navigation and that is what I want to talk about here.

POSITION:

The sea chart shows a sector of the Earth that is notified through longitude λ and latitude ϕ. If you talk about a certain point on the world, the distance towards the Equator is called its latitude. A right angle has got 90° and every degree has 60 minutes. The la titude is taken as an angle from the middle of the Earth. The angle is 0° at the Equator and 90° at th e poles. It is called "north" or "south" in accordance to the fact of being north or south of the Equator.

A nautical mile (1852 metres) is the equivalent to 1 minute of altitude at any point of the world. Thus the scale of latitude can be used for measuring distances. The minute of longitude is only equal to a

nautical mile on the Equator, as the meridians are nearer to each other the nearer you come to the poles. The scale of longitude cannot be used to measure distances.

THE SEACHART (MERCATOR PROJECTION):

To understand the principle of this projection, you must imagine a globe with a lamp inside. If you roll a sheet of paper around it in a way that it touches the globe everywhere on the Equator and then switch on the lamp, the figures of the globe will get to be seen on the paper. This paper is our sea chart. All meridians appear as parallel lines, but towards the poles the degrees of latitude get more and more distant to each other. Therefore it is necessary to choose the scale for measuring distances on the sea chart in the region of the same latitude as you are in the same moment.

A ship sailing strictly northward describes a straight line on the sea chart. Angles and directions are the same on both chart and globe. This fact makes navigation a lot easier then it was with other projections.

COMPASS:

A compass is simply a magnetic needle in a circle that is called the "rose". This circle is divided into 360° clockwise. For a ship's compass the rose is movable, so that 000° always shows northward. Further on it has got a line that points into the direction of the ship's bow - which is actually the direction in which the ship is steered at the moment. The difference towards 000° indicates the course that is steered.

GIRO COMPASS:

The magnetic field of the Earth and the iron of the ship itself influence the magnetic compass severely. On the MIR we find a modern giro compass system, which gives us the true north. It is compensated for all effects and delivers a corrected course to displays on the bridge and other prominent places on board the ship. Helmsman and watch officer find a giro compass repeater next to their posts for convenient work. Of course modern techniques are liable to failure and so the magnetic compass gets checked and compared with the giro compass regularly and the difference between both is noted into the ship's log book at least at the end of every watch - which means every 4 hours - or every time when the course is changed.

GPS AND ELECTRONICAL SEA CHART

On MIR computer navigation is done by satellite with NAVSTAR (GPS). Several times a minute the position of MIR is taken by bearings towards satellites and gets projected onto the computer screen into the charts of the ECDIS being exact by a few metres. Additionally, useful information about MIR and from ARPA and AIS the positions, courses and speeds of other ships inside a certain radius, can be plotted on the screen. Even information about the kind of vessel, nationality, cargo and destination can be received that way if the other vessels provide them for the AIS.

All this is very useful, but this type of navigation can only be seen as additional source of information. It is still necessary to have a proper lookout, to plot other ships' positions and speed in the conventional way. Computers are liable to crash down and depend on electricity. In case of a probable collision, a contact ship-to-ship is made via VHF, to make sure the other ship is aware of us and the fact that a square rigged tall ship reacts differently to other vessels. (What does not mean that we do always have the right of way...)

AIS

The Automatic Identification System is a new aid for collision avoidance for ships. It was originally developed as anti-terror-tool, but now proved very useful for all ships. It submits all important data of all ships in vicinity and helps the watch officer decide if a close quarters situation is developing. It also gives him the names and call signs of the ships to enable him to call them via VHF. For sailing ships it gives extra safety as it also transmits to other ships if we are under sails which might change the right of way.

COURSE:

Now we know our position and know the course we are steering. Unfortunately this does not mean that we now know where we are actually going. Apart from the course the helmsman steers with the help of the giro compass, there exists a course through the water and a course above ground. To find out this course above ground and to choose the course the helmsman (or the autopilot) has to steer to enable the ship to sail in the desired direction is the main duty of the watch officer.

The drift influences the course through the water. The higher the ship sails by the wind the more drift we have. Of course this also depends from the power of the wind, the aerodynamic forms of the ship and the angle of its list. The drift can be so strong that she ship makes half a metre to the side for every metre forward.

Currents and tides affect the course above ground. They influence the drift of the ship. If they are permanent ones they are normally noted on the sea charts and handbooks or added by the watch officer due to information from the GPS. Very often it is necessary to find out about them during the sailing by comparing the logged course with the one shown by the satellite navigation screen or by plotting landmarks, tons, other ships, etc. if there are any.

How big the influence of drift and set can be - and high waves, bad steering, heavy rolling, bad trimming even multiply this - can be seen in the following example. In December 1999 MIR was hit by a cyclone in the Baltic Sea. Without any sails they were motor sailing with full speed ahead. The truth is they were driven backwards with a speed of 3 knots!

DEAD RECKONING NAVIGATION:

Means that from the last waypoint on the position gets logged in accordance of the course and the speed. To do this logged miles made good are noted in the sea chart in the direction of the steered course. This gets repeated regularly until there is an opportunity to see landmarks or buoys to find out

the true position of the ship. As we have seen it is quite tricky to find out the true course above ground and the true speed during the voyage and so the chance of landing at a completely different place is quite good. Means this kind of navigation is nice for trainees to get a rough idea of where the ship sails, but for the safe navigation of the ship it is not too useful. It only gets used for planning the route and scheduling manoeuvres or arrival times.

TERRESTRIAL NAVIGATION:

It is possible to find out the true position of the ship through bearings towards objects in the sky (celestial navigation) and on the earth. If you are interested in the first, it is best to ask one of MIR's navigation teachers or watch officers about it. The work with a sextant is a tricky thing. On a ship that is permanently moving it is not so easy to look towards a star and the horizon at the same time and of course you need to read the tables in the almanacs and nautical handbooks (which are written in Russian language, of course)...

However, everybody can easily learn the terrestrial navigation. Most easy this is done near to shore. You simply look towards 2 prominent points at the coastline (check the sea chart for church towers or light houses, etc. first...) and read their bearings on the compass. Now you calculate 360 minus the bearings and note them on the sea chart. Where the lines cross is the ship. If you repeat this (with the same landmarks) a little later you get a new position of the ship. Now make a line between the first and the second position and you will be able to find out in which direction the ship sailed, how many miles and at what speed. If you now prolong the line you can see where you will be in maybe an hours time. You should check the position again regularly to make sure your course is steady and the drift has not changed.

Near shore this kind of navigation is definitely best. In narrow waters 3 persons work together closely. One is permanently looking, the 2nd notes this on the sea chart and compares it with the GPS and a 3rd - an experienced helmsman - steers as exact as possible the announced course.

PILOTAGE:

Due to her size MIR is required to take on a local pilot when going into port or sailing in certain waters. As full concentration is needed then, trainees and cadets have to leave the bridge at these times. The helm is taken by a sailor from the permanent crew then.

Navigational Terminology

The sea charts that are used on the navigation bridge on MIR use Russian terminology, only new charts use Russian and Englisch abbreviations. All navigational literature on MIR is in Russian language only. The Russian sea charts and nautical literature uses the same system and have the same content as the British equivalents.

1. Lights					
Fixed	F.	Постоянный огонь	П.	Festfeuer	F.
Occulting	Oc.	Затмевающийся огонь	Зтм.	Unterbrochenes Feuer	Ubr.
Group-occulting	Oc.(2)	Групповый затмевающийся огонь	Зтм.(2)	Unterbr. Feuer in Gruppen von...	Ubr.(2)
Isophase	Iso.	Изофазный огонь	Изо.	Gleichtaktfeuer	Glt.
Single-flashing	Fl.	Проблесковый огонь	Пр.	Blitzfeuer	Blz.
Long-flashing	Lfl.	Длительно-проблесковый огонь	Дл.пр.	Blinkfeuer	Blk.
Continous quick	Q.	Частый	Ч.	Funkelfeuer	Fkl.
Continous very quick	VQ.	Прерывистый частый огонь	Прер.ч.	schnelles Funkelfeuer	SFkl.
Continous untra quick	UQ.	Прерывистый ултра частый огонь	Уч.	Ultra-Funkelfeuer	UFkl.
white	W	белый	бл.	weiss	w.
red	R	красный	кр.	rot	r.
green	G	зелённый	зл.	gruen	gn.
yellow	Y	жёлтый	жл.	gelb	g.
blue	Bu	синий		blau	bl.
violet	Vi			violett	viol.
orange	Or			orange	or.
2. buoys/beacons					
buoy		буй		Tonne	
beacon		знак		Bake	
light beacon		светящийся знак		Leuchtbake	
light buoy		светящийся буй		befeuerte Tonne	
conical buoy		конический буй		Spitztonne	

can buoy				Stumpftonne	
pillar buoy		сигарообразный буй		Bakentonne	
spar buoy		веха		Spierentonne	
mooring buoy		швартовная бочка		Festmachertonne	
Lateral Marks		Летеральные знаки		Lateralzeichen	
Cardinal Marks		Кардинальные знаки		Kardinalzeichen	
Isolated Danger Marks		Знаки ограждающие отдельные опасности		Einzelgefahr-Zeichen	
Safe Water Marks		Осевые знаки		Mitte-Fahrwasser-Zeichen	
Special Marks		Знаки специального назначения		Sonderzeichen	
New Dangers		Новые опасности		Neue Gefahren	
3. tides					
tide		прилив		Tide	
tidal amplitude		амрлетуда прилива		Tidenhub	
current		течение		Stroemung	
high water		время польной води		Hochwasser	
low water		время малой води		Niedrigwasser	
neap tide		квадратурный прилив		Nippzeit	
spring tide		сизсигный прилив		Springzeit	
mean high water neaps	MHWN	средная квадратурная польная вода	ср.кв.ПВ.	mittleres Nipp-Hochwasser	MNHW
mean high water springs	MHWS	средная сизигная польная вода	ср.сз.ПР.	mittleres Spring-Hochwasser	MSHW
mean low water springs	MLWS	средная сизигная польная малая вода	ср.сз.МВ.	mittleres Spring Niedrigwasser	MSNW
mean low water neaps	MLWN	средная квадратурная малая вода	ср.кв.МВ	mittleres Nipp-Niedrigwasser	MNNW
4. grounds					
stones		камни		Steine	
fine		мельки			
sand		песок		Sand	
shells		ракуша		Muscheln	
rock		скала		Felsen	
5. courses/speeds/postions					
Latitude	Lat.	Широта	Шир.	geografische Breite	
Longitude	Long.	Долгота	Долг.	geografische Laenge	
speed		скорость		Fahrt	

knots		узлов		Knoten	
North	N	севера, Норд	N	Nord	N
East	E	востока , Ост	E	Ost	E
South	S	юг, Сюд	S	Sued	S
West	W	запад, Вест	W	West	W
course		курс		Kurs	
deviation		девиация		Ablenkung	
variation		магнитное склонение		Missweisung	
annual change		годные изменение		jaehrliche Aenderung	
compass error		поправка компаса		Kompassfehler	
speed over ground	SOG	скорость относительно грунта		Fahrt ueber Grund	FueG
course over ground	COG	курс относительно грунта		Kurs ueber Grund	KueG
speed through the water		скорость относительно воды		Fahrt durchs Wasser	FdW
course through the water		курс относительно воды		Kurs durchs Wasser	KdW
drift angle		уголь дрейфа		Beschickung fuer den Wind	BW
magnetic course		магнитный курс		Magnetkompasskurs	MgK
true course		(гирокомпасный курс)		rechtweisender Kurs	rwK
bearing		пеленг		Peilung	
position		место судна		Standort	
to fix the position		определить место судна		einen Standort bestimmen	
direction		направление		Richtung	
6. miscellaneous					
sea chart		карта		Seekarte	
fairway		фарватер		Fahrwasser	
pilot point		место встречи лоцманов		Lotsenpunkt	
satellite navigation systems		спитниковые навигационные система		satellitengestuetzte Navigationssysteme	
approach				Ansteuerung	
anchorage		рейд, яркорное место		Reede	
cable		кабеля		Kabel	
reef		риф		Riff	
wreck		затонувшее судно		Wrack	
light ... is out of action		Огонь ... не горит/ не действует			
... extinguished		погашен		erloschen	
dangerous to navigation		опасно для мореплаване		Gefahr fuer die Schifffahrt	
pipeline		труба		Unterwasser-Rohrleitung	
destroyed		разрушен		zerstoert	
visible		видимый		sichtbar	
radar beacon		радиолокационный маяк		Radarantwortbake	

bank		банка		Sandbank
rudder angle indicator		акциометр		Ruderlagenanzeiger
deep water route		глубоководный путь		Tiefwasserweg
traffic seperation scheme				Verkehrstrennungsgebiet
leeway		дрейф ветровой		Leeweg
UTC		всемирное время		Weltzeit
chart datum		ноль глубиной карты		Kartennull
island		остров		Insel
lighthouse		маяк		Leuchtturm
explosives dumping ground		Р-н. затоп. взр. вещ		
restricted area		плавание запрещено		Sperrgebiet
navigational lights		судовые огни		Positionslichter
sector		сектор		Sektor
temporary	T	временный	B	nur begrenzt gueltig
seasonal				saisonbedingt

Nautical Dictionary

Качества экипажа- Raenge -Ranks

Капитан	**Kapitaen, (der Alte)**	**Master**	**Capitaine**
Старший помощник капитана (Старпом)	Erster Steuermann, (Maat)	Chief mate, First Mate (the Mate)	1e Lietenante
Старший учебный пом. к-на (Учебный пом)	Erster Lehr-Steuermann	Chief trainings mate	
2-5 помощник к-на (второй, третий, ...)	2.-5. Steuermann (2./3....Offizier)	2^{nd}-5^{th} mate	Lieutenante
Судовой врач (Доктор)	Schiffsarzt	Doctor	Médicien du bord
Р. навигатор	Navigationsoffizier	Chief navigator	Timonier
Помощник к-на по радио электроник	Elektronik Offizier	Chief electric	
Радиооператор (радист)	Funker	Radio mate	
Старший механик (Стармех)	Chef Ingenieur (der Chief)	Chief engineer (Chief)	1e Ing.-mécanicien
2-4 механик	2.-4. Ingenieur	2^{nd}-4^{th} engineer	Ingénieur-méchanicien
Старший боцман	Oberbootsmann	Chief bosun	
Боцман	Bootsmann	Bosun	Bosco
Парусный мастер	Segelmacher	Sailmaker	Voilier
Плотник	Zimmermann	Carpenter	Charpentier
Подшкипер	Bootsmannsmaat	Bosun's mate	
Старший моторист	Erster Maschinist	1^{st} motor man	
Моторист	Maschinist	Motor man	
Повар, кок	Smutje, Koch	Cook	Cuistot
Матрос 1кат	Vollmatrose	Able seaman	Matelot
Матрос 2кат	Leichtmatrose	Ordinary seaman	Matelot du pont
Практикант (курсант, кадет)	Schiffsjunge, Kadett	Deck's hand, cadet	Cadet, élève
Руководитель практики	Lehrer, Ausbilder	Teacher	
Буфетчица	Stewardess	Stewardess	stewardesse

местности судна - im Schiff - inside the ship

Кубрик (курсантов)	Unterkunft	**Cabin**	Logis
Туалет	Toilette	Toilet	Toilet
Умывальная	Waschraum	wash room	
Душевая (комната)	Duschraum	Shower	Douche
Столовая	Kantine	canteen	
Капитанский салон	Kapitaens-Salon	Captain's saloon	
Камбуз	Kombuese	Galley	Cuisine
Кают компания	Messe	Mess room	Batterie
Лазарет	Krankenzimmer	Hospital	Hôpital
Машинное отделение	Maschinenraum	Engine room	Salle des machines
Центральная поста управления	Maschinenleitstand	Engine control room	
Мостик	Kommandobruecke	Bridge	Passerelle
Радиорубка	Funkraum	Radio room	Salle de radio
Штурманская рубка	Kartenzimmer	Navigational room	Timonerie
Верхняя палуба	Oberdeck	Upper deck	Pont principal
Нижняя палуба	Unterdeck	Lower deck	Faux pont
Кормовая палуба	Achterdeck	Afterdeck	
Бак	Back	Fo'c'sle	Gaillard
Нос	Bug	Bow	Proue
Корма	Heck	Stern	Poupe

Рангоут - Masten und Stengen - Masts and spars

Рангоут	Stengen	spars	Espars
Мачта	Mast	Mast	Mâts
Колонна мачты	Untermast	Lower mast	
Стеньга	Stenge	Topmast	Mât hune
Брам-стеньга	Bramstenge	Topgallant mast	
Бом-брам-стеньга	Royalstenge	Royal mast	
Рей	Rah	Yard	Vergue

Нок рея	Rahnock	Yardarm end	Fusée
Гик	Baum	Boom	Gui
Гафель	Gaffel	Gaff	Corne
Бушприт	Bugsprit	Bowsprit	Beaupré
утлегарь	Ausleger	Outrigger	
Эзельгофт	Eselshaupt	Doubling	Chouque
Марс	Mars	Top	Hunier
Саллинг	Saling	Cross tree, platform	
Краспица	Puettlings	Spreader	barre de perroquet
Брас-выстрел	Brasswinde	Bumkin	
Утлегарь	Klüverbaum	Jib-boom	Bout-déhours de clin foc
Бегинрей	Bagienrah	Crossjack	Vergue barrée

Приставки:	Vorsilben:	*Prefixes:*	
Фор-, фок-	Fock-	*Fore-*	(mât) de misaine
Грот-	Gross-	*Main-*	Grand (mât)
Бизань-, крюйс-	Besan-, Kreuz-	*Mizzen-*	(mât) d'artimon

паруса - die Segel - the sails

Прямые паруса	Rahsegel	Square sails	Voile carrée
Фок	Fock	Fore course	Misaine
Грот	Grosssegel	Main course	Grand voile
Нижний марсель	Untermarssegel	Lower topsail	Hunier fixe
Верхний марсель	Obermarssegel	Upper topsail	Hunier volant
Брамсель	Bramsegel	Togallantsail	Perroquet
Бом-брамсель	Oberbramsegel, Royalsegel	Royal sail	Cacatois, Perruche
Косые паруса	Schratsegel	Fore and aft sails	Voile d'étai
Стаксель	Stagsegel	Staysails	Foc
Стень-стаксель	Stengestagsegel	Topmast staysail	Marquise
Брам-стень-стаксель	Bramstegestagsegel	Topgallant staysail	Diablotin

	Vorsegel	Headsails	focs
1 кливер	Innenkluewer	Inner jib	Faux foc
2 кливер	Aussenkluewer	Outer jib	Grand foc
Бом-кливер	Flieger	Flying jib	Clin foc
Кливер-топсель	Kluevertopsegel	Jib-o-jib	
Фор-стень-стаксель	Vor-Stengestag-Segel	Fore topmast staysail	Petit foc
Контр-бизань	Besan	Spanker, driver	Artimon, Brigantine

стоячий такелаж -stehendes Gut - standing rigging

Штаг	Stag	Stay	Étai
Стень-штаг	Stengestag	Topmast stay	Étai du mât de hune
Брам-стень-штаг	Bramstengestag	Topgallant stay	Étai de perroquet
Бом-брам-стень-штаг	Royalstengestag	Royal stay	Étai de mât de flèche
Кливер-леер	Kluewerstag	Jib stay	Étai de foc
Ватерштаг	Wasserstag	Bobstay	Sous-barbe
Мартин-штаг	Stampfstag	Martingalestay	Martingale
Фордун	Pardun	Capstay	Galhauban
Бакштаг	Backstag	Backstay	Pataras/ étai arrière
Ванты	Wanten	Shrouds	Haubans
Вант-пченсы	Puettlingswanten	Foottock shrouds	Gambes de revers
Выбленки на вантах	Webleinen	Ratlines	Enflêchure
Выбленки от вант к мачте		Crane lines	
Перты	Pferde, Fusspferde	Footropes	Marchepied
Перт на ноке рея	Hockpferd	Flemish horse	
Эрнс-бакштаг	Ernst-Backstag		
Подпертник	Springstroppen	Stirrup	Étrier
	Jackstag	Jackstay	Filière
	Handstag	Handstay	
	Jungfer	Dead eye	Cap de mouton

бегучий такелаж - laufendes Gut - running rigging

Брас	Brasse	Brace	Bras

Шкот	Schot	Sheet	Écoute
Фал	Fall	Halyard	Drisse
Нирал	Niederholer	Downhaul	Hale-bas, calebas
Галс	Hals	Tack	Armure
Гитов	Geitau	Clewline	Carque-point
Бык-гордень	Bauchgording	Buntline	Carque-font
Нок-гордень	Nockgording	Leechline	Carque-bouline
Завал-тали	Saval-Talje	Vang	Itague
	Bullentalje	Preventer	Pataras
Контршкот	Einholer	Inhaul	Hale-à-bord
Шкентель		Pendant	Itague
Топенант	Topnant	Lift	Balancine
Хват-тали		Jigger	Perruche, tapecul

дельные вещи - wichtige Teile (Rigg) - important pieces

Клот	Block (Fall)	Block	Poulie
Клотик	Mastspitze	Top of the mast	
Огонь	Feuer (Licht)	Light	
Раксы	Stagreiter	Hanks	
Беготка	Oesen	Lizard	
Люверс		Oyelit-hole	
Серьга	Klotje	Earring	
Нагель	Nagel	pin	
Сезнь	Zeising	Gasket	Raban
Кнехты	Belegnagel	Bitts	Cabillot
Утка		Cleat	
Нагельная планка	Nagelbank	Pinrail, Fiferail	Ratalier
Кренгельс	Bullauge, auch Oese	Bull's eye, cringle	Margouillet

узлы - Knoten - knots

Прямый узел	Kreuzknoten	Square knot	
	Halber Schlag	Half hitch	Demi-clef

Восьмерка	Achtknoten	Figure-of-eight knot	
Выденочный узел	Webleinenstek	Clove hitch	Demi-clef à capaler
Выбленка с петлей	Webleinenslipstek	Slip clove hitch	
	Rundtoern	Round turn	Tour mort
	Kopfschlag	Locking hitch	
Шкотовый узел	Schotstek	Sheet bend	Noeud d'écoute
Шлаг с петлей	Slipstek	easy kind of slip clove hitch	
	Trossenstek	Carrick bend	Noeud de Carrick
	Tausendbein	Baggy wrinkle	Fourure
Стопвый узел	Stopperstek	Stopper hitch	
Беседочный узел	Palstek	bowline	Noeud de chaise

комманды от мостика - Kommandos von der Bruecke - orders given from the bridge

Комманды:	Kommandos:	Commands:	
Парусный аврал	Segelalarm	Sails alarm	Pare pour le manoeuvre
Пошел на верх, все паруса к постановке готовить	Entert auf und macht die Segel los	Lay aloft and loose all sails	
На снастях паруса стоять	An die Leinen	Man the sail gear	
Ставить (прямый парус) шкоты до места	Kommando zum Setzen des Segels	Sheet home	
взять на горденя и гитовы	(Segel) aufgeien	Clew up	Drisser
Пошел фал	Fall auslaufen	Walk away with the halyard	
Завести тали, обтянуть наветренный галс	Klar zur Wende	Board the tack	
Все наверх готовы	Alle Mann an Deck	All hands on deck	Tout les mondes sur le pont
Ставить парус	Segel setzen	Set the sail	
Сбросить парус	Segel abstossen	Let fall	
Отдать	Loswerfen	Throw off the...	Larguer
Легче травить	Fieren	Ease the ...	Laisser firez

Садить	Hol weg	Haul away on the...	Haler
Стоп	Stop	Stop	
Подобрать	vorsichtig fieren	Tend the	
Крепить	Belegen	Belay	Fixer, amarrer, tourner
Постановка парусов	Setzen der Segel	Setting of the sails	
Укатка парусов	Festsmachen d. S.	Furling...	Ranbanter
Подготовка парусов	Losmachen d. S.	Unfurling ...	Dérabanter
Подьем парусов	Aufgeien d. S.	Hauling...	
Спуск, уборка парусов	Segel Bergen	Dousing...	Carguer
Управление парусов	Trimmen d. S.	Trimming ...	
Отапливать		Cockbill	

комманды на палубе и наверх - Kommandos an Deck oder im Rigg - orders given on deck or aloft

Готов	Fertig	Ready	fini
Выбирать	Auswaehlen, abnehmen	To heave	
Травить	Fieren	To slack away	Laisser firez, armener
Крепить	Belegen	To make up on the pin	Fixer, amarrer, tourner
Бросили	Loslassen!	Come up	Laisser tomber
Стоп так	Genug	Vast	
Ставить парус	Segel setzen	To set the sail	Hisser des voiles
Убирать парус	Herunterlassen	To hand the sail	Affaler
	Durchholen	To sweat	Border, embraquer
На гитовы и гордени	Aufgegeit	Clewed up	Drisser
Брасопить	Brassen	To brace	Brasser
Укладывать парус	Segel packen	To stow the sail	Serrer des voiles
Держать	Festhalten	To keep the strain	
Отбой	Beendet	Dismissed	Termine
	Festmachen (Segel)	To gasket	Rabanter
Сбросить парус	Abstossen	Let fall	
Отдать	Loswerfen	To throw off the ...	Larguer

Садить	Einholen, schricken	Ease the ...	Mollir

на руле - Ruderkommandos - at the helm

право	steuerbord	starboard	tribord
руль на борт право	hart steuerbord	hard a-starboard	à tribord toute
лево	backbord	port	babord
руль на борт лево	hart backbord	hard a-port	á babord toute
руль право десять	Steuerbord 10	starboard 10	
держать на буй	Tonnenstrich	steer on buoy	
держать на знак	Kurs auf das Seezeichen	steer on beacon	
держать на курс 315	Kurs 315°	steer on course 3-1-5	
так держать	recht so	steady as she goes	comme ça,
	komm auf (z.B. 15°)	come to (i.g.15°)	
на ветер	anluven	a little higher	lofer
на подветра	abfallen	keep off	abattre
	voll und bei	full and by	
держай курс	Kurs so halten	course	cap
	stuetz	return to zero-position	retour au point de depart
"Внимательнее на руль!"		Watch your steering!	

различные - Verschiedenes - Miscallanous

Отсек	Abteilung	Compartment	Compartiment
Дрейф	Abtrift	Drift	Dérive
Кормовый	Achtern	Aft	Arrière
Ахтерштевен	Achtersteven	Sternpost	Étambot
Бейдевинд	Am Wind	By the wind	
На борту	An bord	Aboard	À bord
Якорь	Anker	Anchor	Ancre
	Anker lichten	To weigh anchor	Appareiller
Звено якорной цепи	Ankerkettenglied	Anchor chain link	
Капштань, шпиль	Ankerspill	Capstan	Guindeau
Садить на мель	Auf Grund laufen	To run/ go aground	S'écoucher
Стоять на рейде	Auf Reede liegen	To stay on the road	
Идти наверх	Aufentern	Go aloft	Aborder
	Back (Segelstellung)	Aback	Contre
Левый борт	Backbord	Portside	Babaord
	Backschaft	Galley duties	Rôle de plat
бакштаг	backstags	Quartering winds	
Барк	Bark	Barque	Barque
Судовые огни	Befeuerung	Navigational lights	Feux de route
Катер, шлупка	Beiboot	Boat	Bateau
Лечь в дрейф	Beidrehen	Heave to	Cape (f)
	Bekleeden	To serve	Fourrer
Днище	Bilge	Bottom	Fonds, les
	Bilgenwasser	Bilge water	Eau de cale
Шквал	Boe	Squall	Grain
Буй	Fahrwassertonne ("Boje")	Buoy	Bouée
Старнпост	Bojenwache	Sternpost	
Борт	Bord	Side	Muraille

	Bootsmannsstuhl	Bosun’s chair	Chaise de calfat
Широта	Breite (goegraf.)	Altitude, Latitude	Latitude
	Bullauge	Porthole	Hublot
Члены комманды	Crewmitglieder (Offiziere)	Crewmembers (commanding-)	
Корабль идет...	Das Schiff faehrt nach..., hat Kurs auf..., macht Fahrt	Ship is haeding toward	Le navire fait route vers...
Шлюпбалка	Davit	Davit	Porte-manteau/ bossoir
Трехмачтовый корабль	Dreimaster	Threemasted ship	Troismâts-karré
Палубная настройка	Deckskonstruktion	Deck structure	
Палубная команда	Deckscrew	Deck's crew	Equippage de pont
Конец	Ende (Tau-)	Bitter end	Bout
Этап	Etappe	Race leg	Etape
Суток	Etmal	-	
Фалреп	Fallreep	Accommodation ladder	Échelle du coupée
Фарватер	Fahrwasser	Fairway	
Фендер	Fender	Fender	Défense
Швартовые конца	Festmacher	Dockline	Amarre (f)
Флаг	(National-) Flagge	Ensign	Drapeau nationale
Успех	Fortschritt, gemachte Strecke	Miles made good	Distance effective parcourue
Надводный борт	Freibord	Freebord	
Носовая фигура	Gallionsfigur	Fugure head	Figure de proue
Багаж	Gepaeck	Luggage	Bagage
	Geschirr (Segel)	Gear	Vaiselle
Скорость	Geschwindigkeit	Speed	
Гирокомпасная	Girokompassraum	Gyro room	
Склянка	Glasen	Bells (time)	(demi heure)
Счастливого плавания!	Glueckliche Reise!	Have a good trip!	
Попутный ветер	Guenstige Winde	Fair winds	
Градус	Grad	Degree	Degré
Гавань, порт	Hafen	Port, harbour	Port

Галфвинд	Halbwind-	Half wind -	
Поворот через фордевинд	Halse	Jibe, (to wear the ship)	Virer lof pour lof
Торговый флот	Handelsmarine	Merchant navy	Marine marchande
Порт приписки	Heimathafen	Home port	Port d'attacher
	Holende Part	Running part	Brin à nouer
Вахта собачья	Hundewache	Dogwatch	
Иол	Jolle	Boat	Yole
Каюта	Kajuete	Deck's house	Kajute
	Kalfatern	To caulk	Calfater
	Karabinerhaken	Snap hook	Mousqueton
Карлинг	Karling	Carling	
Цепной ящик	Kettenkasten	Anchor chain locker	Puits à chaîne
	Killen (Segel)	To luff	Fasseyer
Койка	Koje	Bunk	Bannette
Компас	Kompass	Compass	Compas
	Kompassgehäuse	Binnacle	Habitacle
	Kompassmissweisung	Deviation	Deviation
Румб	Kompassrose	Compass scale	Quart
Крен	Kraengung	Heel over	Gîte
Гирокомпас	Kreiselkompass	Gyro compass	Gyrocompas
	Kreuzen	To zig-zag, to beat	Virer vent devant
Курс	Kurs	Course	Allure, cap
	Kurs im Wasser	Water track	Route surface
	Kurs ueber Grund	Course over Ground	Route fond
Берег	Kueste, Ufer	Coast	Côte, rivage
Грузовые помещения	Laderaum	Cargo spaces	Cales
Кладовая	Lagerraum	Store room	Resserres, magasins
Земля	Land	Land	Terre
	Landratte	landlubber	Terrien
Долгота	Laenge (geograf.)	Longitude	Longitude
Подветренная сторона	Lee	Leeward	(amure)

Снасти	Leinen	Ropes	Filins
Маяк	Leuchtturm	Lighthouse	Phare
Журнал	Logbuch	Ship’s journal, logbook	Journal du bord
Лоцман	Lotse	Pilot	Pilote
Лоцманский трап	Lotsenleiter	Pilot leddar	Échelle de coupée
Наветренная сторона	Luv	Windward	(Amure)
Магнитный компас	Magnetkompass	Magnetic compass	
Экипаж	Mannschaft	Crew	Équipage
	Manoever	Maneouvre	Verement
Лавировать	manoeverieren	To manoeuver	Virer
	Mastgarten	Fife rail	Râtelier de pied de mât
Мидель	Mittschiff	Midship	Maître-bau
Идти на двигателем, - на машине	Motoren / unter Maschinenkraft laufen	To proceed under engine	Marcher au moteur navigation
Мотобот	Motorboot	motor boat	
Судоводительство	Nautik	Navigation	Navigation
Туман	Nebel	Mist	Brouilliard
Трап	Niedergang	Compainionway	Descente
Норд	Nordwind		
Сигнал бедствия	Notsignal (SOS)	Distress call	Appel de détresse
	Part (die)	Part	Brin
Запеленговать	Peilen	To bear	Relever
Пелегатор	Peilkompass	Direction finder	
Запеленгование	Peilung	Bearing	Relèvement
Пиллерс	Piller	Pillar	
Ют	Poop	Poop	Poupe
	Proviantlast	Galley store	Cambuse
Радиолокационная антенна	Radarantenne	Radar areal	
Не курить!	Rauchen verboten!	No smoking!	Ne fumez pas!
	Raumen (Wind)	To veer, to haul	Adonner
Рейд	Reede	Anchorage	Rade
Регата, Гонка	Regatta	Race	Régates

Дождь	Regen	Rain	Pleut
	Reinschiff	Clear ship	Rôle de propereté
Поручни	Reling	Railing	Lisse (f)
Становой якорь	Reserveanker	Bow anchor	Ancre de bossoir
Спасательный круг	Rettungsboje	Life buoy	
Дежурная шлупка	Rettungsboot	Rescue boat	
Плота	Rettungsinsel	Life raft	Radeau
Весло	Riemen (Ruder)	Oar	L'aviron
Такелаж	Rigg, Takelage	Rigging	Gréement, mâture
Руль, штурваль	Ruder, Steuerrad	helm	Barre
Румпельное отделение	Ruderanlage	Steering gear	Appareil de gouvernail
Весло, перо рулья	Ruderblatt	Rudder	Gouvernail
Рулевой	Rudergaenger	Helmsman	Homme de barre, Barreur
Баллер руля	Ruderstock	Rudder stock	
Рудерпост	Ruderwache	Rudderpost	Étambot
Шлюпка	Schaluppe	Cutter	
	Schamfielen	To chafe	Raguer
Соедительное звено	Schekel	Joining link	
Судно	Schiff	Vessel	Navire
	Schiffsrumpf	Hull	Coque
Судоходный канал	Schifffahrtskanal	Shipping lane	
	Schlagseite	List	Engagé
Буксир	Schlepper	Tug	Remorgeur
	Schleuse	Lock	Échese (f)
Дымовая труба	Schlot	Funnel	
Шхуна	Schoner	Schooner	Schooner
	Schott	bulkhead	Cloison, étanche
Ветер свистит	Schralen (Wind)	To back	Refuser
	Schwimmweste	Life jacket	Brasserie
Мореходы	Seefahrer	Seafarer	Navigateur
Морская больезн	Seekrankheit	Seasickness	Mal du mer

Карта	Seekarte	Chart	Carte marine
Моряк	Seemann	sailor	Marin
Миля морская	Seemeile	Nautical mile	Mille marin
Плавание, рейс	Seereise	(sea-) voyage	Navigation
Хождение в море	Seereise (seemaenn. "in See gehen"	go to sea	Partir en mer
Идти (плыть) под парусами	Segeln	To sail / under sails	Naviguer
Парусник	Segelschiff, Segler	Sailing ship	Voilier
Секстан	Sextant	Sextant	Sextant
Шпагоут	Spant	Frame	
Капштань	Spill	Capstan	Cabestan
	Spleissen	To splice	Épisser
Шпринг	Spring	Spring	
Остойчивост	Stabilitaet	Stability	
	Stehende Part	Standing part	Brin libre
Правый борт	Steuerbord	Starbord	Tribord
Штурман	Steuermann	Mate	Timonier
	Steuerstrich	Lubber’s line	Ligne de foi
	Strecktau	Lifeline	Ligne de survie
Строп	Stropp	Sling	
Прежная вода	Suesswasser	Fresh water	Eau douce
Страховод	Takelgurt	Harness	harnais de sécurité
Выбленки	Tampen	Bitter end	Bout
Канаты	Taue, Leinen	Ropes, lines	Filins
Марсовые	Toppsgasten		
Гасткадеты	Trainee	Trainee	Stagiaire
Трейниз (трейнизы)	Trainee	Trainee	Stagiaire
Дифферент	Trim	Trim	
Трос	Trosse	Hawser	Aussière
Форма	Uniform	Uniform	Uniforme
Внутренние помещения	unter Deck	Inner spaces	
Удачи!	Viel Glueck!	Good Luck!	Bonne chance!

Корабль	(Voll-) Schiff	Ship, fullrigger	Trois mâts quarré
Стоять на якоре	Vor Anker liegen	Stay at anchor	Mouiller
Фордевинд	Vor dem Wind	In the wind	
Назад	Voraus	ahead	En avant
Форштевен	Vordersteven	Stem	Étrave
Вахта	Wache	Watch	Bordée
Принять вахта	Wache uebernehmen	Take the watch	
Вахтенный Вахтенный официр	Wachhabender Wachhabender Offizier	Seaman on the watch Watchofficer	
Осторожно!	Warschau! (pass auf!)	look out!	
Поворот оверштаг	Wende (ueber den Stag gehen, durch den Wind gehen)	Turn, Tack	Virer vent devant
Верф	Werft	Shipyard	Chantier naval
Ветер	Wind	Wind	Vent
Ветер крепчит	Wind frischt auf, der	The wind freshens	
Винт	Winde	Spill	
Лебёдка	Winsch	Winch	Cabestan, winch
Балл ветра	Windstaerke	Wind force	Force du vent
Обшивка		Plating	Bordage
	Beplankung	Planking	Bordage
Планка	Planke	Plank (hull)	Bordé
Балка, бимс		Beam	Largeur(dimension)/ bau (shape)
Полубимс		Short beam	
Стригер		Stringer	

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