Dynamic Positioning
Field arrival DP checks in practice

Jukka Näsi

Thesis for Bachelor of Maritime Technology

The Degree Programme of Maritime Management

Turku 2016

Bachelors Thesis

Author : Jukka Näsi

Degree Programme : Degree Programme in Maritime Studies, Turku

Specialization: Bachelor of Marine Technology

Supervisor: Captain Lasse Lusto

Title: Dynamic Positioning, Arrival DP Checks in Practice

Date 25.4.2016 Number of Pages 14 Appendices 1

SUMMARY

In this Bachelor thesis the DP arrival checks are introduced clearly and compactly. The goal for the thesis was to create a common checklist for a DP 2 class vessel and make clear instructions for future dpo´s to have better understanding of DP arrival checks. The meaning behind abbreviations and different points of the checklist is introduced step by step following the scheme of DP checks to be carried out by good practice. The information for the thesis is collected by the author from personal experience in training courses and work onboard DP 2 class vessel as senior dpo and from thesis supervisor, experienced DP operator and Captain. This thesis is not overruling any other publications knowledge of DP setup before commence DP operations. The purpose was to create a DP arrival checklist which includes most common systems used in offshore operations related to DP practice or training. The intension is only to give practice at the time the thesis is made. It is vital for safety, that the DP operator understands the meaning behind the various checks to be carried out before commence of safe operation at sea. Good understanding of the system makes a good DP operator. There are several DP system manufacturers, and in this thesis the work is based on Kongsberg K-Pos.

Language : English Key words: DP, Dynamic Positioning

Opinnäytetyö

Tekijä: Jukka Näsi

Koulutusohjelma ja paikkakunta: Utbildning I sjöfart, Åbo

Suuntautumisvaihtoehto / Syventävät Opinnot: Sjökapten YH

Ohjaajat: Sjökapten Lasse Lusto

Nimike: Dynaaminen paikannus, DP-laitteiston käyttöönottotarkastukset käytännössä

Päivämäärä 25.4.2016 Sivumäärä 14 Liitteet 1

TIIVISTELMÄ

Tässä opinnäytetyössä dp-laitteiston käyttöönottotarkastukset on esitelty helposti, käytännöllisesti, sekä riittävän yksityiskohtaisesti. Työn tarkoituksena oli luoda dp2-luokan alukselle yleinen tarkistuslista, jota tulevaisuuden dp-operaattorit voivat hyödyntää omassa opiskelussaan ja joka auttaa ymmärtämään dp- laitteiston oikeaoppiseen käyttöön liittyvät asiat selkeästi. Työssä on tiivistettynä se, mitä työn laatija on katsonut tärkeimmäksi ymmärtää turvallisen dp-operoinnin saavuttamiseksi. Laitteiston täydellinen ymmärrys tekee operoinnista turvallista. Lyhennelmät ja ammattisanasto on selitetty erillisessä osiossa, ja työssä edetään asteittain liitteenä olevan tarkistuslistan mukaisesti. Tiedot opinnäytetyön tekemiseksi perustuvat laatijan omiin kokemuksiin ammattimerenkulusta sekä työn valvojan, kokeneen dp-operaattorin kanssa yhdessä hyväksi havaittuihin käytäntöihin. Lähteinä on käytetty alan kirjallisuutta ja julkaisuja. Tämän työn tarkoituksena ei ole uudelleen määrittää alan ohjeistusta, vaan ainoastaan antaa lukijalleen ja dp-operaattoriksi aikovalle selkeä käsitys siitä, mitä laitteiston käyttöönotto merellä vaatii, ennen kuin alusta voidaan turvallisesti dp-laitteistolla ohjailla. Useista dp-laitteisto valmistajista tässä työssä on keskitytty Kongsberg K-Pos järjestelmään.

Kieli : Englanti Avainsanat : DP, Dynaaminen Paikannus, Tarkistukset

Examensarbete

Författare: Jukka Näsi

Utbildningsprogram och ort: Utbildning i sjöfart, Åbo

Inriktningsalternativ/fördjupning: Sjökapten YH

Handledare: Sjökapten Lasse Lusto

Titel: Dynamisk positionering, DP-systemets ankomstkontroller i praktiken

---

Datum: 25.4.2016 Sidantal: 14 Bilagor:14

SAMMANFATTNING

I det här examensarbetet är DP-systemets ankomstkontroller presenterade enkelt, praktiskt och tillräckligt detaljerat. Ändamålet med arbetet var att skapa en allmän checklist för DP2-typens fartyg, som framtidens DP-operatörer kan uttnyttja i sina studier. Checklistan hjälper att klart förstå de saker, som ansluter till DP-systemets korrekta användning. I arbetet är sammanfattat, vad författaren har betraktat viktigast att förstå för att uppnå ett tryggt DP-opererande. Fullständig förståelse av systemet gör opererandet tryggt. Förkortningarna och yrkesspråket är förklarat i en separat sektion och arbetet framskrider gradvis enligt den bifogade checklistan. Informationen för att göra examensarbetet grundar sig på författarens egna erfarenheter av professionell sjöfart och på goda praxis som har utformats tillsammans med arbetets handledare, en erfaren DP-operatör. Industrins litteratur och publikationer har blivit använda som bakgrundsmaterial för arbetet. Ändamålet med arbetet är inte att på nytt fastställa industrins anvisningar, utan snarare att ge läsaren och en som vill bli DP-operatör, en klar insikt i vad kontroll av DP-systemet till sjöss kräver innan fartyget tryggt kan styras med det. Av flera DP-systemtillverkare har det här arbetet koncentrerat sig på Kongsberg K-Pos systemet.

Språk: Engelsk Nyckelord: DP, dynamisk positionering, kontrollerna

---

ABBREVIATIONS

DP	Dynamic Positioning
DP2	Dynamic Positioning Class Two
DPO	Dynamic Positioning Operator
SDPO	Senior Dynamic Positioning Operator
IMCA	International Marine Contractors Association
FMEA	Failure Mode Effect Analysis
PITCH	Up/Down rotation of a vessel about its lateral/Y (side-to-side or port-starboard) axis.
SURGE	Linear longitudinal (front/back or bow/stern) motion imparted by maritime conditions.
SWAY	Linear lateral (side-to-side or port-starboard) motion
YAW	Turning rotation of a vessel about its vertical/Z axis
OS	Operator Station
PS	Processor Station
UPS	Uninterruptible power supply
BUSBAR	Conducts electricity within a switchboard
ECR	Engine Control Room
VRS	Vertical Reference Sensors
MRU	Motion Reference Unit
UTM	Universal Transverse Mercator projection
PRS	Position Reference System
HMI	Human Machine Interface
LTW	Light Taut Wire position reference system

Table of Contents

1. Introduction

Reliable and robust methods of positioning are required for safe vessel operations in close proximity to offshore installations. Dynamic positioning (DP) is well established as a primary method of vessel positioning, in the diving, drilling, construction, accommodation and shuttle tanker sectors, and it is especially suited to deep-water developments.

As the development and management of DP becomes more refined, an increasing number of the offshore vessels are becoming equipped with DP systems with increasing reliance being given to such systems.

Accepted industry guidance that forms the basis of safe DP operations is the International Maritime Organization (IMO) MSC/Circ.645 – *Guidelines for vessels with dynamic positioning systems*. Ref. (DNV-RP-E307, 2011)

DP operators should also refer to the relevant DP rules of the main classification societies and all appropriate IMCA and Marine Technology Society (MTS) documents.

Such rules and guidelines are focused principally on design, construction and operation of DP vessels and, in particular, apply the principles of redundancy in creating a hierarchy of DP equipment classes. They also set generic requirements for the verification of DP systems, including DP failure modes and effects analyses (FMEA) survey and testing procedures, as well as requirements for vessel operators to develop appropriate operating instructions.

Understanding of the DP system is essential for safe DP operation. By understanding the system DP operators have a full picture of what is going on in the operations, what are the possible consequences and for what the vessel is capable of at different stages of operation.

1.1 Objective

The idea was to create a simple checklist for dpo´s which would be a useful tool in DP setup process. All stages of the checklist are explained in the thesis. The author has experienced in offshore vessels, that DP setup is challenging for fresh dpo graduates and mistakes occur all the time. One of the biggest mistakes is that the buttons on the console are pushed in wrong order. Alarms are sounded when an operator gives an order that the dp-computer cannot handle. The root causes for DP incidents are most often human failures.

1.2 Delimitation

This work is done to create a common form of checklist including most used DP reference systems and thruster allocation arrangements. DP class 2 is generally used in offshore operations. The work including its checklist and selected explanations has not been made to overrule any publication or instruction manual onboard offshore vessels or training centers. The Master has always overall authority to make changes for DP operations process. The vessel charterer or owner can have their own regulations for process. Nowadays DP operations are implemented to shipping company's quality management system and dpo's are instructed to follow company standard process.

2. Executing arrival dp checks

2.1 Heading, Wind, Wave Height (Significant and Maximum), Current

2.1.1 Heading

Heading information should be checked from its original source. Gyro and Fibre Optic compasses are commonly used. Compare repeater and DP heading against original source heading. If errors occur check offset of DP heading setup.

2.1.2 Wind

Check vessel wind indicators against DP wind direction and force. Check "menu" wind direction and force signal is received from all wind sensors on board.

2.1.3 Wave Height (Significant and Maximum)

Compare present sea state against weather forecast and estimate wave heights. Vessels don't usually carry equipment for wave height measurement. A vessel equipped with a helicopter deck has monitoring equipment for heave, which gives idea about current sea state

2.1.4 Current

DP doesn't have sensor for sea current. Vessel sensors are measuring Heave, Roll and Pitch with motion sensors. Heading is measured with heading sensor. Wind speed and direction are measured with wind sensors. Vessel position is measured with position reference system (PRS). DP software has calculated theoretical models made vessel specific, and all other forces which affects vessel are calculated as current. DP current is never exactly the same as sea current but for DP calculations it's a result of all external forces affecting the vessel.

2.2 OS/Processor Station

2.2.1 OS Restarted, Restart Date

Dp 2 vessel has minimum 2 x OS stations. This station is just user panel (HMI) for DP system, not DP itself. User panel stations includes dash with buttons, joystick, trackball and screen, operated through windows computer. Check settings menu for last restart of system, good practice is to restart system before departure last port for next project. The vessel should log the restarts, software updates, maintenance and repairs to separate folder, “DP Log”.

2.2.2 Reset Controller PS A & B

A Dp 2 class vessel has 2 controller units, processor stations. (PS) They are named A and B. These units are the brains of the system. Controllers should be restarted before departure last port for next project.

2.2.3 OS´s Running, UPS Online

After system restart, check that all OS units are running and clear of alarms. UPS units are to be checked that they are online and fully operational. UPS is battery pack connected directly to OS stations and in case of blackout DP stations keep running with battery power.

Kongsberg K-Pos OS Station (sal-heavylift.com)

2.3 Thrusters / Power Management:

2.3.1 Power Management

Dp 2 class operations, power system have to be split in two separate systems. Main engines and propulsion units are split in two separate circuit.
Check from DP screen that bus tie switch is open, so that the switchboard is split, and feed of current is connected to each individual thruster unit. Be always familiar with your own vessel power management and diagrams. It is the most important thing to understand in a DP system.

2.3.2 Retractable Thruster

Check that vessel speed is less than 4 knots before lowering retractable thruster. Too high speed cause rotation of propeller unit in neutral and engaging while rotating can damage gearbox.

2.3.3 Main engines, Auxiliary Engines, Generators and Shaft Generators

Main engines and auxiliary engines produce power for vessel. Diesel engines runs electric generators which supply power to thruster/propeller drives. Shaft generators can be connected to supply thruster drives.

2.3.4 Rudders

Check that rudders are engaged to DP. Some cases where the weather is calm, propulsion starts running unstable back and forward due to rudders engaged to DP. In that case, de-select rudders from DP and check they stop on amidships position. Consult your senior dpo or master always when making this kind of changes. Some clients can request that all possible propulsion is selected on DP at all times.

2.3.5 ECR checks

Engineer's makes a series of checks and tests to verify that the vessel's power set up and configuration of systems and equipment meet the requirements of the necessary mode of operation as determined by the Safest Mode of Operation (SMO) and the DP Class or the Task Appropriate Mode (TAM). Consult engineers that everything is ready in the engine room before commence work on DP mode.

2.4 OS Operator Station Settings

2.4.1 Joystick, Autopos, Dp Controller selection, DP Class

Check joystick in all axis towards indicators in screen. Test full thrust option. Observe Joystick gain from menu. Select autopos mode. Green light should be lit when selected. Observe vessel movements and thruster behavior.

-Check "menu" for which DP controller is a master, A or B.

-Check that power and load is displayed on screen.

-Switch over command between all stations by double clicking "Take".

-Check "menu" that DP class 2 is selected. Number 2 in the lower right corner of the screen should be displayed.

2.4.2 Lamp-test, Time and Date, DP Gain, Rotation Point

Open menu, select lamp test, all buttons on keyboard is lit green. Press one by one to deactivate light. After completion, press "Close lamp-test" on screen box. Make test for all OS units. This test shows that all lights and buttons works.

-Check that year, date and time is correctly set.

-DP controller gain affects how much force DP uses to react for deviation from ordered heading, surge or sway. Heading is always priority for DP system.

-Check Rotation point. Vessel rotation point is normally adjusted in center of gravity. This is the point where DP uses lowest propulsion power to rotate vessel 360 degrees. Some cases in offshore works, vessel rotation point must be adjusted away from center of gravity by horizontal axis, example bow or stern of the vessel.

2.4.3 Alarm Limits, Speed, Rotate speed, DP printer

Check menu that alarm limits are active, and agree with senior dpo the limit distances. Good practice is keep warning on 3 Degrees/Meters and alarm in 5 Degrees/ Meters.

-Vessel Speed: Check menu for speed set point and unit. A common fault is that the vessel is ordered to move at certain speed in meters per second, but user has knots selected in DP or vice versa.

-Rotate speed: When vessel is in auto heading, yaw is controlled by DP, and user have to set the speed of rotation. Degrees per minute. Slow turning speed allows vessel to keep position better.

-DP Printer and Track Ball: Printer unit should be filled with paper and ink and fully operational. Check all OS stations that arrow on screen moves accordingly when directed by track ball.

2.4.4 Gyro, VRS and Wind deviation, History station, OS station selection

Check menu all three gyros for deviation.

-VRS Deviation: Check menu that both MRU´s indicates movement and observe deviation. Pitch, Roll and Heave information is produced through these sensors.

-Wind Deviation: Check menu for Wind indicator deviations for direction and speed.

-DP log computer/ History Station: - Check history station computer which stores all data from DP operations is connected and online. If any alarms occur on screen consult senior dpo or master.

-OS Station in command: Select one of the stations to be used. When operator makes changes for setting in menus, all changes take effect on each individual station.

2.5 Thruster Allocation, Biasing and Control

For the azimuth thrusters, user can choose between various thruster allocation modes. The currently-selected thruster allocation mode is shown both on the Thruster Allocation dialog box and on the Thruster main view.
Depending on the operational mode, illegal thruster allocation modes are unavailable on the Thruster Allocation dialog box.

Default thruster allocation mode is normally **variable** mode. If user deselect thruster or thrusters lose their READY status the system will automatically switch back to the default thruster allocation mode.

Fix-mode: the system automatically selects a fixed angle for each azimuth thruster. When the environmental force is small and constantly changing direction, this mode can be used in order to avoid continuous changes in the azimuth thruster angle.

Environ fix-mode: a set of alternative, fixed angles are predefined for each azimuth thruster. The system will choose the best predefined angle in the set, based on the direction of the environmental forces when the mode is enabled.

Diving-mode: identical to variable mode except that the two modes have separate configuration of prohibited zones. It is used to activate dedicated zones during diving operations to prevent the sending of thruster wash towards the umbilical or diving bell.
This mode can also be used to protect other kinds of equipment, such as HPR and LTW, and will then be named accordingly.

Manual fix –mode the operator can freely set fixed azimuth angles of azimuth thrusters and rudders.

Some azimuth thruster allocation modes can be configured to comprise **Thruster Biasing**.

Thruster biasing allows azimuth thrusters to counteract each other in groups so that the resulting effect of the biasing is zero. Each group can contain either two or three thrusters. Thruster biasing does not limit the use of the thrusters since the counteraction will be reduced when the total demand increases. The operator can specify the level of biasing.

This function is useful in the following situations:

- When an azimuth thruster cannot give zero thrust. Other azimuth thrusters or main propellers can be used to compensate for this minimum force.
- When a higher power consumption is required (than what is actually needed for positioning).
- When the weather is calm.

When a thruster can be enabled for DP control, the thruster is shown as READY on the Thruster main view. There are generally two criteria for a thruster ready status:

- The individual thruster must be running.
- The individual thruster must be available for DP control.

(Kongsberg K-Pos DP Operator Manual 7.0, 2007)

Azimuth thrusters should be kept the way, that when vessel is closing installation the “green thrust”-“positive pitch” is direction away from installation

It is important to have the best effect in propulsion to pull the vessel away from installation instead of towards it.

2.6 Miscellaneous functions

2.6.1 Chart Datum and Co-ordinate system

Check Position Presentation dialogue box that correct datum is selected. Example North Sea region datum: WGS-84.

Check selected Co-ordinate system: UTM, Geographic or Local N/E.
If UTM co-ordinate system is selected, check UTM properties to see correct UTM zone is selected. Options are Auto or Manual.
UTM displays positions in the Universal Transverse Mercator projection. Positions are represented by north and east distance and UTM Zone with compensation for false northing and false easting if appropriate. If you select this option, you must also select the datum that is to be used for the conversion from the internal co-ordinate system to these co-ordinates. *(*Kongsberg K-Pos DP Operator Manual 7.0, 2007*)*

2.6.2 Online Capability/ DP Footprint plots

DP Footprint Plots are not theoretical. They are actual measurements of the vessel's DP station keeping performance in the actual environmental conditions and thruster configuration at the time the plot was taken. DP Footprint Plots should be taken whenever opportunities arise, such as during standby periods, weather downtime or on arrival at the field. Plots should be taken for the thruster configurations used in the DP Capability Plots, i.e. fully intact, loss of most effective thruster(s) and after worst case failure.
Some DP systems have a software application that produces DP Footprint Plots electronically. DPOs can also produce DP Footprint Plots by manual methods using a plotting sheet.
DP Footprint Plots serve two main purposes.
— They provide a scatter plot of vessel positions at regular intervals around the required set position (this shows accuracy of station keeping)
— They also provide comparison points on the limiting wind speed envelope given in the theoretical DP Capability Plots (this shows wind speeds at which it was seen that the vessel was unable to maintain position, thus validating or

contradicting the theoretical DP Capability Plots for the various thruster configurations.)

DP Footprint Plots serve other purposes, including learning and familiarization opportunities for DPOs and in providing snapshots of vessel station keeping behavior for specific locations and activities.

Theoretical DP Capability Plots and DP Footprint Plots combine together to enhance knowledge and understanding of the vessel's DP station keeping ability. (DNV-RP-E307, 2011)

2.7 Position Reference Systems and Sensors

The DP vessel should be equipped with suitable position reference and sensors in accordance with the vessel's DP class notation and operational requirements. Position reference systems should be selected with due consideration to operational requirements, both with regard to restrictions caused by the manner of deployment and expected performance in working situations.

Position reference systems comprise absolute and relative systems.

An absolute system gives vessel geographical position. A relative reference system gives vessel position in relation to a fixed transponder. A relative system can be used as an absolute system if transponder unit is fixed in geographically known fixed position. Hydro acoustic system can be used as absolute system if transponder unit is fixed, example to seabed.

The following are the most common position reference systems in use.

Absolute:

DGNSS (DGPS and GLONASS)

DARPS (Can be absolute and relative)

Relative:

Artemis*

Laser* (e.g. Fan beam, Cyscan)

RADius, RadaScan

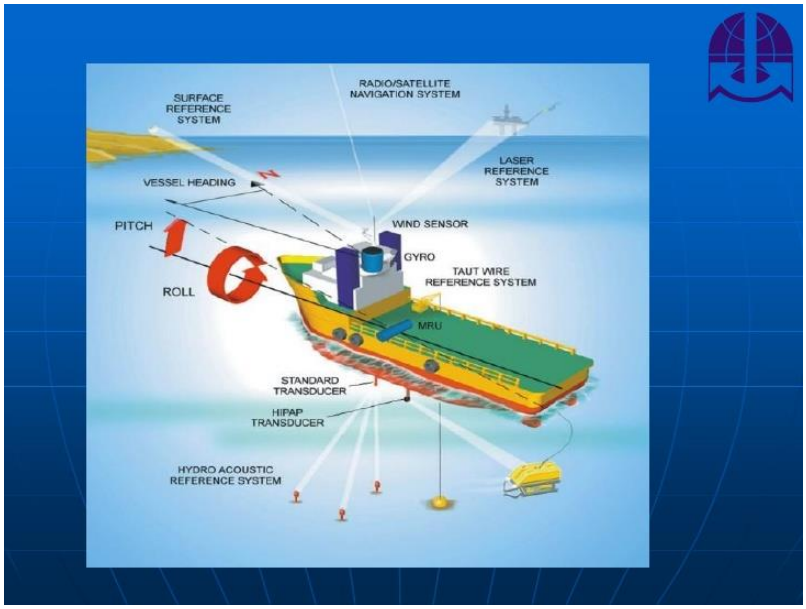
DARPS

Acoustic HPR*

LTW (Taut wire)

**Can be used as absolute when transponder unit is fixed in geographically known location.*

Check signal parameters and possible alarms on position reference systems. A DP class 2 vessel has a minimum of two different operational principle position reference systems, connected to separate UPS(s) and circuits. Differential correction for gps is produced by providers like spot beam,IALA and Inmarsat. Spot beam receivers have be connected to different separate satellites. IALA system is providing differential correction from fixed land station by radio frequencies. Inmarsat provides differential correction through satellite service carrier. The vessel owner or charterer is the one paying for differential correction for satellite service provider, and correct parameters have to be placed in receivers to be able to receive signal. Common satellites to be used EX. North Sea region are AOR-E and ESAT. That is purely because of the geographical location of the vessel.



Reference systems (Northern Shipping Company, 2014)

2.8 Communication

Clear communication and properly working phones and radios are a very important aspect for safe DP operation. Test all phones, radios and backup phones against all parties in deck, engine, survey, rov, plough control, Crane operator, Dive control, Installation and vessels in area. Agree the working channels with all parties in advance on a toolbox meeting. It is good practice to be well prepared for operations instead of asking all questions at arrival to work site.

2.9 Miscellaneous

Check that you have available: Operator manuals, standing orders and bridging documents.
Remember that your vessel is still a vessel underway, nevertheless you are maneuvering on DP mode. Only if your work limits your ability to maneuver the vessel, restricted maneuverability signals should be shown.

2.10 DP Trials

A series of checks and tests confirm satisfactory performance of the DP system and verify the set up mode of operation and DP functions.
The checklist is filled to demonstrate that the vessel is properly set up for the location, in particular the satisfactory performance of the position reference systems. The vessel should stand still on water with autopos enabled for a minimum of 20 minutes to be able to create proper mathematical model of the current state of the vessel in that precise point with present combination of propulsion, reference systems and weather.

3. References

3.1 Literature

- *Dynamic Positioning Systems – Operation Guidance*
Recommended Practice, Det Norske Veritas, DNV-RP-E307*, Jan 2011*

-International Guidelines for the Safe Operation of Dynamically Positioned Offshore Supply Vessels, 182 MSF Rev.2 – Apr 2015
IMCA- The International Marine Contractors Association

-Kongsberg K-Pos DP Operator Manual 7.0, 2007

-IMCA M113

3.2 Pictures

4. Appendix: DP Arrival Checklist

DP ARRIVAL CHECKLIST

VESSEL					
Date/Time:		**Position/Field:**		**Heading:**	
Wind:		**Wave height (Sign./max):**	/	**Depth/Current dir & Speed:**	/

OS/PROCESSOR STATION	**Yes**	**No**	**N/A**	**Comments:**
OS 1-2-3 Restarted (Reboot with OS Restart) ☐ Restart Date				To be reset before each job.
Reset Controller PS A ☐ & B ☐ Restart Date				
OS 1, OS 2 & OS 3 running				
UPS checked and On Line				

THRUSTERS/POWER MANAGEMENT	**Yes**	**No**	**N/A**	**Comments:**
Thruster 1 - feed from SWBD ☐PS ☐SB				
Thruster 2 - feed from SWBD ☐PS ☐SB				
Retractable 3 - feed from SWBD ☐PS ☐SB				Max speed 4 knots to lower
Thruster 4 - feed from SWBD ☐PS ☐SB				
Thruster 5 - feed from SWBD ☐PS ☐SB				
Main Port / Propeller 6 - feed from SWBD ☐PS ☐SB				
Main Stb / Propeller 7 - feed from SWBD ☐PS ☐SB				
Rudder (s) checked out & operational ☐PS ☐SB				
Engine / Generator (s) Running ME 1 ☐ - AE 1 ☐ - AE 2 ☐ - ME 2 ☐				Available: KW Consume.: KW
Shaft Generator running #1 ☐ #2 ☐				Available: KW Consume.: KW
Aux Generator running #1 ☐ #2 ☐				Available: KW Consume.: KW
Main Switchboard ☐Open or ☐Closed				
ECR list filled in				

OS OPERATOR STATION	**Yes**	**No**	**N/A**	**Comments:**
Joystick test in OS 1, OS 2 and OS 3				
Vessel in Autopos mode				
Which controller is master ☐A Controller ☐B Controller				
Power and load displayed				
Switch over command between OS 1, OS 2 and OS 3				
Required DP class selected				Class: 1 ☐ or 2 ☐
Lamp-test completed on ☐OS1☐ OS2 ☐OS3				
Year, date and time correctly set				
Joystick set up Full ☐ Reduced ☐				Gain: Low ☐ General ☐ High ☐
DP Controller gain				Low ☐ Medium ☐ High ☐
Rotation point selected in Auto mode				Rot. Point:
Alarm limits for position and heading				Pos. ☐ M Hdg ☐ deg. Cross ☐ M
Vessel speed checked and correctly set				Speed: m/s

Rotate speed in auto heading mode set correct				Rot. Spd: °/m
DP printer and track ball functioning correctly				
Check deviation between GYRO 1 - 2 - 3				Max. Dev. °
Check deviation between VRS (MRU) 1 - 2				Max. Dev. °
Check deviation between WIND sensors 1 - 2 - 3				Dev. Dir. °Dev. Spd. knots
Dp log computer/history station online and working				
OS Station in command ☐ OS1 ☐ OS2 ☐ OS3				

1 THRUSTER ALLOCATION / CONTROL	**Yes**	**No**	**N/A**	**Comments:**
Azimuth allocation: Variable : ☐ Fix : ☐				

MISC. FUNCTIONS	**Yes**	**No**	**N/A**	**Comments:**
Datum and UTM zone selected Datum:				UTM Zone: Auto☐ Man☐
Online Capability " checked and analysed"				

DGPS (s)				**Yes**	**No**	**N/A**	**Comments:**
Diff Signals	☐**DGPS 1**	☐**DGPS 2**					
Inmarsat	☐	☐					
IALA	☐	☐					
Spot beam 1	☐	☐					Station used: Station not the same as below
Spot beam 2	☐	☐					Station used:
XP	☐						
SBAS	☐						
EPE	EPE:____m	EPE:____m					
HDOP	_____m	_____m					

HPR (HIPAP)	**Yes**	**No**	**N/A**	**Comments:**
Permission to lower transducer granted by ECR (Gate valve open)				
HIPAP transducer out and indicator light on				
Transponder (s) signal quality checked				Fixed☐ Mobile☐
HIPAP system checked and functioning correctly				
Other ships in the area are working on the same frequencies				
HIPAP signal received and accepted on DP				

FAN BEAM	**Yes**	**No**	**N/A**	**Comments:**
Signal received and accepted				
Target in a position without obstructions (signal checked)				

COMMUNICATION	**Yes**	**No**	**N/A**	**Comments:**
Established communication with installation				
Have other vessels operating in the area been contacted and operation channels been noted/checked				
Communication between bridge – ☐ ECR ☐ ECR backup ☐ OPERATION Control ☐ ROV 1 and ☐ 2 ☐ 3 ☐ PLOUGH Control ☐ CRANE Operator ☐ DECK Crew ☐ Installation/Platform ☐ External Dive Control				

MISCELLANEOUS		Yes	No	N/A	Comments:
2	Navigation lights and Day signal prepared				
3	Vessel on DP for minium 20 minutes				
4	Weather forcast accepted				
5	Client permit to work valied				
6	Operator manuals				
7	Standing orders				
8	Bridging documents				

Comments:

	Name	Rank	Signature
DPO			
Captain/ Duty Officer			
Client/OCM			

This list is to be printed out, filled, and signed. To be kept on file for 1 year