MANUAL

TELECOMMUNICATIONS FOR OFFSHORE PLATFORMS

DEP 32.71.00.12-Gen.

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DESIGN AND ENGINEERING PRACTICE

USED BY

COMPANIES OF THE ROYAL DUTCH/SHELL GROUP

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The information set forth in these publications is provided to users for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual operating companies to adapt the information set forth in DEPs to their own environment and requirements.

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APPENDICES

1. INTRODUCTION

1.1 SCOPE

This is a new DEP giving the minimum requirements for equipment and systems used for offshore telecommunications and provides guidance for the selection and specification of equipment and systems meeting these requirements. It supplements DEP 32.71.00.10-Gen. and DEP 32.71.00.11-Gen.

Minimum requirements for telecommunications for offshore platforms with living quarters are normally specified by local regulatory authorities.

Telecommunication systems for a specific offshore platform can rarely be considered in isolation because they normally form part of a total telecommunications network. Significant considerations are telecommunications between other offshore platforms in the same or nearby fields and with the onshore infrastructure. Since the requirements vary from country to country this manual can give general guidance only.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by SIPM, the distribution of this DEP is confined to companies forming part of the Royal Dutch/Shell Group or managed by a Group company, and to Contractors nominated by them (i.e. the distribution code is "C", as described in DEP 00.00.05.05-Gen.).

This DEP is intended for use in oil and gas production facilities.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this DEP the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable as regards safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned with the object of obtaining agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party which carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer**/**Supplier** is the party which manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party which initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **Shall** indicates a requirement.

The word **Should** indicates a recommendation.

1.3.2 Specific definitions

An **A60 enclosure** is an enclosure constructed from A60 firewalls.

An **A60 firewall** is a barrier defined in SOLAS which will withstand a non-hydrocarbon fire for 60 minutes.

A **complex** is two or more platforms connected by a permanent bridge or walkway.

A **hazardous area, 426-03-01, IEC 50** is an area in which an explosive gas atmosphere is or may be expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.

A **manned platform** is continuously occupied by persons accommodated and living thereon.

Mandatory telecommunications equipment is that required by national and local regulations.

A **muster station** is the normal place where personnel await evacuation from the platform.

A **non-hazardous area, 426-03-02, IEC 50** is an area in which an explosive gas atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.

A **platform** is an offshore structure standing on the sea-bottom or permanently anchored to it.

The **safety case** is a demonstration that the hazards of an installation have been identified and assessed and are under control and that the exposure of personnel to these hazards has been minimised. For offshore platforms an important feature is a demonstration that the arrangements are made for refuge and evacuation of personnel in the event of an emergency.

The **sea area** is the area of the sea in which the platform is located. Sea areas A1, A2, A3, and A4 are defined in the GMDSS amendments to the SOLAS convention.

The **temporary refuge** provides a place where personnel can muster without undue risk while having access to the communications, monitoring and control equipment necessary to ensure their personal safety and from which, if necessary, safe and full evacuation can be effected.

Type approval is the permission to connect a specific type of telecommunication equipment to the public network. The permission is usually only granted after tests to ensure e.g. safety, acceptable spurious radiation, interworking with other equipment, etc. The certificate granted after such tests is the type approval certificate.

An **unmanned platform** has no living accommodation or quarters provided.

1.4 ABBREVIATIONS

AC	-	Alternating current
CCR	-	Central control room
DC	-	Direct current
DSC	-	Digital selective calling
GMDSS	-	Global marine distress and safety system
HF	-	High frequency
Hz	-	Hertz
INMARSAT	-	International marine satellite
LOS	-	Line of sight
LQ	-	Living quarters
MF	-	Medium frequency
MODU	-	Mobile offshore drilling unit
NDB	-	Non directional beacon
OTH	-	Over the horizon
PABX	-	Private automatic branch exchange

SCADA	-	Supervisory control and data acquisition
SOLAS	-	Safety of life at sea
TEMPSC	-	Totally enclosed motor propelled survival craft
TDMA	-	Time division multiple access
TR	-	Temporary refuge
UHF	-	Ultra high frequency
UPS	-	Uninterruptible power supply
VHF	-	Very high frequency

1.5 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets. Other documents referenced by this DEP are listed in (10).

2. GENERAL

2.1 PURPOSE OF TELECOMMUNICATIONS

Telecommunication facilities may be grouped and prioritised as follows:

- safety telecommunications for compliance with the Principal's safety philosophy and mandatory national and local regulations;
- operational telecommunications to enhance the efficiency of offshore operations;
- non-essential telecommunications to enhance personnel welfare and recreation, and provide administrative data systems.

2.1.1 Mandatory telecommunications

Telecommunications systems specifically designated as mandatory for safety reasons include the public address and general alarm system, equipment to operate on the international maritime distress frequencies, aeronautical band radios.

The specifications of mandatory equipment are often covered by official regulations.

2.1.2 Operational telecommunications

Certain telecommunications systems are provided specifically to support production operations. These include facilities such as the ability to monitor operations from shore and to give assurance of the integrity of pipelines. Operational telecommunications should be typified by high availability and reliability with monitoring of the system to give an early indication of failure. However, temporary loss of operational telecommunications should not, on its own, be a reason to shut down oil and gas facilities.

2.1.3 Non-essential telecommunications

The welfare aspects of telecommunications apply to installations with LQs and include the provision of audio and video entertainment systems, and facilities to allow personnel on board to telephone home. Administrative data systems are also deemed non-essential.

2.2 TELECOMMUNICATION AUTHORITY

Contact with the Telecommunication Authority shall be made by the Principal for each project in which telecommunication is included. See DEP 32.71.00.10-Gen., section 2.2.

2.3 TELECOMMUNICATIONS STANDARDS

International standards should be used wherever possible to satisfy regulatory authorities, to allow interconnection with other systems, and to help Manufacturers meet the requirements. See DEP 32.71.00.11-Gen.

2.4 CAPACITY REQUIREMENTS AND TECHNOLOGIES USED

The telecommunications capacity required between an offshore platform and shore should be considered carefully since this has a major impact on the cost and may limit the choice of technologies which can be used. All new multichannel systems should be digital and advantage can then be taken of reduced rate voice technology for some or all of the services which are needed. Consideration should be given to techniques for dynamically assigning timeslots (or bandwidth) between voice and data to further utilise the available capacity more efficiently. Typically, a large platform or complex will require about 256 Kbit/sec bearer capacity to cover all services if the system is well engineered. Where cost is high and directly related to capacity, e.g. a satellite link, this would be the installed capacity. Where cost is less dependent on bit rate, e.g. a terrestrial system, more capacity can be installed, typically 2 Mbit/sec. It is important to plan sufficient capacity for future developments in the area.

NOTE: See Appendix 1 for the telecommunications technologies which can be used from platform to shore or to other platforms.

2.5 USE IN HAZARDOUS AREAS

Electrical equipment located in a hazardous area shall be certified for use in that area.

3. PLATFORMS WITH LIVING QUARTERS

The presence of a LQ on a platform or complex determines a certain minimum level of telecommunications. This shall include the requirements for mandatory telecommunications equipment and equipment deemed necessary during preparation of the safety case or other safety management system procedures.

3.1 MANDATORY TELECOMMUNICATIONS EQUIPMENT

Various systems are used for communications under both normal and emergency conditions. These may be considered complementary to each other so that a number of options for communications should be available at all times. However, certain minimum requirements shall be met by mandatory telecommunications equipment.

The level and type of equipment provided should conform to the 1988 GMDSS amendments to the 1974 SOLAS convention concerning radiocommunications and to the 1991 amendments to the 1989 code for the construction and equipment of MODUs. Note that under the GMDSS regulations, the equipment required depends on the sea area where the platform is located. A platform is not directly comparable with a ship since most platforms will have a permanent means of communication with shore which can be used to summon help in the event of an emergency.

Systems shall remain operational in each emergency situation as required by the Principal, see also (6).

3.1.1 On-platform systems

3.1.1.1 Public Address and General Alarm System

Offshore platforms which have a LQ shall be provided with public address and general alarm systems. The Principal should decide whether or not to provide the general alarm by using audible tones over the public address equipment. If the choice is a combined public address and general alarm system then it shall be capable of raising the alarm at all parts of the installation where persons are frequently present. Where aural communication is not practicable, conspicuous visual warning by means of a coloured light system indicating platform status should be provided. If a separate general alarm system is chosen, its specification is outside the scope of this DEP.

Combined alarm systems shall consist of duplicated isolated systems, each system separately feeding each location over separately routed cabling, and each system on its own capable of providing full audibility and/or visibility in all areas of the platform. The total public address and general alarm system shall be designed and constructed to survive as far as is practicable physical damage to parts of the platform. The amplifiers and batteries for each system should be located in separate areas as far as possible or at least in separate A60 enclosures. Facilities provided by combined public address and general alarm systems should include:

- multiple microphone access points with emergency priority;
- the possibility for automatic alarm generation remotely triggered by the platform fire and gas system;
- mute of the alarm signal for voice announcements;
- mute of the alarm signal in the CCR.

Facilities shall also be available to mute the entertainment systems in the event of an alarm signal. One microphone station shall be located in the TR.

The public address system should be entirely solid state and have facilities to centrally monitor the operational status of the component parts and to generate an alarm on detection of any failure.

In normal operation the public address system is used for paging and general announcements. When operated in this mode there shall be provision for muting individual zones, e.g. sleeping quarters.

The telecommunications equipment in the TR shall be capable of operating even after other parts of the platform have suffered catastrophic damage. On a platform with a 'fragmented'

TR (i.e. one in which unconnected areas of the platform are utilised) secure communication links shall be provided between the TR and each 'fragmented' TR.

On most manned platforms the TR is likely to be in the LQ and this is the normal location for the radio room and radio equipment. If it is decided not to locate the TR within the LQ then the telecommunications equipment may need to be duplicated in the LQ to ensure operability in the case of an incident.

3.1.1.2 Totally enclosed motor propelled survival craft

Each TEMPSC shall be equipped with the following:

- an emergency radiotelephone on the international marine distress frequency of 156.8MHz (channel 16);
- a search and rescue radar transponder, operating in the 9GHz marine radar frequency band;
- an approved electronic position indicating rescue beacon operating on the international satellite distress frequency of 406 MHz. Fitting of this beacon depends on there being a well defined national rescue service in operation.

3.1.1.3 Lifeboats

Each lifeboat shall be equipped as in (3.1.1.2).

3.1.1.4 Liferafts

If liferafts are provided as part of the platform equipment then at least two emergency VHF radiotelephones and two radar transponders should be available on the platform, so stowed that they can be rapidly placed in any liferaft.

3.1.1.5 Testing of emergency equipment

Provision shall be made for regular testing of emergency equipment.

3.1.2 In-field systems

3.1.2.1 VHF marine band radiotelephone

A multi-channel VHF marine band radiotelephone shall be provided for routine communications with nearby shipping and other installations and for emergency voice communications on the marine distress frequency of 156.8 MHz (channel 16). This equipment shall have a dual watch facility to enable continuous monitoring of channel 16 while also being used on working channels. It should also have provision to maintain continuous DSC watch on channel 70. The transmitter shall have a transmit power of 1 watt, switchable to 25 watts. Stations should radiate only sufficient power as is necessary to ensure a satisfactory service. The control unit(s) should be located in the radio room and/or control room so that a continuous watch can be kept, at least during the hours of manning. Consideration may be given to a remote control unit on shore if this would significantly increase the hours of manning or for other operational reasons.

An additional VHF marine band radiotelephone shall be provided in the TR if this is a different location from the above. Note that radios in the TR should be locally controlled and powered by a battery which is also located in the TR. Consideration shall be given to protecting the antennas and feeders which are likely to be outside the relatively secure environment of the TR. They should remain operational for at least the endurance of the TR.

3.1.2.2 VHF aeronautical band radiotelephone

Where helicopters are used, a single frequency VHF aeronautical radiotelephone shall be provided for routine and emergency communications.

An additional VHF aeronautical band radiotelephone shall be provided in the TR if this is in a different location from the radio room/control room. This radiotelephone should be controlled and powered as in (3.1.2.1).

3.1.2.3 Non-directional aeronautical radio beacon

An NDB should be provided on one or more platforms in a field.

NOTE: See (6.3) for the safety implications of an NDB operating in the MF band.

3.1.2.4 Communications with other platforms

It may be a legal requirement to provide communications with other platforms linked by a pipeline carrying hydrocarbons. In this case suitable communications shall be provided.

NOTE: There will also be operational requirements for such a communications link. See (3.2.2).

3.1.2.5 Standby boat

Where standby boats are used, there shall be communications between the standby boat and the platform, as well as with other boats and platforms in the area. Normally this should be by means of VHF, either marine band, a private frequency, or a combination of both. UHF may also be used.

3.1.2.6 Fast rescue craft

Where fast rescue craft are provided and can be deployed from the platform or a standby boat or another platform in the area, they should be equipped for communication with the platforms and standby boat. Normally this should be as in (3.1.2.5).

3.1.3 Communications to shore

For safety reasons a communications link with shore shall be provided.

NOTE: There will also be operational requirements for such a link. See (3.2.2).

3.2 TELECOMMUNICATIONS FOR OPERATIONAL SERVICES

3.2.1 On-platform systems

3.2.1.1 Telephone System

All installations with a LQ shall be equipped with a telephone system complete with telephone exchange and telephone instruments. The primary function of the platform telephone system is to provide a means of voice communication between personnel at fixed locations on the offshore installation. It also provides a means of access to the company telephone system to enable communication with other offshore installations, onshore locations, and the public network.

Guidance for the telephone system is given in DEP 32.71.00.10-Gen, sections 3.1 to 3.7.

3.2.1.2 On-Platform Radio System

The function of the platform radio system is to provide person-to-person voice communications in situations where the use of a normal telephone or fixed intercom system is not possible.

Guidance for the platform radio system is given in DEP 32.71.00.10-Gen, sections 4.1 to 4.4.

3.2.1.3 Paging system

Paging systems enable personnel who may be away from their normal work area to be located quickly when necessary and without using the public address system. Paging systems are not common on offshore platforms.

Guidance on paging systems is given in DEP 32.71.00.10-Gen., section 5.

3.2.1.4 Intercom

Intercom systems are provided for point-to-point communications between two or more fixed locations on the same complex. They provide instant voice access without the delay in

setting up a connection via the telephone exchange. They can also be used for long term connections without the need to tie up switching equipment. Intercom systems are often used to connect drilling locations. Either normal handsets or loudspeaker equipment may be used. Special versions are sound powered and are inherently intrinsically safe so that they can be used at all levels of platform shutdown. Noise filtered units should be used.

3.2.1.5 Crane radios

Most platforms will have one or more cranes. Sophisticated cranes require skilled operators. It is normal to support such an operator with a radio and or public address package to allow him to communicate with the supply boat and the deck crew.

Crane radios may be of hybrid design and should provide the following functions:
- VHF marine band operation for communication with supply vessels;
- the platform VHF or UHF radio system (if fitted);
- public address facility for broadcasting instructions to the deck crew.

Crane radios should also be provided with the following for ease of operation:
- choice of loudspeaker or headphones;
- boom microphone mounted on an adjustable mechanical support;
- press-to-talk facility operated either by a foot switch or a switch fixed to the crane control levers.

If provided, the crane radio and associated equipment shall be certified for use in the area classification zone for the crane. See (2.5).

3.2.1.6 Radio communication tower

A telecommunications tower or equivalent structure is normally required to provide an antenna mounting support of sufficient height for line of sight microwave or other radio links. The height of the tower is dependent on the distances to be spanned and will be a compromise between acceptable propagation availability and cost. If the platform will be used as a repeater for further development in the area this will influence the tower design. The location chosen for the tower will be a compromise based on a minimum distance between the tower and the radio equipment room and minimum interference with helicopter operations.

Since the tower will influence the structural design and the layout of the platform, the requirements should be developed at the conceptual design phase of the project.

The design criteria for combined twist and sway of the tower and platform shall be commensurate with the beamwidth of the antennas used.

A ladder shall be provided equipped with safety hoops and rest platforms at appropriate levels. Work platforms should be provided at every level where antennas are or will be mounted.

A permanent davit should be provided at the top of the tower for installation of antennas and feeders. The safe working load of the davit should be 550 Kg unless a greater load is indicated in the telecommunications design.

3.2.2 In-field systems and communications to shore

Telecommunication links to other platforms and to shore will be used for both operational and emergency voice and data communication and should be designed with adequate capacity to cover the expected current and future platform traffic requirements. The bearer equipment should normally be duplicated but it is essential to provide an alternative and independent means of communication back-up. A back-up system with substantially reduced capacity is acceptable, even to the extent of a single voice communication link.

The telecommunication design should allow for future developments in the area, e.g. in the choice of capacity of the link to another platform or to shore, alternate routing, etc.

The services normally carried are:
- inter PABX traffic
- hotline(s)
- operational data systems

- administrative data systems
- remote control of platform radios
- network management and supervisory system.

3.2.2.1 Inter PABX traffic

The platform PABX will normally be linked by trunks or tie lines to a PABX on shore, to other platforms in the area, and to the public telephone network if permitted. The telephone system provides flexibility in both service and facilities. To limit the traffic, extensions may be barred from making calls outside the immediate platform area.

3.2.2.2 Hotline(s)

There is often a need to coordinate production activities on platforms in a field or fields which share common facilities such as a trunkline. Hotlines provide either a point to point or conference voice link between specified locations. It is a dedicated system, independent of the telephone network with simplicity of use and fast call set up. It is normally used between the control room(s) of offshore platforms and nominated location(s) on shore. There should not be separate hotlines for operational and emergency service because a hotline which is seldom used is difficult to check.

3.2.2.3 Operational data systems

Telecommunications links may be employed to extend control and/or monitoring of a remote installation to another installation or to an onshore control centre. Such links shall conform to normal telecommunication practices but have extra emphasis on circuit availability in accordance with mandatory requirements and operational philosophy. Both ends of the telecommunications links shall include an interface for conversion of the standard telecommunications format to that required at the input and output of the controlling system.

3.2.2.4 Remote control of platform radios

It can be operationally advantageous to operate some platform radios by remote control from another platform or an onshore location.

3.2.2.5 Network management and supervisory system

A supervisory/network management system shall be designed to monitor the offshore electronic equipment and send system alarm status back to a shore based network control centre. Sufficient capacity should be allowed for this service. Multichannel radio systems should support an engineering order wire for the use of telecommunications maintenance staff.

3.2.2.6 Closed circuit TV

Closed circuit TV should not be used because of the difficulty and expense of maintaining the camera equipment and the high bandwidth needed to transmit the signal.

3.3 NON-ESSENTIAL TELECOMMUNICATIONS

Non-essential telecommunications systems and equipment have a low priority status. Non-availability should not have any significant impact on normal offshore operations. They may be grouped into three categories:

- entertainment systems provided for the welfare of personnel;
- access to public telephone network; and
- ancillary equipment which provide desirable but not essential facilities.

3.3.1 Entertainment systems

Entertainment systems on manned platforms should consist of an entertainment package feeding a distribution network.

The possible entertainment sources are:

- audio and video tape or disc players
- broadcast radio receivers

- satellite television receivers.

The entertainment package source equipment should be located at a central point with convenient access to allow changing discs and tapes. The distribution system should feed common areas, cabins and offices. The provision of bed-head units or video monitors in cabins is at the Principal's discretion.

All entertainment audio outputs shall be muted during hazard alarms and emergency public address announcements.

3.3.2 Access to the public telephone network

Means should be provided for personnel on board the platform to make private calls on the public network. If calls are to be charged to individuals, this can be achieved by several means, e.g. prepaid phonecards or by toll-ticketing, in which case the necessary equipment should be provided.

During an emergency this means of communication (for both incoming and outgoing calls) should be controlled.

3.3.3 Administrative data systems

A structured wiring system should be installed covering the majority of the LQ. This will allow easy and economical connection of servers, data terminals and workstations at a later date.

Electronic mail systems have generally displaced telex but in some cases telex may still be required. See DEP 32.71.00.10-Gen., section 9.

Facsimile provides an economical system for the transmission of text and drawings. See DEP 32.71.00.10-Gen., section 9.

4. PLATFORMS WITHOUT LIVING QUARTERS

Major reductions of the amount of equipment on a platform can be achieved if the platform is unmanned.

Equipment	Manned platform	Unmanned platform
PA	Required	Not required
PABX	Required	Not required
Platform radio	Required	Personal equipment
Marine band radio	Required	Personal equipment
Aeronautical radio	Required	Not usually required
Radio beacon	Required	Not usually required
Link to shore	Required	Required

Unmanned platforms cover a range of technical complexity from single wellhead jackets to major platforms with sophisticated hydrocarbon processing on board. There may or may not be the requirement to monitor or control production. The appropriate level of telecommunications should be determined in each case.

4.1 MANDATORY TELECOMMUNICATIONS EQUIPMENT

4.1.1 Personal Communications

Personnel who make visits to unmanned platforms shall be equipped with portable radios for communication with support boats, helicopters, manned platforms in the area or with the shore. These radios may operate on private frequencies, in the marine band, the aeronautical band, or on a combination of these.

The Principal should decide whether or not fixed radios for the marine band, aeronautical band, or on private frequencies, will be provided on the platform. If these are to be a part of the platform equipment, they should be located in (or at) the TR. See (3.1.2.1) and (7.2.1).

4.1.2 Public Address

Platforms without a LQ should not require a PA or an alarm system. PA and alarm systems are maintenance intensive and should be avoided. However, there should be some alternative means of attracting attention of personnel on the platform during visits, e.g. portable radios either working independently as described in (4.1.1) or in conjunction with a platform radio system described in (4.2.1). For occasions when the number of personnel on a platform is significant, e.g. during drilling or maintenance, suitable arrangements should be made for the supporting drilling rig or construction vessel to provide the necessary additional communications facilities including an alarm.

4.1.3 Totally enclosed motor propelled survival craft (TEMPSC)

See (3.1.1.2).

4.1.4 Lifeboats

See (3.1.1.3).

4.1.5 Liferafts

See (3.1.1.4).

4.1.6 Testing of emergency equipment

Provision shall be made for regular testing of emergency equipment.

4.2 TELECOMMUNICATIONS FOR OPERATIONAL SERVICES

The unmanned platform may either be operated from the shore, or from a nearby manned platform. The telecommunication requirements for the unmanned platform are likely to be the same in both cases.

4.2.1 Personal Communications

The on-platform requirements for communication between individuals can be met in a number of ways. It may be possible to provide radio coverage from another platform with a base station in the vicinity, or directly from shore. It may be necessary to provide a 'talk-through' radio repeater on the platform if the distance and metal structure makes it difficult to achieve adequate radio coverage directly. In either case remote access from shore should be provided by one means or another.

A telephone patch to extend radio calls over the company telephone network or a single remote telephone, either as a long line extension off a PABX on shore or another platform in the area, should be considered if this will provide operational benefits.

4.2.2 SCADA link to shore (or mother platform)

An unmanned platform shall be provided with fully automatic local control and safeguarding systems to allow it to operate autonomously and safely. However, if the plant has any degree of sophistication, remote monitoring is usually essential and may even be a legal requirement. The Principal should decide what, if any, remote monitoring and control will be required. The facility shall be designed in such a way that it can continue to operate safely, even during loss of the main telecommunication link.

The data link to shore (or mother platform) may have combinations of the following functions:

- to provide positive confirmation that the platform and process are operating safely
- to relay key process data
- to adjust the set points of controllers remotely
- to stop and start equipment remotely
- to signal the need for a maintenance intervention visit
- to provide sufficient information for the maintenance intervention team to consist of the right skills and take the right spare parts to bring the platform back on stream at the first pass.

The time constants of the normal offshore hydrocarbon processes are typically quite long (in electronic terms) and reaction time to mobilise and transport an intervention team to site is hours rather than minutes. The remote monitoring system should therefore scan variables and alarms in terms of minutes rather than seconds. For a 100 point mixed analogue and digital system the expected data rate would be in the order of 1200 bits/sec.

NOTE: Individual instruments may scan process or mechanical variables several times per second but it is not necessary to transmit the results of these individual scans to shore (or mother platform) in real time.

4.2.3 Non-Directional Aeronautical Beacon

See (3.1.2.3). The beacon may be switched on and off remotely from shore.

4.3 NON-ESSENTIAL COMMUNICATIONS

It should not be necessary to provide any entertainment systems where there is no LQ.

Distribution of administrative data on the platform and access to shore based administrative data services should not be required.

5. TEMPORARY TELECOMMUNICATIONS FACILITIES

5.1 MAJOR INSTALLATION HOOK-UP

It is likely that there will be a requirement for telecommunications during installation, hook-up and commissioning of a new offshore installation. There will then be a need to provide temporary communications until the permanent communications are operational. If an accommodation or logistics support vessel is allocated to the project, this may be chosen as the base for telecommunications. Communications from the support vessel to shore may be provided via a multi-channel radio link either directly or via a nearby platform which has spare capacity to shore if such a platform exists. In some areas of the world, it may be possible to use a stabilised Ku band satellite earth station working to a ground station on shore. Alternatively, if the support vessel is equipped with an INMARSAT terminal this may be used, or such a terminal could be fitted as a temporary installation. If hook-up and commissioning is dependent on computer terminals on the support vessel working with an onshore computer, it will also be necessary to provide reliable data communications.

Private channel UHF, VHF and Marine VHF portable radios will provide the core of the communications between the support vessel and the platform under construction because of their availability and mobility.

Temporary telecommunications between the support vessel and the installation should be provided by means of an umbilical cable connection over the gangway. In this way extensions from the support vessel telephone exchange may be provided on the platform. If this system is employed, provision must be made for fall-back communications by radio to cater for those occasions when the support vessel is forced to stand off from the installation, with consequent disconnection of the umbilical cable.

The support vessel shall be provided with mandatory equipment described in (3.1).

The equipment and facilities provided will be commensurate with the number of personnel who will be dependent on it.

5.2 TENDER ASSISTED DRILLING

Similar considerations as above apply to tender assisted drilling, in which a drilling facility may be associated with a platform for a number of months or even years. In this case, the "temporary" facilities will have to be engineered to a sufficiently high standard to provide a satisfactory level of service throughout the drilling period.

5.3 MAINTENANCE

The normal practice for unmanned platforms is to leave the platform unattended and unmanned for the majority of the time and mount a major maintenance campaign at regular intervals. Communications are required from the support vessel as described in (5.1). Since maintenance will be repeated during the life of the platform, it may be economic to permanently install some mechanical parts and the wiring.

5.4 FLOTEL

A flotel is a mobile stand-alone accommodation platform. It is normally used to provide short or medium term accommodation when attached to a platform or located within a field. The flotel shall be provided with the SOLAS equipment described in (3.1). However, the Flotel may sometimes depend on the host platform for a permanent link to other platforms or to shore. This may require the use of a telecommunications tower and telecommunications equipment on the attached platform.

It is important to check that the addition of a Flotel to a platform does not change the communication requirements on the platform, e.g. a combined public address and alarm system.

The communications link to the Flotel should be multi-channel and engineered to avoid degradation due to rig movement - especially when pulled off in bad weather. As the present digital radio systems for this purpose are usually licensed in the 7 - 13 GHz bands, it may

not be possible to provide sufficiently wide antenna beamwidth to cope with the movement and maintain the overall link gain needed. It may be necessary to continue to use 6 to 12 channel analogue systems using Yagi antennas on the platform and rig rather than complete end to end digital systems.

6. SHUTDOWN OF TELECOMMUNICATIONS SYSTEMS

6.1 EMERGENCY SHUTDOWN

Most offshore platforms have pre-defined graded levels of shutdown during emergencies. There may be a requirement to switch off electrical equipment in what was previously classified as a non-hazardous area if hydrocarbon gas is discovered there. Most telecommunications equipment is located in the non-hazardous area and shut-down of this equipment may have serious consequences at a time when there is usually an increased need for communication. Some equipment, e.g. portable radios, may be certified intrinsically safe and therefore suitable for use in hazardous locations. However, base stations and microwave link equipment are not generally intrinsically safe and it is usually not practicable to provide flameproof enclosures. During the design phase it is therefore important to prevent flammable gas penetrating the telecommunications spaces.

Various scenarios need to be considered and a plan created showing which equipment will remain operational under prevailing circumstances.

6.2 SHUT DOWN FOR DRILLING AND MAINTENANCE

For shutdown during drilling, well work-over, or mechanical maintenance, mains power on the platform may be isolated unless special arrangements are made. For a major platform it is likely that there will be a support vessel in attendance and if necessary power can be taken from it. However, the drilling rig or support vessel may have a different standard of electrical power from the normal 50 Hz or 60 Hz platform supply.

If the platform to be shut down normally provides a communication relay function to other platforms in the field or adjacent fields this also needs to be taken into account during the planning to ensure continuity of service.

6.3 SHUT DOWN FOR PERFORATING

Certain down-hole tasks such as perforating, require the use of explosives and detonators. While there is a growing trend to use detonators which are unaffected by extraneous radio and electrical energy, their use is by no means universal and precautions need to be taken to avoid premature detonation. See BS 6657. Of most concern is the lower spectrum of radio frequencies such as MF, HF, and VHF and the relatively high power associated with transmitters using these frequencies. The power feeds to such equipment should be clearly identified and a simple method of isolation should be provided.

Since negligible hazard exists from LOS microwave antennas facing away from the platform, normal operation of microwave LOS telecommunications link during perforation activities is acceptable.

7. POWER SUPPLIES

7.1 POWER SOURCES

For information regarding requirements for the main electrical supply facilities refer to DEP 33.64.10.10-Gen.

NOTE DEP 33.64.10.10-Gen. covers electrical facilities up to and including the main supply facilities for telecommunication equipment. Some telecommunications equipment is provided with a packaged or integral DC or AC UPS which may be specified and supplied without reference to DEP 33.64.10.10-Gen.

7.1.1 Main platform power supply

Power for telecommunications equipment can be provided from:
- Interruptible, maintained electricity supply
- Uninterruptible, maintained electricity supply.

NOTE: The normal system frequency for offshore platforms is 60 Hz, although 50Hz may be used.

7.1.2 Alternative power supply

Main platform power may not always be available. In these cases it may be necessary to provide electrical power solely for telecommunications. There are various technologies which can be used depending on the amount of power required, as follows:
- primary cells
- solar power systems
- thermoelectric generators
- wind and wave generators.

Because the cost of alternative power depends on the amount of power generated, preference should be given to telecommunication equipment which has a low power consumption.

7.2 POWER SUPPLY FOR TELECOMMUNICATIONS EQUIPMENT

7.2.1 Mandatory equipment

This equipment provides vital service and shall be powered from the uninterruptible, maintained electricity supply system. See DEP 33.64.10.10-Gen., sections 4.2 and 4.9 and see DEP 33.65.50.31-Gen., Appendix 2. Additional to the above, dedicated DC UPS systems may be required for SOLAS equipment and emergency equipment located in the TR.

7.2.2 Survival Craft Systems

Telecommunications systems for survival craft should consist of equipment wholly powered by internal battery packs contained within a watertight case. The manufacturer's battery pack expiry date shall be clearly marked on the equipment to which it is fitted. Battery packs shall be replaced before their expiry date and the equipment shall be routinely tested to ensure availability in accordance with current operating practices.

7.2.3 PABX

The PABX should have a battery back-up, the duration of which is determined by local requirements, typically 8 hours. It is necessary to keep the PABX operational for this period, even after loss of emergency generation, because most voice communications, on platform, to other platforms and to shore are provided by the PABX. Provision should also be made to save the PABX internal configuration information for a period of days to ensure rapid start-up after a power break.

8. CABLES AND CABLING

Cables shall be in accordance with IEC codes.

All cabling and wiring shall be of adequate size and rating. The conductors for telephone and signal cabling shall be solid annealed copper of diameter approximately 0.63 mm. Insulation displacement type connectors shall be used. Cables shall be terminated at the main distribution frame which shall be either floor standing or wall mounted.

Structured wiring for data shall use unshielded twisted pairs and be terminated in a data patch panel. Normal links shall be hard-wired and patch cords shall only be used for temporary alterations. Where high speed data cables are required outside the LQ, fibre optic cable shall be used.

Signal cables shall be routed in such a way as to avoid interference from other cables or equipment. High voltage wiring shall be segregated from low voltage wiring.

Cable trays shall be provided to adequately support cable runs to minimise the risk of mechanical damage during installation, operation or maintenance. Junction boxes shall comply with the area classification and be easily accessible from a normal standing position without the need for ladders or scaffolding. Outdoor junction boxes shall have a degree of protection to IP 65 in accordance with IEC 529. Top cable entry shall not be used. All drilled or tapped entries shall be provided with suitable stopping plugs.

A system of marking and documenting the cables, the pairs and the terminal strips shall be provided.

9. PROJECT MANAGEMENT AND LICENSING ASPECTS

The E&P project management guideline EP 90-4000 and DEP 32.71.00.10-Gen., section 2.2 should be followed. Specific telecommunication activities and their timing are indicated below. The cycle from conceptual design to commissioning of even a simple system can take at least 18 months.

9.1 CONCEPTUAL DESIGN / FEASIBILITY STUDY

Pre-discussions should be held with the regulatory authorities in the country concerned to make them aware of the potential project and to discover their approval procedures if they are not already known.

9.2 REQUIREMENTS ANALYSIS AND BASIS FOR DESIGN

In this phase, it is necessary to open formal discussions with the authorities. They will be required to issue a concept approval, sometimes called approval in principle. It is likely to take some months of discussion before the concept approval is issued and it may take much longer in cases where there is no clear precedent for the preferred technical solution. Specific radio frequencies can be applied for only after concept approval has been given.

9.3 DETAILED DESIGN

Frequency assignment should take place in this phase and firm frequencies are a prerequisite for ordering any radio equipment. Preference should be given to purchasing equipment which is already type approved for use. If the chosen equipment is not type approved, arrangements will have to be made to have it approved or to negotiate an exemption.

9.4 PROCUREMENT, CONSTRUCTION, INSTALLATION AND COMMISSIONING

It may be necessary to obtain special import licences for telecommunication equipment shipped either as individual units or as part of the integrated construction. The local telecommunications authority may wish to carry out acceptance tests before permitting connection to the public network.

10. REFERENCES

In this DEP reference is made to the following publications:

NOTE: Unless specifically designated by date, the latest edition of each publication shall be used, together with any amendments/supplements/revisions thereto.

SHELL STANDARDS

Index to DEP publications and standard specifications	DEP 00.00.05.05-Gen.
Plant telecommunications (July 1991)	DEP 32.71.00.10-Gen.
Telecommunication standards	DEP 32.71.00.11-Gen.
Electrical engineering guidelines (December 1992)	DEP 33.64.10.10-Gen.
Static DC uninterruptible power supply unit (January 1992)	DEP 33.65.50.31-Gen.
E&P project management guideline	EP 90-4000

BRITISH STANDARDS

Guide to prevention of inadvertent initiation of electro-explosive devices by radio-frequency radiation	BS 6657

Issued by:
British Standards Institution
Linford Wood
Milton Keynes MK14 6LE
United Kingdom.

INTERNATIONAL STANDARDS

IEC Standards

International electrotechnical vocabulary	IEC 50
Degrees of protection provided by enclosures (IP code)	IEC 529

Issued by:
International Electrotechnical Commission
3, Rue de Varembé 1211
Geneva 20
Switzerland.

IMO Standards

Code of the construction and equipment of mobile offshore drilling units 1989 with 1991 amendments	MODU
Conference of contracting governments to the international convention for the safety of life at sea, 1974 with 1988 amendments	SOLAS

Issued by:
International Maritime Organisation
4 Albert Embankment

London SE1 7SR
United Kingdom.

APPENDIX 1 TELECOMMUNICATIONS TECHNOLOGIES

The following technologies may be used to communicate with other platforms and with shore:

- Line of sight multichannel UHF or microwave
- Over the Horizon multichannel UHF or microwave
- Tropospheric scatter
- Dedicated satellite capacity
- INMARSAT service
- Fibre optic cable
- TDMA subscriber radio
- Trunked radio
- Cellular radio
- Packet radio
- VHF or UHF single channel
- HF backup

Line of Sight multichannel UHF or microwave
This is the conventional solution. Without significant ground height advantage at the shore end the range will be limited to about 40 Km. However, for longer ranges, consideration can be given to locating the shore terminal on a suitable hill or mountain. Because the sea has a high coefficient of reflection for radio waves, space diversity protection should be provided.

A multichannel radio can be used in either the UHF or microwave frequency bands depending on capacity and spectrum availability. Digital radio equipment should be chosen for new installations. The capacity of each link should be sufficient to carry the expected traffic during the life of the equipment and this includes any further field developments which will use the outlying node platforms as relay stations.

Over the horizon multichannel UHF or microwave
If the range is beyond a conventional LOS radio link, it may still be possible to engineer a sufficiently reliable path using conventional equipment and techniques but with additional transmitter power and antenna gain. OTH diffraction links require specialist knowledge and an expert in this field should be consulted.

Tropospheric scatter
For long distances, beyond the range of reliable diffraction, tropospheric scatter can achieve reliable communications up to a range of about 300 km. However such equipment is difficult to licence. Specialist advice should be sought.

Dedicated satellite capacity
In most countries of the world it is possible to rent dedicated satellite capacity for either primary or standby service. Points to consider are:

- size and pointing accuracy of the antennas
- requirement for antenna stabilisation
- requirement for antenna tracking
- rain attenuation
- dedicated or shared shore station
- backhaul arrangements
- provision of standby equipment
- consequences of the round-trip delay (0.5 second)
- cost.

INMARSAT service
The INMARSAT system is a global satellite communications system designed for ship to ship and ship to shore communications. In most countries permission can now be obtained to use such systems on fixed platforms. The Standard A earth station will provide voice, facsimile and telex but since operating costs are quite high it is normally used only as a back-up to alternative platform to shore systems. For back-up the INMARSAT service is generally considered more reliable than the alternative of HF communications. The use of INMARSAT A may be a mandatory requirement for back up purposes and imposed by satellite system operators for operation of a multichannel satellite system. INMARSAT M and B systems may be considered when they become available.

Fibre optic cable
Undersea fibre optic can be considered for some applications. It is particularly appropriate for situations where power is provided to a platform by means of an undersea cable. The fibre optic filaments can be included in the main cable. The most likely application is for communication between main and satellite platforms. The cable must be protected to prevent damage by fishing and ships anchors.

Time division multiple access subscriber radio
TDMA systems could be considered for specific applications and are particularly useful to provide service for a cluster of platforms in a field. The base station equipment is set up on shore, one or more platforms are designated as a repeater site, and remaining platforms are equipped with outstations. All platforms can then access the capacity on a demand access basis.

Where simultaneous point to multipoint communication channels are required, e.g. several platforms around a host platform, TDMA equipment can be considered. The benefit of using TDMA in preference to discrete point to point links is that it provides greater spectrum efficiency and is very flexible. Once the master station is in place, additional outstations can be added at a much lower cost than discrete point to point links. For most paths space diversity reception should be required to attain the expected reliability. Note that not all manufacturers provide a space diversity option. For extra range, repeaters can be considered. Since they are digital no loss of quality will result. However, it is necessary to engineer the system for adequate propagation reliability.

Trunked radio
For greater spectrum efficiency in larger systems it may be worthwhile considering the use of trunked radio in either the VHF or UHF bands. This technique shares the traffic over several radio channels automatically. Some versions use a dedicated control channel for setting up and supervising the calls so that it only becomes efficient for systems with more than two traffic channels.

Cellular radio
For inshore locations it may be possible to use a public cellular service if it is available.

Packet radio
There is often a need to provide low rate data datacommunication access to vessels within the field or in nearby fields, e.g. to allow personnel on board to access host based computer systems or for messaging. The option of using telephone dial-up in a conventional voice communication system is not attractive since the channel is occupied for the duration of the call, which could be quite lengthy. A better way is to provide a packet radio system. The base station equipment is located on one or more platforms in the field and broadcasts traffic packets. The individual outstations recognise packets with their own address and reply with return data packets. Data integrity is maintained by a checksum in the trailer of each outgoing and incoming packet. Packets in error are discarded and the data is repeated until correctly received.

VHF or UHF single channel
Single channel VHF or UHF radios are usually arranged as a point to point service but they can also be configured as an omnibus network with either voice calling or selective calling to each station.

Where it can be used, single channel VHF or UHF can provide a simple means of low capacity communication.

HF backup
HF should be regarded as a communications means of last resort. An HF system can provide some backup but full 24 hour availability may not be possible over some distances or if the appropriate frequencies are not available.