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Warship with Standardised Operating Units

The invention relates to a warship and has particular reference to the improvement of warships of the type disclosed in German patent 20 56 069.

In warships of the kind known from German patent 20 56 069 a significant rationalisation is obtained during manufacture in that the weapon units, the fire control units, the floodlight units and/or the position finding units are prepared on standardised platforms outside of the ship in special factories, and in that the standardised platforms provided with the units then only need to be mounted on standardised foundations provided in the hull of the ship. The known system of standardised operating units not only makes it possible to manufacture warships economically but also makes it possible to change out obsolete units in a simple manner, simply by removing the standardised platform carrying the old unit from the associated standardised foundation, and by replacing it with another standardised platform equipped with a modernised or new unit. This can take place within a very short period of a few days, whereas previously months of conversion work were necessary for this purpose. The modernised or new unit will typically have been previously prepared in a special factory on a suitable standardised platform.

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To the extent that apparatus located outside of the container, for example an antenna mounted on a mast, needs to be arranged relatively high above the deck of the ship, the container can be housed at a suitable location in the ship, and can be connected with the apparatus mounted at a remote location via a line. The command post unit is also preferably housed in a container in the interior of the ship.

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All the units mentioned here are standardised operating units which is intended to mean that, as far as possible, all of the total elements necessary for the operation of the unit are contained in as compact a form as possible in the unit so that a complete interchange of the unit is possible without a great deal of disassembly work. The standardised operating units are in particular housed in containers which - to the extent that they are not located in the interior of the ship - should each be closed at the top by the aforementioned standardised platform on which the apparatus belonging to the unit (for example a cannon) is mounted. Preferred designs of the standardised platforms and of the corresponding standardised foundations are disclosed in U.K. Patent No. 2 094 448.

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Two or more different standardised foundation/standardised platform types (for example of different dimensions) can also be provided, as e.g. disclosed in U.K. Patent application 82 03 375, publication Nr. 2 095 373.

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A problem with the known warship designs lies however in the fact that information transmission lines between the individual standardised operating units and between the units and the command post unit must be present in a very large number. By way of example approximately

1 200 km of data cable must presently be laid within a
warship in order to be able to effect all the informa-
tion transmissions between the units and the command
post unit. For this purpose cable tracks must be con-
5 structed and the cables laid, secured, cast to the bulk
heads, and provided with plugs. This not only signifies
a considerable amount of work but also brings about a
quite considerable increase in the weight of the ship
which is undesirable. Particularly disadvantageous is
10 the fact that on replacing old units with modernised or
new units all the cabling, apart from the current
supply, must be newly executed. Despite the advantages
provided by the use of standardised operating units this
represents a considerable disadvantage and it should be
15 born in mind that some of the standardised operating
units require up to 40 plugs with, in each case, up to
40 pins in order to be able to effect the required
exchange of information with other units or with the
command post.

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The object of the invention is thus to provide a warship
of the initially named kind in which the mechanical stan-
dardisation achieved by the provision of standardised
operating units, using standardised foundations in the
25 ships hull and standardised platforms carrying the
units, is supplemented by an electronic standardisation
which makes it possible not only to considerably reduce
the cost and effort of providing cabling between the
units and the command post, but also makes it possible
30 to dispense with the need for new cabling each time some
or all of the standardised operating units are replaced
by new or modernised standardised containers on standard-
ised platforms.

35 In order to satisfy this object there is provided, in ac-
cordance with the invention, a warship comprising a
hull; a plurality of standardised foundations provided

1 in said hull; a central command post unit; a navigation
 unit; at least one communication unit; a plurality of
 standardised operating units each comprising either a
 5 a respective container which is closed at the top by a
 standardised platform receivable in one of said standard-
 ised foundations; power supply lines connected to and
 terminating at said central command post unit and other
 ones of said units; a respective data processor provided
 10 inside each standardised operating unit and having stan-
 dardised hardware and software modules, each said data
 processor including a store in which data specific to
 the associated unit is stored so that the associated
 unit is capable of operating independently of the other
 15 standardised operating units; wherein associated ones of
 said controlling and controlled standardised operating
 units form functional groups; wherein the data proces-
 sors of the standardised operating units which belong to
 the same functional group only exchange digitised crude
 20 information and wherein standardised information trans-
 mission lines are laid between the data processors of
 the standardised operating units of each functional
 group independently of the nature of the different stan-
 dardised operating units for the exchange of said
 25 digitised crude information, whereby each data processor
 provides a standardised electronic interface equipped
 with the same connection contacts and sockets, in
 addition to the standardised information transmission
 lines and the standardised mechanical interface between
 30 the standardised platforms of the individually designed
 operating units and the standardised operating units.

Thus, in accordance with the invention, the standardised
 foundations which are fixedly built into the hull are
 35 supplemented by a standardised transmission line system
 which is built into the ship in just the same way as the

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1 standardised foundations and which can be used for all
the units built into the standardised foundations by
means of standardised platforms. The standardised infor-
mation transmission line system is only individualised
5 to a degree such that only fire control units, for
example, can be built into specified standardised founda-
tions, that only abovewater or underwater weapon units,
for example, can be built into other standardised founda-
tions, and that the command post unit, a fire control
10 unit or the like can only be mounted at specific
locations in the ship. In other words only one specific
type of unit, such as a weapon unit or a position
finding unit can be built into each standardised founda-
tion, the type or special construction of the unit is
15 however in other respects immaterial, by reason of the
standardised information transmission line system of the
invention, because the data processor built into the
unit can bring all the data into a form compatible with
the standardised information line system.

20 It is for example possible to mount a modern rocket
weapon in place of an obsolete cannon, or a modern fire
control unit in place of an old one, in a standardised
foundation by means of a standardised platform without
25 requiring new cabling. A command post unit contained in
a container can also be replaced by a new one at any
time. The fact that only crude information is exchanged
between the units, which cannot be prepared by the indi-
vidual data processors provided for each unit, is parti-
30 cularly significant for the reduction in the complexity
of the cabling. Thus every avoidable transmission of in-
formation and data between the units themselves and
between the units and the command post unit is dispensed
with.

35 The crude information, for example in the case of a
weapon, can relate to aiming, to ballistics, to munition

1 specific data or to restrictions on the range of the weapon.

5 The decentralisation of the control of the units brought about in this way has the great advantage that the individual units remain operable to a restricted degree on destruction of the operations center during battle. For this purpose, in accordance with a preferred embodiment, keyboards for hand control can be provided at each controlled standardised operating unit. The individual weapons can thus still be operated using this keyboard because the characteristic data for the particular weapon is present in decentralised form in the associated data processor.

15 Control of the weapon however normally takes place from the fire control unit which delivers the crude information, such as direction and range, via the standardised information transmission line.

20 The construction in accordance with the invention makes it possible to reduce the cabling complexity in comparison with the known standardised operating unit system to $1/3$ or $1/4$.

25 As a result of the association of an individual data processor with each unit it is basically possible to make do with a single cable instead of the 30 information cables that were previously necessary. However, even with the new system, one operates in general with from two to five information cables for reasons of redundancy.

35 Both classical cables and also coaxial cables, and in particular glassfibre cables which permit particularly high data speeds are suitable cables for the standardised information transmission line system of the

1 invention.

5 In order to provide redundancy it is further advantageous if the data processors are constructed so that each of the several standardised information transmission lines between units belonging to different functional groups can take over the total information transmission. If a standardised information transmission line between two units becomes inoperative the other line can thus
10 take over the total information transmission, which admittedly takes place somewhat more slowly but nevertheless continues to ensure a complete flow of information.

15 It is particularly advantageous if the standardised information transmission lines connect all the units of a functional group to a ring. The information is, in this arrangement, transmitted by two routes from one unit to the other or from the command post to one unit, so that on interruption of the ring at one point the full flow
20 of information continues to be ensured.

In order to increase the redundancy additional standardised information transmission lines can however be laid between specific units of a functional group and/or the
25 command post in dependence on the significance of the unit concerned for the total system.

30 In a preferred embodiment several standardised information transmission lines are laid electrically in parallel but spatially separated from one another between specific standardised operating units in order to ensure additional security for the transmission of information in the event of damage.

35 Particular significance is attributed to the recognition underlying the present teaching that the units should be subdivided into functional groups in order to provide a

1 standardised information transmission line system. Con-
trolling units (sensors) and controlled units
(effectors) are associated with one another in functio-
5 combined with a rocket firing unit into a functional
group, or a torpedo control unit is combined with a
torpedo firing unit into a functional group.

10 In one practical embodiment the central command post
unit is connected via standardised information transmis-
sion lines with the abovewater weapon units and associa-
ted fire control units to form a first functional group.

15 Furthermore, it is expedient for the central command
post unit to be connected via standardised information
transmission lines with the underwater weapons and asso-
ciated fire control units to form a second functional
group.

20 In a warship having a plurality of communication units
the latter should be connected together and with the
command post unit via standardised information transmis-
sion lines to form a third functional group. Moreover,
the central command post unit should be connected via
25 standardised information transmission lines with
specific standardised operating units and with said navi-
gation unit. In particular, the fire control units, the
command post unit and a navigation unit should form a
fourth functional group which is of particular signifi-
30 cance on a ship. The rocket and/or torpedo units and, op-
tionally, at least one communication unit should also
belong to the fourth functional group.

35 A specific standardised information transmission line is
preferably provided for the signals given by the naviga-
tion unit, with this standardised information transmis-
sion line connecting all the standardised operating

1 units and the communication unit or units which are
supplied with the signals into a ring.

5 This arrangement provides the substantial advantage that
the complexity of the cabling for supplying the indivi-
dual units with the signals of the navigation unit is
considerably reduced relative to a star system. On the
other hand the special standardised information transmis-
10 sion lines used for the transmission of the signals
coming from the navigation unit can also be used for the
transmission of crude information if one or more of the
standardised information transmission lines normally
used for this purpose should become defective or damaged
in battle. The incorporation of the special standardised
15 information transmission line system normally used for
transmitting the navigation signals in ring form into
the crude information transmission system for the indivi-
dual standardised operating units thus improves the re-
dundancy and hence the operational reliability of the in-
20 formation transmission system without considerably incre-
asing the cabling complexity.

A particular advantage of the present proposal resides
in the fact that shipboard units which at the present
25 time still operate extensively in analog manner can
readily be made suitable for the standardised informa-
tion transmission line system of the invention by
analog/digital converters built into the data proces-
sors. For future units which from the outset will
30 operate in digital manner the compatibility with the
standardised information transmission line system of the
invention is present from the very beginning.

The thought underlying the invention can be expressed by
35 the statement that the functional units of German patent
20 56 069 are equipped with their own intelligence for
processing or manipulating and for distributing and for-

warding data. Through the very much higher transmission speed for the exchange of information (digitised by the data processors) between the units mounted on standardised platforms and forming the operating units, considerably more data per time interval can be transmitted which signifies the realisation of a more copious information exchange with reduced cable complexity. The individual intelligence provided for each unit takes over the conversion of the digital information in the data bus into analog information for processing in the unit and vice versa.

The units attached to the standardised platforms are housed in containers which are of rectangular shape beneath the platform and which carry at the top, on the platform, a weapon, a position finding device or the like belonging to the unit.

By reason of the ring-like combination of the units belonging to one functional group all the generated information can reach each unit of the functional group. The manipulation and processing takes place irrespective of whether this information is required for the respective system concept or not.

The standardised data processor for each unit mounted on a standardised platform has all the customary interfaces for the exchange of information with the unit and, via a normed process, for the exchange of information between various units.

For this reason the complexity of the cabling between the units can be minimised. On the whole the standardised information transmission line system of the invention makes possible a considerably increased redundancy when compared with the classical data transmission systems.

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A land terminal is preferably provided via which some, or all, of said functional groups can be connected to an external simulation, diagnosis and/or evaluation computer.

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The possibility of using programs inside the individual data processors for fault finding, training, system matching and simulation allows these activities, which are personnel and time intensive, to be sensibly facilitated and/or carried out more quickly.

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All the required external information can be generated by means of the simulation programs within the data processors of the individual units. On this basis functional testing of the units can be carried out without the otherwise necessary external units and devices being available.

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The exchange of standardised platforms equipped with units, for example weapon units or fire control units, for the purpose of conversion or later modernisation is straightforwardly possible using the same standardised information transmission line system. It is only necessary to construct the standardised data processors within the individual units appropriately.

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The data processors of the individual units are formed by an information, computing and storage unit which is of modular construction.

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These modules are so constructed that they contain computing units, memory units, power supplies and interface modules for process control, for linking the units between one another and for linking the units to the command post.

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1 The arrangement of the invention makes it possible to
simulate the manner of operation of as many units as
desired in simple manner in order to test the operation
of the total system.

5 It is of particular significance, as previously
mentioned, that a specific unit can operate automatical-
ly even when it can no longer communicate with the
remaining system.

10 The time regulation is controlled by an internal clock
while varying data is continuously updated by extrapola-
tion for a specified time. The data processors can also
be used as an adjustment aid when servicing a functional
15 unit. By way of example one can generate control pulses
at a specific rate in order to realise a semi-automatic
measuring method. The total system consists of standard-
ised hardware and software modules. This provides favou-
rable preconditions for the logistics and simplifies the
20 servicing of the hardware and the care of the software.

The standardisation of the software relates not only to
a unification of the programs but also to norming of the
transmitted information, i.e. a uniform format for the
25 data sets is ensured.

As an option, each data processor can be equipped with
an additional audio channel. In this way oral informa-
tion from one unit (operating unit) can be transferred
30 to any other unit as desired via analog to digital con-
verters and the channels of the information net. This is
a valuable possibility, particular during commissioning
and during tests. A further important test aid is a con-
nection for a pocket terminal as a combined input/output
35 device for checking the data processors and the total
system. Retrospective changes of the information net are
possible at any time through the modular construction of

1 the system, even after commissioning of the ship.

The information net operates autonomously. Inside the net there is no data processor which exerts governing
5 control functions over other data processors. Each data processor transmits relevant data to all other data processors and receives data from all other data processors, provided the relevant units associated with the data processors belong to a common functional group.

10 Suitable algorithms ensure that the relevant data is timely available for all the data processors, that rapid data has priority over slow data, that disturbed transmission channels are recognised and indicated, and that
15 alternative routes are sought when channels are overloaded or inoperative.

When one channel becomes inoperative during a data transmission this is recognised and the already transmitted
20 part quantity is rejected. In a defined region there is to be found backup of the information with which the transmission can be started anew.

The transmission systems operate with addressed data. Microprocessors can be used for asynchronous data transmission, multiplex method or parallel data transmission.
25 Special cables with, for example, sixteen leads are suitable for the latter.

30 The invention will now be described in the following by way of example and with reference to the drawing, the single figure of which shows a schematic block circuit diagram of units arranged on standardised platforms and contained in a warship, and of the standardised information transmission line system associated with the
35 warship.

- 1 As seen in the drawing a command post unit 11 in which
for example two data processors 11', 11" are provided,
is located in the ship at a central position, for
example on the bridge. At the command post unit one or
5 more persons feed in the target which is to be followed
and fought. The command post 11 receives signals repre-
sentative of the direction of the ship relative to
north, a speed signal, a wind speed signal etc. from a
navigation unit 31, which contains compasses, a log, a
10 wind speed measuring device, a Decker navigator, an
omega navigator, a satellite navigator etc. The corres-
ponding values can be read off from appropriate slave
display devices in the command post unit 11.
- 15 Various units are located on standardised platforms or
standardised containers arranged in standardised founda-
tions (not shown) of the ship as follows:
- Rocket firing unit (ASPID) 12
20 Rocket firing unit (OTOMAT) 13
40 mm cannon 14
40 mm cannon 15
40 mm cannon 16
40 mm cannon 17
- 25 127 mm compact cannon 18
fire control unit (STIR) 19
fire control unit (LIOD) 20 (starboard)
fire control unit (LIOD) 21 (port)
fire control unit (WM 25) 22
- 30 radar unit (DA 08) 23
rocket control unit (ECM/ESM) 24
torpedo control unit (SONAR) 25
underwater rocket firing unit 26
torpedo firing unit 27
- 35 communications center container 28, 29
remote signalling device container 30.

1 A sensor system 33 accepts the data from the ships engines and delivers it to the navigation unit 31.

5 32 designates a land connection by means of which the entire system can be connected to an external simulation, diagnosis and/or evaluation computer which is not illustrated.

10 In accordance with the invention an individual data processor 12', 13', 14', ... 26', 27', 28' and 30' is also arranged in each unit container or in each unit arranged at a standardised platform.

15 The data processors contain memories in which all the specific data for the associated unit itself are stored. For the weapon units 12 to 18 and 26, 27 this data can for example be data relating to aiming or ballistics, data specific to the munitions, restrictions on the range of the weapon etc.

20 In this manner the individual weapon unit need only be supplied with crude information which is relatively simple to transmit and which consists essentially of a direction signal and a range signal.

25 In order to effect this transfer the abovewater weapon units 12, 13, 14, 15, 16, 17 and 18 are combined with the associated fire control units 19, 20, 21, 22 as standardised functional groups into a ring system in which, 30 in each case, the data processors of subsequent units are connected together by means of standardised information transmission lines 34 shown as broken lines. In the illustrated embodiment the data processors 12', 13', 14', 15', 16', 17', 18', 22', 21', 20', 19', 12' are in 35 each case connected together by a standard information transmission line 34. The command post unit 11 could also be included in this ring line system. In the

present case the command post unit 11 is however connected via a standardised transmission line 34' with the data processor 19' of the fire control unit 19, via a further standardised information transmission line 34" with the data processor 22', via a further line 34"' with the data processor 15' of the cannon unit 15 and, finally, via a fourth standard information transmission line 34"" with the data processor 16' of the cannon 16.

The fire control units 19 to 22 are told which target is to be followed by digitised signals from the command post unit 11 via the standardised information transmission lines. As addressed data is transmitted via the lines 34', 34" the data processors 19', 20', 21', 22' can seek out the signals intended for them from the totality of the transmitted signals. These control signals also specify which of the abovewater weapons 12, 18 is associated with which of the fire control units 19, 22.

The data processors 19' to 22' of the fire control units 19, 22 then transfer the required control signals to the data processors 12' to 18' of the abovewater weapons 12 to 18. Starting from each fire control unit two paths are available for this purpose via the ring line system 34 (in both directions of the ring), so that if the ring is interrupted in some way, for example by a projectile hit, a second path for the signal transmission is available.

In the present embodiment a considerable redundancy is also provided by the starlines 34' to 34"".

Microprocessors for asynchronous data transmission, multiplex devices or parallel data transmission devices are suitable as microprocessors and either classical cable, or coaxial cable or glass fiber cable can be used

1 as standard information transmission lines 34, 34', 34",
34"' and 34'''.

5 As a result of the arrangement of data processors both
in the central command post unit 11 and also in each of
the individual operating units, or in each individual
unit, the information to be transmitted from the command
unit 11 to the units or between the units, can always
10 use one and the same standard information transmission
line system 34, 34', 34", 34"', 34''' irrespective of the
special nature of the individual unit. This also applies
when one of the units is replaced by a modernised or a
new unit.

15 It is however important that, in the described manner,
the fire control units 19 to 22 are combined into a
first functional group with the abovewater weapons 12 to
18.

20 The fire control units 23, 24, 25 for the underwater
weapons (underwater rocket unit 26 and torpedo firing
unit 27) are combined in accordance with the invention
in a second functional group, the standard information
transmission lines 35 of which are shown in chain-dotted
25 lines. The ring line 35 leads from the command post unit
11 via the data processor 24' of the fire control unit
24 to the data processor 25', from there to the data
processor 27' of the torpedo firing unit 27, from there
to the data processor 26' of the underwater rocket
30 firing unit 26 and from there finally back to the
command post unit 11, so that once again a functional
group connected by a standardised information transmis-
sion line 35 is present, with the same advantages as
described above with reference to the system connected
35 by the ring line 34.

1 A radar unit 23 provided for all sensors is connected by means of the inbuilt data processor 23' to the data processor 24' of the fire control unit 24 via a line 35'.

5 Weapon control data in digitised form is transmitted to the weapon units 26, 27 via the standardised information transmission lines 35, 35', with the signals likewise consisting only of crude information, whereas all the particulars specific to the weapons 26, 27 are stored in
10 the data processors 26', 27'.

A third functional group is formed by communication center units 28, 29 and a container 30 with communication apparatus. The data processor 28' of the unit 28
15 and the data processor 30' of the communication unit 30 are connected to the command post units 11 and to one another via the standardised information transmission lines 36, 36' illustrated in dotted lines. Communication data such as teletype data, command transmission within
20 and outside of the ship etc., are transmitted via the lines 36, 36' which can fundamentally also be completed into a ring line.

The navigation unit 31 which transmits compass signals, ships speed signals, wind speed signals etc. in
25 digitised form is of particular significance aboard the ship. The units fed by the navigation unit 31 form a fourth functional group which is completed by standardised information transmission lines 37 illustrated in
30 broken lines. The ring line 37 fed by the navigation unit 31 includes all those units, or the data processors arranged therein, which are dependent on signals or information from the navigation unit 31.

35 The rocket weapons 12, 13, 26 and 27 need the navigation signals as a reference for rocket launching.



1 From the above description it can be seen that the indi-
vidual functional groups overlap in part. Thus, by way
of example, the weapon units 12, 13 and the fire control
units 19 to 22 belong both to the first functional group
5 connected by the ring line 34 and also to the fourth
functional group connected by the ring line 37.

Although basically only one standardised information
transmission line is required between the data proces-
sors of neighbouring units, for example 19, 20, the com-
10 bination to functional groups, which in the example of
the units 19, 20 requires two lines 34, 37, is preferred
because, in the event that one of the two lines 34, 37
fails, the other line which remains intact can take over
15 the data transmission, which admittedly is only possible
at a lower speed but nevertheless still leaves the total
system intact.

The data processors should thus be so constructed that
20 on failure of one line the remaining line or lines can
take over the transmission of information.

Redundancy can also be achieved, apart from the
provision of the star-like additional standardised infor-
25 mation transmission lines, by connecting several stan-
dardised information transmission lines in parallel,
with these standardised information transmission lines
usefully being laid at spatially distinct locations.

30 For the sake of simplicity the power supply lines for
the individual units are not shown in the drawing. They
are arranged and laid in the classical manner.

35 A keyboard 38, by way of example, is arranged at the
container of the weapon unit 13 and can also be present
at all the other weapon units. This keyboard serves to
allow manual operation of the weapon on failure of the

1 command center and/or the fire control units. This is
possible because an individual data processor is
provided in each weapon, for example the data processor
13' in the weapon 13, with the data processor executing
5 the necessary corrections and limitations for the asso-
ciated weapon. Thus the weapon can still be operated
manually if the operation center breaks down.

Each individual weapon unit can also be tested at any
10 time for example with the aid of plug-in cards.

Only plug contacts for the power supply and, optionally,
a voice link are provided at the individual units in
addition to the cable connections for the standardised
15 information transmission lines.

By reason of the arrangement of data processors in each
weapon unit it is also immaterial whether the individual
unit operates on analog or digital lines because the
20 required analog to digital converters can readily be
built into each data processor should this be necessary.

The ring line 35 for supplying the navigation signals to
the individual units has shown itself to be particularly
25 advantageous because, by way of example, up to eighty
cables had previously to be laid from the compass of the
ship to the individual units and have now been replaced
by a single ring line.

30 If one or other unit container is replaced by a new or
modernised unit container it is only necessary to
release the plug contacts of the old container,
whereupon the old container can be removed and a new
container with a new unit inserted. This new container
35 has the same connection contacts and sockets as the old
container, so that after mounting it is only necessary
to reestablish the plug connections. The total system is

1 then at once capable of further operation. Any differences
between the new unit compared with the old are taken
into account by appropriate arrangement of the data
processor of the new unit.

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The data processors used in the units in accordance with
the invention receive and deliver, exclusively,
digitised signals from and to the standardised informa-
tion transmission lines.

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CLAIMS



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- 1 1. A warship comprising a hull; a plurality of standard-
ised foundations provided in said hull; a central
command post unit; a navigation unit; at least one commu-
5 nication unit; a plurality of standardised operating
units each comprising either a controlling unit or a con-
trolled unit and each including a respective container
which is closed at the top by a standardised platform re-
ceivable in one of said standardised foundations; power
supply lines connected to and terminating at said
10 central command post unit and other ones of said units;
a respective data processor provided inside each stan-
dardised operating unit and having standardised hardware
and software modules, each said data processor including
a store in which data specific to the associated unit is
15 stored so that the associated unit is capable of
operating independently of the other standardised
operating units; wherein associated ones of said control-
ling and controlled standardised operating units form
functional groups; wherein the data processors of the
20 standardised operating units which belong to the same
functional group only exchange digitised crude informa-
tion and wherein standardised information transmission
lines are laid between the data processors of the stan-
dardised operating units of each functional group inde-
25 pendently of the nature of the different standardised
operating units for the exchange of said digitised crude
information, whereby each data processor provides a stan-
dardised electronic interface equipped with the same con-
nection contacts and sockets, in addition to the stan-
30 dardised information transmission lines and the standard-
ised mechanical interface between the standardised
platforms of the individually designed operating units
and the standardised operating units.
- 35 2. A warship in accordance with claim 1, wherein said
standardised information transmission lines laid between



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- 1 the data processors of the standardised operating units
of a functional group are laid in ring form.
3. A warship in accordance with either of claims 1 or 2
5 wherein a keyboard for hand control is provided at each
controlled standardised operating unit.
4. A warship in accordance with any one of the preceding
10 claims, wherein a plurality of standardised information
transmission lines are laid electrically in parallel but
spatially separated from one another between specific
standardised operating units.
5. A warship in accordance with any one of the preceding
15 claims, wherein the central command post unit is
connected via standardised information transmission
lines with the abovewater weapon units and associated
fire control units to form a first functional group.
- 20 6. A warship in accordance with any one of the preceding
claims, wherein the central command post unit is
connected via standardised information transmission
lines with the underwater weapons and associated fire
25 control units to form a second functional group.
7. A warship in accordance with any one of the preceding
claims, wherein a plurality of communication units are
provided and are connected together and with the command
post unit via standardised information transmission
30 lines to form a third functional group.
8. A warship in accordance with any one of the preceding
claims, wherein a specific standardised information
transmission line is provided for the signals given by
35 the navigation unit, with this standardised information
transmission line connecting all the standardised
operating units and the communication unit or units



-24-

1 which are supplied with the signals into a ring.

5 9. A warship in accordance with any one of the preceding claims, wherein a land terminal is provided via which some or all of said functional groups can be connected to an external simulation, diagnosis and/or evaluation computer.

10 10. A warship substantially as herein described with reference to and as illustrated in the drawing.

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