HELI-TRASPORTABLE SURGICAL UNIT

NCE HELI-TRANSPORTABLE SURGICAL UNIT

1) COMPOSITION OF THE NCE HELI-TRANSPORTABLE SURGICAL UNIT

The variable volume NCE heli-transportable surgical unit, conceived constructed and patented by O.M.A.R. TECHNOLOGY S.R.L. was created in response to a specific request from the ITALIAN ARMED FORCES, which wanted to equip themselves with a Surgical Unit fitted out as an operating theatre and intensive care unit, to be used in the event of natural disasters in the service of the Civil Protection Department and also to meet their own needs.

To satisfy these needs, some shelters extendible in both width and height were created.

This system, innovative in its every aspect, made it possible for the first time to solve both operational problems and those of transport inside helicopters and aircraft.

The NCE, fully equipped, self-sufficient, speedy in intervention time and reliable in operation, is built to comply with all current technical standards relating to both plant and materials, equipment and supplies.

The NCE can be carried on flat-bed trucks or towed on its own skids, but its primary characteristic is that it can be carried inside helicopters such as the CH 47 and the like, and aircraft such as the G 222, C 130 and the like.

This form of transport allows the NCE to be taken quickly to particularly difficult areas reachable only by aircraft equipped for instrument flying (IFR).

The NCE comprises:

- 1 variable volume SHELTER, equipped as Operating Theatre -
- 1 " " " " " " " " Intensive Care Unit -
- 1 principal service TRAILER
- 1 secondary service TRAILER

All the medical equipment is enclosed in the shelters, housed in special containers, while the support equipment in the service trailers allows the N.C.E. to be completely independent during both transport and use.

2) PRINCIPAL CHARACTERISTICS

External shelter dimensions

a - External dimensions during transport and parking, shelter closed with stabilizers:

- Length mm. 4300 + 200 +200 for stabilizers
- Width mm. 2120
- Height mm. 1600

b - External dimensions during operation (roof fully raised and top and bottom side walls fully extended).

- Length mm. 4300
- Width mm. 3520
- Height mm. 2400

c - External dimension tolerances with the shelter operating, fully extended, except for the lifting system.

- Length ± 20 mm.
- Width ± 20 mm.
- Height ± 20 mm.

Internal shelter dimensions

During use (roof fully raised, top and the bottom side walls fully extended), the internal dimensions of the shelters are as follows.

- Length	min. mm. 3670	max. mm. 3900
- Width	min. mm. 3100	max. mm. 3400
- Height		max. mm. 2100

3) SHELTER STRUCTURE

The two shelters are perfectly identical in structure, functioning and finish.
They are constructed of extruded tubular sections of " anticorrodal " aluminium.
Each shelter comprises:
a base - a roof - two bottom side walls - two top side wall and two internal movable gangways - the whole assembled by hydraulic jacks,
mechanical screws and guides with ball cursors. At the top corners of the structure there are four steel corner pieces for lifting and anchoring. The corner pieces and the whole structure are designed to withstand the following stresses:

- Longitudinal 4 G
- Transverse 1.5 G
- Vertical (top bottom) 4 G

The same calculation has been made for the service trolleys.

4) SHELTER WALLS AND ROOF

The bottom and top side walls and roof comprise prefabricated panels formed from 45 mm. steel/polyurethane/steel sandwich, precomprossed and with the following characteristics:

- Resistant to ram blows
- Resistant to vibrations
- Resistant to fire and flame class B2
- Steam-light
- Protection from electrical and magnetic fields
- Soundproofing
- Resistant to corrosion
- Resistant to chemical and biological behaviour with heat dispersion coefficient K = 0.38.

5) FLOOR

The floor is formed of press-formed " anticorodal " aluminium battens 40 mm. thick slotted in and welded to the base structure. The floor forms an integral part of the base structure.

6) INTERIOR CLADDING (WALLS AND FLOOR)

The inside walls of the shelter, bottom and top, and the ceiling are clad with antistatic, fireproof plastic material (PVS) complying with the standards.
The floor is clad with similar fire-resistant material, conductivity
complying with standards, electrowelded.
This material is normally used and is of the type appropriate for the interior of operating theatres.

7) SEALS (HERMETIC)

Sealing against water, air and dust is ensured by a series of dust- stoppers, double, counterpoised silicone seals which ensure the seal both in use and during transport.

8) SHELTER ACCESS DOORS

Each shelter is fitted with two rear doors, one at the centre of each end. These are constructed of panels of a steel/polyurethane/steel sandwich 38mm thick and are divided into two parts. The lower part remains hinged to the shelter, while the upper part is added when the shelter is extended. One of the two doors is fitted with a window facing the tunnel connecting the two shelters.

9) CONNECTING TUNNEL AND GANGWAY

The Operating Theatre and Intensive Care Unit shelters are connected by a gangway formed of extruded light alloy sections and a folding tunnel with a PVC roof, the ends of which rest on the ends of the shelter, pressed by special extensors.

10) HYDRAULIC SYSTEM

Each shelter is provided with a electro-hydraulic power unit, fed from 4x24 V 240 ampere-hour traction batteries.
This plant, complete with oil tank with filter, valve group, proportional pumps, solenoid valves and anti-burst valves with stainless steel pipes, operates wall extension and raising of the roof and internal movable floors; it also operates the hydraulic stabilizer jacks.

11) ELECTRICAL SYSTEM

Each shelter is provided with an electrical system that complies with the standards applicable to rooms used as operating theatres.
The wiring is housed in special light alloy ducts anchored to the perimeter walls, complete with sockets and lamps to CEI standards, in sufficient numerbs for the intended use.
This system is connected by exterior sockets to a general control box on the principal trailer and the whole is powered from a 70 KVA AC generator set.
To ensure continuity in the supply of electric energy required to operate the principal medical equipment's, the electrical plant is fitted with an inverter (static continuity group) of 3.5 KVA with a 1 hour capacity.

12) MEDICAL GAS PLANT

Each shelter is provided with a centralized medical gas system (oxygen, N_20, air) that runs parallel to the electrical ducting on the internal perimeter walls.
This plant is provided with quick-coupling attachments and appropriate visual and audio alarm signals.

The plant is connected by specific pipes with quick-couplings to a central control unit, fed from 1 oxygen generator. In addition, the 4 oxygen and 2 N_20 cylinders act as an emergency supply and are housed on the secondary service trailer.

13) SERVICE TRAILER STRUCTURE

The service trailers are constructed of iron pipes and are of the same size as the closed shelters.
To permit access to the support equipment, extraction of the generator set and setting the oxygen generator vertical, since rigid external protection is not possible they are covered during transport by preformed PVC covers, fixed to the base by hooks and straps.
Each trailer is fitted with corner blocks at the top corners, like those on the shelters.

14) STABILIZER JACKS

Each shelter and each trailer is provided with 4 stabilizer jacks, adjustable from inside and outside, with duel extension and dual effect and locking valves and an excursion of about 1600 mm.
These jacks are controlled from the push button unit with which each shelter and trailer is fitted.
This system allows loading on flatbed trucks, aircraft and helicopters without using external loading gear such as cranes, bridge cranes, elevators etc.
In addition, the hydraulic plant and the push-button control unit are arranged in such a way that the 4 jacks can operate synchronously, in pairs or singly. This last mode allows the shelters and trailers to by levelled even on unprepared sites.

15) ROLLERS

Each shelter and trailer is provided with a base structure and a set of teflon rollers for use during loading and unloading from helicopters. There are similar rollers at the ends of the hydraulic stabilizer jacks, so that both the shelters and the trailers can be moved sideways, for lining up in the operational stage.

16) WHEELS

Each N.C.E. is provided with a set of 4 wheels and semiaxles, of which 2 steering ones serve to move the shelters and the trailers on prepared ground and at slow speed for short distances.
These wheels are inserted in the 4 bottom corners of each shelter and each trailer. Connection of the 2 steering axles is made by two steering tiebars and a tow bar that allows towing by a suitable vehicle (AR-ACM).

17) ELECTRICAL GENERATOR SET

The generator set adapted for this application has a general control panel with output at 380 / 220 V at 50 Hz and is provided with a:

- Current stabilizer and fuel reserve alarm –

The set is mounted on a base with two rubber-tyres wheels and a retracting tow bar. It can therefore be towed by a suitable vehicle (AR).

18) OXYGEN GENERATOR

The medical oxygen generator is driven by a 2000 litre screw compressor which, by means of molecular sieves, is capable of continuous production of a maximum of 6 Nm3/h of oxygen at a pressure of 3.5 ± 3.7 Kg./cm2 of 97-98% purity, complete with prefilter, micropore filter and automatic drainage for protection of the molecular sieves.

19) AIR-CONDITIONING

This is provided for the Operating Theatre and Intensive Care Unit, by specific quick-coupling corrugated pipes.
It can maintain a constant interior temperature with exterior temperatures between -20°C and + 45°C.

C O N T E N T S

20) CONTENTS OF OPERATING THEATRE

- Operating table, radio-opaque in 4 sectors including specially constructed small-base adjustable service shelf, mounted on two ball guides fixed to the floor. It can slide lengthways in both the lower and upper parts of the column with 360° rotation.

- Anaesthesia apparatus on a trolley complete with open circuit fan with a quick-coupling potential, Flouted vaporisers and accessories. Patient safety system with at least 25% of oxygen. Automatic N_20 shut-off in the event of reduced oxygen pressure.

- Solid state elector-scalpels with the option of monopolar or bipolar operation.

- Centralized operating theatre medical gas plant with O_2, N_20 and compressed air. Fitted with luminous and sound alarm, and operating pressure manometers. The whole connectable by special tubes and differentiated quick couplings to the central medical gas distribution unit located on the secondary service trailer.

- Monitor with defibrillator, network recorder and battery, arranged for remote transmission of date; lid incorporated for screen protection.

- Shadow-free lamp with 4 light elements with luminous density regulation by wall switch; the same runs to the centre of the ceiling by a specific ball-cursor.

- Autoclave M 23, automatic pressurised steam complete with 5 containers, with capacity to sterilise several objects, as gloves, tissues at 1 atm, 120° C, and metal things and glassware at 2 atm 134° C.

- 2 germicidal UV lamps with maximum emission at 2540 A (254 nm).

- Surgical aspirator large trolley-mounted, with 2 containers, specifically for lengthy operations, with pedal control; capacity for aspirated liquid: 3 litres per container.

- Surgical aspirator, medium 1 container for first aid and special surgery; aspirated liquid capacity: 2 litres.

- Radiological unit complete with X-ray generator, control console, brilliance intensifier from 9/6" anchored to the floor. Telecamera, control unit, 17" professional monitor, DLC constant luminous intensity device. Pedal control and monitor trolley with housing for X-ray block during transport.

- Wall-mounted telescopic arm with possibility of vertical and horizontal adjustment to support the X-ray block in use.

- Set of cupboards (2 blocks) of stainless steel with various drawers, shelves and doors, disappearing, of which one with washbasin and electric pump and pedal control.

- Diffuser with absolute filters, foldable upwards for pressurised air-conditioning.

21) INTENSIVE CARE UNIT

- Centralized intensive care unit plant, with 0_2, compressed air, luminous and sound alarms and manometers indicating operating pressure. The whole connectable to the medical gas distribution unit on the secondary service trailer.

- 2 adjustable stretchers FERNO MOD. P4 complete with mattress with possibility of TRENDELEMBURG and ANTI-TRELEMBURG.

- 1 folding stretcher FERNO - first aid.

- 2 high performance pulmonary ventilators complete with heated humidifiers for mechanical and assisted ventilation, microprocessor controlled, with the following characteristics:

- Usable for adults and children -
- Modalities of ventilation -
- Display of machine and patient data -
- Possibility of display of various parameters on optional monitors -

- 4 line modular monitor complete with modules for measuring ECG, non-invasive pressure, recorder, with possibility of operation connected to a central unit -

- 2 line monitor to measure ECG, temperature and non-invasive arterial pressure. Mains and battery powered.

- Monitor for checking oxygen saturation pressure and pulse -

- Monitor for simultaneous measurement of SAO_2 CO_2 aspirated and N_20 inspirited with display of the plathysmographic wave form trend for the last 20-60 minutes adjustable contrast -

- Pulmonary ventilator volumetric emergency time cycle with possibility of ventilation 100% O_2 with Venturi system 50% air, complete with patient circuit with non-rebreathing valve.

- First aid reanimation case containing: reanimation balloon, adult mask, infant mask, 4 oropharyngeal cannulas, packet for endotracheal tubes, Penlon laryngeoscope, intravenous pack holder, medicine container, nuchal, 2 aspiration catheters, set of 6 endotracheal tubes, stethoscope, disinfectant, scissors, pliers, syringes, needles, medication material, light battery, 1 litre oxygen cylinder, spare balloon, oxygen regulator for a constant flow of 6 1 p.m.

- Germicidal UV lamps, maximum emission at 2540 A (254 nm).

- Set of cupboards (2 blocks) of stainless steel with various drawers, shelves and doors, disappearing, of which one with washbasin and electric pump and pedal control.

- Blood storage refrigerator, appropriately dimensioned for the intensive care shelter.

- Set of light alloy equipment cases with reinforced corners, hermetic seal, stickball; interior lined with formed anti-impact sponge.

- Emergency aspirator, small model with 1 litre container for first aid and emergencies.

- Diffuser with absolute filters, for air-conditioning.

22) CONTENTS OF THE PRINCIPAL SERVICE TRAILER

- Generator set, 70 KVA, trolley mounted with retracting tow bar, provided with current stabiliser, 50 Hz, control panel.

- Air-conditioning unit, set for conditioning the Operating Theatre and Intensive Care Unit, with special corrugated quick coupling pipes, set to maintain a constant inside temperature with outside temperatures of from -20°C to +45°C.

- Continuity group (Inverter) with special storage batteries to guarantee current to the Operating Theatre and to specified equipment's. Life about 1 hour.

- General electrical control panel, with transformer and general and specific equipment switches.

-Electrical wiring.

23) CONTENTS OF THE SECONDARY SERVICE TRAILER

- Therapeutic oxygen generator unit.

- Screw compressor feeding the oxygen generator.
- Compressor for medical gasses, appropriately dimensioned for supplying the Operating Theatre and Intensive Care Unit.

- Housing for 4 oxygen cylinders, 2 N_2O cylinders.
- Medical gas control unit, including pressure reducers, valve and quick couplings.

- Gangway connecting the two shelters (Operate Theatre and Intensive Care) and tunnel cover.

- External access gangway and various accessories.

- Case containing various accessories.

- Set of wheels with accessories for moving the shelter and trailers on the road.

- Various accessories.

ATTENTION: WITH RESERVE OF MODIFICATIONS AND IMPROVEMENTS

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