AD-A045 156 ARMY MEDICAL INTELLIGENCE AND INFORMATION AGENCY WAS--ETC F/G 6/12
TESTING OF VACUUM MATTRESSES (ERPROBUNG VON VAKUUM-MATRATZEN),(U)
AUG 77 ZIMMER

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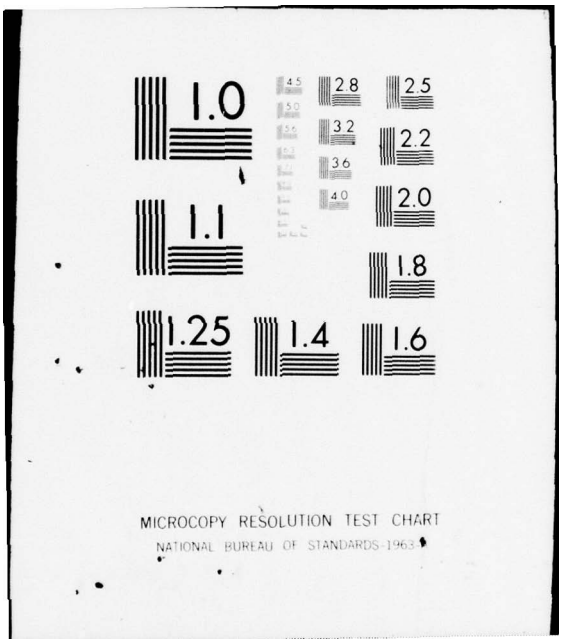
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963

DEPARTMENT OF THE ARMY
U.S. ARMY MEDICAL INTELLIGENCE AND INFORMATION AGENCY
WASHINGTON, D.C. 20314

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Study Group for Medical Technology,
Medical Supplies

8 Munich 40, 16 July 1975 /1

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P.O.B. 400035
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Sch/bm

To:

Federal Office for Military Technology
and Procurement (BWB)
- BA IV 2 -
54 Coblence, Am Rhein 2-6

For Information

Medical Office of the Bundeswehr
- III 2 -
53 Bonn-Beuel 1, Platanenweg 29

Subject: Testing of Vacuum Mattresses

References:
1. SanABw - III 2 - Ref. No. 72-20-00 of 6 November 1974
2. SanABw - III 2 - Ref. No. 72-20-00 of 3 December 1974
3. BWB-BA IV 2 - Ref. No. 90-65-15 of 18 March 1975
4. BWB-BA IV 2 - Ref. No. 90-65-15 of 6 May 1975

Inclosure: 1. (for BWB, 2 copies)

The test report for the vacuum mattresses is forwarded as inclosure.

The testing took place in accordance with contract reference 1 corresponding to the resolution in the third meeting of the Study Group for Development and Procurement of Medical Material (SanMat) under the responsibility of the Academy for Medical Service and Sanitation of the Bundeswehr (SanAkBw) in collaboration with the Offices of the Army and Air Force mentioned in reference 2.

The Academy for Medical Service and Sanitation of the Bundeswehr received with references 3 and 4 the vacuum mattresses, pumps and questionnaires.

The vacuum mattresses were forwarded to the Mountain Medical Battalion (GebSanBtl) 8, Murnau, to the Air Force Medical Squadron (LwSanStff), LTG 61 Penzing, and finally forwarded to the Joint Medical Training Battalion (GemSanLehrBtl) 865 so that the answers to the questions could be prepared by testing.

The Academy for Medical Service and Sanitation of the Bundeswehr undertook no investigations. /2

Subsequently, a conference was scheduled in Murnau at which the vacuum mattress and regular ambulance resources including the SAR helicopter were made available. Present at the conference were:

Program Directors	Dr. Probst	Chief Doctor Orthopedic Accident Clinic, Murnau
	Dr. Ruidisch	Orthopedic Accident Clinic, Murnau
LTCOL (MC)	Dr. Grabarek	Special Committee for Orthopedics, Academy for Medical Service and Sanitation of the Bundeswehr
LTCOL (Field Forces (MC)	Dr. Grigoleit	Divisional Medical Officer, First Mountain Division, Garmisch-Partenkirchen
LTCOL (Pharmacy)	Steinlechner	Divisional Pharmacist, First Mountain Division, Garmisch-Partenkirchen
LTCOL (MC)	Dr. Miesel	Chief, Air Force Medical Squadron, Penzing
	Mr. Fischer	Federal Office for Military Technology and Procurement (BWB), BA IV 2, Coblence
LTCOL (Pharmacy)	Schell	Academy for Medical Service and Sanitation of the Bundeswehr, Study Group for Medical Technology, Medical Supplies
LT	Dengler	Academy for Medical Service and Sanitation of the Bundeswehr, Study Group for Medical Technology, Medical Supplies

The results of the individual tests by the experimental stations and the orthopedic experiences of the specialists were discussed and -- to the extent necessary -- reinforced or explained by a repetitive testing.

The questionnaire was finally answered jointly except for a few technical data which was to be worked on later by the Academy for Medical Service and Sanitation of the Bundeswehr (SanAkBw).

The findings are given in detail in the inclosure.

Short Summary of Findings

1. The vacuum mattress is ~~from today's viewpoint urgently~~ necessary for the transport of casualties with specific types of injuries.

2. No one of the models ~~supplied~~ satisfies ~~in its present form~~ the requirements ~~for such a mattress~~ to any extent completely.

3. Model 3 comes closest to the model required and could be made optimum with a minimum change cost.

4. The vacuum mattresses require a specific patching kit and must be inflatable for patching which requires a valve change.

5. The pumps supplied all are either limited or not usable at all. /3
A pump is required which is of commercial quality and usable models are to be selected.

6. Further tests are needed with an improved model.

The date given (15 July 1975) could not be adhered to owing to extensive studies.

[Signature]

(Dr. Zimmer)
General (MC)

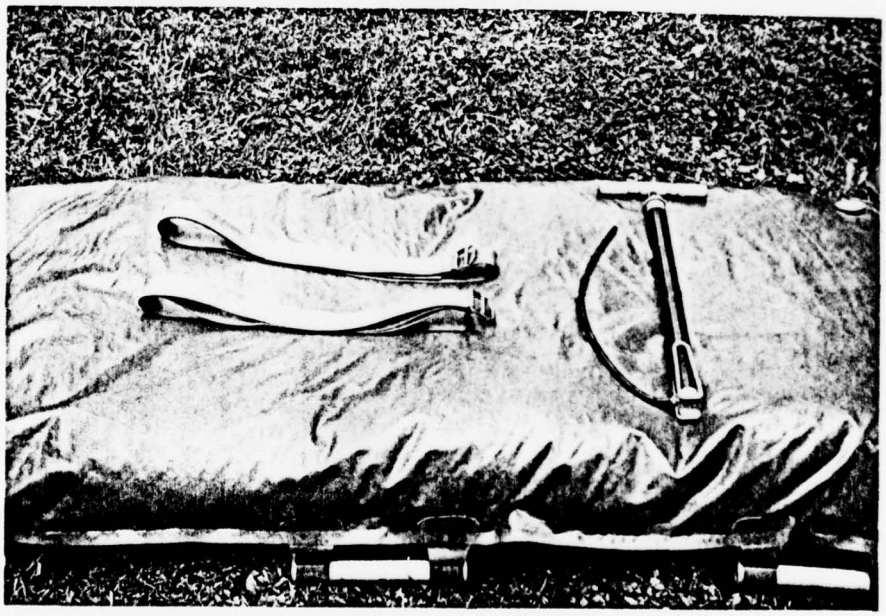
Inclosure to letter
SanAkBw/ASW, StudGrp
SanTSanMat
Ref. No. 90-65-15-25
of 16 July 1975

Testing of Vacuum Mattresses for the BWB Questionnaire

For 1. General

Five models were tested.

Model 1 - Draeger rescue mattress with handpump and straps



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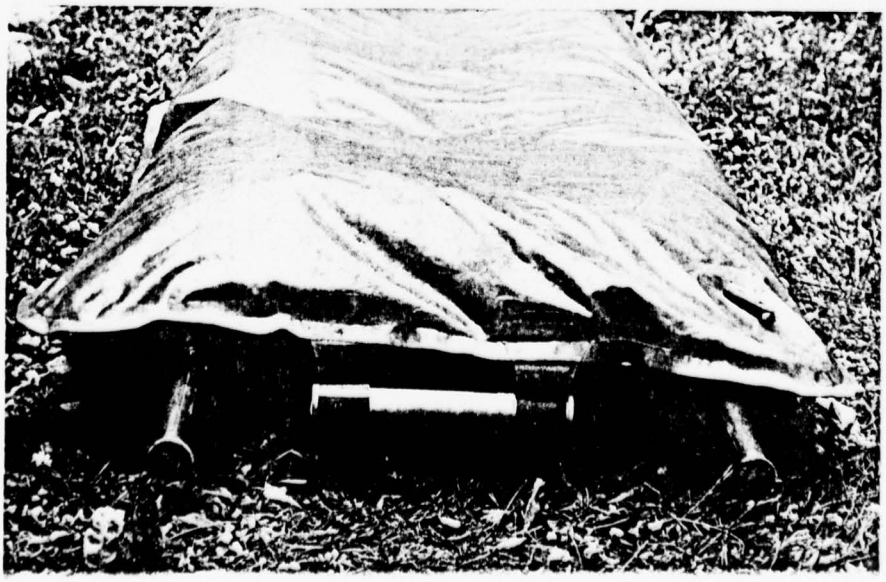

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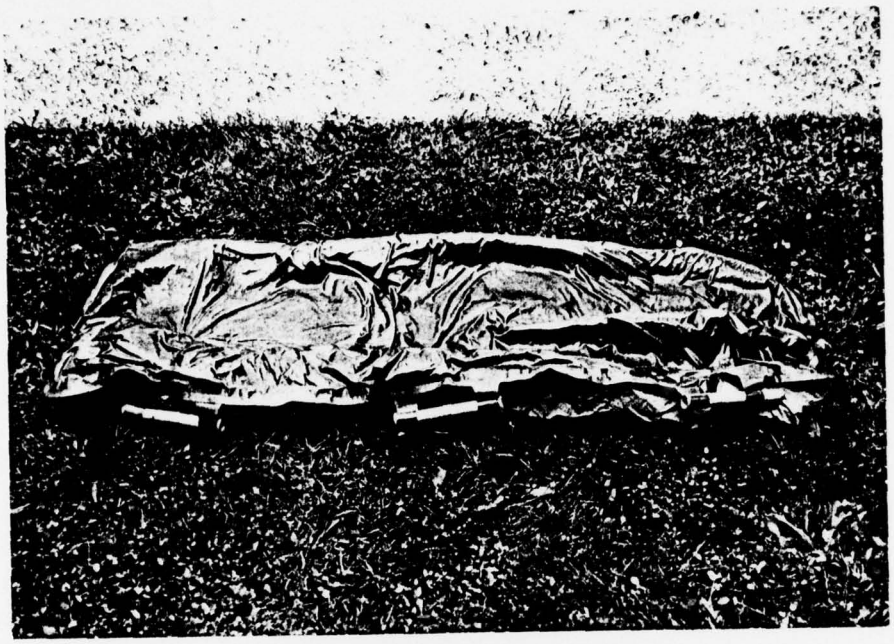

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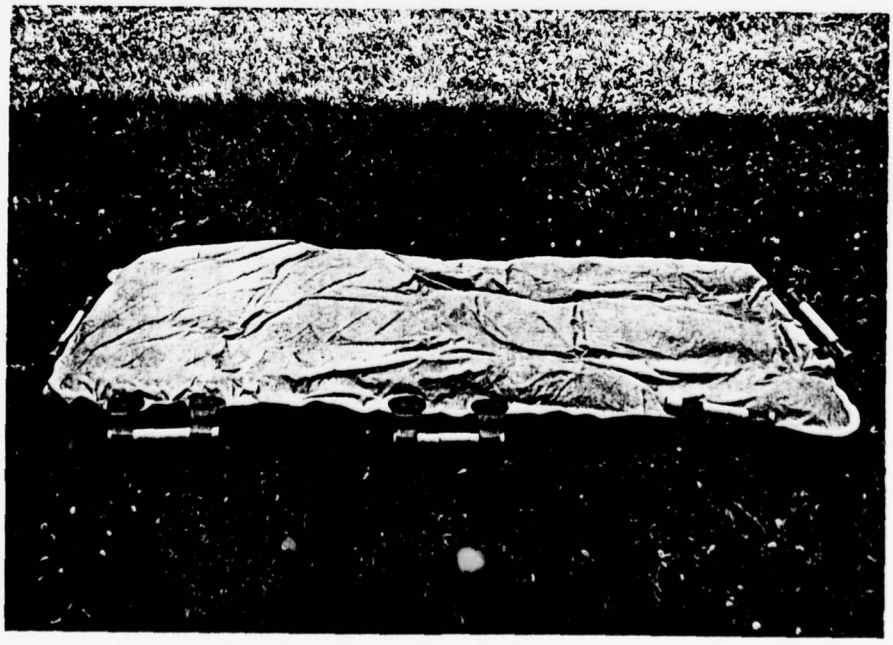

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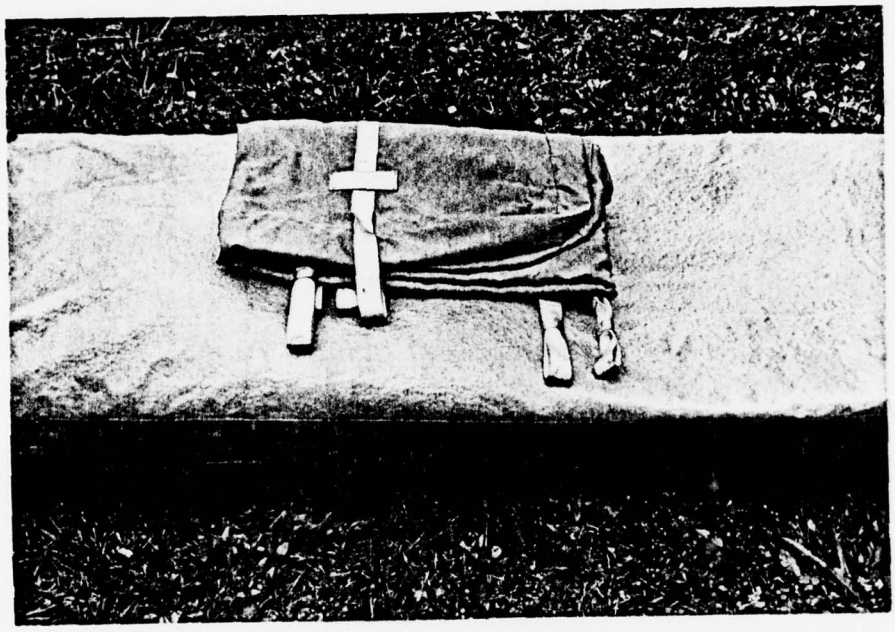
Model 2

Laerdal mattress



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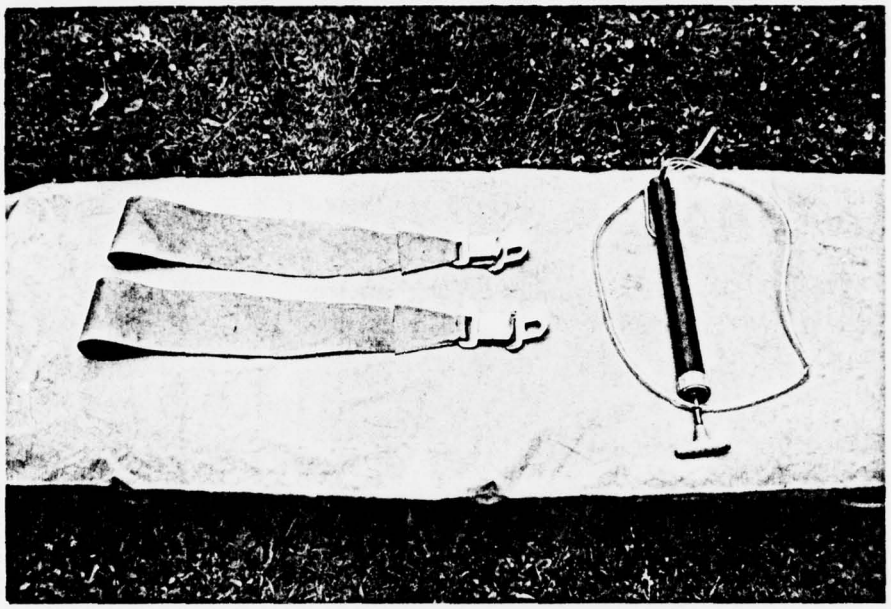
Model 3

/5

Original Firn mattress with handpump and straps



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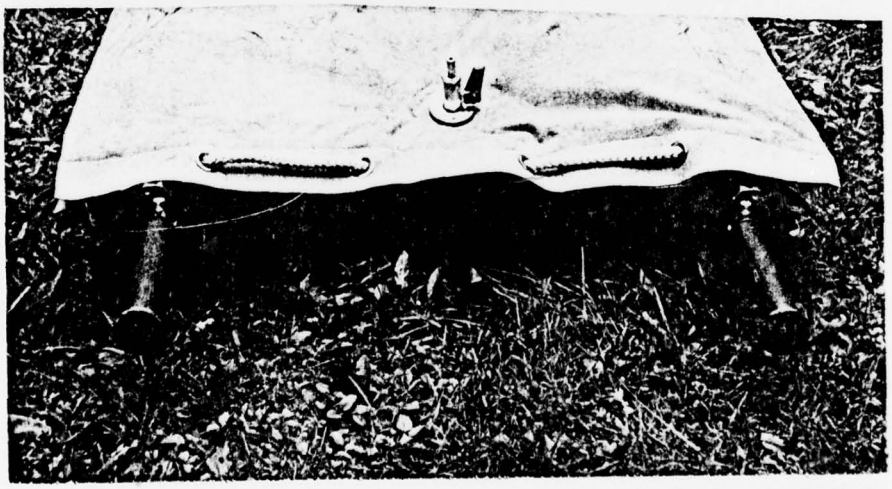

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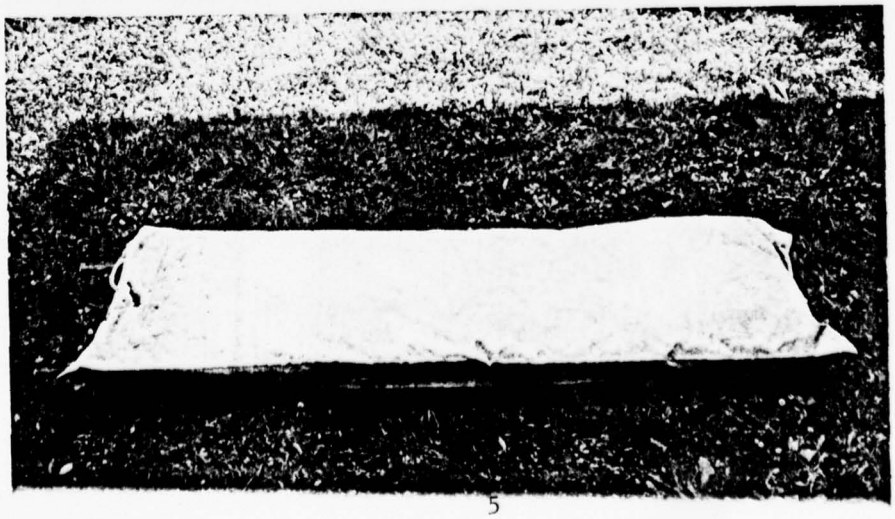

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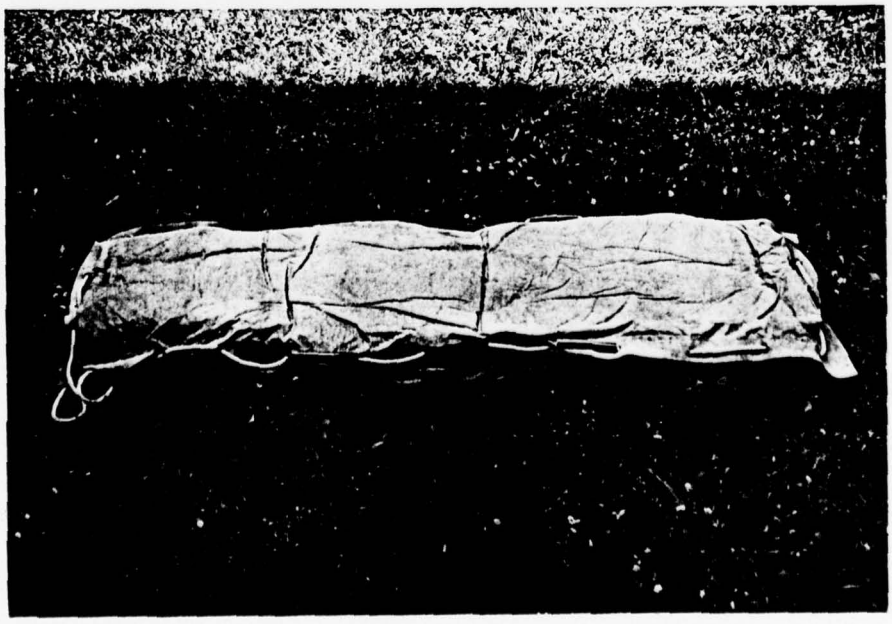

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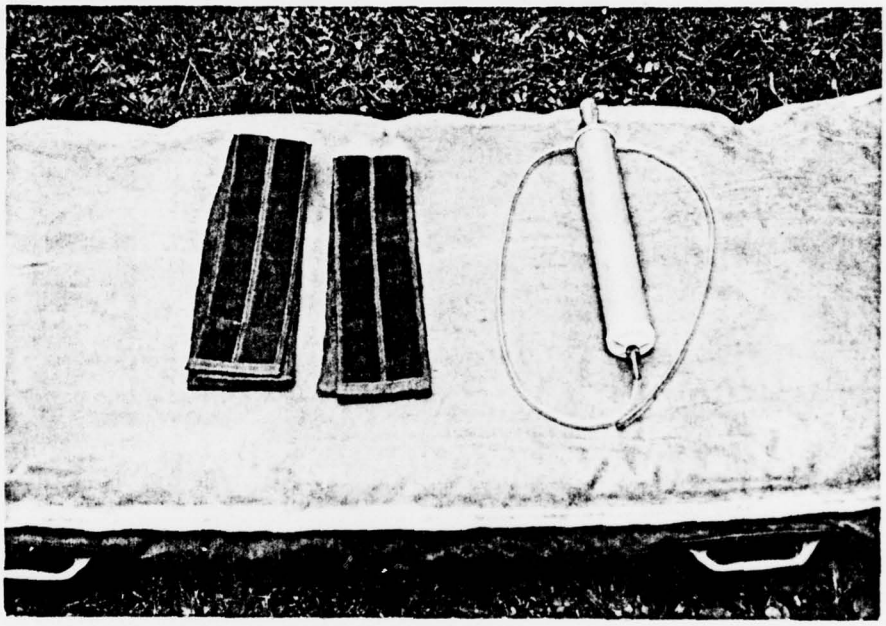
Model 4

Soehngen vacuum mattress with handpump, straps and repair pack



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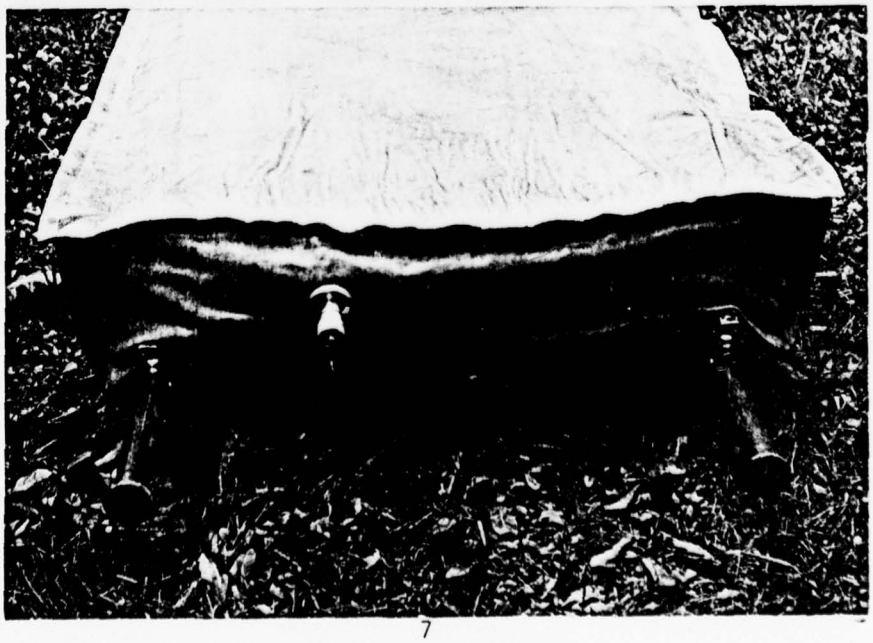

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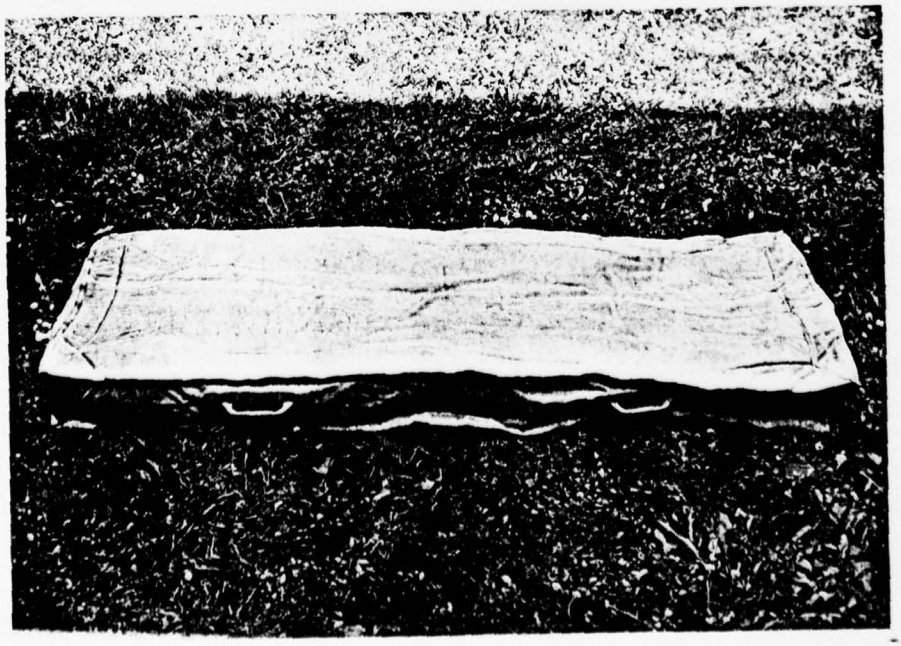

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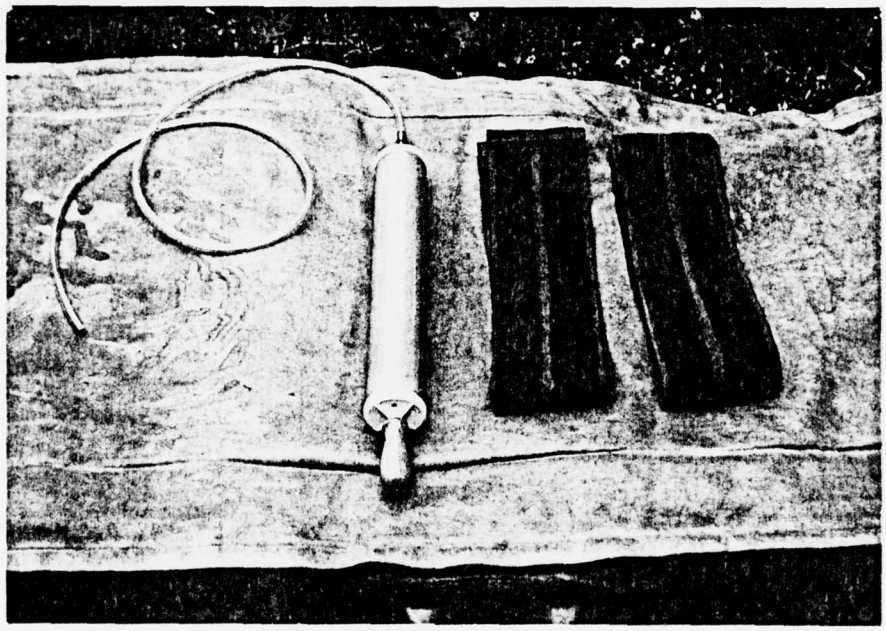
Model 5

Soehngen vacuum mattress with three rips on the longitudinal sides. Handpump, straps, repair pack (not Navy service component).



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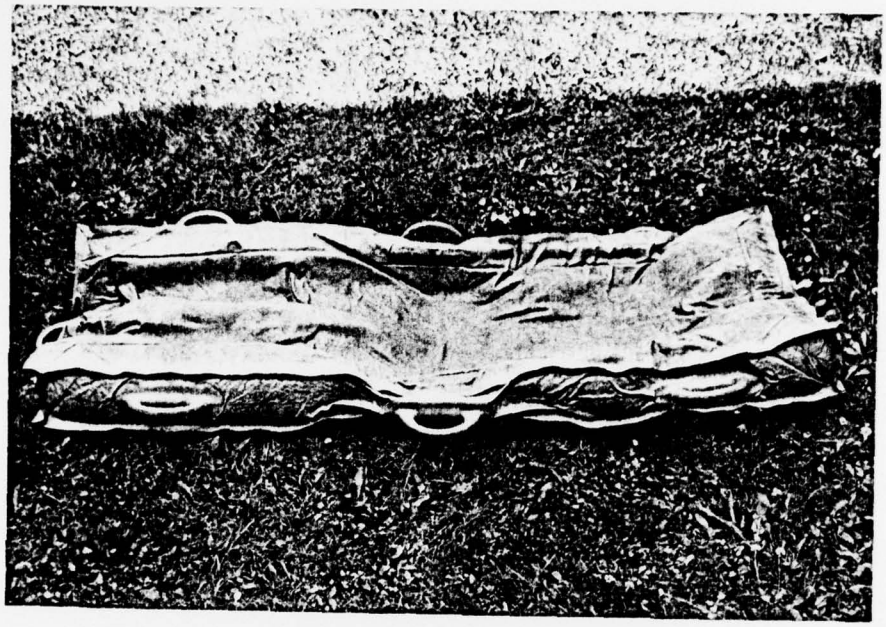

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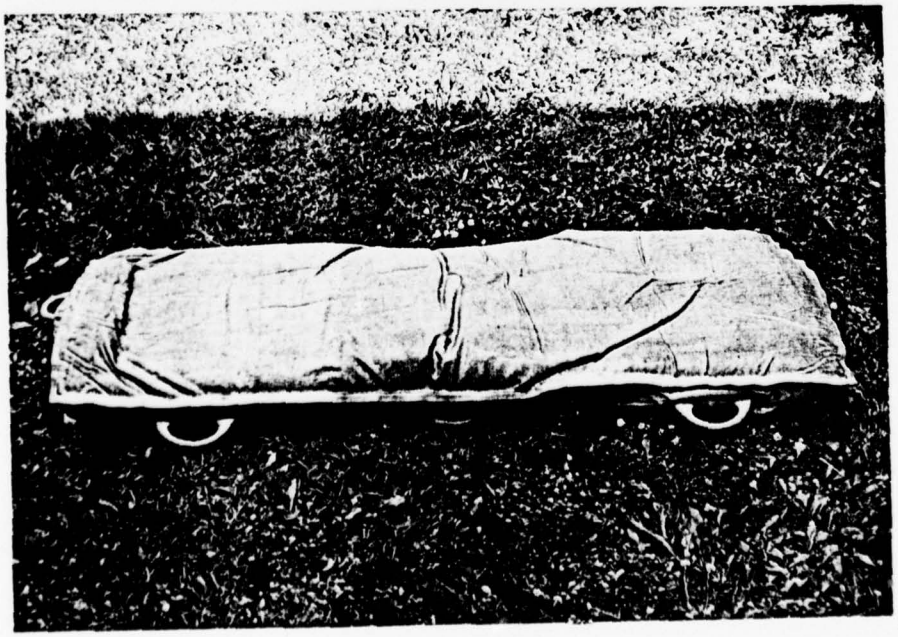

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2.1 Does the size and shape of the vacuum mattresses correspond to requirements? /11

M1 Sufficient length, almost too wide, filling proper, allows good lateral modeling.

M2 Length hardly sufficient, much too narrow; a model 5 cm longer could also find room in the SAR helicopter. Lateral modeling -- especially for heavy patients -- almost impossible owing to narrow width and too extensive filling.

M3 Length and width good. Filling too little, ca. 20-25% more filling material required for good stabilization.

M4 Length and width of contact surface good. Filling determined by box shape is too extensive. Box shape unsuitable, grips too narrow.

M5 Same as M4. Grips better for grasping although disruptive when loading.

2.2 Did deflation of the mattresses take place using the furnished exhaust pump or were other accessories used?

The deflation took place for all models using the furnished pumps, with the field equipment, artificial respiration, automatic drive and with the deflation device, foot operation (Ambu).

2.2.1 Is it absolutely necessary for handpumps to be furnished?

The field equipment, artificial respirator, aut., portable is well suited for deflation although only used occasionally since it is not available everywhere and high oxygen consumption is not always to be tolerated.

The deflation device, foot operation (Ambu) is sufficiently suited for deflation but is also not available everywhere.

Both deflation equipments assume properly configured valves or connecting pieces. Handpumps with good performance and quality are absolutely necessary. /12

2.2.2 Is the suction capacity of the furnished handpumps sufficient to produce an adequate vacuum?

The suction capacity: M1 just sufficient
M3 sufficient
M4 and M5 good.

All pumps furnished do not correspond to minimum requirements for design and stability. Through pump M3, all pumps became unusable or even broken with standard use without extraordinary load.

Proposal

A usable pump should be sufficiently resistant to fracture and stable. Volume not to be less than with M4 and M5. Standing pump with foot holders for both feet. Deflation if possible with pressure.

Insofar as only working with suction is concerned, it must be ensured that neither the handle nor the whole pump is not ripped apart by a rather heavy suction -- which may certainly be necessary.

The hose for the pump should be made of a rubber material with a fabric inlay in order to avoid kinking.

2.3 Is it necessary for mattresses to be premodeled before each use or is a hollow suitable for a satisfactory immobilization produced by the weight of the patient?

An exact premodeling is an absolute prerequisite for an optimum transport of a casualty.

2.4 Are the vacuum mattresses light and can they be adapted to the position of the casualty without great effort?

With a small amount of premodeling and modeling at the sides during deflation /13

M1	Very good and easily done
M2	Not possible since too narrow and overfilled
M3	Good
M4 & M5	Partially unfavorable owing to box shape and too tightly filled.

2.4.1 Is sufficient immobilization possible in every required position?

M1	Yes
M2	No, since too narrow and overfilled
M3	Yes
M4	Yes
M5	Yes

2.5 Is the mattress stable enough in the deflated state to make possible a shock-free, immobile transport even without a stretcher?

The shock-free condition is a function of the transportation resource immobilizing the vacuum mattress but does not absorb shocks when deflated to some extent. All models are not stable enough to make possible an injury-free transport without stretcher.

Models 1, 4 and 5 are suitable for that.

The transport should always be carried out on a firm support (stretchers, etc.).

2.6 The mattress cover is a layered fabric. Is there a difference between the individual mattresses with respect to the pliability of the cover fabric which has a disadvantageous effect on the operational effectiveness?

The differences are not essential.

2.7 When the mattress is deflated, creases occur owing to changes in size. /14

Are these creases found to be uncomfortable in the case of a rather long transport of casualties? Do they inhibit a proper bedding?

It was not possible to take statements on this subject from casualties but tests were carried out with uninjured individuals. This provided only subjective statements.

According to experiences of the Accident Clinic, Murnau, the unavoidable forming of creases resulting during evacuation is nonessential for short transport periods of ca. 1 hour.

When transporting for long periods, a repositioning or checking air pressure and repeated light evacuation is required about every 1½ hours.

2.7.1 Could these creases also produce pressure points on the casualty?

During a long period of transport without rearrangement: Yes!

2.8 Is an optimum protective transport of the casualty achieved only in the connection

Vacuum mattress -- Stretcher

Cf. answer to question 2.5.

The optimum transport capability is provided by the mattress on stretcher.

2.9 Is it advisable to use protective sheets when transporting casualties?

Not necessary to have other than the customary covering for casualties.

Creases are less detectable under a cover as protective cover.

2.10 Securing straps are occasionally supplied for the vacuum mattresses. Is it necessary to strap the casualty on the mattress?

The casualty does not need to be fastened to the mattress in the case of suitable mattresses (except in the case of air transport).

2.10.1 Is it necessary for the mattress to be attached to the stretcher? /15

It is urgently required to attach the mattress to the support (stretcher) in order to avoid slipping.

2.10.2 Can the securing straps be passed simultaneously around the stretcher, mattress and the casualty thereby causing an additional stabilization?

Either sufficiently long straps (like the samples) are to be furnished or -- as would be desirable anyhow -- all stretcher securing straps of the Bundeswehr should be lengthened by about 30-40 cm (change in shape).

2.11 The vacuum mattresses are to be used in medical evacuation resources introduced into the Bundeswehr. What transportation resources are available for testing?

LKW 1.5 t Krkw

LKW 5 t Krkw

MTS M 113 Krkw, armored reconnaissance vehicle, short Krkw

KOM Mercedes and Buessing with 36 seats

LKW 0.25 t with field stretcher holder + Pritsche (platform)

(Aircraft, cf. 2.21)

2.11.1 Is there space available in these transportation resources so that a casualty transport with the mattress can be undertaken without any great difficulties?

M1 Difficulties in the LKW 5 t Krkw
Center bottom and forward top right and left

M2 No difficulties

M3 No difficulties

M4 and M5 Difficulties in the LKW 5 t Krkw
Forward and rear bottom right and left, likewise forward top right and left:
No placement possible bottom center!
Difficulties bottom right and left wiht the MTW M113.

With all models except M2, slight difficulties with strap holders in the KOM. Can be alleviated by skillful molding.

2.11.2 Where was the vacuum mattress stored in the unused state?

The vacuum mattresses should be left during transport flat on the stretcher or on the truck floor. To the extent that the space is confined (e.g., SAR helicopter, MTW M113 Krkw), the vacuum mattresses should be partially premodeled and slightly deflated.

2.12 The vacuum mattresses are also provided for rescue helicopters. Was the mattress also tested in rescue helicopters?

If yes, are the vacuum mattresses available for testing also suited for use in rescue helicopters?

M1 Yes, with slight difficulties

-17-

M2 Ideal dimensions since does not extend beyond the stretcher dimensions. To be rejected for technical reasons (cf. 2.1).

M3 Yes

M4 & M5 Yes with some limitations

M1, M4 and M5 have only limited utility for use in aircraft owing to size.

2.13 It must be expected that the vacuum mattresses will be used without stretcher.

Is the covering material for the mattresses firm enough for no injuries to be caused upon contact with the ground?

In this test, the mattresses were loaded with medium weight soldiers, /17
to the extent possible fully evacuated and carried by two men flat over the ground (ca. 30 m average rough asphalt and ca. 30 m loose Isar gravel -- not sharp edged).

M1 Heavily damaged, a number of rather large holes

M2 Covering material loose, ripped quite easily
Covering material inside, firm, is easily damaged
(test interrupted)

M3 Heavily damaged, a number of large holes

M4 & M5 Deep scratches, a few holes.

All vacuum mattresses are not suitable for dragging on rough surfaces. They should only be used on stretchers or other supports. If dragging is necessary as an exception, this should be done using a rescue cloth for casualties.

2.14 Is it possible to use loading surfaces of cargo trucks in cases of emergency without the mattress being damaged during the loading process?

Insofar as the loading surface does not have sharp edges or nails (is valid for M1-M5).

2.15 To the extent that tracked vehicles were involved in the test, what findings were there made here?

Cf. 2.11.

2.16 Can the mattresses be purified and disinfected without great effort? If yes, what purification and disinfection agent were used?

The following purifying and disinfecting agents were used:

Water,

Aqueous soap solution,

-18-

Zephirol,

Isopropanol,

Ethanol,

Gasoline and ether,

Wetting agent (Pril, Rei), /18

Scouring powder (Vim, Ata).

Gasoline, ether and other solvents dissolve the covering material to a certain extent and should not be used.

For determinations made with other reagents, cf. table at the end of the test report.

2.17 Have any changes at all been found on the covering fabric when it is placed in contact with disinfectants, cleaning substances, blood, etc.?

Cf. table at the end of this test report.

2.18 The vacuum mattresses will also be used at minus temperatures.

Were there noted in this regard any changes at all in the covering fabric (less pliable, cracks in the layered fabric) which adversely affect utility or even make unusable?

This could not be tested since no cool room was available.

2.19 Are the mattresses easily penetrated by X-rays? If this is true, is a higher KV factor (stress value) necessary?

The permeability to X-ray radiation was tested with a radiation measuring device and there resulted therewith a radiation absorption of the primary emission.

In a practical test using a dummy (torso) with the Siemens X-ray equipment Pantoscope 3, it was possible to determine no essential difference in the image quality in the case of comparative photos taken for all models. The photos were taken with 65 kV, 320 mAs, 1.6 s in open light.

Insofar as the skeleton investigations which are predominantly involved, the vacuum mattresses can be used without change of exposure.

The slight differences are compensated for anyhow with automatic X-ray /19
devices.

2.20 Is the vacuum mattress within the meaning of first aid an essential improvement which must without fail be included in rescue vehicles (marine and air transport included) or can it be replaced by other accessories?

The vacuum mattress is an accessory that is indispensible today for injuries of the spinal column, pelvis and in the area of the upper thigh.

A replacement is only provided in previously improvised transportation methods.

-19-

2.21 Supplement for the Air Service Component

2.21.1 Were the vacuum mattresses also tested and used in aircraft? If true, in what types?

The vacuum mattresses were tested in the LTG 61 and in the UH 1D SAR.

M1 Slight limitations since quite large and handles projecting out

M2 Good stowage capability but to be rejected on technical basis

M3 Without difficulties

M4 & M5 Restriction since the box shape and projecting handles are disturbing.

In all other aircraft with strap holding facilities, the mattresses can be stowed as well as or poorer than in the UH 1D.

The spatial relationships are not more unfavorable.

2.22 Supplement for the Navy Service Component

Not available.

2.23 Has the test shown that the vacuum mattresses offer maximum protection during transport expecially of casualties having spinal or pelvic injuries? /20

M1 to M5.

The experiences of the Accident Clinic, Murnau working together with LTG 61, SAR helicopters of the Bavarian Red Cross and the Mountain Rescue Service have shown that an optimum protective transport of casualties having injuries of the spinal column, pelvis and upper thigh area only with the vacuum mattress. The transport with the vacuum mattress can also be required in the case of motor-restless patients having injuries to skull and brain as well as fractures of the lower extremities.

Also possible to be placed prone on the side for injuries of the face and skull and other one-sided injuries.

2.24 The vacuum mattresses are usually provided with two, three securing straps or an encircling securing line.

What model has proven advantageous in this respect?

M1 Carrying capability good, stability questionable, grips occasionally are disturbing by pushing in when being carried in the Medivac resource

M2 Cut in during a rather long transport situation, unfavorably attached, grips are missing on the front

end. No provision made for carrying with rods.

M3 Encircling line quite good; there should be at least six grip possibilities on the side and one on the front side. A slipping through of the rope should be prevented to any extent. The eyes must be strong enough

M4 Too little and too narrow grips

M5 Grips adequate, easy to grasp, projecting out too far, too rigid.

2.25 A repair pack is issued with models 4 and 5.

To the extent that these mattresses become damaged, is it possible using the repair material to achieve a sufficient tightness of the mattress or is a repair pointless? /21

The repair material is satisfactory on M4 and M5. The same material is not satisfactory on any of the other models. Further repair testing could not be undertaken since the fabric of the covering material is unknown and because holes which were not clearly visible could not be detected.

A repair capability must be required to the maximum with currently available or existing material. It is, however, only possible when the vacuum mattresses can also be inflated in order to detect holes which are not clearly visible.

2.26 Is it advantageous to have only one model used by the service component (SAR helicopters included) so that an exchange of mattresses is guaranteed?

Yes.

2.27 Insofar as the tests of the vacuum mattresses have positive results, which model should be given preference?

Model 3.

Still with the following improvements:

Valve shifted on the side,

A practical usable valve mechanism, if possible reversible for deflating,

More filler material (ca. 20-25% more),

More handgrips on the encircling line (one handgrip at the balance point at high level),

Material easy to clean and heavy duty.

Cleaning with Clear Water		Model 1	Model 2	Model 3	Models 4 + 5
Very smudgy street dirt	Fresh	+++	+++	+	++
	Dried	-	-	-	+
Blood	Fresh	++	+++	+	++
	Dried	+++	+++	+	+
Merfen orange	Fresh	+	+	--	+
	Dried	-	-	---	-
Kodon stained	Fresh	+	+	--	+
	Dried	-	-	---	-
Black shoe polish	Fresh	X	X	-	--
	Dried	-	-	---	---
Blue ballpoint pen	Fresh	---	---	---	---
	Dried	---	---	---	---

Key:

+++	Quite easy to clean	---	Not cleanable
++	Easy to clean	--	Cleanable with significant residues
+	Still cleanable	-	Cleanable with slight residues

Gasoline: Should not be used since the rubber is attacked by this agent (easily dissolved).

Cleaning with Aqueous Soap Solution		Model 1	Model 2	Model 3	Models 4 + 5
Very smudgy street dirt	Fresh	+++	+++	+	++
	Dried	−	−	−	+
Blood	Fresh	+++	+++	+	++
	Dried	+++	+++	+	+
Merfen orange	Fresh	+	+	−−	+
	Dried	−	−	−−−	−
Kodon stained	Fresh	+	+	−−	+
	Dried	−	−	−−−	−
Black shoe polish	Fresh	+	+	−	−−
	Dried	−	−	−−−	−−−
Blue ballpoint pen	Fresh	−−−	−−−	−−−	−−−
	Dried	−−−	−−−	−−−	−−−

Key:

+++	Quite easy to clean
++	Easy to clean
+	Still cleanable
---	Not cleanable
--	Cleanable with significant residues
-	Cleanable with slight residues

Gasoline: Should not be used since the rubber is attacked by this agent (easily dissolved).

Cleaning with Sephisol Solution 2%		Model 1	Model 2	Model 3	Models 4 + 5
Very smudgy street dirt	Fresh	+++	+++	+	++
	Dried	-	-	-	+
Blood	Fresh	+++	+++	+	++
	Dried	+++	+++	+	+
Merfen orange	Fresh	+	+	--	+
	Dried	-	-	---	-
Kodon stained	Fresh	+	+	--	+
	Dried	-	-	---	-
Black shoe polish	Fresh	+	+	-	--
	Dried	-	-	---	---
Blue ballpoint pen	Fresh	---	---	---	---
	Dried	---	---	---	---

Key:

+++	Quite easy to clean	---	Not cleanable
++	Easy to clean	--	Cleanable with significant residues
+	Still cleanable	-	Cleanable with slight residues

Gasoline: Should not be used since the rubber is attacked by this agent (easily dissolved).

Cleaning with Isopropanol 99%		Model 1	Model 2	Model 3	Models 4 + 5
Very smudgy street dirt	Fresh	+ + +	+ + +	+	+ +
	Dried	−	−	−	+
Blood	Fresh	+ + +	+ + +	+	+ +
	Dried	+ + +	+ + +	+	+
Merfen orange	Fresh	+	+	− −	+
	Dried	−	−	− − −	−
Kodon stained	Fresh	+	+	− −	+
	Dried	−	−	− − −	−
Black shoe polish	Fresh	+	+	−	− −
	Dried	−	−	− − −	− − −
Blue ballpoint pen	Fresh	− − −	− − −	− − −	− − −
	Dried	− − −	− − −	− − −	− − −

Key:

+++ Quite easy to clean

++ Easy to clean

\+ Still cleanable

--- Not cleanable

-- Cleanable with significant residues

\- Cleanable with slight residues

Gasoline: Should not be used since the rubber is attacked by this agent (easily dissolved).

Cleaning with Ethanol 96% Denatured		Model 1	Model 2	Model 3	Models 4 + 5
Very smudgy street dirt	Fresh	+++	+++	+	++
	Dried	-	-	-	+
Blood	Fresh	+++	+++	+	++
	Dried	+++	+++	+	+
Merfen orange	Fresh	+	+	--	+
	Dried	-	-	---	-
Kodon stained	Fresh	+	+	--	+
	Dried	-	-	---	-
Black shoe polish	Fresh	+	+	-	--
	Dried	-	-	---	---
Blue ballpoint pen	Fresh	---	---	---	---
	Dried	---	---	---	---

Key:

+++ Quite easy to clean

++ Easy to clean

\+ Still cleanable

--- Not cleanable

-- Cleanable with significant residues

\- Cleanable with slight residues

Gasoline: Should not be used since the rubber is attacked by this agent (easily dissolved).

		Model 1	Model 2	Model 3	Models 4 + 5
Very smudgy street dirt	Fresh				
	Dried	Valid for all models			
Blood	Fresh	Cleaning with liquid Pril or similar material			
	Dried	Surface dirt can easily be removed using plastic sponge. Then wash off with clear water.			
Merfen orange	Fresh				
	Dried				
Kodon stained	Fresh	Cleaning with liquid Pril and scouring powder			
	Dried	Stubborn dirt can easily be removed with these agents and a plastic sponge. Then wash off with clear water.			
Black shoe polish	Fresh				
	Dried				
Blue ballpoint pen	Fresh				
	Dried				

Key:

+++	Quite easy to clean	---	Not cleanable
++	Easy to clean	--	Cleanable with significant residues
+	Still cleanable	-	Cleanable with slight residues

Gasoline: Should not be used since the rubber is attacked by this agent (easily dissolved).

Federal Office for Military
Technology and Procurement (BWB)

BA IV 2 January 1975 /1

QUESTIONNAIRE FOR TESTING VACUUM MATTRESSES

1. General

The vacuum mattresses are used for transporting casualties who must be kept as shockfree as possible while prone chiefly in cases involving suspicion of fractures in all sections of the spinal column and pelvis.

The test should show whether vacuum mattresses correspond to the requirements of the Medical Service of the Bundeswehr.

For this reason, it is important to undertake testing close to actual conditions with air, tracked and wheeled vehicles in order to provide an accurate picture of the operational capabilities of the vacuum mattress.

The following models were available for the test:

Model 1 = Draeger rescue mattress with handpump

Model 2 = Laerdal mattress

*Model 3 = Original Firn mattress with handpump

Model 4 = Soehngen vacuum mattress, with handpump, securing strap, repair pack

Model 5 = Soehngen vacuum mattress, with three grips on the longitudinal sides, handpump, securing strap, repair pack (not Navy service component).

Insofar as still further determinations were made during the test which were not taken up in the questionnaire, please likewise forward them to me in order that a comprehensive evaluation can be made concerning the operational effectiveness of vacuum mattresses.

2. Questions

2.1 Does the size and shape of the vacuum mattresses correspond to requirements?

Model 1

Model 2

Model 3

Model 4

Model 5

*Delivered by the firm Binz & Co., P.O.B. 1120, D-7073 Lorch/Wuerttemburg.

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2.2 Were the mattresses deflated by the exhaust pump supplied or were other accessories used? /2

2.2.1 Is it absolutely necessary for handpumps to be furnished?

2.2.2 Is the suction performance of the furnished handpumps satisfactory to achieve a sufficient vacuum?

Model 1

Model 2

Model 3

Model 4

Model 5

2.3 Is it necessary for the mattress to be premodeled before each use or is a satisfactory hollow for sufficient immobilization produced by the weight of the patient?

Model 1

Model 2

Model 3

Model 4

Model 5

2.4 Are the vacuum mattresses light and able to be adjusted to the position of the casualty without great effort?

Model 1

Model 2

Model 3

Model 4

Model 5

2.4.1 Is a sufficient immobilization possible in every required position? (Please provide details concerning implemented capabilities.)

Model 1 /3

Model 2

Model 3

Model 4

Model 5

2.5 Is the mattress in its deflated state stable enough to enable a shockfree immobile transport, if necessary even without ambulance?

Model 1

Model 2

Model 3

Model 4

Model 5

2.6 The cover of the mattress is a layered fabric. Is there a difference between the individual mattress with respect to the pliability of the cover material and does its difference have a disadvantageous effect on the operational effectiveness?

Model 1

Model 2

Model 3

Model 4

Model 5

2.7 When the vacuum mattress is deflated, does there occur creasing owing to changes in measurements?

Have these been found to be uncomfortable in the case of rather long transports of casualties? Do they impede an orderly bedding?

Model 1

Model 2

Model 3

Model 4

Model 5

2.7.1 Can these creases also cause appearance of pressure points in the casualty? /4

Model 1

Model 2

Model 3

Model 4

Model 5

2.8 Is an optimum careful transport of the casualty achieved only in the vacuum mattress to stretcher relationship?

2.9 Is it advisable to use protective sheets when transporting casualties?

Model 1

Model 2

Model 3

Model 4

Model 5

2.10 Securing straps are delivered on occasion for the vacuum mattresses. Is it necessary for the casualty to be strapped to the mattress?

2.10.1 Is it necessary to fasten the mattress on the stretcher?

2.10.2 Can the securing strap be passed simultaneously around the stretcher, mattress and the casualty thus enabling additional stabilization?

2.11 The vacuum mattresses are to be utilized in the casualty transport resources introduced into the Bundeswehr. What transport resources are available for the test?

2.11.1 Is there sufficient room in these transportation resources so that casualty transport can be undertaken with the mattress without great difficulties? /5

Model 1

Model 2

Model 3

Model 4

Model 5

2.11.2 Where will the vacuum mattress be stored in the unused state?

2.12 The vacuum mattresses are also planned for the rescue helicopters.

Has the mattress also been tested in the rescue helicopter?

If yes, are the vacuum mattresses available for the test also suitable for utilization in the rescue helicopter?

Model 1

Model 2

Model 3

Model 4

Model 5

2.13 It must be anticipated that the vacuum mattresses will be used without stretcher.

Is the cover fabric of the mattresses so stable that contacts with the ground will cause no damages?

Model 1

Model 2

Model 3

Model 4

Model 5

2.14 In the case of emergencies, is the use of loading surfaces of cargo vans possible without the mattress being damaged during the loading process with casualties?

Model 1

Model 2

Model 3

Model 4

Model 5

2.15 To the extent that tracked vehicles are involved in the test, what data can be collected in this respect? /6

2.16 Can the mattresses be purified and disinfected without great effort?

If yes, which purification and disinfectant agents were used?

2.17 Have any changes at all appeared on the cover fabric when it comes into contact with disinfecting agents, purification agents, blood, etc.?

Model 1

Model 2

Model 3

Model 4

Model 5

2.18 The vacuum mattresses are also to be used in minus temperature ranges.

Was it possible in this case to note any changes at all in the cover fabric (not as pliable, cracks in the layered fabric) which adversely affect the utility or even make unusable?

Model 1

Model 2

Model 3

Model 4

Model 5

2.19 Do the mattresses easily allow penetration by X-rays? If yes, is a higher KV factor (stress value) required?

Model 1

Model 2

Model 3

Model 4

Model 5

2.20 Is the vacuum mattress an essential improvement in the sense of first aid and does it unconditionally belong in rescue vehicles (including air and sea transport) or can it be replaced by other accessories? /7

2.21 Supplement for Air Force Service Component

2.21.1 Were the vacuum mattresses also tested and used in aircraft?

If yes, in what types?

2.21.2 What data was collected in these cases?

2.22 Supplement for Navy Service Component

2.22.1 Were the vacuum mattresses also tested and used on ships?

2.22.2 What data was it possible to collect in these cases?

2.23 Has the test shown that the vacuum mattresses offer the greatest possible protection when transporting espeically casualties with spinal or pelvic injuries?

Model 1

Model 2

Model 3

Model 4

Model 5

2.24 The vacuum mattresses are in part provided with 2, 3 handgrips or an encircling securing line.

What model has proven advantageous in this case?

Model 1

Model 2

Model 3

Model 4

Model 5

2.25 A repair pack comes with Models 4 and 5. To the extent that these vacuum mattresses become damaged, is it possible to achieve a sufficient tightness of the mattress using the repair material or is a repair useless? /8

2.26 Is it advantageous to have only one model used by the service components (SAR helicopter included) so that exchange of mattresses is guaranteed?

2.27 To the extent that the test of the vacuum mattresses continues to make positive progress, what model is given preference?

Model 1

Model 2

Model 3

Model 4

Model 5

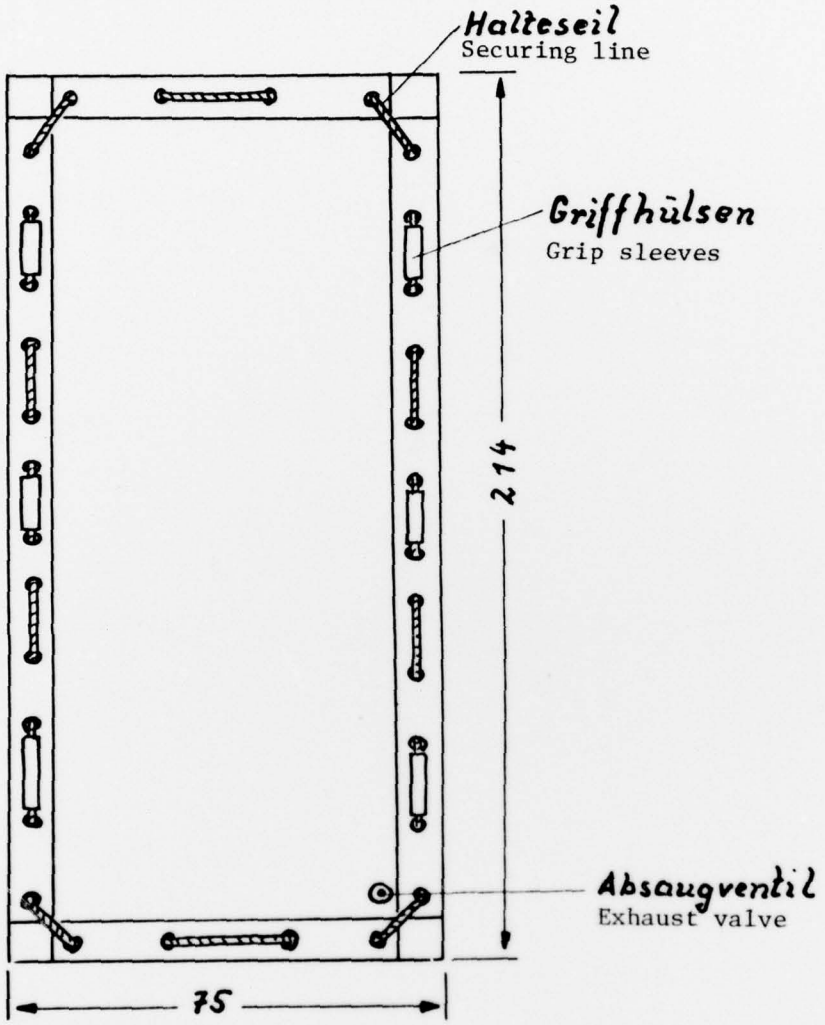
3. Please submit the final report in duplicate by 15 July 1975.

Schema der Vakuum-Matratze

Diagram of the Vacuum Mattress

Fa. Firn
Firm Firn

Maße in cm
Measurements in cm



Cross section
Schnitt

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