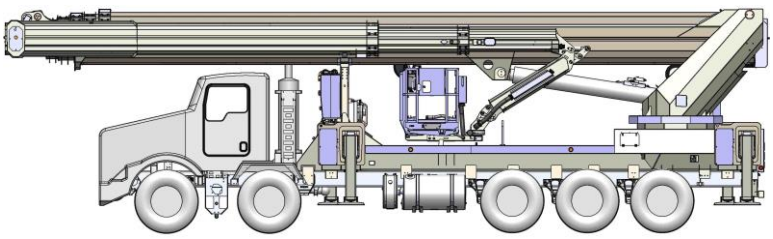
RUTHMANN
A TIME MANUFACTURING COMPANY

Operator's Manual

RUTHMANNSTEIGER®

Mobile Elevating Work Platform

Type	**T 243 AE**
Fabrication no.	**34296**



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Revision sheet

Index	Date	Chap.no / title / version	Changed

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0 General information

The Ruthmann Steiger T 243 AE is equipped with a **D**ynamic **R**each **S**ystem (DRS) as special equipment. The description of the basic DRS package, including the auxiliary computer, can be found throughout the entire operator's manual. The note *(special equipment)* is not explicitly added to the description, as may be the case with other types of special equipment. Furthermore, Chapter 10 "Special equipment" contains other accessories that are used in connection with the basic DRS package.
The following chapter gives you general and legal information as well as explanations for this Operator's Manual as well as important information for you as owners, users, operators, lessors and lessees, brokers and maintenance personnel of the Ruthmann Steiger T 243 AE.

0.1 Introduction

The Operator's Manual is intended for the owners, users, operators, lessors and lessees, brokers and the maintenance personnel of the Ruthmann Steiger T 243 AE. It contains important information for operation and care of the Ruthmann Steiger T 243 AE. With regard to the operation and care of the chassis, we refer explicitly to the Operator's Manual of the chassis manufacturer. These Operator's Manuals must be read carefully. In addition, the personnel must be familiarizing with standard ANSI/SAIA A92.2 "Vehicle-Mounted Elevating and Rotating Aerial Devices". This standard contains important information's toutlining the responsibilities of the owners, users, operators, lessors and lessees, brokers concerning safety, training, inspection, maintenance, application and operation.

Observing the documents specified above helps you to operate the Ruthmann Steiger T 243 AE in a safe, correct and economical manner, to avoid dangers, repair costs and downtimes as well as increase the reliability and service life of the Steiger.

It is your responsibility to maintain the operational readiness and safety of the Ruthmann Steiger T 243 AE by viewing and observing the documents, as well as following our instructions and ensuring for inspection, routine maintenance and care at regular intervals.

The following generally applies:
those operating or using the Ruthmann Steiger T 243 AE are responsible that other humans, animals and objects within the danger area of the Steiger are not at risk of injury or damage.

The signs mounted on the Ruthmann Steiger T 243 AE must be observed.

We would be pleased to respond to any questions you may have. Please call, mail or fax us. In event of questions, correspondences or spare parts orders, please always also specify the type "T 243 AE" and fabrication no. “34296” of the Steiger.

Have a good trip!

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0.2 Quality management system

(Example)

Our quality management system forms the basis for the quality and safety of the Ruthmann Steiger. The development and production processes of the Ruthmann Steiger T 243 AE, as well as the maintenance processes of Ruthmann Services are integrated in a certified quality management system according to EN ISO 9001:2015.
You will find a current copy of the certificate on our homepage at "https://www.ruthmann.de" under "Profile / Quality Management".

0.2.1 Liability for material defects

For the Ruthmann Steiger T 243 AE, the "general terms for delivery of mechanical, electrical and electronic products" of Orgalime applies at the time of concluding the contract as long as any deviations to this are not agreed in writing. These also include, amongst others, the regulation of the terms of liability for personal injury and property damage on or with the Ruthmann Steiger T 243 AE. In case of claims, please do not hesitate to contact our RUTHMANN Services.

0.2.2 Unauthorised changes / retrofits

The Ruthmann Steiger T 243 AE, fabrication no. 34296 corresponds to the time of first placing on the market the fundamental safety and health requirements. Subsequent unauthorized changes, such as e.g.,

- the installation or attachment of fixed mounted components on the, or of the work platform as long as this not permitted by this Operator's Manual.
- Conversions on the superstructure,
- mounting or attaching of box bodies, towing hitches, dropsides, rope winches (e.g., recovery / pulling winches), loading cranes or other superstructures.
- Conversions on the vehicle chassis,
- increasing or reducing the payload of the vehicle chassis,
- rendering the safety equipment ineffective, the adjustment of safety valves,
- electrical modifications, such as on electronic components or devices, terminals or wiring, etc.
- functional modification and / or changes to the performance of the Steiger,
- etc.

where applicable, the machine no longer fulfils the requirements of the safety standards. The "operating permit" for operation is cancelled. If the operation and / or use of the Ruthmann Steiger T 243 AE is influenced fundamentally or the safety level is reduced by, e.g., an unauthorised modification, due to the new hazard or a higher risk as well as their prevention, it can be assumed that this leads to a fundamental alteration to the Steiger and the change must be considered as the superstructure of a new machine. The conformity assessment procedures must be re-applied. Those that have carried out the modification are now considered as the manufacturer and must fulfil the obligations of the safety standards and the applicable guidelines.

Unauthorised changes not carried out in agreement with us releases us from any liability.

The vehicle chassis also belongs the machine Ruthmann Steiger. Modifications to the vehicle chassis must therefore not only be considered in conjunction with participation in road traffic, but could also have an effect on the Ruthmann Steiger T 243 AE as a machine. With regard to this, no unauthorised changes may also be made to the vehicle chassis without having been tested. This also applies for increasing or reducing the payload of the vehicle chassis, even if this would be possible by the vehicle manufacturer, e.g., per clearance certificate (formal) due to the vehicle type. Increasing the payload may, e.g., lead to an overload of the stabilizing jacks. The stability of the Ruthmann Steiger T 243 AE is, where applicable, no longer given due to the changed distribution of weight.

“Major alterations” or “major repairs” are considered as changes on the entire Steiger or on parts of it that have an effect on the stability, the strength or the mode of operation. These modifications require design and approval inspections in such a scope that the modifications or the repairs correspond accordingly. By the replacement of components (repairs), a new conformity assessment procedure is not required. This however, does **not** exclude the inspections specified above.

If a modification of the Steiger is now subject to application of the conformity assessment procedure by replacing or supplementing new components must be checked in individual cases. We recommend that you have any changes checked and carried out by our **RUTHMANN Service** department, also due to the required special knowledge and, where applicable have this checked by an "exceptional inspection".

0.2.2.1 Teleservice, operating data recording with remote query or GPS localisation

When retrofitting devices that, e.g., allow Teleservices, operating data recording with remote query or GPS localisation of the Steiger, take care that the aerials of these devices are positioned outside the switch box (emergency control) in order to ensure for the continuous trouble-free function of the Steiger electronic components. Such devices are, e.g., the devices from "m-tec". As the aerial of these devices is integrated in the device housing, the entire device must be mounted outside the switch box (emergency control). Apart from that, it is forbidden to position these devices in switch boxes (emergency control) on the Steiger-substructure as the housing of the switch box is made of metal (shielding). For the retrofitting of such devices, also contact our **RUTHMANN Service** department due to the required special knowledge or personnel that have been authorised by us.

0.3 Availability of the Operator's Manuals

The Operator's Manuals are integrated components of the Ruthmann Steiger T 243 AE, fabrication no. 34296. They consist of:

- Operator's Manual of the Ruthmann Steiger T 243 AE, fabrication no. 34296,
- Operator's Manual of the chassis manufacturer and
- if applicable, other applicable Operator's Manuals for special equipment.

These operator's manuals must always be available on the Steiger so that they can be refered to by the operating personnel. For example, in the driver´s cabin along with the accompanying documents of the vehicle chassis (☞ Chapters 8.11 and 11.3 of the standard ANSI/SAIA A92.2). If other persons are working with or on the Steiger other than yourself, ensure that these persons are also instructed and have taken note of the operator's manuals.
When selling the Steiger, the manuals specified above as well as the Instruction Handbook of the Ruthmann Steiger T 243 AE, fabrication no. 34296 must also be handed over (☞ Chapter 7.4 and 8.7 of the standard ANSI/SAIA A92.2).

0.4 Layout and content of the Operator's Manual

0.4.1 In principle

The Operator's Manual is intended exclusively for the Ruthmann Steiger T 243 AE, fabrication no. 34296 specified on the cover sheet of the Operator's Manual and is not generally applicable.

The basis for preparing this Operator's Manual were, amongst others,

- Directive and standards based on it, such as
  - EN ISO 12100 "Safety of Machinery",
  - ANSI/SAIA A92.2 "Vehicle-Mounted Elevating and Rotating Aerial Devices",
- as well as the group standard, such as
  - EN IEC/IEEE 82079-1 "Preparation of Instructions for Use",
  - ANSI Z535.6 "Product Safety Information in Product Manuals, Instructions, and other Collateral Materials"
- and the "Technical documentation" of the Ruthmann Steiger T 243 AE.

The Operator's Manual contains all information required for the correct use of the Steiger. They relate to all "Life phases", such as e.g.

- commissioning,
- normal operation (Steiger-operation),
- emergency operation (emergency lowering),
- maintenance and
- disposal.

The content of the Operator's Manual is sub-divided into different chapter levels. A certain clarity and clear legibility should be achieved by using tables, numbers, cross-references and the font "Arial". Illustrations and graphical representations should ensure for a better comprehensiveness. These are basically reduced to the essentials. Differences between the illustrations shown or represented and the delivery state of the Ruthmann Steiger T 243 AE may be possible due to the different device and chassis constellations and do not have any significant influence on the handing of the Steiger. More information can be found in the header and footer. For example, the respective header contains the first headline level of the corresponding chapter. The document number "OM.ENG.25-34296-07-29-FTA-jh", Steiger type "T 243 AE" and page number are specified in the footer, divided into "Chapter and Page No.". Each chapter therefore begins with page number "1". This information makes the clear allocation of the pages easier. Replacement of the pages in event revision of the Operator's Manual, in particular for folders with a loose-leaf folder, is much easier. When pages have to be added, the entire

Operator's Manual do not have to be replaced but only the respective chapter revised, where applicable. In the front, the Operator's Manual are provided with a revision sheet for this purpose. The Operator's Manual must always be considered as a document. **A single chapter is not a complete Operator's Manual**.
The safety of the personnel is at the foreground when describing the functions of the machine as well as when describing maintenance tasks. An overlapping chapter for safety instructions is put in front of the Operator's Manual. If necessary, special warning notes are listed in the further chapters, in particular in front of the handling procedures of the individual life phases.
In order to maintain the readability of this Operator's Manual, the name Steiger is used in the running text instead of the brand name Ruthmann Steiger T 243 AE. The designation of the control position, control elements (control device matrix) and displays of the Ruthmann Steiger T 243 AE are carried out in CAPITAL LETTERS in order to highlight them in the running text.

0.4.2 Explanation for the warning instructions

⚠ **DANGER**	**designates a hazard with high degree of risk that, if is not avoided, may result in mortal or sever injury.**
⚠ **WARNING**	**designates a hazard with average degree of risk that, if is not avoided, may result in mortal or sever injury.**
⚠ **CAUTION**	designates a hazard with average degree of risk that, if is not avoided, may result in minor or moderate injury.
NOTICE	*designates a hazard that, if disregarded, may lead to a hazard for the machine and its function.*

The signal words correspond to EN IEC/IEEE 82079-1 or ISO 3864-2. The signal words DANGER, WARNING and CAUTION are placed in front of a warning sign, consisting of an equilateral triangle that encloses an exclamation mark.

Formal structure of the warning instructions

SIGNAL WORD	Type, source and / or cause of the hazard when disregarded. ⊘ Prohibition(s), forbid(dance) to avoid a hazard. ⊘ … and / or ➢ Measure(s) for averting the hazard. ➢ …

Please consider that the described prohibitions, limitations (and/or) measures to avoid or prevent hazards become effective only when they are observed and implemented by you, the operator / business and the operating personnel.

0.4.3 Explanation for the pictograms

Details, amongst others, with regard to the use of the machine that should be brought to your particular attention.

Details with regard to protecting the environment.

Information for other chapters / instructions.

0.4.4 Structure of the Operator's Manual

The content of the Operator's Manual has the following structure:

- **Cover sheet**
  Identification
  - Original instructions: Instructions of the manufacturer,
  - Title: Operator's Manual,
  - Brand name: **RUTHMANN**STEIGER®,

- Designation of the machinery: Mobile Elevating Work Platform,
- Designation of type: T 243 AE,
- Fabrication no.: 34296,
- Manufacturers address: RUTHMANN Holdings GmbH
  Ruthmannstraße 4
  48712 GESCHER
  GERMANY

- **General information**
  General information
  - Purpose of the Operator's Manual.
  - Explanation of the conformity and their cancellation in event of unauthorised modifications made without informing us.
  - Important information of the operator / business with regard to the provision, instruction / introduction and maintenance of the Ruthmann Steiger T 243 AE.
  - Explanation of the terms used in the Operator's Manual.

- **Intended use and safety instructions**
  Includes the correct use and foreseeable misuse as well as the safety instructions for the safe operation of the Ruthmann Steiger T 243 AE. The intended use is defined here. Enumerations under foreseeable misuse for prohibitions are provided with a bullet in the form of a " ⦸ ". Furthermore, this chapter contains the fundamental as well as special type of safety instructions that must be read and observed by the operating personnel.

  Handling-related warning instructions that relate to specific hazards as a result of handling processes are listed in the respective chapter or in the handling sequences.

- **Technical specifications**
  Technical information on the Ruthmann Steiger T 243 AE.

- **Description**
  Description of individual components, function and operating points of the Ruthmann Steiger T 243 AE.

- **Control elements and displays**
  Description of the emergency stop facility and the control elements for "normal operation" as well as for "emergency operation" (emergency control system) relevant for the operating personnel.

- **Commissioning**
  Information for preparing the Ruthmann Steiger T 243 AE and the set-up location in order to put the Steiger into operation in a safe manner. Enumerations with conditions, measures and checks for a safe operation are provided with a bullet in the form of a " ✓ ". This creates a certain type of "Check list character".

- **Operation**
  Handling the Ruthmann Steiger T 243 AE. The handling processes are represented in a table as far as possible. Requirements are provided with a bullet in the form of a "✓". This also creates a certain type of "Check list character" with regards to the requirements here as well.

- **Emergency control**
  Operation of the Ruthmann Steiger T 243 AE in emergency operation, e.g., in event of failure of the main driving power, the electronics / electrics, etc.

- **Elimination of malfunctions**
  Elimination of problems when handling the Ruthmann Steiger T 243 AE (control-related problems). Elimination of malfunctions. Using a table, possible handling problems are represented, their possible causes specified and a corresponding remedy provided. An explanation is provided for the meaning of the error memory code numbers.

- **Maintenance**
  The section “maintenance” refers to the operating personnel that are responsible for the cleaning and care as well as the daily inspection of the Ruthmann Steiger T 243 AE.

- **Special equipment**
  Contains special equipment where a description is no made in the standard section of the Operator’s Manual.

- **Annex**
  Work area, safety data sheets, etc.

0.5 Information for the operator / business

Next to the information specified here, the information in chapter 1 must also be observed. In addition, the owners, operators, lessors and lessees, brokers must be familiarizing (hereinafter "operator / business") with standard ANSI / SAIA A92.2 “Vehicle-Mounted Elevating and Rotating Aerial Devices”. This standard contains important information’s toutlining the responsibilities concerning safety, training, inspection, maintenance, application and operation.

0.5.1 Requirement on the provision and use

0.5.1.1 General requirements

- The operator / business must provide the operating personnel with a Steiger that is suitable for the conditions in the area of use and for the intended use. The safety and health protection during use must be ensured according to the state of engineering. The intended use must be covered by the correct use of the Ruthmann Steiger T 243 AE.
- The Operator’s Manual of the Ruthmann Steiger T 243 AE must be supplemented by the operator / business by the operating instruction(s) according to the application, on the basis of the risk assessment corresponding to the use as well as existing national guidelines (e.g., accident prevention).
- The operator / business is responsible that the operating personnel of the Steiger take note of the necessary documents.
- Deploy only trained and instructed personnel (☞ Chapter 10.12 of the standard ANSI/SAIA A92.2). The business must exclusively authorise this person must in the operation of the Ruthmann Steiger T 243 AE. The order to operate must be issued in writing. The responsibilities of the personnel for operation and inspection such as vision and function inspections that are necessary in order to guarantee the safety of the Ruthmann Steiger T 243 AE must be clearly defined.
- The responsibility for the operation of the Ruthmann Steiger T 243 AE must be defined. The person responsible must be given the authority to reject instructions of third parties that impair safety.

0.5.1.2 Regulations for technical occupational safety

Regulations for technical occupational safety specify the minimum requirements and apply equally for the operator and business. The regulations describe the measures for occupational safety. They put the technical, organisational as well as personal protective measures for use into concrete terms and instruct when preparing risk assessments. The relevant guidelines must be defined for the use of the Steiger. Being the operator / business, you are responsible for the definition, implementation and compliance of appropriate measures.
More information on the guidelines can be obtained, e.g., from

- the responsible national ministries, institutes and associations for occupational safety and occupational medicine (OSHA),
- the International Powered Access Federation (IPAF),
- the publishers for standards,
- etc.

If national regulations for protective measures with a higher safety level are specified than in this Operator's Manual, then these must be applied.

0.5.1.3 Risk assessment

Being the operator / business, you must carry out a risk assessment according to country-specific guidelines that allows you to verify the safe provision and use of the Ruthmann Steiger T 243 AE. The Declaration of Conformity of the Steiger does not release you from carrying this out. The risk assessment includes the identification as well as evaluation of the hazards and how to avert them. In doing so, amongst others, the hazards must be identified that are linked to the use of the Steiger direct in operation as well as, e.g., interactions with other machines or with other operating materials or the working environment caused at the location of use. The necessary technical, organisational as well as personal protective measures must be in take to avert these. For the implementation of the necessary maintenance work when carried out by themselves, the operator / business must prepare a respective risk assessment in order to ensure that the work is also carried out safely according to the state of the art engineering.
The risk assessment must only be carried out by persons that dispose of the necessary specialist knowledge. Specialist knowledge depends on the respective type of the deployment. They must be kept up-to-date, e.g., by participating on training courses, seminars and further education measures.

Further information on risk assessment can be obtained in the guidelines for technical occupational safety specified above.

0.5.1.4 Operating instruction

The operating instruction should contain in-house instructions for the operational procedures and handling. The work procedures with the Steiger and safety guidelines should be appropriately described in here for the use. In doing so, the safety guidelines are the summary of the protective measures of the risk assessment specified above. The operating instruction should regulate the behaviour of the employee workplace and activity-related with the goal to avoid accident and health risks.
Further information on the operating instruction can be obtained in the guidelines for technical occupational safety specified above.

0.5.2 Instruction / training

Being the operator / business, you are obliged to instruct and train the operating personnel about the existing legal guidelines and accident protection guidelines as well as about the existing safety equipment on the Ruthmann Steiger T 243 AE. The operating personnel must have understood and observed the instructions and training (☞ Chapter 9.3 of the standard ANSI/SAIA A92.2). This should achieve a safety and hazard concious method of working. The training on the Ruthmann Steiger T 243 AE must be confirmed in writing by the operating personnel. It is a component of the instructions for use. The instruction is carried out based on the occasion, where applicable, for each new work task or deployment location. Where required, this can be repeated at least once annually. Identical country-specific regulations of the USA must be observed!

0.5.2.1 Example for instructing / training topics

The following exhaustive list of the topics are guides. The contents of the topics may, e.g., be obtained from the Operator's Manual and operating instructions. They must be supplemented by the content of other guidelines and regulations for a complete instruction depending on the use of the Ruthmann Steiger T 243 AE.

1. Safety

- Legal basis and rules of engineering practice,
  - General legal guidelines,
  - Technical rules for operating safety,
  - Accident protection guidelines,
  - Applicable technical standards,
- General safety instructions,
- Correct use of the Ruthmann Steiger T 243 AE,
- Personnel requirements,
- Personal protective equipment,
- Safety instructions for the commissioning of the Ruthmann Steiger T 243 AE,
- Safety instructions for operation of the Ruthmann Steiger T 243 AE,
- Meaning of the signs on the Ruthmann Steiger T 243 AE,
- Measures in event of emergency,
- Conduct in event of accidents - First aid,
- etc.

2. Information on the Ruthmann Steiger T 243 AE

- Technical specifications,
  - Technical data,
  - Work area,
  - etc.,
- Superstructure,
- Hydraulic system,
- Control, emergency control,
- Control elements and displays,
- etc.

3. Commissioning the Ruthmann Steiger T 243 AE

- Definition of the transport configurations and basic setting,
- Measures such as vision and function inspections that are necessary in order to guarantee the safety of the Ruthmann Steiger T 243 AE,

- Ways of proceeding at the installation location,
  - Safeguarding in public road traffic,
  - Safeguarding for live components of electrical systems,
  - Safety distances from embankments, pits and excavations,
  - Supporting subsurface,
- Safeguarding measures such as, e.g., earthing due to exterior influences on the Ruthmann Steiger T 243 AE,
- Preventive measures for winter operation,
- etc.

4. Operating the Ruthmann Steiger T 243 AE

- Accesses (entering and leaving the work platform),
- Arrangement and dealing with the emergency shut-off facility, control elements / displays,
- Safe jacking (setting up) at the installation location,
- Boom movements,
- Dealing with the emergency control system (emergency lowering), over-riding emergency system and emergency control system in extreme cases,
- Special experience in handling the Steiger,
- etc.

5. Maintenance

- Correct handling of operating materials and lubricants,
- Cleaning and care,
- Inspection such as vision and function inspections that are necessary in order to guarantee the safety of the Ruthmann Steiger T 243 AE,
- etc.

0.5.2.2 Specimen "Certification of training"

Header Header Header Header Header Header *Company logo*

Certification

Mrs. / Mr.
.....
.....
.....

was, on the DD.MM.YYY,
instructed in the operation and function of the Ruthmann Steiger

Type: T 243 AE

Fabrication no: 34296

in accordance with the American National Standards ANSI/SAIA A92.2
“Vehicle-Mounted Elevating and Rotating Aerial Devices”.

The Operator’s Manual of the Ruthmann Steiger T 243 AE
has been accepted and/ or been acknowledged.
The safety guidelines and instructions have
been observed and maintained.

Signature
person instructing
.....

Signature
instructed person
.....

Location, date

Company
Adresse

Footer Footer Footer Footer Footer Footer Footer Footer Footer Footer

0.5.3 Maintenance

The Ruthmann Steiger T 243 AE has been designed and built according to the fundamental safety and health requirements.

Being the operator / business, you are responsible that the requirements on the condition of the Ruthmann Steiger T 243 AE are continued to be fulfilled in accordance with the Industrial Safety Regulations or identical country-specific guidelines.

Being the operator / business, you must take appropriate measures according to state of the art engineering so that the operating personnel are provided with a mobile elevating work platform that guarantees safety and health protection when used correctly.
In order to keep the Steiger in a good condition and thus for a safe and effective operation, care, inspection must be taken of the Steiger as well as maintenance work must be carried out at regular intervals. Cleaning, inspection and routine maintenance at regular intervals should also be carried out depending on the deployment frequency and how difficult the operating conditions are. The harder the operating conditions, the more frequently the work should be carried out. Next to the prescribed inspection and maintenance intervals in the separate Maintenance Manual of the Ruthmann Steiger T 243 AE, it is also your responsibility to have the Ruthmann Steiger T 243 AE inspected and documented by a qualified person (technical expert) in accordance with the guidelines for work equipment of the American National Standards

- ANSI/SAIA A92.2 „Vehicle-Mounted Elevating and Rotating Aerial Devices“.

Identical country-specific regulations must be observed! Conduct a complete protocol of all information of the inspections, routine maintenance and repairs that have an immediate influence on the Steiger safety. As a preventive measure, any safety-related defects that may be caused by, e.g., influences that cause damage such as weather, dust, dirt, corrosive media, ageing, wear, incorrect operation, etc. must be systematically identified and eliminated.
The content of the separate Maintenance Manual of the Ruthmann Steiger T 243 AE give you the necessary information in order to prepare the maintenance plans specified in EN 13306 "Maintenance" in conjunction with the special concerns resulting from your risk assessment for the respective use of your Ruthmann Steiger T 243 AE. In accordance with the "Fundamentals of maintenance", the plans for inspection and routine maintenance must, amongst others, include details about the Steiger, the location, schedule, the measures and the characteristic values to be considered or observed. For a

safe maintenance, before carrying out maintenance work, this, on the other hand, must also be considered within a risk assessment and, where applicable, the resulting operating instructions must be provided.

The Ruthmann Steiger T 243 AE must be checked and maintained at regular intervals according to the intervals of the separate Maintenance Manual of the Ruthmann Steiger T 243 AE. A check must also be carried out by a qualified person (technical expert) after one year at the latest (☞ Chapter 8.2.4 "Periodic Inspection or Test" of the standard ANSI/SAIA A92.2).

We recommend that you refer to our INSPECTION SERVICE and that the "Periodic inspection" (technical expert inspection) is carried out by the RUTHMANN Service department.

The results of the regular periodic inspections as well as the tests following major alterations or repair can be recorded and kept on file in Appendix 3 of the Instruction Handbook for Ruthmann Steiger T 243 AE, fabrication no. 34296 (☞ Chapter 8.3.2 of the standard ANSI/SAIA A92.2). In this way, you can document your operating personnel, your employees or customers that you dispose over a Steiger that has been inspected by a technical expert.

In addition to the above-mentioned regular inspections, a major structural inspection of the Ruthmann Steiger T 243 AE shall be performed after the first fifteen years of service, and at every ten year interval thereafter (☞ Chapter 8.2.5 "Major Structural Inspection" of the standard ANSI/SAIA A92.2).

0.5.4 Disposal

Environmental protection and the responsible handling of resources has a high priority. In order to minimise environmental impacts, the use of raw materials must be optimised. Recycling and reuse of all types of materials is gaining more significance throughout the world. When the service life has exceeded, the Ruthmann Steiger T 243 AE still has valuable operating and recyclable material in the final phase of its life cycle that can be reused by recycling. New high quality products and the beginning of a new life cycle can be created from this. The operating and recyclable materials of the Steiger must be disposed of and according to the local guidelines at the time of disposal, via a recycling facility. For detailed information on the disposal of your Ruthmann Steiger T 243 AE it is a little too early at this stage due to the "long service life" of your Steiger. When delivered, thus when introduced to the market, the Steiger is at the star of its life phase. How the supposed applicable local guidelines for disposal will be at the time of disposal cannot be foreseen at present. As a matter of course for today, if however parts of or the Steiger itself have reached the end of the last life cycle, that

- operating substances such as: operating substances of the chassis, e.g., fuel, engine oil, refrigerant cooling fluid (air conditioning system), brake fluid, operating substances of the Steiger superstructure e.g., gear oils and hydraulic oils,
- materials from: chassis, substructure, boom, work platform, hydraulic and electronic and electric components,
- and hazardous waste such as: vehicle and computer batteries, components contaminated with oil or grease

are disposed of separated from each other and in an environmentally friendly manner or recycled. When recovering, these are complicated disposal or recycling processes where different utilisation goals have been defined. Information on disposal of operating resources of the Steiger superstructure can be obtained from the corresponding safety data sheets in the Annex of this Operator's Manual. The disposal of vehicle and computer batteries is carried out e.g. according to the Regulation (EU) 2023/1542 for used batteries, in accordance with the German battery act "BattG". Identical country-specific regulations of the USA must be observed! Due to the necessary specialist knowledge and technical requirements, we recommend that the disposal of components of the Steiger are carried out by a specialist recycling company. Please contact your public waste disposal agency and specialist waste disposal company for further information. If you should have further information about disposal of the Steiger, please contact the Ruthmann Service department.

0.6 List of terms

The glossary explains terms used in the Operator's Manual. This list is not arranged alphabetically; the terms are grouped according to their technical context.

RUTHMANNSTEIGER® or **STEIGER**® (Mobile elevating work platform)	Machine intended for moving persons, tools and material to working positions, consisting of at least a work platform with controls, an extending structure and a chassis [*ANSI/SAIA A92. 20*]. The Ruthmann Steiger T 243 AE is a mobile elevating work platform mounted on a vehicle chassis that is intended to move persons to working positions where they are carrying out work from the work platform with the intention that persons are getting on and off the work platform only at access positions at ground level or on the chassis and which consists as a minimum of a work platform with controls, an extending structure and a chassis. **RUTHMANN**STEIGER® and **STEIGER**® are registered trademarks for mobile elevating work platforms from RUTHMANN Holdings GmbH. For more than 70 years, they are not only the most well-known name in the trade on the internationally orientated market for HGV elevating work platforms, are also a synonym for creative technology combined with high quality and safety standards.
Classification	Classification into two groups A and B as well as the three types 1 to 3. Type 2 and type 3 can be combined with each other [*ANSI/SAIA A92.20*].
Group A	Mobile elevating work platforms on which the vertical projection of the center of the platform area, in all platform configurations at the maximum chassis inclination specified by the manufacturer, is always

	inside the tipping lines [*ANSI/SAIA A92.20*].
Group B	All other mobile elevating work platforms.
Type 1	Mobile elevating work platform for which traveling is allowed only when in the stowed position [ANSI/SAIA A92.20]. Travelling is only allowed with the mobile elevating work platform in its transport configuration.
Type 2	Mobile elevating work platform for which traveling with the work platform in the elevated travel position is controlled from a point on the chassis. [ANSI/SAIA A92.20].
Type 3	Mobile elevating work platform for which traveling with the work platform in the elevated travel position is controlled from a point on the work platform [ANSI/SAIA A92.20].
Correct use	Use of the Ruthmann Steiger T 243 AE according to the specifications in the Operator's Manual.
Foreseeable misuse	Use of the Ruthmann Steiger T 243 AE in a manner not intended according to this Operator's Manual that, however, may arise from easily foreseeable human behaviour. Such applications are prohibited!
Operating personnel	Instructed persons that are at least 18 years of age, are in possession of their full physical and mental capabilities, that possess the necessary driving permit that are responsible for the commissioning, operation, cleaning, "daily" inspection and transport of the Ruthmann Steiger T 243 AE.

TRANSPORT CONFIGURATION	Fixed defined arrangement of the Ruthmann Steiger T 243 AE in which the Ruthmann Steiger can be taken to the deployment location.
HOME POSITION	Fixed defined initial position of the Ruthmann Steiger T 243 AE. Position that the work platform can be accessed and exited.
Carrying capacity	Highest permissible vertical load of the work platform, that acts on the Steiger by the weight of persons and additional load.
Jacking inclination	Inclination of the Steiger-substructure after setting up the Steiger.
Permissible jacking inclination	Max. permissible inclination up to which boom movements (from the TRANSPORT CONFIGURATION) can be controlled after setting up the Steiger. The permissible jacking inclination must not be exceeded.
Components	Components that contributes to the function of the Ruthmann Steiger T 243 AE with other composite parts.
Stabilizing jacks	Stabilizing jack facility that comprises several jacks and serve to jack by lifting or lowering the complete Ruthmann Steiger T 243 AE.
Steiger-substructure	Substructure consisting of among other things a welded base frame. The base frame serves as a support frame. In combination with the carrier vehicle, it takes up the boom loads occurring from the Steiger-operation and directs them to the ground via the stabilizing jacks.
Boom / lifting equipment	Structure, i.e. carrying construction consisting of - Tower, - lower boom,

- upper boom and
- Rüssel,

that allows the work platform to be moved to a desired work position.

Tower	Rotary column of the boom.
Lower boom	Telescoping connecting arm (boom system) between the tower and upper boom.
Upper boom	Telescoping connecting arm (boom system) between the lower boom and Rüssel.
Rüssel®	Connecting arm (platform lifting arm) between the upper boom and work platform.
Work platform (Load lifting accessories)	Load supports that can be moved into a work position under load where work can be carried out and moved standing on a console. According to ANSI/SAIA A92.20, mobile elevating work platforms where the vertical projection of the load centre of gravity may also be located outside the tipping edge, are classified in group B.
Nominal load	Highest permissible vertical load of the work platform that acts on the work platform by the weight of persons and additional load.
Permissible number of persons	Highest permissible number of persons in the work platform.
Platform additional load	Permissible vertical load from loading the work platform with material and tools depending on the load of the persons so that the maximum nominal load is not exceeded.
Platform floor	Anti-slip standing surface that bears the nominal load.

Guard rail	Open or closed protective equipment, e.g., in the form of a railing on all sides that should prevent persons and objects from falling down from the platform floor.
Anchor point (for personal fall protection systems)	Marked anchorage (anchor eye) designed according to ANSI/SAIA A92.2 for attaching personal fall protection systems. The anchor eye is marked with the number of persons that can be hooked on simultaneously.
Personal fall protection system	A protection system (including all components) according to OSHA regulation 29 CFR 1910.140, that an employer uses to provide protection from falling or to safely arrest an employee's fall if one occurs. Mobile elevating work platforms require a personal fall arrest system, consisting of a body holding device (full body harness) and a fastening system (lanyard), which can be connected to anchor point designed accordance to ANSI/SAIA A92.2. Body belts are prohibited as part of a personal fall arrest system. Fall protection systems criteria and practices are covered in the OSHA regulation 29 CFR 1926.502 (d).
Commissioning	Preparation of the Ruthmann Steiger T 243 AE and the set-up location in order to put the Steiger into operation in a safe manner.
Steiger-operation	Operation of the Ruthmann Steiger T 243 AE according to the specifications in this Operator's Manual within its dimensioning parameters.
Control position	Location at or on the Ruthmann Steiger T 243 AE from which the operating personnel control the operation of the Steiger.

STABILIZING JACK CONTROL	Control unit on the Steiger-substructure that is only used for extracting and retracting the stabilizing jacks.
PLATFORM CONTROL	Operation of the Ruthmann Steiger T 243 AE using the control panel from the work platform.
REMOTE CONTROL	Additional control unit of the Ruthmann Steiger T 243 AE. Operation, e.g., from the ground (special equipment).
EMERGENCY CONTROL	Operation of the Ruthmann Steiger T 243 AE using the additional control facility from the Steiger-substructure. This control facility is only used for the emergency lowering or for maintenance purposes (emergency control facility).
Control command	Actions of the operator (motor skills) carried out manually using control elements that should lead to a controlled Steiger movement or change in the switching state.
Control element (control device)	Human-Machine Interface as part of the control that the operator uses to transfer the control commands to the Steiger. E.g.: - Joystick/control lever - Push button - Function key
Joystick	Control lever in the control panel of the work platform.
Push button (Push function)	Pushbutton operated switching devices where the push button and its corresponding contact piece automatically return to the initial position after being released.
Push button (Push-to-lock-function)	Pushbutton operated switching devices where the push button and its corresponding contact piece remain in the

	operated position until the locking function is released by a second switch movement thus causing a switch to return to the initial position.
Illuminated push button	Push button where the button head is transparent and is fitted with a lamp on the inside which indicates a switched state when illuminated.
Function key	Membrane key where the key and its corresponding contact piece automatically return to the initial position after being released.
Selector button (Push function)	Toggle-operated switching device where the T-handle and its corresponding contact piece automatically return to the initial position after being released.
Selector switch (Push-to-lock-function)	Toggle-operated switching devices where the T-handle and its corresponding contact piece remain in the set position until the locking function is released by a renewed or opposite rotational movement, thus causing the switch to return to the initial or second position.
Display	Human-Machine Interface as part of the control that the operator uses to receive feedback from the Steiger. E.g.: - Warning, signal lamp - LED - Display/clear text display - Buzzer
Warning / signal lamp	Light indicator that indicates malfunctions or switching states by illuminating.
LED	**L**ight **E**mitting **D**iode.
Display / clear text display	Electrically controlled display for the visual representation of variable operational, informative and fault messages.

Buzzer	Acoustic indicator that uses a tone (e.g. intermittent or continuous tone) to indicate switching states or malfunctions.
Inclination display	Display on the control position that shows in a simple way whether the inclination of the Steiger-substructure lies within the permissible jacking inclination. Inclination displays are e.g.: - Corresponding signal lamps or LEDs on the control elements of the control device - Corresponding display screens on the LC display (e.g., LCD levelling indicator) - Corresponding display screens on the clear text display
LCD levelling indicator (electronic levelling indicator)	Electronic inclination display. Visual representation of an electronically measured two-dimensional inclination (XY plane).
IDS	**I**nformation and **D**iagnosis **S**ystem
Over-riding emergency system	Facility that allows the work platform to be moved into the initial position in event of a main drive force failure. The movements are controlled from the work platform (emergency lowering).
Steiger movements	Moving components of the Steiger using control commands.
Electric interlocking	Deactivation of certain movements / functions
LML	**L**oad **M**oment **L**imitation. Safety equipment that switches off the Steiger movement in the work area when triggered, e.g., when reaching the permissible tipping moment.

Stabilizing jack basis	Relating to the stabilizing jack version for the stabilizing jack range of the Ruthmann Steiger T 243 AE.
Fully jacking	Jacks extended horizontally and vertically on both sides.
Stabilizing jack in the vehicle profile on one side	Stabilizing jacks extended vertically on one side and horizontally and vertically on one side in the vehicle profile.
Stabilizing jack in the vehicle profile, both sides.	Stabilizing jacks extended vertically on both sides in the vehicle profile.
Hazard area	Area on or in the surroundings of the Ruthmann Steiger T 243 AE where safety or the health of one or more persons is at hazard by the use of the Steiger.
Working area	Area from which the persons can carry out work from the work platform under normal operating conditions according to the dimensioning of the Ruthmann Steiger T 243 AE when observing the permissible loads and forces. Where applicable, the Steiger can have several working areas.
Lifting height (platform height)	Vertical dimension. Height from the surface on which the Steiger is set up to the floor of the work platform.
Work height	Lifting height (platform height) plus 6.56 ft (2 m). Height to which persons can carry out work from the work platform under normal operating conditions according to the jacking and boom constellation of the Steiger when observing the permissible platform load and manual forces.
Work width (range)	Horizontal dimension. Distance from the middle of the Steiger tower to the rear edge of the work platform plus 1.64 ft

	(0.5 m). Width to which persons can carry out work from the work platform under normal operating conditions according to the jacking and boom constellation of the Steiger when observing the permissible platform load and manual forces.
Maximum range	Maximum working width with rotated work platform (dependent of boom swivel angle).
PPE	**P**ersonal **P**rotective **E**quipment. Special device, apparatus or equipment designed in such a manner that is held or worn by a single person for their protection against one or several health and safety hazards.
Maintenance	Combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function [*EN 13306: 2010*]. The Ruthmann Steiger T 243 AE should be considered as a unit as well as a component.
Maintenance plan	Structured and documented set of tasks that include the activities, procedures, resources and the time scale required to carry out maintenance [*EN 13306:2010*].
Inspection	Examination for conformity by measuring, observing, or testing the relevant characteristics of an item [*EN 13306:2010*]. Measures for defining and assessing the actual state of the Ruthmann Steiger T 243 AE including the determination of the cause and the use and deriving of the necessary consequences for future use.
Service	Maintenance carried out at

- Routine maintenance - (preventive maintenance)	predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item [*EN 13306:2010*]. Measures for delaying the reduction of the existing wear reserves. They serve the maintenance of the functional state of the Ruthmann Steiger T 243 AE.
Repair (corrective maintenance)	Maintenance carried out after fault recognition and intended to put an item into a state in which it can perform a required function [*EN 13306:2010*]. Measures in order to restore the function of a faulty unit. They serve to restore the functional state of the Ruthmann Steiger T 243 AE.
Periodic inspection	Inspection by the qualified person (technical expert) following the initial commissioning at intervals of one year at the most that should indicate that the required safety level has been maintained for operational safety.
Exceptional inspection	Inspection by the technical expert that are necessary after modifications have been made to the construction and following fundamental repairs on bearing components before recommissioning.
Qualified person (technical expert)	Persons who, as a result of their training and experience, have adequate knowledge in their field elevating work platforms and are familiar with the relevant national occupational health and safety regulations, accident protection guidelines and generally acknowledged rules of engineering (e.g. Standard sheets) so that they can assess the safe condition of the Ruthmann Steiger T 243 AE.

Technical expert	Persons who, as a result of their training and experience, have particular knowledge in their field elevating work platforms and are familiar with the relevant national occupational health and safety regulations, accident protection guidelines and generally acknowledged rules of engineering (e.g. Standard sheets). They must be able to inspect and perform a technical assessment of the Ruthmann Steiger T 243 AE.
OSHA	**O**ccupational **S**afety and **H**ealth **S**tandards
IPAF	**I**nternational **P**owered **A**ccess **F**ederation. Organisation that promotes the safe and effective use of mobile elevating work platforms world wide.
DGUV	**D**eutsche **G**esetzliche **U**nfall-**V**ersicherung e. V. (German Statutory Accident Insurance). Central association of the Industrial Trade Associations and the Public-sector Accident Insurers.

1 Intended use and safety instructions

1.1 Using the Ruthmann Steiger T 243 AE

1.1.1 Correct use

The Ruthmann Steiger T 243 AE is a "Mobile elevating work platform" that is intended to move persons to workplaces to allow them to complete from the work platform. Work could be, **e.g.**:

- Inspection,
- Cleaning,
- Assembly,
- Maintenance,
- Painting,
- Tree trimming,
- Photo and film tasks.
  For photo and filming work using a camera mounted on a work platform, you need particular equipment (special equipment).

The work platform on the Ruthmann Steiger T 243 AE is prepared for the attachment of a Ruthmann Lift-Up System (special equipment, ☞ Chapter 10). The Lift-Up system allows loads and object to be carried outside the work platform. The following Ruthmann Lift-Up System can be mounted on the work platform:

- Type: LUS 400, Type No.: 644039

Correct use also includes observing the

- ✓ prescribed operating parameters and measures before commencing driving, Steiger-operation and winter operation (☞ Chapter 2.1.2, 5.2, 5.3 and 5.4),
- ✓ prescribed maintenance conditions (☞ Chapter 9.2 and separate Maintenance Manual, Chapter 5.5),
- ✓ prescribed operating conditions for special equipments (☞ Chapter 10),
- ✓ applicable guidelines for technical occupational safety (☞ Chapter 0.5.1.2) as well as
- ✓ other generally recognised safety-related occupational medicine guidelines and
- ✓ road traffic regulation guidelines.

The Ruthmann Steiger T 243 AE is intended for use outdoors. When used in closed buildings (e.g., halls), particular measures must be taken, amongst others with regard to the diesel engine emissions (☞ Chapter 1.2.12).

The use of the Ruthmann Steiger T 243 AE where a particular method of working or work conditions are necessary that goes beyond the operating parameters and uses of the specified correct use requires our permission.

Ensure that the Steiger is used, maintained and repaired only by personnel familiar with the above and trained with regard to the associated hazards (☞ Chapter 1.1.3).

The persons must access and exit the work platform at the access point near to the ground or from the chassis defined for this purpose. From the work platform, you control the operational movements in order to move the work platform to the work places specified above, according to the specifications in this Operator's Manual.

1.1.2 Foreseeable misuse

The Ruthmann Steiger T 243 AE must, amongst others, **not** be used by persons:

- that have not reached legal age,
- that are not in full possession of their physical and mental capabilities, e.g. due to illness,
- that are under the influence of alcohol, medicine and other drugs,
- that have not been instructed or trained.

Use beyond the intended use specified in Chapter 1.1.1 is not permissible. The Ruthmann Steiger T 243 AE must, amongst others, **not** be used:

- for crane work,
- for extinguishing tasks,
- for pulling loads and trailers,
- for pulling cables,
- for transporting hazardous goods,
- for transporting materials and goods in the work platform during travel operation (e.g. road travel),
- to move persons from one level to another level that leave or access the work platform raised there,
- for blasting work (particular equipment of the Steiger is required for the blasting work),
- for exercising sport activities such as, e.g., bungee jumping,
- for use in potentially explosive areas (no explosion protection),

- ⊘ to earth overhead power lines with the structure, i.e. the Steiger boom,
- ⊘ for use on live components of electrical systems.

1.1.3 Personnel requirements

1.1.3.1 Operating personnel

Only persons are authorised in operating the Ruthmann Steiger T 243 AE that

- ✓ are at least 18 years of age,
- ✓ are in full possession of their physical and mental capabilities,
- ✓ have been instructed and have confirmed this in writing,
- ✓ are in possession of the required driving permit and
- ✓ that they are expected to fulfil the tasks authorised to them in a safe and reliable manner.

The operating personnel must have sufficient qualifications. They must provide the competence to be able to carry out the "Tests before Steiger-operation" (☞ Chapter 5.3.1). These are tests that should ensure the safety and health protection of the persons when working with the Ruthmann Steiger T 243 AE.

1.1.3.2 Maintenance personnel

Only qualified personnel are to be assigned with the inspection, routine maintenance and repairs of the Ruthmann Steiger T 243 AE that, next to the requirements specified in Chapter 1.1.3.1, are authorised to carry out work assigned to them and are able to recognise and avoid hazards due to their

- ✓ professional training,
- ✓ professional experience and their current occupational activities in the field of mobile elevating work platforms as well as
- ✓ their knowledge on the applicable
  - standards,
  - national occupational health and safety regulations,
  - accident prevention regulations and
  - generally recognised rules of

engineering practice. We recommend maintenance personnel to update their specialist knowledge at regular intervals e.g. in further education courses in order to remain qualified and to keep up-to-date on the relevant

developments for inspection, maintenance and repairs of mobile elevating work platforms.

1.2 Safety instructions

At the time of introducing the Ruthmann Steiger T 243 AE to the market, residual risks cannot be ruled out, even when observing the applicable guidelines according to the rules of engineering practice. For this reason, read and observe the safety instructions as well as the special warning notes added to the following instruction chapters! The protective goals and protective measures described will only be effective after being observed and implemented by your or the operator and the operating personnel.

1.2.1 Basic rules

- Caution and mutual consideration are always the highest priority!
- If you are under the influence of alcohol, medicine and other drugs, it is forbidden to operate as well as work on / with the Steiger.
- During all movements of the Steiger, the operating personnel must take care that they and other persons are not put at hazard.
- If several persons are working in or within the vicinity of the Steiger, then a supervising person must be allocated.
- Before starting work, the operating personnel must familiarise themselves with all equipment and actuating elements as well as their functions. It is too late once you have been deployed to work.
- Before each commissioning, the vehicle must be checked that it is road and operational safe.
- Safety equipment must not be rendered inoperable.
- Safety equipment must be kept free of snow and ice before commissioning and during operation.
- The Operator's Manual of the chassis manufacturer must be observed!
- The Operator's Manual of the Ruthmann Steiger T 243 AE must be observed.
- Next to the notes in these Operator's Manuals, also observe the legal and generally applicable safety and accident protection guidelines for the applicable use of the Steiger!
- Inter alia, the relevant chapter 7, 8, 9, 10, 11, 12, etc. of the standard ANSI/SAIA A92.2 "Vehicle-Mounted Elevating and Rotating Aerial Devices" must be observed.
- The legal guidelines must be observed when using public infrastructures!
- If the work platform or boom is swivelled out and / or the work platform is lowered into the traffic area of road vehicles lower than 14 ft 9 in (4.5 m) above the ground then the area underneath the work platform and the boom must be cordoned off.

- Maintain sufficient distance to embankments, trenches, etc.
- The use of the Ruthmann Steiger T 243 AE in potentially explosive areas is prohibited.
- Only switch in the ignition from the driver´s cabin. The vehicle engine must not be started by short-circuiting the electric connections at the starter.
- Before starting up, check the vicinity. Ensure for sufficient visibility!
- Take care when handling fuels.

  - increased risk of fire! -

  Never top up fuels when you are near to open flames or sparks that could ignite. Do not smoke when filling with fuel!
- Exercise caution when handing brake fluids and battery acid.

  - toxic and corrosive! -
- Work only when there is sufficient light and visibility conditions!
- In the following, there is a danger from crushing when:
  - opening and closing the doors and windows of the driver´s cabin,
  - opening and closing of other doors and hatches on the Steiger,
  - opening and closing of covers for emergency equipment.
- With the following activities, exercise particular caution against slipping, tripping, falling or falling down:
  - walking on covers and loading surfaces,
  - walking on the roof of the box body (special equipment),
  - climbing into the driver´s cabin,
  - climbing out of the driver´s cabin,
  - climbing into the work platform,
  - climbing out of the work platform.
- Hazards from burns and scalding is present during operation, in particular at the following locations:
  - cooling water circuit,
  - vehicle engine and exhaust system,
  - auxiliary heater of the vehicle,
  - brake system,
  - hydraulic oil lines (when defective).
- Communication with the personnel must be ensured.
- Operation of the Steiger must be stopped immediately in event of:
  - failure of safety equipment,
  - malfunctions,
  - occurrence of a failure or malfunctions in the control system,
  - unexpected loss of stability,
  - impairment of sight,
  - non-permissible wind conditions,
  - occurrence of fatigue or reduction of attention.

- In event of a hazard occurring in or in the area of the Steiger, actuate the warning device.
- Missing or non-legible lettering must be replaced immediately.
- Missing or warning markings must be replaced immediately.
- Ensure for a roadworthy and stable positioning!
- Stop blocks must be used for slopes and inclinations.
- The permissible axle loads and the permissible total weight of the Steiger must not be exceeded.
- Switch on lights when it starts to get dark, or in event of poor visibility.
- Never leave the Steiger unattended as long as the vehicle engine is still running!
- The vehicle engine and auxiliary heaters must never run when filling the tank with fuel! ***- Toxication hazard! -***
- The operation of the Steiger may only be started once the pneumatic system has been filled.

1.2.2 Travel operation (driving)

- The Operator's Manual of the chassis manufacturer must be observed.
- Passengers may only be transported in the driver´s cabin if this is fitted with a correct passenger seat and the permissible axle loads and the permissible total weight is not exceeded. Moreover, the transporting of persons is not permissible.
- Before commencing driving, free the following areas from snow and ice:
  - roof area of the driver´s cabin,
  - roof area of the box body (special equipment),
  - covers, cargo area,
  - other areas where ice and snow can fall off when travelling.
- When travelling,
  - the Ruthmann Steiger T 243 AE must be in the transport configuration,
  - the doors of the driver´s cabin must be closed,
  - the covers, hatches and other doors of the vehicle must be closed,
  - the doors or roller shutters of the box body (special equipment) must be closed.
- The driving route must have properties that the stability is not impaired.
- The driver must have an overview of the road surface and of the room to be driven through.
- Travelling with the Ruthmann Steiger T 243 AE may only be carried out in the transport configuration of the Steiger and with unoccupied work

platform. Transporting materials and goods in the work platform is prohibited. No obstacles may be in the traversing area.

- Ensure for soft starting and decelerating. Sudden and jerky travel movements are prohibited.
- When travelling through mountains or valleys and travelling crosswise to slopes, avoid sudden curving.
- Never disengage the clutch and change gear on inclinations! The driving behaviour as well as the steering and braking capabilities are influenced by the high centre of gravity. Thus, ensure for sufficient steering and braking capability!
- When travelling through underpasses, bridges, amongst other observe the height of the vehicle.
- When driving through curves, observe the rear swivelling out to the side due to the rear overhang of the vehicle.
- In event of failure of the power unit of the Ruthmann Steiger T 243 AE, tow away according to the Operator's Manual of the chassis manufacturer.
- Observe the front overhang of the boom above the driver´s cabin!

1.2.3 Steiger-operation

- With "One man operation", the windows of the driver´s cabin must be wound up and the driver´s cabin doors must be locked.
- Unnecessary staying on the Steiger and in the area of the swivel mechanism is prohibited during operation.
- Accessing covers as well as the loading area (walking on the roof of the box body with special equipment) is prohibited when operating the Steiger.
- The underground must be able to withstand the maximum loads occurring under the stabilizing jacks.
- Ensure that the Steiger is positioned as horizontal as possible. The permissible jacking inclination must not be exceeded.

  - Risk of tipping! -

  The boom may only be raised after the Steiger has been jacked-up correctly. Correct jacking must also me monitored during operation. In particular, e.g. after work intervals, the extended stabilizing jacks and the jacking inclination of the Steiger must be checked.
- The work platform may only be accessed and exited via the entrance determined for this purpose.
- The permissible nominal load of the work platform must not be exceeded.

  - Risk of tipping / Risk of break up! -

The stability of the Steiger is put at hazard when exceeding the maximum nominal load! Components of the Steiger may be damaged!

- During the operation of the Steiger, we require that you wear an OSHA compliant personal fall protection system in the work platform. Accordance with OSHA regulation 29 CFR 1926.502 (d), this is a personal fall arrest system with a lanyard attached to the anchor eye.
- When using a chainsaw, when two persons are working in the work platform, there must be a separating grid between the person operating the saw and the other person.
- Loads (e.g., tools) must be attached to the work platform in such a manner that an unintentional change of position is prevented.
- Manual forces may only be maximum 90 lbf (400 N).
- Cable drag is prohibited. ***- Risk of tipping! -***
- Objects must not be thrown onto or from the work platform.
- Additional loads that are a hazard to the stability of the Steiger are prohibited. ***- Risk of tipping! -***
- Other additional loads are prohibited after the load measurement device and / or load moment limitation activating.

  - Risk of tipping! -
- Operation must be stopped in event of an upcoming storm.

  - Risk of lightning strike! -

  In an appropriate manner, before operation, obtain information about the weather conditions to be expected from the weather services.
- From a wind velocity more than the permissible wind velocity (☞ Chapter 2.1.2.1), operation must be stopped.

  - Risk of tipping! -

  In an appropriate manner, before operation, obtain information about the weather conditions to be expected from the weather services.
- It is prohibited to attach any types of objects (e.g., writing panels, flags, etc.) that lead to a non-permissible increase of the wind force on the Steiger. ***- Risk of tipping! -***
- The working height and range must **not** be increased or expanded by boards, ladders or other objects.

  - Risk of tipping! -
- The control of all operational-related movements of the work platform may only be carried out by the operating personnel from the work platform.

  - Danger from collision or crushing! -

  Generally the operating personnel on the work platform can themselves best judge the hazards, to which the personnel on the work platform are exposed as a result of obstacles in the operating range of the Steiger. For this reason the operating personnel must always be capable of controlling the movements of the work platform themselves.

- The Steiger must not be allowed to swing. Jerky movements must be avoided.
- Collision of the work platform and / or the boom e.g., against an obstacle (building, vehicle, elevating work platform, crane, tree, branch, etc.) is prohibited.
- The emergency control must only be used for rescuing persons from the work platform (upon their agreement) in event of failure of the work platform control, and for servicing purposes.
- In event of failure to the control system and defects to the emergency lowering facility, if necessary, the fire brigade must be called to rescue the personnel in the work platform!
- In the following, there is a danger from crushing when:
  - opening and closing the access ladder,
  - moving the jacks out and in,
  - lowering the Rüssel,
  - lowering the boom system,
  - swivelling the boom,
  - moving the work platform in the area of objects at the work place.

1.2.4 Leaving the Ruthmann Steiger T 243 AE

- Secure the Steiger against rolling away when leaving:
  - apply the handbrake,
  - turn off the vehicle engine,
  - use chocks on slopes or inclinations.
- When leaving the Steiger, take the key out of the ignition and lock the driver´s cabin!

1.2.5 Electrical system of the Ruthmann Steiger T 243 AE

- Pay attention to the batter gases - they are **highly explosive**!
- Avoid the formation of sparks and open flames near to batteries!
- When charging, the plastic cover must be removed from the batteries to avoid the accumulation of highly explosive gases! Do not perform a quick charge of the batteries!
- Use only original fuses. ***- Risk of fire! -***
- When using a socket in the work platform, a residual current circuit-breaker must be installed in the mains line.

1.2.6 Hydraulic system of the Ruthmann Steiger T 243 AE

- Parts of the hydraulic system are exposed to high pressure!
- When looking for leaks, use appropriate equipment due to the risk of injury!
- Check the hydraulic oil lines and hoses at regular intervals and replace in event of damage and ageing!
- The safety equipment must be checked at regular intervals!
- It is forbidden to replace the hydraulic connections!

- Risk of accident! -

1.2.7 Brakes, wheels and tyres of the chassis

- See Operator's Manual of the chassis manufacturer.

1.2.8 Maintenance

- The Ruthmann Steiger T 243 AE must be checked at regular intervals after one year at the latest. A check must also be carried out by a qualified person (technical expert). Verification of the technical expert check must be recorded.
  For the technical expert check, due to the required special knowledge, we recommend that you contact our **RUTHMANN Service department**.
- The "daily" inspection work may be carried out by the operating personnel (☞ Chapter 1.1.3.1). Moreover, inspection, service and repair requires persons who have been appointed and trained for this purpose (☞ Chapter 1.1.3.2). We recommend that you refer to our **RUTHMANN Service department**.
- During maintenance work, the vehicle must be secured against rolling away in all cases!
  - Apply the handbrake.
  - Use wheel chocks.
- Do not allow the vehicle engine to run in closed rooms without the exhaust gas hose being attached!

- Toxication hazard! -

- The Operator's Manual of the chassis manufacturer is binding for the maintenance of the chassis.
- Fluids escaping under high pressure (fuel, hydraulic oil, brake fluid, water) can penetrate your skin and cause severe injury. Thus, if necessary, seek medical attention otherwise these could lead to serious infections!

- Avoid any skin contact as well as breathing in vapours of hydraulic fluids. Wear protective gloves and protective goggles.
- Dispose of cleaning agent in a correct manner!
- Top up with fuel only when the vehicle engine is turned off!

  - No smoking! -
- Ensure for the prescribed quality of all operating materials, and store only in approved containers!
- After maintenance work, reattach all protective equipment again!

1.2.9 Use of the Ruthmann Steiger T 243 AE on or in the vicinity of parts of electrical systems

- Never move the work platform or components of the Ruthmann Steiger T 243 AE towards **live parts of electrical systems**, e.g., overhead power lines! ***- Mortal danger! -***

  Contact with live parts of electrical systems may have lethal consequences!
- When working on or in the vicinity of electrical system components, the guidelines of the system operator must be observed.
- If live components of the system cannot be e.g., switched
  - voltage-free and earthed for the duration of work to protect persons or
  - isolated electrically or
  - covered and / or shielded,
  - or safeguarded in any other manner,

  it is **essential** to maintain a **sufficient safety distance** to the live components (see e.g., §1926.1408 Table A).
- Always define safety measures in coordination with the system operator.

1.2.10 Earthing the Ruthmann Steiger T 243 AE when being used on transmitter systems, wind turbines or transformer stations

- When working on or in the surroundings of, for example, transmitter systems, wind turbines or transformer stations, the guidelines of the system operator must be observed.
- Before starting work on or in the surroundings of, for example, transmitter systems, wind turbines or transformer stations, where appropriate, the Steiger must be earthed correctly.

- If there are no guidelines known for earthing the Steiger, it is essential to coordinate earthing measures with the system operator before starting work.

1.2.11 Use of the Ruthmann Steiger T 243 AE in residential or sensitive areas

- The operating time of the elevating work platforms with combustion engines in residential or sensitive areas is regulated by the local guidelines of the region (e.g., "German Device and Machine Noise Prevention Regulation"). Residential or sensitive areas are, amongst others:
  - residential areas, small housing estates,
  - spa and clinic areas,
  - grounds of hospital buildings and care institutes,
  - areas for tourist accommodation,
  - special areas that serve for recreation,
  - etc.
- Before starting deployments in the areas specified above, the operating times can be obtained from the legal guidelines. For deployments outside the legal guidelines, an exceptional approval may have to be obtained.

1.2.12 Use of the Ruthmann Steiger T 243 AE in halls

- Driving in halls with the Ruthmann Steiger T 243 AE, and setting up the Steiger there must be coordinated with the responsible statics engineer / hall operator. Amongst others, the construction and statics of the hall / hall floor and the tyres, axle loads, the jack force of the stabilizing jacks as well as the emission values of the Ruthmann Steiger T 243 AE must be considered.
- Before using on hall floors with channels, pipelines, shafts, cable ducts or other hollow spaces underneath, or on other cavity floors (double floors) and ceilings, the carrying capacity of these must be verified in all cases.

  - Risk of tipping! -
- Diesel engine emissions are cancer-causing hazardous substances. The technical guidelines for hazardous substances "Exhaust emissions from diesel engines" TRGS 554 or similar national guidelines must be observed. Depending on the results of the use belonging to the risk assessment for the use, the vehicle engine must not be allowed to run in closed halls without applying emission reducing measures such as, e.g., exhaust

gas aftertreatment systems, plug-on filter or exhaust gas extraction units!

- Toxication hazard! -

The diesel engine emissions of the vehicle engine can be requested, e.g., from the vehicle chassis manufacturer.

If another drive (e.g., electric motor driven secondary drive) can be used instead of the vehicle engine, this should be used during the deployment in the hall if required.

- The risk assessment carried out by the operator for the measures resulting from the intended purpose must be considered in the operating instruction belonging to the deployment.

1.2.13 Starting aid

- When using start jumper leads or a starting device, the Steiger-operation must be switched off.
- The Operator's Manual of the chassis manufacturer must be observed.

1.3 Signage

- The signs on the Ruthmann Steiger T 243 AE must be observed. Next to the information about the control elements, they also, amongst other things, provide specific safety and health statements for persons that work with the Steiger and / or stay on the Steiger. Using the combination of shape, colour, clear text and / or icons (symbols), the following statements specified above are made clear, in particular with regard to safety signs.
- Safety signs mounted on the Steiger (safety labelling)
  - prohibit behaviour that can lead to a hazard (prohibition signs),
  - warning against risks or hazards (warning signs),
  - prescribe specific behavior (mandatory signs),
  - provides further safety statements (information signs),
  - etc.

  If the safety statements of a prohibition, warning or mandatory signs are not sufficient alone, supplementary icons provide further information. The supplementary icon is attached directly below or next to the prohibition, warning or mandatory sign.
- The signs of the Steiger must always be kept in a complete and legible state.
- Detailed information on signage can be found in the spare parts list, Chapter 9 in the separate Maintenance Manual of the Ruthmann Steiger T 243 AE:
  - 0.177.179.300 Lettering USA standard equipment T 243 AE.
  - 0.175.242.100 Lettering after final test.
  - 0.177.203.300 Lettering USA preparation Lift-Up system.

1.3.1 Icons on safety signs

- **Prohibition signs**

⇨ Access to the hazard area is prohibited!
Remaining in the hazard area is prohibited!

⇨ When in a raised state, the driver´s cabin must be empty and remain free of loads. Thus, when the front axle is raised, if is prohibited to remain in the driver´s cabin! Additional load in the driver´s cabin or additional loads or attachments on the driver´s cabin are also prohibited! The front steps must not be used!
Briefly accessing the driver´s cabin for switching the Steiger on and off is excluded from this.

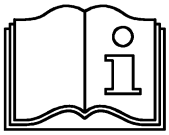
⇨ Use of high-pressure cleaner, water or steam jet, etc. is prohibited!

⇨ Working on or in the vicinity or live parts of the electric system is forbidden!
Maintain a safety distance!

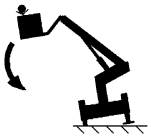
- **Mandatory signs**

⇨ Wear a personal fall protection system (personal fall arrest system, such as a full body harness, connector (lanyard), and anchorage)!

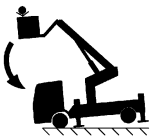
- **Icons on warning and information signs**



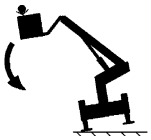
⇨ Improper operation can lead to serious bodily injuries or death! Observe the Operator's Manual!



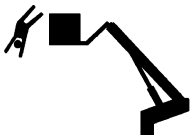
⇨ Risk of tipping!
There is risk of tipping over by yielding of the stabilizing jacks, e.g. sinking in of a jack!



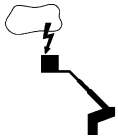
⇨ Risk of tipping!
The stability of the Steiger can, e.g., be reduced by persons and additional load in the driver´s cabin.



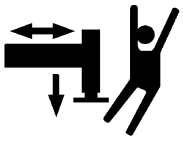
⇨ Risk of tipping!
The stability of the Steiger is put at hazard when exceeding the maximum carrying capacity and / or wind strength!



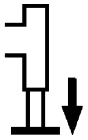
⇨ Risk of falling!
Persons may fall out of the work platform!



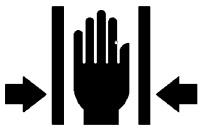
⇨ Risk of lightning strike!
A lightning strike may have lethal consequences! Operation must be stopped in event of an upcoming thunderstorm!



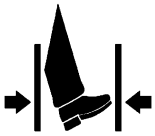
⇨ Observe the jack! Danger from crushing!
Always observe the jack when extracting or retracting!



⇨ Jack force on the underground.



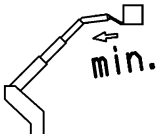
⇨ Warning against hand injuries when telescoping the work platform in. Do not touch the handrail when it is telescoping in.



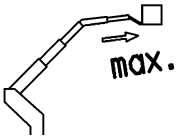
⇨ Warning against foot, leg and knee injuries when telescoping the work platform in. Make sure that feet, legs, knees, etc. are not through the guard rail.

⇨ Warning against risk of tripping.

⇨ Warning of obstacles in the head area.



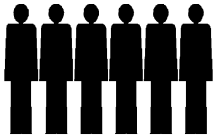
⇨ Upper boom telescope, telescoped in completely.



⇨ Upper boom telescope, telescoped out completely.

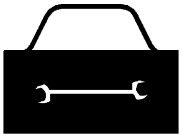
XXX

⇨ Maximum nominal load of the work platform.



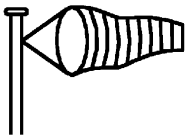
⇨ Permissible number of persons in the work platform. In this example, six persons.

⇨ Permissible number of persons in the work platform. In this example, three persons.

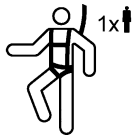


⇨ Permissible additional load (e.g., tools and material) of the work platform.

⇨ Permissible manual force.

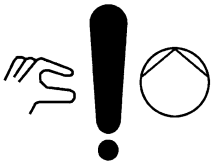


⇨ Permissible wind velocity.



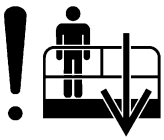
⇨ Only for personal fall protection systems. Anchor point (anchor eye) for personal protection system against falling. In this example, one person for each anchor point.

⇨ Functional earth connection.



⇨ Manual pump.

⇨ Hydraulic oil tank.



⇨ Emergency control device. Indicates emergency control device for emergency control systems in context with other graphic symbols.

⇨ Observe the Operator’s Manual!

1.4 Personal Protective Equipment

If it cannot be ruled out that the personnel are exposed to the risk of accidents, health or safety due to operation-related and organisational measures, the personnel must wear appropriate Personal Protective Equipment (PPE). The priority of the protective measures must be considered when selecting:

1. **Technical** protective measures. (E.g., separation of the hazard point from the work area by, e.g., housing, covers, hoods, shielding / encapsulating, protective grating, cladding, fences, enclosure, insulation, etc.)
2. **Organisational** protective measures (e.g., access limitations, instructions, warning information, etc.)
3. **Person-related** protective measures. (Personal protective equipment, e.g., safety shoes, personal fall protection system, safety helmet, ear protection, protective goggles, protective gloves, protective clothing, etc.)

The use of personal protective equipment must be limited to a necessary minimum. It must be adapted depending on the application case of the Steiger and is based on the summary of the risk assessment. The personal protective equipment must be kept in an orderly state during the entire deployment.

Before accessing the work platform, wear appropriate footwear (e.g., safety shoes with anti-slip tread soles) in order to avoid the risk of slipping, tripping and falling. Adapt the shoes or the soles of the shoes also to the weather conditions. The shoes should always give you a safe grip.

In order to increase safety, we require wearing a **personal fall protection system during the Steiger operation** on the work platform, e.g., in accordance with OSHA regulation 29 CFR 1926.502 (d). The anchor points (anchor eyes) in the work platform are marked for this purpose (☞ Chap. "Icons on safety signs"). The personal fall protection system usually consists of

- a **body holding device**, e.g. a full body harnesses **and**
- a **fastening system**, e.g. an automatically adjustable retractable type fall arrester with energy-absorbing fall arrest function *or* lanyard with integrated energy absorber, which can be connected to the intended anchor point in the work platform.

In accordance with the OSHA regulation 29 CFR 1926.502 (d), the safety brake of the retractable type fall arrester or an energy absorber integrated into the lanyard must reduce the arrest force to below 8 kN (1,800 lbf) for full body harnesses. Fastening systems should not be used in a side-by-side set-up (i.e. two fastening systems in parallel on a body holding device), as this will increase the arrest force.

Generally, full body harnesses, e.g., are provided with respective eyes, as well as practical snap locks. Depending on the version, the harnesses are equipped with comfortable padding in the shoulder, back and leg area, which

should allow prolonged work to be carried out in comfort. The leg and shoulder straps are generally length adjustable. This allows the full body harness to be adjusted individually to the respective user. The personal fall protection system must be worn correctly and remain worn according to the manufacturer specifications. Full body harnesses worn "slackened" impair the safe function of the fall protection system. The full body harness must be worn tight on your body. The full body harness worn correctly is hooked onto the anchor point of the work platform marked for this purpose using the spring hook of the fastening system.
When using a lanyard with an integrated energy absorber, take care that this is located on the full body harness of the person and not on the anchor point of the work platform. We recommend keeping the lanyard short enough so that, i.e., the edge or guard rail of the work platform is not exceeded (freedom of movement)! In event of hazard, the person should be held within the work platform, and not catapulted out of it. Full body harness, if intended to stop a fall, must be adjusted in accordance with OSHA regulation 29 CFR 1926.502 (d) (16 iii) so that the person can neither free fall more than 6 ft (1.8 m), nor contact any lower level. Retractable type fall arresters with an automatic retraction mechanism automatically lock the length of the lanyard to the shortest distance and always allow as much leeway as is necessary for working and moving.
More information on wearing, care and maintenance can be obtained in the Operator’s Manuals of the manufacturers.

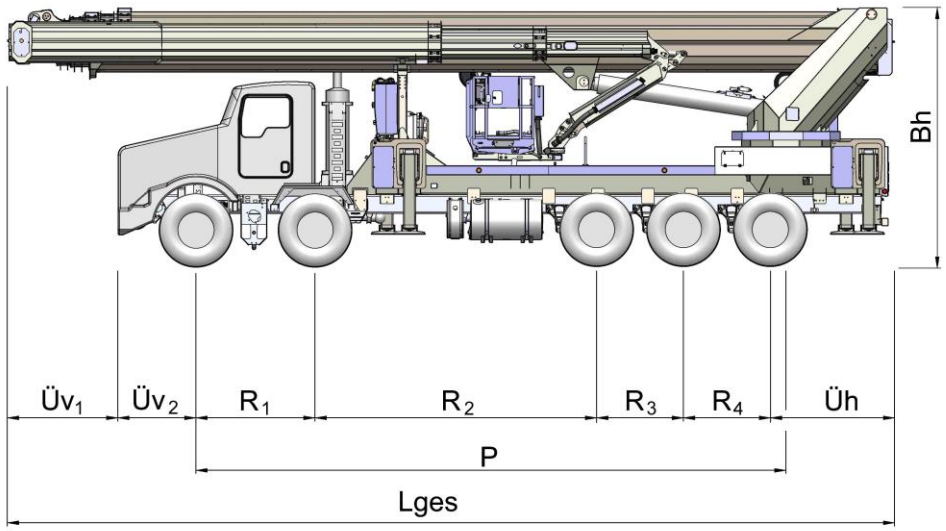
Depending on the application, the applicable legal guidelines for the protective equipment must be observed!

2 Technical specifications

2.1 Technical data

Steiger type	T 243 AE
Classification	Group B / Type 1 (ANSI/SAIA A92.20)
Fabrication no.	34296
Vehicle type (chassis)	Kenworth T 880
Vehicle identification no.	1NK-ZXPTX-8-SR169796

2.1.1 Dimensions and weights of the entire vehicle



Total length in transport configuration	Lges	approx. 45 ft 9 in (13.95 m)
Construction height in transport configuration	Bh	approx. 13 ft 5 in (4.10 m)
Vehicle width, max.		approx. 8 ft 8 in (2.63 m)
Overhang, front	$Üv_1$	approx. 4 ft 9 in (1.44 m)
	$Üv_2$	approx. 4 ft 0 in (1.23 m)
Wheelbase of the vehicle	R_1	approx. 7 ft 2 in (2.18 m)
	R_2	approx. 13 ft 9 in (4.19 m)
	R_3	approx. 4 ft 6 in (1.37 m)
	R_4	approx. 4 ft 6 in (1.37 m)
Overhang, rear	Üh	approx. 7 ft 1 in (2.17 m)
Positioning	P	approx. 31 ft 5 in (9.57 m)
Tyres	Axle 1	425 / 65 R 22.5
	Axle 2	425 / 65 R 22.5
	Axle 3	425 / 65 R 22.5
	Axle 4	425 / 65 R 22.5
	Axle 5	425 / 65 R 22.5
Permissible axle loads		
Front axle group (axles 1 to 2)		total 33,070 lbs (15,000 kg)
Rear axle group (axles 3 to 5)		total 52,910 lbs (24,000 kg)
Permissible total weight		83,775 lbs (38,000 kg)
Own weight		approx. 74,430 lbs (33,760 kg)

When the front axle is raised, it is prohibited to remain in the driver´s cabin! Additional load in the driver´s cabin or additional loads or attachments on the driver´s cabin are also prohibited! The front steps must not be used!
Briefly accessing the driver´s cabin for switching the Ruthmann Steiger T 243 AE on and off is excluded from this.

2.1.2 Details for the Steiger superstructure

2.1.2.1 Main characteristic data

Work height	max. approx. 243 ft 7 in (74.25 m)
Lifting height (platform height)	max. approx. 237 ft 0 in (72.25 m)
Work depth (underfloor)	approx. 45 ft 11 in (14 m)
Max. range (when fully jacked and rotated work platform)	approx. 134 ft 6 in (41 m)
Carrying capacity (Steiger)	max. 1,280 lbs (580 kg)
Permissible manual force	max. 90 lbf (400 N)
Wind load (wind velocity [mph (m/s)] and wind strength [Bft])	max. 28 mph (12.5 m/s) ≙ 6 Bft
Permissible jacking inclination	max. 2°; vehicle wheels ground clearance; between 1° and 2° the outreach will be adapted automatically
Compensating terrain inclination	approx. 3°
Insulation	no
Area of application	Use outdoors (when used in closed buildings (e.g., halls), particular measures must be taken, amongst others with regard to the diesel engine emissions)
Temperature operating range	5°F to +122°F (-15°C to +50°C)

2.1.2.2 Stabilizing jacks

Type of stabilizing jacks	Front:	Horizontal vertical stabilizing jacks
	Rear:	Horizontal vertical stabilizing jacks
Jack range relating to the stabilizing jack basis (jack plate outer edge)		
Full jacking	Front:	approx. 29 ft 4 in (8.96 m)
	Rear:	approx. 29 ft 4 in (8.96 m)
	Left:	approx. 25 ft 5 in (7.75 m)
	Right:	approx. 25 ft 5 in (7.75 m)
Stabilizing jack left in the vehicle profile	Front:	approx. 18 ft 10 in (5.75 m)
	Rear:	approx. 18 ft 10 in (5.75 m)
	Left:	approx. 25 ft 5 in (7.75 m)
	Right:	approx. 25 ft 5 in (7.75 m)
Stabilizing jack right in the vehicle profile	Front:	approx. 18 ft 10 in (5.75 m)
	Rear:	approx. 18 ft 10 in (5.75 m)
	Left:	approx. 25 ft 5 in (7.75 m)
	Right:	approx. 25 ft 5 in (7.75 m)
Stabilizing jack both sides in the vehicle profile	Front:	approx. 8 ft 3 in (2.52 m)
	Rear:	approx. 8 ft 3 in (2.52 m)
	Left:	approx. 25 ft 5 in (7.75 m)
	Right:	approx. 25 ft 5 in (7.75 m)
Jack plate	Front:	approx. 10 in x 1 ft 8 in (0.25 x 0.50 m)
	Rear:	approx. 10 in x 1 ft 8 in (0.25 x 0.50 m)
Maximum jack force on the underground (horizontal jacking, equal vehicle lift)	Front left:	76,000 lbf (338 kN)
	Front right:	76,000 lbf (338 kN)
	Rear left:	76,000 lbf (338 kN)
	Rear right:	76,000 lbf (338 kN)
Maximum surface pressure under the jack plates (horizontal jacking, equal vehicle lift)	Front left:	392 psi (270 N/cm^2)
	Front right:	392 psi (270 N/cm^2)
	Rear left:	392 psi (270 N/cm^2)
	Rear right:	392 psi (270 N/cm^2)

The Ruthmann Steiger T 243 AE must only be jacked using suitable underlays (e.g. Ruthmann supporting plates)!

The underlays must be able to distribute the jack forces equally into the underground. They must be dimensioned with regard to material, thickness and size in such a manner that they can assume the jack forces and reduce the

surface pressure onto the underground to a sufficient degree. See also Chapter 10, subchapter “Supporting plate with milled groove”.

2.1.2.3 Boom

Tower	Swivel angle (when fully jacked)	max. approx. 250° ↻ max. approx. 250° ↺
Lower boom	Boom version	telescopic-lifting arm with 5 elements
	Extension telescope "III"	max. approx. 62 ft 4 in (19 m) (synchronous, 31 ft 2 in (9.5 m) each telescope section)
	Extension telescope "II"	max. approx. 61 ft 6 in (18.8 m) (synchronous, 30 ft10 in (9.4 m) each telescope section)
Angle of elevation		max. approx. 83°
Upper boom	Boom version	telescopic-lifting arm with 3 elements
	Extension telescope "I"	max. approx. 29 ft 5 in (9 m) (synchronous, 14 ft 9 in (4.5 m) each telescope section)
	Telescopic extension in transport configurations	approx. 9 ft 5 in (2.86 m) (synchronous, 4 ft 8 in (1.43 m) each telescope section)
	Angle of elevation	max. approx. 180°
Rüssel	Boom version	1-fold lifting arm
	Angle of elevation	max. approx. 220° = 60° + 160°

2.1.2.4 Work platform

Work platform Type coding: Type:	HP . Alu . 600 - 20 . N . 0 . 01 Aluminium telescope work platform
Dimensions	approx. 7 ft 9 in x 3 ft 6 in (2.37 m x 1.07 m)
Width of the platform can be telescoped to	max. approx. 12 ft 4 in (3.77 m)
Height of the guard rail	approx. 3 ft 7 in (1.10 m)
Work platform rotation angle	approx. 220° ↻ approx. 220° ↺
Nominal load "I" - upper boom telescope, telescoped in completely or telescoped out up until transport configuration	max. 1,280 lbs (580 kg)
Permissible number of persons	6
Permissible additional load (special equipment, tools and material apply as additional load!)	230 lbs (100 kg) = 580 kg - 6 persons (480 kg)
Nominal load "II" - upper boom telescope, telescoped out completely	max. 660 lbs (300 kg)
Permissible number of persons	3
Permissible additional load (special equipment, tools and material apply as additional load!)	135 lbs (60 kg) = 300 kg - 3 persons (240 kg)
Access	left and right
Grounded socket	Electrical duplex grounded receptacles 110 V / 15 A / 60 Hz
Socket	2-pin 24 V (DC)
Moving spotlight, can be removed (special equipment)	LED 12 V/24 V (DC) - 11 W
Pneumatic / water line connection (special equipment)	Operating pressure: max. 2,176 psi (150 bar) Temperature: max. +176°F (+80°C)
Communication with control position PLATFORM CONTROL	none

2.1.2.4.1 Carrying capacity of the Steiger and nominal load of the work platform

The Ruthmann Steiger T 243 AE is designed for a loading of 1,300 lbs (590 kg) in its basic version. The work platform of this Ruthmann Steiger T 243 AE, fabrication no. 34296 is equipped with fixed installed special equipment. Due to the design, equipment fixed installed are included in the net weight. They therefore reduce the usable load, i.e. the carrying capacity of the Steiger and the nominal load of the work platform compared to the basic version mentioned above. The maximum load (weight of persons and additional load) of the Steiger is specified on the fabrication sign as carrying capacity, as well as also on the work platform as nominal load. In accordance with ANSI/SAIA A92.20, the following applies:

$$m = n \cdot m_p + m_e$$

m	≙	Nominal load
n	≙	Permissible number of persons in the work platform
m_p	≙	176 lbs (80 kg), mass of a person
m_e	≙	≥ 88 lbs (40 kg), mass of tools and material

The carrying capacity and the nominal load compared with the basic version are listed in the following:
- Steiger carrying capacity max. 1,300 lbs (590 kg) (basic version),
- Steiger carrying capacity max. 1,280 lbs (580 kg) (fabrication no. **34296**),
- **Nominal load** work platform max. **1,280 lbs** (580 kg) (fabrication no. **34296**),

The nominal load of 1,280 lbs (580 kg) is decisive. This value must **not** be exceeded!

The marking of the work platform may be rendered invalid due to the attachment or removal of fixed installed equipment that you make onto or for a work platform. The decision if an attachment or removal is subject to a change must be made in separate cases. We recommend that you have the attachment or removal of fixed attached components checked and carried out by our **RUTHMANN Service** department due to the necessary specialist knowledge.

The work platform can be equipped with further removable special equipment. The extra weight of the equipment, i.e. the sum of the masses, must be considered when loading the work platform.

2.1.2.4.2 Weight of possible equipment of the work platform

Equipment		Additional weight
- Telescopic aluminium work platform (work platform US version)	(E)	18 lbs (8.0 kg)
- Ambient and platform floor lighting	(E)	4.4 lbs (2.0 kg)
- 1 item fold down seat		11 lbs (5.0 kg)
- 1 item tool tray		3 lbs (1.5 kg)
- 1 item tool tray (large)		7 lbs (3.0 kg)
- 1 item height adjustable wind gauge		12 lbs (5.5 kg)
- 1 pair hydraulic quick coupling for the connection of hydraulic tools	(E)	20 lbs (9.0 kg)
- 1 item work spotlight		2 lbs (1.0 kg)
- 1 holder for the work spotlight	(E)	1 lbs (0.5 kg)
- Preparation Lift-Up system (fixing material)	(E)	2 lbs (1.0 kg)
- Lift-Up system LUS 400		25 lbs (11.5 kg)

2.1.2.4.3 Determining the usable load of the work platform

The net weights of the type-related fixed installed equipment (E) specified above no longer find consideration in the determination. They have already been included in the specification of the nominal load of the work platform ex-factory. See also explanation of "Field 4" of the type code in the chapter "Identifying the work platform".

Delivery state (see work platform)

$$580\ kg = 600\ kg - 10 * \text{integer}\ (^{1}/_{10} * (8.0 + E_2 + \ldots + E_n))\ kg$$
$$580\ kg = 600\ kg - 10 * \text{integer}\ (^{1}/_{10} * 20.5)\ kg$$
$$580\ kg = 600\ kg - 10 * \text{integer}\ (2.05)\ kg$$
$$580\ kg = 600\ kg - 20\ kg$$

$$1{,}280\ lbs \approx 1{,}323\ lbs - 44\ lbs$$

Moreover, further removable special equipment must be considered as follows:

$$T_{Platform} = N_A - \Sigma\ m_{rSE(i)}$$

Example: Delivery state

$$T_{Platform} = 1{,}280\ lbs - \Sigma\ m_{rSE\ (i)}$$
$$(T_{Platform} = 580\ kg - \Sigma\ m_{rSE(i)})$$

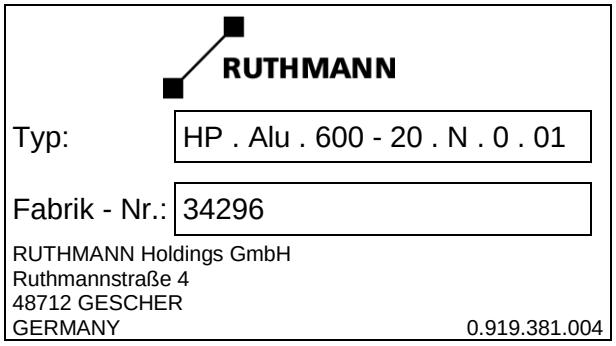
or. $T_{Platform} = 660\ lbs - \Sigma\ m_{rSE\ (i)}$
($T_{Platform} = 300\ kg - \Sigma\ m_{rSE(i)}$)

$T_{Platform}$	≙	Remaining usable load of the work platform (weight of persons and additional load)
N_A	≙	Nominal load (I or II) of the work platform
$\Sigma\ m_{rSE(i)}$	≙	Sum of the **m**asses of **r**emovable **s**pecial **e**quipment

Principally, the weights of removable equipment must be considered as additional load.

2.1.2.4.4 Identification of the work platform

For clear identification, a sign with the following details is attached to the work platform in the bottom middle area of the guard rail / kick plate, on the side of the boom facing the tower:



The *Typ* (type) coding “HP . Alu . 600 - 20 . N . 0 . 01” comprises seven characteristic fields separated by " **.** " and " **-** " with letters and number combinations with the following meaning:

Field 1: ⇨ Model series (drilling pattern and the free space consideration).
Field 2: ⇨ Material of the work platform.
Field 3: ⇨ Carrying capacity of the EN basic Steiger version.
Field 4: ⇨ Carrying capacity reduction value, 00 ≙ **No** reduction, 10 capable integer value of a 10 proportion of the total weight of fixed installed equipment of the work platform.
Field 5: ⇨ Isolation marking. N ≙ **No** isolation / I ≙ isolation.
Field 6: ⇨ Conductor marking. Steps of an access ladder attached to the work platform, 0 ≙ **No** access ladder present.
Field 7: ⇨ Version number of the work platform.

The *Fabrik-Nr.* (fabrication no.) “34296” is the fabrication no. of the Steiger, for which the work platform is designed.

2.1.2.5 Hydraulic pump drive

Main drive	Vehicle engine	see Operator’s Manual of the chassis manufacturer
	Hydraulic pump	Axial piston - variable displacement pump (tandem pressure-controlled hydraulic pump)
	Control of the engine speed (according to the PTO switched on)	automatically to approx. 950 / 1,100 / 1,350 rpm
Auxiliary drive for emergency lowering		Manual pump
Auxiliary drive		Battery operated hydraulic pump
Hydraulic oil in the system		
	Trade name	RENOLIN LF 15 HV
	Quantity	915 l

2.1.2.6 Control

Control	Electronic proportional control
Power supply (intern)	Vehicle battery incl. converter 12 V / 24 V (DC)
Operating voltage, part of chassis	12 V (DC)
part of Steiger	24 V (DC)
Control voltage	24 V (DC)
Control position	- STABILIZING JACK CONTROL, - PLATFORM CONROL, - REMOTE CONTROL (special equipment), - EMERGENCY CONTROL
Operating and fault message encoder	- Warning and signal lamps, - Graphic capable Display, - Clear text display
Joystick configuration	000
Platform overload detection aid (occurrence of the reaction when the load is exceeded by more than):	110 % of the permissible carrying capacity
Platform bottoming detection Level 1: Level 2:	 110 lbs (50 kg) 220 lbs (100 kg)

2.1.2.7 Vibrations

Effective value of the estimated acceleration	
in the work platform	$a_w < 0{,}5\ m/s^2$

2.1.3 Details on the chassis

The technical specifications for the chassis can be obtained in the Operator's Manual of the chassis manufacturer.

2.1.4 Static and dynamic inspections by the manufacturer

The objective responsibilities as well as type, scope and implementation of the inspections before the first commissioning must be obtained from, e.g., the principles of the standard

- ANSI/SAIA A92.2 "Vehicle-Mounted Elevating and Rotating Aerial Devices".

The following inspections were, using intended stabilizing jacks at horizontal jacking, carried out in the scope of determining the agreement with the safety requirements and / or measures:

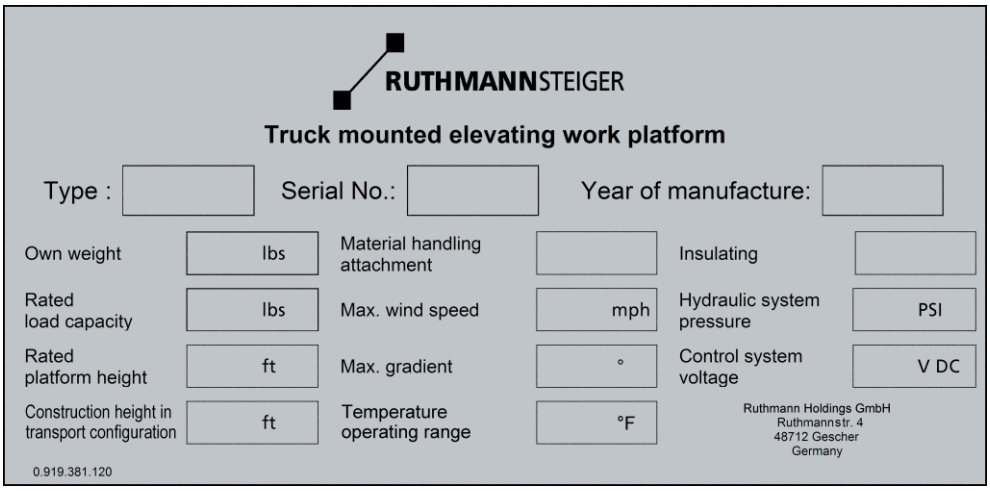
- Stability check
- Overload inspection
- Function inspection

The results of the inspections show that the Ruthmann Steiger T 243 AE

- has stability,
- is stable,
- all functions work correct and safe and
- the markings have been attached.

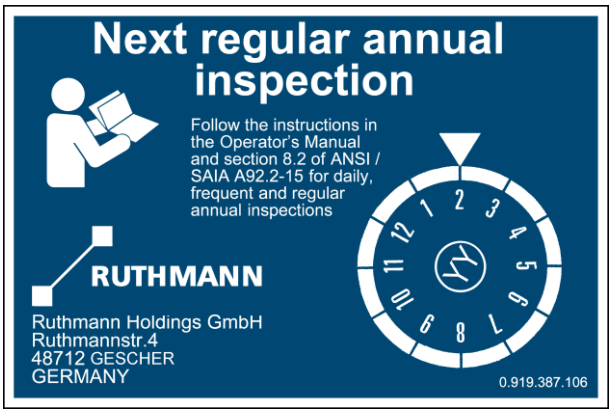
2.2 Fabrication sign and inspection tags

Fabrication sign (example).



Our inspection tags with information about the next regular inspection.

Plate with inspection tag on tower of boom (example).



2.3 Work area

The working areas are based on, amongst others, the following stabilizing jack version *(The permissible jacking inclination must not be exceeded.)*:

1. Full jacking
   - All jack arms are completely extended horizontally.
   - All jacks have ground contact.
   - The vehicle wheels have ground clearance.
2. Stabilizing jack in the vehicle profile, left side.
   - The jack arms remain completely *retra*cted horizontally, *left* side. On the opposite side they are completely extended horizontally.
   - All jacks have ground contact.
   - The vehicle wheels have ground clearance.
3. Stabilizing jack in the vehicle profile, right side.
   - The jack arms remain completely *retra*cted horizontally, *right* side. On the opposite side they are completely extended horizontally.
   - All jacks have ground contact.
   - The vehicle wheels have ground clearance.
4. Stabilizing jack in the vehicle profile, both sides.
   - The jack arms remain completely retracted horizontally, both sides.
   - All jacks have ground contact.
   - The vehicle wheels have ground clearance.
5. Fully variable jacking
   - All jack arms are randomly extended. The computer control receives the associated reach from the Dynamic Reach System (DRS) corresponding to the actual support situation.
   - All jacks have ground contact.
   - The vehicle wheels have ground clearance.

The working area depends on the stabilizing jack version of the Ruthmann Steiger T 243 AE specified above. The jacking inclination in the graphic representation of the standard working area is max. 1°. The work platform is rotated. From a jacking inclination of 1° up to the maximum permissible jacking inclination of 2°, the range reduces accordingly. The maximum permissible jacking inclination must not be exceeded. Graphical representations can be obtained from Chapter 11.1 of the Annex of this Operator's Manual.

2.4 Beaufort scale

Excerpt from the Beaufort scale

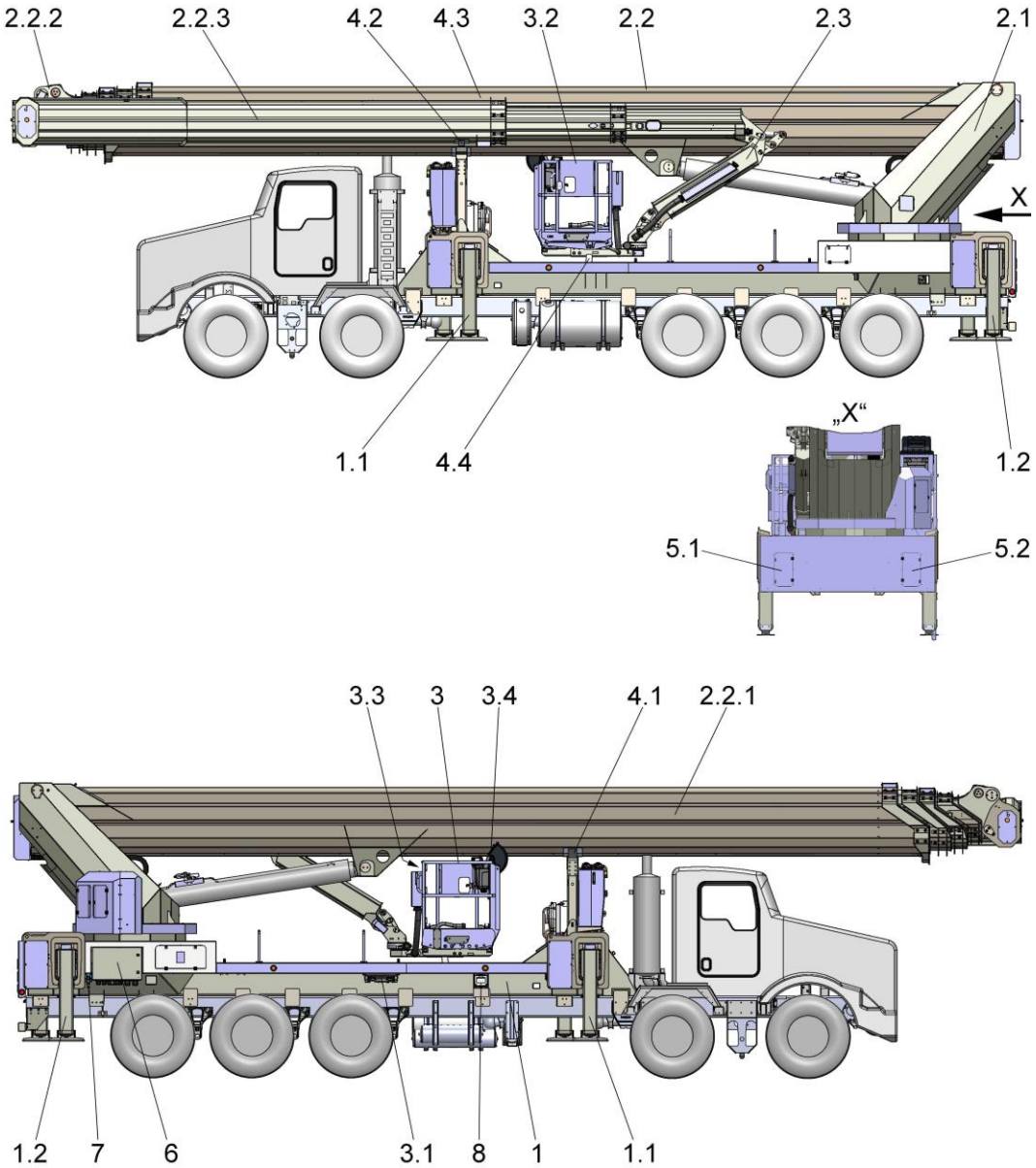
Wind strength		Wind velocity		Impact on the Inland winds	dynamic pressure N/m²
Bft [1]	Designation	m/s	mph		
5	Fresh breeze	8.0 - 10.7	18 - 24.1	Branches of a moderate size move. Small trees in leaf begin to sway Many whitecaps. Small amounts of spray on the sea.	40 - 72
6	Strong breeze	10.8 - 13.8	24.2 - 30.9	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.	73 - 119
7	High wind	13.9 - 17.1	31 - 38.4	Whole trees in motion. Effort needed to walk against the wind	120 - 183
8	Fresh gale	17.2 - 20.7	38.5 - 46.4	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.	184 - 268
9	Strong gale	20.8 - 24.4	46.5 - 54.6	Slight structural damage occurs (chimney-pots and slates removed).	269 - 377

[1] Grades on the Beaufort scale

Beaufort scale according to the British Admiral and oceanographer Sir Francis Beaufort (1774 - 1852). Scale for estimating the wind strength according to the effects observed.
The details in the table refer to an internationally defined measuring height of 10 metres above the ground in open grounds. With the same grades on the Beaufort scale, one can expect higher wind velocities of up to 20% at a height of 30 metres above the ground.
For the operation of the Ruthmann Steiger T 243 AE, the permissible wind velocity must not be exceeded (☞ Chapter 2.1.2.1). Operation must be stopped if this is any higher. It must be observed that the wind velocity increases with increasing working height.

3 Description

3.1 Structure of the Ruthmann Steiger T 243 AE



1. Steiger-substructure.
   - 1.1. Stabilizing jacks, front.
   - 1.2. Stabilizing jacks, rear.
2. Boom.
   - 2.1. Tower.
   - 2.2. Boom system (lifting arm).
     - 2.2.1. Lower boom.

2.2.2. Four-bar linkage.
2.2.3. Upper boom.
2.3. Rüssel.
3. Work platform.
3.1. Ascent.
3.2. Door (access left side).
3.3. Door (access right side).
3.4. Switch box PLATFORM CONTROL (control panel).
4. Boom support points.
4.1. Lower boom support.
4.2. Upper boom support.
4.3. Upper boom rest.
4.4. Work platform support.
5. Switch box STABILIZING JACK CONTROL.
5.1. Stabilizing jack control, left side.
5.2. Stabilizing jack control, right side.
6. Switch box EMERGENCY CONTROL (central control electronics).
7. Manual pump.
8. Current supply “Work platform”.

3.1.1 Components and assemblies

In the following you will find a description of the fundamental components and assemblies that the Ruthmann Steiger T 243 AE comprises.

3.1.1.1 Steiger-substructure

The Steiger-substructure comprises a welded base frame with cover. The base frame serves as a support frame. In combination with the carrier vehicle, it takes up the boom loads occurring from the Steiger-operation and directs them to the ground via the stabilizing jacks. The swivel mechanism fixed to the base frame is used to swivel the boom. The hydraulic drive units, lines and control elements are mounted in or on the base frame. The base frame is covered with an aluminium quintet treadplate cover. The covers can be removed for maintenance purposes and for the manual actuation of the solenoid valves (emergency lowering). The middle fuselage section of the base frame has an anti-slip coating.

3.1.1.1.1 Stabilizing jacks

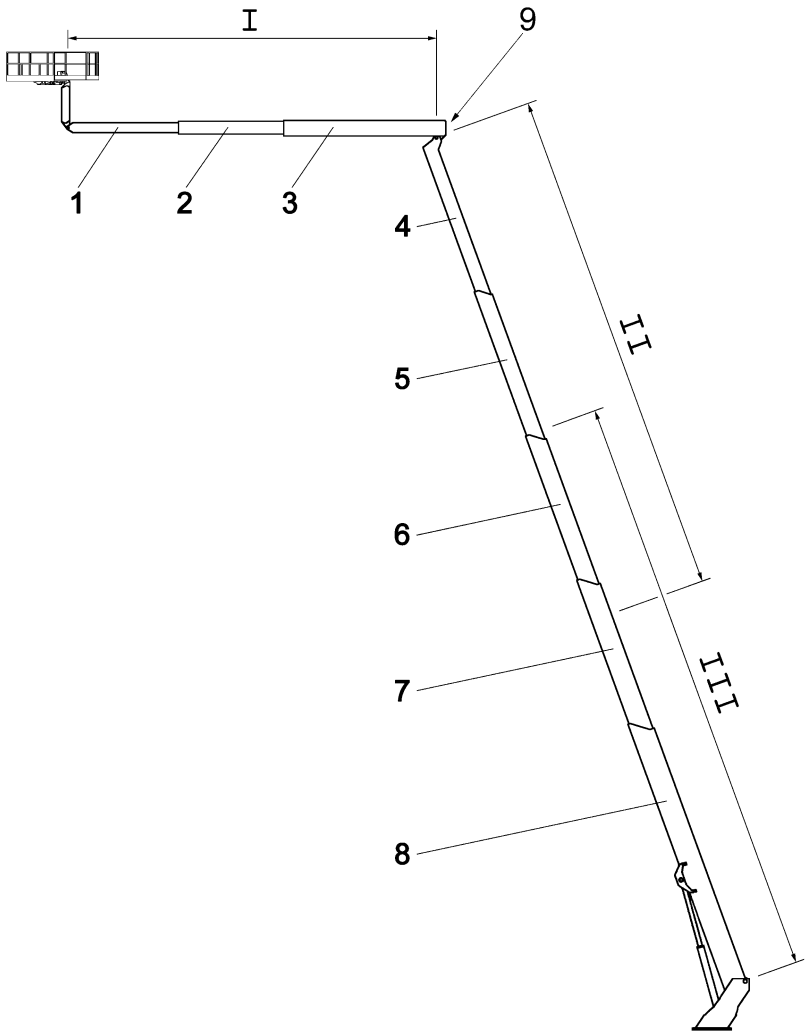
The Ruthmann Steiger T 243 AE including chassis is raised by a mechanically / hydraulically actuated stabilizing jacks. This is designed as a horizontal-vertical stabilizing jack (HV) with four jacks. The jacks basically each comprise one horizontal jack arm and a vertical jack cylinder. The jack range, i.e. the stabilizing jack basis, can therefore be varied with the horizontally extendible jack arms. Movable jack plates are located on the stabilizing jack cylinders that compensate the small ground unevenness. Yellow flashing lights on the jacks keep flashing when the stabilizing jacks are extended and the Steiger ignition is switched on.
As previously described in the “Steiger-substructure” chapter, the stabilising jacks transfer the boom loads into the ground. In Steiger-operation, due to the permissible elastic torsion of the Steiger-substructure and the jacks, a jack can be relieved on the non-load side. It is assumed that the previous set-up of the Steiger has been done correctly and so that it is torsion-free, in accordance with this Operator’s Manual. An impermissible behaviour of the jacks for Steiger-operation, as a result of a loaded jack yielding, e.g. due to sinking in, etc., must be ruled out.
Setting up the Ruthmann Steiger T 243 AE must only be carried out using suitable underlays (e.g., Ruthmann supporting plates, special equipment). The jack plates guide the jack forces resulting from the boom loading into the underground via these underlays. Information for suitable Ruthmann supporting plates can be obtained from our Ruthmann Services or at our homepage "http:// www.ruthmann.de".

3.1.1.2 Boom

The boom is the lifting equipment of the Ruthmann Steiger T 243 AE. The boom comprises following main assemblies:

- Tower
  The tower welded as sheet metal construction is located above the Steiger-substructure. It is the rotary column of the boom. The swivel mechanism is located on the tower plate. It establishes the connection to the Steiger-substructure. The swivel mechanism basically comprises the ball swivel connection and a planetary drive with spring-loaded holding brake. The swivel mechanism is driven by an infinitely controllable hydraulic motor.

- Boom system (lifting arm)



The lower boom is represented in a partially extended state.

The boom system is manufactured as steel telescope articulation boom system comprising:

- lower boom,
- four-bar linkage upper boom,
- upper boom.

It is raised and lowered using lifting cylinders.

The lower boom comprises the booms "8" to "4". In doing so, the booms "8" to "6" form telescope "III" and booms "6" to "4" form telescope "II". Each telescope is extended or retracted synchronously by a hydraulic cylinder located on the inside and respective towing ropes or towing chains. Telescope "III" is only extend after telescope "II" has been extended to a value that has been saved in the

computer control. Together, both telescopes (III and II) form the lower boom telescope.
The upper boom comprises the boom elements "3" to "1". They form the upper boom telescope (telescope "I"). It is extended or retracted synchronously by a hydraulic cylinder located on the inside and respective towing ropes or towing chains. The upper boom is raised or lowered by a four-bar linkage "9" actuated by a hydraulic cylinder. All boom elements moving out or in are guided by sliders.
The lower boom telescope and the upper boom telescope can be extracted and retracted by the operating personnel independent from each other.

- Rüssel (platform lifting arm)
  The Rüssel is designed as a box profile. It is moved using a four-bar linkage actuated by hydraulic cylinder. The supply lines are located outside on the Rüssel beneath a cover.

The lines required for the energy guiding are routed through the boom on the inside. Only the connecting lines are routed out. There are hatches on the tower, lower boom, upper boom and Rüssel for servicing purposes.
The levelling (compensation) of the work platform during the raising or lowering movements of the lower boom, upper boom and / or the Rüssel is achieved by an electro-hydraulic platform compensation. In doing so, a hydraulic actuator on the Rüssel console compensates the resulting change in inclination and keeps the work platform horizontal.

3.1.1.3 Rüssel platform console

The design of the machine type T 243 AE summarises the exceptional movability in the area of the work platform rotation angle and Rüssel angle of elevation that offers the personnel in the work platform the highest degree of use / *flexibility* and freedom of movement. The maximum Rüssel angle of elevation is 220° and the maximum swivel angle of the work platform is up to 440° depending on the Rüssel constellation.

3.1.1.4 Work platform

The work platform is the “standing” load lifting accessory of the Ruthmann Steiger T 243 AE. The standard aluminium telescope work platform comprises an “two-part” aluminium tube sheet metal construction with access from the side as well as the rear. An aluminium quintet treadplate ensures

for the required stepping and anti-slip safety in the work platform. A guard rail 3 ft 7 in (1.1 m) high comprising hand rail, knee rail and kick plate on all sides encloses the platform floor. There is a cleaning flap on the kick plate for cleaning the platform floor. The doors integrated in the guard rail permit access to the work platform. In doing so, the access doors do not fold outwards, they open inwards. They are self-locking thus, they are designed to return to the closed and locked position automatically. In doing so, the rotary latch lock closes latching. The width of the work platform can be enlarged variably by the hydraulic extension of the telescoping platform part of the work platform.
Access to the work platform is carried out in the home position of the boom using the ascent mounted on the Steiger-substructure, on the right side in the driving direction. Anchor points are located in the work platform for attaching personal fall protection systems. The anchor points are marked accordingly. Each anchor point is dimensioned for the maximum one person. At least one anchor point is available for each approved person (see nominal load sign).
The switch box with the control panel for the operational-related movements is secured in the work platform at the top right. For Steiger-operation, there is also an option to fix the switch box on the other side of the guard rail, depending on the deployment case. Respective fasteners are located on the guard rail at knee rail height. When the boom of the Steiger is moved into the home position, the switch box however, must be secured back the outer right side on the guard rail of the work platform again.

3.1.1.4.1 110 V sockets

Electrical duplex grounded receptacles for 110 V with residual current circuit breaker (FI fuse) and with self-closing lid located in the work platform. The power supply is carried out in the Steiger-substructure via a US-Nema 5-15P built-in plug, also equipped with residual current circuit-breaker (FI fuse).
When using the duplex socket, possible defects before the power supply or on the connected consumers could lead to dangerous situations for the operator.
It is important to note that the Steiger only feeds the electrical energy from the power supply on the Steiger-substructure to the duplex socket on the work platform.

For the power supply on the Steiger-substructure, **only** use a power source **with devices for protection against electric shock** (earthing, electrical separation with insulation monitoring device (IMD), etc. or an equivalent electrical protective

equipment). E.g. secured public power grids. Therefore, the use of e.g. a self-sufficient mobile power generator without suitable protective equipment is prohibited. Before connecting the power source, clarify the protection that is available for the power source. See also DGUV Information 203-032 or identical country-specific regulations of the USA!

Depending on the application, other rules and regulations may need to be observed. The operator must assess possible electrical hazards taking into account the power source and the connected consumers and, if necessary, must take further protective measures. The ambient and operating conditions must also be taken into account. Electrical protective measures are measures on electrical systems (e.g. earthing of a self-sufficient mobile power generator) that must be planned, supervised/implemented and checked by an electrician. The risk assessment performed by the operating company for the measures resulting from the intended purpose must be considered in the corresponding operating instructions.

3.1.1.4.2 **Pneumatic or water line to the work platform** (special equipment)

The pneumatic or water connection mounted as special equipment on the work platform is dimensioned for an operating pressure of max. 2,176 psi (150 bar) and a max. temperature of +176°F (+80°C).

3.2 Hydraulic system

The components of the Ruthmann Steiger T 243 AE are moved mechanically / hydraulically using actuators.

A tandem hydraulic pump mounted on a power take-off of the vehicle engine provides the hydraulic energy. Using a hydraulic control, the tandem hydraulic pump only provides the performance necessary for the respective movement. In doing so, the speed of the vehicle engine is adapted to the decrease in performance automatically, from an economical and ecological point of view.
The tandem hydraulic pump supplies two hydraulic circuits. Whereas the controlled boom movements are controlled with the one circuit (pump 1), the other circuit (pump 2) compensates the inclination of the work platform electro-hydraulically.

The following hydraulic actuators move the components of the Steiger:

Actuators	Movements	Components
Jack cylinder	Extract / retract	Jack (1 to 4)
Extension cylinder	Extract / retract	Jack arm (1 to 4)
Telescope cylinder III	Extract / retract	Lower boom
Telescope cylinder II		
Telescope cylinder I	Extract / retract	Upper boom
Telescope cylinder	Extract / retract	Work platform
Lifting cylinder	Raise / lower	Lower boom
Lifting cylinder	Raise / lower	Upper boom
Rüssel cylinder	Up / down	Rüssel
Compensating cylinder	Compensate	Work platform
Swivelling drive	Swivel	Boom
Rotary drive	Rotating	Work platform

Electromagnetic directional valves (solenoid valves) control the flow of the hydraulic oil to the hydraulic actuators. The moving speeds of the actuators are controlled hydraulically using proportional valves.

Two electromagnetic directional seat valves block the flow of the pressure lines to the jack hydraulics in addition to the electromagnetic directional valves of the remaining hydraulic circuits. The directional seat valves and the corresponding directional valve of the hydraulic circuit only open after the jack movements have been released by the computer control.

Pressure limiting valves installed safeguard the hydraulic system and diverse actuators, such as e.g., the telescope cylinder of the lower and upper boom. In event of a line or hose rupture, the locking blocks that are mounted direct on the actuators bearing the load prevent the jacks retracting and the work platform lowering.

A return filter installed in the hydraulic oil tank protects the hydraulic unit against dirt particles by a full flow filtering of the oil return of both circuits. The venting filter integrated in the filter housing ensures for the filtering of the air taken in and prevents non-permissible pressure fluctuations in the tank. A pressure gauge shows the degree of contamination of the filter element. It measures the back-pressure in front of the filter element. The back-pressure can be used as a measure of the degree of contamination. Increasing pressure provides information on the probable degree of contamination of the filter element and, where applicable, when a filter element change is due. The tank vent filter installed on the hydraulic oil tank, filters the air sucked in and prevents impermissible variations in the tank pressure.

An air-cooled oil cooler is present in the return line to the hydraulic oil tank. Therefore, a portion of the hydraulic oil flows through the cooler instead of directly through the return filter and is cooled. The oil cooler is switched on and is controlled automatically. Upon reaching a certain temperature, a temperature switch switches the fan on and off automatically.

In event of failure of the drive or possible power take-off, the Steiger can be operated temporarily via the hydraulic pump battery (emergency lowering). The hydraulic energy is generated by the hydraulic pump battery. Both hydraulic circuits are supplied by the hydraulic pump battery at the same time. The **high power consumption** of the hydraulic pump battery must be **observed**!

In event of the hydraulic pump battery failing, an emergency lowering of the work platform is made possible by using a manual pump mounted on the left side next to the switch box on the Steiger-substructure. The hydraulic energy is then generated by the manual pumping motions. Both hydraulic circuits are supplied with the manual pump at the same time.

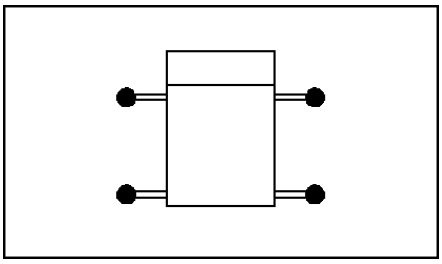
3.3 Description of the control

The control is described in the following that is used control the movements of the Ruthmann Steiger T 243 AE.

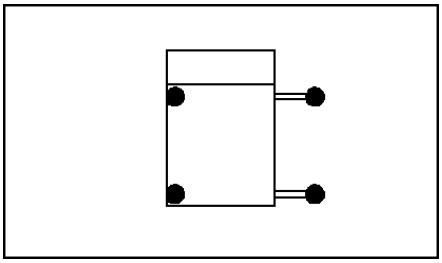
The control is used for controlling and monitoring the Steiger and forms the interface between humans and the machine. It comprises, amongst others, a computer control with two independent processor systems (main and control processor) and an auxiliary processor consisting of two computer units that monitor each other mutually. The sensors are used to, e.g., transfer the status of the stabilizing jacks, swivel angle of the booms, etc. to the control.

3.3.1 Stabilizing jack basis

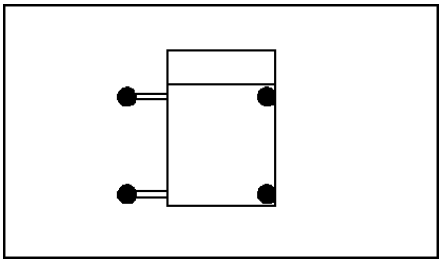
- *Full jacking*
  Jacks extended horizontal and vertical on both sides.



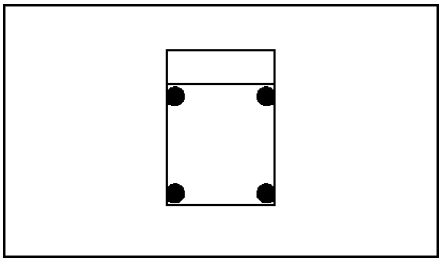
- *Jacked on the left side in vehicle profile*
  Jacks extended vertical in the vehicle profile on the left side and horizontal and vertical on the right side.



- *Jacked on the right side in vehicle profile*
  Jacks extended vertical in the vehicle profile on the right side and horizontal and vertical on the left side.



- *Jacked on the both sides in vehicle profile*
  Jacks extended vertical in the vehicle profile on both sides.



The determination of the correct stabilizing jack basis and the stable jacking of the Steiger is the basis of all further Steiger movements. The mechanically / hydraulically actuated stabilizing jack facility is controlled using the control elements of the control. In doing so, the computer control implements the control commands actuated. It moves the hydraulic cylinder of the stabilizing jacks using the electromagnetic valves. Now the Steiger is jacked by raising or lowering. The computer control uses the sensors to detect the stabilizing jack basis. After detecting the correct jacking of the Steiger electronically, the computer control releases the further Steiger movements. The electronic control of the movements can, in hazard cases, be interrupted by actuating one of the EMERGENCY STOP switch.

3.3.1.1 Fully variable stabilizing jacks

The Ruthmann-Steiger T 243 AE is equipped with an auxiliary processor to allow real time, dynamic adaptation of the work platform reach to the specific type of stabilizing jack version. The horizontal extension of the jack arms can be selected as desired by the operating personnel. This means that the operating personnel are completely free to adapt the horizontal extension to the spatial conditions. This can result in different jacking situations to match the vertical extension of the jack arms. The actual support situation is then one of the basic factors for the auxiliary processor*s computer-supported Dynamic Reach System (DRS) for calculation of the movement possibilities for the work platform.

3.3.1.2 Plausibility monitoring of the jacking situation

The plausibility monitoring checks if the stabilizing jacks of the Ruthmann Steiger T 243 AE after the boom has moved out of the boom support. It comprises

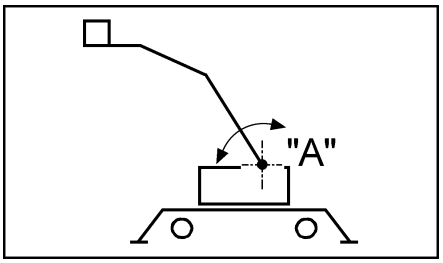
- a vehicle inclination plausibility monitoring check (jacking inclination),
- a ground contact plausibility monitoring check and
- an extension of jack arm plausibility monitoring check.

If one or more of the monitoring checks responds then an electronic operational-related interlocking takes place. At the same time, a corresponding message appears on the control panel in the work platform or on the operator panel of the emergency control. Only certain boom movements approved by the computer control in order to move the boom to the home position. If a non-interlocked boom movement is now controlled, a short buzzer interval sound rings and the warning light OVERLOAD on the control panel flashes.

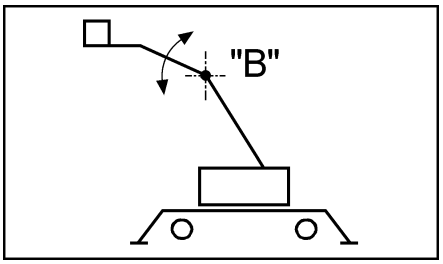
These reactions to the monitoring cease when the computer control detects a correct jacking situation again.

3.3.2 Steiger movements

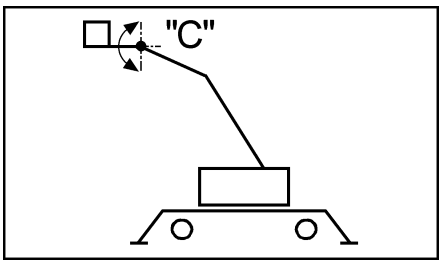
- *Raise / lower lower boom*
  Movements that bring the work platform to higher or lower heights. The lower boom moves horizontally around the "A" axis.



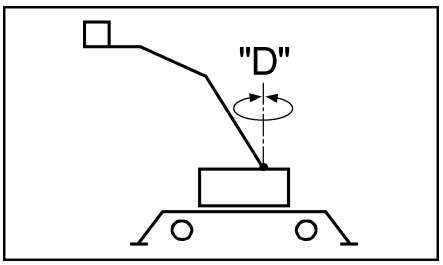
- *Raise / lower upper boom*
  Movements that bring the work platform to higher or lower heights. The upper boom moves horizontally around the "B" axis.



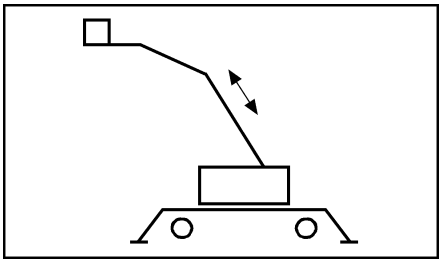
- *Rüssel up / down*
  Movements that bring the work platform to higher or lower heights. The Rüssel moves horizontally around the "C" axis.



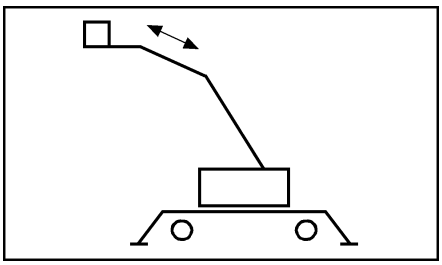
- *Swivel boom left / right*
  Movement of the boom (tower) vertically around the "D" axis.



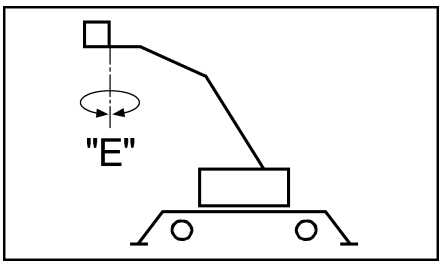
- *Extending / retracting lower boom telescope*
  Telescoping the lower boom out or in.



- *Extending / retracting upper boom telescope*
  Telescoping the upper boom out or in.



- *Rotate platform left / right*
  Movement of the work platform vertically around the "E" axis.



After correct jacking of the Steiger, the released Steiger movements specified above can be applied using the control elements of the control. In doing so, the computer control implements the control commands. Using the electromagnetically actuated hydraulic valves, it moves the controlled hydraulic cylinders of the Steiger components specified above. The computer control uses the sensors to release the Steiger movements. The electronic control of the components can, in hazard cases, be interrupted by actuating one of the EMERGENCY STOP switch.

3.3.3 Control device

The Ruthmann Steiger T 243 AE features the following control devices, among others:

- Control panel of the **dashboard** in the driver´s cabin:
  - Switch HOLD (air spring pressure retention).
  - Switch PTO (power take-off).
    - Switching the hydraulic pump drive on or off (power take-off).
    - Switching the operating on or off (main switch). After "Booting", the computer control automatically releases the control position PLATFORM CONTROL if it is not otherwise locked electrically. Switching on the EMERGENCY CONTROL is carried out by opening the switch box door of the Emergency control.
  - Signal lamp STEIGER NOT IN TRANSPORT CONFIGURATION.
  - Signal lamp STABILIZING JACKS NOT IN HOME POSITION.

- Switch box rear side on the **left** and **right** on the **Steiger-substructure**:
  - Operator panel STABILIZING JACK CONTROL with
    - EMERGENCY STOP switch,
    - Flat keyboard,
    - Graphic capable LC-display.

- Switch box in the **work platform**:
  - Control panel PLATFORM CONTROL with
    - EMERGENCY STOP switch,
    - Joystick,
    - Push buttons (special equipment),
    - Flat keyboard,
    - Signal and warning lights (LEDs),
  - Graphic display.

- Switch box on the **Steiger-substructure** on the **right** in the driving direction:
  - Operator panel EMERGENCY CONTROL with
    - EMERGENCY STOP switch,
    - Clear text display,
    - Flat keyboard,
  - Process control,
  - Auxiliary processor (two computer units),
  - Proportional amplifier,
  - Fuse block,
  - Switch if fitted, for activating special equipment,

– Ball valve for manual emergency lowering.

3.3.4 Control position

The control allows the operation of the Steiger movements, thus, stabilizing jack and / or boom movements, from the following control positions:

1. Control position STABILIZING JACK CONTROL; rear left side of the Steiger-substructure.
2. Control position STABILIZING JACK CONTROL; rear right side of the Steiger-substructure.
3. Control position PLATFORM CONTROL; from the work platform.
4. Control position REMOTE CONTROL; with the remote control (special equipment).
5. Control position EMERGENCY CONTROL: right from the Steiger-substructure.

The control positions are locked against each other. Thus, if for example the switch box door on the control position EMERGENCY CONTROL is opened, the Steiger can neither be operated using the control position PLATFORM CONTROL, nor with the control position STABILIZING JACK CONTROL and nor with the control position REMOTE CONTROL (special equipment). The same applies for the control position PLATFORM CONTROL and the control position STABILIZING JACK CONTROL. The operation of the Steiger using the control position PLATFORM CONTROL and the control point "Stabilizing jack control" is not possible at the same time.
The operational-related movements of the work platform (boom movements) are carried out from the control position PLATFORM CONTROL using the control panel of the work platform. The other control positions must be closed against unauthorised actuation.

3.3.4.1 Control position STABILIZING JACK CONTROL

The control positions are located at the rear on the left and right side on the Steiger-substructure. The operation is for the following movements:

- Starting or stopping the vehicle engine.
- Stabilizing jack control
  - Electronic inclination display (LCD levelling indicator),
  - Extending or retracting the jacks horizontally,
  - Extending or retracting the jacks vertically.

  The stabilizing jacks are extended or retracted by pressing the corresponding button. In doing so, the left stabilizing jack is actuated using the left stabilizing jack control and the right stabilizing jack using the right stabilizing jack control. Once all jacks have ground contact, the jacks can be actuated from one side, thus be extended or retracted vertically.
- Automatic positioning of the work platform (access aid).
- Automatic movement to the home position of the Steiger.

The stabilizing jack control is locked as soon as the control elements on the work platform control panel are actuated. It is then only released again after the lower boom has been moved back into the boom support correctly, or the computer control has been switched on again.

3.3.4.2 Control position PLATFORM CONTROL

The operation of the work platform has been dimensioned as a sensitive electronic proportional control for the following movements:

- Extending or retracting the jacks horizontally,
- Extending or retracting the jacks vertically,
- Raising or lowering the lower boom,
- Raising or lowering the upper boom,
- Move the Rüssel upwards or downwards,
- Boom (tower) swivel to the left or to the right side,
- Extending or retracting the lower boom telescope,
- Extending or retracting the upper boom telescope.

The speed control of the movements is carried out proportionally depending on the movement of the joystick.
The fine control device can be used to perform precise positioning of the work platform with a significantly reduced speed.

Rotating as well as telescoping the work platform out and in are carried out with constant speed.

Up to four boom movements can be carried out at the same time. Thus, two movements can be controlled at the same time using the each joystick. If only one movement can be carried out, the operation of a total of four boom movements to be carried out at the same time can be switched to two.

The control position of the work platform is equipped with an electronic reverse movement for the swivelling movement of the boom (tower) and the rotating movement of the work platform. According to the arrangement of the control panel, being aligned to the tower or away from the tower, the operating personnel can reverse the direction of movement. The operating personnel therefore experience a controversial swivelling/rotating movement according to the deflection direction of the joystick.

3.3.4.3 Control position EMERGENCY CONTROL

The following movements can be carried out using the control position:

- The same boom movements as with the platform control.

The movements are initiated by pressing appropriate function key. Two speeds are available:

- Normal speed
  The movements run just as quick as in operating mode "Platform control" with fully deflected joystick.
- Fine control
  Significant reduction of the normal speed.

The movements automatically run on and stop softly (exception: the work platform rotates).
The control position provides the possibility of carrying out two movements at the same time.

3.3.5 EMERGENCY STOP switch

An EMERGENCY STOP switch is located on each control position. Independent from where a Steiger movement is controlled electrically, in case of hazard, this movement can be interrupted from every control position by pressing the EMERGENCY STOP switch. The EMERGENCY STOP switch actuated on the control position PLATFORM CONTROL can be overridden by the control position EMERGENCY CONTROL.

3.3.6 Vehicle engine stop with "EMERGENCY STOP"

If one of the EMERGENCY STOP switches is pressed when the vehicle engine is running and the computer control is switched on, not only the electric control of the Steiger movements is interrupted immediately, but also the vehicle engine should also switch off. If, e.g., when the EMERGENCY STOP switch is pressed, the hydraulic pump drive is switched on, then the vehicle engine is stopped. The vehicle engine can only be started again on after resetting the EMERGENCY STOP switch.

3.3.7 Increasing the vehicle engine speed in Steiger-operation

To achieve an appropriate travelling speed, the speed of the vehicle engine is increased automatically. Increasing the speed is carried out if a Steiger movement is controlled.

3.3.8 Dynamic Reach System (DRS)

The Dynamic Reach System uses an auxiliary processor to calculate the stability in real time during operation of the Steiger. This allows the movement capability of the work platform to be adapted to the current, i.e. actual jacking situation, platform load and momentary boom constellation as well as movement of the boom components by means of continuous calculation. The auxiliary processor receives and processes the required information continuously from the computer control. The feedback to the computer control and processing there then allows the controlled movement of the work platform to be slowed down or locked electrically.

3.3.9 Electric interlocking

Electric interlocking deactivates certain Steiger movements and functions.

3.3.9.1 Platform overload detection aid

The platform overload detection aid indicates that the maximum permissible carrying capacity of the work platform has been exceeded by more than a certain permissible range by warning lights OVERLOAD flashing. At the same time, a buzzer interval tone sounds during the overload. A corresponding message appears in the display (text display). During this time, the control blocks individual Steiger movements. The reaction against exceeding the platform load is only carried out if the exceeding prolongs for several seconds. This reaction is also only cancelled once the work platform loading has been again in the permissible range. The detection of an overload is saved by the control with last date, time and consecutive number.

3.3.9.2 Platform bottoming detection

The platform bottoming detection is only active with the "Platform control". A difference is made between two switching levels.
Level "1" indicates that the work platform has been lowered onto an obstacle. If the work platform is interrupted by the load being set down, after a short period (a few seconds), a continuous buzzer tone sounds in the work platform. The warning light OVERLOAD illuminates in the control panel. The control locks individual Steiger movements as long as the buzzer sounds. A corresponding message appears in the display (text display).
Check the Steiger for impact damage! After the work platform has been set down on an obstacle, there is an increased risk of accident from subsequent damage, depending on how hard it was lowered down! If damage to the Steiger, e.g., collision damage to the boom system, parallel guide, platform console, work platform, etc. is identified, it is necessary to have check carried out immediately by a qualified person or, if required, by a technical expert. Operation of the Steiger should be resumed only after the defect has been rectified.
The activation of level "2" results in that the "platform bottoming detection" is saved in the control with last date, time and consecutive number.

3.3.9.3 Distance control under the work platform

The Ruthmann Steiger T 243 AE is equipped with a distance control for the work platform. A distance sensor is located underneath the work platform. If this sensors addresses, the boom movements being carried out are deactivated by the computer control. It can no longer carry out movements that would lead to a reduction of the distance between the work platform and the underground. On a level surface, this equipment prevents an unintended impact of the work platform with the underground. In order to be able to move the work platform closer to the ground, the distance control can be bypassed. Now the operating personnel can now carry out certain boom movements released by the computer control using the control panel of the work platform when simultaneously pressing the bypass distance sensor and thus moving the work platform closer to the underground. Bypassing the distance control must be kept pressed as long as the distance control responds in order to carry out a movement. This also affects moving away from the underground.

3.3.9.4 Dynamic Reach Limitation

The Ruthmann Steiger T 243 AE is equipped with a load measurement device, position monitor and torque measuring device, which switch off the extended telescopes and current work platform load by interlocking, depending on the jacking situation and boom position, thus limiting the lateral reach. Shortly before actuation of this switch-off, all motions, which would increase the load, are slowed down automatically and continuously and, upon reaching the limits calculated by the DRS, are switched off completely by the computer control. The warning light LML SWITCH-OFF also illuminates on the control panel on the work platform. Movements are still possible that do not exceed the permissible load moment.
The DRS and computer control disable the following motions:

- "Lower lower boom",
- "Lower upper boom" or "Raise upper boom",
- "Rüssel downwards" or "Rüssel upwards",
- "Extend lower boom telescope" and
- "Extend upper boom telescope" or "Retract upper boom telescope" if the upper boom is raised beyond the position vertically downwards

in several areas, also the movement

- "Swivel boom (Tower)".

If the calculated limit is reached by a swivelling movement of the boom, this movement is then switched off. To continue swivelling in the direction which led to switch-off, another load reducing movement is required first, e.g.,

"Retract upper boom telescope", when the upper boom is lifted vertically downward above the position.

The load measuring system in combination with the position monitor or force measuring device switches off the system depending on the jacking situation and boom constellation, i.e. the swivel angle of the tower, the angle of elevation of the lower boom, upper boom and Rüssel and, where applicable the effects of the wind.

3.3.9.5 Platform load-dependent upper boom telescopic extension limitation

The extension length of the upper boom telescope is limited, amongst others, depending on the work platform load. Up until a certain platform load, the upper boom telescope may be fully extended. Furthermore, the movement "Extend upper boom telescope" is switched off upon reaching the limits determined by the DRS with the computer control.
If the upper boom telescope has been telescoped out up until the telescopic extension necessary for the transport configuration, the work platform load may correspond to the maximum value of the "Permissible carrying capacity of the work platform in transport configuration".
With a lower boom angle of elevation (ALB) below 50° and an upper boom angle (AUB) less than 5°, or a total angle from angle of elevation lower boom (ALB) and upper boom angle (AUB) less than 45°, the upper boom telescope may only be telescoped out approx. 9 ft 7 in (2 x 146 cm). For example: ALB = 30° and AUB = 15°. Even if the platform load is smaller than or equal to the “Permissible max. carrying capacity with extended upper boom telescope”.

3.3.10 Automatic jacking

With one control element, all jacks can be extended or retracted horizontally or vertically at the same time. Line resistances in the hydraulic system and the friction differences of the cylinders may lead to different starting speeds of the jacks. When extending the stabilizing jacks vertically with "Full jacking", the control attempts to raise (automatic jacking) the Steiger within the permissible jacking inclination as long as one jack is not fully extended. If one jack is fully extended, no automatic jack compensation is carried out with regard to the permissible jacking inclination. The inclination of the Steiger must be checked in all cases.
For all jacking situations that do not correspond to "Full jacking", the jacking inclination must be readjusted using the stabilizing jack control.

3.3.11 Automatic positioning aid of the work platform (access aid)

After the Steiger has been set down correctly, the work platform can be moved into a position automatically with the control positions STABILIZING JACK CONTROL by pressing the respective button combinations, that permits convenient access to the work platform at ground level. The following positions are possible:

- on the left side next to the Steiger-substructure,
- on the right side next to the Steiger-substructure,
- at the rear side behind the Steiger-substructure (near to the stabilizing jack control).

In doing so, the positioning of the work platform on the left next to the Steiger-substructure with the left stabilizing jack control, right- with the right stabilizing jack control and -rear side- independent from one of both stabilizing jack controls. When "Positioning", the movements of the components of the booms run one after another automatically similar to the memory function in order to move the work platform from its home position to the ground. As long as the positioning is carried out, the distance control under the platform is switched off. For safety reasons, positioning the work platform at the front side in front of the Steiger-substructure has been omitted as this position cannot be seen from the rear side control position specified above.

3.3.12 Automatic platform compensation

The work platform is maintained horizontal electro-hydraulically during the Steiger-operation. On the one hand it carries out a compensation of the work platform based on a change in inclination by a controlled lifting or lowering movement of the lower and / or upper boom. On the other hand, a compensation of the work platform is also carried out due to a change in inclination, e.g., as a result of an elastic bending of the boom system.
The inclination of the work platform is detected permanently, and forwarded to the computer control. In event of deviation from a setpoint, the computer control then adjusts the work platform delicately via a hydraulic actuator.

3.3.13 Soft start and soft stopping of Steiger movements

The following movements using the electronic control permit a soft starting or stopping:

- Extending or retracting the jacks horizontally / vertically,
- Raising or lowering the lower boom,
- Raising or lowering the upper boom,
- Rüssel upwards or downwards,
- Work platform down or up,
- Boom (tower) swivel to the left or to the right side,
- Extending or retracting the upper boom telescope,
- Extending or retracting the lower boom telescope.

3.3.14 End position damping

The speeds of the following movements are reduced automatically before reaching the end position:

- Raising or lowering the lower boom,
- Raising or lowering the upper boom,
- Rüssel upwards or downwards,
- Boom (tower) swivel to the left or to the right side,
- Extending or retracting telescope "III" (lower boom),
- Extending or retracting telescope "II" (lower boom),
- Extending or retracting telescope "I" (upper boom).

The end positions of the respective hydraulic cylinders are designated as end position. The swivelling movement of the boom is not limited mechanically by a stop in the end position. It is carried out computer controlled using the sensors.
Before reaching the respective end position, the movement speed is also reduced automatically with fully deflected joystick.

3.3.15 Memory

"Memory" makes approaching certain recurring target positions (work platform positions) easier. If a target position is not reached, then it can be saved. This target position can be approached automatically from every other position. However, in doing so the previous route taken is not taken again!
The target position saved is maintained even after switching off the Steiger, until another position is saved.

3.3.16 Automatic movement to the home position of the boom

The boom can be moved into the home position automatically per control command. If at the beginning of or during the automatic approach to the home position, individual movements are blocked due to an electric interlock, using manual control commands, the operating personnel must move the boom from the interlock.

3.3.17 Control panel "RUTHMANNCockpit" of the work platform

The control panel with modular design has a graphical user navigation with transparent design. Ergonomic aspects were included in the design. It basically comprises a switch, control and information area tilted at the top as well as a lower control area. The control commands, control and information selection are carried out with convenient joysticks, push buttons as well as function keys. All push buttons installed and all function keys have background lighting. Status LEDs indicate the switching states of the function keys to the operating personnel. An ergonomic hand rest ensures for the respective comfort when carrying out the control commands and protects against incorrect operation. Furthermore, the control panel offers the connecting option for electric consumers. Moreover, there are many different optional equipment with useful additional functions available that can also be retrofitted if required. The information and control elements are protected against the influence of weather as well as forbidden third party operation by the integrated and lockable cover.

3.3.17.1 Control information and switch area

In the top area, the control panel is equipped with a comprehensive switch panel with integrated full-colour 7" graphic display as information area. As special equipment, the left and right side of the switch panel can be equipped with up to seven push buttons for controlling the Steiger or switch functions. E.g., for saving a boom position or for switching the spotlights on and off on the work platform, etc. Ten function keys (F1 to F10) on the left and right side next to the graphic display permit a simple and intuitive menu-guided navigation of the display. For this purpose, the function keys are occupied with self-explanatory functions dependent of the screen page display. They are visible on the display direct next to the function key. Attention: The display is not a touchscreen! In order to have the important sensor and operating data displayed quickly, the information and diagnostics system is also actuated via these function keys. Principally, the graphic display then shows the same information as the clear text display in the operator panel of the emergency control. There are also seven function keys below the graphic display, so-called quick or direct keys, that allow menus and information, such as e.g.,

- important vehicle information,
- jacking situations,
- boom constellation,
- special functions,
- information on operation,
- Steiger and display settings as well as

- contrast settings

to be displayed immediately.
The information area provides the operating personnel with a diversity of information in order to deploy the Ruthmann Steiger T 243 AE quickly and efficiently. With three different display contrast strengths, the graphic display ensures for optimum reading properties in all light conditions. Being during the daytime, night or under strong rays of sunlight.

3.3.17.2 Control area

With the joysticks and the ergonomic hand rest, the bottom part of the control panel offers a lot of comfort for a relaxing and sensitive control of the Steiger. A flat keyboard with 16 function keys with symbols arranged centrally (4 lines with 4 function keys per line) permit the efficient and safe entry of commands for different functions such as, e.g., automatic retraction into the home position, automatic jacking of different jack positions or the starting and stopping of the vehicle engine. Control and warning lights (LEDs) above the joystick indicate switching states or malfunctions.

3.3.18 Operator panel of the EMERGENCY CONTROL

The operator panel comprises one clear text display and a flat keyboard.

3.3.18.1 Clear text display:

The display is used for information and diagnostics purposes. It comprises a 4-digit LC display with 20 characters per line. Operating messages or operating information are displayed on the screen automatically by the computer control. Moreover, the display can also be used to control the sensors (limit switch, proximity switch, etc.). This permits a quick check of the Steiger and frequently, a remote diagnosis by telephone via Ruthmann Service.
The display can best be read from a vertical viewing direction. Prolonged exposure to sunlight on the display as well as heating to more than 50°C should be avoided. The display is slow and unclear at temperatures below 0°C.

3.3.18.2 Flat keyboard:

The flat keyboard comprises 28 function keys. 7 lines with 4 function keys per line. The function keys are currently allocated with multiple functions.
The flat keyboard serves, e.g., for:

- Emergency control,
- Scrolling the clear text display,
- Choosing the language,
- Programming (password entry, set the clock, etc.),
- Changeover of the simultaneous boom movements to be executed,
- Disabling or Enabling the fine control option.

3.3.18.3 Choosing the language

The computer control is equipped with a comfortable language management of the operating and informative messages. These are stored as clear text in different languages. After "Booting" the computer control, the text of the last language set appear in the clear text display.
"At the press of a button", the operating personnel are able to change the language on the operator panel. All operating and informative messages of the clear text display shown can then be output in the language selected.

3.4 Power supply

The power supply of the Ruthmann Steiger T 243 AE is carried out using the vehicle batteries mounted on the chassis. They supply, amongst others

- the vehicle chassis,
- the computer control,
- the sensors,
- the electrically actuated valves of the hydraulic system,
- the battery hydraulic pump,
- etc.

The vehicle batteries are charged using the generator of the chassis.

3.4.1 Battery voltage monitoring

The supply voltage of the vehicle batteries is monitored by the computer control. If the supply voltage falls below a value stored in the computer control, a buzzer and a signal lamp on the control panel of the work platform indicates that the battery voltage is too low. The vehicle engine must be started immediately in order to maintain the supply voltage and to charge the vehicle battery.

3.4.2 Fuses

The current circuits and their consumers are protected by electronic fuses.

3.4.2.1 Chassis fuses

Please refer to the Operator's Manual of the chassis manufacturer for information electrically safeguarding the chassis.

3.4.2.2 Ruthmann Steiger T 243 AE fuses

- Main fuses next to the vehicle battery.
- Fuses in the driver´s cabin (depending on the vehicle chassis).
- Fuse board in the switch box (emergency control) on the Steiger-substructure. A board with fuses is mounted on the inside of the swing frame. The fuses can be accessed from the outside.

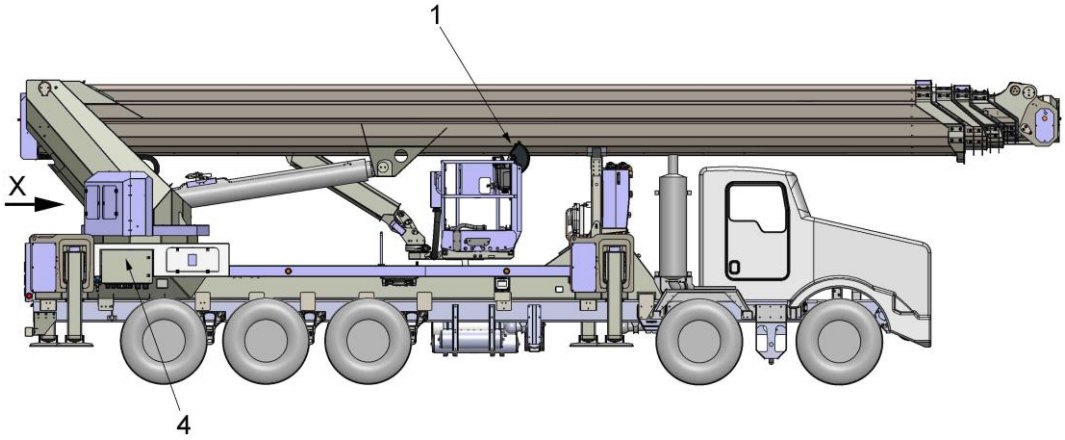
F1		⇨ Free.
F2		⇨ Free.
F3	7,5A	⇨ USB charging socket (special equipment)
F4	7,5A	⇨ Flood lamp platform (special equipment).
F5	3 A	⇨ Signal lamps driver´s cabin, ignition.
F6		⇨ Free.
F7	5 A	⇨ Jack flashing light.
F8	5 A	⇨ Stabilizing jack control, left side.
F9	5 A	⇨ Stabilizing jack control, right side.
F10	3 A	⇨ Limit switch, proximity switch, push-buttons for commands.
F11	5 A	⇨ Power supply control management, CAN modules.
F12	3 A	⇨ Power exits controller control without safety cut-off matrices for control device.
F13	7,5 A	⇨ Proportional amplifier A6 and A13, valve "Telescope "II" and "III" (lower boom) in", valves "Platform up / down", “Rotate platform left / right", "Platform telescope in / out".
F14	7,5 A	⇨ Proportional amplifier A5 and A15, valves "Rüssel up / down", “Lift / lower upper boom”, "Telescope "I" (upper boom) in".
F15	7,5 A	⇨ Valves "Jacks", "Lower boom lift / lower", "Swivelling left / right", relay "Telescope "II" and "III" (lower boom) out", "Telescope "I" (upper boom) out".
F16		⇨ Free.
F112		⇨ Free (Board A22).

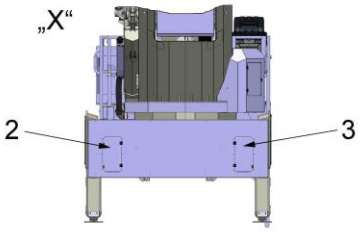
Another four fuse sockets are located to the right next to fuse F16. A safety test socket is located to the left of these four sockets. The right three sockets serve as a holder for the spare fuses. If a functional fuse is inserted into the test socket, a green LED with "Test" lettering illuminates to the right under the socket. The control positions PLATFORM CONTROL or EMERGENCY CONTROL must be switched on for this purpose.

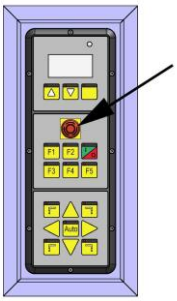
4 Control elements and displays

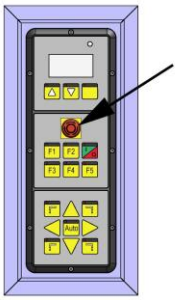
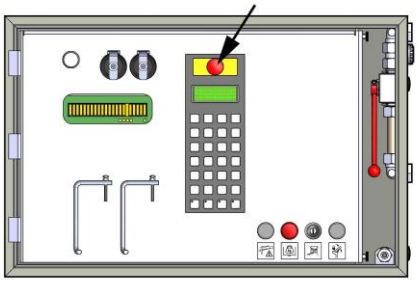
4.1 Arrangement of the EMERGENCY STOP switch

The Ruthmann Steiger T 243 AE is equipped with the following EMERGENCY STOP switches:





1. On the control panel in the work platform, top right.	
2. On the rear side on the Steiger-substructure in the driving direction, **left side**, in the middle operator panel of the stabilizing jack control.	

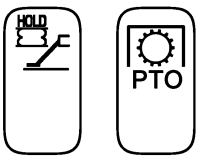
3. On the rear side on the Steiger-substructure in the driving direction, **right side**, in the middle operator panel of the stabilizing jack control.	
4. In the switch box on the Steiger-substructure in the driving direction on the **right side**, above the operator panel of the emergency control.	

4.2 Control elements and displays of the chassis

The operation of the chassis can be obtained in the Operator's Manual of the chassis manufacturer.

4.3 Control elements and displays of the Ruthmann Steiger

4.3.1 Control elements and displays on the dashboard in the driver´s cabin



The switch HOLD (air spring pressure retention) and the switch PTO (power take-off, main switch) are located on the control panel of the dashboard. They are used to switch the hydraulic pump drive (**P**ower **T**ake-**O**ff) as well as the Steiger-operation on and off at the same time. See also Operator's Manual of the chassis manufacturer.

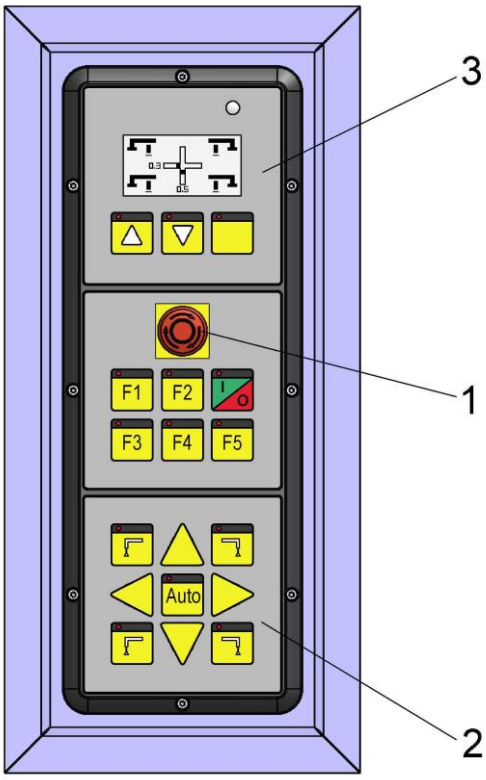
Two signal lamps are also located on the control panel. The signal lamps indicate that the Ruthmann Steiger T 243 AE is not in the transport configuration. They go out once the Steiger-operation has switched off and the following signals of the sensors are active:

1.  Signal lamp STEIGER NOT IN TRANSPORT CONFIGURATIO N
   ⇨ goes out when:
   - Work platform is telescoped in,
   - Boom system is in the boom support.

2.  Signal lamp STABILIZING JACKS NOT IN HOME POSITION
   ⇨ goes out when:
   - Stabilizing jacks are retracted.

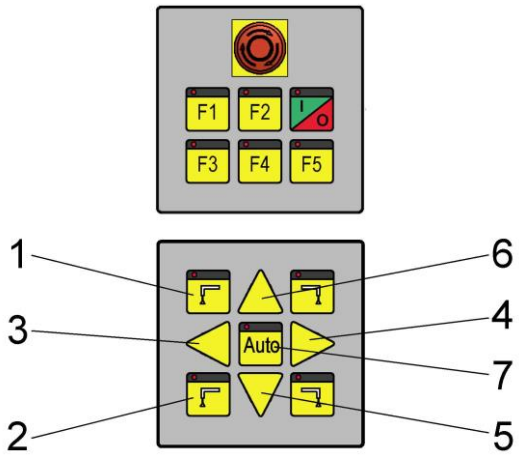
The shape and position of the switches or the signal lamps may change slightly depending on the equipment of the chassis (see also Operator's Manual of the chassis manufacturer).

4.3.2 Switch box STABILIZING JACK CONTROL on the Steiger-sub-structure (at the rear)



1. EMERGENCY STOP switch (*Module 2*)
   ⇨ Interrupts the electric control of the Steiger movements immediately. The vehicle engine is stopped.
2. Flat keyboard (*Module 3*)
   ⇨ Stabilizing jack control
3. Display (*Module 1*)
   ⇨ Jacking/inclination display (LCD levelling indicator)

4.3.2.1 Function keys of the flat keyboard (left side)



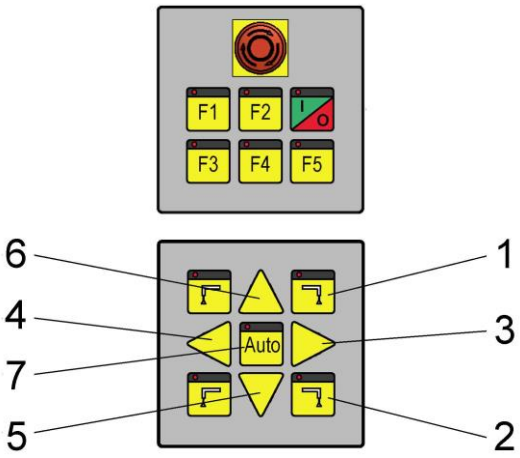
The function keys have multiple functions allocated in some cases.

Function key (designation)	Description
I / 0 START / STOP	⇨ Function: - Starts the vehicle engine. - Stops the vehicle engine.
F1 Empty	⇨ No function.
F2 Empty	⇨ No function.
F3 Empty	⇨ No function.
F4 Empty	⇨ No function.
F5 POSITIONING	⇨ Activates function key no. 3, 5 or 6 for positioning.
1. JACK FRONT LEFT	⇨ Function: - Activates function key no. 3, 4 or 5, 6 for controlling the front left jack. ⇨ Flashing light: - See function key no. 2. ⇨ Continuous light: - See function key no. 2.

Function key (designation)	Description
2.  JACK REAR LEFT	⇨ Function: - Activates function key no. 3, 4 or 5, 6 for controlling the rear left jack. ⇨ Flashing light: - Jack has ground contact and - electronically measured inclination of the Steiger is within the permissible jacking inclination. ⇨ Continuous light: - Jack has ground contact and - electronically measured inclination of the Steiger is within the permissible jacking inclination and - front wheels / rear wheels have ground clearance.
3. ◁ - JACK OUT HORIZONTAL - SIDE LEFT	⇨ Function: - Moves the jack arm out horizontally. - Automatically positions the work platform on the side to the left next to the Steiger-substructure.
4. ▷ JACK IN HORIZONTAL	⇨ Function: - Moves the jack arm in horizontally.
5. ▽ - JACK OUT VERTICALLY - REAR SIDE	⇨ Function: - Moves the jack out vertically. - Automatically positions the work platform at the rear side behind the Steiger-substructure.

Function key (designation)			Description
6.	△	- JACK IN VERTICALLY - HOME POSITION	⇨ Function: - Moves the jack in vertically. - Moves the boom components into the home position. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - No continuous light intended.
7.	Auto	ALL JACKS	⇨ Function: - Activates function key no. 5, 6 for controlling all four jacks at the same time. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - No continuous light intended.

4.3.2.2 Function keys of the flat keyboard (right side)



The function keys have multiple functions allocated in some cases.

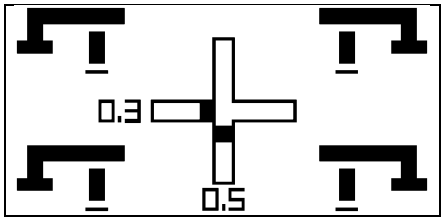
Function key (designation)	Description
I / 0 START / STOP	⇨ Function: - Starts the vehicle engine. - Stops the vehicle engine.
F1 Empty	⇨ No function.
F2 Empty	⇨ No function.
F3 Empty	⇨ No function.
F4 Empty	⇨ No function.
F5 POSITIONING	⇨ Activates function key no. 3, 5 or 6 for positioning.
1. JACK FRONT RIGHT	⇨ Function: - Activates function key no. 3, 4 or 5, 6 for controlling the front right jack. ⇨ Flashing light: - See function key no. 2. ⇨ Continuous light: - See function key no. 2.

Function key (designation)	Description
2.  JACK REAR RIGHT	⇨ Function: - Activates function key no. 3, 4 or 5, 6 for controlling the rear right jack. ⇨ Flashing light: - Jack has ground contact and - electronically measured inclination of the Steiger is within the permissible jacking inclination. ⇨ Continuous light: - Jack has ground contact and - electronically measured inclination of the Steiger is within the permissible jacking inclination and - front wheels / rear wheels have ground clearance.
3. ▷ - JACK OUT HORIZONTAL - SIDE RIGHT	⇨ Function: - Moves the jack arm out horizontally. - Automatically positions the work platform on the side to the right next to the Steiger-substructure.
4. ◁ JACK IN HORIZONTAL	⇨ Function: - Moves the jack arm in horizontally.
5. ▽ - JACK OUT VERTICALLY - REAR SIDE	⇨ Function: - Moves the jack out vertically. - Automatically positions the work platform at the rear side behind the Steiger-substructure.

Function key (designation)			Description
6.	△	- JACK IN VERTICALLY - HOME POSITION	⇨ Function: - Moves the jack in vertically. - Moves the boom components into the home position. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - No continuous light intended.
7.	Auto	ALL JACKS	⇨ Function: - Activates function key no. 5, 6 for controlling all four jacks at the same time. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - No continuous light intended.

4.3.2.3 Operating and informative messages of the graphical LC display

After switching on the operation, the display shows the "Start screen".



front

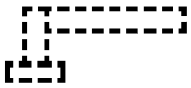
rear

left right

The screen page indicates the current jacking situation with which the Steiger is jacked (jacking/inclination display).

The example shows:
- jack arm extended to 100%,
- jack with ground contact,
- jacking inclination of 0.3 transverse and 0.5 lengthwise,
- vehicle wheels ground clearance (relieved).

The symbols have the following meaning:



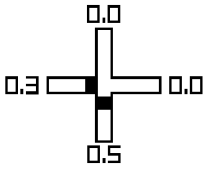
⇨ Example, left stabilizing jack. Stabilizing jacks retracted horizontal and vertical.

⇨ Example, left stabilizing jack. Jack arm extended horizontally to 75%. Jack plate does not have ground contact.

⇨ Example, left stabilizing jack. Jack arm extended horizontally to 50 %. Jack plate has ground contact.

⇨ Vehicle wheel has ground contact.

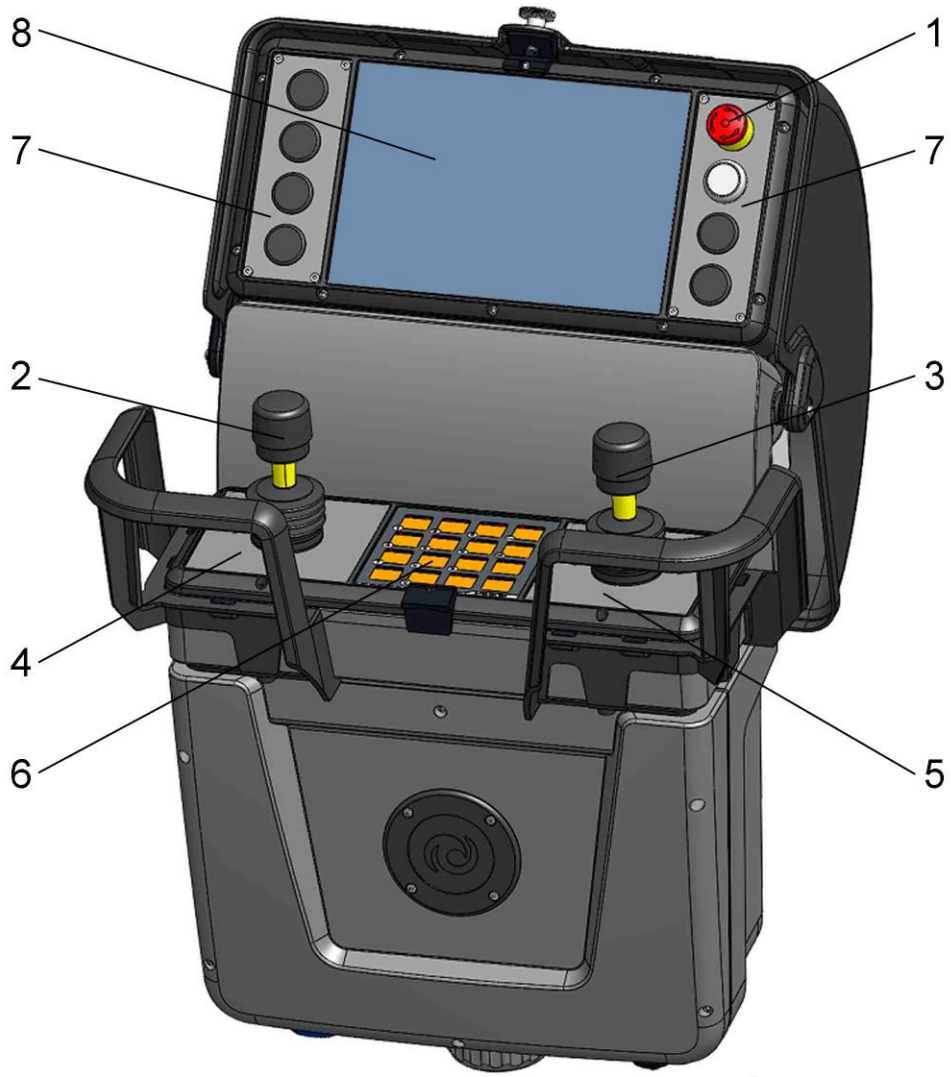
⇨ Vehicle wheel relieved, thus, raised from the ground (ground clearance)



⇨ Electronic levelling indicator (LCD levelling indicator). Indicates the current electronically measured jacking inclination of the Steiger. The figures indicate the jacking inclination [°] in the longitudinal direction (e.g., 0.5°) as well as in the transverse direction (e.g., 0.3°). Depending on the inclination, either the upper or the lower value or the left or right value are displayed. The other two values (here 0.0) are then not displayed. The box ■ filled in the cross of the levelling indicator shows that the computer control has a correct jacking situation. Otherwise it will not be filled □.

4.3.3 Switch box PLATFORM CONTROL in the work platform

4.3.3.1 Control panel RUTHMANNCockpit



Control element / display	Description
1. EMERGENCY STOP switch, red	⇨ Interrupts the electric control of the Steiger movements immediately. The vehicle engine is stopped.

Control element / display	Description
2.	**Joystick (left side)** Control lever for Steiger movements ↑ = Vertical axis, deflection to the front, ↓ = Vertical axis, deflection to the rear, ← = Horizontal axis, deflection to the left, → = Horizontal axis, deflection to the right, 1 = First function, 2 = Second function, 3 = Third function of the control lever. When moved, the control lever also activates the function key block for control commands for associated Steiger movements. The status remains active for approx. 5 sec. after deflection.
 - RAISE LOWER BOOM	↑ 1 : - Raises the lower boom.
 - RÜSSEL UP	↑ 2 : - Moves the Rüssel upwards.
 - JACK IN VERTICALLY	↑ 3 : - Moves the jack in vertically.
 - LOWER LOWER BOOM	↓ 1 : - Lowers the lower boom.
 - RÜSSEL DOWN	↓ 2 : - Moves the Rüssel downwards.
 - JACK OUT VERTICALLY	↓ 3 : - Moves the jack out vertically.
 - SWIVEL BOOM LEFT	← 1 : - Swivels the boom (tower) to the left.
 - JACK OUT HORIZONTAL	← 3 : - Moves the jack arm out horizontally.
 - SWIVEL BOOM RIGHT	→ 1 : - Swivels the boom (tower) to the right side.
 - JACK IN HORIZONTAL	→ 3 : - Moves the jack arm in horizontally.
3.	**Joystick (right side)** Control lever for Steiger movements ↑ = Vertical axis, deflection to the front, ↓ = Vertical axis, deflection to the rear, ← = Horizontal axis, deflection to the left, → = Horizontal axis, deflection to the right, 1 = First function, 2 = Second function, 3 = Third function of the control lever. When moved, the control lever also activates the function key block for control commands for associated Steiger movements. The status remains active for approx. 5 sec. after deflection.
 - RAISE UPPER BOOM	↑ 1 : - Raises the upper boom.
 - LOWER UPPER BOOM	↓ 1 : - Lowers the upper boom.
 - LOWER BOOM TELESCOPE IN	← 1 : - Moves the lower boom telescope in.
 - UPPER BOOM TELESCOPE IN	← 2 : - Moves the upper boom telescope in.
 - LOWER BOOM TELESCOPE OUT	→ 1 : - Moves the lower boom telescope out.

Control element / display	Description
 - UPPER BOOM TELESCOPE OUT	➔ 2 : - Moves the upper boom telescope out.
4.	Warning and signal lamps (LED) in front of the left joystick Light function indicates the switch state or malfunction.
 FUNCTION KEYS ENABLED (signal lamp)	⇨ Continuous light: - Function key block enabled for control commands for associated Steiger movements. When the function key is pressed the control command signals are transferred immediately to the computer control. Extinguishes approx. 5 sec. after last command control is actuated.
 CONTROL OVERLOAD (warning light)	⇨ Continuous light: - Platform bottoming detection. Work platform set down on obstacle. - Push button BYPASSING SAFETY SWITCH OFF actuated although no "conditional EMERGENCY STOP" present. ⇨ Flashing light: - Platform overload detection aid. Exceeding the maximum permissible carrying capacity of the work platform by ≥ 10%. - Boom movements with triggered plausibility monitoring of the stabilizing jacks.
 LML SWITCH-OFF (warning light)	⇨ Continuous light: - Movements causing increased moment locked. ⇨ Flashing light: - Computer control has switched to "conditional EMERGENCY STOP". Flashes alternately with the warning light SAFETY SWITCH OFF.

Control element / display		Description
		- Computer control has switched to EMERGENCY STOP.
○	JS SECOND FUNCTION RELEASED (signal lamp)	⇨ Continuous light: - Left joystick released for the control command of the second function (symbol in circle).
5.	Warning and signal lamps (LED) in front of the right joystick Light function indicates the switch state or malfunction.	
○	JS SECOND FUNCTION RELEASED (signal lamp)	⇨ Continuous light: - Right joystick released for the control command of the second function (symbol in circle).
	SAFETY SWITCH OFF (warning light)	⇨ Flashing light: - The computer control has determined a fault ("limited Steiger-operation"). - Computer control has switched to "conditional EMERGENCY STOP". Flashes alternately with the warning light LML SWITCH-OFF.
	BATTERY STATE-MONITORING (signal lamp)	⇨ Flashing light: - Battery voltage (supply voltage) too low, start vehicle engine.
6.	Flat keyboard (16 key function key block with LEDs illuminated red) ⇨ Functions of the keys (alternative): - Activates the joystick for the control command for jack movements (active for approx. 1 sec.). - Activates the function key block for control commands for associated Steiger motions. The left LED above the left joystick illuminates. The status remains active for approx. 5 sec. after pressing the function key. The control command is transferred to the computer control by pressing the key a second time. If the function key block is already activated, recognizable on the illuminated LED above the left joystick, the control command is transferred to the computer control immediately upon pressing the key. - Activates the left joystick for the control command MOVE TO POSITION or HOME POSITION (with the same actuation). - Switches the functions and devices on or off. - Input / programming. ⇨ Meaning of the LED lamps: - Indicates switching and operating states with flashing light or continuous light.	
 ①	START / STOP	⇨ Function: - Starts the vehicle engine. - Stops the vehicle engine. - Occupied with "1" in input mode.

Control element / display	Description
	⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Left LED, function key actuated. - Right LED, vehicle engine running.
 BYPASSING DISTANCE SENSOR ②	⇨ Function: - Bypasses the triggered distance control of the work platform. - Occupied with "2" in input mode. ⇨ Flashing light: - Left LED, no flashing light intended. - Right LED, distance control bypassed. ⇨ Continuous light: - Left LED, function key actuated. - Right LED, distance control triggered.
 BATTERY PUMP ③	⇨ Function: - Switches the battery operated hydraulic pump on. - Switches the battery operated hydraulic pump off. - Occupied with "3" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Left LED, function key actuated. - Right LED, battery operated hydraulic pump switched on.
G GENERATOR (special equipment) ESC	⇨ Function: - Switches the generator on. - Switches the generator off. - Occupied with "ESC" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Left LED, function key actuated. - Right LED, generator switched on.

Control element / display	Description
 SAVE POSITION ④	⇨ Function: - Saves the target position that the work platform that has been moved to. - Occupied with "4" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
 MOVE TO POSITION ⑤	⇨ Function: - Moves Steiger components to target position saved previously. With simultaneous deflection of the left joystick in direction " 🡻 ". - Occupied with "5" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
 SPECIAL FUNCTION ⑥	⇨ Function: - Switches the fine control on. - Switches the fine control off. - Levels the work platform horizontally. - Occupied with "6" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Fine control switched on. - Function key actuated.
 HOME POSITION ↵	⇨ Function: - Moves the boom components to home position. With simultaneous deflection of the left joystick in direction " 🡻 ". - Occupied with "↵ in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Steiger **not** in the home position.

Control element / display	Description
	- Function key actuated.
 - PLATFORM TELE. IN  - JACK FRONT LEFT ⑦	⇨ Function: - Telescopes the work platform in. Reduces the platform width. When function key is pressed once or twice, depending on activation status. - Activates the joystick for controlling the front left jack. - Occupied with "7" in input mode. ⇨ Flashing light: - See function key JACK REAR RIGHT. ⇨ Continuous light: - See function key JACK REAR RIGHT.
 ROTATE PLATFORM LEFT ⑧	⇨ Function: - Rotates the work platform to the left side. When function key is pressed once or twice, depending on activation status. - Occupied with "8" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
 ROTATE PLATFORM RIGHT ⑨	⇨ Function: - Rotates the work platform to the right side. When function key is pressed once or twice, depending on activation status. - Occupied with "9" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
 - PLATFORM TELE. OUT  - JACK FRONT RIGHT	⇨ Function: - Telescopes the work platform out. Increases the platform width.

Control element / display	Description
	When function key is pressed once or twice, depending on activation status. - Activates the joystick for controlling the front right jack. ⇨ Flashing light: - See function key JACK REAR RIGHT. ⇨ Continuous light: - See function key JACK REAR RIGHT.
JACK REAR LEFT	⇨ Function: - Activates the joystick for controlling the rear left jack. ⇨ Flashing light: - See function key JACK REAR RIGHT. ⇨ Continuous light: - See function key JACK REAR RIGHT.
REVERSE MOVEMENT	⇨ Function: - Reverses the direction of movement for "Swivel boom" and "Rotate platform". - Occupied with "0" in input mode. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Reversed directions of movement.
⓪	
ALL JACKS	⇨ Function: - Activates the joystick for controlling all four jacks at the same time. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
JACK REAR RIGHT	⇨ Function: - Activates the joystick for controlling the rear right jack.

Control element / display		Description
		⇨ Flashing light: - Jack has ground contact and - Electronically measured inclination of the Steiger is within the permissible jacking inclination. ⇨ Continuous light: - Jack has ground contact and - Electronically measured inclination of the Steiger is within the permissible jacking inclination and - Front wheels / rear wheels have ground clearance. - Function key actuated.
7.	Switch panel for illuminated push buttons ⇨ Functions of the push button (alternative): - Steiger movements. - Switching the functions and devices on or off. ⇨ Meaning of the lamp: - Only background illumination of the push button.	
	BYPASSING SAFETY SWITCH OFF	⇨ Push function: - Bypasses the safety switch off "conditional EMERGENCY STOP". Then, first the telescope must be retracted. - Emergency operation, any misuse is prohibited! -
	LOWER BOOM STILL (special equipment)	⇨ Switch function: - Switches off the control option for the lower boom movements “Raise” and “Lower the lower boom”. The lower boom remains still. - Switches on the control option for the lower boom movements “Raise” and “Lower the lower boom” (☞ Chapter 10).
	ROTATE PLATFORM LEFT (special equipment)	⇨ Push function: - Rotates the work platform to the left side.
	ROTATE PLATFORM RIGHT (special equipment)	⇨ Push function: - Rotates the work platform to the right side.

Control element / display		Description
	HOME POSITION (special equipment)	⇨ Push function: - Moves the boom components into the home position.
	AMBIENT ILLUMINATION (special equipment)	⇨ Switch function: - Switches the ambient illumination on the work platform on. - Switches the ambient illumination on the work platform off.
	GROUND ILLUMINATION (special equipment)	⇨ Switch function: - Switches the ground illumination on the work platform on. - Switches the ground illumination on the work platform off.
	SPOTLIGHT (special equipment)	⇨ Switch function: - Switches the work spotlight on the work platform on. - Switches the work spotlight on the work platform off.
8.	Graphic capable display with the following function keys ⇨ Display: - Indicates operating, information and fault messages. ⇨ Function keys: - Quick access to operating and informative messages - Menu navigation	
	CHASSIS	⇨ Function: No function. Should show informative messages for the chassis in the future.
	STABILIZING JACKS	⇨ Function: Shows the operating message and information for the jacking situation.
	BOOM	⇨ Function: Shows the operating message and information for the boom constellation.
	SPECIAL FUNCTION	⇨ Function: Calls up the menu SPECIAL FUNCTION.

Control element / display		Description
	OPERATION	⇨ Function: Shows information for operating.
	SETUP	⇨ Function: Calls up the menu SETUP.
	CONTRAST	⇨ Function: Sets the contrast.
 to 	Menu-dependent function keys	⇨ Function: - Action according to the menu screen. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
 to 	Menu-dependent function keys	⇨ Function: - Action according to the menu screen. ⇨ Flashing light: - No flashing light intended. ⇨ Continuous light: - Function key actuated.
9.	Buzzer (in switch box) - Indicates switching states or malfunctions.	
		⇨ Short continuous tone: - Computer control booted after switching on the operation and Steiger-operation released (sounds approx. 1 second). ⇨ Continuous tone: - Platform bottoming detection. Work platform lowered onto an obstacle - Level 1 has tripped. - Push button BYPASSING SAFETY SWITCH OFF actuated although no "conditional EMERGENCY STOP" present. - Battery voltage (supply voltage) too low, start vehicle engine.

Control element / display	Description
	⇨ Interval tone: - Platform overload detection aid. Exceeding the maximum permissible carrying capacity of the work platform by ≥ 10%. - Boom movements with triggered plausibility monitoring of the stabilizing jacks. - Platform telescope retracts. - Push button BYPASSING SAFETY SWITCH OFF actuated. - Selector button BYPASSING EMERGENCY STOP actuated on the switch box EMERGENCY CONTROL. - Push button BYPASSING SAFETY SWITCH OFF actuated on the switch box EMERGENCY CONTROL.

4.3.3.2 Graphical display

When switching on the operation, thus, as long as the computer control "is booting", the display shows the "Start screen" with information for the version, date and description.

After booting, the graphical display shows the first menu screen. The menu structure has three levels. The menus can be called up under the display directly for each screen using the seven direct keys. On the respective menu screens, there are additional symbols for the function keys F1 to F10 that can be used to navigate within the menu structure. Tapping on a symbol on the screen does not trigger any action (no touchscreen). Moreover, there is also a reproduction of the clear text screens of the emergency control on several menu screens (classic LCD). Information on the content of these screens, see chapter "Operating and informative messages of the clear text display".

4.3.3.2.1 Possible navigation symbols of function keys F1 to F10

Symbol	Description
DISPLAY NEXT	⇨ Scrolling within the classic LCDs; shows the next clear text screen.
DISPLAY BACK	⇨ Scrolling within the classic LCDs; shows the previous clear text screen.

Symbol	Description
MENU	⇨ Opens the menu selection. Assigns the function keys to menu levels.
MENU LEVEL BACK	⇨ Shows the previous "Menu level".
NEXT SCREEN	⇨ Scrolling in the menu level displayed; shows the next screen of the menu.
LAST SCREEN	⇨ Scrolling in the menu level displayed; shows the previous screen of the menu.

4.3.3.2.2 Explanation for the menu screens

CHASSIS menu:

This menu display provides the operating personnel with a variety of information on the chassis.

STABILIZING JACKS menu (jacking/inclination display):

The menu screen gives the operating personnel a diversity of information to make a quick, efficient and safe jacking of the Ruthmann Steiger T 243 AE easier. Amongst others, it represents the following information in a clearly arranged graphical form:

- Stabilizing jack basis,
- Jacking inclination (LCD levelling indicator),
- Wheels ground clearance or wheels ground contact,
- Classic LCD (text display),
- etc.

The stabilizing jack basis displayed indicates the current jacking situation with which the Steiger is jacked. On the basis of the graphical bars in the jack arms and the percentage details above, you can read the extension of all jack arms immediately. Circles filled on the jack plates indicate ground contact. Two wheels arranged on top of each other, each for the front and rear indicate the ground clearance of the vehicle wheels. With filled circle, a levelling indicator represents the current electronically measured jacking inclination of the Steiger. The inclination is also specified as numerical value at the same time.

BOOM menu:

The menu screen represents the following information in a clearly arranged graphical form, as well as other information:

- Boom constellation,
- Load moment (LML),
- Work platform load,
- Classic LCD (text display),
- etc.

The graphical representation with numerical values in percent and angle details represents the current boom constellation of the boom components. “Movement arrows” light up when the computer control carries out a controlled boom movement. The representation of the boom itself remains unchanged in the constellation. If boom movements are electrically locked, small prohibition signs ∅ light up on the movement arrows. A corresponding message appears on the Classic LCD (text display). On the basis of graphical bars, the current load moment can be read-off in [%] (100% = LML switch-off) and the current boom loading in [lbs (kg)]. Two displays with platform symbols arranged above each other show the current work height and work width in [ft (m)]. The following applies:

- Work height = Platform height + 6.56 ft (2 m) and
- Work width = Distance (tower middle to platform rear edge) + 1.64 ft (0.5 m).

SPECIAL FUNCTION menu:

This menu display provides special information. For example, the Ruthmann-Steiger T 243 AE can be equipped with up to 4 cameras as special equipment in the area containing the four-bar linkage for the upper boom / lower boom. Their mounts can be displayed in real time on the graphic display in the RUTHMANNCockpit. For navigation purposes, corresponding symbols are available on the menu screen for the function keys F1 to F10.

OPERATION menu:

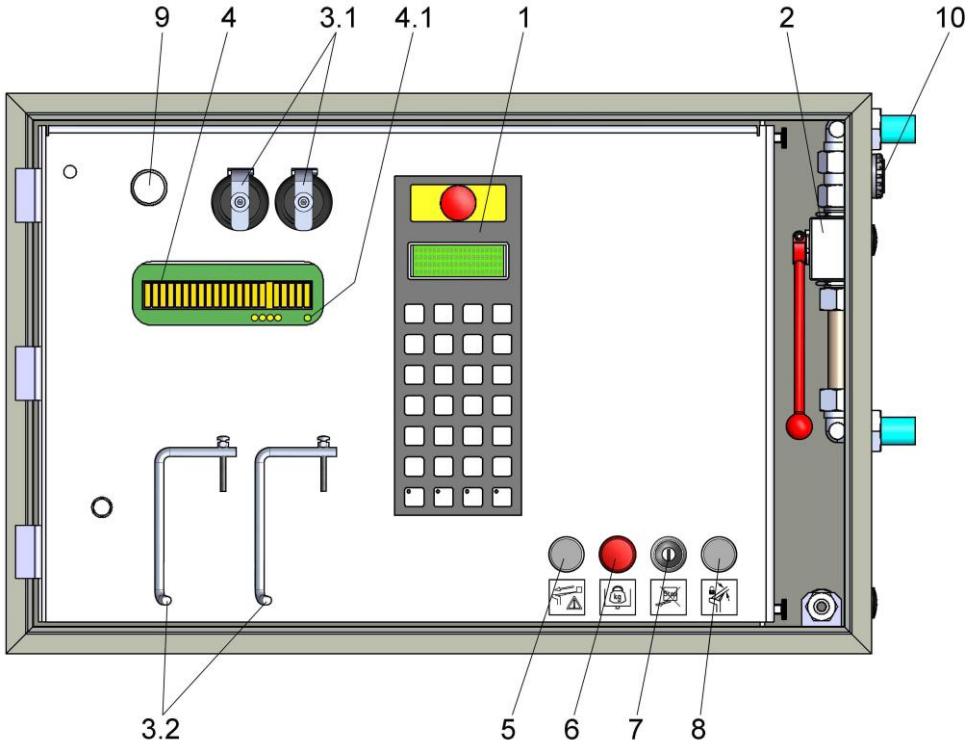
The menu screen provides the operating personnel with information for setting up and handling the Steiger, amongst others, for the selection of supporting plates and examples for the correct extension of stabilizing jacks.

Other menus:

In the other **SETUP** and **CONTRAST** menus, information and settings of the Steiger are output as well as the contrast of the graphical display. In the menu CONTRAST, the graphical display can be switched from day to night as well as black / white representation.

Principally, all menu screens are self-explanatory. The graphical display offers the possibility to represent information in a more detailed form that as the clear text display.

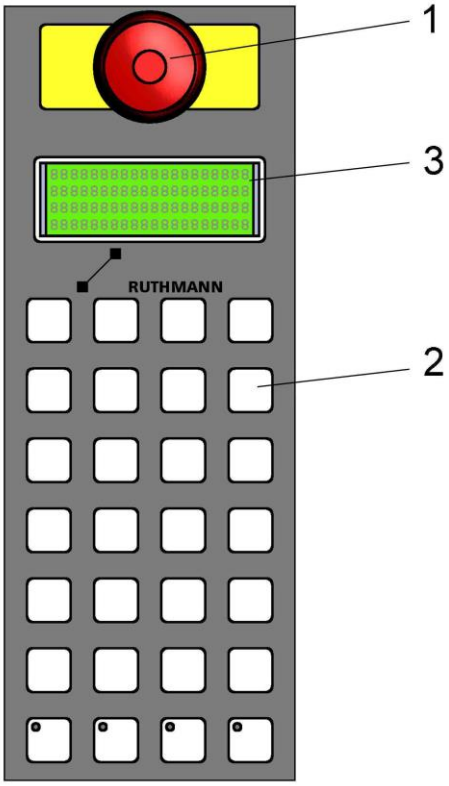
4.3.4 Switch box EMERGENCY CONTROL on the Steiger-substructure (right side)



1.	Operator panel	⇨ Flat keyboard and clear text display
2.	Ball valve	⇨ Emergency operation
3.1	Solenoid arresting device	⇨ Emergency operation, solenoid valves NG 6
3.2	Solenoid arresting device	⇨ Emergency operation, solenoid valves NG 10
4.	Fuse board	⇨ Consumers and current circuits are safeguarded by safety fuses that have different strengths
4.1	Green LED on the fuse board	⇨ Test function, fuse
5.	Push button BYPASSING SAFETY SWITCH OFF	⇨ Push function, bypasses the safety switch off "conditional EMERGENCY STOP". Then, first the telescope must be retracted. - Emergency operation, any misuse is prohibited! -

6.	 Warning light OVERLOAD	⇨ <u>Continuous light:</u> - Push button BYPASSING SAFETY SWITCH OFF actuated although <u>no</u> "conditional EMERGENCY STOP" present. ⇨ <u>Flashing light</u>: - Platform overload detection aid. Exceeding the maximum permissible carrying capacity of the work platform by ≥ 10%.
7.	 Selector button BYPASSING EMERGENCY STOP	⇨ Push function, option for overriding the EMERGENCY STOP switch of the work platform. - Emergency operation, any misuse is prohibited! -
8.	 Push button LOWER BOOM STILL (special equipment)	⇨ <u>Switch function</u>: - Switches off the control option for the lower boom movements “Raise” and “Lower the lower boom”. The lower boom remains still. - Switches on the control option for the lower boom movements “Raise” and “Lower the lower boom” (☞ Chapter 10).
9.	Special equipment	
10.	Buzzer	⇨ <u>Interval tone</u> - Platform overload detection aid. Exceeding the maximum permissible carrying capacity of the work platform by ≥ 10 %.

4.3.4.1 Operator panel EMERGENCY CONTROL



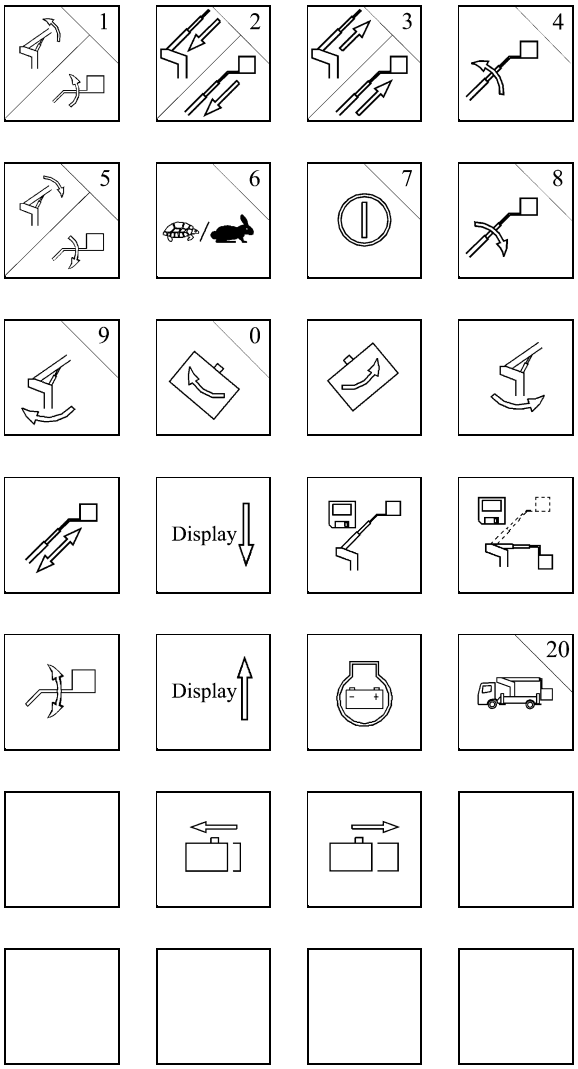
1. EMERGENCY STOP switch
   ⇨ Interrupts the electric control of the Steiger movements immediately. The vehicle engine is stopped.
2. Flat keyboard
   ⇨ Emergency control;

   scrolling the operating and informative messages:

   Programming (password entry, set the clock, etc.);

   numeric entry.
3. Clear text display
   ⇨ Indicates operating, information and fault messages.

4.3.4.1.1 Function keys of the flat keyboard



Allocation of the function keys from the left to the right or from the top to the bottom. The function keys have multiple functions allocated in some cases.

Function key (designation)	Description
1.  RAISE LOWER BOOM RÜSSEL UP	⇨ - Raise the lower boom. - Move the Rüssel upwards. Numerically allocated with "1".
2.  LOWER BOOM TELESCOPE IN / UPPER BOOM TELESCOPE IN	⇨ - Retract the lower boom telescope. - Retract the upper boom telescope. Numerically allocated with "2".

Function key (designation)	Description
3. LOWER BOOM TELESCOPE OUT / UPPER BOOM TELESCOPE OUT	⇨ - Extend the lower boom telescope. - Extend the upper boom telescope. Numerically allocated with "3".
4. RAISE UPPER BOOM	⇨ - Raise the upper boom, Numerically allocated with "4".
5. LOWER LOWER BOOM / RÜSSEL DOWN	⇨ - Lower the lower boom. - Move the Rüssel downwards. Numerically allocated with "5".
6. SPECIAL FUNCTION	⇨ Switch the fine control on or off. Numerically allocated with "6".
7. ENGINE START / STOP	⇨ Start or stop the vehicle engine. Numerically allocated with "7".
8. LOWER UPPER BOOM	⇨ - Lower the upper boom. Numerically allocated with "8".
9. SWIVEL BOOM LEFT	⇨ - Swivel the boom to the left. Numerically allocated with "9".
10. ROTATE PLATFORM LEFT	⇨ - Rotate the work platform to the left. Numerically allocated with "0".
11. ROTATE PLATFORM RIGHT	⇨ - Rotate the work platform to the right.
12. SWIVEL BOOM RIGHT	⇨ - Swivel the boom to the right.
13. UPPER BOOM TELESCOPE	⇨ Activates function key no. 2, 3 for controlling the upper boom telescope.
14. DISPLAY NEXT	⇨ Scroll the clear text display; the next "Display Screen" is displayed.
15. SAVE POSITION	⇨ Saves a target position of the work platform that has been moved to.

Function key (designation)	Description
16.  MOVE TO POSITION	⇨ Moves to a stored target position of the work platform. With simultaneous pressing of the function key SPECIAL FUNCTION.
17.  RÜSSEL	⇨ Activates function key no. 1, 5 for controlling the Rüssel.
18.  DISPLAY BACK	⇨ Scroll the clear text display; the previous "Display Screen" is displayed.
19.  BATTERY PUMP	⇨ Switch the battery operated hydraulic pump on or off.
20.  HOME POSITION	⇨ Moves boom components to home position. With simultaneous pressing of the function key SPECIAL FUNCTION.
21. Free	⇨ No function
22.  PLATFORM TELE. IN	⇨ Telescope the work platform in. Reduce the width of the work platform.
23.  PLATFORM TELE. OUT	⇨ Telescope the work platform out. Increase the width of the work platform.
24. Free	⇨ No function
25. Free	⇨ No function
26. Free	⇨ Special equipment.
27. Free	⇨ No function
28. Free	⇨ No function

4.3.4.1.2 Operating and informative messages of the clear text display

After switching on the operation, the display shows the "Start screen" provided that no fault messages are pending. If a fault message is pending, the display automatically switches to the respective screen and displays the fault message.

Information on the sensors or components is provided on the following screens. In order to transfer a large amount of information, the corresponding abbreviations have been selected for the components. Numbers (switch signals or angle details) are underneath the abbreviation that have the following meaning:

- "1" ⇨ Signal active,
- "0" ⇨ Signal inactive,
- "ZZZ" ⇨ Angle detail in degrees.

Example: (Screen page "1")

Screen line 1:
2:
3:
4:

The "1" under the abbreviations means, in this case, that the jacks have ground contact.

The messages and meanings are explained in the following list.

Clear text display	Meaning
RUTHMANN-Steiger **!! T 243 AE !!**	⇨ Start screen with the designation of the Steiger type
Next regular inspec- **tion according OM!**	⇨ Date of the annual technical experts inspection according **O**perator's **M**anual with month and year. The data is shown when booting the computer control instead of the start screen as soon as this is reached or exceeded, if a Steiger movement is controlled, the display changes to the start screen. Ruthmann Services will enter a new date.
x Wind Time %DRS **FLdn RLdn FRdn RRdn**	x ⇨ Screen page

Clear text display	Meaning
	Wind ⇨ Wind velocity in miles per hour [mph] (special equipment) Time ⇨ Time for the internal clock of the computer control %DRS ⇨ Percentage value of DRS capacity, 100% = switch-off DRS FLdn ⇨ Jack front left ground contact RLdn ⇨ Jack rear left ground contact FRdn ⇨ Jack front right ground contact RRdn ⇨ Jack rear right ground contact
x TCdeg EncDeg .AUB **.CI01 .ALB .AA .AC**	x ⇨ Screen page TCdeg ⇨ Swivel angle of the boom in degrees (tooth counter) EncDeg ⇨ Swivel angle of the boom in degrees (slewing gear encoder) .AUB ⇨ Angle "Upper boom - Lower boom" in 1/10 degree *1 .CI01 ⇨ Platform inclination in 1/10 degree *1 .ALB ⇨ Angle of elevation of the lower boom in 1/10 degree *1 .AA ⇨ Angle "Rüssel - Upper boom" in 1/10 degree *1 .AC ⇨ Angle "Platform - Rüssel" in 1/10 degree *1 *1 If e.g., the value "3" is displayed, this corresponds to an angle of 0.3°. The angle is displayed at steps of 0.1°.
x LBt2r LBt3r LBt2e **LBu LBend LBTft Merc**	x ⇨ Screen page LBt2r ⇨ Telescope II (Lower boom) retracted LBt3r ⇨ Telescope III (Lower boom) retracted LBt2e ⇨ Telescope II (Lower boom) extended LBu ⇨ Lower boom raised LBend ⇨ Lower boom in upper end position LBTft LBTcm ⇨ Total extraction, lower boom telescope cylinder in ft (cm) Merc ⇨ Inclination switch. "1", if the platform inclination is less than 10°.

Clear text display	Meaning
x UBTin UBTft UBlo **ATBup wow**	x ⇨ Screen page UBTin ⇨ Upper boom telescope retracted UBTft UBTcm ⇨ Upper boom telescope cylinder extension in ft (cm) UBlo ⇨ Upper boom lowered ATBup ⇨ Rüssel raised wow ⇨ Without material winch (special equipment)
x WhelfrF WhelfrR **Ilon Icros Tot0.1D**	x ⇨ Screen page (inclination display) WhelfrF ⇨ Signal front wheels free (relieved) WhelfrR ⇨ Signal rear wheels free (relieved) Ilon ⇨ Vehicle lengthwise inclination in 1/10 degree Icros ⇨ Vehicle crosswise inclination in 1/10 degree Tot.1D ⇨ Vehicle complete inclination in 1/10 degree
x FLout Rlout JAcom **FRout RRout Jack**	x ⇨ Screen page FLout ⇨ Jack arm front left extended RLout ⇨ Jack arm rear left extended JAcom ⇨ Common signal of the redundant limit switch "Jack ground contact" FRout ⇨ Jack arm front right extended RRout ⇨ Jack arm rear right extended Jack ⇨ Information for Ruthmann Services.
x FLin RLin **FRin RRin**	x ⇨ Screen page FLin ⇨ Jack front left retracted RLin ⇨ Jack rear left retracted FRin ⇨ Jack front right retracted RRin ⇨ Jack rear right retracted
x Brest RoT1 RoT2 **RoT3 CTre WHft WDft**	x ⇨ Screen page Brest ⇨ Boom in boom support RoT1 ⇨ Chain or rope break telescope I (upper boom) RoT2 ⇨ Chain or rope break telescope II (lower boom) RoT3 ⇨ Chain or rope break telescope III

Clear text display	Meaning
	(lower boom) CTrel ⇨ Telescoping work platform out permitted WHft WHcm ⇨ Work height in ft (cm) (approx. platform height + 6.56 ft (200 cm)) WDf WDc ⇨ Work width in ft (cm) (approx. distance tower middle to work platform rear edge + 1.64 ft (50 cm))
x DistNOK D+ TelSer **RelG PrP2 HtzOKHtzD+**	x ⇨ Screen page DistNOK ⇨ Distance control of the work platform (distance not OK) D+ ⇨ "1", if the vehicle engine is running TelSer ⇨ Teleservice (special equipment) RelG ⇨ Generator (special equipment) DrPp2 ⇨ Oil pressure pump 2 in bar HtzOK ⇨ "1", if the Hatz engine is running and the air filter, temperature are OK (special equipment) HtzD+ ⇨ "1", if the Hatz engine is running (special equipment)
x lbs LimLbs PltIn **DRS Height Perf.**	x ⇨ Screen page lbs ⇨ Platform load in lbs. The value could be >> 0 with a supposed "empty" work platform. Resulting mass of the equipment of the work platform compared with the standard work platform are displayed (☞ Sub-chapter "Work platform" in Chapter 2.1.2). LimLbs ⇨ Platform load limit in lbs PltIn ⇨ Platform telescope retracted DRS_ Height Perf. ⇨ DRS (special equipment). "1", if the movements “raise and lower the lower boom” released
EC.Right EC.Left RC **Work.cage Turret**	EC. Right ⇨ Door "Emergency control" opened on right side EC.Left ⇨ Door "Emergency control" opened on left side RC ⇨ Remote control (special equipment) switched on

Clear text display	Meaning
	Work. cage ⇨ Platform control switched on Turret ⇨ Tower control switched on (special equipment)
X Jacking HP KP	x ⇨ Screen page HP ⇨ Stabilizing jacks HP. “1”, if main processor (HP) detects correct jacking situation. KP ⇨ Stabilizing jacks KP. “1”, if control processor (KP) detects correct jacking situation.
x swivel speed boom **cur. max. dif.**	x ⇨ Screen page cur. ⇨ Current swivel speed of the platform in cm/s max. ⇨ Maximum permitted swivel speed of the platform in cm/s dif. ⇨ Current difference between the main processor (MP) and control processor (CP)
x Weekday **DD.MM HH:MM YYYY**	⇨ Displays the date and time "Weekday Day.Month Hours:Minutes Year".
No fault message available	⇨ If an error is detected in the sensors or the control, the display automatically goes to this scree. Then the corresponding error number appears here and a clear text note for the error determined. As long as no error is determined after switching in the control the last time, "No fault message available" appears on the screen. A screen number is not displayed.
Read out fault memory? yes=special	⇨ Output of fault messages from the error memory.
Fault memory DD.MM HH:MM YYYY **deleted on**	⇨ Displays the last deleting of the error message "Day. Month Hour : Minute Year".
Numerical values ...	⇨ Screen pages for Ruthmann Services.
This page is not used	Only clear text display operator panel EMERGENCY CONTROL

Clear text display	Meaning
	⇨ Empty screen added. Keep scrolling with the function key DISPLAY NEXT or DISPLAY BACK.
x Cockpit platform **16 key block**	Only classic LCD of control panel work platform ⇨ Indication of the depressed button according to the commander matrix. Example: 5 The first button in the second line of the flat key-board (16 function key block) of the control panel of the work platform is pressed.
This page is not used	Only classic LCD of control panel work platform ⇨ Empty screen added. Keep scrolling with the function key DISPLAY NEXT or DISPLAY BACK.
Button depressed on **E-control right side** or **Button depressed on** **E-control left side**	Only clear text display operator panel EMERGENCY CONTROL ⇨ Display of the button pressed according to the control device matrix. Example: Button depressed on 5 E-control right side The first button in the second line of the right emergency control is pressed. A screen number is not displayed.
This page is not used	⇨ Empty screen added. Keep scrolling with the function key DISPLAY NEXT or DISPLAY BACK.
x Stuetzensteuerung **? ? ?** **links CAN Bus ok=2** **? ? ?**	x ⇨ Screen page Value 1 ⇨ Module 1: Display of the button pressed. 7 = "Arrow up", 8 = "Arrow down", 9 = "Enter" Value 2 ⇨ Module 2: Display of the button pressed. 4 = "F1", 5 = "F2", 6 = "I/O", 7 = "F3", 8 = "F4", 9 = "F5" Value 3 ⇨ Module 3: Display of the button pressed.

Clear text display	Meaning
	1 = "Jack front left, 2 = "Arrow up". 3 = "Jack front right", 4 = "Arrow left", 5 = "AUTO", 6 = "Arrow right", 7 = "Jack rear left", 8 = "Arrow down", 9 = "Jack rear right" Value 4 ⇨ Module 1: "2", if CAN-Bus communication ok Value 5 ⇨ Module 2: "2", if CAN-Bus communication ok Value 6 ⇨ Module 3: "2", if CAN-Bus communication ok
x Stuetzensteuerung **? ? ?** **rechts CAN Bus ok=2** **? ? ?**	x ⇨ Screen page Value 1 ⇨ Module 1: Display of the button pressed. 7 = "Arrow up", 8 = "Arrow down", 9 = "Enter" Value 2 ⇨ Module 2: Display of the button pressed. 4 = "F1", 5 = "F2", 6 = "I/O", 7 = "F3", 8 = "F4", 9 = "F5" Value 3 ⇨ Module 3: Display of the button pressed. 1 = "Jack front left, 2 = "Arrow up". 3 = "Jack front right", 4 = "Arrow left", 5 = "AUTO", 6 = "Arrow right", 7 = "Jack rear left", 8 = "Arrow down", 9 = "Jack rear right" Value 4 ⇨ Module 1: "2", if CAN-Bus communication ok Value 5 ⇨ Module 2: "2", if CAN-Bus communication ok Value 6 ⇨ Module 3: "2", if CAN-Bus communication ok

Clear text display	Meaning
This page is not used	⇨ Empty screen added. Keep scrolling with the function key DISPLAY NEXT or DISPLAY BACK.
Volt HP KP	⇨ On-board voltage in Volt. The values of the main processor (HP) and control processor (KP) are displayed.
x Software-Version	⇨ Version of the Ruthmann Steiger software.
x Cockpit-Version	⇨ Version of the hardware or software of the RUTHMANNCockpit. Information for Ruthmann Services.
Change-over language Change=sp.funct	⇨ Language management. Choosing the English language automatically switches the units to imperial. A choice of metric or imperial units is available with the English language only. All other languages default to metric. After implicitly toggling the unit selection, a restart is required, i.e. operation must be switched off and on again.
This page is not used	⇨ Empty screen added. Keep scrolling with the function key DISPLAY NEXT or DISPLAY BACK.
x Display Units Imperial Change=sp.f or **x Display Units Metric Change=sp.f**	⇨ Change of displayed units: metric/imperial. Only available with English language. After toggling a restart is required, i.e. operation must be switched off and on.
Press spe. function for DRS OE password or **DRS OE password already entered**	⇨ Only for special equipment "Additional DRS options".
Press spec. funct. wind force [mph]	⇨ Only for special equipment "Additional DRS options". If the additional DRS option is not included in the scope of delivery, the message "Preselection xxx not available!" appears after the function key SPECIAL FUNCTION is pressed.
Press spec. funct. cage load [lbs]	
Press spec. funct. and sel. outr. force	
Password required Cont.=special funct.	⇨ The following screens can only be called up after entering a password.

Clear text display	Meaning
or **Password already typed in**	
This page is not used	⇨ Empty screen added. Keep scrolling with the function key DISPLAY NEXT or DISPLAY BACK.
Adjusttlscopeextsion in ft with sp. Funct	⇨ Only with special equipment "Programmable telescope extension limitation"
4 movements at the same Change=sp.funct or **2 movements at the same Change=sp.funct**	⇨ Release of the possibility that up to four Steiger movements can be carried out at the same time.
Sens.cont. from cage possible Change=Sp.f or **Sens.cont. from cage no pos Change=Sp.f**	⇨ Release of the possibility that the fine control can be switched on or off via the function key SPECIAL FUNCTION of the work platform control panel.
Ruessel, Oberarmtele dauerhaft Aend=Sond or **Ruessel, Oberarmtele einmalig Aend=Sond**	⇨ Joystick second function assignment. The second function following activation, i.e., after pressing down the joystick vertically, is assigned to the joystick either permanently or for one single operation.
Set clock? **Yes = Special Funct.**	⇨ Set the internal clock.
Change Password? **Yes = Special Funct.**	⇨ Change the password.
Last touch down: DD.MM HH:MM YYYY **in all:** or **No touch down occurred**	⇨ "Platform bottoming detection" Displays the last time the work platform was set down (Level "2") with date, time, year figure and total number of setting down.
Last overload: DD.MM HH:MM YYYY **in all:** or **No overload appeared**	⇨ "Platform overload detection aid" Displays the last platform overload with date, time, year figure and total number of overloads.

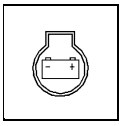
Clear text display	Meaning
Since New=sp.funct **Steiger h min**	⇨ "Operating hour counter" Displays the operating hours of the Steiger (computer control switched on) since the last new setting.
Last tare of TT MM JJJJ **weighing cell**	⇨ Displays the last taring of the weigher cell "Day Month Year".
Neig Boden Aussch **.NeigTr .Neig**	Neig ⇨ Vehicle inclination plausibility has tripped Boden ⇨ Ground contact plausibility has tripped Aussch ⇨ Extension of jack arm plausibility has tripped .NeigTr ⇨ Total vehicle inclination in 1/10 degree after setting up, thus, boom in boom support .Neig ⇨ Current total inclination of vehicle as 1/10 of a degree

4.3.5 Over-riding emergency system

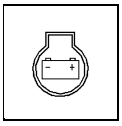
4.3.5.1 Battery operated hydraulic pump

The battery operated hydraulic pump is located at the rear left of the Steiger-substructure. Depending on the pre-selection of the control position, it is either switched on or off using the control panel on the work platform or with the operator panel of the switch box on the Steiger-substructure.

- Function key BATTERY PUMP on the work platform control panel

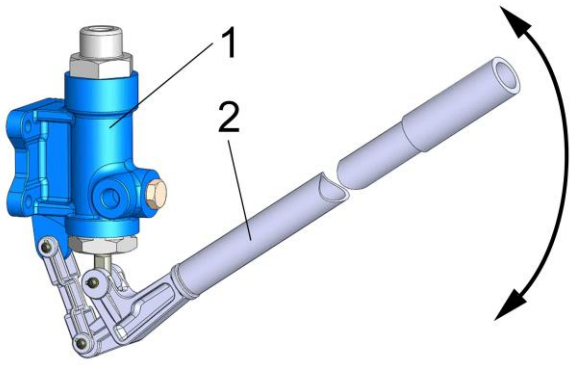


- Function key BATTERY PUMP on the operator panel of the Steiger-substructure switch box



4.3.5.2 Manual pump

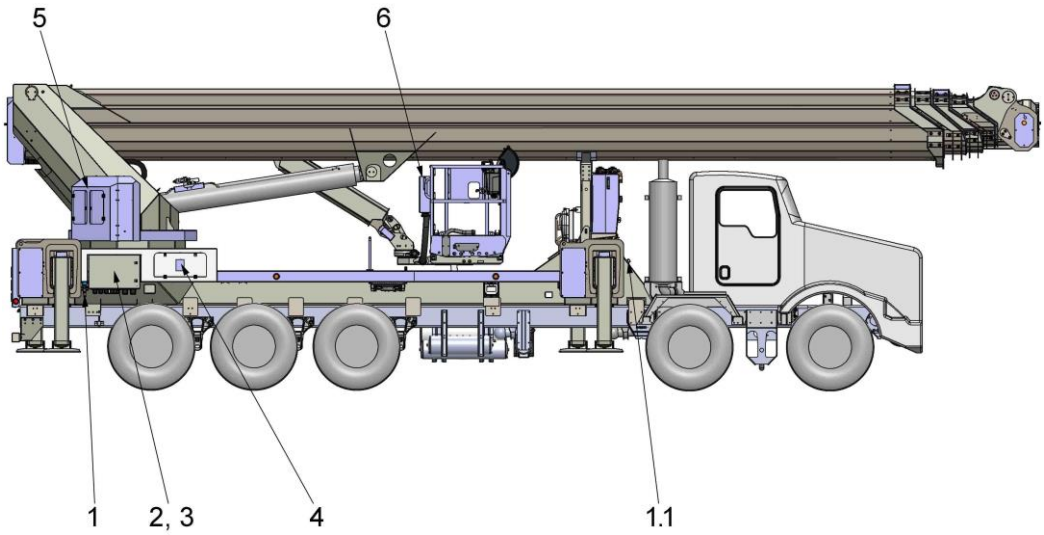
The manual pump is located next to the switch box EMERGENCY CONTROL on the Steiger-substructure.



1. Manual pump
   ⇨ Drive of the hydraulics in event of hydraulic pump failure
2. Manual pump lever (extension tube)

Manual pump lever ☞ Chapter "Emergency control system in extreme cases".

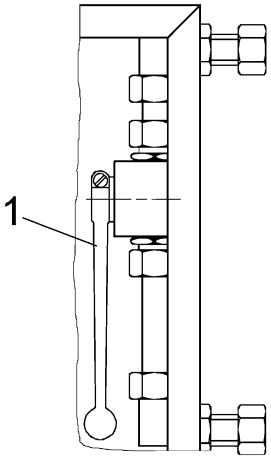
4.3.6 Emergency control system in extreme cases



1. Manual pump.
   1.1 Manual pump lever.
2. Ball valve (in the switch box EMERGENCY CONTROL).
3. Solenoid arresting device (in the switch box EMERGENCY CONTROL).
4. Directional valve for extending or retracting the stabilizing jacks and additional valve for lowering the lower boom (behind hatch).
5. Directional valve for controlling the boom (behind door).
6. Directional valve for controlling the work platform (in the valve box).

4.3.6.1 Ball valve

The ball valve is located on the right inside wall of the switch box EMERGENCY CONTROL on the Steiger-substructure.



1. Hand lever

⇨ Ball valve closed - hand lever in the direction of the pipe routing.

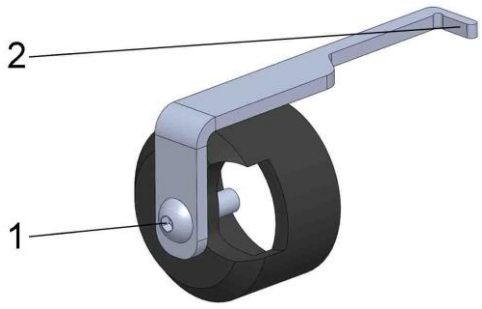
⇨ Ball valve opened - hand lever in a horizontal position.

Ball valve represented in a closed state.

4.3.6.2 Solenoid arresting devices

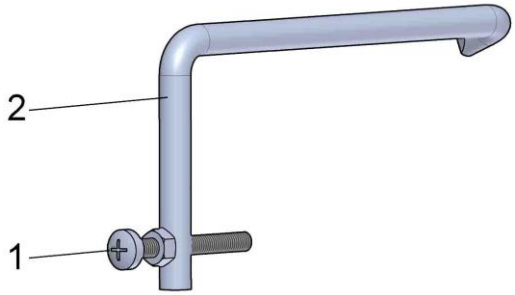
The solenoid arresting devices for the manual activation of the solenoid valves are located in the switch box EMERGENCY CONTROL on the Steiger-substructure.

Solenoid arresting device for manual activation of solenoid valves NG 6



1. Actuating screw
   ⇨ Solenoid head actuation
2. Bracket
   ⇨ Locking

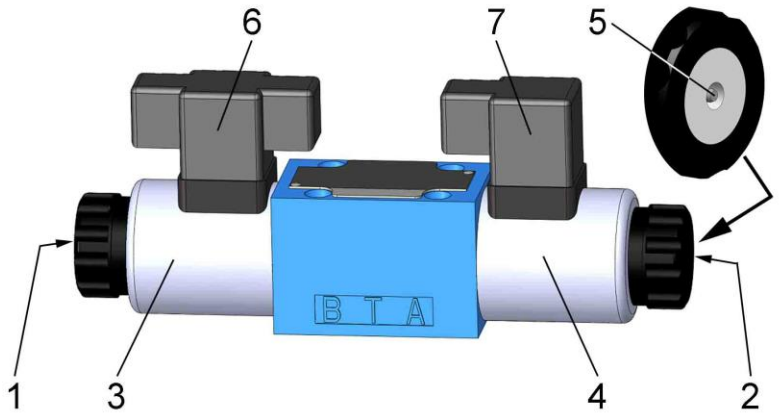
Solenoid arresting device for manual activation of solenoid valves NG 10



1. Actuating screw with lock nut (adjustable)
   ⇨ Solenoid head actuation
2. Bracket
   ⇨ Locking

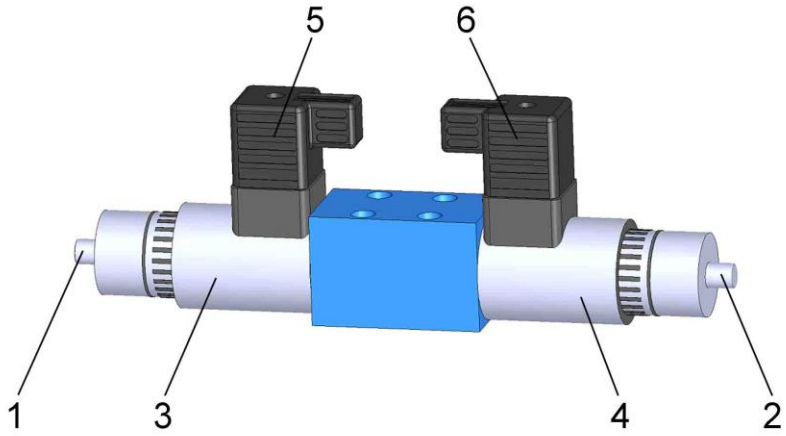
4.3.6.3 Directional valves / solenoid valves

Example: Directional valves NG 6 / NG 10



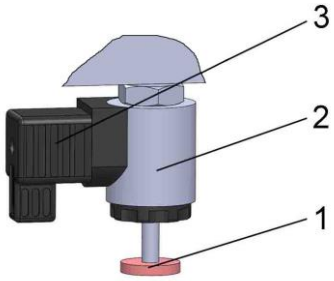
1. Manual emergency actuation, left side. Mount for the actuating screw of the solenoid arresting device.
2. Manual emergency actuation, right side. Mount for the actuating screw of the solenoid arresting device.
3. Solenoid, left side.
4. Solenoid, right side.
5. Plunger.
6. Device socket, left side.
7. Device socket, right side.

Example: Directional valves NG 4



1. Manual emergency actuation, left side with return spring (plunger).
2. Manual emergency actuation, right side with return spring (plunger).
3. Solenoid, left side.
4. Solenoid, right side.
5. Device socket, left side.
6. Device socket, right side.

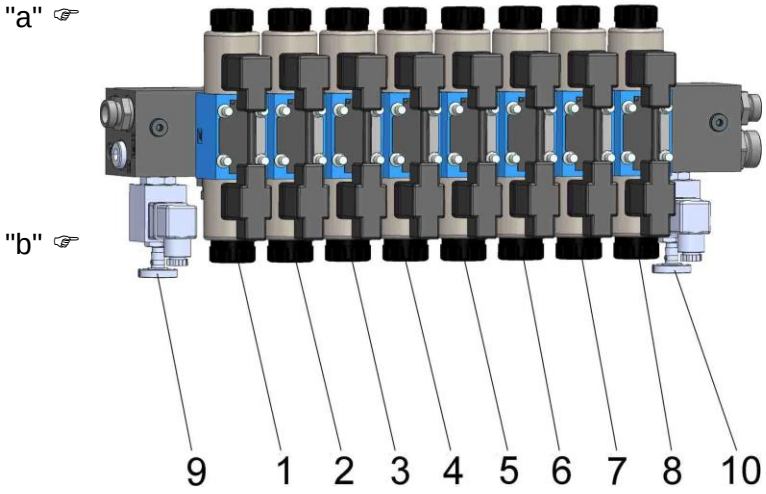
Example: Directional seat valves

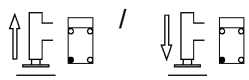
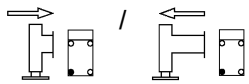
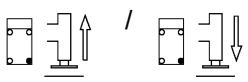


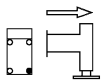
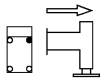
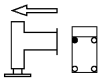
1. Manual emergency actuation with return spring (plunger).
2. Solenoid.
3. Device socket.

4.3.6.3.1 Directional valve for controlling the stabilizing jacks

The following solenoid valves are located on the base frame at the rear right:

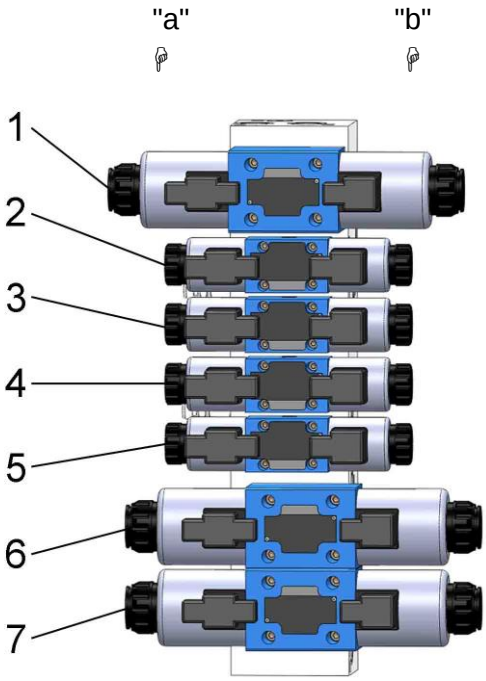


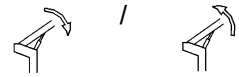
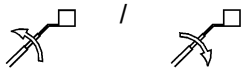
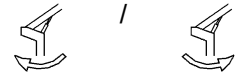
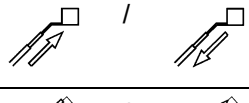
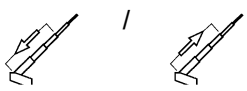
No.	Manual emergency actuation “a” / “b”	Function
1.		⇨ Retracting or extending the rear left jack vertically.
2.		⇨ Retracting or extending the rear left jack horizontally.
3.		⇨ Retracting or extending the rear right jack vertically.

No.	Manual emergency actuation "a"	/	"b"	Function
4.		/		⇨ Retracting or extending the rear right jack horizontally.
5.		/		⇨ Retracting or extending the front right jack vertically.
6.		/		⇨ Retracting or extending the front right jack horizontally.
7.		/		⇨ Retracting or extending the front left jack vertically.
8.		/		⇨ Retracting or extending the front left jack horizontally.
9.	--	/	--	⇨ Open the P line for moving the rear jacks using solenoid valves no. 1 to no. 4.
10.	--	/	--	⇨ Open the P line for moving the front jacks using solenoid valves no. 5 to no. 8.

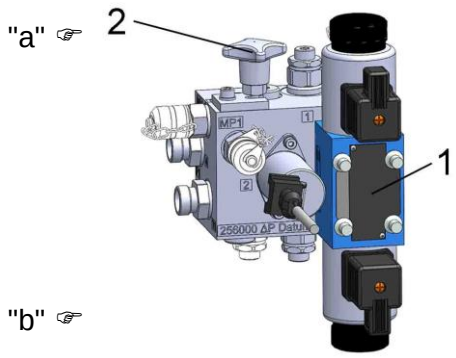
4.3.6.3.2 Directional valve for controlling the boom

The following solenoid valves are located on the tower:



No.	Manual emergency actuation “a” / “b”	Function
1.		⇨ Lowering or raising the upper boom.
2.		⇨ Move Rüssel upwards or downwards.
3.		⇨ Raise or lower the upper boom.
4.		⇨ Swivelling the boom (tower) to the left or to the right side.
5.		⇨ Extending or retracting telescope "I" (upper boom)
6.		⇨ Retracting or extending telescope "II" (lower boom)
7.		⇨ Retracting or extending telescope "III" (lower boom)

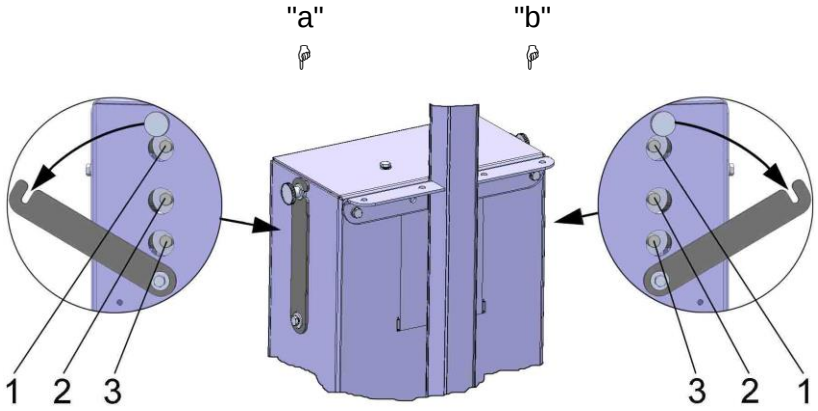
The following additional valves are located on the base frame at the rear right:



No.	Manual emergency actuation "a"	/	"b"	Function
1.		/	--	⇨ Additional valve. Lower the lower boom. Controlling the brake valve on the lifting cylinder of the lower boom.
2.				⇨ Throttle valve. Lower the lower boom.

4.3.6.3.3 Directional valve for controlling the work platform

The following solenoid valves are located in the valve box of the work platform:



No.	Manual emergency actuation “a”	/	“b”	Function
1.		/		⇨ Upwards or downwards inclination angle compensation of the work platform.
2.		/		⇨ Rotating the work platform to the left or to the right side.
3.		/		⇨ Telescoping the work platform out or in. Enlarge or reduce the width of the work platform.

4.3.7 Jacking/inclination display

Before moving the boom, check the jacking of the Steiger. There is a display on each control position that visually shows whether the inclination of the Steiger-substructure lies within the permissible jacking inclination and whether the computer control has detected a jacking situation.

Control position	Jacking/inclination display
STABILISING JACK CONTROL	Signal lamps (LEDs) and screen pages on the LC displays (e.g. LCD levelling indicator) on the switch boxes, rear left and right on the Steiger-substructure (☞ Chapters 4.3.2.1, 4.3.2.2 and 4.3.2.3).
PLATFORM CONTROL	Signal lamps (LEDs of the flat keyboard) - JACK FRONT LEFT - JACK FRONT RIGHT - JACK REAR LEFT - JACK REAR RIGHT and STABILISING JACKS menu screen on the graphic display on the control panel (☞ Chapters 4.3.3.1 and 4.3.3.2).
EMERGENCY CONTROL	Screen pages on the clear text display on the operator panel (☞ Chapter 4.3.4.1.2).

5 Commissioning

⚠ WARNING **Improper commissioning can lead to serious bodily injuries or death!**

- **Only sufficiently trained personnel must be assigned with commissioning of the Ruthmann Steiger.**
- **The Operator's Manuals of the Ruthmann Steiger and chassis manufacturer must be observed.**
- **The operating personnel must understand and adhere to the legal and generally applicable safety and accident protection guidelines provided in the Operator's Manual for the applicable use of the Steiger!**
- **The operating personnel must have understood and observed the document!**
- **If defects should be determined during commissioning, operation may not be started. Operation may only be commenced after the defect has been rectified.**

Next to the following information listed, particular attention must be made to the safety instructions in chapter 1.2.

5.1 Definition of the transport configurations and basic setting

The transport configurations and home position are identical.

Position of the components		
Components		**Position**
Stabilizing jacks	Jack front left	**retracted**
	Jack front right	**retracted**
	Jack rear left	**retracted**
	Jack rear right	**retracted**

Components		Position
Boom	Tower	**middle position**
	Upper boom telescope (I)	**intermediate position)***
	Lower boom telescope (II / III)	**retracted**
	Upper boom	**in boom support**
	Lower boom	**in boom support**
Work platform	Control panel	**completely to right**
	Platform console	**on work platform support**
	Doors	**closed**
	Platform telescope	**retracted**

* The upper boom telescope is telescoped out far enough so that the work platform rests correctly on the work platform support.

Switch settings and light indicator (transport configuration)	
Switch / signal lamp	**Position / display**
Switch PTO (power take-off) (Steiger-operation On / Off)	**OFF**
Signal lamp STEIGER NOT IN TRANSPORT CONFIGURATION (with the ignition switched on)	**OFF**
Signal lamp STABILIZING JACKS NOT IN HOME POSITION (with the ignition switched on)	**OFF**
Vehicle pneumatic suspension	**Normal level**

Switch settings (basic setting)	
Switch / signal lamp	**Position / display**
Switch PTO (power take-off) (Steiger-operation On / Off)	**ON**
Switch HOLD (air spring pressure retention)	**ON**

The Ruthmann Steiger T 243 AE may **only** be moved to the deployment location when in transport configuration.

During transport, the telescope ladder of the ascent **must** be laying locked in the insertion compartment.

5.2 Measures before commencing driving

Observe the Operator's Manual of the chassis manufacturer!

- Additional checks before starting the vehicle engine:
  - ✓ Check the Steiger visually for
    - – damaged, cracks, deformation,
    - – corrosion on bearing components,
    - – fixing and securing detachable connections and covers,
    - – leaks,
  - ✓ Ruthmann Steiger T 243 AE in **TRANSPORT CONFIGURATION**.

- Additional checks after switching on the ignition:
  - ✓ The signal lamps
    - – STEIGER NOT IN TRANSPORT CONFIGURATION and
    - – STABILIZING JACKS NOT IN HOME POSITION

    on the control panel of the dashboard must have gone out.

5.3 Measures before Steiger-operation

If several persons are working together with the, or within the vicinity of the Ruthmann Steiger T 243 AE, then a supervising person must be allocated.

5.3.1 Checks before Steiger-operation

Before commissioning each time and before starting each work shift, the operating personnel must convince themselves of the correct state of the Ruthmann Steiger T 243 AE and the effectiveness of the actuating and safety equipment (☞Chapter 9.2.1)!

Checks:

- ✓ The Operator's Manuals and, where applicable, operating instructions belonging to the use are on-location.
- ✓ The Steiger must be suitable for the conditions present at the site where it is to be used and for the intended application (☞ Chapter 1.1 and 2).
- ✓ Ensure that the inspection interval for "regular inspection" (inspection by expert) is not exceeded (☞ Chapter 0.5.3 and 2.2 as well as Steiger Instruction Handbook).
- ✓ Check the Steiger visually for
  - damage, cracks, deformation,
  - corrosion on bearing components,
  - fixing and securing detachable connections and covers,
  - leaks.
- ✓ Check accessible components and standing surfaces such as ascents, ladders, work platform, etc. to ensure they provide proper support and protection against slipping (cleanliness, wear, etc.).
- ✓ Check the anchor points for the connection of personal fall protection systems for damage and fixing point.
- ✓ The water drain openings of the work platform must be free.
- ✓ Legibility of the signs, such as information and safety signs, fabrication sign, inspection tag, etc. (☞ Chapter 1.3 and 2.2),
- ✓ Rotating flashing beacons, jack flashing lights,
- ✓ Fuel supply, engine oil and additional operating substances such as, e.g., Adblue. Check the filling level according to the Operator's Manual of the chassis manufacturer.
- ✓ Vehicle batteries. Check the charge state of the vehicle batteries according to the Operator's Manual of the chassis manufacturer.

- ✓ Hydraulic oil fill level. Check the oil level in the hydraulic oil tank when the oil is cold, the vehicle is positioned horizontal and the hydraulic pump drive is switched off.
- ✓ Suction line ball valves of the hydraulic oil tank connection elbow. The ball valves must be opened in all cases. Thus, the hand lever of the ball valves must be located in the direction of the pipe routing. In order to prevent unintended closing, they must be secured using cable ties.
- ✓ Steering the trailing axle (if fitted). Before setting up the Steiger and when in a jacked state, the wheels of the trailing axle of the vehicle chassis must be positioned straight ahead.
- ✓ Check of the free spaces for the motion sequences of the mechanical components, including all hydraulic cylinders.
- ✓ Cleanliness of the sensors.
- ✓ Visual and function inspection of the safety equipment (e.g., EMERGENCY STOP switch, etc. ☞ Chapter 4.1 and 6.1).
- ✓ Visual and function inspection of the control elements (e.g., joystick, push buttons, flat keyboard, etc. ☞ Chapter 4.3 ff.)
- ✓ Installation location and jack underground (☞ Chapter 5.3.2 ff.)
- ✓ Earthing (e.g., when using on or in the vicinity of transmitting, wind turbines or transformer stations ☞ Chapter 5.3.3).

5.3.2 Installation location

Before commencing work, the operating personnel must familiarise themselves with the work surroundings. The intended installation location must be selected with care. The responsibility for safe jacking of the Ruthmann Steiger T 243 AE lies with the operating personnel.

- ✓ You must leave the installation location prior to installation. The work environment include, e.g. even obstructions in the working and traffic area. Check operating area especially for hazards up in the air, resulting from
  - – high voltage and overhead electrical lines,
  - – extending building parts,
  - – equipment or bridge constructions,
  - – other elevating work platforms, cranes or other machines located in the range of motion as well as
  - – other possible overhead obstacles.
- ✓ It may be necessary to safeguard the site from the public traffic zone (☞ Chapter 5.3.2.1).
- ✓ Maintain adequate safety distance to live components of the electrical systems (☞ Chapter 5.3.2.2).

- ✓ Maintain adequate safety distance to embankments, pits and excavations (☞ Chapter 5.3.2.3).
- ✓ Carrying capacity of the ground (Jack underground). The load carrying capacity of the ground or carrying capacity of the sub-constructions below the jack plates must be dimensioned sufficiently (☞ Chapter 5.3.2.4).
- ✓ Suitable underlays (e.g. Ruthmann supporting plates) for reducing the surface pressure on the underground. (☞ Chapter 5.3.2.4).
- ✓ Maintain adequate free spaces for the motion sequences, i.e. extension of the stabilizing jacks (☞ Chapter 2.1.2.2).
- ✓ Maintain adequate free spaces for the motion sequences, i.e. boom movements (☞ Chapter 2.3).
- ✓ Ensure that there is adequate ventilation at the installation location.
- ✓ The wind velocity must be determined. The wind velocity must be lower than the permissible wind velocity (☞ Chapter 2.1.2.1 and 2.4).

5.3.2.1 Safeguarding in public road traffic

⚠ DANGER

Traffic hazard due to laterally swivelled boom! Road users may collide with the boom or the work platform based on the very low clearance height!

- ➢ **If the work platform or boom is swivelled out and / or the work platform is lowered into the traffic area of road vehicles lower than 14 ft 9 in (4.5 m) above the ground then even the area underneath the work platform and the boom must be cordoned off.**
- ➢ **If the tower head or boom foot of the laterally swivelled out boom protrudes beyond the stabilizing jack range of the Steiger, the area must also be cordoned off.**

If the Ruthmann Steiger T 243 AE is deployed in road traffic, then the Steiger must be secured from the road traffic according to the local national provisions (e.g. road traffic regulations). Before beginning the work of safeguarding areas that affect the road traffic, the type of blocking and marking of the work location must be coordinated with the road traffic authorities in charge. When using resources for controlling and diverting the traffic, special attention must be paid to clear and safe traffic guidance. Markings, traffic signs and traffic equipment should divert the traffic meaningfully, not contradict one another and thus guide the traffic safely. The perceptibility should not be impaired by a large number of transportation facilities. The traffic signs and

transportation facilities must comply with the guidelines (e.g. road traffic regulations).

Safeguarding against traffic hazards can be done, e.g. by:

- switching on rotating flashing beacons, visible from all sides. The high power consumption of the rotating flashing beacons must be observed. If necessary, allow the vehicle engine to run during the entire period of deployment.
- Traffic sign (Construction site)
- Traffic facilities, such as, e.g.:
  - Warning lights,
  - Blocking devices, such as, e.g.:
    - Blocking barriers,
    - Followers (Warning posts),
    - Traffic cones,
    - Mobile crash wall (with or without warning flags),
    - Mobile crash wall with flashing arrow (with or without warning flags).
- Flagmen

Safeguarding work locations and the use of blocking devices takes place according to the guidelines for securing work locations on roads (e.g. RSA 21 or ASR A5.2).

5.3.2.2 Safety distances to live components of electrical systems

⚠ DANGER

Mortal danger by electrical shock! Contact with live components of electrical systems may have lethal consequences! Even with conducting materials that are not good conductors, flash-over may take pace especially under wet conditions!

- ⦸ **Working on or in the vicinity or live parts of the electric system is forbidden!**
- ➢ **Maintain adequate safety distance to the live components! This is applicable in all directions for direct contact even for components of the Steiger (such as, e.g. work platform, boom, Steiger-substructure, chassis, etc.) devices, tools and work-pieces.**
- ➢ **Do <u>not undershoot</u> the safety distances by Steiger movements.**

- **External influences, such as, e.g. any upswing of the work platform, the boom and the upswing of e.g. overhead power lines due to wind, must be taken into consideration with the dimensioning of the safety distance.**
- **Maintain a sufficient safety distance (Protective distance) according to §1926.1408 Table A.**

If the Ruthmann Steiger T 243 AE is being deployed at or near live components of electrical systems, then **adequate safety distance** must be maintained to the live components if the components of the system, e.g. are not

- voltage-free and earthed for the duration of work to protect persons or
- isolated electrically or
- covered and / or shielded,
- or cannot be safeguarded

in any other manner. For non-electrical work, such as, e.g. for

- construction, assembly and installation, painting and touching up work,
- pruning overhead power lines,
- working with other devices or construction aids

according to the DGUV guidelines 3, the requirement with respect to the permissible approaches (protection by keeping distance) is met, if e.g. the safety distances listed below are **not** undershot. Identical country-specific regulations of the USA must be observed!

Safety distances (Protective distances) for working near live components:

a) according to the Guidelines of the "Deutschen Gesetzlichen Unfallversicherung" DGUV (German Statutory Accident Insurance) Guidelines 3 "Electrical systems and equipment":

Nominal voltage				Safety distance *[1]
up to		1000 V (1 kV)		1.0 m
above	1 kV	to	110 kV	3.0 m
above	110 kV	to	220 kV	4.0 m
above	220 kV	to	380 kV	5.0 m
for unknown nominal voltage				> 5.0 m

b) according to Table A of §1926.1408

Nominal voltage				Safety distance *1	
up to			50 kV	10 feet	(3.05 m)
above	50 kV	to	200 kV	15 feet	(4.60 m)
above	200 kV	to	350 kV	20 feet	(6.10 m)
above	350 kV	to	500 kV	25 feet	(7.62 m)
above	500 kV	to	750 kV	35 feet	(10.67 m)
above	750 kV	to	1000 kV	45 feet	(13.72 m)
above	1000 kV			see §1926.1408	

*1 *Other safety distances (Protective distances) may apply depending on the country/. The personnel deployed must be aware of the safety distances to be maintained according to the local provisions.*

If **no information** is known about the live components, then, in any case, the **largest safety distance** must be maintained.

5.3.2.3 Safety distances from embankments, pits and excavations

⚠ DANGER

Risk of tipping! Edges of embankments, pits or excavations may slip abruptly based on the supporting forces acting on them. Edges may be washed out. The stability of the Steiger is endangered. The Steiger may tip over!

- ⦸ **Never install the Steiger on unknown embankments, pits and excavations!**
- ➢ **Always maintain adequate distance to the edge of the embankment, pit or excavation.**
- ➢ **Place supporting plates and, if necessary, other large-area underlays below the jack plates!**

If the Ruthmann Steiger T 243 AE is installed, e.g. in embankments, pits or excavations, then **adequate safety distance** must be maintained opposite the edge. Measures for stable installation of the Steiger can be referred to, e.g. in the

- DGUV Guidelines 39 "Construction work",
- DIN 4124 "Excavations and trenches" and the
- Technical Instructions of the IPAF "Soil conditions".

In other nations, identical country-specific regulations must be observed!
You should travel on the edges of embankments, pits or embanked construction pits only if the stability of the soil or rock face is ensured. This is also applicable to shored pits, construction pits and excavations as long as the

shoring has not yet been brought in completely. Stable installation of the Steiger depends on the

- **terrain** inclination,
- **soil properties**,
- **Inclination** of the embankment or embanked construction pit,
- **Height** of the embankment or embanked construction pit and on the
- **total weight** of the Steiger.

According to DIN 4124, the Steiger may be installed on an even horizontal terrain near an embankment, an excavation or an embanked construction pit with corresponding safety distance "D" if the adjacent gradient is less than:

- ≤ 45° with non-cohesive or less cohesive soil,
- ≤ 60° with at least firmly cohesive soil,
- ≤ 80° with rock.

In the process, *non-cohesive soil* of frictional ground, consists of grains of different size, such as, e.g. rubble, crushed rock, gravel or sands as well as mixtures thereof. *Cohesive soil* is a soil that can absorb and retain water such as, e.g. silt, clay or mixtures thereof such as mud or marl. And *rock* is a stone that can be dense and solid or loose and rugged, such as, e.g. limestone, sandstone, granite, basalt or porphyry.

Safety distance "D" to the above-mentioned embankment or embanked construction pit according to the "Technical Instructions of the IPAF":

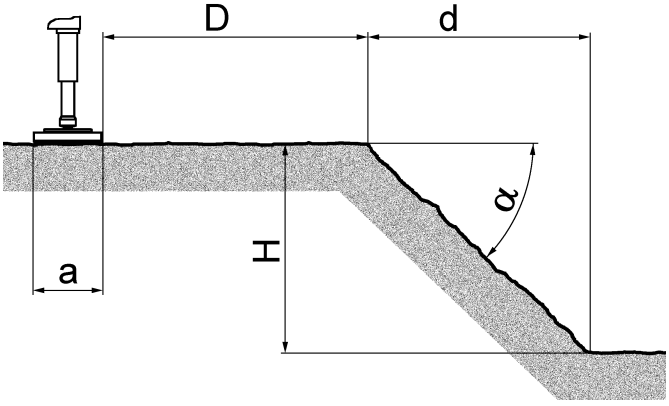
$D \geq a \times 4$

and

$D + d \geq 2 \times H$

with

$d = H / \tan \alpha$



D	≙	Safety distance
a	≙	Edge length of the full-area square underlay plate
d	≙	Horizontal embankment length
H	≙	Embankment height
α	≙	Inclination of the embankment

The safety distance "D" is the unobstructed distance from the outer edge of the jack plate underlay to the edge! The square underlay below the jack plate must be dimensioned adequately. The carrying capacity of the ground (jack underground) must be observed!

If necessary, to determine the stability of the Steiger, geotechnical verification of the stability must be prepared.

Safety distances in appropriate terrain for embankment or embanked construction pits or for pit shoring for horizontal or vertical shoring must be taken e.g. according to the rules of the above-mentioned standard based on the complexity.
For higher embankments, if necessary, berms (banks, storeys, terraces) must be created in order to prevent the soil from slipping away. You need to decide about the need and design of berms on a case-to-case basis. For an embankment of more than 5 m height or a larger embankment angle, geotechnical stability must be verified according to DIN 4124.

5.3.2.4 Supporting underground

⚠ DANGER

There is risk of tipping over by yielding of the stabilizing jacks, e.g. sinking in of a jack! Asphalt and concrete plates may be washed out. Ducting, cable shafts or pipelines may be located below the asphalt or concrete plates. The stability of the Steiger is endangered. The Steiger may tip over!

⦸ Stabilizing jacks must be <u>avoided</u>:
- **on canal covers, gratings,**
- **on ducting, cable shafts or pipelines,**
- **on heaped up soil,**
- **near kerb edges so that the jack plate does not make full contact,**
- **etc.**

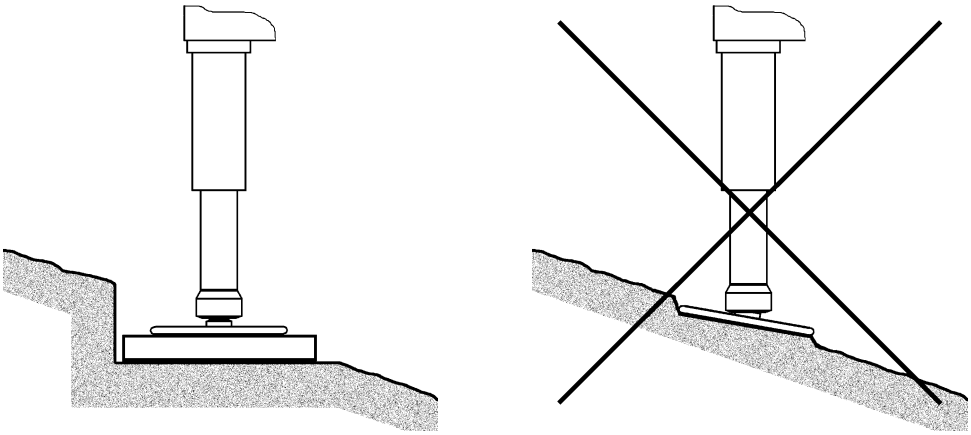
⦸ Installing the Steiger is prohibited on
- **quicksand,**
- **soil conditions, with which even by using larger underlays (supporting plates) the carrying capacity of the underground is not adequate.**

Changing soil conditions, for example, due to rain, thawing, or sunlight, etc. may reduce the carrying capacity of the underlying surface even during deployment. The stability of the Steiger is endangered. Steiger can tip over!

- **Check the ground conditions during deployment. For example,**
  - **Non-cohesive soils may lose their stability due to rain or the influx of water**
  - **Frozen ground may lose its stability due to increasing temperatures**
  - **Bitumen and asphalt may cave in under sun exposure!**
- **Increase the supporting surface accordingly by using appropriately large underlays (e.g. underlay plates and supporting planks) below the jack plates.**

The underground must be such that the Steiger cannot slip away. The underground and underlays must be undamaged and free from ice, oil, grease and other lubricating substances. The underground must be even. If required, lay an even surface. Hinged feet, in fact, compensate slight unevenness of the ground, but they cannot be used to compensate inclinations at gradients.

Example



Correct Incorrect

During the installation procedure, the jacks must be able to move freely. **The Ruthmann Steiger T 243 AE should be installed only with appropriate underlays (e.g. Ruthmann supporting plates and, if necessary, supporting planks).** For proper stabilizing jacks of the Steiger it is necessary that the supporting plates are located in the middle below the jack plates of the respective jack cylinder. The support plates must lie against the underground with their complete surface. It must be checked whether the underground withstands the maximum stresses of the stabilizing jacks that occur during the entire deployment. **On soft or non-cohesive underground, such as,**

e.g. on grassland or if the resistance of the underground is exceeded by the action of the supporting force, the supporting plate must be enlarged accordingly by placing additional appropriate underlays (e.g. supporting planks).

5.3.2.4.1 Determining the carrying capacity

The stress on the underground resulting by the action of the supporting force below the supporting plate, must be significantly smaller than the permissible design value of the resistance of the underground so that the underground is stable. The stress below the supporting plate is the quotient of the supporting force and contact surface area of the full-area supporting plate.

$$p_{Jack} = F_{Jack} / A_{SP}$$

p_{Jack} ≙ Stress below the jack
F_{Jack} ≙ Jack force (see Chapter 2.1.2.2 "Stabilizing jacks")
A_{SP} ≙ Complete surface base area of the supporting plate

The jack force is specified at the individual jacks (☞ also Chapter 2.1.2.2).

Specifications of the permissible surface pressure:

	Non-cohesive soils *1	Paved surface *1	Road surface *1, 2
[N / cm²]	25 to 35	50 to 60	75 to 100
[kN / m²]	250 to 350	500 to 600	750 to 1000
[psi]	36 to 51	73 to 87	109 to 145

*1 The values specified are approximate values!
*2 Road surface suitable for truck traffic.

The investigation listed in the following serves as a *reference value*. With the introduction of EN 1997-1 as a replacement for DIN 1054:2005, the carrying capacity of the ground is determined on the basis of design values of the ground resistance and the ground penetration depth and no longer with the values of ground pressure or the permissible surface pressure. There is no ground penetration depth available when installing the Steiger.

If necessary, to determine the stability of the Steiger, geotechnical verification of the stability must be prepared.

1. **Determining the surface below a square supporting plate**

$$A_{SP} = a \times a = a^2$$

A_{SP} ≙ Complete surface base area of the supporting plate
a ≙ Edge length of the full-area square supporting plate

or

Determining the surface area below a rectangular supporting plate

$$A_{SP} = a \times b$$

A_{SP} ≙ Complete surface base area of the supporting plate
a, b ≙ Edge length of the full-area rectangular supporting plate

2. **Calculating the stress below the jack**

$$p_{Jack} = F_{Jack} / A_{SP}$$

p_{Jack} ≙ Stress below the jack
F_{Jack} ≙ Jack force (see Chapter 2.1.2.2 "Stabilizing jacks)

3. **Comparing the stress with the permissible surface pressure**

$$p_{Jack} << p_{Permissible}$$

$P_{Permissible.}$ ≙ Permissible surface pressure

The stress on the underground must be considerably less than the permissible surface pressure on the underground.

5.3.3 **Earthing** (special equipment)

Before operation on or in the surroundings of, for example, transmitter systems, wind turbines or transformer stations, where applicable it may be necessary to earth the Ruthmann Steiger T 243 AE according to the guidelines of the operator. On transmitter systems, the surroundings where earthing measures, may be necessary depend on the transmitting performance of the transmitter and the lifting height of the work platform. This may be several kilometres with large-scale devices. Static charging may also occur on wind turbines that make earthing the Steiger necessary.
More detailed information can be obtained from the responsible operator. The earthing method of the Ruthmann Steiger T 243 AE must be agreed with the person responsible for the system, and work.

The following connections (earthing cable, cross-section ≥ 50 mm^2) must be established as a minimum:

- ✓ from the lower boom to the tower,
- ✓ from the Steiger-substructure to the earth.

5.4 Preventive measures for winter operation

In order to achieve a trouble-free operation of the Ruthmann Steiger T 243 AE during the winter months at sub-zero temperatures, the following Preventive measures must, amongst others, be carried out:

- ✓ Keep the door locks in a smooth-running state and free of ice.
- ✓ Avoid the accumulation of water residues. Water drain holes must be kept free.
- ✓ In event of frost, the water line to the work platform (if present) must be drained completely. For this purpose, there is a drain cock next to the switch box on the Steiger-substructure. The plug-in connector in the work platform must be vented during the draining procedure (blow out water).
- ✓ Check the sensors are clean. All limit switches and proximity switches must be free of snow and ice.
- ✓ Make sure that the rubber buffers are smooth.
- ✓ Keep the access ladder and work platform floor free of snow and ice.
- ✓ Make sure that the retraction chains and extension ropes are kept free of ice.
- ✓ Sliding parts must not freeze tight in and on components.
- ✓ During extreme cold periods, ensure for the sufficient exchange of oil in the hydraulic cylinders. This can be achieved by, e.g., lower Steiger movement speeds.

6 Operation

⚠ WARNING **Improper operation can lead to serious bodily injuries or death!**

- **Only sufficiently trained personnel must be assigned with operation of the Ruthmann Steiger.**
- **The Operator's Manuals of the Ruthmann Steiger and chassis manufacturer must be observed.**
- **The operating personnel must understand and adhere to the legal and generally applicable safety and accident protection guidelines provided in the Operator's Manual for the applicable use of the Steiger!**
- **The operating personnel must have understood and observed the document!**
- **If defects should be determined during operation, operation must be stopped immediately. Operation should be resumed only after the defect has been rectified.**

With "One man operation", the windows of the driver´s cabin must be wound up and the driver´s cabin doors must be locked.

Next to the following information listed, particular attention must be given to the safety instructions in Chapter 1.2.

6.1 EMERGENCY STOP switch

In hazard cases, control can be interrupted by pressing the red EMERGENCY STOP switch. Before commencing work, the corresponding EMERGENCY STOP switches (☞ Chapter 4.1) must be checked.

Resetting the EMERGENCY STOP switch:

- The button is turned clockwise until it jumps out.
- Do not control any movements while resetting.

Functional check of the EMERGENCY STOP switch:

- Actuate the EMERGENCY STOP switch during a movement, e.g. "Extending jacks".
  - ✓ The electrical control of the movements is interrupted. The vehicle engine is stopped.

✓ The warning light LML SWITCH-OFF flashes.

- Movements can be carried out only when the EMERGENCY STOP switch is reset.
- Next, start the vehicle engine and issue the control command again.

6.1.1 Overriding the EMERGENCY STOP switch on the control position PLATFORM CONTROL

The EMERGENCY STOP switch actuated on the work platform switch box of the control position PLATFORM CONTROL can be overridden by the control position EMERGENCY CONTROL. To enable the Steiger movements, the BYPASSING EMERGENCY STOP selector button on the switch box EMERGENCY CONTROL must also be actuated continuously. Now, even with the EMERGENCY STOP switch on the control position PLATFORM CONTROL actuated, the electrical control of Steiger movements is possible with the operator panel EMERGENCY CONTROL. Only a single movement can be controlled. Multiple movements are now not possible. The Steiger movement then occur at a significantly reduced speed.
As long as the selector button is actuated, an intermittent buzzer sounds on the control position PLATFORM CONTROL.
The EMERGENCY STOP switches on the control positions JACK CONTROL, EMERGENCY CONTROL and REMOTE CONTROL (special equipment) cannot be overridden.

6.2 Travel operation

NOTICE

If materials and / or goods are located in the work platform when travelling, the Rüssel platform console and/or the work platform may be damaged by the oscillations or vibrations caused when travelling!

⦸ *In order to avoid possible damage, it is forbidden to transport materials and goods in the work platform!*

See also Chapter 1.2.

Requirement:

- ✓ Commissioning the Ruthmann Steiger T 243 AE according to Chapter 5.
- ✓ Ruthmann Steiger T 243 AE in **transport configuration.**

Components	Position / display	Execution in the driver´s cabin
Vehicle engine	Start	Starting according to the Operator's Manual of the chassis manufacture.

The operation for travelling is carried out according to the specifications of the chassis manufacturer Operator's Manual.

6.3 Switching the hydraulic pump drive (Power take-off) on or off

Switching on:

Before switching on the power take-off, set the air spring pressure retention to "HOLD". During Steiger-operation, leave the Air spring pressure retention in position “HOLD”.
When switching on the power take-off and as long as the power take-off is switched on, the accelerator must not be touched directly nor indirectly, e.g., via a cruise control.
If the PTO (power take-off) has been switched off, the handbrake must be released and re-applied again before the PTO (power take-off) is switched on.

Requirement:

- ✓ Commissioning the Ruthmann Steiger T 243 AE according to Chapter 5.
- ✓ Vehicle engine started and operating pressure of the compressed air system built up.

Components	Position / display	Execution in the driver´s cabin
Handbrake	applied	Apply according to the Operator’s Manual of the chassis manufacture.
Gearbox	neutral position	According to the Operator’s Manual of the chassis manufacturer.
Vehicle engine	running	According to the Operator’s Manual of the chassis manufacturer, if the vehicle engine is not running yet.
Air spring pressure retention (pneumatic suspension bellows)	HOLD	Switch on according to the Operator’s Manual of the chassis manufacture.
PTO (power take-off)	ON	Switch on according to the Operator’s Manual of the chassis manufacture. If a gear train is present (slow / fast), then the gear group switched on acts on the speed of the power take-off (hydraulic pump drive). See Operator’s Manual of the chassis manufacturer.
Engine speed		Regulates automatically.

Switching off:

Components	Position / display	Execution in the driver´s cabin
PTO (power take-off)	OFF	Switch off according to the Operator's Manual of the chassis manufacture.
Air spring pressure retention (pneumatic suspension bellows)	OFF (normal level)	Switch off according to the Operator's Manual of the chassis manufacture.

Before the PTO (power take-off) is switched on again, the hand-brake must be released and re-applied in accordance with the Operator's Manual of the chassis manufacture.

6.4 Switching the operating and control position on or off

6.4.1 Switch the operation on or off

Operation	Position	Execution in the driver´s cabin
Steiger-operation	ON	Switch on hydraulic pump drive (Power take-off) as described in Chapter 6.3.

or

Steiger-operation	OFF	Switch off hydraulic pump drive (Power take-off) as described in Chapter 6.3.

Operation (Steiger-operation) is switched on or off via a relay connected to the switch PTO (power take-off). When switching on the power take-off, the computer control of the Steiger is "Booted" at the same time. On the display, first the screen page (start screen) appears in case there is no error message. As long as the computer control has not released the operation, no control elements (such as joystick, push button, function keys, etc.) may be operated, except for the EMERGENCY STOP switch. Otherwise, the computer control switches to EMERGENCY STOP due to the control elements being checked. Release of the operation is indicated via a short buzzer interval sound by the computer control.

The selection of the control position is carried out via

- the lockable door of the switch box of the control position EMERGENCY CONTROL on the Steiger-substructure or
- the selector switch REMOTE CONTROL available as special equipment.

If, e.g., the door of the switch box of the control position EMERGENCY CONTROL should be opened and / or the remote control operation (special equipment) is switched on, the following hierarchy applies:

1. Control position EMERGENCY CONTROL is active.
2. Control position REMOTE CONTROL is active (special equipment).
3. Control position PLATFORM CONTROL is active. The control position STABILIZING JACK CONTROL at the rear of the Steiger-substructure is active until after the computer control has booted after a control command has been carried out with the control panel of the work platform for the first time.

6.4.2 Switching the control position STABILIZING JACK CONTROL on or off

The control position STABILIZING JACK CONTROL on the Steiger-substructure must be closed after being used each time in order to secure it against unauthorised third parties and unintended use.

Requirement:

- ✓ Operation switched on.
- ✓ Selector switch REMOTE CONTROL (special equipment) in position OFF if present.
- ✓ The door of the switch box EMERGENCY CONTROL is closed.
- ✓ Lower boom in boom support.
- ✓ Stabilizing jack control on the control panel of the work platform not actuated.

Control position	Position	Execution on the Steiger-substructure
STABILIZING JACK CONTROL	ON	No execution required. *

* If the selector switch REMOTE CONTROL (special equipment) is in the position OFF and the door of the switch box of the control position EMERGENCY CONTROL is closed then the control is automatically located in the operating mode "Platform control". The STABILIZING JACK CONTROL at the rear of the Steiger-substructure is now active (thus, switched on) as long as a push button for the stabilizing jack control has been pressed on the control panel of the work platform or on the lower boom for the first time after switching on the operation. If one of the requirements specified above is no longer fulfilled, then the STABILIZING JACK CONTROL is switched off automatically. It is then only released again after a raised lower boom has been moved back into the boom support correctly, or the operation has been switched on again with supported boom.

6.4.3 Switching the control position PLATFORM CONTROL on or off

Requirement:

- ✓ Operation switched on.
- ✓ Selector switch REMOTE CONTROL (special equipment) in position OFF if present.
- ✓ The door of the switch box EMERGENCY CONTROL is closed.

Control position	Position	Execution on the Steiger-substructure
PLATFORM CONTROL	ON	No execution required. *

* If the selector switch REMOTE CONTROL (special equipment) is in the position OFF and the door of the switch box of the control position EMERGENCY CONTROL is closed then the control is automatically located in the operating mode PLATFORM CONTROL. If one of the requirements specified above is no longer fulfilled, then the platform control is switched off automatically.

6.4.4 Switching the control position EMERGENCY CONTROL on or off

The control position EMERGENCY CONTROL on the Steiger-substructure must be closed after being used each time in order to secure it against unauthorised third parties and unintended use.
The control position must be used for emergency lowering only in emergencies in agreement with the work platform personnel and for servicing purposes.

Requirement:

✓ Operation switched on.

Control position	Position	Execution on the Steiger-substructure
EMERGENCY CONTROL	ON	Open the door of the EMERGENCY CONTROL switch box.

or

EMERGENCY CONTROL	OFF	Close the door of the EMERGENCY CONTROL switch box.

6.5 Steiger-operation

⚠ DANGER **Risk of tipping!**

The stability of the Steiger is put at hazard when exceeding the maximum carrying capacity and / or wind strength! Components of the Steiger may be damaged! The Steiger may tip over!

- ⦸ **The maximum carrying capacity of the Steiger should not be exceeded!**
- ⦸ **Additional loads that are a hazard to the stability of the Steiger are prohibited!**
- ⦸ **Other additional loads are prohibited after the load measurement device and / or load moment limitation activating!**
- ⦸ **The attachment of any kind of objects (e.g., writing panels) that lead to a non-permissible increase of the wind force on the Steiger are prohibited!**
- ⦸ **The increasing or expanding the working height and range by boards, ladders or other objects is prohibited!**
- ⦸ **The manual forces of max. 90 lbf (400 N) must not be exceeded!**
- ⦸ **Cable drag is prohibited!**
- ➢ **The load on the work platform should be dimensioned so that the maximum load capacity of the Steiger is not exceeded!**
- ➢ **From a wind velocity more than the permissible wind velocity, operation must be stopped (☞ Chapter 2.1.2.1).**

The stability of the Steiger can, e.g., be reduced by persons in the driver´s cabin. The raised Steiger could, during boom movements carried out to the front, lead to a tipping movement over the front jacks.

- ⦸ **When the front axle is raised, if is prohibited to remain in the driver´s cabin!** Briefly accessing the

driver´s cabin for switching the Steiger on and off is excluded from this.

- ⦸ **Additional load in the driver´s cabin or additional loads or attachments on the driver´s cabin are also prohibited!**
- ⦸ **The front steps must not be used!**

⚠ DANGER **Risk of lightning strike!**
A lightning strike may have lethal consequences!

- ➢ **The Steiger-operation must be stopped in event of an upcoming thunderstorm!**

During Steiger-operation, the vehicle pneumatic suspension must remain set and remain in the position “HOLD”. See also Operator’s Manual of the chassis manufacturer.
All operational-related movements of the Ruthmann Steiger T 243 AE are only possible when the vehicle engine is running. The ignition and the hydraulic pump drive (power take-off) must remain switched on during the entire Steiger-operation.

Requirement:

- ✓ Commissioning the Ruthmann Steiger T 243 AE according to Chapter 5.
- ✓ Vehicle engine started and operating pressure of the compressed air system built up.
- ✓ Steering the trailing axle (if fitted) set straight ahead.
- ✓ Vehicle pneumatic suspension in position “HOLD”.
- ✓ Hydraulic pump drive switched on.
- ✓ Control position PLATFORM CONTROL switched on.

In the control position selection PLATFORM CONTROL, all Steiger movements can be controlled using the work platform control panel. As long as no movements are carried out with the control panel of the work platform, the stabilizing jack control in the vehicle rear is also active.

6.5.1 Handling the operator panel of the STABILIZING JACK CONTROL

Requirement:

- ✓ Lower boom in boom support.
- ✓ Stabilizing jack control on the control panel of the work platform not actuated.

6.5.1.1 Operating the jack function keys

The movements of the stabilizing jacks are initiated by pressing the appropriate function keys. To initiate a movement, the function key for the jack to be moved must be pressed first and then the second function key for the associated movement must be pressed. After initiating the movement, the second function key can then be released. The movement is carried out until it is ended by releasing the first function key or until it is interrupted by the control. As long as the jacks do not have any ground contact, the respective jack control can be used to move the jacks that are assigned to it. Thus, the left jack with the left "Stabilizing jack control" and the right jack with the right "Stabilizing jack control". The vertical retraction of all jacks is excluded from this. This can be carried out with the left as well as the right "Stabilizing jack control".
The jacking situation of the Steiger must be read off from the display. The jacking inclination must be checked in all cases with the electronic levelling indicator before taking up boom movements.

6.5.1.2 Starting or stopping the vehicle engine

Components	Position / display	Execution on the flat keyboard
Vehicle engine	Stop	Press the function key " I / 0 ".

or

Vehicle engine	Start	Press the function key " I / 0 ".

To stop or start the vehicle engine, keep the function key pressed until the vehicle engine has come to standstill or it has started up. With the gear engaged or EMERGENCY STOP switch pressed, a vehicle engine that has been stopped cannot be started.

6.5.2 Entering and leaving the work platform

⚠ DANGER

Risk of falling!
Persons may fall out of the work platform.

- **Wear a personal fall protection system!**
- **The lanyard must be hooked up at the anchor point of the work platform.**
- **We recommend keeping the lanyard short enough so that, i.e., the edge or guard rail of the work platform is not exceeded!**

⚠ WARNING

Risk of stumbling!

- **Entering and leaving the raised work platform is prohibited!**
- **The work platform should be entered or left only in the position in which can be carried out without any danger. For example, in the home position or when the work platform is lowered on the side near the Steiger-substructure!**

The maximum nominal load of the work platform should not be exceeded! See the signs of the work platform and main code numbers of the Ruthmann Steiger T 243 AE.

Entering:

- Fold out the ladder of the ascent.
  - Open the catch at the ladder.
  - Lift the ladder at the handle, pulling it towards you and leave it downwards in such a manner that it remains inclined. The uppermost step must latch tightly.
- Enter the platform (Cover, loading area) via the ascent.
- Open the door.
- Enter the work platform.
- Close the door.

In order to increase safety, we require that during the Steiger operation, a personal fall protection system is worn in the work platform. For mobile elevating work platforms, a personal fall arrest system is required. For example, a full body harness with automatically adjustable retractable type of fall arrester. Body belts

are prohibited as part of a personal fall arrest system. The lanyard must be hooked up at the anchor point of the work platform. We recommend keeping the lanyard short enough so that, i.e., the edge or guard rail of the work platform is not exceeded.

Leaving:

- Open the door.
- Leaving the work platform.
- Close the door.
- Leave the platform (Cover, loading area) via the ascent.
- Fold out the ladder of the ascent.
  - Lift the ladder at the handle and push it in so that it gets latched in.

6.5.3 Handling the RUTHMANNCockpit in the work platform

6.5.3.1 Cover of the control panel

NOTICE

The control panel may possibly be damaged by external influences!

- *To protect the control panel, the cover must be closed again after completing the work and leaving the work platform.*

There is a folding cover above the switch box of the work platform. By "pulling the front edge forwards slightly", it is released from the snap locks. Then, the cover can be folded up. Closing takes place in reverse order by folding the cover down until it gets latched and closes.

6.5.3.2 Starting or stopping the vehicle engine

Components	Position / display	Execution on the control panel
Vehicle engine	Stop	Press the function key START / STOP.

or

Vehicle engine	Start	Press the function key START / STOP.

To stop or start the vehicle engine, keep the function key pressed until the vehicle engine has come to standstill or it has started up. With the gear engaged or EMERGENCY STOP switch pressed, a vehicle engine that has been stopped cannot be started.

6.5.3.3 Switching the hydraulic pump battery on or off

When operating of the Steiger with the battery hydraulic pump, the following must be observed:

- Only use the battery hydraulic pump for the emergency lowering.
- Quick discharging of the vehicle battery. The high power consumption of the battery hydraulic pump must be observed!

- The battery hydraulic pump has a reduced hydraulic output compared to operation with the main drive. Less movement speeds. Carry out only single movements. The Steiger must be moved into the transport configuration without interruptions, where possible. With increasing inclination of the platform, carry out the boom movements slower or stop them all together until the work platform is positioned horizontal again. If the Steiger should be moved to the home position automatically per push button then the telescope must have been fully retracted, e.g., using the joystick.
- If Steiger movements are no longer carried out, switch off the battery hydraulic pump.
- Allow for a cooling phase. Never leave the battery hydraulic pump switched on for longer than approx. 10 minutes- **risk of overheating**.
- When actuating the "EMERGENCY STOP", not only the control of the Steiger movement, but also the operation of the battery hydraulic pump is interrupted. If the EMERGENCY STOP switch is actuated, the battery hydraulic pump cannot be switched on.

Requirement:

- ✓ Operation switched on. Computer control has "booted".
- ✓ The vehicle engine must not be running. The battery hydraulic pump is automatically switched off when the vehicle engine is starting up.

Components	Position / display	Execution on the control panel
Battery hydraulic pump	on	Press the function key BATTERY PUMP.

or

Battery hydraulic pump	off	Press the function key BATTERY PUMP.

6.5.3.4 **Switching the ambient illumination on or off** (special equipment)

Requirement:

✓ Ignition switched on.

Components	Position / display	Execution on the control panel
Ambient illumination	on	Press the push button AMBIENT ILLUMINATION.

or

Ambient illumination	off	Press the push button AMBIENT ILLUMINATION.

6.5.3.5 **Switching the ground illumination on or off** (special equipment)

Requirement:

✓ Ignition switched on.

Components	Position / display	Execution on the control panel
Ground illumination	on	Press the push button GROUND ILLUMINATION.

or

Ground illumination	off	Press the push button GROUND ILLUMINATION.

6.5.3.6 **Switching the work spotlight on or off** (special equipment)

Requirement:

✓ Ignition switched on.

Components	Position / display	Execution on the control panel
Work spotlight	on	Press the push button SPOTLIGHT.

or

Work spotlight	off	Press the push button SPOTLIGHT.

6.5.3.7 Operating the joystick

⚠ WARNING

Danger from collision or crushing!
The work platform and the boom system may oscillate with jerky boom movements.

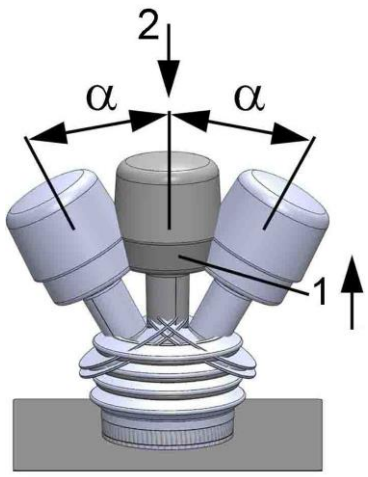
- ⦸ **Don't crouch over the control panel!**
- ⦸ **Avoid abrupt deflection and release of the joystick!**
- ➢ **Deflect the joystick delicately.**

NOTICE

The joysticks may be damaged from forceful deflection!

- ➢ *Deflect only the unlocked joysticks delicately.*

1. Release the joystick by pulling (1) the latch. Hold unlocked.
2. When briefly pressing down the joystick vertically (2), the second function of the joystick is activated.
3. Deflect the joystick delicately in the direction of the label corresponding to the desired movement. The speed of movement is controlled via the angle of deflection (α).
4. To end the movement, reset the joystick again to the neutral position.



5. Let go of latch (1). The joystick is locked again.

The following multiple functions are assigned to the left joystick:

First function	Second function	Third function
Lift the lower boom	Move the Rüssel upwards	Retract the jack vertically
Lower the lower boom	Move the Rüssel downwards	Extend the jack vertically

First function	Second function	Third function
Swivel the boom (Tower) to the left	-	Extend the jack arm horizontally
Swivel the boom (Tower) to the right	-	Retract the jack arm horizontally

The following multiple functions are assigned to the right joystick:

First function	Second function	Third function
Lift the upper boom	-	-
Lower the upper boom	-	-
Retract the lower boom telescope	Retract the upper boom telescope	-
Extend the lower boom telescope	Extend the upper boom telescope	-

The *first function* is carried out directly by deflecting the joystick.

1. Unlock the joystick by pulling the latch (1). Hold the latch.
2. Deflect the joystick in the direction of the label corresponding to the desired movement. The speed of movement is controlled via the angle of deflection (α).

Ending the movement takes place in the reverse order:

3. Bring the joystick to the neutral position.
4. Release the latch (1) and the joystick gets locked.

The *second function* is only activated after pressing on the joystick:

The second function can be set for one-time operation or permanently depending on the setting in the control. The setting (one-time/permanent) is required only with on the emergency control panel using the corresponding display page after entry of the customer password.

1. Release the joystick by pulling (1) the latch. Hold the latch.
2. Press the joystick down vertically briefly (2). Do not keep pressed. The second function if set on the joystick either as a one-time operation or permanently depending on the second function setting.
3. Deflect the joystick in the direction of the label corresponding to the desired movement. The speed of movement is controlled via the angle of deflection (α).

Ending the movement takes place in the reverse order:

4. Bring the joystick to the neutral position.

5. If necessary switch off any permanently assigned second function. For this purpose briefly press the joystick down vertically (2). Do not keep pressed. The joystick is then set to the first function again. This step is not required, as long as the second function is still to be used or when set to “single assignment of second function”.
6. Release the latch (1) and the joystick gets locked.

The *third function* is activated after pressing the corresponding function key(s) for the jack(s) on the control panel:

1. Press and hold function key(s) for jack(s) in question or function key for ALL JACKS.
2. Unlock the joystick by pulling the latch (1). Hold the latch.
3. Deflect the joystick in the direction of the label corresponding to the desired movement. The speed of movement is controlled via the angle of deflection (α).

Ending the movement takes place in the reverse order:

4. Bring the joystick to the neutral position.
5. Release the latch (1) and the joystick gets locked.
6. Release function key(s) for jack(s) in question or function key for ALL JACKS.

The control can be set optionally for four or two boom movements to be carried out at the same time. The following points must be observed when operating the joystick:

"4 movements at the same time"
With each joystick, two boom movements assigned to it can be carried out at the same time by means of horizontal and vertical deflection.

"2 movements at the same time"
After switching over to two boom movements, you can carry out one of the boom movements assigned to each joystick with it. The boom carried out the movement of that joystick first that has been moved out first from the neutral position.

6.5.3.8 Reversing the swivel movements

Corresponding to the position of the control panel, the operating personnel can reverse the directions of the movement for swivelling the boom (Tower) and rotating the work platform with the help of the REVERSE MOVEMENT function key.

⚠ WARNING **Danger from collision or crushing!**
The work platform can carry out a swivel movement against the direction of deflection of the joystick.

- **In order to avoid confusion, before carrying out the swivel movement, the operator must satisfy himself that the position of the control panel and the switch position of the push button REVERSE MOVEMENT correspond to the direction of movement to be carried out.**

If the control panel is positioned directed away from the tower and the function key REVERSE MOVEMENT is not pressed (LED off), then the direction of movement corresponds to the boom (Tower) of the direction of deflection of the joystick "Swivel boom". If with this arrangement of the control panel and the direction of viewing of the operator is away from the tower, the joystick for the swivel movement is deflected to the left, then the operator in the work platform experiences a movement to the left as seen by him.
If the control panel is positioned in the opposite direction, thus in the direction of the tower and the function key REVERSE MOVEMENT is pressed, then the direction of movement of the boom (Tower) corresponds to the direction of deflection of the joystick "Swivel joystick". If with this arrangement of the control panel and the direction of viewing of the operator is towards the tower, the joystick for the swivel movement is now deflected to the left, then the operator in the work platform experiences a movement to the left as seen by him.

The same applies to the rotating movement of the work platforms.

6.5.3.9 Graphical display

Requirement:

✓ Operation switched on, main switch in the "On" position.

Principally, the operation of the graphic capable display is carried out using the function keys F1 to F10, and the direct keys.
With the function keys F4 - DISPLAY NEXT - or F5 - DISPLAY BACK -, you can scroll through the screens of the Operating and informative messages of the reproduced clear text display in the menu STABILIZING JACKS, BOOM and "Classic LCD". If the function keys F4 and F5 are pressed at the same time, then the first screen page appears on the graphical display of the clear text display regardless of the pages that was displayed earlier.

In the CONTRAST menu, you can adjust the brightness of the backlit illumination and the contrast of the viewing field on a corresponding screen.

The other options of use with the display are self-explanatory in a menu-navigated dialogue operation. The operator is prompted in a dialogue here, if necessary, to use other control elements of the display.

6.5.4 Moving the stabilizing jacks

⚠ DANGER

Risk of tipping posed by the jack yielding!
The stability of the Steiger may be reduced by:

- **change in the soil conditions,**
- **a jack sinking in,**
- **leakage of the jack hydraulic system.**

➢ **The underground must withstand the respective loads of the stabilizing jacks (☞ Chapter 5.3.2.4). The jack forces are specified at the individual jacks. The Ruthmann Steiger T 243 AE should be installed only with appropriate Ruthmann supporting plates (special equipment) or other appropriate pads.**

➢ **Correct jacking must also me monitored during operation. In particular, e.g. after work intervals, the extended stabilizing jacks and the jacking inclination of the Steiger must be checked! All vehicle wheels must have ground clearance!**

➢ **Steiger operation must be discontinued immediately if the stability is no longer guaranteed.**

Before jacking the Ruthmann Steiger T 243 AE, the working area and the jacking base for this purpose must be specified. Amongst others, the following jacking bases are possible:

- Full jacking
  All jack arms are completely extended horizontally.
- One-sided stabilizing jacks in the vehicle profile
  The jack arms remain completely retracted horizontally on one side. They are horizontally extended on the other side.
- Two-sided jacking in the vehicle profile
  The jack arms remain horizontally completely retracted on both sides.

The horizontal extension of the jack arms can be selected freely by the operating personnel (variable). The different jacking situations therefore result according to the vertical extension of the stabilizing jacks. The computer control detects, amongst others, based on the extension of the jack arms, the permissible working area for the jacking situation.

- Maintain sufficient safety distance to embankments, pits and excavations (☞ Chapter 5.3.2.3).
- The Steiger should not be able to slide away.

- Adequate free space must be available to extend the jacks.
- Use suitable Ruthmann supporting plates (special equipment) or other appropriate pads. They must lie against the underground with their complete surface. Observe the instruction for the supporting plate!
- The jack plates must be placed horizontally correctly and in the middle on the supporting plates and should not cant. During the installation procedure, the jack plate must be able to move freely.
- The wheels of the vehicle must be relieved, i.e. raised from the ground (**ground clearance**). With insufficient jacking lift, the supporting plates must be put underneath accordingly with appropriate means (supporting planks).
- The jacking inclination of the Steiger must be checked with the electronic levelling indicator (inclination display). The permissible jacking inclination should not be exceeded.
- It must be ensured that the vehicle is raised in a torsion-free manner.

The jacking must be carried out in such a manner that the stability of the Ruthmann Steiger T 243 AE is always ensured.

Requirement:

- ✓ Supporting plates or other appropriate pads are available,
- ✓ The underground withstands the respective loads of the stabilizing jacks,
- ✓ Lower boom telescope retracted,
- ✓ Upper boom telescope in the intermediate position (transport position),
- ✓ Boom is in the boom support.

As soon as one jack leaves the home position, the signal lamp HOME POSITION illuminates on the control panel of the work platform.
With vertical extension of the stabilizing jacks, carrying out the jack movement must be interrupted briefly before the vehicle wheels get lifted out. Interruption is necessary, so that the pneumatic suspension bellows do not press the suspension with a jerk to the end stops of the shock absorbers when lifting out the wheels. As soon as the vehicle wheels are loaded considerably once again when retracting the stabilizing jacks vertically, carrying out the jack movement must also be interrupted briefly. Pay attention to ensure that there is adequate free space for the dirt trap on the mud guard!

The STABILIZING JACK CONTROL should be operated only from the side (jack control position) from which the space required for jacking can be observed completely, for the sake of having an overview. Cordon off the space in advance, if necessary. The stabilizing jack on the left side is extended in doing so with the jack control position on the left side and the stabilizing jack on the right side is extended with the jack control position on the right side until ground contact is made. Then the Steiger can be lifted out from one control position. After completing the jacking procedure, the respective door of the jack control must be closed again.

The jacking inclination of the Ruthmann Steiger T 243 AE must be checked with the electronic levelling indicator and, if required, must be matched with the permissible jacking inclination by controlling the jack cylinders individually.

6.5.4.1 Full jacking

⚠ WARNING **Danger from crushing when extending the stabilizing jacks!**

- **Keep persons away from the stabilizing jacks. If necessary, safeguard the hazard area!**
- **Observe the extending stabilizing jacks continuously!**
- **Stop the jack movement if there are persons located in the hazard area.**

NOTICE *An extended jack cylinder may damage the stabilizing jacks, e.g. by rubbing with the jack plate above the underground or colliding with an edge.*

- *First extend the jacks horizontally and then extend them vertically.*

Highly non-uniform extension of the jack cylinder may damage the Steiger-substructure and the stabilizing jacks!

- *Extend the jack cylinder in such a manner that the vehicle remains torsion-free as far as possible.*

Before vertical extension of the jack cylinder, place the supporting plates or other appropriate pads in the middle below the jack plates. If required, align the supporting plates or other pads again before placing the jack plates.

6.5.4.1.1 Execution with the flat keyboard of the stabilizing jack control

Component	Movement / Display	Execution on the flat keyboard of the stabilizing jack control
Left stabilizing jack control		
Jack on the left side	completely extend horizontally	Simultaneously press the function keys JACK FRONT LEFT and JACK REAR LEFT, as well as actuate the function key ◁, or Press the function key AUTO as well as actuate the function key ◁.

	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.
Switch to the right stabilizing jack control		
Jack on the right side	completely extend horizontally	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as actuate the function key ▷, or Press the function key AUTO as well as actuate the function key ▷.
	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.
Jack on the left side and jack on the right side	extend vertically	Press the function key AUTO as well as actuate the function key ▽.
The computer control stops the movement automatically, if: • all jacks have ground contact, • the wheels of the vehicle are relieved, i.e. are raised from the ground • and the electronically measured inclination of the Steiger lies within the permissible jacking inclination. The **jacking inclination** of the Steiger must be **checked** with the electronic levelling indicator in all cases!		
Vehicle wheels	**Ground clearance**	If necessary, the chassis must be lifted up more by extending the jacks further. Check the jacking inclination of the Steiger!
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	

Alternatively, the stabilizing jacks can also be extended with the control panel of the work platform.

6.5.4.1.2 Execution with the control panel of the work platform

Components	Movement / Display	Execution on the control panel
Jack on the left side	completely extend horizontally	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as deflect the joystick → JACK OUT HORIZONTAL.
Jack on the right side	completely extend horizontally	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as deflect the joystick → JACK OUT HORIZONTAL.
Jack on the left side and jack on the right side	extend vertically	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as deflect the joystick → JACK OUT VERTICALLY, in exchange with Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as deflect the joystick → JACK OUT VERTICALLY.
Vehicle wheels	**Ground clearance**	Check the jacking inclination of the Steiger!
Signal lamp HOME POSITION	illuminates	
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	

6.5.4.2 One-sided stabilizing jacks in the vehicle profile

⚠ WARNING **Danger from crushing when extending the stabilizing jacks!**

- **Keep persons away from the stabilizing jacks. If necessary, safeguard the hazard area!**
- **Observe the extending stabilizing jacks continuously!**
- **Stop the jack movement if there are persons located in the hazard area.**

NOTICE *An extended jack cylinder may damage the stabilizing jacks, e.g. by rubbing with the jack plate above the underground or colliding with an edge.*

- *First extend the jacks horizontally and then extend them vertically.*

Highly non-uniform extension of the jack cylinder may damage the Steiger-substructure and the stabilizing jacks!

- *Extend the jack cylinder in such a manner that the vehicle remains torsion-free as far as possible.*

Before vertical extension of the jack cylinder, place the supporting plates or other appropriate pads in the middle below the jack plates. If required, align the supporting plates or other pads again before placing the jack plates.

6.5.4.2.1 Execution with the flat keyboard of the stabilizing jack control

Component	Movement / Display	Execution on the flat keyboard of the stabilizing jack control
Left stabilizing jack control		
Jack on the left side	completely extend horizontally	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as actuate the function key ◁, or Press the function key AUTO as well as actuate the function key ◁.

	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.
Switch to the right stabilizing jack control		
Jack on the right side	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.

or

Left stabilizing jack control		
Jack on the left side	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.
Switch to the right stabilizing jack control		
Jack on the right side	completely extend horizontally	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as actuate the function key ▷, or Press the function key AUTO as well as actuate the function key ▷.
	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.
Jack on the left side and jack on the right side	extend vertically	Press the function key AUTO as well as actuate the function key ▽.

The computer control stops the movement automatically, if: • all jacks have ground contact, • the wheels of the vehicle are relieved, i.e. are raised from the ground • and the electronically measured inclination of the Steiger lies within the permissible jacking inclination. The **jacking inclination** of the Steiger must be **checked** with the electronic levelling indicator in all cases!		
Vehicle wheels	**Ground clearance**	If necessary, the chassis must be lifted up more by extending the jacks further. Check the jacking inclination of the Steiger!
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	

Alternatively, the stabilizing jacks can also be extended with the control panel of the work platform.

6.5.4.2.2 Execution with the control panel of the work platform

Component	Movement / Display	Execution on the control panel
Jack on the left side	completely extend horizontally	Simultaneously press the function keys JACK FRONT LEFT and JACK REAR LEFT, as well as deflect the joystick → JACK OUT HORIZONTAL.

or

Jack on the right side	completely extend horizontally	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as deflect the joystick → JACK OUT HORIZONTAL.
Jack on the left side and jack on the right side	Extend vertically	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as deflect the joystick → JACK OUT VERTICALLY, in exchange with Simultaneously press the function keys JACK FRONT RIGHT and JACK REAR

		RIGHT, as well as deflect the joystick → JACK OUT VERTICALLY.
Vehicle wheels	**Ground clearance**	Check the jacking inclination of the Steiger!
Signal lamp HOME POSITION	illuminates	
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	

6.5.4.3 Two-sided jacking in the vehicle profile

⚠ WARNING **Danger from crushing when extending the stabilizing jacks!**

- **Keep persons away from the stabilizing jacks. If necessary, safeguard the hazard area!**
- **Observe the extending stabilizing jacks continuously!**
- **Stop the jack movement if there are persons located in the hazard area.**

NOTICE *Highly non-uniform extension of the jack cylinder may damage the Steiger-substructure and the stabilizing jacks!*

- *Extend the jack cylinder in such a manner that the vehicle remains torsion-free as far as possible.*

Before vertical extension of the jack cylinder, place the supporting plates or other appropriate pads in the middle below the jack plates. If required, align the supporting plates or other pads again before placing the jack plates.

6.5.4.3.1 Execution with the flat keyboard of the stabilizing jack control

Component	Movement / Display	Execution on the flat keyboard of the stabilizing jack control
Left stabilizing jack control		
Jack on the left side	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.

Switch to the right stabilizing jack control		
Jack on the right side	extend vertically until ground contact is made	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as actuate the function key ▽, or Press the function key AUTO as well as actuate the function key ▽.
Jack on the left side and jack on the right side	extend vertically	Press the function key AUTO as well as actuate the function key ▽.
The computer control stops the movement automatically, if: • all jacks have ground contact, • the wheels of the vehicle are relieved, i.e. are raised from the ground • and the electronically measured inclination of the Steiger lies within the permissible jacking inclination. The **jacking inclination** of the Steiger must be **checked** with the electronic levelling indicator in all cases!		
Vehicle wheels	**Ground clearance**	If necessary, the chassis must be lifted up more by extending the jacks further. Check the jacking inclination of the Steiger!
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	

Alternatively, the stabilizing jacks can also be extended with the control panel of the work platform.

6.5.4.3.2 Execution with the control panel of the work platform

Components	Movement / Display	Execution on the control panel
Jack on the left side and jack on the right side	extend vertically	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as deflect the joystick → JACK OUT VERTICALLY, in exchange with

		Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as deflect the joystick → JACK OUT VERTICALLY,
Vehicle wheels	**Ground clearance**	Check the jacking inclination of the Steiger!
Signal lamp HOME POSITION	illuminates	
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	

6.5.4.4 Retracting the stabilizing jacks

⚠ WARNING **Danger from crushing when retracting the stabilizing jacks!**

- **Observe the retracting stabilizing jacks continuously!**
- **Keep persons away from the stabilizing jacks. If necessary, safeguard the hazard area!**
- **Stop the jack movement if there are persons located in the hazard area.**

NOTICE *Highly non-uniform retraction of the jack cylinder may damage the Steiger-substructure and the stabilizing jacks.*

- *Retract the jack cylinder in such a manner that the vehicle remains torsion-free as far as possible.*

Damage to the jacks during horizontal retraction! An extended jack cylinder may damage the stabilizing jacks, e.g. by rubbing with the jack plate above the underground or colliding with an edge!

- *First retract the jacks vertically and then retract them horizontally.*

Components	Movement / Display	Version on the control panel
Jack on the left side and jack on the right side	retract vertically	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as deflect the joystick → JACK IN VERTICALLY, in exchange with Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as deflect the joystick → JACK IN VERTICALLY.
Vehicle wheels	Ground contact	
Signal lamps JACK … - FRONT LEFT, - REAR LEFT,	goes off	

- FRONT RIGHT, - REAR RIGHT		
Jack on the left side	retract horizontally	Simultaneously press the function keys JACK FRONT LEFT and - REAR LEFT, as well as deflect the joystick → JACK IN HORIZONTAL.
Jack on the right side	retract horizontally	Simultaneously press the function keys JACK FRONT RIGHT and - REAR RIGHT, as well as deflect the joystick → JACK IN HORIZONTAL.
Signal lamp HOME POSITION	goes off	

Alternatively, the stabilizing jack may also be retracted with the respective control position on the left side or right side. The stabilizing jack on the left side is retracted in doing so with the jack control position on the left side and the stabilizing jack on the right side is retracted with the jack control position on the right side.

After retracting the stabilizing jack, store the supporting plates or other appropriate pads properly.

6.5.4.5 Moving the stabilizing jacks with the help of the control element ALL JACKS (Automatic jacking)

⚠ WARNING **Danger from crushing when retracting or extending the stabilizing jacks!**

- **Observe the extending or retracting stabilizing jacks continuously!**
- **Keep persons away from the stabilizing jacks. If necessary, safeguard the hazard area!**
- **Stop the jack movement if there are persons located in the hazard area.**

NOTICE *Damage to the jacks during horizontal extension or retraction! A vertically extended jack cylinder may damage the stabilizing jacks, e.g. by rubbing with the jack plate above the underground or colliding with an edge.*

- *First extend the jacks horizontally and then extend them vertically or first retract them vertically and then retract them horizontally.*

Highly non-uniform vertical extension or retraction may damage the Steiger-substructure and the stabilizing jacks!

- *Retract the stabilizing jacks in such a manner that the vehicle remains torsion-free as far as possible.*

Before vertical extension of the jack cylinder, place the supporting plates or other appropriate pads in the middle below the jack plates. If required, align the supporting plates or other pads again before placing the jack plates.

With the help of the function key ALL JACKS, all jacks can be extended or retracted horizontally or vertically at the same time.

Components	Movement / Display	Execution on the control panel
Jack on the left side and jack on the right side	extend horizontally	Actuate the function key ALL JACKS and simultaneous deflect the joystick → JACK OUT HORIZONTAL.

or

Jack on the left side and jack on the right side	retract horizontally	Actuate the function key ALL JACKS and simultaneous deflect the joystick → JACK IN HORIZONTAL.

Components	Movement / Display	Execution on the control panel
Jack on the left side and jack on the right side	extend vertically	Actuate the function key ALL JACKS and simultaneous deflect the joystick → JACK OUT VERTICALLY.
The computer control stops the movement automatically, if: • all jacks have ground contact, • the wheels of the vehicle are relieved, i.e. are raised from the ground • and the electronically measured inclination of the Steiger lies within the permissible jacking inclination. The **jacking inclination** of the Steiger must be **checked** with the electronic levelling indicator in all cases!		

or

Jack on the left side and jack on the right side	retract vertically	Actuate the function key ALL JACKS and simultaneous deflect the joystick → JACK IN VERTICALLY.

6.5.5 Positioning the work platform at an access position on the ground (access aid)

⚠ WARNING

As long as the positioning is being carried out, the distance control under the work platform is switched off. There is a risk of collision with possible obstacles or objects that are located under the path of movement! The boom or the work platform may be damaged by impacts, e.g. with objects in such a manner that the safety of the persons is no longer ensured after entering the work platform!

- **The operating personnel must take care to ensure that while moving automatically, no collisions occur between the boom, work platform and obstructions!**
- **If the boom or the work platform make contact with an obstacle or an object, the Steiger must be inspected for damage before commencing operation. If damage to the boom system, parallel guide, platform console, work platform, etc. is identified, it is necessary to have check carried out immediately by a qualified person or, if required, by a technical expert. Operation of the Steiger may only be resumed after the defect has been rectified.**

After the Steiger has been jacked correctly (☞ chapter 6.5.4), the work platform can be moved into the following access positions:

- on the left side next to the Steiger-substructure,
- on the right side next to the Steiger-substructure,
- rear behind the Steiger-substructure.

Positioning the work platform in the access position is carried out using the flat keyboard on the left or right stabilizing jack control. Depending on the control position, the boom swivels the left or right way around.

6.5.5.1 Access position on the left side next to the Steiger-substructure

Components	Movement	Execution on the flat keyboard of the *left* stabilizing jack control
Work platform	Positioning on the left side	Press the function key POSITIONING (F5). Also press the function key ◁. After initiating the movement, one of the function keys can then be released.
As long as the function key is pressed, the boom moves the work platform into the access position.		

6.5.5.2 Access position on the right side next to the Steiger-substructure

Components	Movement	Execution on the flat keyboard of the *right* stabilizing jack control
Work platform	Positioning on the right side	Press the function key POSITIONING (F5). Also press the function key ▷. After initiating the movement, one of the function keys can then be released.
As long as the function key is pressed, the boom moves the work platform into the access position.		

6.5.5.3 Access position at the rear behind the Steiger-substructure

Components	Movement	Execution on the flat keyboard of the left or right stabilizing jack control
Left stabilizing jack control		
Work platform	Positioning anti-clockwise at the rear side	Press the function key POSITIONING (F5). Also press the function key ▽. After initiating the movement, one of the function keys can then be released.

or

Right stabilizing jack control		
Work platform	Positioning clockwise at the rear side	Press the function key POSITIONING (F5). Also press the function key ▽. After initiating the movement, one of the function keys can then be released.

As long as the function key is pressed, the boom moves the work platform into the access position.

6.5.6 Moving the boom and work platform

⚠ DANGER

There is a risk of electrical shock! Contact with live components of electrical systems may have lethal consequences! Even with conducting materials that are not good conductors, flash-over may take pace especially under wet condition!

- **Maintain adequate safety distance to the live components! See §1926.1408 Table A.**
- **Do not undershoot the safety distances by boom movements. This is applicable in all directions for direct contact even for devices, tools and work-pieces.**
- **External influences, such as, e.g. any upswing of the work platform and the upswing of e.g. over-head power lines due to wind, must be taken into consideration with the dimensioning of the safety distance.**

⚠ WARNING

There is a risk of collision!
The boom and the work platform may collide during Steiger movements with supports, the driver's cabin, stabilizing jacks and other components of the Steiger, the ground and obstacles, etc. Steiger movements may endanger other persons and property or the Ruthmann Steiger T 243 AE itself may get damaged. For boom movements in the lower elevation area, there is danger of crushing or collision as long as even the upper boom is near its home position.

- **⃠ The collision of the Steiger with an obstacle / object, collision of the work platform or collision of the boom system is prohibited!**
- **The operating personnel must take care to ensure collision-free Steiger movements!**
- **Pay attention with all Steiger movements to ensure that it does not endanger the operator or any other persons!**
- **Execute the operational-related boom movements with the work platform control panel.**
- **Steiger movements are only permissible when the area of movement of the boom system and**

the working area can be viewed. This also concerns the area below the work platform.

- **If the boom or the work platform make contact with an obstacle or an object, the Steiger must be inspected for damage before commencing operation. If, e.g., collision damage is detected on the boom system, parallel guide, platform console, work platform, etc. where applicable, movements may no longer be carried out. The Steiger may be damaged by impacts in such a manner that the safety of the persons in the work platform is no longer ensured. Components important for the function (e.g., bearing bolts, hydraulic components, etc.) may be damaged or torn-off. This may lead to severe accidents. To recover the platform personnel, the fire brigade may have to be called!**
- **Collision of the Steiger with an obstacle or an object must be reported to the qualified personnel, even if visible damage cannot be detected. A damaged Steiger must be inspected by qualified personnel or, where applicable, a technical expert. Operation of the Steiger may only be resumed after the defect has been rectified.**

Risk of tipping with the boom raised!

- ⦸ **The extension of the jack arms should not be changed under any circumstances, e.g. with the manual emergency activation of the solenoid valves! The jacking situation changed subsequently is not taken into consideration by the computer control with the boom raised!**
- **Correct jacking must also me monitored during operation. In particular, e.g. after work intervals, the extended stabilizing jacks and the jacking inclination of the Steiger must be checked! All vehicle wheels must have ground clearance!**

Movements of boom and work platform are only permissible if the Ruthmann Steiger T 243 AE is jacked correctly (☞ Chapter 6.5.4).

Requirement:

✓ Ruthmann Steiger T 243 AE is jacked properly!

With proper jacking, the following signal lamps light up on the control panel:

Components	Display	Execution on the control panel
Signal lamp HOME POSITION	illuminates	
Signal lamps JACK … - FRONT LEFT, - REAR LEFT, - FRONT RIGHT, - REAR RIGHT	illuminate	The **jacking inclination** of the Steiger must be **checked** with the electronic levelling indicator (inclination display)!

First boom movement:

The first movement to be carried out is the "Lift lower boom" movement. The lower boom must be lifted until the other movements desired are possible, but at least so much that neither the lower boom, upper boom nor the work platform lie on their boom supports.
For the movements "Lower the lower boom", "Lower the upper boom", "Rüssel downward" and "Rotate platform", it must be ensured that the work platform does not collide with the boom with any given constellation.
The movement "Extend the lower boom telescope" is possible only if the lower boom is raised accordingly and the upper boom is no longer in the home position.
The upper boom telescope can be extended via the telescope extension beyond the home position if the upper boom is raised at least up to an angle specified in the computer control. The telescope extension length is dependent on the platform load.

Movement of the boom to the home position:

NOTICE

There is a risk of collision! The work platform may knock against the Steiger-substructure. The lower boom may damage the control panel.

- *Position the work platform in the home position straight (middle position) before moving the boom.*
- *The control panel must be fastened completely on the right side and outside on the guard rail.*

In order to avoid dangers and to conserve the device, for movement of the boom to the home position, the telescope must first be retracted to its home position, if possible. Next, the boom must be swivelled up to the middle /

Steiger longitudinal axis. The upper boom telescope must be retracted up to the telescope extension necessary for transport configurations. The platform load should not exceed the "permissible carrying capacity of the work platform in the transport configurations". Next, the upper boom and the lower boom must be lowered to their boom supports. For this purpose, with the upper boom lowered, but not yet parallel to the lower boom, the Rüssel is moved completely upwards such that it forms an angle of approx. 30° to the upper boom. The lower boom must be raised so much that the pending upper boom movement can be carried out collision-free. Now, the upper boom can be lowered parallel to the lower boom. Before lowering the boom to the boom support, it may be necessary to control the swivel movement for centring. The work platform must be positioned straight (Middle position). Next, the lower boom is lowered together with the upper boom into the boom support.

6.5.6.1 "Lift the lower boom" or "Lower the lower boom"

Components	Movement	Execution on the control panel
Lower boom	lift	Deflect the joystick → RAISE LOWER BOOM.

or

Components	Movement	Execution on the control panel
Lower boom	lower	Deflect the joystick → LOWER LOWER BOOM.

6.5.6.2 "Lift the upper boom" or "Lower the upper boom"

NOTICE

There is a risk of collision! If the upper boom is still raised not over the position "Vertically downwards", then the upper boom first carries out a movement downwards as a consequence of its circular movement.

➢ *The lower boom must be raised so much that the upper boom movement can be carried out collision-free.*

Components	Movement	Execution on the control panel
Upper boom	lift	Deflect the joystick → RAISE UPPER BOOM.

or

Components	Movement	Execution on the control panel
Upper boom	lower	Deflect the joystick → LOWER UPPER BOOM.

6.5.6.3 "Move the Rüssel downwards" or "Move the Rüssel upwards"

Components	Movement	Execution on the control panel
Rüssel	move downwards	Press the joystick down briefly (signal lamp "○" illuminates). Then deflect the joystick → RÜSSEL DOWN.

or

Rüssel	move upwards	Press the joystick down briefly (signal lamp "○" illuminates). Then deflect the joystick → RÜSSEL UP.

When the second function is set permanently, i.e. as long as the indicator light " ○ " is illuminated, the Rüssel can be moved without pressing down the joystick again. The permanently set Rüssel motion can be switched off by momentarily by pressing down the joystick vertically. The indicator light " ○ " extinguishes. The joystick is then set to the first function again.

6.5.6.4 "Swivel the boom on the left side" or "Swivel the boom on the right side"

⚠ WARNING

Danger from collision or crushing!
With a rotation angle of the work platform that is greater than 90° ↻ or 90° ↺, the deflection direction of the joystick for the movement "Swivel boom" and the swivelling direction of the boom are no longer uniform. The boom (tower) carries out a swivel movement against the direction of deflection of the joystick.

- **If necessary, press the function key REVERSE MOVEMENT before executing the movement.**

Requirement:

- ✓ Lower boom is raised.

Components	Movement	Execution on the control panel
Boom (tower)	swivel towards the left side	Deflect the joystick → SWIVEL BOOM LEFT.

or

Boom (tower)	swivel towards the right side	Deflect the joystick → SWIVEL BOOM RIGHT.

6.5.6.5 "Extend the lower boom telescope" or "Retract the lower boom telescope"

Components	Movement	Execution on the control panel
Lower boom tele-scope	extend	Deflect the joystick → LOWER BOOM TELESCOPE OUT

or

Lower boom tele-scope	retract	Deflect the joystick → LOWER BOOM TELESCOPE IN.

6.5.6.6 "Extend the upper boom telescope" or "Retract the upper boom telescope"

Components	Movement	Execution on the control panel
Upper boom telescope	extend	Press the joystick down briefly (signal lamp "○" illuminates). Then deflect the joystick → UPPER BOOM TELESCOPE OUT

or

Upper boom telescope	retract	Press the joystick down briefly (signal lamp "○" illuminates). Then deflect the joystick → UPPER BOOM TELESCOPE IN

When the second function is set permanently, i.e. as long as the indicator light " ○ " is illuminated, the upper boom telescoping motion can be executed without pressing down the joystick again. The permanently set upper boom telescoping motion can be switched off by momentarily by pressing down the joystick vertically. The indicator light " ○ " extinguishes. The joystick is then set to the first function again.

6.5.6.7 "Rotate the platform on the left side" or "Rotate the platform on the right side"

NOTICE

There is the risk of collision with the Steiger-substructure when rotating the work platform!

- *In order to avoid contact, rotate the work platform only when adequate distance is available between the work platform and the Steiger-substructure.*

Components	Movement	Execution on the control panel
Work platform	rotate towards the left side	If the function key block is not activated, press function key ROTATE PLATFORM LEFT to activate the function key block (signal lamp FUNCTION KEYS ENABLED illuminates). Then keep the function key pressed again permanently (LED illuminates). or Press the push button ROTATE PLATFORM LEFT (keep it pressed, special equipment).

or

Work platform	rotate towards the right side	If the function key block is not activated, press function key ROTATE PLATFORM RIGHT to activate the function key block (signal lamp FUNCTION KEYS ENABLED illuminates). Then keep the function key pressed again permanently (LED illuminates). or Press the push button ROTATE PLATFORM RIGHT (keep it pressed, special equipment).

6.5.6.8 "Telescoping the platform out" or "Telescoping the platform in"

⚠ WARNING **The stability of the persons on the work platform is endangered! Persons may fall from the work platform! The platform base and the telescopic platform part of the work platform may get damaged!**

- **There should be no persons standing on the telescopic platform part of the work platform during the telescope operation.**

During telescoping in of the work platform, a buzzer interval tone sounds.

Components	Movement	Execution on the control panel
Work platform	telescoping out	If the function key block is not activated, press function key PLATFORM TELESCOPE OUT to activate the function key block (signal lamp FUNCTION KEYS ENABLED illuminates). Then keep the function key pressed again permanently (LED illuminates).

or

Work platform	telescoping in	If the function key block is not activated, press function key PLATFORM TELESCOPE IN to activate the function key block (signal lamp FUNCTION KEYS ENABLED illuminates). Then keep the function key pressed again permanently (LED illuminates). After approx. 2 seconds, the platform telescope retracts.

6.5.7 Bypassing the distance sensor of the work platform

In order to carry out bypassing the distance sensor, the function key must be pressed until the distance sensor responds.

Requirement:

✓ Platform control switched on.

Components	Movement	Execution on the control panel
Boom	continue movement	Press the function key BYPASSING DISTANCE SENSOR (keep it pressed) and the control a boom movement.

6.5.8 Memory

6.5.8.1 Saving the target position

The target position saved is maintained even after switching off the Ruthmann Steiger T 243 AE, until another position is saved.

Components	Movement	Execution on the control panel
Work platform	save position	Press the function key SAVE POSITION.

6.5.8.2 Move to the target position

⚠ WARNING

There is risk of collision with possible obstructions that are located on the approach path of the target position! The Steiger may be damaged by impacts, e.g. with objects in such a manner that the safety of the persons in the work platform is no longer ensured.

- **The operating personnel must take care to ensure that while moving automatically to the target position, no collisions occur between the work platform, boom and obstructions!**
- **If there is an obstacle on the way that the computer control travels, this must be bypassed manually with the help of the control panel of the work platform. Then the position can be approached again automatically.**

As long as the boom is located near its home position, automatic approach to the target position is interlocked. The lower boom and the upper boom must be lifted at least 10° out of the home position and the boom must be swivelled 10° to the left or the right to move to the target position.

Components	Movement	Execution on the control panel
Work platform	move to the target position	Actuate the function key MOVE TO POSITION and simultaneous pull the left joystick towards you “ 🡻 ”. Then the function key can be released when actuating the joystick.
As long as the left joystick is deflected, the boom moves to the target position stored. The order of the boom movements, in the process, is not identical in most cases with the order of the first movement to the target position and its storage.		

6.5.9 Automatic movement to the home position of the boom

⚠ WARNING

There is risk of collision with possible obstructions that are located on the approach path of the home position of the boom! The Steiger may be damaged by impacts, e.g. with objects in such a manner that the safety of the persons in the work platform is no longer ensured.

- **The operating personnel must take care to ensure that while moving automatically to the home position, no collisions occur between the work platform, boom and obstructions! If there is an obstacle on the way that the computer control travels, this must be bypassed manually with the help of the control panel of the work platform. Then the position can be approached again automatically.**
- **Before lowering the boom into the boom support, the personnel not controlling the Steiger must have left the work platform when it is in a safe position. For example, with the work platform lowered to the side near the Steiger-substructure.**
- **The operator must stand completely on the right side in the work platform when lowering the lower boom into the boom support.**

If at the beginning of the automatic approach to the home position, individual movements are blocked based on an electric interlock of the Dynamic Reach System, then the operator must carry out the boom movement on his own from the interlock by actuating the joystick. Next, the automatic operation can be continued.

NOTICE

The four-bar linkage of the parallel guide, the platform console and the work platform may, if necessary, be strained by the automatic approach movement!

- *Before lowering the boom completely into the boom support, interrupt the movement briefly so that the work platform can adjust itself to the support.*

6.5.9.1.1 Execution with the control panel of the work platform

Components	Movement	Execution on the control panel
Boom	move to the home position	Actuate the function key HOME POSITION and simultaneous pull the left joystick towards you “ 🡻 ”. Then the function key can be released when actuating the joystick. or Press the push button HOME POSITION and simultaneous pull the left joystick towards you “ 🡻 ”. Then the push button can be released when actuating the joystick (special equipment).
As long as the left joystick is deflected, the components move to their home position.		

6.5.9.1.2 Execution with the flat keyboard of the stabilizing jack control

Components	Movement	Execution on the flat keyboard of the left or right stabilizing jack control
Boom	move to the home position	Actuate the function key POSITIONING (F5). Also actuate the function key △. After initiating the movement, the function key (F5) can be released.
As long as the function key is actuated, the components of the boom move to home position.		

6.6 Handling the Operator Panel for EMERGENCY CONTROL

Steiger movements (Control commands):

Requirement:

- ✓ Hydraulic pump drive on.
- ✓ Control position EMERGENCY CONTROL switched on.

In the EMERGENCY CONTROL selection of the control position, the function keys of the operator panel, among others, are released for controlling the following components of the Ruthmann Steiger T 243 AE:

- Starting or stopping the vehicle engine,
- Switching the hydraulic pump battery on or off,
- Moving the boom,
- Moving the work platform.

The emergency control should be used only in emergencies in agreement with the work platform personnel and for servicing purposes.

The movements are initiated by pressing appropriate function key.
In some cases, the function keys are assigned multiple functions (☞ Chapter "Function keys of the flat keyboard"). To initiate a Steiger movement, the button for the component to be moved must be pressed first and then the second button for the associated movement must be pressed. After initiating the movement, the second button can then be released. The movement is carried out until it is ended by releasing the first button or until it is interrupted by the control.

6.6.1 Starting or stopping the vehicle engine

Components	Position / display	Execution on the operator panel
Vehicle engine	Stop	Press the function key STOP.

or

Vehicle engine	Start	Press the function key START.

To stop or start the vehicle engine, keep the function key pressed until the vehicle engine has come to standstill or it has started up. With the gear engaged or EMERGENCY STOP switch pressed, a vehicle engine that has been stopped cannot be started.

6.6.2 Switching the hydraulic pump battery on or off

Remarks, information and requirements of the Chapter 6.5.3.3 must be observed.

Components	Position / display	Execution on the operator panel
Battery hydraulic pump	On	Press the function key BATTERY PUMP.

or

Battery hydraulic pump	Off	Press the function key BATTERY PUMP.

6.6.3 Moving the boom and work platform

The following description is limited to execution on the control panel itself. **Read and observe the remarks, notes and requirements of Chapter 6.5.6!**

6.6.3.1 "Lift the lower boom" or "Lower the lower boom"

Components	Movement	Execution on the operator panel
Lower boom	lift	Press the function key RAISE LOWER BOOM.

or

Lower boom	lower	Press the function key LOWER LOWER BOOM.

6.6.3.2 "Lift the upper boom" or "Lower the upper boom"

Components	Movement	Execution on the operator panel
Upper boom	lift	Press the function key RAISE UPPER BOOM.

or

Upper boom	lower	Press the function key LOWER UPPER BOOM.

6.6.3.3 "Move the Rüssel downwards" or "Move the Rüssel upwards"

Components	Movement	Execution on the operator panel
Rüssel	move downwards	Press the RÜSSEL function key and also press the function key RÜSSEL DOWN.

or

Rüssel	move upwards	Press the RÜSSEL function key and also press the function key RÜSSEL UP.

6.6.3.4 "Swivel the boom on the left side" or "Swivel the boom on the right side"

Components	Movement	Execution on the operator panel
Boom (Tower)	swivel on the left side	Press the function key SWIVEL BOOM LEFT.

or

Boom (Tower)	swivel on the right side	Press the function key SWIVEL BOOM RIGHT:

6.6.3.5 "Extend the lower boom telescope" or "Retract the lower boom telescope"

Components	Movement	Execution on the operator panel
Extend the	extend	Press the function key LOWER BOOM TELESCOPE OUT.

or

Extend the	retract	Press the function key LOWER BOOM TELESCOPE IN.

6.6.3.6 "Extend the upper boom telescope" or "Retract the upper boom telescope"

Components	Movement	Execution on the operator panel
Upper boom tele-scope	extend	Press the UPPER BOOM TELESCOPE function key and also press the function key UPPER BOOM TELESCOPE OUT.

or

Upper boom tele-scope	retract	Press the UPPER BOOM TELESCOPE function key and also press the function key UPPER BOOM TELESCOPE IN.

6.6.3.7 "Rotate the platform on the left side" or "Rotate the platform on the right side"

Components	Movement	Execution on the operator panel
Work platform	rotate on the left side	Press the function key ROTATE PLATFORM LEFT.

or

Work platform	rotate on the right side	Press the function key ROTATE PLATFORM RIGHT.

6.6.3.8 "Telescoping the platform out" or "Telescoping the platform in“

Components	Movement	Execution on the operator panel
Work platform	telescoping out	Press the function key PLATFORM TELESCOPE OUT.

or

Work platform	telescoping in	Press the function key PLATFORM TELESCOPE IN.

6.6.4 Move to the target position (Memory)

The following description is limited to execution on the control panel itself. **Read and observe the remarks, notes and requirements of Chapter 6.5.8!**

Components	Movement	Execution on the operator panel
Work platform	move to the target position	Press the function key MOVE TO POSITION. Also press the function key SPECIAL FUNCTION.
As long as the function keys are actuated, the components of the boom system move to the target position stored. The order of the boom movements, in the process, is not identical in most cases with the order of the first movement to the target position and its storage.		

6.6.5 Automatic movement to the home position of the boom

The following description is limited to execution on the control panel itself. **Read and observe the remarks, notes and requirements of Chapter 6.5.9!**

Components	Movement	Execution on the operator panel
Boom	move to the home position	Press the function key HOME POSITION. Also press the function key SPECIAL FUNCTION. After initiating the movement, the function key SPECIAL FUNCTION can be released.
As long as the function key is actuated, the components of the boom move to home position.		

6.6.6 Information and Diagnostics system (IDS)

Operational and informative messages are output on the display (clear text display) using the function keys DISPLAY NEXT, DISPLAY BACK. If the function keys DISPLAY NEXT and DISPLAY BACK are pressed at the same time, the first screen page is output on the clear text display regardless of the page that was displayed earlier.

Requirement:

✓ Operation switched on.

Clear text display	Execution on the operator panel
Text Text Text Text **Text Text Text Text**	Use the function key DISPLAY NEXT or DISPLAY BACK to scroll to the desired screen page of the clear text display.

The following functions can be executed, for example:

- choosing the language,
- entering a password,
- modifying a password,
- setting the clock,
- resetting the operating hours counter.

Control commands are not executed when executing the functions given above.

6.6.6.1 Choosing the language

The language of the clear text display can be changed on the operator panel of the emergency control in the following manner:

Clear text display	Execution on the operator panel
	Use the function key DISPLAY NEXT to scroll on the respective screen page of the clear text display.
Change-over language **Change=sp.funct**	By pressing the function key SPECIAL FUNCTION on this page, the clear text can be activated in a different language. Each time that you press the function key SPECIAL FUNCTION, the clear text is

	displayed in the next possible language. Actuate the function key until the desired language appears. If the clear text appears again in the same language as that at the start of the choosing procedure, it is possible that the desired language is not available.
	Continue with the function key DISPLAY NEXT or DISPLAY BACK.

The language set in this manner remains even after switching off the device until it is changed again.

6.6.6.2 Password

The following programs to be called up via the operator panel are protected by password:

- modifying the password,
- setting the clock,
- resetting the operating hours counter,
- etc.

In order to obtain the authorisation for executing the above-mentioned actions, it is necessary to enter a password, i.e. a certain sequence of keys must be pressed. You can specify the password on your own and modify it whenever desired. However, you also have the option of carrying out the above actions without a password having been assigned earlier. You can release access to the above-mentioned actions by using the "Change password" function. This takes place by making a request to enter a new password, without pressing any sequence of keys, but by immediately pressing the function key SPECIAL FUNCTION and entering the new password. You can do the same when requested to "Re-enter the password".

We recommend that you choose the option of password protection and specifying a password. No password is entered at the time of ex-works delivery of the Ruthmann Steiger T 243 AE!

The password can consist of maximum 5 pressed function keys. The function key SPECIAL FUNCTION is excluded from this. There are 27^5 = 14.34 million combinations of function keys available. This is why you must make absolutely sure to note down the password.

If the password is no longer known, it can be read out again by our Service department.

6.6.6.2.1 Enter a password

To enter a password, first keep pressing the function key DISPLAY NEXT until the display "Password is necessary! Next = Special" or "Password already entered" appears.

Clear text display	Execution on the operator panel
	Use the function key DISPLAY NEXT to scroll on the respective screen page of the clear text display.
`x Password required! Cont.=Special funct.`	Press the function key SPECIAL FUNCTION.
`Input of Password then Special funct.`	Enter the key sequence (maximum 5 characters). [1]
	Press the function key SPECIAL FUNCTION.

Password correct

Next screen page	Keep pressing the function key DISPLAY NEXT until the desired protected screen appears.

Password wrong

`No permission! Cont.=Special funct.`	Press the function key SPECIAL FUNCTION. [2]
`x Password required! Cont.=Special funct.`	Press the function key SPECIAL FUNCTION.
`Input of Password then Special funct.`	Enter the key sequence (maximum 5 characters). [1]

[1] During input, the function of the keys for Steiger movements is interrupted. Now, you must press the required function keys in the correct sequence. The function key SPECIAL FUNCTION itself can **not** be a part of a password.

[2] You can repeat the input by pressing the function key SPECIAL FUNCTION. However, you may also continue with the operation of the Steiger. The functions of the keys are no longer disabled.

The access authorisation is available until operation is switched off. After switching on operation once again, the access authorisation is reset.

6.6.6.2.2 Change password

To do this, you have to enter the currently valid password when asked to do so.

Clear text display	Execution on the operator panel
	Enter a password.
	Use the function key DISPLAY NEXT to scroll on the respective screen page of the clear text display.
x Change Password? Yes = Special funct.	Press the function key SPECIAL FUNCTION.
Input of Password then Special funct.	Enter the key sequence (maximum 5 characters).
	Press the function key SPECIAL FUNCTION.
Again input of password then Special f.	Enter the same key sequence once again. [1]
	Press the function key SPECIAL FUNCTION.

Passwords identical

Password changed	Password change terminated.

Passwords different

Passwords different	The password is not changed.

[1] The second input is meant to prevent a password from getting saved that is not the one intended. Only now is the password saved in the memory.

6.6.6.3 Setting the clock

Correct setting of the clock is meaningful since errors that occur are saved with the date and time.

Clear text display	Execution on the operator panel
	Enter a password.
	Use the function key DISPLAY NEXT to scroll on the respective screen page of the clear text display.
x Set clock? **Yes = Special funct.**	Press the function key SPECIAL FUNCTION. [1]
DDMMYYHHMMW W: 1=Mon,2=Tue,3=Wed...7=Sun	Enter the numeric key sequence: [2] e.g.: 29072508352

after entering the last digit, the following appears automatically

Tuesday **29.07. 8:35 2025**	

The keyboard is released again for Steiger movements.

[1] During input, the function of the keys for Steiger movements is interrupted.

[2] The abbreviation DDMMYYHHMMW means:

DD 2-digit number for the day
MM 2-digit number for the month
YY 2-digit number for the year
HH 2-digit number for the hour
MM 2-digit number for the minute
W 1-digit number for the day of the week

1 = Monday	5 = Friday
2 = Tuesday	6 = Saturday
3 = Wednesday	7 = Sunday
4 = Thursday	

6.6.6.4 Resetting operating time counter

The operating time counter in the computer control can be reset or set back on the emergency control panel as follows:

Clear text display	Execution on control panel
	Enter password.
	Use the function key DISPLAY NEXT to scroll to the respective screen page on the clear text display.
Since New=sp.funct **Steiger h min** **hhh mm**	The new setting can be activated on this page by momentarily pressing the function key SPECIAL FUNCTION.
Steiger hours new? **0**	The number of hours can then be entered on the page displayed using the function keys assigned numerical values. For example to set to “0” hours, momentarily press function key 0. Then confirm entry with function key 20.
Since New=sp.funct **DD.MM hh:mm YYYY** **Steiger h min** **0 0**	The operating time display then indicates the value entered. If the function key 20 is pressed without entering the number of hours, the operating time display is reset to zero. Simultaneously the new setting is displayed with “DD.MM hh:mm YYYY” in both cases regardless of whether or not the number of hours is entered.
	Continue with function key DISPLAY NEXT or DISPLAY BACK.

After setting in this manner the count for the operating hours remains unchanged, until it is reset or set back.

6.6.7 Changeover the joystick second function from continuous to one-time operation and vice versa

Clear text display	Execution on the operator panel
	Enter password.
	Use the function key NEXT SCREEN to scroll to the respective screen page on the clear text display.
Ruessel, Oberarmtele dauerhaft Aend=Sond or **Ruessel, Oberarmtele einmalig Aend=Sond**	Press the function key SPECIAL FUNCTION. It is possible to switch back and forth between the “permanently set second function” and the “one-time second function” using the function key SPECIAL FUNCTION.

The function set in this manner remains even after switching off the device until it is changed again.

6.6.8 Changeover of the simultaneous boom movements to be executed

Clear text display	Execution on the operator panel
	Enter a password.
	Use the function key DISPLAY NEXT to scroll on the respective screen page of the clear text display.
4 movements at the same Change=sp.funct or **2 movements at the same Change=sp.funct**	Press the function key SPECIAL FUNCTION. With the function key SPECIAL FUNCTION, changeover takes place from "4 movements at the same time" to "2 movements at the same time" and vice versa.

6.6.9 Disabling or Enabling the fine control option

Switching on the "Fine control option from the control panel to the work platform" can be disabled or enabled via the software. For the operator panel of the emergency control, however, fine control generally remains active so that the movements can be carried out in two speed levels.

Clear text display	Execution on the operator panel
	Enter a password.
	Use the function key DISPLAY NEXT to scroll on the respective screen page of the clear text display.
Sens.cont. from cage possible change=Sp.f or **Sens.cont. from cage no pos change=Sp.f**	Press the function key SPECIAL FUNCTION. Now, with the function key SPECIAL FUNCTION, the option of fine control from the control panel or the platform is disabled or enabled.

6.7 Fine control

The fine control is possible both in control position selection PLATFORM CONTROL and also EMERGENCY CONTROL.
With fine control switched on, all movements in Steiger operation take place with considerably reduced speed.

- Switching on the fine control:

  1. Briefly press the function key SPECIAL FUNCTION (**do not** keep pressed). The LED SPECIAL FUNCTION illuminates in the control panel.
  2. Carry out the Steiger movement.
     On the clear text display of the emergency control, a brief message "Fine control" appears.

- Switching off the fine control:

  Press the function key SPECIAL FUNCTION briefly (so **not** keep it pressed).

It is possible to switch fine control on or off even during Steiger movement.
For boom movements with the memory function "Move to position", fine control, if switched on, is switched off. Similarly, fine control is switched off when the Steiger approaches the home position automatically.
Switching on the fine control option from the control panel to the work platform via software can be disabled or enabled after entering the customer password.

7 Emergency control (emergency lowering)

⚠ DANGER

In case of a defect in the control and the emergency lowering facility (emergency control, manual pump, solenoid valves, etc.), emergency lowering is not possible without any danger!

- **To rescue the platform personnel in case of a defect in the control and the emergency lowering facility, you must discontinue operation immediately and call the fire brigade!**

Next to the following information listed, particular attention must be made to the safety instructions in Chapter 1.2.

The emergency control system of the Ruthmann Steiger T 243 AE should be used only for emergency lowering or for servicing purposes! The emergency lowering of the Ruthmann Steiger T 243 AE should be carried out only in emergency cases and in agreement with the operating personnel.

The following emergency situations are distinguished:

- **Failure of the main drive force.** ⇨ Emergency lowering in case of failure of the main drive force (Vehicle engine, hydraulic pump, etc.) and functions of the electrical / electronics systems.
- **Operating personnel in the work platform is no longer in a position to carry out Steiger movements as required by the operations.** ⇨ Emergency lowering when the main drive force and the electrical / electronics systems are working.
- **Failure of the electrical / electronics systems (Extreme situation)** ⇨ Emergency lowering in case of failure of the electrical / electronics systems.

First, always check whether an EMERGENCY STOP switch is pressed and if this is why the control via the corresponding control position is no longer possible (☞ Chapter 6.1).

7.1 Failure of the main drive force

In event of failure of the main drive force, the required pressure and volume flow of the hydraulic fluid is generated by the over-riding emergency system (☞ Chapter 4.3.5) so that the work platform can be moved to a position (e.g., transport configuration or home position) where it can be exited without hazard (emergency lowering).

The electric interlocking of the Ruthmann Steiger T 243 AE remains functional. The **Steiger movements** are controlled from the work platform **using the control panel**.

Read and observe the remarks, notes and requirements of Chapter 6.5 "Steiger-operation"!

7.1.1 Emergency lowering using the battery operated hydraulic pump

The **hydraulic energy** is generated by the **battery hydraulic pump**. Both hydraulic circuits are supplied by the battery hydraulic pump at the same time.

The **high power consumption** of the battery hydraulic pump must be **observed**!

- Leave the ignition and control position PLATFORM CONTROL switched on.
- The vehicle engine **must** not be running!
- Switch on the battery hydraulic pump. Depending on the pre-selection of the control position, the battery hydraulic pump is either switched on using the control panel on the work platform or with the operator panel of the switch box on the Steiger-substructure.
- Move the boom to the home position. Where possible, swivel the work platform to the middle position first due to the high power consumption of the battery hydraulic pump. "Automatic approach of the home position" is no longer possible without problems.
- Retract the stabilizing jacks.
- Switch off the battery hydraulic pump. Depending on the pre-selection of the control position, the battery hydraulic pump is either switched off using the control panel on the work platform or with the operator panel of the switch box on the Steiger-substructure.

7.1.2 Emergency lowering using the manual pump

The **hydraulic energy** is generated by actuating the **manual pump**. Both hydraulic circuits are supplied by the manual pump at the same time.

- Leave the ignition and control position PLATFORM CONTROL switched on.
- The vehicle engine **must** not be running!
- Attach the extension tube to the lever of the manual pump.
- Move the boom to the home position.
  With the control movement initiated, generate the pressure and volume flow of the hydraulic fluid using vertical pumping movements.
- Retract the stabilizing jacks.
  With the control movement initiated, generate the pressure and volume flow of the hydraulic fluid using vertical pumping movements.
- Remove the extension tube from the manual pump and stow away.

7.2 Ability of the operating personnel

The operating personnel in the work platform are no longer in a position to carry out Steiger movements as required by the operations. Emergency lowering using the EMERGENCY CONTROL.

The electric interlocking of the Ruthmann Steiger T 243 AE remains functional. The **Steiger movements** are controlled using the **operator panel** from the EMERGENCY CONTROL switch box on the Steiger-substructure.

Read and observe the remarks, notes and requirements of Chapter 6.6 "Handling the Operator Panel for EMERGENCY CONTROL"!

- Leave the ignition switched on.
- Switch on control position EMERGENCY CONTROL.
  ⇨Open the switch box on the Steiger-substructure using a key.
- Move the boom to the home position.

If the EMERGENCY STOP switch on the control position PLATFORM CONTROL is actuated, then to enable boom movements, the BYPASSING EMERGENCY STOP selector button on the EMERGENCY CONTROL switch box must be actuated permanently. Now, even with the EMERGENCY STOP switch on the control position PLATFORM CONTROL actuated, the electrical control of boom movements is possible with the EMERGENCY CONTROL operator panel. All boom movements occur at a significantly reduced speed.

- Switch off control position EMERGENCY CONTROL.
  ⇨Close the switch box on the Steiger-substructure using a key.

Then

- Retract the stabilizing jacks.

For reasons of a clear overview, the operation of the STABILIZING JACK CONTROL may only be operated from the side (control position) so that you have an overview of the area for jacking.

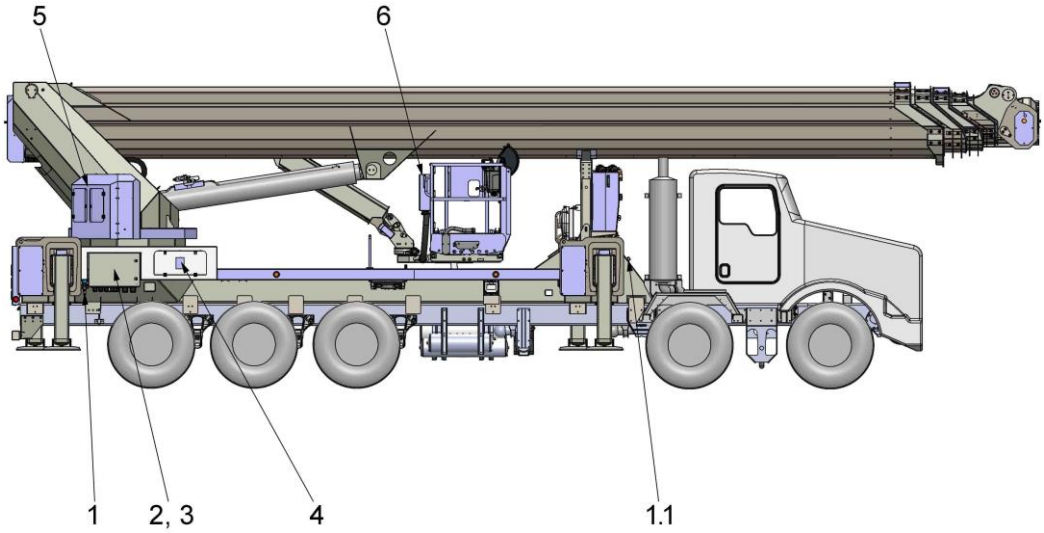
- Switch off the hydraulic pump drive (power take-off) (main switch).

7.3 Failure of the electrical / electronics systems (Extreme situation)

⚠ DANGER

The electric interlocking of the Ruthmann Steiger T 243 AE are non- functional! There is the risk of tipping posed by boom movements that enlarge the load moment!

- **Special care must be taken when carrying out the emergency lowering!**
- **If the work platform cannot be moved to a position from which it is possible to leave the work platform safely, the fire brigade must be called to rescue the platform personnel.**



1. Manual pump.
   1.1 Manual pump lever.
2. Ball valve (in the switch box EMERGENCY CONTROL).
3. Solenoid arresting device (in the switch box EMERGENCY CONTROL).
4. Directional valve for extending or retracting the stabilizing jacks and additional valve for lowering the lower boom (behind hatch).
5. Directional valve for controlling the boom (behind door).
6. Directional valve for controlling the work platform (in the valve box).

Emergency lowering using the emergency control system in extreme cases (☞ Chapter 4.3.6). All movements of the Ruthmann Steiger T 243 AE can be carried out by a **manual actuation of the valves**. In doing so, the **hydraulic energy** is generated by actuating the **manual pump**. Read and

observe the remarks, notes and requirements of Chapter 6.5 "Steiger-operation"!

- Switch off the hydraulic pump drive (power take-off) (main switch).
- Switch off the ignition. The vehicle engine **must** not be running!
- Open the switch box EMERGENCY CONTROL on the Steiger-substructure using a key.
- Fold down or open the hatch, door and / or cover of the directional valves.
- Remove the solenoid arresting devices from the holders of the switch box on the Steiger-substructure.
- Open the ball valve (switch box).
  ⇨ Turn the hand lever of the ball valve horizontal.
- Move the boom to the home position.

⚠ DANGER

There is the risk of tipping posed by boom movements that enlarge the load moment! An automatic platform compensation is not carried out! Persons and objects may fall out of the work platform!

- **Only carry out load moment reducing movements!**
- **First retract the upper boom telescope and the lower boom telescope completely.**
- **For stability reasons, lower and swivel the boom only with the upper and lower boom telescope fully retracted.**
- **With jack arms that are not fully extended horizontally (thus no maximum jack range), particular care must be taken that the boom is not lowered to the side. In this case, it is essential to swivel the boom back to the middle position (vehicle longitudinal direction) before performing the lowering movement.**
- **When the lowering movements of the boom are carried out manually, the inclination of the work platform must be readjusted manually.**

I. First retract telescope "I" and then telescope "II" and after that, telescope "III" completely. When retracting telescope “I”, ensure that the load moment is not increased by the motion. This is the case, for example, when the upper boom is raised to a position higher than horizontal. If the load moment increases - for example when the upper

boom is raised to a position lower than horizontal - it is necessary to retract telescopes “II” and “I” in the correct sequence for safety reasons to prevent the load moment from increasing.

NOTICE

Retracting the telescopes in the wrong sequence can result in damage to the lower boom telescope!

➢ *Always retract telescope “II” before telescope “III”!*

II. Then, swivel the boom (tower) back to the middle position (home position).

NOTICE

The electric cable and hydraulic hoses may tear off during the swivelling movements of the boom!

➢ *Always swivel the boom (tower) back in the direction from the position it was moved from!*

III. Using appropriate lowering movements of the upper boom, the lower boom and the appropriate Rüssel movement, then lower the boom far enough to allow the platform personnel to exit the work platform without hazard. **During the lowering movements, observe the inclination of the work platform in all cases!** If necessary, the inclination must be readjusted manually from the work platform.

⚠ DANGER

Persons may fall out of the work platform!

➢ **If persons are in the work platform, special caution must be exercised! The work platform may only be positioned horizontal.**

➢ **If the platform personnel cannot readjust the inclination of the work platform, where applicable, the work platform can be kept horizontal using appropriate manual Rüssel movements from the ground.**

All three valves "Lowering lower boom" (two directional valves and one throttle valve) must be actuated at the same time for the lowering movements of the lower boom.

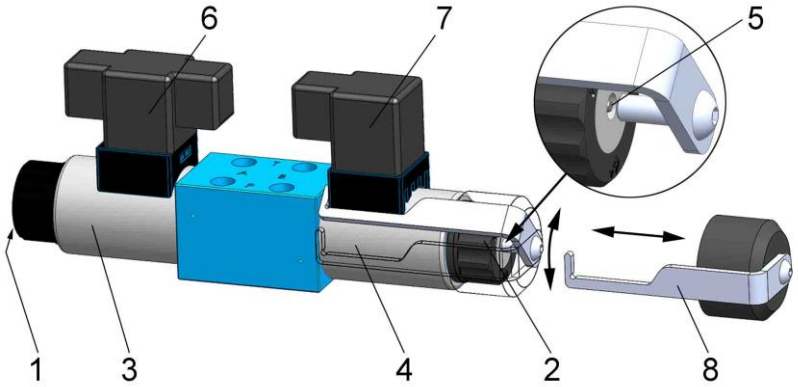
IV. After the platform personnel have exited the work platform, continue to move the lower boom, upper boom and Rüssel into the home position. Before positioning in the boom support,

* the Rüssel must form an angle of 30° to the upper boom,
* the upper boom telescope must be raised that is required for the transport configuration of the telescopic extension,

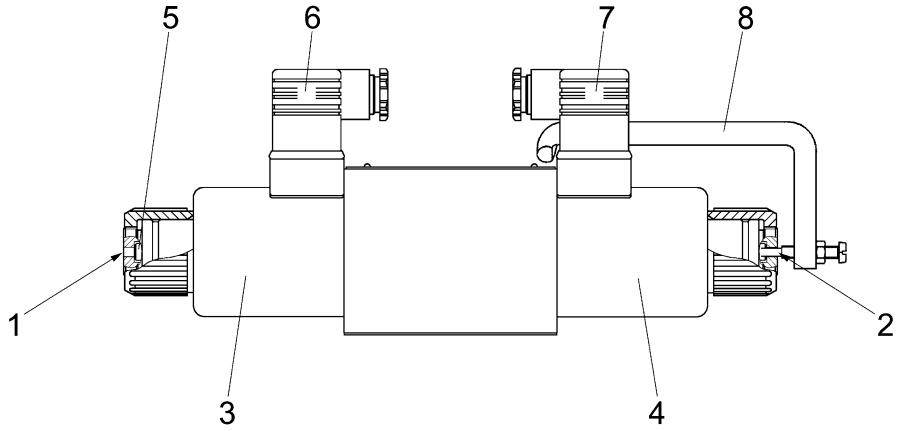
* the upper boom must be resting parallel on the lower boom and
* the work platform must be positioned parallel to the lower boom.

Handling the manual emergency actuation:

– Place the solenoid arresting device (8) onto the solenoid head of the directional valve NG 6 / NG 10 of the desired movement.



Example: Directional valves NG 6



Example: Directional valves NG 10

* Insert the actuating screw into the intended actuating mount (1 or 2) on the solenoid head (3 or 4) intended for this purpose.
* Lock the bracket (8) behind the device socket (7 or 6). The actuating screw must be set in such a manner that the actuating path of the plunger (5) is carried out in the solenoid head. Noticeable play of the plunger must no longer be present. The actuating screw and lock nut must be screwed tight.

– The throttle valve must be closed (turn the star knob clockwise) for the lowering movement of the lower boom.

  - Generate the pressure and the volume flow of the hydraulic fluid using the manual pump. The speed can be controlled by the frequency of the pumping movements.
  - Stop the pumping movements once the desired position has been reached.
  - When reaching the desired position of the lower boom, the throttle valve must be fully opened again (turn the star knob anti-clockwise). The throttle valve must be opened for the operational-related Steiger-operation.
  - Remove the solenoid arresting device from the solenoid head of the directional valve **immediately**.
- Always retract the stabilizing jacks at the end.
  - Depending on the jack to be moved, either both directional seat valves or at least the left or right directional seat valve must be actuated, thus, opened for the movements. For this purpose, pull the handle of the manual emergency actuation down and turn slightly until it engages so that the handle does not jump back.
  - Manual actuation of the directional valves is carried out as previously described under the point "Move boom to home position".
  - After the stabilizing jack has been fully retracted, the manual emergency actuation of the directional seat valves **must be returned in all cases**. For this purpose, turn back the handle of the manual emergency actuation close so that it engages. Do not allow the handle to "jump".
- **Close** the ball valve.
  ⇨ Move the hand lever of the ball valve back to the vertical position.
- Close the hatch, door and / or cover of the directional valves.
- Put the solenoid arresting device back into the holder.
- Close the switch box EMERGENCY CONTROL on the Steiger-substructure using a key.

7.4 Emergency lowering after interruption of Steiger movements by a "conditional EMERGENCY STOP"

The Steiger movements were interrupted on account of a "conditional EMERGENCY STOP" (safety switch off). "Conditional EMERGENCY STOP" may be triggered by:

- Inclination of the work platform by more than 10° to the horizontal,
- exceeding the max. permissible load moment significantly.
- exceeding the max. permissible carrying capacity of the Steiger,
- certain defective sensors such as e.g.:
  - "Boom" angle encoder,
  - "Lower boom" inclination sensor,
  - "Upper boom " angle encoder,
  - "Rüssel" angle encoder,
  - pressure sensor,
  - etc.

In order to now move the Steiger from the work platform to the home position (emergency lowering), you have the option of bypassing the safety switch off if no EMERGENCY STOP switch is actuated.

⚠ DANGER **There is the risk of tipping posed by boom movements that enlarge the load moment!**

- ➢ **This is why all telescopes must be completely retracted first!**
- ➢ **Special care must be taken when carrying out the Steiger movements!**
- ➢ **If the work platform cannot be moved to a position from which it is possible to leave the work platform safely, the fire brigade must be called to rescue the platform personnel!**

The operating personnel can carry out certain Steiger movements released by the computer control with the control panel of the work platform or the switch box operator panel on the Steiger-substructure by actuating the BYPASSING SAFETY SWITCH OFF push button simultaneously. First actuate the push button (keep it pressed) and then issue the control command. After a few seconds, the Steiger movements are made with reduced speed.

I. First, retract all telescopes (upper boom and lower boom telescope) completely. One prerequisite for retracting the upper boom telescope, is that the load moment must not increased by the motion. This is the case, for example, when the upper boom is raised to a position higher than horizontal. If the load moment increases - for example when the upper boom is raised to a position lower than horizontal - it is necessary to retract the upper and lower boom telescopes in the correct sequence for safety reasons to prevent the load moment from increasing.

II. For stability reasons, the lower boom must be almost fully raised before swivelling the boom back. When raising the lower boom, ensure that the load moment is not increased by the movement. This is the case, for e.g. when the work platform is higher than the tower-lower boom fulcrum point.
If the load moment increases, then the upper boom and the lower boom must be moved alternately in the correct sequence for stability reasons. This is the case, for e.g. when the work platform is lower than the tower-lower boom fulcrum point. For e.g. in the underfloor area. Now, the LOWER UPPER BOOM and RAISE LOWER BOOM movements must be carried out alternately with care, so that the load moment is not increased. This must be done until the work platform is higher than the “tower-lower boom” fulcrum point or the load moment is not increased by the lifting movement of the lower boom. Then the lower boom can only be raised further with the RAISE LOWER BOOM movement.

III. Afterwards, swivel the boom (tower) back into the middle position, though at least within a swivel angle “ZZgrd” of ± 10° to the boom support.

IV. Then, using appropriate lowering movements for the upper boom and the lower boom, as well as Rüssel movements, lower the work platform far enough to allow the platform personnel to exit the work platform without hazard.

V. Next, continue to move the boom to the home position.

If the safe switch off gets cancelled by the Steiger movements initiated, then after determining the cause of this safe switch off, if required, operation-related Steiger operation can be resumed. If the cause cannot be established, operation must be discontinued immediately. Operation should be resumed only after the defect has been rectified.

8 Elimination of malfunctions

As long as malfunctions are present, the operation must be discontinued and remain so. Operation should be resumed only after the malfunction has been rectified correctly.

If operating faults cannot be rectified in accordance with the specifications and information provided here or if they persist, Ruthmann Service must be notified.

8.1 Control-related problems during Steiger operation

No Steiger movement is possible.	
Possible cause	Remedy
– Hydraulic pump drive off.	– Switch on the hydraulic pump drive (power take-off).
– The engine speed increases. However, there is no Steiger movement.	– Switch off hydraulic pump drive (power take-off). Release the handbrake and apply it again. Then switch on the hydraulic pump drive (power take-off) again.
– Power take-off speed too low.	– Increase the speed. For fixed programmed speed, notify Ruthmann Service.
– Operation off.	– Switch on operation.
– Door of the switch box EMERGENCY CONTROL is opened.	– For Steiger movements from the work platform or with the remote control (special equipment): Close the switch box door on the Steiger-substructure.
– EMERGENCY STOP switch actuated.	– Rectify the fault and reset the EMERGENCY STOP switch.
– Fuse defective.	– Check that the fuses are working. Replace defective fuses.
– Inclination of the work platform is greater than 10°.	– Reduce the inclination of the work platform.

– Platform overload detection aid has responded.	– Reduce the work platform load. – If necessary, emergency lowering according to Chapter 7.4 "Emergency lowering after interruption of Steiger movements by "conditional EMERGENCY STOP".
Vehicle engine stops or does not start up.	
Possible cause	Remedy
– EMERGENCY STOP switch actuated.	– Rectify the fault and reset the EMERGENCY STOP switch.
Moving the stabilizing jacks from the control position "Jack control" not possible.	
Possible cause	Remedy
– Door of the switch box EMERGENCY CONTROL is opened.	– Close the switch box door.
– One jack push button on the control panel of the work platform has been actuated. In other words, the jack control of the platform control is activated.	– Switch off operation and switch it on again.
Extending the jacks horizontally is not possible.	
Possible cause	Remedy
– Boom is not lowered in the boom support.	– Lower the boom into the boom support.
– Jack ground contact.	– Retract the jack vertically.
Retracting the jacks horizontally not possible.	
Possible cause	Remedy
– Boom is not lowered completely in the boom support.	– Lower the boom into the boom support.
– Jack ground contact.	– Retract the jack vertically.
Extending the jacks vertically not possible.	
Possible cause	Remedy
– Telescope is not retracted.	– Retract the telescope.
– Boom (Tower) is not in the middle position.	– Swivel the boom (Tower) in the middle position.
– Boom is not lowered completely in the boom support.	– Lower the boom into the boom support.

Retracting the jacks vertically not possible.	
Possible cause	Remedy
– Telescope is not retracted.	– Retract the telescope.
– Boom (Tower) is not in the middle position.	– Swivel the boom (Tower) in the middle position.
– Boom is not lowered completely in the boom support.	– Lower the boom into the boom support.
Boom movements not released.	
Possible cause	Remedy
– Jack not extended far enough	– Extend the jack properly.
– Permissible jacking inclination exceeded.	– Reduce the jacking inclination.
– Axle sensing is not switching although the vehicle wheels are free, i.e. are relieved sufficiently.	– Retract the jack completely and then extend it again.
– Platform overload detection aid has responded.	– Reduce the work platform load.
One or more boom movements not possible / getting interrupted.	
Possible cause	Remedy
– Plausibility monitoring of the jack has responded	– Move the boom to the home position. If a non-interlocked boom movement is now controlled, a short buzzer interval sound rings and the warning light OVERLOAD on the control panel flashes. These reactions to the monitoring cease when the computer control detects a correct jacking situation again. The **cause** of the operational interlock **must be determined**. **If defects are established as the cause, operation must be stopped immediately. Operation should be resumed only after the defect has been rectified.**

– Platform bottoming detection, level "1" has responded (with "Platform control").	– Check the Steiger for impact damage. If there is no impact damage, move the work platform away from the obstruction. **If defects are noticed, operation must be stopped immediately. Operation should be resumed only after the defect has been rectified.**
Lifting the lower boom not possible / gets interrupted.	
Possible cause	Remedy
– Boom movements not released.	– See "Boom movements not released".
– Platform compensation in the end position. Rüssel in the position "vertical upwards".	– Move the Rüssel downwards. – Lower the upper boom.
– SKY performance mode enabled.	– Disable SKY performance mode. Enable the movements “Raise” and “Lower the lower boom” within the boom’s permitted range of motion using the push button LOWER BOOM STILL.
Lowering the lower boom not possible / gets interrupted.	
Possible cause	Remedy
– Dynamic Reach limitation switches off.	– Reduce the load moment by e.g. ∗ retracting the lower boom telescope, ∗ retracting the upper boom telescope, ∗ reduce the work platform load.
– Upper boom is not raised far enough or the upper boom telescope is not retracted far enough.	– Retract the upper boom telescope. – Lift the upper boom.
– Platform compensation in the end position. Rüssel in position "vertical downwards".	– Move the Rüssel upwards. – Lift the upper boom.
– SKY performance mode enabled.	– Disable SKY performance mode. Enable the movements “Raise” and “Lower the lower boom” within the boom’s permitted range of motion using the push button LOWER BOOM STILL.

Lifting the upper boom not possible / gets interrupted.	
Possible cause	Remedy
– LML switch-off, if the upper boom is below the horizontal.	– Reduce the load moment by e.g. ∗ retracting the lower boom telescope, ∗ retracting the upper boom telescope, ∗ reduce the work platform load.
– Platform compensation in the end position. Rüssel in the position "vertical upwards".	– Move the Rüssel downwards. – Lower the lower boom.
Lowering the upper boom not possible / gets interrupted.	
Possible cause	Remedy
– LML switch-off, if the upper boom is above the horizontal.	– Reduce the load moment by e.g. ∗ retracting the lower boom telescope, ∗ retracting the upper boom telescope, ∗ reduce the work platform load.
– Platform compensation in the end position. Rüssel in position "vertical downwards".	– Move the Rüssel upwards. – Lift the lower boom.
– Upper boom in the position "vertical downwards" and upper boom telescope extended.	– Retract the upper boom telescope. – Reduce the work platform load.
Rüssel downwards not possible / gets interrupted.	
Possible cause	Remedy
– LML switch-off, if the Rüssel is above the horizontal.	– Reduce the load moment by e.g. ∗ retracting the lower boom telescope, ∗ retracting the upper boom telescope, ∗ reduce the work platform load.
– Platform compensation in the end position Rüssel in position "vertical downwards".	– Lift the upper boom. – Lift the lower boom.

Rüssel upwards not possible / gets interrupted.	
Possible cause	Remedy
– LML switch-off, if the Rüssel is below the horizontal.	– Reduce the load moment by e.g. * retracting the lower boom telescope, * retracting the upper boom telescope, * reduce the work platform load.
– Platform compensation in the end position. Rüssel in the position "vertical upwards".	– Lower the upper boom. – Lower the lower boom.
Platform compensation delayed.	
Possible cause	Remedy
– Operating temperature of the hydraulic oil in the platform compensation is not yet reached (cold hydraulic oil, e.g. in winter).	– Increase the oil temperature of the platform compensation e.g. by Rüssel movements. Move the Rüssel upwards and downwards several times with the emergency control with the work platform unoccupied. – Reduce the speed, deflect the joystick less far.
Swivelling the boom (Tower) not possible / gets interrupted.	
Possible cause	Remedy
– Lower boom in boom support.	– Lift the lower boom.
– Maximum swivel angle reached in the respective working area.	– No increase of the swivel angle possible. – Swivel back.
– Load moment too large.	– Reduce the load moment by e.g. * retracting the lower boom telescope, * retracting the upper boom telescope, * reduce the work platform load.
Extending the lower boom telescope not possible / gets interrupted.	
Possible cause	Remedy
– Lower boom in boom support.	– Lift the lower boom.

– Upper boom at the upper boom system, i.e. parallel to the lower boom.	– Lift the upper boom slightly.
– LML switch-off.	– Reduce the load moment by e.g. ∗ reduce the work platform load. – Swivel the boom in the direction that permits a higher load moment.
Extending the upper boom telescope not possible / gets interrupted.	
Possible cause	Remedy
– Upper boom not raised far enough.	– Lift the upper boom.
– Platform-dependent telescopic extension limitation has responded.	– Reduce the work platform load.
– LML switch-off.	– Reduce the load moment by e.g. ∗ retracting the lower boom telescope, ∗ reduce the work platform load. – Swivel the boom in the direction that permits a higher load moment.

8.2 Impact of a malfunction on the Steiger operation

If the computer control determines a fault in the sensors or the control, generally only limited operation of the Steiger is possible to reach the home position. Operation must be discontinued. On occurrence of serious faults, the control switches to EMERGENCY STOP. The flashing warning light LML SWITCH-OFF is indicated to the operating personnel in the platform when a fault is present. A corresponding note on the possible cause of the fault and the corresponding error code are output in the clear text display at the same time. The display switches automatically to the page of the error message regardless of the page that was selected previously.

8.2.1 Limited Steiger operation

This can be identified in the work platform by the warning light SAFETY SWITCH OFF flashing. Depending on the type of fault, some limited Steiger movements can still be carried out. Even if no impairment in the movements is noticed, operation must be discontinued and the Steiger must be moved to its home position.

8.2.2 Conditional EMERGENCY STOP

"Conditional EMERGENCY STOP" may be triggered by:

- EMERGENCY STOP switch,
- Inclination of the work platform by more than 10° to the horizontal,
- Exceeding the max. permissible load moment significantly.

This can be identified in the work platform by the warning light SAFETY SWITCH OFF and the red warning light LML SWITCH-OFF flashing. A corresponding note appears in the display (text display). Steiger operation is interrupted.
"Conditional EMERGENCY STOP" that was caused by the load moment being exceeded significantly, may be eliminated by reducing the work platform load or by retracting the lower boom or upper boom telescope if necessary. If the malfunction is caused by an excessively large work platform inclination, the work platform must be positioned horizontally.

8.2.3 EMERGENCY STOP

An EMERGENCY STOP may be triggered by:

- Defect in the sensors,

- Defect in the control.

This can be identified in the work platform by the red warning light LML SWITCH-OFF flashing. The Steiger can no longer be operated. If the sensors or control is defective, emergency lowering must be carried out according to Chapter 7.3.

8.3 Reading out the error memory

If with the warning light SAFETY SWITCH OFF flashing no impairment of operation is noticed, the error memory should still be read out and, if necessary, Ruthmann Service should be informed.

The errors are saved with date and time of their occurrence. The error memory can be read out whenever desired, not only by Ruthmann Service but also by the operator with the switch box operator panel on the Steiger-substructure.

Clear text display	Execution on the operator panel
	Press the function key DISPLAY NEXT.

so often, until the corresponding screen page appears

`Read out fault memory? yes=special`	Press the function key SPECIAL FUNCTION.
Number of fault messages saved	Press the function key SPECIAL FUNCTION.
last saved fault message	Press the function key SPECIAL FUNCTION.
penultimate saved fault message	Press the function key SPECIAL FUNCTION, etc.

Quit the program

saved fault message	Press the function key DISPLAY NEXT.
next screen page	

or

saved fault message	Press the function key DISPLAY BACK:
previous screen page	

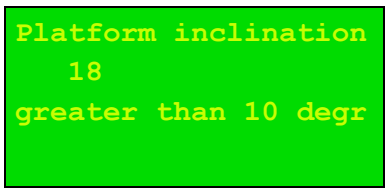
The display first shows the number of saved fault messages. Pressing the function key SPECIAL FUNCTION each time displays the fault messages one by one in the reverse order of their occurrence. The most recent fault message thus, appears first and the oldest fault message appears last. The content of the error memory can be deleted **only** by Ruthmann Service.

8.3.1 Meaning of the fault messages and information on remedial action

The following list is meant to help in analysing operational faults in the Ruthmann Steiger T 243 AE. The codes specified here, possible causes and the options for remedial action are meant to facilitate troubleshooting and finding the source of the fault. Work should be carried out only by trained specialised personnel.

Example: (Screen page “fault message 18”)

Screen line 1:
2:
3:
4:



The number in line 2 (here “18”) corresponds to the *index number* in the subsequent table with *possible cause* and *remedy*.

Code no.	Possible cause	Remedy
1 - 5	– Vehicle on-board voltage too low. – Fuse F11 on the fuse board is defective. – Safety relay on the control is defective.	– Check the vehicle battery. – Check the fuse F11. – Notify RUTHMANN Service.
8	– Fuse defective. – Program switch of the control set incorrectly. It does not match the type coding	– Check the fuse. – Notify RUTHMANN Service.
13	– Program switch set incorrectly.	– These switches are sealed and should be adjusted only by RUTHMANN Service!
14	– Supply voltage of the control is incorrect. – Control defective.	– Check the supply voltage. – Notify RUTHMANN Service.
15	– Supply voltage of the control is incorrect. – Control defective.	– Check the supply voltage. – Notify RUTHMANN Service.
16	– LML switch in the main or control processor system is set incorrectly.	– These switches are sealed and should be adjusted only by RUTHMANN Service!

Code no.	Possible cause	Remedy
17	– Jack limit switch or proximity switch is set incorrectly. – Contacts of the jack limit switch is moist or corroded. – Control defective.	– Notify RUTHMANN Service.
18	– Work platform inclination is greater than 10° or less than -10°. – The tilt switch is supplying 0 Volt.	– Reduce the work platform inclination. – Notify RUTHMANN Service.
20	– Signal of the pressure encoder in the X line of the SBV's lifting cylinder on the piston side is incorrect.	– Notify RUTHMANN Service.
21	– Signal of the pressure encoder in the X line of the SBV's lifting cylinder on the piston side is incorrect.	– Notify RUTHMANN Service.
22	– Signals of the pressure encoder in the X line of the SBV's lifting cylinder on the piston side of the main and control processor is different.	– Notify RUTHMANN Service.
24	– Supply voltage of the control is incorrect. – Control defective. – Error in dual port RAM	– Check the supply voltage. – Notify RUTHMANN Service.
32	– Signal of the "Rüssel" angle encoder is incorrect.	– Notify RUTHMANN Service.
33	– Signal of the "Rüssel" angle encoder is incorrect.	– Notify RUTHMANN Service.
34	– Signals of the "Rüssel" angle encoder on the main and control processor are different.	– Notify RUTHMANN Service.
35	– Signal of the "Rüssel" angle encoder is incorrect. – Proximity switch of "Rüssel raised" is defective.	– Notify RUTHMANN Service.
43	– Signals of the weighing cell on the main and control processor are different.	– Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
44	– Work platform load too high.	– Unload the work platform. Check the Steiger for damage! If defects are noticed, operation must be stopped immediately. Operation should be resumed only after the defect has been rectified.
45	– Counter readings for the ball bearing slewing ring on the main and control processor are different. – The ball bearing slewing ring is contaminated.	– Notify RUTHMANN Service. – Clean and apply grease again to the ball bearing slewing ring.
46	– Tooth counter reading for the "Boom in boom support" is incorrect.	– Notify RUTHMANN Service.
48	– Swivel angle sensing via teeth counter and potentiometer on the ball bearing slewing ring are providing considerably different results.	– Notify RUTHMANN Service.
50	– Signal of the pressure sensor on the piston side is incorrect.	– Notify RUTHMANN Service.
51	– Signal of the pressure sensor on the piston side is incorrect.	– Notify RUTHMANN Service.
52	– Signals of the pressure sensor on the main and control processor are different.	– Notify RUTHMANN Service.
53	– Signal of the pressure sensor on the ring side is incorrect.	– Notify RUTHMANN Service.
54	– Signal of the pressure sensor on the ring side is incorrect.	– Notify RUTHMANN Service.
55	– Signals of the pressure sensor on the ring side on the main and control processor are different.	– Notify RUTHMANN Service.
57	– The maximum permissible differential pressure of the main and control processor is incorrect.	– Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
58	– Current differential pressure values on the main and control processor are different. – Signals of the pressure sensor on the main and control processor are different.	– Notify RUTHMANN Service.
59	– Operationally permissible load moment is considerably exceeded. – Work platform overloaded. – Pressure sensor on the piston side is defective.	– Reduce the load moment, extend the telescope less. – Unload the work platform. – Notify RUTHMANN Service.
69	– Digital signal "Movement controlled" and analogue signal of the joystick are implausible.	– Notify RUTHMANN Service.
74	– Rope length encoder of the "Front left jack arm extension" is defective. – Limit switch of the "Front left jack horizontally fully extended" defective. – Proximity switch "Front left jack retracted horizontally" defective. – Proximity switch "Front left jack retracted vertically" defective. – Limit switch "Front left jack, ground contact" defective.	– Notify RUTHMANN Service.
75	– Rope length encoder of the "Rear left jack arm extension" is defective. – Limit switch of the "Rear left jack horizontally fully extended" is defective. – Proximity switch "Rear left jack retracted horizontally" is defective. – Proximity switch "Rear left jack retracted vertically" is defective. – Limit switch "Rear left jack, ground contact" is defective.	– Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
76	– Rope length encoder of the "Front right jack arm extension" is defective. – Limit switch of the "Front right jack horizontally fully extended" is defective. – Proximity switch "Front right jack retracted horizontally" is defective. – Proximity switch "Front right jack retracted vertically" is defective. – Limit switch "Front right jack, ground contact" is defective.	– Notify RUTHMANN Service.
77	– Rope length encoder of the "Rear right jack arm extension" is defective. – Limit switch of the "Rear right jack horizontally fully extended" is defective. – Proximity switch "Rear right jack retracted horizontally" is defective. – Proximity switch "Rear right jack retracted vertically" is defective. – Limit switch "Rear right jack, ground contact" is defective.	– Notify RUTHMANN Service.
78	– Proximity switch "Boom support" or proximity switch "Lower boom raised" is defective.	– Notify RUTHMANN Service.
79	– Signal of the "Boom in home position" angle encoder (= Tower in the middle position) is incorrect.	– Notify RUTHMANN Service.
80	– Signal of the "Ball bearing slewing ring" angle encoder is incorrect.	– Notify RUTHMANN Service.
81	– Signal of the "Ball bearing slewing ring" angle encoder is incorrect.	– Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
82	– Signals of the angle encoder of the "Ball bearing slewing ring" of the main and control processor are different.	– Notify RUTHMANN Service.
84	– Signals of the "Vehicle longitudinal axle" inclination sensor on the main and control processor are different.	– Notify RUTHMANN Service.
86	– Signals of the "Vehicle transverse axle" inclination sensor on the main and control processor are different.	– Notify RUTHMANN Service.
87	– Signals of the "Lower boom" inclination sensor is incorrect.	– Notify RUTHMANN Service.
88	– Signals of the "Lower boom" inclination sensor is incorrect.	– Notify RUTHMANN Service.
91	– Synchronisation fault of the angle encoder platform.	– Notify RUTHMANN Service.
93	– Switch "Jack retracted" is defective. – Switch "Wheels free" (Axle sensing) is defective.	– Notify RUTHMANN Service.
98	– Signals of the "Lower boom" inclination sensors are different.	– Notify RUTHMANN Service.
99	– Program cycles too long.	– Notify RUTHMANN Service.
100 to 121	– Outputs are defective. – Fuse F15 is defective.	– Notify RUTHMANN Service. – Check the fuse.
122 to 131	– Outputs are defective. – Fuse F14 is defective.	– Notify RUTHMANN Service. – Check the fuse.
132 to 147	– Outputs are defective. – Fuse F13 is defective.	– Notify RUTHMANN Service. – Check the fuse.
148 to 201	– Digital inputs are defective.	– Notify RUTHMANN Service.
226	– Range condition violation. The work platform is outside the permissible sector.	– The boom must be moved back manually via solenoid valves to a permissible sector.
228	– Electrical load is defective.	– Check the fuse of the load. – Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
232	– Rope break or chain break in the lower boom.	– Notify RUTHMANN Service.
233	– Overall vehicle cleaning on the main and control processor is different.	– Notify RUTHMANN Service.
234	– Signal of the "Boom support" proximity switch or signal of the "Lower boom" inclination sensor is incorrect.	– Notify RUTHMANN Service.
235	– Signals of the "Lower boom telescope" rope length encoder on the main and control processor are different.	– Notify RUTHMANN Service.
236	– Signal limit switch of the "Lower boom telescope retracted" or signal of the "Lower boom telescope extension" rope length encoder is incorrect.	– Notify RUTHMANN Service.
237	– Signals of the "Upper boom telescope extension" rope length encoder on the main and control processor are different.	– Notify RUTHMANN Service.
238	– Signal limit switch of the "Upper boom telescope retracted" or signal of the "Upper boom telescope extension" rope length encoder is incorrect.	– Notify RUTHMANN Service.
241	– Signal of the "Upper boom" angle encoder is incorrect.	– Notify RUTHMANN Service.
242	– Signal of the "Upper boom" angle encoder is incorrect.	– Notify RUTHMANN Service.
243	– Signals of the "Upper boom" angle encoder are different.	– Notify RUTHMANN Service.
244	– Signal of the "Upper boom lowered" proximity switch or signal of the "Upper boom" angle encoder is incorrect.	– Notify RUTHMANN Service.
245	– Signals of the "Jack arm extension in the front left" rope length encoder are different.	– Notify RUTHMANN Service.
246	– Signals of the "Jack arm extension rear left" rope length encoder are different.	– Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
247	– Signals of the "Jack arm extension in the front right" rope length encoder are different.	– Notify RUTHMANN Service.
248	– Signals of the "Jack arm extension rear right" rope length encoder are different.	– Notify RUTHMANN Service.
249	– Pressure of the hydraulic pump "Platform balancing" (Pump 2) is incorrect.	– Notify RUTHMANN Service.
252	– One control element of the control panel, the jack control or the operator panel is read as actuated during "start-up" of the computer control.	– Notify RUTHMANN Service.
254 to 259	– Range condition violation. The work platform is outside the permissible area.	– Emergency lowering according to Chapter 7.4 "Emergency lowering after interruption of Steiger movements by "conditional EMERGENCY STOP"". – Notify RUTHMANN Service.
261	– Control panel digital input: Tilt switch signals on the main and control processor are different.	– Notify RUTHMANN Service.
262	– Control panel digital input: Signals of push button BYPASSING SAFETY SWITCH OFF on the main and control processor are different.	– Notify RUTHMANN Service.
263	– Control panel digital input: Signals of push button MOVE TO POSITION on the main and control processor are different.	– Notify RUTHMANN Service.
264	– Control panel digital input: Signals of push button HOME POSITION on the main and control processor are different.	– Notify RUTHMANN Service.
269	– Control panel digital input: Signal distance sensor "Work platform" incorrect.	– Notify RUTHMANN Service.
270	– Control panel digital input: Signal proximity switch "Upper boom lowered" incorrect.	– Notify RUTHMANN Service.

Code no.	Possible cause	Remedy
272	– Control panel digital input: Signal push button HYDRAULIC TOOL incorrect.	– Notify RUTHMANN Service.
273	– Control panel digital input: Signal proximity switch "Rüssel raised" incorrect.	– Notify RUTHMANN Service.
277	– Work platform swivel angle sensing via teeth counter and potentiometer on the rotary drive are providing considerably different results.	– Notify RUTHMANN Service
278	– Rotation angle of work platform greater than or less than maximum or minimum value.	– Notify RUTHMANN Service.
279	– Synchronisation fault of the current swivel speed detection of the boom (tower).	– Notify RUTHMANN Service.
280	– The current swivel speed of the boom (tower) is greater than maximum value.	– Notify RUTHMANN Service.
281	– Control panel fault: no message from CAN bus.	– Notify RUTHMANN Service.
282	– Control panel fault: controller 2 overvoltage.	– Notify RUTHMANN Service.
283	– Control panel fault: undervoltage controller 2.	– Notify RUTHMANN Service.
284	– Control panel fault: overvoltage controller 1.	– Notify RUTHMANN Service.
285	– Control panel fault: undervoltage controller 1.	– Notify RUTHMANN Service.
286	– Control panel fault: no message from HMI bus.	– Notify RUTHMANN Service.
287	– Control panel fault: one function key of the flat keyboard pressed during the "booting" of the computer control.	– Switch on operation again.
288	– Control panel fault: left joystick deflected during the "booting" of the computer control.	– Switch on operation again.
289	– Control panel fault: right joystick deflected during the "booting" of the computer control.	– Switch on operation again.

Code no.	Possible cause	Remedy
290	– Control panel fault: flat keyboard defective.	– Notify RUTHMANN Service.
291	– Control panel fault: right joystick defective.	– Notify RUTHMANN Service.
292	– Control panel fault: left joystick defective.	– Notify RUTHMANN Service.
293	– Control panel fault: controller 2, PWM 5, 6 are deactivated.	– Notify RUTHMANN Service.
294	– Control panel fault: controller 2, PWM 1 to 4 are deactivated.	– Notify RUTHMANN Service.
295	– Control panel fault: controller 2 outputs are deactivated.	– Notify RUTHMANN Service.
296	– Control panel fault: controller 1, PWM 5, 6 are deactivated.	– Notify RUTHMANN Service.
297	– Control panel fault: controller 1, PWM 1 to 4 are deactivated.	– Notify RUTHMANN Service.
298	– Control panel fault: controller 1 outputs are deactivated.	– Notify RUTHMANN Service.
299	– CAN-Bus fault control processor.	– Notify RUTHMANN Service.
300	– CAN-Bus fault main processor	– Notify RUTHMANN Service.
302	– One or several control panel faults occurred.	– Notify RUTHMANN Service.
322	– General Dynamic Reach System error in main processor.	– Notify RUTHMANN Service.
323	– General Dynamic Reach System error in control processor.	– Notify RUTHMANN Service.
344 to 349	– Dynamic Reach System error	– Notify RUTHMANN Service.
350 to 357	– Digital inputs are defective.	– Notify RUTHMANN Service.
362	– BCU overload error: Utilization too high.	– Notify RUTHMANN Service.
370	– Parameter setting for the additional DRS options on the main and control processor is different.	– Notify RUTHMANN Service.

9 Maintenance

Next to the following explanations, the information for the operator in chapter 0.5.3 and the safety instructions in chapter 1.2 must be observed in particular.

The Ruthmann Steiger T 243 AE has been designed and built according to the fundamental safety and health requirements. The responsibility of maintaining the operational readiness and safety of the Steiger lies with you.

We draw your attention explicitly to the fact that all prescribed inspection, routine maintenance and preventive repair according to the separate Maintenance Manual, as well as annual testing by a technical expert, must be carried out conscientiously in accordance. Otherwise, we shall reject any legal liability or liability for material defects.

The "daily" inspection work may be carried out by the operating personnel (☞ Chapter 1.1.3.1). Moreover, inspection, routine maintenance and repair requires persons who have been appointed and trained for this purpose (☞ Chapter 1.1.3.2). "Persons trained for this purpose" are qualified persons who, based on their professional education, professional experience and contemporary professional job as well as instructions and also their knowledge of applicable standards, guidelines, accident protection guidelines and function of the Ruthmann Steiger T 243 AE, are authorised to carry out the respective work and are able to identify and avoid potential hazards in the process.

For maintenance, especially for testing by a technical expert, and for carrying out repairs, we recommend that you make use of our **RUTHMANN Service** or personnel authorised by us.

Only original Ruthmann spare parts or spare parts approved by us should be used for repairs. When using other parts, our legal liability and liability defects becomes null and void.

Please refer to the Operator’s Manual of the chassis manufacturer for information on maintenance work on the chassis.

- Before starting maintenance work on the Steiger, it must be put out of operation and secured against being put back into operation inadvertently.

- Risk of tipping! With the boom raised, the extension of the jack arms should not be changed under any circumstances, e.g., with manual emergency activation of the solenoid valves! The jacking situation changed subsequently is not taken into consideration by the computer control with the boom raised.
- Exercise caution when handling operating and auxiliary substances (Risk of suffering burns or scalds). Components of the hydraulic system are pressurised even when the machine has been put out of operation. Avoid any skin contact as well as inhaling vapours of hydraulic fluids. Wear protective gloves and protective goggles. Greases, hydraulic fluids and gear oils are harmful to health. When handling greases and oils, the safety data sheets applicable for the product must be observed.
- Dirt particles or other contaminants must be prevented from reaching into the hydraulic system under any circumstances. Cleanliness is of maximum significance when maintenance hydraulic systems. For working, especially on the hydraulic system, use only lint-free cleaning cloth.
- For working on the electrical system, all feed cables must be de-energised (e.g., ignition off, battery disconnected). The de-energised condition must be checked and secured against being switched on (e.g., pull out the start key).
- Defective or damaged devices, components or assemblies must be replaced or repaired immediately by RUTHMANN service or by one of our authorised personnel.

When handling oil, take care to ensure that no oil reaches into the soil or the sewage network.
Used oils, greases and oily or greasy cleaning cloths must be disposed of in an environment-friendly manner.

Any claims for warranty shall be rendered null and void by ignoring guidelines and safety data sheets and any loss or damage resulting from the same.
Apart from the explanations given below, the safety instructions also specified in Chapter 1.2, in particular, must be observed.

Sealed assemblies must be opened only by RUTHMANN Service. Inspection, maintenance and repair work on these assemblies should be carried out only by RUTHMANN Service or by personnel authorised by us.

9.1 Cleaning and care

NOTICE

Hydraulic and electric components, such as, for example, valves, solenoid valves, switch boxes, limit switches, proximity switches, etc. should also not be cleaned from the outside with high-pressure cleaners!

- ⊘ *No water must penetrate into the insides of the devices!*
- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use aggressive chemical cleaning agents!*
- ➢ *Use soft cloths, sponges or similar for cleaning.*

Regular cleaning and professional care (e.g. every 2-3 weeks) serve to maintain the value of the Ruthmann Steiger T 243 AE.
Severe atmospheric contamination, salt-content in the air (e.g. at the coast) and other climatic conditions possibly require intensive care of the Steiger. Especially after contact with grit (e.g. de-icing salt in winter), the Steiger should be cleaned since otherwise the painting gets damaged and components may corrode.
The Steiger should be washed from outside using only water and commercially available cleaning agents. Scrubbing agents, solvents, turpentine, cold cleaners or benzine, etc. are not permissible.

You should pay attention to environment-friendliness when purchasing cleaning agents and preservation agents. Residues must be disposed of as special waste depending on the class of harmful substance! Clean the Steiger only at suitable washing stations.

⚠ CAUTION

Cleaning agents or care agents may be harmful to health!

- ➢ Cleaning agents or care agents must always be stored safely!

Before cleaning the Steiger with water or steam cleaner (High-pressure cleaner) or other cleaning agents, cover all those openings or seal them up, in which **no** water, steam or cleaning agents should penetrate for the sake of safety and/or functional reasons. Components that are particularly endangered are switch boxes, sensors (limit switches, proximity switches, etc.) and valves. After cleaning, the covers or seals must be removed completely.

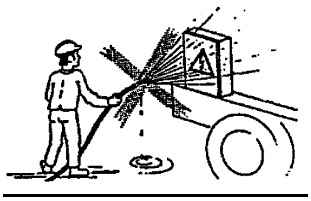
NOTICE

Hydraulic and electric components, such as, for example, valves, solenoid valves, switch boxes, limit switches, proximity switches, etc. should also not be cleaned from the outside with high-pressure cleaners!

➢ *Use soft cloths, sponges or similar for cleaning.*

When using a high-pressure cleaner, the corresponding operator's manuals of the equipment manufacturer with respect to spray pressure and spraying distance must be observed.

- **Bird droppings, insects, residues of resin, tar and grease must be washed off immediately and thoroughly, since they contain substances that may cause considerable damage to the paints and plastic components.**
- **After cutting trees, sawn shavings must be removed immediately. Covers of the boom feet must be removed on the boom system, for example. If collections of sawn shavings are identified, they must be removed carefully by authorised personnel.**
- **Free spaces for movement for moving components must be cleaned immediately.**
- **Direct solar radiation must be avoided during washing.**
- **Never aim the jets of water of steam on the following components of the Ruthmann Steiger T 243 AE:**



  - **electrical components,**
  - **electrical lines,**
  - **hydraulic components,**
  - **hydraulic lines,**
  - **insulators,**
  - **sealing caps e.g.:**
    - **screw plug of the hydraulic oil tank,**
    - **etc.,**
  - **bearing points,**
  - **sealing points e.g.:**
    - **door seals,**
    - **seals of the switch boxes,**
    - **shaft sealing rings,**
    - **etc.,**
  - **brake system.**

Residues of cleaning agents, car polishes and cleaning cloths must be disposed of in an environment-friendly manner.

After cleaning, especially with a high-pressure cleaner, apply a thin layer of grease to sliding surfaces. Depending on the stress caused by weathering or chemical influences, the Steiger should be protected with the help of preservation agent.

- **Paint coating**
  Apply treatment using only acid-free and solvent-free cleaning agents and care agents. For fading paint, the surface can be touched up with a commercially available car polish. In doing so, observe the instructions of the polish manufacturer.

- **Plastic components** (e.g. bearing points, boom support, and work platform, if necessary)
  Clean with a moist cloth and water. If this should not be adequate, only suitable solvent-free cleaning agents and preservation agents should be used.

- **Aluminium side walls and cover**
  Brush off with water and neutral cleaning agent added.

- **Door seals**
  Rub talcum into the door seals of switch boxes.

- **Retraction chains**
  In case of severe contamination, adequate lubrication of the chains is no longer ensured. The chains should be cleaned only with agents containing paraffin such as diesel fuel, petroleum, benzine, etc. Corrosive, caustic or chlorine-containing cleaners should not come into contact with the chain. It is prohibited to use high-pressure cleaners.

  NOTICE *Damage to paint!*

  ➢ *When cleaning the chains with the above-mentioned cleaning agents containing paraffin, special caution needs to be exercised with regard to the other components and surfaces (coatings).*

  After cleaning the chains, it is necessary to lubricate and apply preservation agent to them.

- **Hydraulic cylinder,**
  Remove impurities, dust and crusts carefully from the piston rods, especially exposed piston rods that are not retracted completely into the transport configuration (e.g. lifting cylinder).

  NOTICE

  Steam cleaners or high-pressure cleaners may damage the seals of the hydraulic cylinders!

  - ⊘ *Never use a steam cleaner or high-pressure cleaner!*
  - ⊘ *Never use aggressive chemical cleaning agents!*
  - ➢ *For cleaning, use a soft clean industry cloth, sponge or similar.*

  If the piston rods have come into contact with salt, sand or chemicals, these must be completely removed from the piston rods with sufficient clean water. After cleaning, apply a coat of oil to the piston rods.

  In order to avoid corrosion on the piston rods, extend and retract the hydraulic cylinder completely over the entire length of the piston rod operationally.

9.2 Daily checks

The operating personnel must carry out the "daily inspection" (d) before putting the Ruthmann Steiger T 243 AE into operation. The check comprises visual inspections and function inspections that are necessary in order to ensure safety.

The following is always applicable:

- If defects are identified, which particularly endanger safety, operation must not commence. Otherwise, not only is your own safety at risk, but even that of those persons working in the vicinity.
- Report defects immediately to the operator / business.
- Do not try to rectify the defects identified on your own. Repair work should be carried out only by persons who have been appointed and trained for this purpose.
- Put the Steiger into operation only after the defects have been rectified.

9.2.1 List of daily Inspection

Inspection list		
Components	**Work to be carried out**	**Remarks, other intervals**
General		
Lights	Check for function and cleanliness	
	Cleaning	where required
Operating substances	Check the fuel level	
Steiger		
Steiger, complete	Cleaning	where required
	Inspect visually for damage (cracks, deformation or corrosion)	
	Check the painting / coating (scrapes, scratches or flaking)	
	Check signs for completeness and legibility	
	Check the free spaces for motion sequences of mechanical and hydraulic components	
Stabilizing jacks	Check ease of movement	
Lower boom	Check ease of movement	
Upper boom	Check ease of movement	
Rüssel	Check ease of movement	
Rüssel - platform console	Visual inspection	

Components	Work to be carried out	Remarks, other intervals
Ascent to work platform	Visual inspection	
	Check the walking safety of the steps	
	Cleaning	where required
Work platform	Visual inspection	
	Check the guard rail	
	Check the door	
	Check the anchor points (anchor eyes)	
	Check the walking safety of the ground	
	Cleaning	where required

Hydraulic system

Swivel drive	Visual inspection	
	Check tightness	
Rotary device Rüssel - platform console	Visual inspection	
	Check tightness	
Hydraulic cylinder	Visual inspection	
	Check tightness	
	Check the free space for motion sequences of the hydraulic cylinder	
	Check the surface of the piston rods for damage and corrosion	
Hydraulic pump	Visual inspection	
	Check tightness	
Drive shaft (Hydraulic pump)	Check the noise	
Battery hydraulic pump	Visual inspection	
	Check tightness	
Manual pump	Visual inspection	
	Check tightness	
	Cleaning	where required
Ball valve	Visual inspection	
	Check tightness	
Valves	Visual inspection	
	Check tightness	
Hydraulic hose and pipelines	Visual inspection	
	Check tightness	
Oil cooler	Visual inspection	
	Check tightness	
	Cleaning	where required
Hydraulic tank	Visual inspection	
	Check tightness	
	Check the hydraulic oil level	
	Check the degree of contamination of the hydraulic oil return filter	Visually on the pressure gauge

Electrical system

EMERGENCY STOP switches	Function inspection	
Signal equipment	Function inspection	
Inclination display	Visual inspection	
Sensors	Visual inspection	

Components	Work to be carried out	Remarks, other intervals
Valve connector	Visual inspection	
Cabling	Visual inspection	
Control equipment	Visual inspection	
	Check the legibility of the labels or symbols	
	Check the signal lamps and warning lights	
Computer control	Visual inspection	
Auxiliary processor of DRS	Visual inspection	
Battery	Visual inspection	
	charge state	in winter every 6 to 8 weeks
	Check the liquid level	in summer and hot regions, weekly
	Cleaning	where required
Electric motor (Battery hydraulic pump)	Visual inspection	
	Function inspection	every 2 weeks
	Cleaning	where required
Electric motor (Oil cooler)	Visual inspection	
	Cleaning	where required
Electricity supply work platform	Visual inspection	
	Cleaning	where required

9.2.2 Remarks on carrying out inspection work

In the following sub-chapters, notes on carrying out inspection work on diverse components and assemblies of the Ruthmann Steiger T 243 AE are specified.

9.2.2.1 Lights

The inspection and maintenance of the lights of the chassis is carried out according to the Operator's Manual of the manufacturer.

- Check the entire light system, flashing and brake lights and rotating flashing beacon, etc. to see that they are working and clean, and clean them if necessary.
- Defective lights must be repaired immediately.

9.2.2.2 Steiger, complete

The complete Steiger superstructure, such as e.g., base frame, stabilizing jacks, boom, work platform, must be checked with respect to

- condition and cleanliness,
- cracks,
- deformation / damage,
- coating / painting,
- corrosion,
- presence and legibility of the signs,
- the free space for movement of the mechanical and hydraulic components as well as the external energy guiding,
- etc.

Damage to the coating, such as e.g. scratches, scrapes or damage caused by the impact of stones are must rectified immediately, before corrosion occurs. In case of corrosion on bearing components, consult Ruthmann Service.

If damage to the Steiger, e.g., impact or collision damage, etc. - visible by damage to the painting or coating and bulges - is identified, it is necessary to have check carried out immediately by a qualified person or, if required, by a technical expert. Any defects must be rectified before putting it into operation the next time or continuation of its operation.

The signs of the Steiger must always be kept in complete and legible condition. Damaged and illegible signs must be replaced immediately.

Refer to the following chapters for remarks on individual components.

9.2.2.3 Bearing points / Bolt locks

- Bearing points and bolt locks must be checked for their:
  - condition and cleanliness,
  - wear, cracks and damage.

  If the bolt locks come loose, you must identify the cause and rectify the defect. We recommend that repairs of defective supports and bolt locks be carried out by Ruthmann Service or by personnel authorised by us.

- Clean bearing points from outside. Never use a high-pressure cleaner and / or chemical cleaning agents.

9.2.2.4 Stabilizing jacks

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - smooth running of the guides and cylinder for motion sequences.

9.2.2.5 Lower boom

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - No noise generation of the telescope.

9.2.2.6 Upper boom

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - No noise generation of the telescope.
  - Free space for motion sequences of the mechanical components, e.g., deflection lever, hydraulic cylinder, etc. Foreign objects must be removed immediately.

9.2.2.7 Rüssel

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Free space for motion sequences of the mechanical components, e.g., deflection lever, hydraulic cylinder, etc. Foreign objects must be removed immediately.

9.2.2.8 Rüssel platform console

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Free space for motion sequences of the mechanical components, e.g., deflection lever. Foreign objects must be removed immediately.

9.2.2.9 Ascent to the work platform

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - steps for wear, damage and walking safety,
  - telescope ladder for smooth running.

9.2.2.10 Work platform

⚠ WARNING

Continuing use of holders, safety ropes and body harnesses after an accident is very dangerous, since components e.g. anchorages, ropes and straps may be damaged and thus, may no longer provide adequate protection.

- **The complete holders including ropes for harnesses must be replaced after an accident. We recommend that you have this work carried out by Ruthmann Service or by personnel authorised by us.**
- **We also recommend that you replace the harnesses.**

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - floor for wear, damage and walking safety,
  - adequate height of the kick plate,
  - stability and height of the guard rail,
  - Check doors for smooth running, inspect the closing mechanism: the doors must close automatically,
  - check the anchor points (anchor eyes) for the connection of personal fall protection systems for damage and fixing point.

- Clean the work platform, if required.

NOTICE

Aggressive chemical cleaning agents may damage the work platform!

⊘ *Never use aggressive chemical cleaning agents!*

9.2.2.11 Hydraulic system

⚠ WARNING

Risk of injury from hydraulic fluid spraying out! Parts of the hydraulic system are exposed to high pressure!

➢ **Do not try to rectify the defects identified on your own. Repair work should be carried out only by persons who have been appointed and trained for this purpose.**

- Check the fixing points of components, hydraulic actuators, control blocks, connecting pieces and valves.

- Check pipe and hose connections for damage such as e.g. kinks, cracks, porous surfaces and corrosion.

- Check tightness. If leakages occur, determine the cause and rectify the defect.

9.2.2.12 Swivelling drive

⚠ WARNING **Risk of injury posed by rotating components! Body parts and limbs such as hair, hands and even clothing may get caught or pulled in by the rotating pinion of the swivelling drive!**

⦸ As long as the swivelling drive rotates, no person should remain below the Steiger in the hazard area of the shaft drive!

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Check the swivelling drive for normal running noises. If any extraordinary noises occur, the cause must be identified and the defect must be rectified.

9.2.2.13 Rotary mechanism of Rüssel platform console

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Check the rotary mechanism for normal running noises. If any extraordinary noises occur, the cause must be identified and the defect must be rectified.
  - Check tightness.

- Clean the rotary mechanism, if required.

NOTICE *Steam cleaners or high-pressure cleaners may damage the seals of the rotary mechanism!*

⦸ Never use a steam cleaner or high-pressure cleaner!
⦸ Never use aggressive chemical cleaning agents!
➢ For cleaning, use a soft cloth, sponge or similar.

9.2.2.14 Hydraulic cylinder

- Fixing points and bolt locks must be checked for
  - condition and cleanliness,
  - wear, cracks and damage,
  - ease of movement of the support.

If the fastenings and bolt locks come loose, you must identify the cause and rectify the defect.

- Check the hydraulic cylinder and scraper for tightness and damage. An existing oil film on the piston rod must not form droplets or oil rings. The scraper and seals are wear parts. For internal and / or external leakages the cause must be determined and the defect must be rectified.

- Check the free spaces for motion sequences of hydraulic cylinders. Foreign objects must be removed immediately.

- Check the surface of piston rods for damage. In order to prevent corrosion and damage during longer downtimes of the Steiger, we recommend that the piston rods are retracted (transport configuration).

9.2.2.15 Tandem hydraulic pump

⚠ WARNING

Risk of injury posed by rotating components! Body parts and limbs such as hair, hands and even clothing may get caught or pulled in by the rotating drive shaft of the tandem hydraulic pump!

⦸ As long as the drive shaft rotates, no person should remain below the Steiger in the hazard area of the tandem hydraulic pump!

➢ Stop the vehicle engine and secure it against being put into operation inadvertently. Pull out the ignition key.

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Check the tandem hydraulic pump for normal running noises and vibrations. If any extraordinary noises or vibrations occur, the cause must be identified and the defect must be rectified.
  - Check tightness.

- Clean the tandem hydraulic pump if necessary.

NOTICE

Steam cleaners and high-pressure cleaners may damage the seals of the tandem hydraulic pump! Water may, where applicable, penetrate and impair the function of the tandem hydraulic pump.

- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use aggressive chemical cleaning agents!*
- ➢ *For cleaning, use a soft cloth, sponge or similar and water with a mild cleaning agent.*

9.2.2.16 Drive shaft of the hydraulic pump

⚠ WARNING

Risk of injury posed by rotating components! Body parts and limbs such as hair, hands and even clothing may get caught or pulled in by the rotating drive shaft!

- ⊘ **As long as the drive shaft rotates, no person should remain below the Steiger in the hazard area of the shaft drive!**
- ➢ **Stop the vehicle engine and secure it against being put into operation inadvertently. Pull out the ignition key.**

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Check the drive shaft for normals running noises and vibrations. If any extraordinary noises or vibrations occur, the cause must be identified and the defect must be rectified.

- Clean the drive shaft if necessary.

NOTICE

Steam cleaners and high-pressure cleaners may damage the seals of the drive shaft!

- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use aggressive chemical cleaning agents!*
- ➢ *For cleaning, use a soft cloth, sponge or similar.*

9.2.2.17 Battery hydraulic pump

- Clean the battery hydraulic pump, if required.

NOTICE

The battery hydraulic pump may be damaged. No water must penetrate into the insides!

- ⦸ *Never use a steam cleaner or high-pressure cleaner!*
- ⦸ *Never use chemical cleaning agents!*
- ➢ *Dust deposits may, for example, be removed with a soft brush or by dry compressed air.*
- ➢ *For cleaning, use soft cloth, sponge or similar.*

- Check tightness.
- The battery hydraulic pump must be put into operation at regular intervals in order to check that it is in working condition.
- Check the battery hydraulic pump for normals running noises and vibrations. If any extraordinary noises or vibrations occur, the cause must be identified and the defect must be rectified.

9.2.2.18 Manual pump

- Inspection, see Chapter "Hydraulic system".
  Other inspections:
  - Function inspection of the manual pump according to the inspection list. Keep the manual pump well-running by actuating it several times.

9.2.2.19 Ball valve

- Inspection, see Chapter "Hydraulic system".
  Other inspections:
  - Check ease of movement of the ball valve by actuating it several times.

9.2.2.20 Valves

- Clean the valves, if necessary, from outside.

NOTICE

Steam cleaners and high-pressure cleaners may damage the seals of the valves! Water may, where applicable, penetrate and impair the function of the valves.

- ⦸ *Never use a steam cleaner or high-pressure cleaner!*
- ⦸ *Never use aggressive chemical cleaning agents!*
- ➢ *For cleaning, use a soft lint-free cloth, sponge or similar.*

9.2.2.21 Stop valves in hydraulic cylinders

- Inspection, see Chapter "Hydraulic system".
  Other inspections:
  - Check the tightness with permissible load, if necessary:
    - Apply nominal load to the work platform,
    - Extend the stabilizing jacks,
    - Lift the lower boom,
    - Lift the upper boom,
    - Extend the telescope,
    - Move the Rüssel upwards.

    Let the Steiger remain in position. No change in position should be noticeable over a time period of 5 minutes. With this check, even the tightness of the pressurised side of the hydraulic cylinder is checked at the same time. Hydraulic fluid must not flow over the piston seals. If the position changes, you must identify the cause and rectify the defect immediately! No leaks may occur on the valves, screw fittings and seals.

- Clean the valves, if necessary, from outside.

NOTICE

Steam cleaners and high-pressure cleaners may damage the seals of the valves! Water may, where applicable, penetrate and impair the function of the valves.

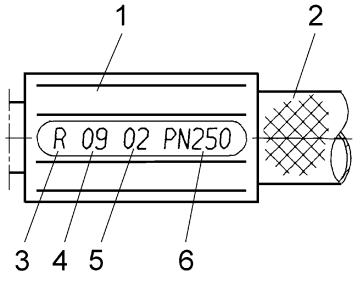
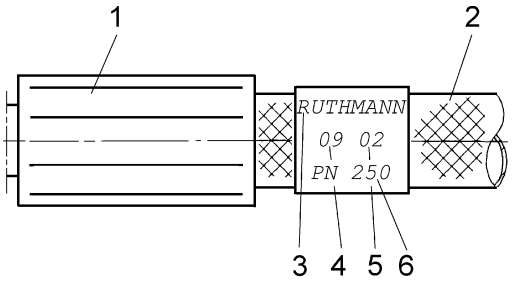
- ⦸ *Never use a steam cleaner or high-pressure cleaner!*

Never use aggressive chemical cleaning agents!

➢ *For cleaning, use a soft lint-free cloth, sponge or similar.*

9.2.2.22 Hydraulic hose lines

- Hydraulic-hose lines are subject to a certain ageing process. For example, light, temperature, movement play and pulse frequencies influence the usage period of the hydraulic hoses. We recommend that you replace the hydraulic hoses after 6 years according to the state of the art.
  Only original Ruthmann spare hydraulic hoses should be used. The hose line is marked with embossing on the fitting or an adhesive sticker is marked accordingly near the fitting.

Marking by	
embossing	**Adhesive sticker**
	

1. Fitting
2. Hose
3. Manufacturer's marking
4. Year of manufacture
5. Month of manufacture
6. max. dynamic operating pressure (in bar)

9.2.2.23 Oil cooler

⚠ WARNING **Danger of burning! The oil cooler can become hot during operation!**

➢ **Ensure that the oil cooler has cooled down, before touching!**

NOTICE

The oil cooler can start running automatically!

- *Always switch off Steiger operation before inspecting! Stop the vehicle engine and secure it against being started back up inadvertently. Remove ignition key.*

- Inspection, see Chapter "Complete Steiger".
  Other inspections:
  - Check the oil cooler for normal running noises and vibrations. In event of any unusual noises or vibrations arising, you must identify the cause and rectify the defect.
  - Check tightness.

- Check cooling element in oil cooler for cleanliness. Dust and deposits, etc. reduce the cooling capacity. Clean oil cooler as required. The ribs on the body of the cooler can be cleaned with a soft brush or compressed air. Do not damage cooling ribs when cleaning.

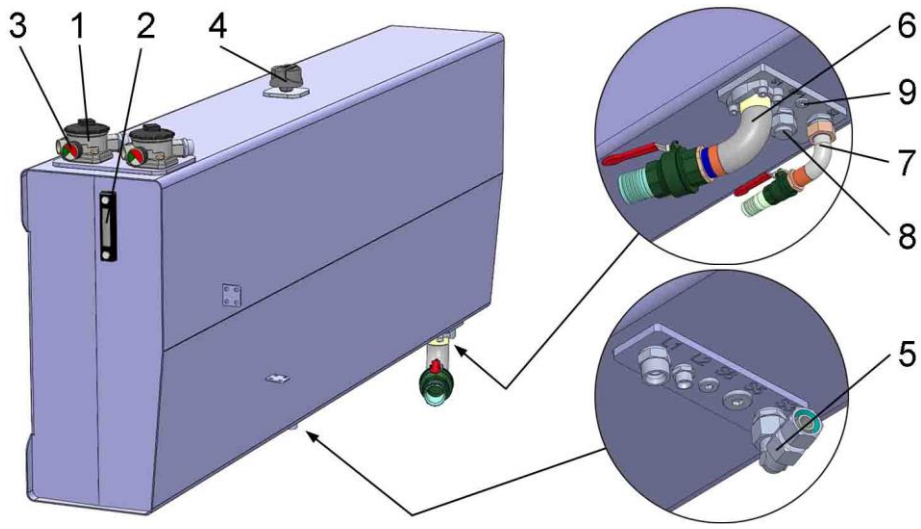
- Severe atmospheric contamination, dusty ambient conditions and other climatic conditions may require more intensive care of the oil cooler. In such cases check the condition of the cooling element in the oil cooler more frequently.

9.2.2.24 Hydraulic oil tank

NOTICE

Dirt or other impurities in the hydraulic oil damage the hydraulic system!

- *Let the hydraulic oil barrels stand still for a longer period of time before removing oil.*
- *Never keep the tank cover on the hydraulic oil tank longer than necessary. Close hydraulic oil barrels again immediately after removing the oil.*



1. Return filter
2. Oil level indicator
3. Contamination indicator (Pressure gauge)
4. Venting filter
5. Suction line of the battery hydraulic pump and manual pump
6. Suction line of the hydraulic pump 1
7. Suction line of the hydraulic pump 2
8. Suction line of the second drive (special equipment)
9. Oil drain screw

The tank connection bends of the suction lines of the hydraulic pumps 1 and 2 are provided with ball valves. In order to prevent unintended closing, they are secured using cable ties. If a ball valve has been closed, e.g. during inspection or for hydraulic oil change, the hand lever must be secured again correspondingly with a cable tie after opening the ball valve.

- Check the hydraulic oil level.
  - Steiger in transport configuration.
  - Steiger out of operation, engine off.
  - Check the fill level with the help of the oil level indicator (2).
    The oil level should be measured only when the vehicle is stationary and in a horizontal position, since otherwise the oil level indicator does not indicate the true oil level. Check the oil level when the hydraulic oil is cold.
    The hydraulic oil level must be located between the upper and lower marking dashes. Ideally, in the middle between the marking dashes ≙ Middle of the oil level indicator (2).
  - If necessary, top up the oil according to the list of lubricating points.

- Check the degree of contamination of the return filter. The filter contamination can be checked visually with the pressure gauge (3). You can view it through the inspection opening in the cover.
  Green indication range ≙ Filter element is in order.
  Red indication range ≙ Filter element contaminated; in this case, maintenance must be carried out on the return filter.

- Clean the hydraulic oil tank if necessary.

NOTICE

No water must penetrate into the insides the hydraulic oil tank!

- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use aggressive chemical cleaning agents!*
- ➢ *For cleaning, use a soft lint-free cloth, sponge or similar.*

9.2.2.25 Electrical system

- Check the fuses for tight fit and, if necessary, to see that they are working.

- Check the switch boxes for tightness and collection of condensed water.

- Checking the
  - EMERGENCY STOP switch,
  - plug connections,
  - push buttons and illuminated push buttons,
  - function keys,
  - joystick and rubber sleeves,
  - limit switches,
  - proximity switches,
  - rotary angle encoder,
  - Inclination sensor,
  - pressure sensor,
  - rope length encoder,
  - solenoid valve connectors

  for cleanliness.

- Remove dirt, dust deposits, ice / snow, etc. from the limit switches and proximity switches.

NOTICE

The limit switches and proximity switches may be damaged. No water must penetrate into the insides of the devices!

- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use chemical cleaning agents!*
- ➢ *For cleaning, use soft cloth, sponge or similar.*

- Function check of all EMERGENCY STOP switches. Actuating the EMERGENCY STOP switch must lead to the electrical control of Steiger movements coming to a standstill. The vehicle engine must stop.

- Check ease of movement of the joystick. The joystick must return to its neutral position after actuating and releasing it. The controlled movement must stop. Avoid releasing the joy stick abruptly. Check the rubber sleeves for fixing point, damage and ageing (Cracks, porous surface, etc.). Replace worn or damaged joysticks.

- Clean control equipment and devices if necessary.

NOTICE

The control elements, solenoid valves, switch boxes, etc. may be damaged. No water must penetrate into the insides of the devices!

- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use chemical cleaning agents!*
- ➢ *For cleaning, use soft cloth, sponge or similar.*

- Both CPU's in the auxiliary processor for the Dynamic Reach System (DRS) have an anticipated service life of 17 years. We recommend having the CPU's replaced prophylactically at latest upon expiration of this period of time to ensure proper operation of the Steiger. Replacement is absolutely necessary after 17 years.

9.2.2.26 Batteries

⚠ WARNING

Battery acid is highly corrosive! Battery acid should not come into contact with the eyes, hands, clothes and the vehicle paint.

- **Do not tip the battery. Acid may leak out from the degassing vents.**
- **Wear safety goggles and gloves. In case of contact with the eyes, rinse them with cold water. Then consult a doctor immediately.**
- **Neutralise acid on the hand or clothes immediately with soap solution and rinse with plenty of water. If necessary, consult a doctor.**
- **If battery acid is swallowed, consult a doctor immediately!**

During the charging operation, a highly explosive hydrogen - oxygen gas mixture is formed!

- **Fire, sparks, exposed light and smoking are prohibited!**
- **In order to prevent formation of sparks at the battery poles, no live charging cable should be connected to or disconnected from the battery.**

Instructions of the battery manufacturer must be observed and followed.

Old batteries and cleaning cloths must be disposed of in an environment-friendly manner. Never dispose of old batteries in household waste but hand them over to a collection centre. For the sake of disposal and the technical knowledge necessary, we recommend that you get the battery and / or battery acid replaced by RUTHMANN Service or by personnel authorised by us. For example, the replacement can be carried out in the course of periodic inspection (inspection by a technical expert).

Vehicle batteries

- Check the fill level of the battery liquid.
- Check the charge state of the battery. Charge the battery if necessary (do not quick-charge). The capacity of a battery reduces with falling

temperature. A highly under-cooled battery has only a fraction of its power. Hence, charge the battery more frequently in the winter months.

- Clean the battery if required. Keep the battery poles clean. Grease the pole terminals (connecting terminals) slightly with an acid-free and acid-resistant grease (e.g. Vaseline).

NOTICE

The battery may be damaged. No water must penetrate into the insides!

- ⊘ *Never use a steam cleaner or high-pressure cleaner!*
- ⊘ *Never use chemical cleaning agents!*
- ➢ *Clean the battery only with sealing stoppers screwed on!*
- ➢ *For cleaning, use soft cloth, sponge or similar.*

- Make sure to observe and follow the Operator's Manual of the battery manufacturer when replacing the battery.

Button cell batteries of the computer control

- We recommend that you have the rechargeable button cell batteries after 6 years. Replacement is absolutely necessary after 8 years.

9.2.2.27 Current supply "Work platform"

- Clean the feed at the base frame and grounded socket of the work platform, if necessary. Dust deposits may, for example, be removed with a soft brush or by dry compressed air.

- Check the feed and the duplex grounded receptacles for tight fit and damage. It must be possible to open and close the protective lids of the US-Nema 5-15P built-in plug and the duplex grounded receptacles with ease. Any damage to the protective lids or to the housings must be repaired immediately.

- Actuate the test button of the FI protective switch of the current supply on the base frame. By actuating this test button, the FI protective switch must trip immediately. This is an indication that the fault current protective switch is working mechanically correctly. If the FI protective switch does not trip, the cause must be established and the defect must be rectified.

- Actuate the test button of the FI protective switch of the duplex sockets of the work platform. By actuating this test button, the FI protective switch must trip immediately. This is an indication that the fault current protective switch is working mechanically correctly. If the FI protective switch does not trip, the cause must be established and the defect must be rectified.

10 Special equipment

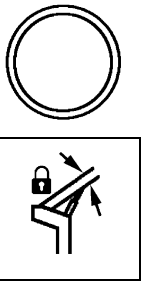
10.1 SKY performance mode

SKY performance mode is mandatory for the Ruthmann Steiger T 243 AE with the basic DRS package. It makes it possible for operating personal to retrieve the maximum performance data for the Steiger and to suppress the movements “Raise” and “Lower the lower boom” deliberately, for other purposes as well. The mode can be activated using the push button LOWER BOOM STILL. The auxiliary computer for the Dynamic Reach System (DRS) regulates whether the mode can be activated or deactivated. When the mode is active, the movements of the lower boom lifting cylinder are locked electrically. This means that the boom movements “Raise the lower boom” and “Lower the lower boom” cannot be executed. The lower boom remains still. In general, it is possible to request SKY performance mode in all boom configurations. Deactivating SKY performance mode, and thus enabling the execution of the boom movements “Raise the lower boom” and “Lower the lower boom” once more, is subject to certain conditions. They must be recognised as permissible by the auxiliary computer. In connection with the computer control, the execution of the boom movements “Raise the lower boom” and “Lower the lower boom” is enabled once more, as long as this function is not otherwise electrically locked.

10.1.1 Locking the movements “Raise” and “Lower the lower boom” electrically

- Push button LOWER BOOM STILL on the work platform control panel.

- Push button LOWER BOOM STILL on the switch box EMERGENCY CONTROL.



Requirement:

✓ Operation switched on. Computer control has "booted".

✓ No movement executed to raise or lower the lower boom.

Components	Movement	Execution on the control panel or switch box EMERGENCY CONTROL
Lower boom lifting cylinder	Control locked electrically	Press the push button LOWER BOOM STILL.

The control option for they lower boom lifting cylinder can be locked electrically by actuating the push button on the computer control. SKY performance mode is enabled in connection with the auxiliary computer. The operator can recognise whether or not the mode is active on a display, e.g. the graphic display on the work platform control panel.

SKY performance mode remains active even after switching the Steiger on and off until the mode is deactivated, e.g. the movements “Raise” and “Lower the lower boom” are enabled once more.

10.1.2 Enabling the movements “Raise” and “Lower the lower boom”

After actuating the push button, **no** boom movements may be executed.

Requirement:

✓ Operation switched on. Computer control has "booted".
✓ The boom and work platform **must remain still**.
✓ The boom and work platform are positioned within a range of motion in which enabling them is permitted.

Components	Movement	Execution on the control panel or switch box EMERGENCY CONTROL
Lower boom lifting cylinder	Control enabled	Press the push button LOWER BOOM STILL.

If the boom and work platform are positioned within a range of motion in which disabling SKY performance mode is

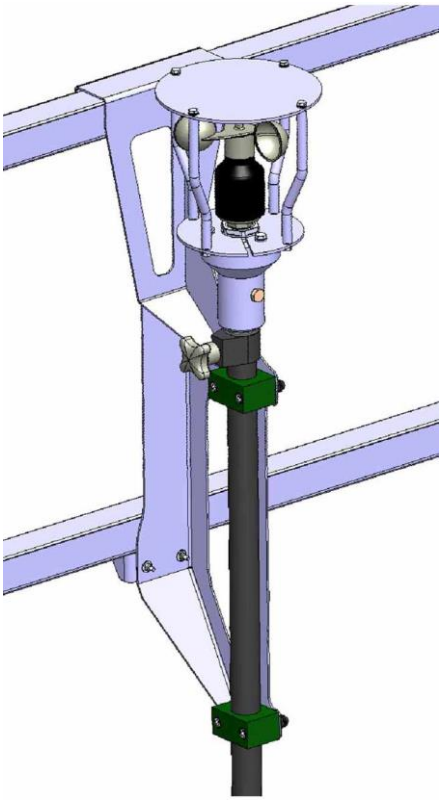
a) **permitted**, then the auxiliary computer deactivates the mode in connection with the computer control after actuating the push button. The boom movements “Raise the lower boom” and “Lower the lower boom” can now be executed again in general.

b) **not permitted**, then actuating the push button causes an operating message to appear on the graphic display of the control panel. At the same time, the LML SWITCH-OFF warning light flashes. Before actuating the push button again, the operator must now execute suitable permitted boom movements that reduce the load. For example, “Retract upper boom telescope”. Afterwards, press the push button again.

c) **not permitted**, and the boom configuration and the work platform are located in the designated **transition area**, then **no** operating message will appear. However, instructions for the operator appear on the graphic display of the control panel. Permitted boom movements must now be executed in order to reduce the load still further. The push button must **not** be actuated again. If the prerequisites have been fulfilled after executing the boom movements, the auxiliary computer deactivates the mode in connection with the computer control. The boom movements “Raise the lower boom” and “Lower the lower boom” can now be executed again in general.

10.2 Wind gauge

A removable wind gauge is fastened to the work platform. It serves for measuring the horizontal wind velocity. The readings are forwarded to the computer control in the form of an electric signal and are visible on the clear text display. The removable wind gauge hangs on a bracket on the upper hand rail of the guard rail, and can be clicked into a quick-release Dirak snap fastener on the knee rail on the work platform. After loosening the star-handle screw, it is possible to adjust the height of the wind gauge variably on a telescopic rod. When loosening the star-handle screw, hold the wind gauge in place. A cover protects the wind gauge from damage.



The wind gauge is connected to the 4-pin socket of the terminal box on the platform console.

Clear text display	Meaning	
x **Wind** Time %LML FLdn RLdn FRdn RRdn	breeze	Wind velocity in miles per hour. Only whole numbers are display, thus, without decimal places. Example: "28" is equivalent to 28 mph (12.5 m/s).

If the wind velocity is higher than e.g. 28 mph (12.5 m/s), the message "Wind velocity too high" appears in the clear text display. An acoustic warning signal sounds at the same time. The message and the warning signal come to an end when the wind velocity falls below 28 mph (12.5 m/s) again.

The wind gauge is equipped with an electrically controlled heater that should prevent the ball bearing of the outer rotating parts from freezing, e.g., during the winter season.

The device operates maintenance-free. It only has to be kept clean from soiling, in particular in the area between the rotating and fixed parts.

10.3 Control position REMOTE CONTROL

The control position REMOTE CONTROL is designed as a cable connected remote control. When operating of the Ruthmann Steiger T 243 AE with the remote control, amongst others, the following must be observed:

- **No** persons must be in the work platform during operation with the remote control.
  Exceptions: - emergency lowering
  - special methods of working or work conditions.
- The connecting cable and the remote control must not be damaged.
- The plug of the connecting cable must be attached correctly to the emergency control switch box as well as on the remote control.
- The symbols of the control elements corresponds with the symbols of the work platform control panel.
- The joysticks are allocated with multiple functions for boom movements. The first function is carried out directly by deflecting the joystick. The joystick does not have to be unlocked. The second function is only controlled after pressing the joystick and then deflecting.
- Only boom movements can be carried out using the remote control. Remarks, information and requirements of Chapter 6.5 "Steiger-operation" must be observed.

Special methods of working or work conditions

⚠ DANGER

Risk of accident!
The persons in the work platform may, where applicable, be crushed, entrapped, knocked or catapulted out!

⦸ Steiger movements using the remote control when the work platform is occupied by persons are only permitted in compliance appropriate measures.

The execution is in the field of responsibility of the operator.
Next to the following information listed, the safety instructions in Chapter 1.2 must be observed in particular.

For special methods of working or work conditions, the Steiger movements using the remote control with work platform occupied by persons is

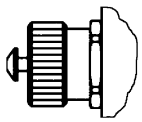
permissible **in exceptions** if, amongst others, the following measures have been implemented:

- ✓ Use with special methods of working or work conditions is not a general case.
- ✓ A risk assessment corresponding to the use must be carried out. The safety and health protection requirements determined must be implemented in appropriate protective measures and mediated to the persons in the work platform and the ground personnel by instruction and training (e.g., operating instructions).
- ✓ A permanent and continuous communication between the persons in the work platform and the ground personnel must be available.
- ✓ A supervising person especially trained must instruct the ground personnel.
- ✓ The operator panel authorised with operating the remote control must be instructed in this separately.
- ✓ The remote control must always be ready for use.
- ✓ The ground personnel must not deactivate the remote control.
- ✓ The ground personnel authorised with operating the remote control must keep permanent eye contact with the persons in the work platform.
- ✓ A recovery plan for hazard cases must be present.
- ✓ Persons falling out or falling down from the work platform must be ruled out.
- ✓ The persons in the work platform must be secured with personal fall protection systems.
- ✓ Crushing or entrapment of persons in the work platform or impact with objects must be ruled out.
- ✓ If necessary, persons trapped in the work platform, e.g., during a malfunction, must be protected against hazards and rescued without risk.

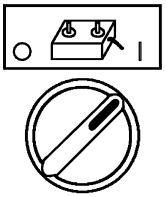
10.3.1 Connection to the switch box on the Steiger-substructure (emergency control)

If defects should be determined during operation, operation must be stopped immediately. Operation should be resumed only after the defect has been rectified.
Next to the following information listed, the safety instructions in Chapter 1.2 must be observed in particular.

- 7-pin socket
  on the switch box on the Steiger-substructure.



- Selector switch
  on the switch box on the Steiger-substructure.



Requirement:

- ✓ Hydraulic pump drive on.
- ✓ Operation on.

Procedure:

NOTICE *Incorrect operations / avoid malfunctions!*

- ⊘ *With a Steiger ready for operation, the remote control must not be set aside.*
- ⊘ *The remote control cable must not be damaged. This may lead to malfunction.*
- ➢ *The remote control must be carried in such a manner that no control element can be actuated accidentally.*

Components	Position / display	Execution
Connecting cable plug	in 7-pin socket	Insert the connecting cable of the remote control in the socket on the left or right side of the switch cabinet.
Connecting cable plug	in 7-pin socket	Insert the connecting cable of the remote control into the socket of the remote control.
Door of the switch box EMERGENCY CONTROL	open	Open the door of the EMERGENCY CONTROL switch box.
Selector switch REMOTE CONTROL (ON / OFF)	I	Turn the selector switch to position "I" (ON).
Door of the switch box EMERGENCY CONTROL	closed	Close the door of the EMERGENCY CONTROL switch box.

Components	Position / display	Execution
LEDs above the EMERGENCY STOP switch of the remote control	flash	Voltage supply present.
EMERGENCY STOP switch, remote control	actuated and reset	When pressing and resetting the EMERGENCY STOP switch, the remote control is released.
LEDs of the remote control	go out or into their operational display	Remote control operation released.
Remote control		The handling of the remote control is carried out when considering the remarks, notes and requirements of the Chapter "Steiger-operation".

The control switches to EMERGENCY STOP as soon as the plug connection for the remote control connection is released and the selector switch REMOTE CONTROL I / 0 (ON / OFF) is in position "I". The EMERGENCY STOP deactivation is cancelled if the selector switch is switched to "0".

10.4 Supporting plate with milled groove

The supporting plate is made of plastic. Rubber has been applied the bottom side. This reduces damage to the underground and increases the anti-slip properties. An additional measure of safety against the Steiger slipping is provided by the milled groove provided on the top of the supporting plate. The grip moulds provided on the supporting plate make handling the plate easier.

- Basically, you also have to observe a changing slipping state with the use of the supporting plates due to e.g., weather conditions such as snow and ice in winter or humidity when raining and / or with foggy conditions. The anti-slipping properties may be reduced by this.
- The general specifications for permissible surface pressure must be observed. Permissible surface pressures changing due to e.g., weather conditions must be considered. The stress on the underground must be considerably less than the permissible surface pressure on the underground (☞ Chapter 5.3.2.4.1). With insufficiently permissible surface pressure, the supporting plates must be positioned underneath over a wide area using appropriate means (supporting plates and / or supporting planks).

  - Risk of tipping! -
- The supporting plates must not be damaged and free from ice, oil, grease and other lubricating substances.
- **Stacking** of several of the supporting plates specified above under the jack plate **is forbidden!**
- It must be ensured that the jack plate is clearly within the milled groove in all cases after the jacking process of the Steiger.
- The supporting plate must not be pressed into the ground on one side due exceeding the local permissible surface pressure of the underground. This could lead to the supporting plate tilting strongly so that the jack could slip or damage is caused to the jack.

  - Risk of tipping! -
- The **operating personnel** is still **responsible for the safe jacking of the Steiger.** The use of the supporting plates does not replace the duty of care of the operating personnel.
- If necessary, the Steiger must be secured against slipping using other appropriate measures.

10.4.1 Technical specifications (supporting plate 0.652.000.**109**)

Supporting plate	Item no.	0.652.000.109
	Type	Plastic plate with - Recess, - Handle and - Anti-slip, rubber-coated underside
	Identifier	109
	Material	TPE / HMW PE 500
	Shape	rectangularly, straight
	Dimensions	approx. 27.6 in x 33.5 in x 2.8 in (700 mm x 850 mm x 70 mm)
	Recess	approx. 22.4 in x 31.9 in x 0.4 in (570 mm x 810 mm x 10 mm)
	Weight	approx. 74 lbs (33,5 kg)
Reduction of the maximum surface pressure *[1] under the supporting plates at (horizontal installation, equal vehicle lift)		Front left: 84 psi (58 N/cm^2) Front right: 84 psi (58 N/cm^2) Rear left: 84 psi (58 N/cm^2) Rear right: 84 psi (58 N/cm^2)

* The specified surface pressures refer to the use of the supporting plates, item no. 0.652.000.109 in conjunction with the Ruthmann-Steiger T 243 AE, fabrication no. 34296 and are not generally applicable.

10.4.2 Handling

Position the supporting plates with the milled groove upwards and with its full surface on the underground. In doing so, the milled groove must be positioned in such a manner that the jack plate is located in the middle in the milled groove after the jacking process of the Steiger. The jack plate must be located within the milled groove in all cases. A possible sliding of the jack plate on the supporting plate during the jacking process must be considered.

10.4.3 Cleaning and care

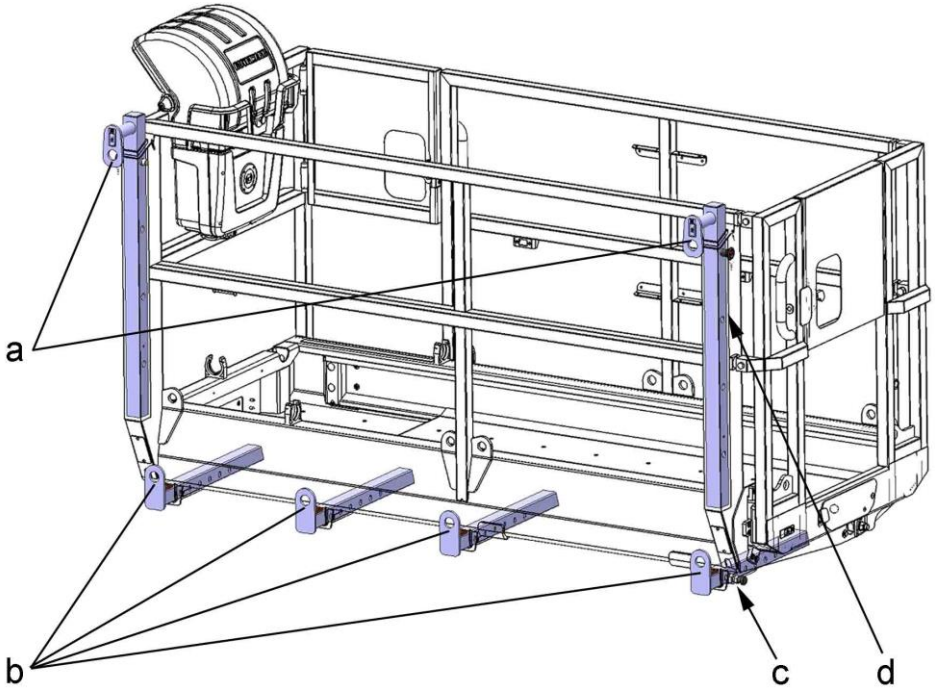
To clean the supporting plates, use only cleaning and care agent free of solvents. Replace damaged supporting plates.

10.5 Ruthmann Lift-Up System LUS 400

The Ruthmann Lift-Up System LUS 400 is intended for transporting loads outside the work platform to and from workplaces at which the platform personnel perform work with the loads from the work platform. It allows convenient installation of items such as

- Windows,
- Solar cells,
- Signs,
- Advertisements,
- Neon lights,
- etc.

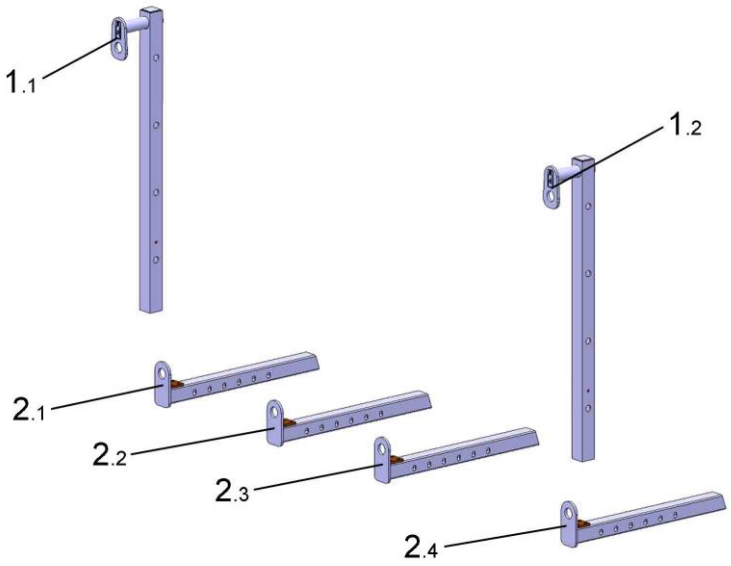
The Ruthmann Lift-Up System LUS 400 consist primarily of two load booms and four aluminium load lifting accessories with a handy weight of less than 6.6 lbs (3 kg) per component. The mounts for the load booms and load lifting accessories are integrated into the extruded aluminium channel construction of the work platform.



a) Two load booms.
b) Four load lifting accessories.
c) Four mounts are integrated into the platform floor construction for the load lifting accessories (b).
d) Two mounts for the load boom (a) are integrated into the posts for the guard rail.

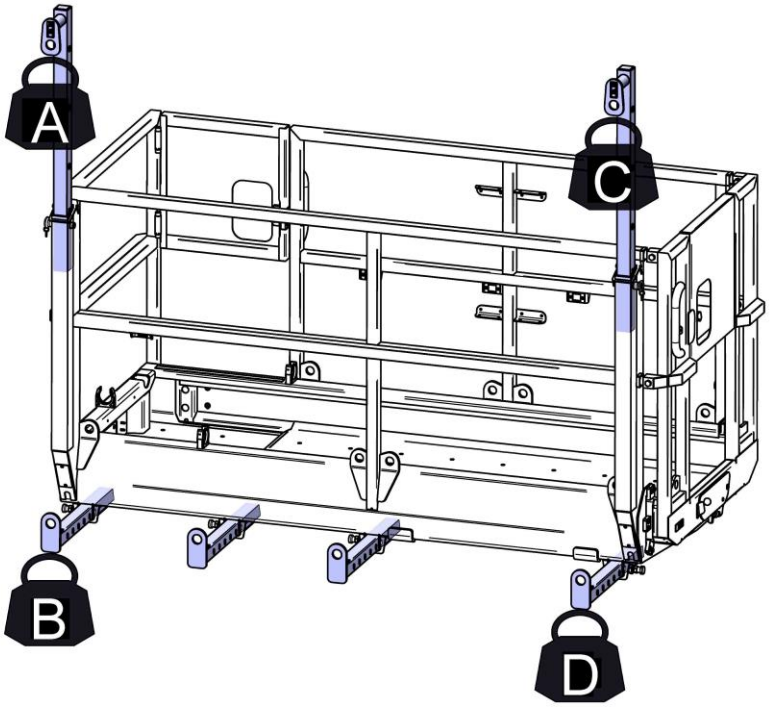
The two load booms (a) can be inserted into the left and right mounts (d) on the guard rail. The four load lifting accessories (b) can be inserted into the mounts (c) on the platform floor construction.

Slinging equipments for lashing the loads are not included in the scope of supply.



- 1.1 Telescopic aluminium load boom, 50 x 50 mm with anchor eye Ø 1,38 in (Ø 35 mm), load capacity max. 440 lbs (200 kg)
- 1.2 Telescopic aluminium load boom, 50 x 50 mm with anchor eye Ø 1,38 in (Ø 35 mm), load capacity max. 440 lbs (200 kg)
- 2.1 Telescopic aluminium load lifting accessory, 50 x 50 mm with anchor eye Ø 1,38 in (Ø 35 mm), load capacity max. 440 lbs (200 kg)
- 2.2 Telescopic aluminium load lifting accessory, 50 x 50 mm with anchor eye Ø 1,38 in (Ø 35 mm), load capacity max. 440 lbs (200 kg)
- 2.3 Telescopic aluminium load lifting accessory, 50 x 50 mm with anchor eye Ø 1,38 in (Ø 35 mm), load capacity max. 440 lbs (200 kg)
- 2.4 Telescopic aluminium load lifting accessory, 50 x 50 mm with anchor eye Ø 1,38 in (Ø 35 mm), load capacity max. 440 lbs (200 kg)

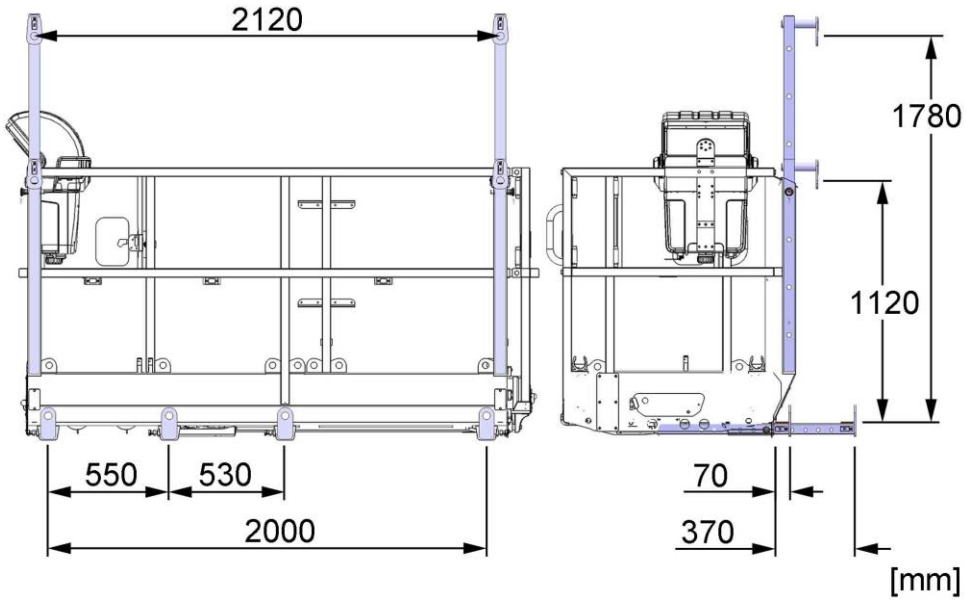
Selectively, either one load boom, one load lifting accessory or a combination of load boom and load lifting accessories can be used for attaching the load. It is necessary to fasten the load to the Lift-Up system with the appropriate slinging equipment so that the personnel can perform the work with the load from the work platform. **The total load must not exceed a maximum weight of 880 lbs (400 kg)! Attention: The maximum permitted total load of the load boom in combination with the outer load lifting accessory is 440 lbs (200 kg)!**



Load combinations and maximum total loads (examples):

a) Combination A + B = max. 440 lbs (200 kg)
b) Combination C + D = max. 440 lbs (200 kg)
c) Combination A + C = max. 880 lbs (400 kg) (with a load distribution of max. 440 lbs (200 kg) on a load boom.)
d) Combination of all load lifting accessories on the kick plate = max. 880 lbs (400 kg) (with a load distribution of max. 440 lbs (200 kg) on a single load lifting accessory.)
e) Combination of load boom and load lifting accessories = max. 880 lbs (400 kg) (in compliance with letters a) and b) as well as a load distribution of max. 440 lbs (200 kg) on a single load boom or load lifting accessory)

Loads attached outside the work platform are considered to be an additional load. **Always observe the permissible nominal load of the work platform!** Also see the type plate and key features of the Ruthmann Steiger T 243 AE and the work platform.
The front area of the load lifting accessories are coated with plastic to protect the load. They can be pulled out in six intervals of 2.4 in (60 mm) each for a distance of approx. 2.8 in (70 mm) to approx. 1 ft 2.6 in (370 mm) from the kick plate and locked in place using a stop bolt.
The clear height between the anchor eyes on the load boom and the anchor eyes on the load lifting accessory is approx. 3 ft 8 in (1120 mm) to 5 ft 10 in (1780 mm). It can be adjusted in three stages of 8.7 in (220 mm) each.



10.5.1 Safety instructions for using the Ruthmann Steiger T 243 AE with the Ruthmann Lift-Up System LUS 400

Mount the Ruthmann Lift-Up System LUS 400 for attaching loads only for the use concerned. After completing the work, the Lift-Up system must be removed again.
Next to the following information listed here, the safety instructions in Chapter 1.2 must be observed in particular.

The following list of items do not claim to be complete. They must be supplemented depending on the use.

- All conditions and procedures of use must be planned carefully before starting. E.g.:
  - ✓ Environmental and site conditions including space requirements.
  - ✓ Safety precautions and any necessary additional safeguards.
  - ✓ Setting up the Steiger (e.g., position of Steiger, position of load being carried, and clearance before, during, and after transport).
  - ✓ Assessment of the load and its characteristics (e.g., weight, centre of gravity, dimensions, wind-exposed area, shape, stability, etc.).
  - ✓ Selecting the appropriate slinging equipment (e.g., shackles, round slings, cable with eyelet, suspension gear, load traverse, etc.).
  - ✓ Fastening the load (precautions for ensuring that the load can be attached and removed safely).
  - ✓ Transporting the load outside on the work platform (e.g., series of boom movements with load carried outside of the work platform).

✓ Working (e.g., assembly or disassembly) with the load from the work platform.
✓ etc.

The applicable national guidelines for use must be observed. The use is in the field of responsibility of the operator or operating personnel. The risk assessment carried out by the operator for the measures resulting from the intended purpose must be considered in the corresponding operating instructions. The personnel must be instructed in the hazards accordingly as well as instructed in the use of the Steiger (ArbSchG, BetrSichV).

- The Lift-Up system serves for moving loads outside the work platform in keeping with the intended use of the Steiger as specified in Chapter 1.1.1.
- Use of the Steiger as a crane remains prohibited. This means exclusive use for moving loads by hoisting, lowering, or moving in one or more directions remains impermissible as the primary use of the Steiger (use as crane) even when the Lift-Up system is installed (☞ Chapter 1.1.2)!
- The use of lifting gear (e.g. pulleys) is prohibited, and attaching lifting gear (e.g. pulleys) to the anchor eyes is also prohibited.
- The Lift-Up system may only be used in combination with a standardised work platform that is suitable for this use. Ruthmann work platform, item no. 0.642.565.000 with type coding "HP . Alu . 600 - 20 . N . 0 . 01" for example.
- Only qualified personnel with additional training specific for performing appropriate operations are allowed to work with the Steiger and the Lift-Up system.
- When jacking the Steiger, take care that the operating personnel nor other persons are put at hazard by the Lift-Up system or by the load.
- The work of retrofitting or conversion should be carried out only by qualified persons appointed for this.
- These must only be carried out when the vehicle engine is stationary and the ignition is switched off. The work platform should be located e.g., on the side next to the Steiger-substructure for conversion work. Jack the Steiger correctly for this purpose.
- Transporting persons with the Lift-Up system is prohibited!
- Cable drag is prohibited!
- Exercising sport activities such as, e.g., bungee jumping, crate climbing, etc. is prohibited!
- Secure loads to the anchor eye(s) of the load boom and / or load lifting accessories of the Lift-Up system with appropriate slinging and fastening equipment in such a manner that no parts can fall down. The load must be positioned at the height of the guard rail on the work platform. It must

not sway or swing freely as a result of boom movements. The boom must not be allowed to swing.

- Accessories must be attached to the work platform in such a manner that an unintentional change of position is prevented.
- Never exceed the permissible carrying capacity of the Lift-Up system.
- Never exceed the permissible nominal load of the work platform.

- Risk of tipping! -

- The attachment of loads outside the transport configuration of the Steiger, e.g., when in the work position puts the stability of the Steiger at risk. The permissible load moment can be exceeded here as a result.

- Risk of tipping! -

- Lateral forces must not be higher that the permissible manual force of the work platform!
- The operating personnel must remove themselves and other persons from the hazard area.

- Remaining under raised loads is prohibited! -

- It is prohibited to pick-up any types of loads that will increase of the wind force on the Steiger.

- Risk of tipping! -

- The work platform operating personnel must not be obstructed by the load attached.
- While the Steiger is in operation, the platform personnel must wear a personal fall protection system on the work platform.
- The Lift-Up system must be removed or the load lifting accessories and the load boom of the Lift-Up system must be pushed in before the boom of the Steiger is moved to the transport configuration.
- The Lift-Up system must not be used at the same time as the Ruthmann Lifting Eye System LES 350 or parts of it.

10.5.2 Assembly / disassembly of the Lift-Up system

Before starting with the assembly / disassembly on the Steiger, it must be secured against being put back into operation unintentionally by unauthorised third parties.

We want to explicitly inform you that all prescribed assembly work must be carried out with great care.
Only original Ruthmann components or those approved by us should be used for assembly. When using other components, our liability and warranty become null and void.

10.5.2.1 Assembly tool

An assembly tool is not required for assembly / disassembly.

10.5.2.2 Scope of assembly

The scope of assembly of the Ruthmann Lift-Up System LUS 400 consists primarily of the following work, depending on the use of the Lift-Up system:

- Mounting load boom.
- Mounting load lifting accessories.

10.5.2.3 Conversion preparation

The conversion work must only be carried out with the work platform lowered to the side next to the chassis for safety reasons. For this purpose, the Steiger must be jacked correctly, e.g., in the vehicle profile.

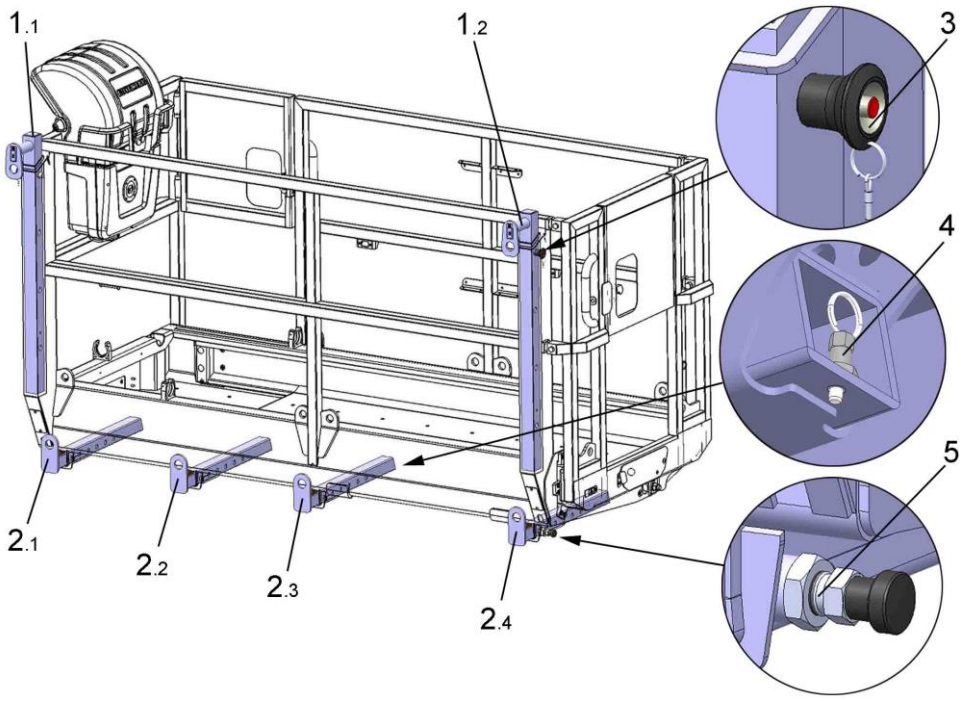
Then remove the load booms and load lifting accessories for the Lift-Up system from the locking storage box at the rear (special equipment).

10.5.2.4 Mounting the Ruthmann Lift-Up System LUS 400

⚠ WARNING

Risk of accident!
The load or parts of the Lift-Up system can fall down if not used correctly!

- **The extensions of load boom and load lifting accessory must be correctly locked with the socket pin and stop bolt.**
  - Perform a visual inspection! -
- **When loosening the socket pin, hold the load boom tight.**



- Remove the square upper plugs on the left and right guard rail posts on the work platform. Release the socket pins (3) by pressing the arresting button and pull out of the guard rail posts. Then insert the left and right load booms ($1._1$ and $1._2$) into the guard rail post from above. Do not allow load boom to drop in!
- Adjust the load booms ($1._1$ and $1._2$) to the desired height according to the punched holes. The operating personnel must make their own decision as to which height is required for attaching the load in order to pick it up safely. Secure the load booms ($1._1$ and $1._2$) in this position with the socket pins (3). Ensure that the socket pins (3) are inserted all the way and arrested, so that the arresting hooks arrest visibly and the arresting button protrudes again. **Perform a visual inspection!**

The maximum extension for the load boom is marked by a red marking hole in the aluminium channel. As soon as the marking hole is visible, the last arresting point is reached.

- Pull the knob on each of the stop bolts (5) on the mounts integrated into the platform floor construction and arrest (turn knob 90°).
- Then press in the stop bolts (4) at the ends of the load lifting accessories ($2._1$ to $2._4$) and simultaneously slide the load lifting accessories into the mounts. Slide the load lifting accessories into the mounts until the stop bolts (4) pop back out.

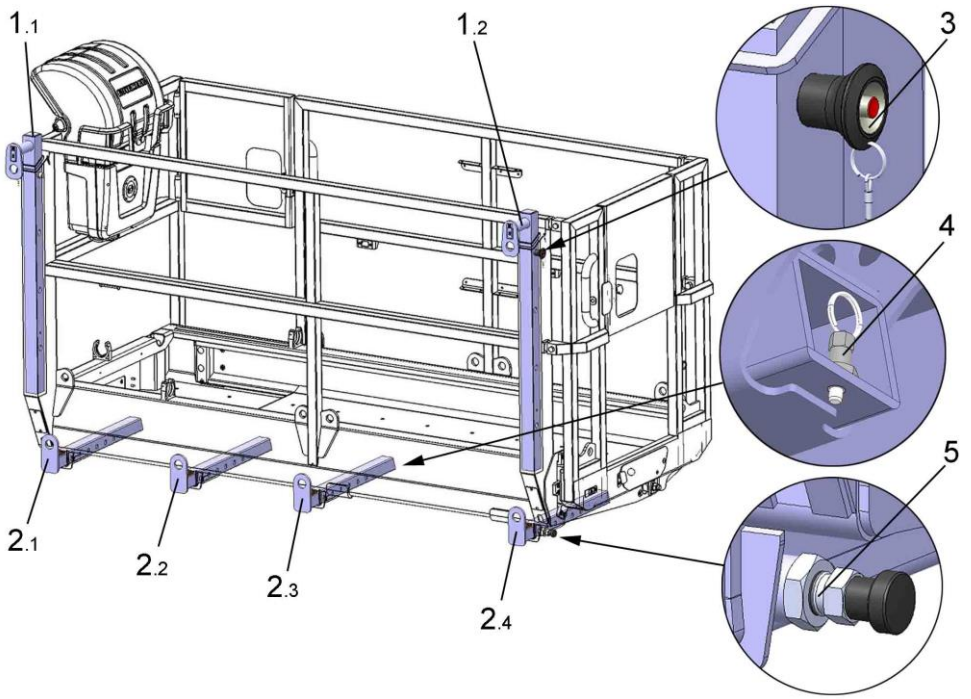
  It is necessary to continue to slide in the load lifting accessories ($2._1$ to $2._4$) at least to the next hole and arrest them with the stop bolts (5) (turn knob 90°). Check visually!

  The stop bolts (4) only prevent the load lifting accessories from being pulled out unintentionally.
- Adjust the load lifting accessories ($2._1$ to $2._4$) to the desired distance from the work platform guard rail according to the holes. The operating personnel must make their own decision as to which distance is required for attaching the load in order to pick it up in a safely. Lock the load lifting accessories ($2._1$ to $2._4$) in position using the stop bolts (5) so that they engage. **Perform a visual inspection!**

10.5.2.5 Disassembling the Ruthmann Lift-Up System LUS 400

⚠ WARNING **When loosening the socket pin, the load boom could fall onto the assembly personnel and cause injury!**

➢ **When loosening the socket pin, hold the load boom tight.**



- Remove the socket pins (3) on the left and right guard rail posts on the work platform and pull load booms ($1._1$ and $1._2$) upward and out. Then reinsert socket pins (3) in guard rail posts and reattach square plugs.
- Pull the knob on each of the stop bolts (5) on the mounts on the platform floor construction and arrest (turn knob 90°).
- Then pull on the rings on the stop bolts (4) at the ends of the load lifting accessories ($2._1$ to $2._4$) and simultaneously move the load lifting accessories in the mounts; then pull forward out of the mounts.

10.5.3 Details for Steiger-operation with Ruthmann Lift-Up System LUS 400

In addition to the handling-related warnings listed here, please also observe the safety instructions for using the Ruthmann Steiger T 243 AE with the Ruthmann Lift-Up System LUS 400.

⚠ DANGER

Risk of tipping! Disassembling and picking up loads with raised work platforms, e.g. in high work positions, compromises the stability of the Steiger. This can result in the permissible load moment being exceeded!

- ⦸ **Picking up a load of unknown weight is prohibited!**
- ⦸ **Picking up a load that increases the load moment in an impermissible way is prohibited!**
- ➢ **Weight of the load determined. Attention: Estimating the weight is not permitted!**
- ➢ **The working area must be selected beforehand so that the load can be picked up safely, i.e. with sufficient stability moment and strength reserve of the Steiger. For example, the work platform must first be moved from the ground into the corresponding position with an equivalent load, in order to determine the capacity use of the Steiger.**

⚠ WARNING

Danger of collision!
Raised loads can fall down and injure persons severely!

- ⦸ **Remaining under raised load is prohibited!**
- ➢ **The area must be closed off and marked accordingly.**
- ➢ **Do not pick up any load that can fall apart.**
- ➢ **Only disconnect the load being carried from the slinging equipment once it has been ensured there is no danger, e.g. when the load is properly installed or is otherwise secured from falling.**

NOTICE

There is a risk of collision! During boom movements, the Lift-Up system and the load may hit the boom.

- *The operating personnel must take care to ensure collision-free boom movements!*
- *Before the boom of the Steiger moves back to the transport configuration, the load lifting accessory and the load boom of the Lift-Up system must either be pushed back or disassembled. When loosening the socket pin, hold the load boom tight.*

Requirement:

- ✓ Commissioning the Ruthmann Steiger T 243 AE according to Chapter 5.
- ✓ The Ruthmann Lift-Up System LUS 400 is properly installed.

10.5.3.1 Supplementary technical specifications

The supplementary "Technical specifications" refer to the use of the Ruthmann Lift-Up System LUS 400 in conjunction with the rectangular Ruthmann work platform item no. 0.642.565.000 with type coding "HP . Alu . 600 - 20 . N . 0 . 01". The table below shows the maximum load capacities of the Ruthmann Lift-Up System LUS 400 in relation to the upper boom telescopic extension (telescoped **in** or telescoped **out**). The basis is the respective nominal load of the work platform, reduced by the dead weight of the Lift-Up system, as well as the assumption of one person on the work platform, so that a remaining additional load capacity of at least 88 lbs (40 kg) or more remains on the work platform.

I. Upper boom telescope telescoped **in** fully	
Nominal load "I" of the work platform (**without** LUS 400)	1,280 lbs (580 kg) (maximum)
Weight of LUS 400	approx. 27 lbs (12 kg)
Permissible total load "I" *1 (work platform and LUS 400)	1,253 lbs (568 kg) = 1,280 lbs - 27 lbs (LUS 400)
Carrying capacity / load capacity "I" LUS 400 *2	880 lbs (400 kg) (maximum)

Load capacity "I" work platform *3 (remaining load of the work platform with a load of 880 lbs (400 kg) on the LUS 400)	373 lbs (168 kg) = 1,253 lbs - 880 lbs (load, LUS 400)
Remaining additional load "I" work platform (remaining additional load of the work platform with **one** person in the work platform and a load of 880 lbs (400 kg) on the LUS 400)	197 lbs (88 kg) = 373 lbs - 176 lbs (one person)
II. Upper boom telescope telescoped **out** fully	
Nominal load "II" of the work platform (**without** LUS 400)	660 lbs (300 kg) (maximum)
Weight of LUS 400	approx. 27 lbs (12 kg)
Permissible total load "II" *1 (work platform and LUS 400)	633 lbs (288 kg) = 660 lbs - 27 lbs (LUS 400)
Load capacity "II" LUS 400 *2	**369 lbs** (168 kg) (maximum)
Load capacity "II" work platform *3 (remaining load of the work platform with a load of 369 lbs (168 kg) on the LUS 400)	264 lbs (120 kg) = 633 lbs - 369 lbs (load, LUS 400)
Remaining additional load "II" work platform (remaining additional load of the work platform with **one** person in the work platform and a load of 369 lbs (168 kg) on the LUS 400)	**88 lbs** (40 kg) = 264 lbs - 176 lbs (one person)
Projected wind-exposed areas	
Wind-exposed area on the work platform (work platform **without** LUS 400)	approx. 32.3 ft^2 (3.0 m^2) (telescoped in) approx. 51.7 ft^2 (4.8 m^2) (telescoped out)
Total wind-exposed area *4 (work platform and load carried on LUS 400)	max. 51.7 ft^2 (4.8 m^2) (in relation to a shape factor corresponding to a surface exposed to wind for box-shaped cross-sections)

*1 The permissible total load comprises the loads of persons and additional load acting vertically in the work platform and the total load on the Lift-Up system acting vertically.

*2 If more than one person is in the work platform, the load capacity of the Lift-Up system reduces per person by min. 176 lbs (80 kg). If removable special equipment and / or more remaining additional loads (tools and material) are in the work platform, the load capacity of the Lift-Up system also reduces accordingly.

*3 The load capacity of the work platform comprises the remaining loads of persons and additional load acting vertically in the work platform.

*4 The total permitted wind-exposed area is composed of the wind-exposed areas on the work platform and on the load on the Lift-Up system. Any overlapping wind-exposed areas on the load and work platform should only be taken into account once. This results in a wind-exposed area of approx. 19.4 ft^2 (1.8 m^2), which can be applied at large above the hand rail, below the kick plate and/or on the sides of the retracted work platform. Aerodynamic influences such as turbulence and increases in dynamic pressure due to the structural form of the load, e.g. due to inward-facing wind-exposed areas (concave arrangement), were not taken into account for this approach.

10.5.3.2 Fasten load

⚠ DANGER

Risk of tipping!

Danger due to swaying load. The released forces and/or oscillating forces caused by a swinging load increase the tipping moment on the Steiger. The Steiger may tip over! As a result of oscillations, the load can cause serious injury to people or it can damage other objects!

- ⦸ **Attaching a load to the lower load lifting accessory, so that the load hangs under the work platform and is no longer in the safe handling area of platform personnel is prohibited!**
- ➢ **If possible, place the load on the load lifting accessory and secure it properly.**
- ➢ **In addition, fasten the load to the load boom. Attach the load vertically to the eyes of the load boom. Lateral forces due to lashing the load must be avoided.**
- ➢ **Shorten the hanging slinging equipment as much as possible.**

Bulky loads can increase the wind force to prohibited levels. The Steiger may tip over!

- ⦸ **In the event of wind, don't fasten bulky loads to the outside of the work platform!**

We would like to explicitly inform you that the attachment and fastening work must be carried out with great care.
Only suitable, permitted, tested, and appropriately labelled attachment and fastening equipment may be used to attach and fasten the load.

Please observe the Operator's Manual of the slinging equipment manufacturer! Please observe any applicable national guidelines for attaching and fastening loads.

Requirement:

- ✓ The weight and centre of gravity of the load are determined and allow safe use. Attention: Estimating the weight and centre of gravity is not permitted! The load can only be picked up in the correct position once its weight and centre of gravity have been determined correctly.
- ✓ The wind speed is defined and the total wind-exposed area of the load including the work platform is determined and they allow safe use.
- ✓ The material and structural design of the load can absorb the holding forces of the slinging equipment without deformation.
- ✓ Appropriate fastening type (direct, tied, hanging) for holding/securing the load is determined. The incorrect fastening type can cause the load to break.
- ✓ For the fastening type, appropriate attachment and fastening equipment is available, e.g.
  - Shackles, to connect slinging equipment to anchor eye,
  - Round slings, cable with eyelet, suspension gear, lifting straps,
  - load traverse,
  - etc.

  Lashing equipment must not be used as slinging equipment.

Possible procedure:

- Jack the Ruthmann Steiger T 243 AE correctly using the stabilizing jack basis required for the application.
- Lower the work platform with the attached Lift-Up system, for example, from the side next to the Steiger-substructure to the ground.
- Fasten load. Please observe the load combinations and maximum total loads!

⚠ WARNING **Danger from crushing!**

- **When tensioning the slinging equipment, keep body parts away from the slinging equipment.**
- **Do not reach under the ties!**

A high load before disassembly and picking up using the Lift-Up system, e.g. Secure temporarily to the object itself to prevent falling, until it is securely fastened to the Lift-Up system. The e.g. securing of the load to the object must be done in such a way that no dangerous forces can be triggered, e.g. by the subsequent tensioning of the slinging equipment. Connect the load to the anchor eyes so that it cannot slip or slide off. It must not be possible for parts to fall off of it. When using the “hanging” fastening type, the load must also be secured against shifting. Otherwise, the load can slip through the ties below. With the “tied” type, make sure that the load is not restricted by the ties. If necessary, support brackets can be attached to the load, to which the attachment and fastening equipment can be secured directly. Prevent any danger to the personnel and any potential damage to the work platform, Lift-Up system and load. After securing the load and before moving the boom with the load being carried outside the work platform, exit the hazard area below.

a) Carrying loads with the load boom and the four load lifting accessories

- Put the load on the plastic supports of the load lifting accessories.
- Then, using the appropriate attachment and fastening equipment, secure the load to the anchor eyes of the load boom and the load lifting accessories according to the Operator’s Manual of the slinging equipment. Lateral forces on the load boom and load lifting accessories caused by fastening must be avoided. - **Perform a visual inspection!** -
- Test lifting of the work platform (at least “cm”) by moving the boom of the Steiger in fine control mode.

b) Carrying loads with both or one load boom

- Position the load under the anchor eyes of the Lift-Up system so that the load can be picked up perpendicular to the anchor eye. The position of the anchor eye might need to be adjusted by moving the Steiger boom in fine control mode.
  In order to minimise the swaying of the load, the distance between the anchor point of the load to be attached and the anchor eye of the load boom must be short. The load must be positioned at the height of the guard rail on the work platform.
- Using suitable slinging equipment, connect the load to the anchor eyes of the load boom according to the Operator’s Manual of the

slinging equipment. In the case of multi-strand slinging equipment, the permitted inclination of the slinging equipment must be observed. - **Perform a visual inspection!** -

– Carefully tension the slinging equipment tightly, for example, by moving the Steiger boom in fine control mode. When tensioning the slinging equipment, make sure that
  - ✓ the load does not get caught or stuck on the ground or object,
  - ✓ according to the structural design of the load, the slinging equipment holds the load proportionally or evenly (no slack rope) without exceeding the permissible loads of the load boom,
  - ✓ the load is hanging correctly on the Lift-Up system, without exerting lateral forces on the anchor eyes, and is horizontal,
  - ✓ especially with high loads, the slinging equipment is pretensioned perpendicular to the load, so that during subsequent boom movements, the load cannot fall into the slinging equipment (anchor ropes).

  - **Perform a visual inspection!** -
– Test lifting of the work platform (at least “cm”) by moving the boom of the Steiger in fine control mode.

A load that tilts, shifts, sways or hangs at an angle, etc. in an impermissible way when the slinging equipment is tensioned or during the test lift of the boom must be secured again. In case of doubt, do **not** carry out any boom movements with the load to be carried outside the work platform.

10.5.3.3 Boom movements with the load carried outside the work platform

⚠ DANGER

Risk of tipping!

Danger posed by load swaying as a result of boom movements and/or gusts of wind. The released forces and/or oscillating forces caused by a swinging load increase the tipping moment on the Steiger. The Steiger may tip over!

- ⦸ **Do not violently raise loads being carried on the outside of the work platform.**
- ➢ **Each time the Steiger boom is moved, the operating personnel must make sure that the load being carried on the outside of the work platform**

does not start to swing dangerously. Carefully deflect the Steiger joystick.

Bulky loads can increase the wind force on the Steiger to prohibited levels. The Steiger may tip over!

⦸ In the event of wind, do not transport bulky loads!

Risk of falling!

- **In the work platform, wear a personal fall protection system.**

⚠ WARNING

Danger of collision!
As a result of oscillations caused by the Steiger boom movements, the load can cause serious injury to people or it can damage other objects!

- **Each time the Steiger movements, the operating personnel must make sure that the load being carried on the outside of the work platform does not start to swing dangerously. Carefully deflect the Steiger joystick.**

Requirement:

- ✓ The load is properly secured to the Lift-Up system.
- ✓ The load to be carried is not caught on the ground or secured to the object.
- ✓ The total load of the work platform and Lift-Up system allows the boom movements.

From the work platform, the operating personnel move loads attached to the outside of the platform into the required position, at which the personnel perform work with the loads from the work platform (e.g., installing the loads). The Steiger is operated according to Chapter 6.5 “Steiger-operation”.

10.5.4 Maintenance of the Ruthmann Lift-Up System LUS 400

The safety instructions in Chapter 1.2.8 and Chapter 9 must be observed.

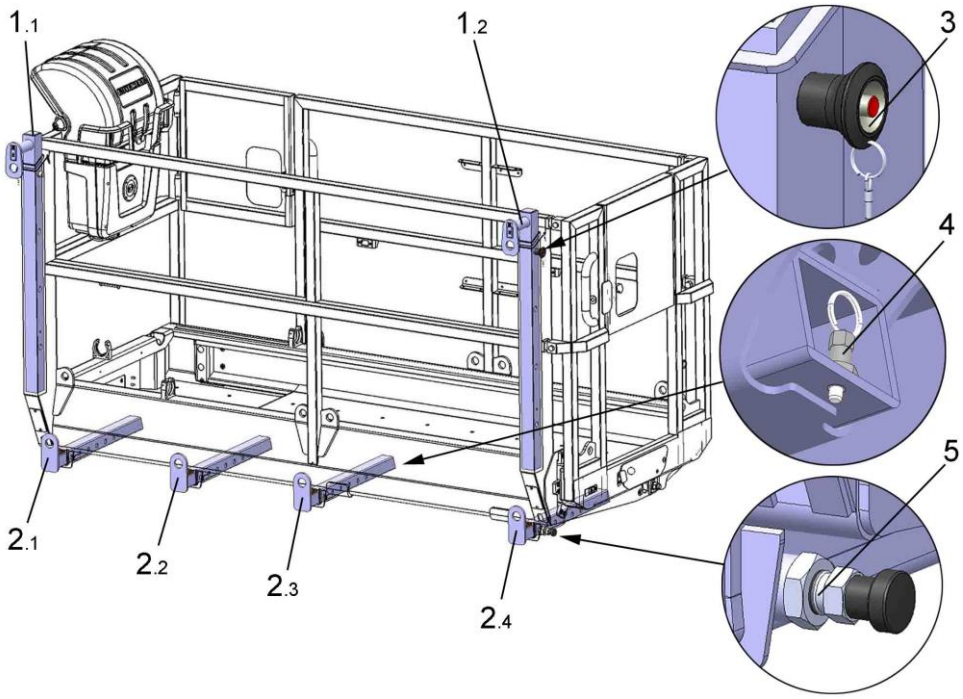
Inspection list

Components	Work to be carried out	Remarks, other intervals
Lift-Up system LUS 400 complete	Cleaning	where required
	Inspect visually for damage (cracks, deformation or corrosion)	
	Check signs for completeness and legibility	
	Check detachable connections	
	Check securing elements for damage and completeness	
Load boom	Check anchor eyes for damage (cracks, deformation or corrosion)	
	Check the extensions for ease of movement and locking of the socket pins	
Load lifting accessories	Check anchor eyes for damage (cracks, deformation or corrosion)	
	Check the extensions for ease of movement and stop bolts	
	Check the plastic coating of the load lifting accessories for damage	

Professional care and regular cleaning serve the value retention of the Ruthmann Lift-Up System LUS 400. Clean the aluminium parts with warm water and neutral cleaning agent added. For cleaning, use a clean cloth or a sponge.

The Ruthmann Lift-Up System LUS 400 must be inspected at intervals of maximum one year by a qualified person after initial commissioning (inspection by a technical expert). For carrying out the checks by the qualified person, apart from the technical expert, even e.g. customer service technicians of **RUTHMANN Service**, production engineers and foremen may also be involved.

The Ruthmann Lift-Up System LUS 400 is virtually maintenance free.



Check the anchor eyes, the load booms ($1._1$, $1._2$) and the load lifting accessories ($2._1$ - $2._4$) for damage. Replace damaged parts such as plastic coatings on the load lifting accessories, socket pins (3) and stop bolts (4, 5). Further use of damaged components is not permitted! Replace missing or damaged signs immediately.

10.6 Hydraulic tool connection in the work platform

⚠ WARNING

Leaking from hydraulic fluids under pressure! The hydraulic connections are under pressure when connected to hydraulic tools.

- **Only connect or disconnect the quick-coupling when the Steiger is not in operation.**

Risk of tripping!
The operating personnel may trip over the hydraulic hoses.

- **All hydraulic hoses must be routed so that the standing area in the work platform remains free of tripping hazards.**

The Ruthmann Steiger T 243 AE is equipped with hydraulic quick couplings in the work platform for the connection of hydraulic tools.

Connecting data:

- Pressure line (P): - 12-L coupling sleeve M 18x1.5
  flat seal FH10-1
  - max. operating pressure 2,030 psi (140 bar)
  (maximum pressure 3,045 psi (210 bar))
  - max. volume flow 10 l/min
  - dust protection cap

- Tank line (T): - 12-L coupling connector M 18x1.5
  flat seal FH10-2
  - dust protection cap

The hydraulic and electrical connection of the lines, the commissioning and operation of the hydraulic tools is carried out according to the Operator's Manual of the hydraulic tool manufacturer.

When operating of the Steiger with a hydraulic tool, the following must be observed:

- The hydraulic tool must be connected correctly.
- The hydraulic tool operation is always switched off after switching on the Steiger-operation, thus, when "Booting" the computer control.

- The hydraulic tool is operated using pump 2 of the hydraulic pump drive (power take-off). First start the vehicle engine. And then switch on the hydraulic tool.
- Steiger-operation in **not** possible when operating the hydraulic tool.
- If the vehicle engine does not run, thus has been switched off, the hydraulic tool operation is also switched off.

10.6.1 Connecting or disconnecting hydraulic tools

⚠ WARNING

Leaking from hydraulic fluids under pressure! The hydraulic connections are under pressure when connected to hydraulic tools.

➢ **Only connect or disconnect the quick-coupling when the Steiger is not in operation.**

Risk of tripping!
The operating personnel may trip over the hydraulic hoses.

➢ **All hydraulic hoses must be routed so that the standing area in the work platform remains free of tripping hazards.**

NOTICE

Dirt, dirt particles and other contaminants lead to damage to the hydraulic system! Dirt particles or other contaminants must be prevented from reaching into the hydraulic system under any circumstances.

➢ *Remove any plastic dust protection caps shortly before connecting the quick-couplings.*
➢ *Reattach the plastic dust protection caps onto the coupling pieces immediately after disconnecting the quick-coupling.*
➢ *Where applicable, clean the quick-coupling before connecting. Use soft lint-free cloths, sponges or similar for cleaning.*

Do not swap hydraulic connections.

➢ *Perform a visual inspection.*

Requirement:

✓ The hydraulic pump drive is switched off.
✓ The vehicle engine is not running.

- **Connecting the hydraulic tool:**
  - ✓ Remove the plastic dust protection caps from the quick-couplings of the hydraulic connections.
  - ✓ Remove the plastic dust protection caps from the quick-couplings of the hydraulic connections for the hydraulic tool.
  - ✓ Connect the coupling sleeve of the hydraulic tool to the coupling connector of tank line (T) so that it engages. **Perform a visual inspection!**
  - ✓ Connect the coupling connector of the hydraulic tool to the coupling sleeve of pressure line (P) so that it engages. **Perform a visual inspection!**

- **Disconnecting the hydraulic tool:**
  - ✓ Pull off the coupling connector from the hydraulic tool for the coupling sleeve of pressure line (P).
  - ✓ Pull off the coupling sleeve from the hydraulic tool for the coupling connector of tank line (T).
  - ✓ Put the plastic dust protection caps onto the quick-couplings of hydraulic connections (P and T connection).
  - ✓ Remove the plastic dust protection caps from the quick-couplings of the hydraulic connections for the hydraulic tool.

10.6.2 Switch the hydraulic tool operation on or off

NOTICE

The hydraulic system may overheat due to a decrease in performance!

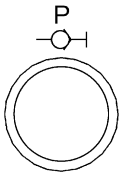
➢ *The operating personnel have to make their own checks that the hydraulic system does not heat during hydraulic tool operation.*

Requirement:

- ✓ Start the vehicle engine,
- ✓ Hydraulic pump drive is switched on, thus, operation is switched on and the computer control has "Booted".
- ✓ Hydraulic tool connected.
- ✓ The hydraulic tool operation can only be switched on if no Steiger movement is being carried out.

Depending on the pre-selection of the control position, the hydraulic tool operation is either switched on or off using the control panel on the work platform or the switch box on the Steiger-substructure.

- Illuminated push button HYDRAULIC TOOL on the work platform control panel or Steiger-substructure switch box.



Operation	Position / display	Execution on the control panel or switch box
Hydraulic tools	on	Press the HYDRAULIC TOOL illuminated push button.

or

Hydraulic tools	off	Press the HYDRAULIC TOOL illuminated push button.

The operation of the hydraulic tools is carried out according to the Operator's Manual of the hydraulic tool manufacturer.

10.6.3 Maintenance of the hydraulic tools

The safety instructions in Chapter 1.2.8 and Chapter 9 must be observed.

Inspection list		
Components	**Work to be carried out**	**Remarks, other intervals**
Quick coupling	Cleaning	where required
	Visual inspection	
Return filter	Cleaning	where required
	Visual inspection	

- If necessary, clean quick-couplings and plastic dust caps from outside. Never use a high-pressure cleaner and chemical cleaning agents.

NOTICE

Steam cleaners or high-pressure cleaners may damage the seals or components! Water may, where applicable, penetrate and impair the function of the hydraulic system.

⦸ *Never use a steam cleaner or high-pressure cleaner!*

Never use aggressive chemical cleaning agents!
➢ *For cleaning, use a soft lint-free cloth, sponge or similar.*

- Check tightness. When coupling or decoupling, no oil loss may occur.
- The sealing plunger of the coupling connector must close sealing flat in the coupled state.
- The plastic duct caps must be fitted, clean and not damaged.

11 Annex

11.1 Work area

- Working areas of the
  Ruthmann Steiger T 243 AE with DRS, fabrication no. 34296

11.2 Safety data sheets for lubricants used ex-factory

List of safety data sheets		
Product identifier / trade name	Manufacturer / supplier	Mat. no. [1]
Aral Aralub HLP 2	BP Europa SE	911160
Spheerol LZ	BP Europa SE	911161 / 911171
CEPLATTYN BL	FUCHS Lubritech	911410
DRAKO-SOL	PFEIFER DRAKO	790100
STRUCTOVIS BHD Spray	KLÜBER Lubrication	911412
Transmax Manual EP 80W-90	BP Europa SE	911163
Aral Getriebeöl ATF 22	ARAL	911174
RENOLIN LF 15 HV	FUCHS Schmierstoffe	911106

[1] Ruthmann material no.

The safety data sheets enclosed are not subject to our revision services.