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FABRIZIO PLESSI'S *LIQUID TIME II* AT THE ZKM | CENTER FOR ART AND MEDIA. PART I: PRESERVATION AND PRESENTATION OF A LARGE-SCALE KINETIC VIDEO SCULPTURE

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ABSTRACT

This text presents a choice of aspects of an extensive case study, which the ZKM | Center for Art and Media Karlsruhe, Germany, contributed to the international research project Inside Installations: Presentation and Preservation of Installation Art.[1] The research on Fabrizio Plessi's (b. 1940) video sculpture *Liquid Time II* (1993) was conducted by the Museum and Exhibition Technical Services department with assistance from external experts between 2004 and 2007 (fig. 1).[2] Part one of this two-part text focuses on the main conservation and maintenance issues, with special regard to the electronic equipment encountered during a two-year presentation of the artwork. Due to the kinetics of the artwork, parts of the electronic equipment are exposed to permanent mechanical stress and become unreliable for long-term operation. The error-proneness of the system caused frequent need for repair and maintenance of the components and ultimately led to a re-conception and replacement of important parts of the equipment.

INTRODUCTION

The ZKM is a state-run foundation that, for more than twenty years has been dedicated to research on and dissemination of media art and media technology. In addition to two museums and an extensive public media library, the ZKM houses research institutes in the areas of visual media, music and acoustics, film, and media technology as well as a laboratory for antique video systems. Since its founding, the ZKM has used its infrastructure and know-how to implement or support numerous artistic productions at the intersection of art and scientific research. Since the

Fig. 1. Fabrizio Plessi, *Liquid Time II*, 1993, kinetic video sculpture, installation view at the ZKM | Media Museum, Karlsruhe 2004–2006. Courtesy of Franz Wamhof.

mid-1980s, it has been building an important collection of international contemporary art, with the objective of documenting current movements in video and computer-based art and relating them to other art categories.

One of the major works in the ZKM collection is the monumental video sculpture *Liquid Time II* from 1993 by the Italian artist Fabrizio Plessi. Since the 1970s Plessi has pursued a concept he calls "*tempo liquido*," or "liquid time." The artwork *Liquid Time II* ultimately derives from a first version entitled *Liquid Time I*, which was originally shown in 1989 at the Centro per l'arte contemporanea Luigi Pecci in Prato, Italy. In this first version, a wheel was placed between two high steel walls and visitors could cross a channel of water by means of a small bridge. All the parts were painted in grey. *Liquid Time II* was realized as a freestanding sculpture in 1993 for the IFA Berlin, a major trade fair for consumer electronics in Germany. Following two other presentations in 1993 and 1997, it was reinstalled at the ZKM | Media Museum in Karlsruhe in 2004.

Liquid Time II consists of an upright iron wheel nearly six meters tall, which rotates above a steel tank eighteen meters long through which water runs. The set is that of a rusty mill wheel, however, where one would expect to find the scoops, in their place are twenty-one television sets showing all the same video loop of cascading water. The heavy steel structure consists of more than a hundred elements, as well as a few hundred metric screws. Five main elements form the central water tank. One end is surrounded by a base, which is eight meters long and four meters wide and supports the upright mill wheel, which is in turn composed of seven segments (figs. 2,

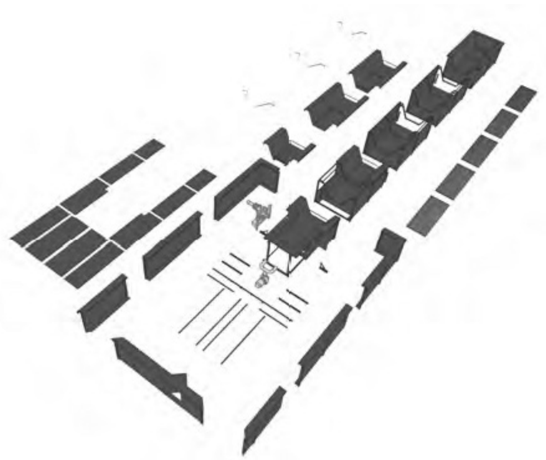

Fig. 2. Scheme of the main steel elements of the base and the water tank. Courtesy of Volker Möllenhoff.

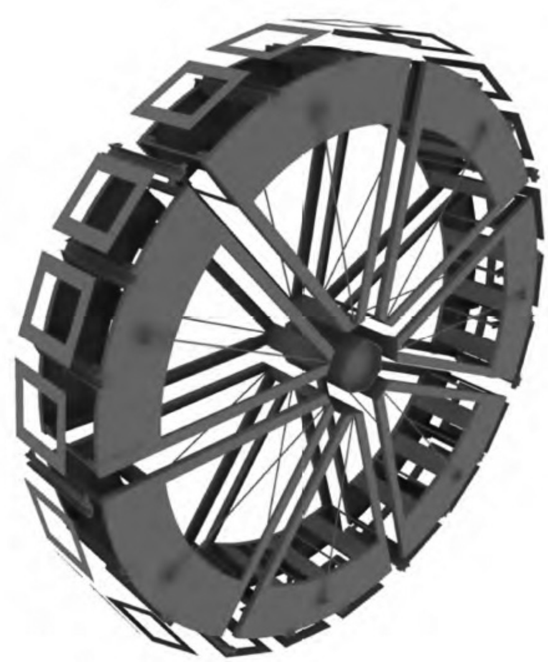

Fig. 3. Scheme of the main steel elements of the wheel. Courtesy of Volker Möllenhoff.

Fig. 4. Element number 1 of the water tank in its original state in 1993. Courtesy of Jochen Saueracker.

Fig. 5. Modifications in 1997. Installation of a foil tank (in blue) in the substructure to ensure against leaks. Couresty of ZKM.

3). All the visible steel parts are artificially rusted and feature a matte and delicate surface. A strong electric engine with a gearbox drives the turning mill wheel by a chain at a speed of one and a half revolutions per minute. The steel tank contains 3,500 liters of water, which is moved through an open gutter by means of an electric water pump.

In preparing the work for assembly in 2004, it became obvious that the documentation on it was very limited. Hence it was decided that the occasion of assembling the artwork should be used as an opportunity to produce the first comprehensive documentation of the work. Initially, some of the most important sources of information were the individuals who had helped assemble it previously. Jochen Saueracker (b. 1957), an artist and former assistant to Nam June Paik (1932–2006), had been responsible for presentations of *Liquid Time II* in the 1990s. He was brought on to head our construction team. When planning the approximately ten-member team, a decision was made to include one additional conservator, Fenna Yola Tykwer, who would focus exclusively on collecting all the data possible. The purpose of the documentation was to provide a detailed written and visual description, including measurements, of all the components and their functions. In addition to a detailed photographic documentation of all the parts and their assembly, the entire three-week-long installation process was recorded on video from several perspectives. When the installation was complete, all of the components were recorded at scale using the software Autodesk 3ds Max. This program enables the user to create a vector-based 3D visualization of the work or selected parts thereof. The extensive video material was evaluated and edited. With all this data collected, the first installation manual for the work was produced.

GENERAL CONSERVATION PROBLEMS

"PLEASE DON'T TOUCH"—MORE THAN A HUNDRED SQUARE METERS OF SENSITIVE RUST SURFACES

All visible surfaces of the steel construction had been deliberately corroded with an acid solution when the work was originally produced, resulting in a sensitive, predominantly matte, rust surface whose coloration varies between bright rust red and brownish black. The consistency of the rust surfaces ranges from stable and compact to finely powdered, and encrusted areas with small, loose lamellae. The surface is, in general, very sensitive to being touched. The visitors are not permitted to touch the object in the exhibition and the delicate surface causes difficulties above all when the sculpture is being assembled or disassembled and during maintenance.

3,500 LITERS OF WATER ON WOOD PARQUET FLOORS

A system filled with three and a half cubic meters of water can only be operated in a museum if particular safety precautions are met. In 1997, extensive modifications were undertaken to isolate the water circulation. Since then, a double-walled foil tank catches the water in the interior of the channel (figs. 4, 5). Despite this modification, there remain potential weak points in the water circulation system, notably the gaskets of the pipes and for the pump as well as the places where the intake pipe is led through the foil tank. During the installation in 2004, two electronic water sensors were placed in the substructure to identify immediately any water escaping. When they come in contact with water, these sensors give off an acoustic alarm and a signal is sent directly to the museum's security center to ensure constant monitoring.

WATER QUALITY—MINERAL SALT CONTENT AND BIOLOGICAL GROWTH

While on display, there is a constant loss of water from evaporation such that water must be replenished at regular intervals to maintain the necessary water level at the intake socket of the pump. Evaporation also causes the mineral salts contained in water—primarily calcium carbonate—to accumulate. These salts collect in the water channel as a mineral layer (fig. 6). The drinking water in Karlsruhe has a high concentration of calcium ions. In order to minimize the salt content of the water from the outset, since 2004 partially de-mineralized water has been used; it is processed at the ZKM in larger quantities for use in the air conditioning system and kitchen operations.

A further problem is the contamination of the water and subsequent germ formation. The running water takes in dust from the air, and this dust becomes a breeding ground for germs. Six weeks after putting the work into operation, a biological report of the water quality was ordered and the presence of germs was clearly established. (It was possible, however, to eliminate any health risk to museum visitors.) Various options for keeping the water clean were evaluated, and two possibilities emerged: (1) Replacing the water regularly or (2) Controlling biological growth with biocide water additives. In the end, the idea of biocide water additives was rejected, since it could not be ruled out that they would interact with the object and increase corrosion. It was decided to replace the water completely and to clean the channel at regular intervals of six weeks.

STEEL + WATER = CORROSION

In terms of corrosion development, the channel area beneath the wheel was a particularly problematic zone

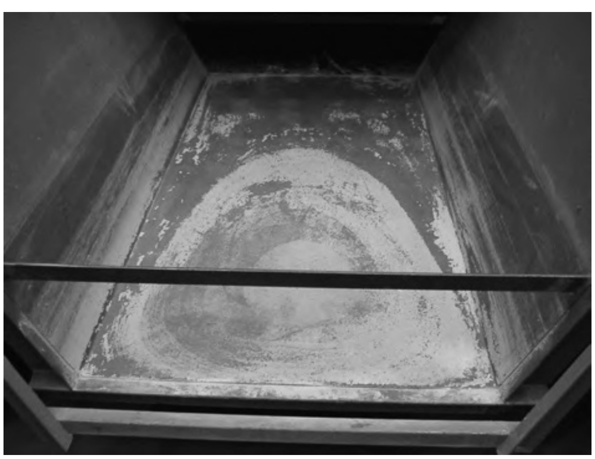

Fig. 6. Mineral deposits cover the upper water channel. Courtesy of ZKM.

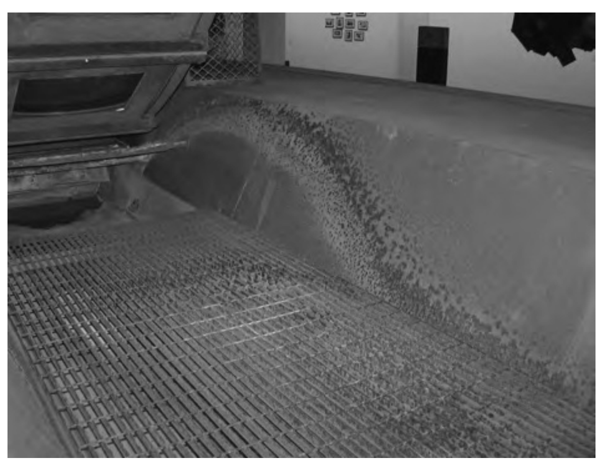

Fig. 7. Progressing corrosion in splash water area beneath the wheel. Courtesy of ZKM.

(fig. 7). Here, the water bubbles into the channel and splashing water regularly wets the unprotected tank panels. When the pump is switched off, these areas dry out again. This alternation of wet and dry led—over the long exhibition period—to a considerable progressing of corrosion in this area. In order to identify approaches for addressing the corrosion, both external specialists and metal conservators were consulted.

ELECTRONIC MEDIA CONSERVATION PROBLEMS

One particular source of problems was the rotation of the wheel. All the components continuously rotate three hundred and sixty degrees and are subject to constantly changing mechanical stresses. Soon after the work went into operation, these stresses resulted in a series of malfunctions and damage, in particular with the electronic equipment.

Liquid Time II can be described as a single-channel video sculpture. The video equipment includes a laser disc player situated in the base. In order to transmit electricity and the video signal from the static substructure to the rotating wheel, a slip ring unit was installed on the wheel's axle. Two video distributors and amplifiers and twenty-one cathode ray tube television sets are mounted in the mill wheel (fig. 8). The various components inside the wheel are connected to one another by a number of cables and plugs. All in all, there are nearly a hundred plug connections for the power supply and video transmission. In 1997, some of the equipment was replaced, following a number of malfunctions, beginning as early as 1993, which occurred during relatively short periods of operation. Each of the two presentations in 1993 lasted only about ten days.

ERROR SYMPTOMS

Since the sculpture was installed in 2004, the following externally visible symptoms of malfunctions could be observed:

1. Brief flickering or short-term interruptions of the video image. Flickering could occur with individual

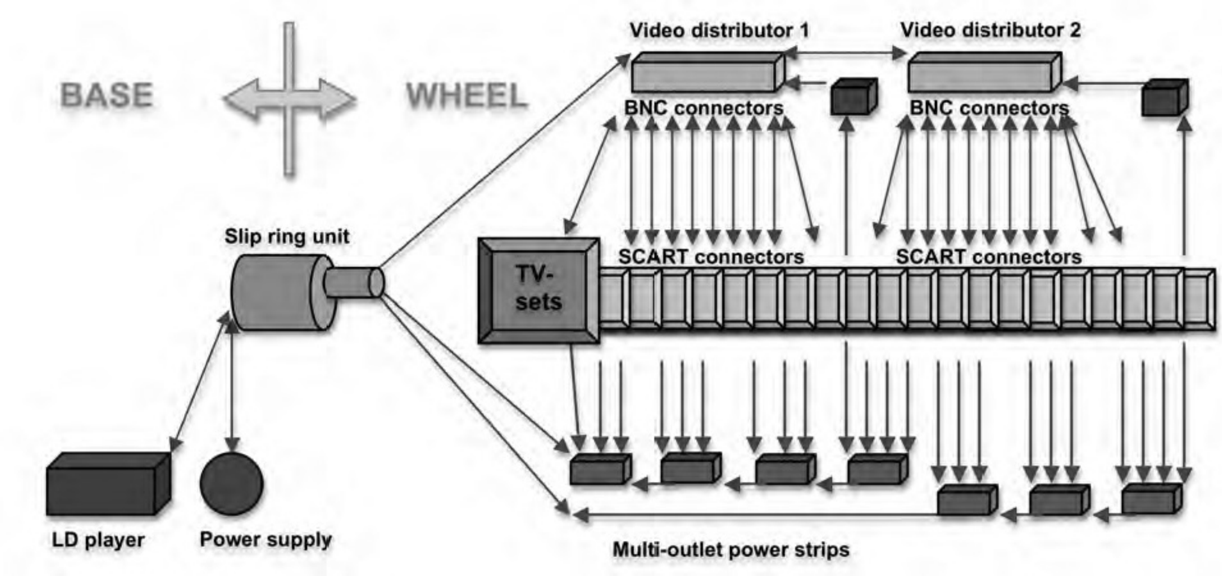

Fig. 8. Scheme of the power supply system (in red) and the video equipment (in blue) of *Liquid Time II*. Courtesy the author.

Fig. 9a-d. Sequence of stills from a video showing the running wheel with error symptoms like flickering of three television sets (9b) or all television sets at the same time (9d). Courtesy of ZKM.

television sets, with groups of television sets, or with all the television sets at the same time (figs. 9a–9d).

2. Long-term loss of image on the picture tubes (complete blackout)

ERROR SOURCES

1. Loose Contacts. The original implementation of the SCART plugs to the monitors was limited to the two or three pins required. As a consequence, the mechanical seating in the monitor socket was inadequate and quickly became loose. Also, some of the BNC connectors at the video distributors repeatedly became loose. Due to poor connections, many of the power contacts developed burn marks, such that the plugs and sockets had to be replaced.
2. Fatigue fractures of soldering points. Both the soldering points of the plugs and the circuit boards of the televisions suffered fatigue fractures due to mechanical stress. Some of the cable cords were also damaged.
3. Voltage fluctuations. Extreme voltage fluctuations, resulting from poor contacts, overloaded and damaged the electronic parts. The power supply units of the television sets were affected by this in particular, but so were parts of the cathode ray deflection system of the picture tubes. In both cases, the monitors had to be disassembled and repaired by external specialists. As a precautionary measure for the occasion when monitors need to undergo repair, ZKM owns two replacement television sets for *Liquid Time II* that can be used in the meantime.
4. Slip ring unit causing faulty transmission of power supply and video signal. Another common source of problems was faulty transmission via the “crucial point” of the slip ring unit (fig. 10). This appliance functioned reliably for the first six months. Thereafter, the contacts, which consist of a tempered nonferrous alloy, showed increasing signs of wear. Fouling from metal wear frequently led to interruptions in transmission. It became necessary to clean the slip rings more and more frequently during the course of the exhibition.

For the technical team, each time the slip rings needed to be cleaned, this meant removing the steel grille on the wheel support and disassembling the housing of the slip ring unit. The contact rings could then be cleaned using compressed air and tissues. This maintenance was very time-consuming and sometimes had to be done as much as twice a week. The video signal was particularly affected by these problems. For each pole of the power supply, two rings are available, cutting the risk of faulty transmission in half, whereas each of the two video poles passes through one single slip ring.

When the problems caused by the slip ring unit got out of hand, solutions were sought to transmit the video signal in a different manner. (Those investigations and the

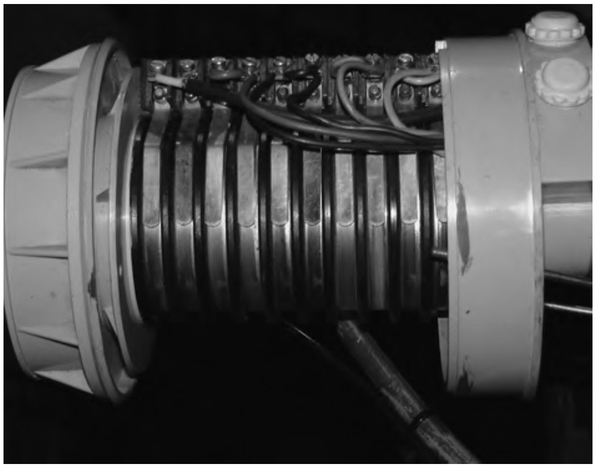

Fig. 10. Detail of the inner parts of the slip ring unit on the wheel's axle. Courtesy of ZKM.

measures taken are discussed in greater detail by Fenna Yola Tykwer in Part II of this text.)

In the spring of 2006, after approximately eighteen months of operation, the contact points of the slip ring unit were worn to the degree that it was predicted they would soon break. At that point, it was determined that repair or replacement of these elements was unavoidable. Working with a specialized company, a new slip ring unit was devised and a solution was sought that would alter the original appearance as little as possible. It worked as an advantage that today's slip ring units are considerably smaller than the original one, making it possible to integrate the new appliance within the casing of the original. In the end, the outward appearance was minimally altered (figs. 11, 12).

In hindsight, it is easy to list the malfunctions and damage to the video equipment of *Liquid Time II*. In practice, however, analyzing problems was often a laborious and time-consuming process for technicians and conservators. The first task involved determining outward symptoms that would indicate the malfunction or failure of one or more television monitors. The error pattern made it more or less possible to narrow down theoretically the probable causes. However, when several causes occurred simultaneously—as was often the case—it was more difficult to identify them. Several hurdles had to be overcome to get from the theoretical localization of the problem to its verification on the work itself. When working with Plessi's wheel, for example, it was necessary to cover the steel base with a protection. When removing the television sets, a platform had to be installed above the water channel. The accessibility of the critical points—especially for the equipment, cables, and plug connections hidden in the wheel—was made difficult due to the compact construction of the wheel (fig. 13). In addition, in some cases the sources of the problems—loose contacts, for example—could only be determined after systematic testing.

Fig. 11. New slip ring unit during testing period in 2006. Courtesy of ZKM.

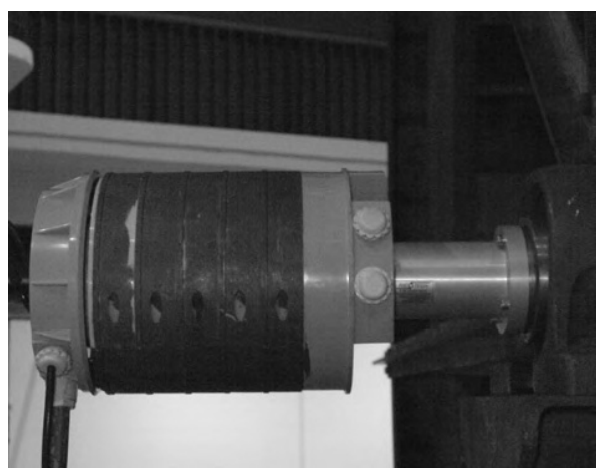

Fig. 12. Final installation of the new slip ring unit covered with the original casing. Courtesy of ZKM.

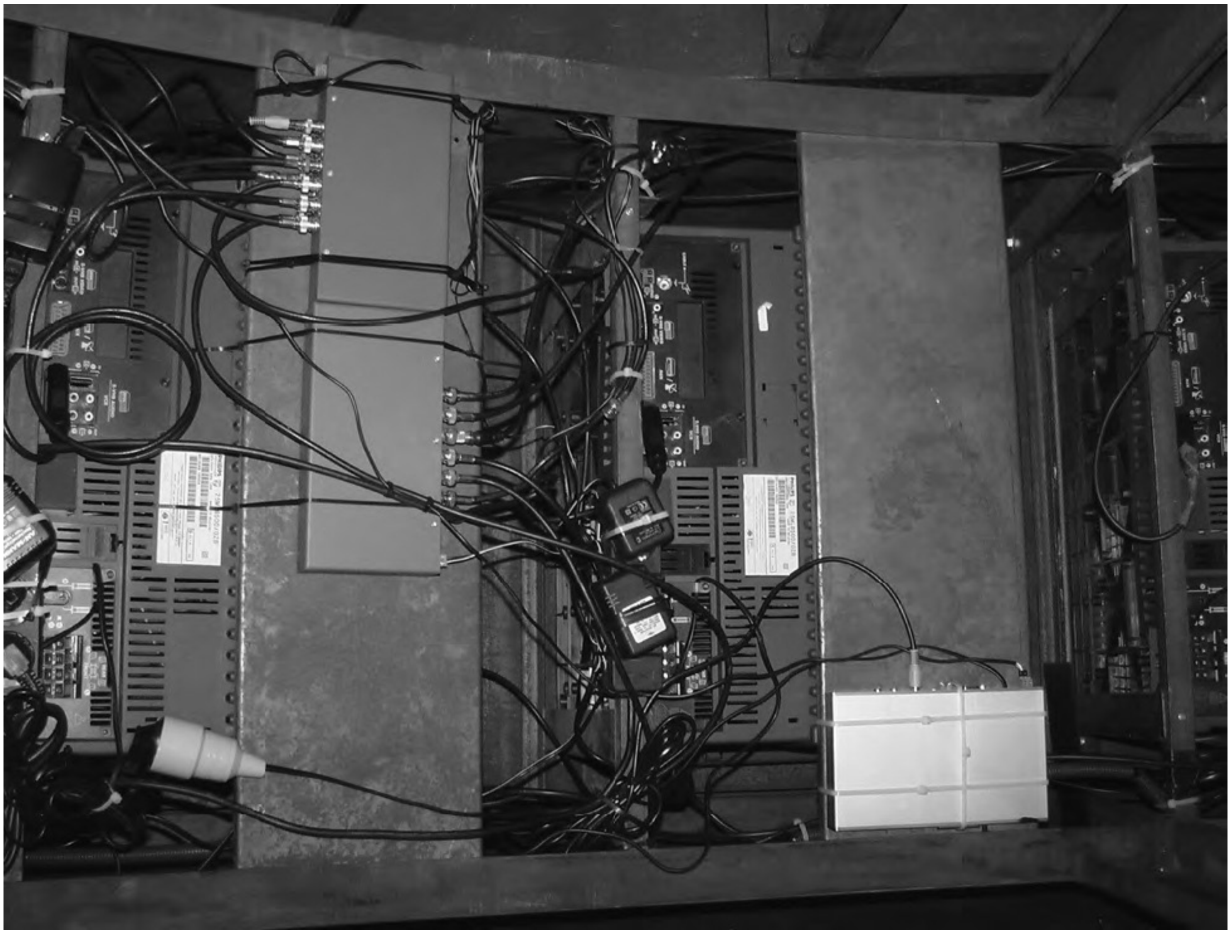

Fig. 13. Welcome to the jungle; wiring of power supply and video equipment within the wheel structure. Courtesy of ZKM.

All of these measures together, as well as regular maintenance steps like changing the water and cleaning the tank, required considerable manpower. The ZKM is in the fortunate position, for an institution for media art, to have a large, permanent team of specialized technicians available who can do this work. Even so, this staff was at times pushed to its limit. The financial expenditures, such as the costs of outside experts, repairs, and replacement equipment, were considerable. In our case, some of the investments could be covered with support from project funds.

These financial considerations have a direct effect on the conservators' work as well. Conservators of electronic art are faced not only with the task of conceiving preventative conservation measures or working on acute damage, they are also constantly confronted with the question of whether it is appropriate or not to take measures that reduce required maintenance and costs even if they sometimes alter the original work of art in crucial ways.

Because it is one of Fabrizio Plessi's major works, other institutions frequently ask to borrow *Liquid Time II*. Based on the experience gained from two years of exhibiting the work, ZKM now is able to formulate precise conditions for lending it and to estimate realistically the cost of a loan in terms of transportation, assembly and disassembly, and all operating expenses. Thus far, all such loan requests have been withdrawn because the requirements stipulated by ZKM to ensure the long-term preservation of the work exceed the expectations or possibilities of the requesting institutions. This should not be taken to mean that the ZKM is not willing to lend the work. Rather, it simply makes it clear that the effort of ensuring a sustainable presentation of media art continues to be underestimated and in some cases pushes the capacities of traditional art institutions to their limits.

NOTES

1 The international research project Inside Installation: Presentation and Preservation of Installation Art (2004–2007) was supported by the EU funding program Culture 2000 and coordinated by the ICN, Amsterdam. For more information about the project activities please visit the website www.inside-installations.org.

2 The case study was initiated and coordinated by the author during his employment as head of conservation at ZKM (2002–2006). After he left the institution in 2006, a ZKM research grant allowed him to finalize his work on the case study until the end of the project in May 2007, while the coordination was handed over to Fenna Yola Tykwer, who was part of the case study team and worked as media art conservator at ZKM (2006–2010).

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