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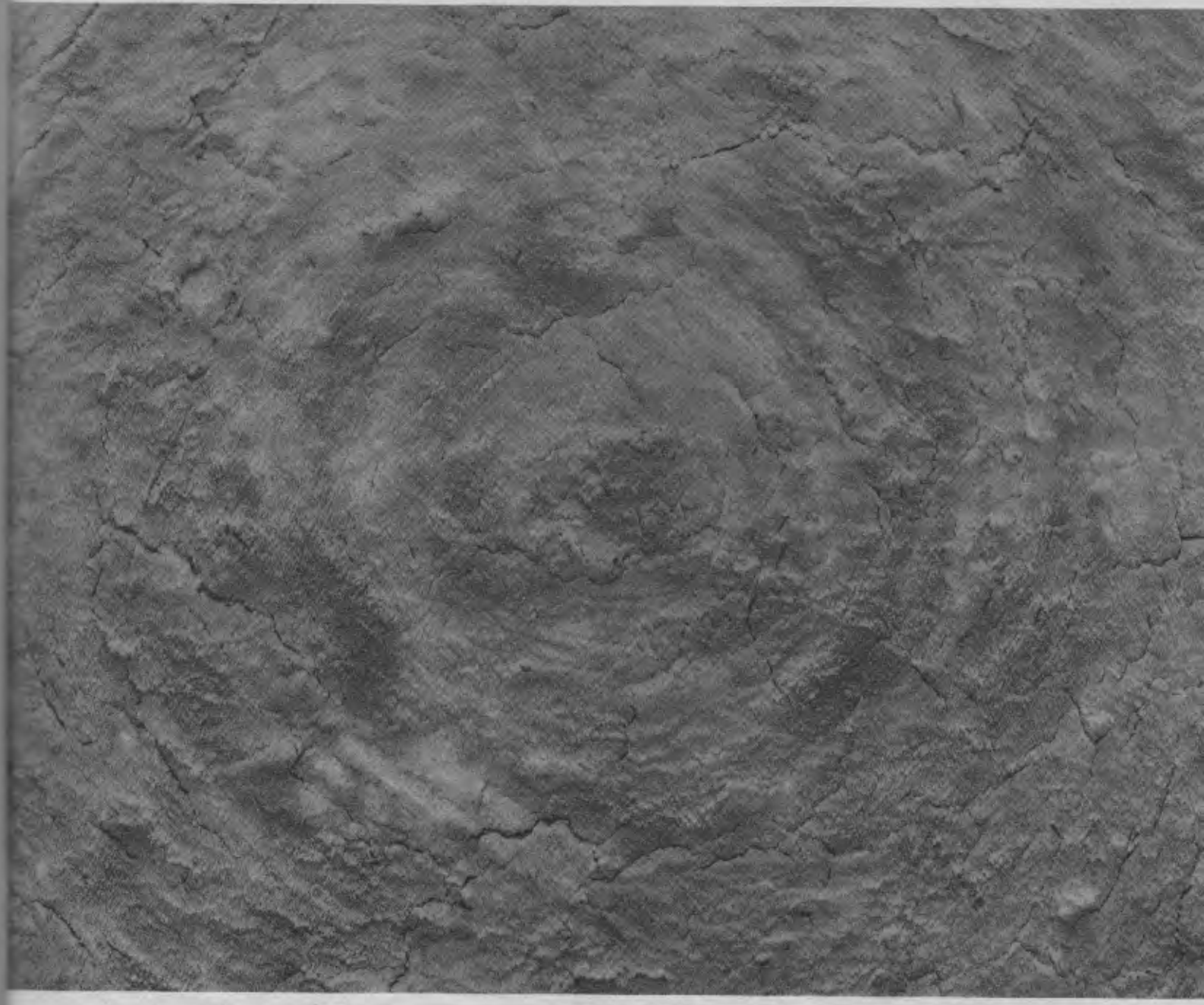
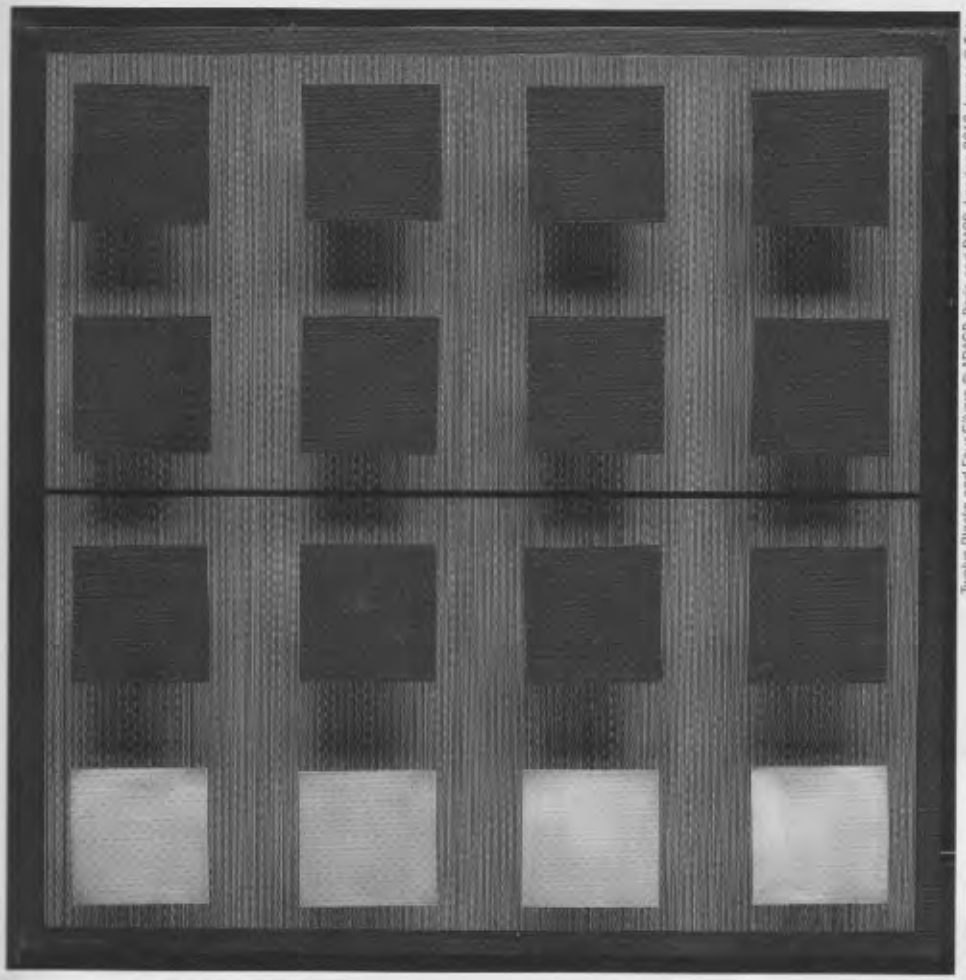


TREATMENT FEATURE | Consolidation of an Underbound 'Soil Compound' Layer: The Treatment of Marcos Grigorian's *Creation of the Planet*

ARTISTS' PRACTICE | Silent Partners: Charles Roberson and the Fitzwilliam Museum Lay Figures

TECHNICAL FEATURE | A CAPS Case Study at Tate: The Cleaning of Jesús Rafael Soto's *Twelve Blacks and Four Silvers*, 1965

TECHNICAL FOCUS | A CAPS Case Study at Tate: The Cleaning of Jesús Rafael Soto's *Twelve Blacks and Four Silvers*, 1965



Twelve Blacks and Four Silvers © ADAGP, Paris and DACS, London 2016; Image © Tate, London 2016. Photographer: Mark Heathcote

Figure 2a: Whole front view before treatment. *Twelve Blacks and Four Silvers*, 1965, Jesus Rafael Soto, Painted wood and metal (Tate T03769).

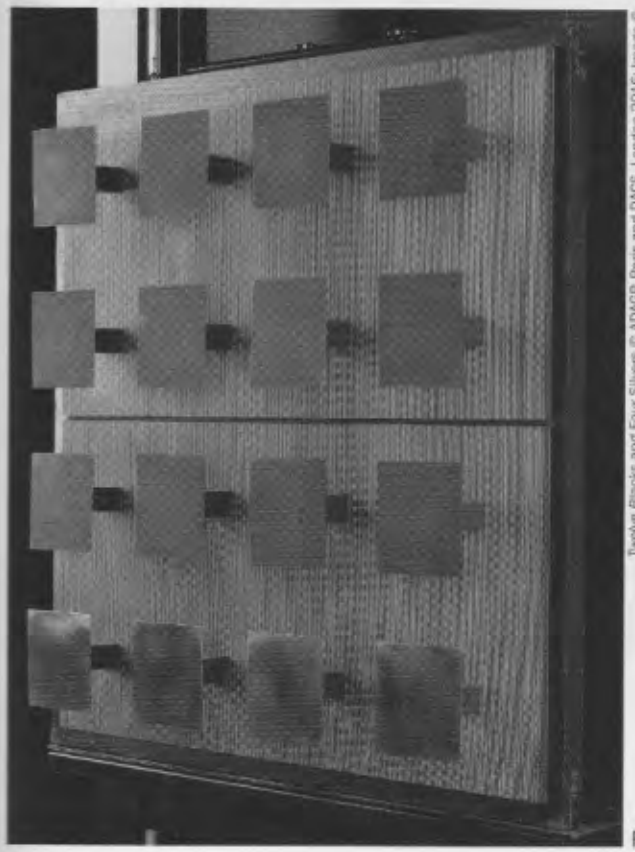


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Figure 2b *Twelve Blacks and Four Silvers*, oblique view before treatment.

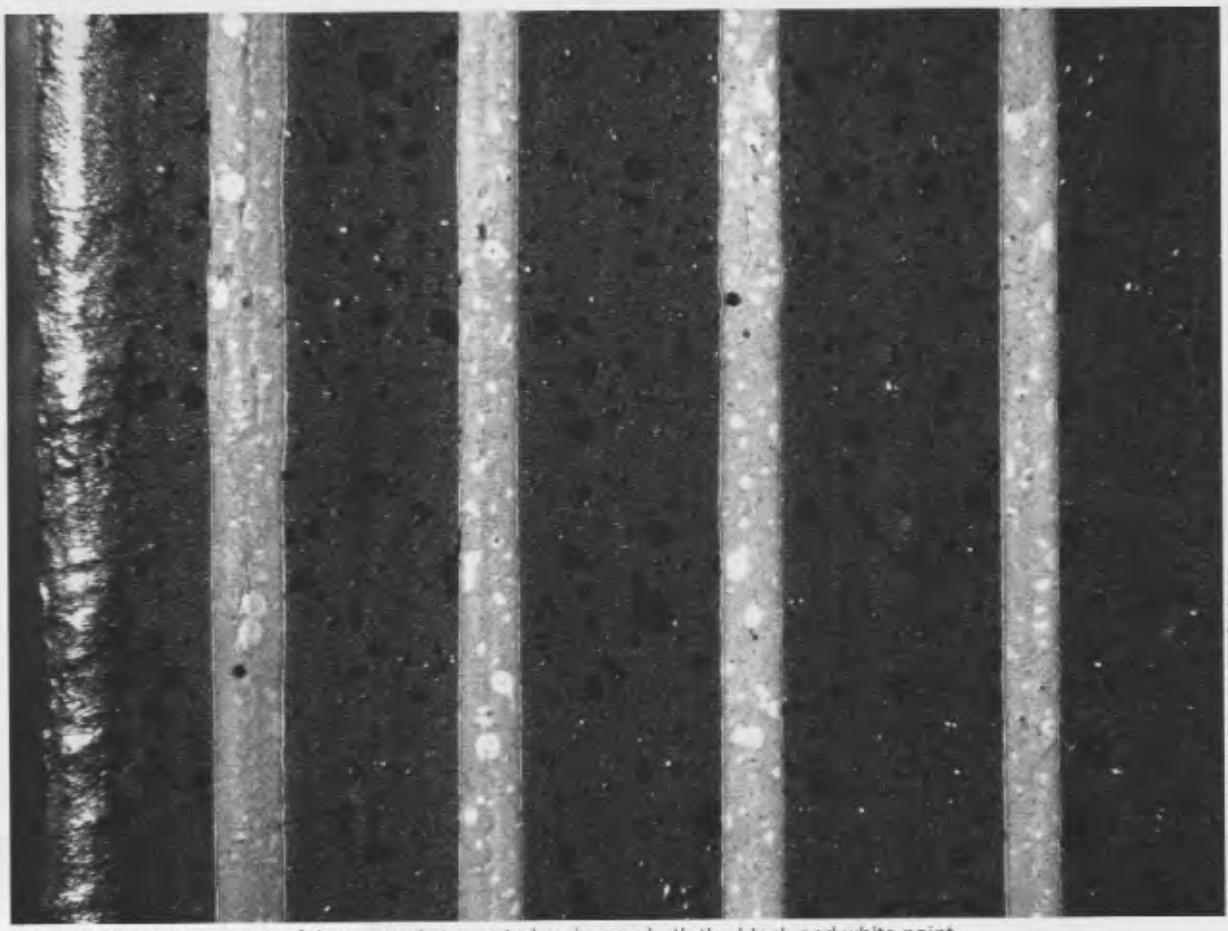
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Figure 3: Microphotograph of the spotted styrenated resin over both the black and white paint.

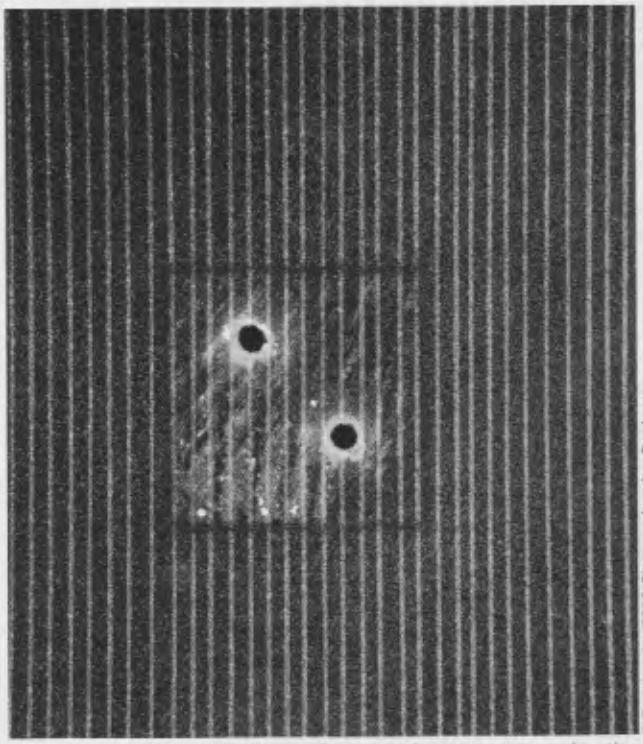
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Figure 6: UV Detail of the surface coating present under the wooden blocks.

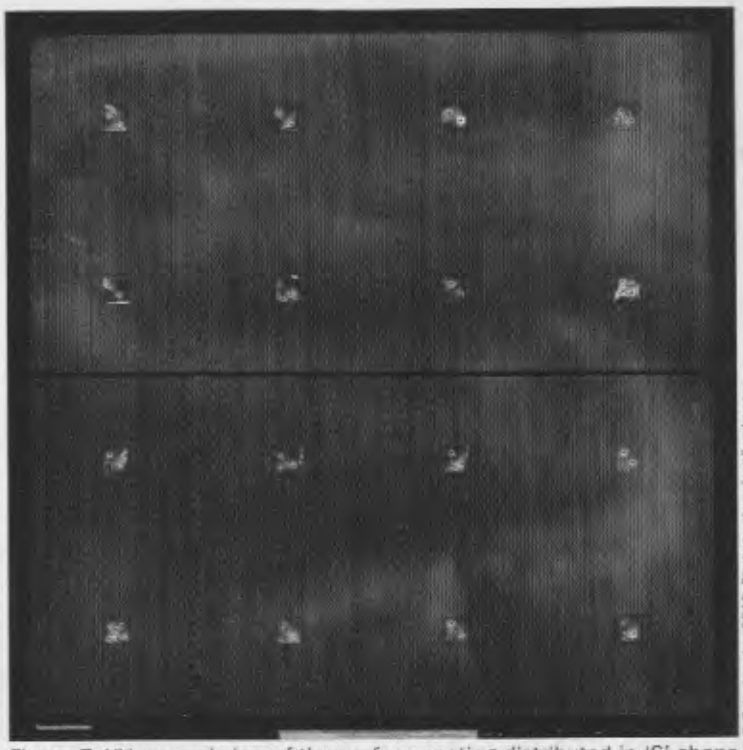
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Figure 7: UV general view of the surface coating distributed in 'S' shape over the striped panel.


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Figure 10a: Detail of corner with L-shaped bracket.


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Figure 10b: Detail of corner with L-shaped bracket removed.


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Figure 10c: Detail of corner with L-shaped bracket removed under UV light showing the over-painted areas.

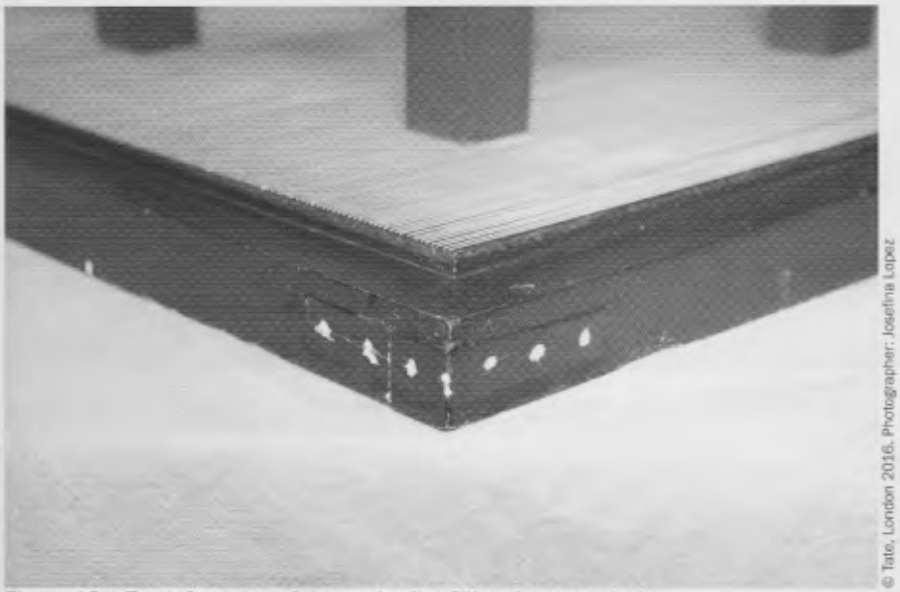
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Figure 12a: Top left corner of the work after filling the screw holes.

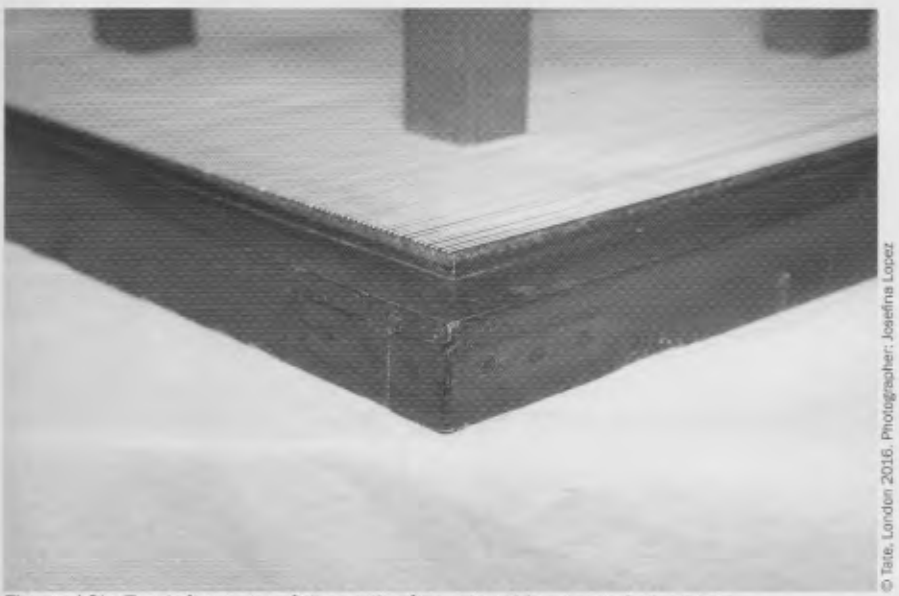
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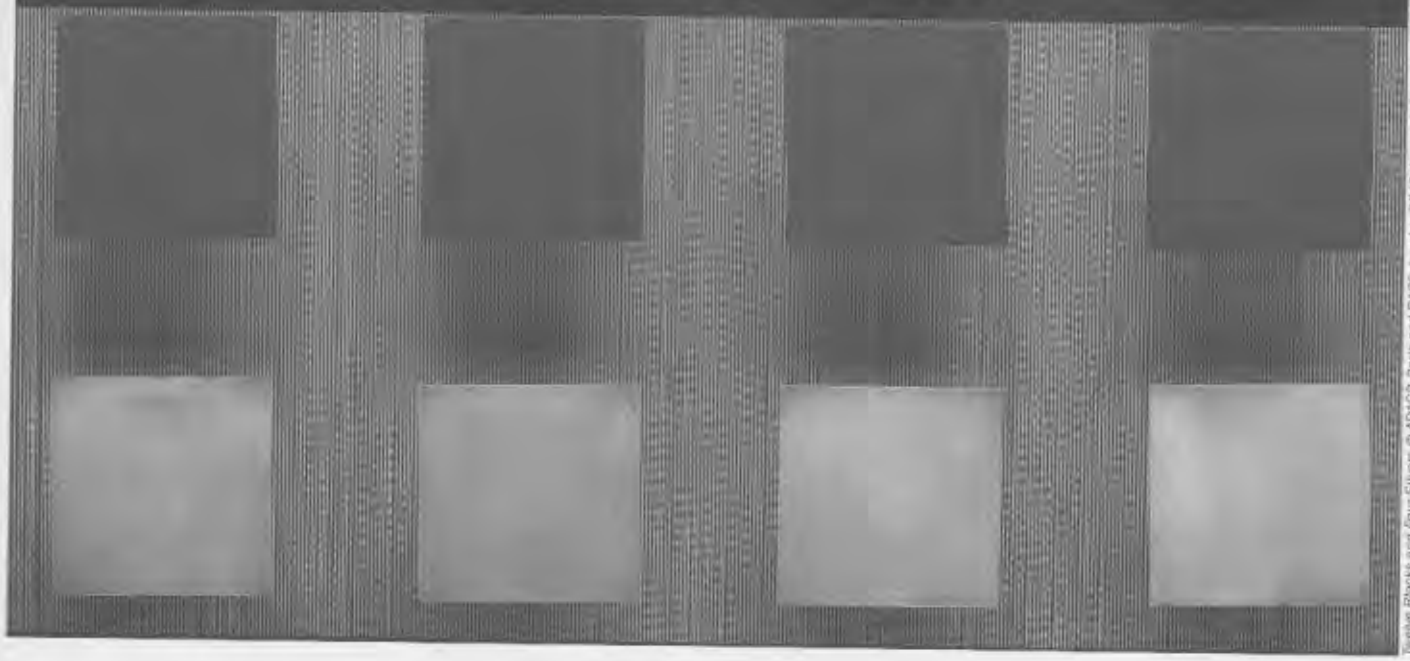
Figure 12b: Top left corner of the work after retouching screw hole areas.

Figure 13: Detailed of the cleaned areas and the difference in gloss.

Figure 14: Josefina López next to the work after treatment. *Twelve Blacks and Four Silvers*, 1965, Jesus Rafael Soto, Painted wood and metal (Tate T03769).

TECHNICAL FEATURE | A CAPS Case Study at Tate: The Cleaning of Jesús Rafael Soto's *Twelve Blacks and Four Silvers*, 1965



Twelve Blacks and Four Silvers © ADAGP, Paris and DACS, London 2016; Image © Tate, London 2016; Photographer: Mark Heathcote

As part of the Cleaning Acrylic Painted Surfaces (CAPS) ongoing research, while a Fellow in the Conservation Science department at Tate **Josefina López** carried out the conservation of this extraordinary Kinetic Art object by Soto. This paper focuses on the role of conservation science and CAPS in providing technical information on the painting materials as well as solutions to cleaning problems. Josefina's article interestingly highlights that in this case it was not only the choice of cleaning material but also the physical technique of cleaning which affected the efficacy of the method chosen.

INTRODUCTION

It was during a CAPS (Cleaning Acrylic Painted Surfaces) meeting at Tate that the idea of this article was brought to light. These meetings are periodically scheduled by Dr. Bronwyn Ormsby, Principal Conservation Scientist, and they bring together Conservation Science with the Sculpture, Paper and Paintings Conservation departments to examine the latest research on the cleaning of modern unvarnished painted surfaces and discuss its implementation by conservators.

At the time, I was an advanced fellow at the Conservation Science Department (formerly an intern in Paintings Conservation) tasked with contributing to ongoing collaborative CAPS research between Tate, the Getty Conservation Institute (GCI) and Dow Chemical Company, under the supervision of Dr. Ormsby. The study focussed on assessing gloss change while testing a range of cleaning systems on prepared paint samples (figure 1).

My six-month fellowship concluded with a case study treatment on a work from Tate's collection, working jointly with the Sculpture and Paintings Conservation Departments. After shortlisting the potential candidates, strongly influenced by my Latin American background and field of interest, I embarked on the study and treatment of *Twelve Blacks and Four Silvers* (Tate, T03769), a 1965 work by Jesús Rafael Soto, one of Venezuela's most important artists.

ART HISTORICAL BACKGROUND

It was during the mid 1960s that Kinetic Art had an international boom and where the participation of the spectator became crucial to many artworks. Soto made important contributions to this movement and became well known for his *Vibrations* at that time, later moving into large-scale works. He maintained that the objects and materials used in his work were of no great importance, while the relationships between elements remained the main aspect of his creative process.

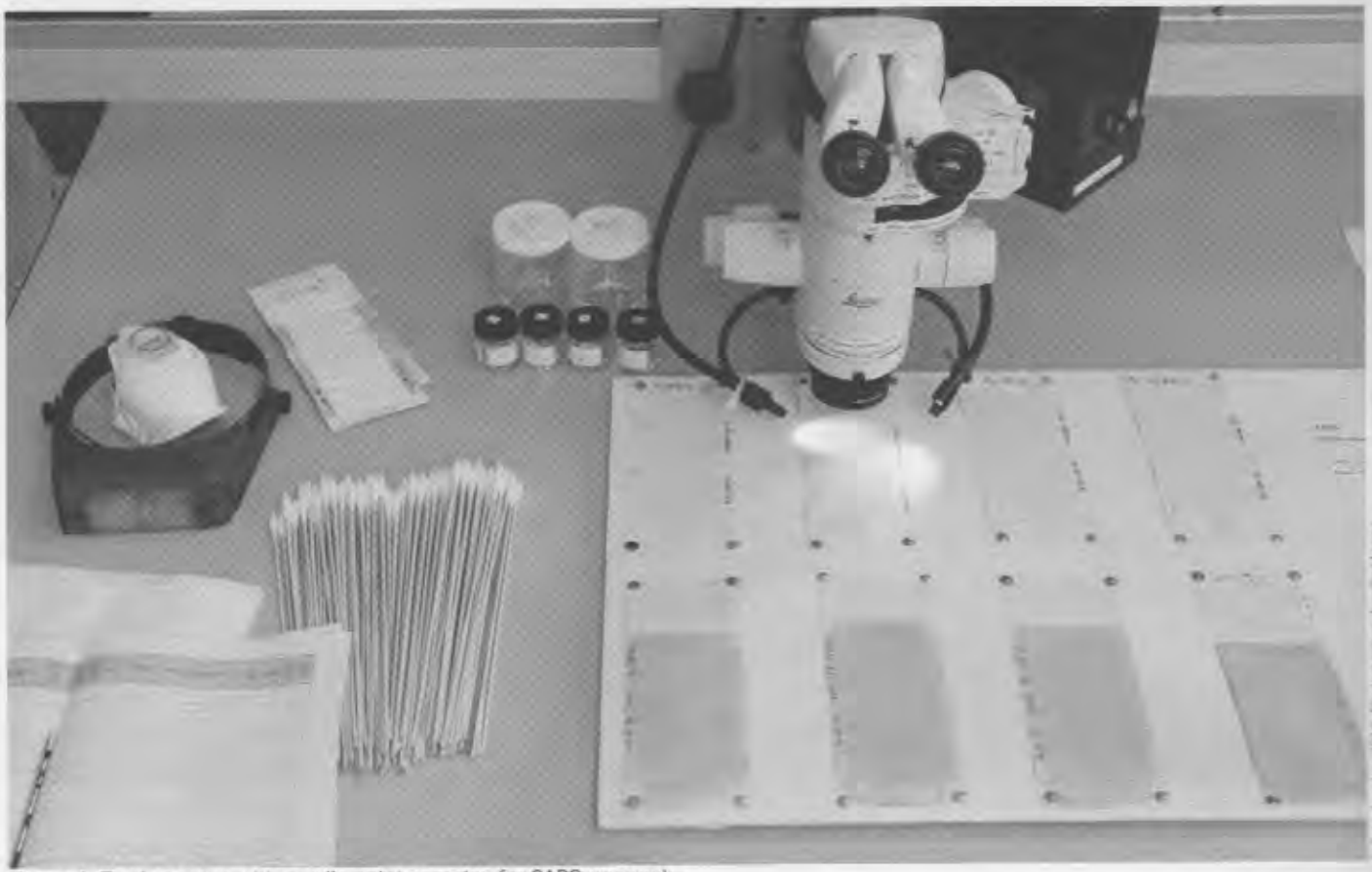


Figure 1: Testing setup with acrylic paint samples for CAPS research.

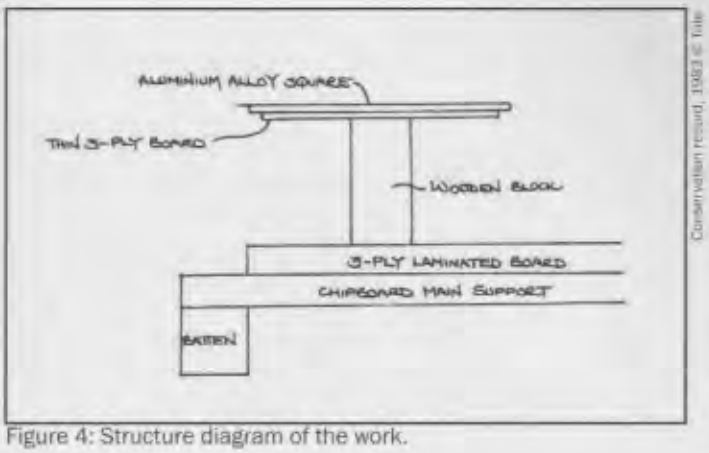
Twelve Blacks and Four Silvers (figure 2a and 2b. See colour plates) is a relief that rests on the fine line between a painting and a sculpture; when seen from the face it looks like a painting, somehow intriguing. It hangs flat on the wall with an added third dimension protruding to the front of the work; all the parts have been placed with exact mathematical, geometrical distribution to produce a vibrating illusion as the spectator moves in front of it, a subtle but striking effect. In Guy Brett's words, this is the kind of work where elements seem to loose their precise location in space and 'create their own fluid unstable space' (Brett 1968). This was the exact feeling the first time I saw the work, and ever after.

This work was created and first exhibited in 1965 in Signals London (the same year that the exhibition entitled *The Responsive Eye*, was showcased at MoMA in New York), then purchased by the Victoria and Albert Museum, who lent the piece to the Birmingham School of Art and Design for their *Op Graphics* exhibition in 1966. After its return to London, it remained in storage until 1983 when it was transferred to Tate. In 2012 it was exhibited at Tate Liverpool and it has since been away from public view.

At first, in this research, there was only a Tate Structure and Condition report and black and white photographs dating from 1983. The succinct available records made necessary a comprehensive study of the provenance, conservation history and Soto's working methods. An essential piece of reference was a Signals bulletin from the 1965 exhibition,[1] which provided a context for the work. Consultation with contemporaries, interviews with the artist and footage from documentaries found online were very revealing about Soto's artistic intentions and working techniques. Comparison with other similar works, like *Relationship of Contrasting Elements* (Tate, T00793), 1965, was also very informative of the materials used for this type of construction. Further in my investigation, I came across documents provided by the V&A Archive[2] that revealed that during the loan to Birmingham, *Twelve Blacks and Four Silvers* had been damaged upon installation and later repaired by School technicians; there was very little information on this event and the outcome of that intervention, but having this evidence, and all the other information gathered, was crucial in the determination of the conservation approach.

STRUCTURE AND CONDITION: UNDERSTANDING THE CONSTRUCTION

The work consists of a main support made of a 10 mm chipboard panel supported by four 28 mm wooden battens glued and pinned to the perimeter, (creating an integral frame) all painted black. The overall dimensions of the work are 1060 x 1060 x 162 mm. All four corners have L-shaped brackets screwed to the side and painted black. Two equally sized 3-ply laminated wood boards have been placed side-by-side on the chipboard support with



Conservation record, 1983 © Tate
Figure 4: Structure diagram of the work.

an 8 mm space running horizontally at the centre of the composition. These boards are painted with fine vertical white stripes over a black background and there is a spotted coating distributed unevenly on the surface (figure 3. See colour plates). There are 16 softwood blocks (40 x 40 x 100 mm) spaced equidistantly on the panel (four rows of four). They are held, end-grain on, onto the construction, with two screws from the reverse. Each wooden block supports a 3mm 3-ply wooden panel (140 x 140 mm). These panels are held in place by four panel pins through the front of the board and into the end-grain of the wooden block. Each of the 3-ply panels support a square metal plate (142 x 142 mm), of which twelve are painted black and four expose bare metal. These last four are aluminium alloy and the other twelve are possibly steel (figure 4).

The work was, in general, sound and stable. Some wear and tear was evident, possibly coinciding with the fall and repair at the Birmingham School of Art and Design. The main issues were related to previous treatments and poor handling and included minor damage on the integral frame and on the metal plates, overall soiling, marks on the painted surface and signs of corrosion.

During inspection, the wooden blocks holding the square metal plates were unscrewed from the reverse of the panel, leaving the front clear for better handling and access; this was crucial for understanding the construction and the condition history too, of which the most relevant aspects to this case are mentioned below. All the detached elements were methodologically numbered, mapped and photographed to ensure their correct position when re-assembled (figure 5).

The detachment of the blocks revealed that the spotted coating was present underneath the wooden blocks (figure 6. See colour plates) (suggesting it could have been there from the work's creation) and had been spray applied in an 'S' motion, clearly visible under UV (figure 7. See colour plates). The coating was only present on the striped painted panels and the horizontal gap between them and not on the integral frame, which therefore appeared to have been over-painted. The area beneath the blocks was a lot cleaner and without signs of yellowing, in contrast to the rest of the panel. The metal plates seen from behind revealed which ones had been previously damaged and repaired; this also gave a sense of Soto's working methods and showed the possibilities and risks of different treatment options.

ANALYSIS AND PAINT CHARACTERISATION

Measurements of pH, surface conductivity and gloss (figure 8)[3] were taken from the striped panel, as well as the integral frame and the metal plates.

Paint samples were taken and prepared for cross-section analysis, Energy Dispersive X-ray analysis (EDX) and Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (FTIR-ATR) (figure 9). This analysis, carried out at Tate,[4] revealed that the panel is painted with a single layer of black paint over two layers of white priming and, on top of the black, the white stripes. Paint layers are all polyvinyl acetate (PVAc); the black pigment is black iron oxide with a large amount of barytes and chalk, with some extenders that may include chalk, kaolin, alumina and


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Figure 5: Detachment of the protruding elements from the panel support for examination, testing and cleaning treatment.

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Figure 8: Gloss measurements with the Rhopoint Novogloss before cleaning.


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Figure 9: Dr. Bronwyn Ormsby taking paint samples for analysis.

silica and a cobalt-based drier, while the white pigment is titanium white and barium sulphate. The paint is more likely a commercial paint than an artist's paint.[5] The coating over the black and white striped background is probably a styrenated alkyd resin.

Vinyl, acrylic and styrene-butadiene paints are all synthetic resin emulsion-based paints, which were introduced in the late 1940s combining all of the good properties of both oil and water-based paints. PVAc paints were popular for being mechanically stable, easy to apply, easy to clean up, quick drying; having excellent adhesion to wood, plaster and cement; being resistant to UV radiation and oxidation; and being reasonably resistant to water and alkalis (Standeven 2011).[6] In addition to these features, its matt quality and low cost made the paint popular among abstract artists during the 50s and 60s. PVAc and acrylic emulsion paints are similar, although paints made from vinyl emulsions dry very matt and evenly as apposed to acrylic, which can be glossier and dries less evenly, presenting air bubbles on the surface of the paint. They also have some slightly different handling properties and therefore different response to treatment. For this reason, it is not possible to recommend a single cleaning formula for synthetic paints; systematic testing and observant evaluation is encouraged.

TREATMENT

The goals of the treatment were shaped by the scope of our research on cleaning modern paints, a given timeframe and the context of the artwork. It had been established that Soto worked with simple elements and materials to achieve certain effects, so the important thing here was to not only restore material aspects to a limited extent, but also to maintain that desired kinetic effect as the main characteristic of the work, avoiding disturbances that could interfere its reading. So it was determined to eliminate non-original material as long as it represented a disturbing element.

After verifying they were not providing any structural support, the L-shaped brackets from all four corners were removed, revealing the paint layer structure beneath and, with this, confirmation that the brackets were later additions and the integral frame had been completely overpainted (figures 10a, b and c. See colour plates).

Soiling, as non-original material, gave the surface of the paint an altered appearance that reduced the intensity of the vibrating effect. Also, the spotted coating created an important contrast between the soiled, unvarnished paint and the coated areas. Because we were not certain if that coating was artist-applied or a later addition, it was decided to keep it and find a cleaning formula that would bring the soiled areas to the level of the those that had been protected from direct soiling. The overpaint on the integral frame would not be removed because, even though it can be understood as a non-orignal layer, it was not distracting to the overall artwork.

The work was first brush vacuumed to eliminate any loose soiling. Following the Tate CAPS methodology, 23 different wet cleaning formulas were tested on small areas of both the striped panel and the integral frame, assessing gloss change and cleaning efficacy by eye and documenting with microphotographs. These included aqueous formulas, mineral spirits, silicone and microemulsion systems; Velvesil™ Plus (an emulsifiable silicone gel)[8] and a Pemulen™ TR-2[9] gel were tested as well. This initial list was narrowed to a shortlist of five formulas, and a final selection of three was used.

The selected systems were Pemulen™ TR-2 (2% w/v in deionised water, adjusted to pH6 with ammonium hydroxide);[10] 0.5% w/v tri-ammonium citrate (TAC) in water; and silicone emulsion A.[11] Pemulen™ TR-2 worked very well on the striped panel and on the painted surface of the metal plates; the cleaning improved both their general appearance and the contrast between black and


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Figure 11a Dry sponges cut in different sizes, according to cleaning area, and Evolene® tissue.


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Figure 11b: Dry sponges wrapped in Evolene® tissue.


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Figure 11c: Application of the gel on the paint surface.

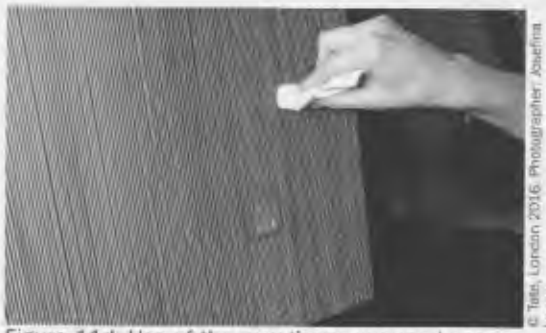
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Figure 11d: Use of the new tissue-wrapped sponge to clean excess of the gel and clear off residues.


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Figure 11e: Swabs and tissues used in the cleaning showing results of the process.

white, also bringing the colour to an even level between the unvarnished and the coated areas, without generating unacceptable gloss changes; however, as can be the case with Pemulen systems, it proved too strong on the integral frame.

As there were two types of paint reacting differently, different formulas were chosen for each surface. For the panel, Pemulen™ TR-2 was used, applied thinly with a swab and left on the surface for one minute and then cleared with pH-adjusted water.[12] For the integral frame, first 0.5% w/v TAC in deionised water was applied to remove ingrained dirt marks, this was also cleared with pH-adjusted water, and later an application of silicone emulsion cleared with silicon solvent D4.[13] This produced an appropriately saturated and even finish.

Although the panel and the metal plates were coated with the same type of paint, the difference between the supports needed to be carefully considered regarding the use of water in the cleaning and clearance steps. For the metal plates, the use of water was disregarded due to the possibility of activating or accelerating corrosion, which was present on some of the plates. Unfortunately due to time constraints, the cleaning of the metal plates was left for a later occasion, however silicone polymer gel, working through silicone solvent barriers, and rigid hydrogels[14] would be worth considering and evaluating for these delicate paint layers.

One of the major outcomes of this treatment was the innovation in the practical aspect of cleaning. Using the usual swabs to apply, remove and clear the gel was inefficient, induced swelling and left tidelines after clearance, resulting in uneven overall gloss. Taking into account the inherent properties of PVAc and the rigid support, a change in the handling of the cleaning system was developed. In this case, the gel was first applied with a swab on a larger area, then soft sponges wrapped with Evolene® tissue were used, pressing slightly and evenly to pick up the excess of the gel. For the clearance stage, the same tissue-wrapped sponge, slightly moistened with adjusted water, was used to pick up any remaining residues. This method proved efficient and safe, as it facilitated working on larger areas, allowing more even results with minimal pigment pick up (figures 11a, b, c, d and e).

After cleaning the main panel, the blocks were lightly cleaned with a soft brush and put back in position. The screw holes in the four corners of the integral frame were filled with Flugger® acrylic paste and retouched with Lascaux® gouaches. Black pigment was mixed with a very tiny amount of ultramarine blue to match the colour, and glazes of the same gouache binder were applied on top to match the gloss. Because it was decided not to remove old fillings and retouchings until more information was gathered and due to the time limitations, one of the main difficulties here was to achieve a retouching that integrated the surrounding area with all its imperfections (figures 12a and b. See colour plates).

Further treatment might include removing overpaint from the integral frame to expose the original paint layer and fully integrate fillings and retouchings; developing a cleaning system for the metal plates so the whole work meets the same level of clean; and rearranging more precisely some of the elements that have been displaced or damaged in the past.

It is important to mention here that all these issues were discussed with other conservators and very knowledgeably supervised by Rachel Barker, Paintings Conservator at Tate Modern, who would always bring ethical aspects and the new approaches to modern and contemporary conservation into the conversation. Her advice, together with Dr. Ormsby's methodologies, made this a successful treatment that even being partial met the goal of making the work exhibitable again.

"One of the major outcomes of this treatment was the innovation in the practical aspect of cleaning."

CONCLUSIONS

This treatment, at first thought to be a simple one, became a lot more complex than anticipated. Instead of focusing on the limitations of this case, I would like here to highlight the approach to the conservation of modern and contemporary art, the cross-disciplinary collaboration and the shifting from traditional paintings restoration to the treatment of an object that blurs the boundaries of specialisation, as we know it, with all its intricacies.

At Tate, I had the opportunity to learn from leading professionals in the conservation science field and also to contribute to scientific and curatorial research from the conservator's realm. I became deeply involved with research into Soto's working methods and the materials he used, while at the same time developing the appropriate treatment methodology, carrying out the treatment and deciding on an appropriate moment to stop.

Although only partially treated, the overall appearance was very much improved by the surface cleaning process, with a slight expected gloss increase (figure 13. See colour plates) and the enhancement of the vibrating effect. The work was integrated by removing some of the added parts to the original construction, making the work suitable for display again (figure 14. See colour plates).

There were more potential interventions to leave the work in perfect shape, and it's difficult not to try do as much as possible, but understanding the artist's intention was an important consideration to not over-treat it at this stage; Soto was more inclined towards the relations between elements and the motion effect rather than to producing a pristine work of art or a highly valuable object.

A complete treatment would need to address complicated issues such as; the removal of overpaint (possibly applied close to the creation of the work with a similar type of paint), but more importantly in this case, explorations into surface cleaning systems for matt, delicate paint layers applied to painted metal would be useful to achieve the same level of clean while avoiding the risk of corrosion. the ongoing research at Tate may provide solutions to these questions and collaboration with the conservation and science community will play a crucial part in this.

Photographic documentation accompanied every step of the process, providing very informative and useful images to go with the rest of the research. Videos were also recorded to represent the vibrating effect of the work and I suggest this becomes regular practice when movement is essential to the work. There is a lot more to be done with this piece however, all of the documentation gathered will facilitate an easy transition to a full treatment.

The Tate CAPS methodology was a great resource for establishing the parameters for this treatment and collaboration with conservation scientists allowed me to approach the object from a broader perspective. It was this freedom that facilitated the creative thinking that nurtured the accompanying research, which I will take forward into my studio practice. I hope my approach to this particular case will encourage other conservators to explore further and share their experiences with the wider community.

Josefina López

ENDNOTES

1. Signals bulletin November – December 1965, 1(10).

2. V&A Archive documents include: Nominal File for Signals London (archive reference MA/1/S1729) and the damage papers from the Circulation Department Damage, Losses and Thefts of Art Objects file (archive reference VA160/15 part 3).

3. A Rhopoint Novogloss glossmeter at 60° angle was used for recording gloss levels (macrogloss) before and after treatment.

4. By Dr. Bronwyn Ormsby and Dr. Joyce Townend at Tate Conservation Science.

5. From documentary footage it was possible to see the large paint buckets of household paint that Soto used and the technique for painting the white stripes on the black background. There is also evidence that Soto used a spray gun for paintings; perhaps he explored varnishing with this technique. Hurtado A. 1988. 'Soto a new vision of the art'. Video documentary, digitized, available online: https://youtu.

be/3LCN9eFbIzA. See min 17:19, accessed: 24th July 2016.

6. Their properties are well described in Standeven 2011.

7. Although microemulsions were not used in this particular treatment, they were the focus of the research on cleaning acrylic painted surfaces. Dr. Ormsby's achievements, in collaboration with GCI and Dow Chemicals, have provided important resources that should be considered in any modern and contemporary paint cleaning treatment. For the latest research see references.

8. Velvesil™ Plus on WAAC open access.

9. Pemulen™ TR-2 is a polymeric emulsifier produced by Noveon. A block copolymer consisting of a poly acrylic acid similar to the Carbopol resins used to make aqueous and solvent gels in art conservation (Carbopol 934, Carbopol 940, Carbopol 941) cross linked with a long-chained methacrylate, this carbomer has a lipohipllic regions (the methacrylate) as well as hydrophillic regions (the acrylic acid). These regions of differing affinity allow Pemulen™ TR-2 to act as a primary emulsifier, that is, it can be used to make oil in water (O/W) emulsions without the addition of soap or surfactant.

10. Gel preparation tutorials can be found at the GCI website: https://www.youtube.com/watch?v=2O5pYyc45Qo, accessed: 24thJuly 2016. More information about Pemulen™ TR-2 and its preparation is available at: http://pemulentr2.pbworks.com/w/page/15636419/Pemulen%20TR2, accessed: 24th July 2016.

11. Prepared with: Water 50g.; Ecosurf® EH-3 30; Cyclomethicone 20.

12. pH-adjusted water recipes by Chris Stavroudis are available on the GCI website: https://www.getty.edu/conservation/publications_resources/teaching/caps_ph_adjusted_h2o.pdf, accessed 24th July 2016.

13. Cyclomethicone (D4), chemical name: Octamethylcyclotetrasiloxane. The functions of octamethyltetracyclosiloxane (also used in cosmetics) are reported as antistatic, emollient, humectant, solvent, viscosity controlling, hair conditioning. In addition, silicone-containing formulations have a good spreadability.

14. Deep research into gels is currently being carried out at Tate. More information on different gel applications in conservation treatments can be found in Angelova, Ormsby, Richardson, 2015 and in Laura Hinde's article in Issue 43 of The Picture Restorer (2013).

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