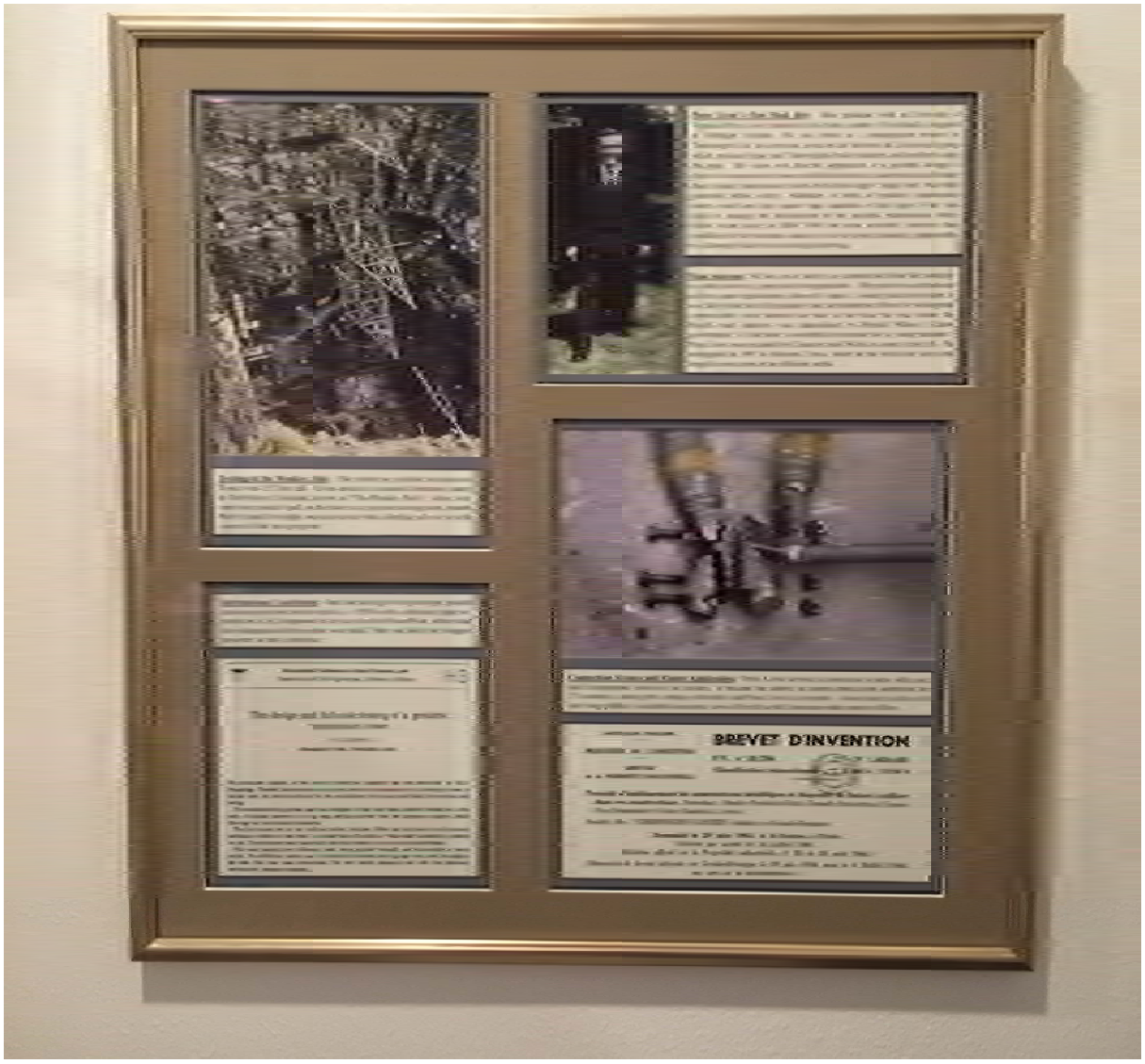
The framed story on Peter's first real job



Two framed color prints survived fifty years of moves from one office to another in the course of my career. I was proud of them as they were from work on my first project. 2016 technology made it possible for these now very faded prints to be restored, prompting what other materials were around to help tell the story of what on reflection a half century later, was a remarkable project at that point in time. This document is the electronic - or printable – version of the framed material at our home office in Houston.

Peter Lovie's First Real Job: After graduate work at University of Virginia, Peter Lovie returned to his home country of Scotland as required of Fulbright Scholars. He was hired as a management trainee by Tubewrights Ltd. in Liverpool, a unit of the Stewarts & Lloyds steel group which produced pipe. Tubewrights built structures and products using that pipe. The vision was that the appearance of a geodetic design of electricity transmission tower would blend into the countryside much better than existing transmission towers built from larger "angle iron" that often generated public outcry. Hundreds of miles of geodetic transmission towers could one day require huge quantities of steel pipe! Peter was asked to manage the development of the geodetic transmission tower, which meant using an IBM 7094 (the most powerful computer then available) for the structural analyses, a lot of project planning, plus months on a drawing board to create drawings for the prototype.

Final outcome: All was set to start to go commercial when the company was shut down in a group wide reorganization. The project was abandoned and the patent applications allowed to lapse. Looking back years later, it was likely that the full regulatory and development efforts for widespread commerciality were deemed too risky at the time, the year before the British steel industry was nationalized by Harold Wilson's Labour government. It had been a wonderful experience for a young engineer! Peter Lovie was recruited by Cameron Iron Works to come to the US. He emigrated in

February 1967 to Houston, Texas, where he has lived ever since and forged a new career in the offshore world.

Connection System In order to make the geodetic tower concept practical, Peter Lovie devised a connection system with cast steel components shown in the picture. This allowed tubular structural members to be connected where they intercepted at different angles, simply connected using computer generated factory jig settings with these standard connection pieces.

Patent Application: The connection system became the subject of patent applications submitted in 27 countries, naming the company directors and Peter Lovie as inventors – shown here in the only surviving publicly available document, now in French at the European online patent offices:

RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE L'INDUSTRIE

SERVICE
de la PROPRIÉTÉ INDUSTRIELLE

BREVET D'INVENTION

P.V. n° 22.784 **N° 1.450.635**

Classification internationale : E 04 b // E 04 h

Procédé d'établissement de constructions métalliques et dispositif de liaison à utiliser dans ces constructions. (Invention : Stanley Frederick RICE, Kenneth SCHOLFIELD, Francis Eyre SOMMERSET et Peter MARSHALL LOVIE.)

Société dite : TUBEWRIGHTS LIMITED résidant en Grande-Bretagne.

Demandé le 29 juin 1965, à 16 heures, à Paris.
Délivré par arrêté du 18 juillet 1966.
(*Bulletin officiel de la Propriété industrielle*, n° 35 du 26 août 1966.)
(*Demande de brevet déposée en Grande-Bretagne le 29 juin 1964, sous le n° 26.861/1964, au nom de la demanderesse.*)

The cast steel node idea of this project became the inspiration several years later for the use of cast steel nodes in jackup leg connections for the series of ETA jackup Mobile Offshore Drilling Units of Peter's design that were built in France, Singapore and Japan during 1973-1977 for service in record water depths (at that time) in the North Sea as well as for more moderate conditions in the Far East, both carrying larger variables loads than were typical of that era.

Testing at the Monkey Hole: The prototype geodetic transmission tower was 152 feet tall. It was first test assembled at the Tubewrights plant near Liverpool and then taken apart to be rebuilt and tested in a disused limestone quarry in Derbyshire, England, known as "The Monkey Hole". Winches and wire ropes were used to pull on the tower in a test program lasting many months.

Peter's head for heights was also tested while climbing all over it in the course of that test program!

International Conference: Once the testing of the prototype geodetic transmission tower was complete, a 9,500 word conference paper reported on it all, composed in the days before Powerpoint, when hand done diagrams, 35 mm slides, and the written word ruled. Peter was likely the youngest presenter at that conference.

The excerpt from the title page of the conference paper summarizes what it was all about:

International Conference on Space Structures 1966
Department of Civil Engineering, University of Surrey

H3

The design and full scale testing of a geodetic transmission tower

P.M. LOVIE
Management Trainee, Tubewrights Limited

The structural analysis of the tower by electronic computer has been described by H.B. Humpidge. Detailed information is now given about the construction of a prototype tower in tubular steel, the method adopted for the manufacture of the parts and finally the erection and testing.

The manufacturing process used was arranged so that joint pieces could be welded on to the ends of tubular members in a jig using settings derived from the computer analysis. Detail drawings are thus almost eliminated.

The joint pieces rely on the 'ball and socket' principle. When the joint piece is at the correct orientation relative to the tube, it is welded up in the factory. 'Piece small' assembly is possible on site. The prototype was 'hand built' and trial erected to a very close time schedule.

Full scale loading tests followed, loads being applied vertically and horizontally at seven points. Ten deflection meters and 183 electrical resistance strain gauges were used throughout the tests. Five load cases were tested. The test results compared well with the behaviour predicted by computer analysis.