

A Compendium
of Articles and Papers
celebrating the **Centenary**
of the birth of the eminent
Argentinian Locomotive Engineer
Livio Dante Porta
1922 - 2003

Volume 1



Compiled by
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On behalf of the Advanced Steam Traction Trust



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Authors' Legend:

| | | |
|-------------------------------|-----------------------|--------------------|
| CN – Chris Newman (Editor) | MB – Martyn Bane | Click – John Click |
| LDP – Livio Dante Porta | RC – Richard Campbell | GH – Gary Hunter |
| SM – Shaun McMahon | DW – David Wardale | KM – Ken Mills |
| S&W - M. Swift & R. Wilkinson | | |

Notes on Page Numbering:

- Page numbers at the top of each page represent those of the combined volume.
- Page numbers at the bottom of each page represent those of the individual papers.

Preface

The Argentinian engineer Livio Dante Porta (1922 - 2003) remains a largely unsung hero in the long history of steam locomotive development. Following in the footsteps of Chapelon, he rebuilt numerous locomotives and produced several remarkable and revolutionary locomotive designs. But, like Chapelon, none of his new designs were built and most of his rebuilds have been lost to scrap – most tragically and unnecessarily, his masterpiece “Argentina”. He has however left a rich legacy in the form of 200+ technical papers covering a very range of subjects that are a testimony to the breadth and depth of his knowledge. These papers were written not only in his native Spanish, but also in French and English, the majority being written in English because he felt that he would reach a wider audience in that language.

A few of his papers were published in conference proceedings; some were typed, but most have been left to us as hand-written manuscripts. Many were written for specific purposes such as “Application of the Gas Producer Combustion System to the 141R” and “On the Hudson-Orrok Heat Transfer Equation” which were written to guide David Wardale in his endeavours in South Africa and China, and “A Proposal for the Tornado Project” which was written for the purpose specified in the title. Others would have been written for the more general purpose of guiding present and future designers and maintenance engineers towards the further improvement of the steam locomotive.

It is commonly thought that throughout his life Porta believed that as the world’s oil reserves became depleted there would be a renaissance of steam. Indeed he often wrote so. However it seems that in reality this was not the case. In his later years, he privately acknowledged that the battle for steam was lost and that there would be no going back.¹ Nevertheless, he never gave up his endeavours to prolong steam’s existence wherever there was a possibility of doing so.

I never had the opportunity to meet Porta, and I only communicated with him once immediately before his death. It was my reading of Dave Wardale’s epic work “The Red Devil and Other Tales from the Age of Steam” in 1999 that not only resuscitated my (then) jaded interest in steam, but introduced me to Porta and sparked my interest in, and respect for, his works. I have expressed that respect through the papers of his that I have transcribed and published² and through this centennial compendium. Unlike the other volumes, this “compendium” includes only one paper (a non-technical one) by Porta himself (to appear in the second volume). Instead, it is filled with the writings of others, forming a miscellany of papers and articles about Porta and his works. It is offered to celebrate the centenary of Porta’s birth in March 1922.

It may be argued that Porta came too late to change the course of the history of the steam locomotive. But it wasn’t just the circumstance of time that stood against him, but also the circumstance of place. Most of his work was undertaken in remote parts of a remote country in a remote region of the world, long before the days of the Internet and mass communication. Indeed, given these limitations, it is astonishing that Porta was able to amass so much, and such a diversity of, technical information from so many countries as is evidenced by the enormous lists of references that accompany so many of his papers. Not only did he read and speak English and French (in addition to his native Spanish), but he also developed an understanding of written German, Italian and Russian.

Yet whilst Porta arrived on the scene too late to prevent the disappearance of steam from

¹ As advised by David Wardale - from a conversation he had with Porta in Cuba in 1998 or 1999.

² 27 of Porta’s English-language papers have so far been published in three volumes under the auspices of the Advanced Steam Traction Trust. A fourth volume will cover feedwater heating, boiler water circulation and boiler water treatment and a fifth volume is planned covering a miscellaneous variety of subjects. All are, or will be, made available through ASTT’s website at <https://www.advanced-steam.org/books-for-sale/>

commercial railway operations, it is not too late even now for his knowledge and wisdom to be applied to the remnants of steam that still operate in the world. Given that virtually all extant steam locos are heritage artifacts, there is an understandable reluctance to make changes to them, especially when such changes might alter their external appearance. However, many of Porta's innovations for improving locomotive performance and/or for reducing their operating and maintenance costs can be implemented without visible alteration – for instance:

- his easily applied internal water treatment which can significantly reduce, and even virtually eliminate, boiler maintenance;
- his improvements to the design of pistons and piston valves, and especially their rings, can dramatically reduce ring and liner wear and steam leakage;
- lubrication of valves and pistons, and improvements to lubrication in general which can dramatically reduce wear rates and maintenance costs;
- streamlining of valve ring edges, land edges and port edges can improve steam flows and locomotive performance;
- enhancements to exhaust systems³ that can dramatically increase draught while reducing cylinder back-pressure, thereby improving engine efficiency.

Photos of Porta and his works are rather limited, hence I apologise that some images appear more than once in these pages. Some are repeated out necessity because they appear in more than one of the articles that have been reproduced here. I have however chosen to repeat others because it seems easier both for myself and for the reader if I re-use illustrations rather than adding cross-references back to a single copy of each.

Likewise there is much repetition of the information that appears in the various articles making up this anthology. This is inevitable given that the articles are unrelated and that each author was relating different facets of the same underlying story. I make no apology for this, but suggest that readers dip in and out of the book, absorbing individual articles separately so that the repetitions can act to reinforce understanding rather than becoming sources of irritation.

Having so little first-hand knowledge of Porta, there is little that I can add to this compendium by way of a personal contribution. Hence I have relied on the work of others to fill its pages, most notably Martyn Bane whose website I have mined exhaustively for almost all of the material that it contains about Porta and his works. Sadly Martyn is no longer maintaining his website, and I know from experience with my own 5AT website that web pages are not as permanent as we like to imagine. They can disappear in an instant in the event of a server fault, as happened to the 5AT website a few years ago. Hence I like to believe that by including so many of Martyn's pages in this volume, I am helping to preserve them for posterity.

Anyway, I thank him for his generosity in allowing me to reproduce them here, just as I do to all the other contributors, and for their permissions to reproduce their work herein.

It was my original intention to publish this compendium in a single volume, however I find myself with more pages and less time than I had planned for. To some extent the situation is out of my control as I am waiting on some very busy people to contribute some of the later chapters. So in order to meet the centennial deadline of 21st March 2022, I have decided to compromise by dividing the compendium into two volumes. This first volume therefore focuses on Porta's earlier work and the second volume will focus on his later work, with some inevitable blurring of the boundary between the two. Be that as it may, I will endeavour to get the second volume into print as soon as I can.

Chris Newman – February 2022

³ Some exhaust system enhancements (such as the Lempor) do involve visible alterations.