The Legacy of TRW and Space Park
A Summary with Key Dates and Milestones
Revision 6

Dr. Leslie A. Hromas
November 2008

This document was created by the author for educational purposes and is not an official statement of dates and events.
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Introduction

Simon Ramo and Dean Wooldridge were two brilliant scientists who pushed back the frontiers of science and also developed a new engineering integration process called "systems engineering." Both Caltech PhDs at age 23 they formed a team at Hughes Aircraft in 1946 with a goal of establishing an electronics research laboratory. After seven very successful years they chose to form their own company leaving Hughes on the eventful date of 9/11/1953 to pursue the development of advanced electronic systems. They felt that integral electronic systems could be salable products just as an aircraft company would buy complete engines from another company. The R-W Corp flourished doing not only electronic systems development but also in assisting the US Government in developing the brand new and technology-stressing Intercontinental Ballistic Missile (ICBM). Not only were products built, but the concept of integration called systems engineering was validated. On the cover of Time Magazine, Ramo and Wooldridge were truly outstanding examples of American ingenuity and drive. The ability to advance the products of science as well as introduce the new process of system engineering was a most valuable contribution to American industry.

The purpose of the present booklet is to present an abbreviated summary of the important dates and milestones of the company they founded. The booklet also includes the completion dates of the major buildings at Space Park (SP), the launch dates of major satellite systems, and start dates of both ICBM and laser projects. Some of the early organization charts and announcements are included as appendices. The history and role of Thompson Products, Ramo and Wooldridge’s initial financial backer, is summarized with dates and milestones in an appendix.

The booklet is not an official document of Northrop Grumman and any errors are the responsibility of the author. Conversation with Dr Ramo regarding events and dates is gratefully acknowledged.
Key Dates and Milestones

The Ramo-Wooldridge Corporation

1913  Simon Ramo and Dean Wooldridge born

1936  Ramo and Wooldridge earned PhDs from Caltech

Ramo joined General Electric in Schenectady, NY
Wooldridge joined Bell Telephone Laboratories in New Jersey

1946  Ramo joined Hughes Aircraft and Wooldridge followed
Their objective: develop complete avionics systems for aircraft and missiles

Sept 11 1953  Ramo and Wooldridge left Hughes with Gen. Harold George

Sept 16 1953  The Ramo-Wooldridge Corporation (R-W) incorporated in Delaware with financial backing from Thompson Products (TP)

- Common-stock format:
  - 49% Class A controlled by TP
  - 51% Class B controlled by Ramo and Wooldridge

TP historical data and milestones summarized in Appendix A

R-W organized with three divisions targeted to develop integrated avionics system:
- Computers
- Communications
- Controls

First R-W office, opened in 1953
Site of first R-W office today
1954 Ballistic Missile Systems Engineering and Technical Direction (SETD) contract signed with Air Force

Guided Missile Research Division (GMRD) formed (Appendix B)
ICBM related hardware exclusion accepted

### Employment Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Ballistic Missile</th>
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<tbody>
<tr>
<td>1953</td>
<td>18</td>
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<tr>
<td>1954</td>
<td>281</td>
<td>170</td>
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<td>1955</td>
<td>1156</td>
<td>760</td>
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<tr>
<td>1956</td>
<td>2657</td>
<td>1557</td>
</tr>
<tr>
<td>1957</td>
<td>3269</td>
<td>1961</td>
</tr>
</tbody>
</table>

source: Reference 3

1956 Studies initiated on use of Space for surveillance

1957 Planned expansion into Space with broadening of GMRD

Soviets launched Sputnik on October 4

GMRD reorganized into Space Technology Laboratories (STL) (Appendix C)

1958 STL-built Pioneer 1 launched — 1st NASA satellite

ICBM missile ATLAS flew successfully full range

Oct. 31 1958 Thompson Ramo Wooldridge Inc. was formed

STL remained a separate subsidiary corporation

Gen. Jimmy Doolittle, STL Board Chairman
Louis Dunn, President; Rube Mettler, Executive V.P. (Appendix D)

1959 Moved Controls, Computers, and Communications Divisions to new Canoga Park facility in expansion process and to separate the corporate entities R-W and STL

2nd STL-built satellite, Explorer VI, launched

June 4, 1960 Aerospace Corp. founded to provide ICBM advanced planning function for the Air Force 1700 employees of 3680 transferred from STL to Aerospace

1960 Space Park (SP) site purchased from Santa Fe Railroad -- 110 acres in Redondo Beach
Dec 7 1960  
Broke ground at Space Park.  
Buildup: R1, R2, E1, M1 (R3, S followed)

STL proceeded to bid on and build satellites

New Space Park facilities expanded

Jan 1 1962  
Wooldridge retired

Employment number was 5440

1963  
The Bunker-Ramo Corporation founded for Computers & Automation

STL’s computer stake and Canoga Park facility transferred to Bunker-Ramo

Controls and Communications start to move back to Space Park as facility expands

Corporate consolidation:
- Tapco → TRW Equipment Group
- STL → TRW Space Technology Labs
- Automotive → TRW Automotive Group

May 1965  
Thompson Ramo Wooldridge became TRW, Inc.

STL became TRW Systems Group under TRW, Inc. (Appendix E)
Fall 1965
Organization of
TRW Systems Group
(Rube Mettler)
(Appendix F)
- Systems Engineering &
Integration Division
(Dick DeLauer)
- Space Vehicle Division (Dolf
Thiel / George Gleghorn*)
- Electronic Systems Division
(Henry Samulon)
- Power Systems Division
(Bob Bromberg / Art Grant)
- Systems Laboratories
(George Solomon / Bob Muchmore)
- Special Projects (Bill Carlson)
- Instruments Division (commercial) (Fred Hesse)

Expansion / Spin-off Areas
- Civil Systems and Energy (1965)
- Credit Data (1970)

Feb 1968
Rube Mettler elected Assistant President of TRW Inc.
- Dick DeLauer became Head of Systems Group

1969
Rube Mettler becomes President and COO, TRW Inc.

1970
TRW Systems
(Dick DeLauer)
- Systems Group
(George Solomon)
- Systems Application Center
(Art Summer)
- Industrial Operations
(Fred Hesse)

1971
TRW Systems Group
(George Solomon / Ed Doll)
(Appendix G)
- Applied Technology Division
(Bob Bromberg / Art Grant)
- Systems Engineering &
Integration Division (Bob Burnett)
- Other Divisions (reporting through Dolf Thiel)
  - Space Vehicle Division (George Harter)
  - Electronic Systems Division (Paul Glazer)
  - Defense & Space Systems Division (Bill Russell)
1978 TRW Systems & Energy Sector (Dick DeLauer)
- Defense & Space Systems Group
  (George Solomon, Bob Burnett / George Harter)
- ESL acquired (Bill Perry)
- Applied Technology Division (Art Grant)
- Systems Engineering and Integration Division (Bill Besserer)
- Ballistic Missiles Division (Bob Anderson)
- Manufacturing Division (Hugh Brady)
- Space Systems Division (Bob Walquist)
- Electronic Systems Division (Charlie Stephens)
- Special Programs (Dan Scally)
- Energy Products Group (Gen. Sam Phillips)
- Energy Systems Group (Johnny Foster)

1980-1983 TRW Electronics and Defense Sector (George Solomon)
(Appendices H & I)
DeLauer left in April 1981 to become Undersecretary of Defense for
Research and Engineering

Organization
- Defense Systems Group (Bob Burnett)
- Electronic Systems Group
  (Charlie Stephens, later Ed Dunford)
- Energy Development Group (Bob Anderson)
  EDG merged with S&TG after 1984
- Operations & Support Group
  Manufacturing Division (Hugh Brady)
- Space & Technology Group (Bob Walquist)
  Applied Technology Division (Gerry Elverum)

1985 – 1986 TRW Electronics and Defense Sector (George Solomon/Bob Burnett)
(Appendix J)
- Federal Systems Group (Bob Williams)
- Space and Technology Group (Ed Dunford)
  (Appendix K)
  - Engineering and Test Division (Paul Mayhew)
  - Applied Technology Division (Gerry Elverum)
  - Energy Division (John Sellers)
  - Defense Projects Division (Dan Goldin)
  - Military Space Systems Division (W. J. Wellemes)
  - Federal Systems Division (Al Sabroff)
- Electronics Components Group (Lester Hill/Ira Coron/Forbes Powell)
- Operations and Support Group (Ed Noneman)
- Electronic Systems Group (Bob North/Ed Goldburg)
- Defense Systems Group (Don Jacobs/Nat Trembath)
1988  Rube Mettler retired, Joe Gorman became Chairman, TRW Inc.

1989  TRW Space and Defense Sector (Ed Dunford/Bob Burnett)
      (Appendix L)
      • TRW Defense Systems Group (Don Jacobs/Nat Trembath)
      • TRW Electronic Systems Group (Ed Goldberg/Tim Hannemann)
      • TRW Federal Systems Group (Bob Williams/John Stenbit)
      • TRW Space and Technology Group (Dan Goldin)

1991  Ed Dunford became President and COO, TRW Inc.

1993  TRW Inc. (Joe Gorman/Ed Dunford)
      (Appendix M)
      • TRW Automotive
      • TRW Information Systems and Services
      • TRW Space and Defense
        • Space and Electronics Group (Tim Hannemann/Gordy Williams)
          (Appendix N)
        • Defense Systems Division (Don Winter/Marv Stone)
        • Federal Systems Division (Ed Nowacki)
        • Electronic Systems Division (Paul Sasaki)
        • Spacecraft Technology Division (Don Stager)
        • Electronic Technology Division (Bob Fielding)
        • Applied Technology Division (Joe Miller)
        • Systems Integration Group (John Stenbit)
        • Avionics and Surveillance Group (Bob Kohler)

1994  Ed Dunford retired
      Peter Helman became President, TRW Inc.

1998  Space & Electronics Group (Tim Hannemann/Don Winter/Wes Bush)
      (Appendix O)
      • Defense Systems Division (Ed Nowacki/Dick Croxall)
      • Space and Laser Programs Division
        (Joanne Maguire / Tom Romesser)
      • Telecommunication Programs Division (Dave Vandervoet)
      • Space and Technology Division (Al Frew)
      • Electronics and Technology Division (Fred Ricker)
      • Avionics Systems Division (Roy Adams)

1999  Dave Cote became President and COO, TRW Inc.
      (Appendix P)
      • TRW Aerospace and Information Systems Sector (Ron Sugar)
      • TRW Space and Electronics Group (Tim Hanneman)
      • TRW Systems and Information and Technology (Phil Odeen)
      • TRW Aeronautical Systems Group (Ken Maciver)
      • TRW Telecommunications Group (John Stenbit)
2001  Space & Electronics Group (Tim Hannemann/Wes Bush/Joanne Maguire)  
Reorganized around Processes:  
(Appendix Q)  
• Business Development (Joanne Maguire)  
• Program Execution (Ed Nowacki/Craig Staresinich))  
• Engineering (Dave DiCarlo/Tom Romesser)  
• Production and Supply Chain Management (Paul Borzcik/Mike McVey)  
• Enabling Processes  
• TRW Radio Systems, Rancho Bernardo (Dave Vandervoet)

2002  Northrop Grumman (Kent Kresa, later Ron Sugar) acquired TRW  
TRW became:  
• NG Space Technology (Wes Bush, later Alexis Livanos)  
• NG Mission Systems (Don Winter)  
• Part of NG Information Technology  
• TRW Automotive Divested

2003  Red “TRW” replaced by blue “Northrop Grumman”  
in sign on Building E2  
Northrop Grumman Systems Technology (Wes Bush)  
(Appendix R)  
• Programs (Ed Nowacki)  
• Business Development (Jeff Grant)  
• Technology Development (Tom Romesser)  
• Engineering (Dave DiCarlo)  
• Production and Supply Chain (Mike McVey)

Additional information in Appendix S  
Summary TRW History Table of Contents from Davis Dyer,  
TRW — Pioneering Technology + Innovation since 1900
# The Ramo-Wooldridge Element Key-Dates Table*

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Milestones</th>
<th>Space/Satellite/Propulsion/Laser</th>
<th>Major Facilities Milestones**</th>
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<tbody>
<tr>
<td>1953</td>
<td>Oct - Atlas Start</td>
<td></td>
<td>Barber Shop, West 92nd Street</td>
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<tr>
<td>1954</td>
<td></td>
<td></td>
<td>Arbor Vitae</td>
</tr>
<tr>
<td>1955</td>
<td>Jan - Thor Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1956</td>
<td>Jan - Titan I Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>Mar - Minuteman I Start</td>
<td></td>
<td>R&amp;D Center, El Segundo</td>
</tr>
<tr>
<td>1958</td>
<td></td>
<td>Oct - Pioneer 1</td>
<td></td>
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<tr>
<td>1959</td>
<td></td>
<td>Aug - Explorer 6; Nov - Able 4</td>
<td>Canoga Park</td>
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<tr>
<td>1960</td>
<td>Oct - Titan II Start</td>
<td></td>
<td>Dec - Space Park Ground Break</td>
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<td>1961</td>
<td>Apr - Minuteman II Start</td>
<td></td>
<td>Blds. R1, R2, E1</td>
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<tr>
<td>1962</td>
<td></td>
<td></td>
<td>Blds. R3, M1</td>
</tr>
<tr>
<td>1963</td>
<td>Oct - Vela 1, 2 (Total 12, Final Launch 4/70)</td>
<td></td>
<td>Bld. S</td>
</tr>
<tr>
<td>1964</td>
<td>Sept - OGO 1 (Total 6, Final Launch 6/69)</td>
<td>Bld. M2, Capistrano Test Site</td>
<td></td>
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<tr>
<td>1965</td>
<td>Jan - Minuteman III Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td></td>
<td></td>
<td>Blds. E2, O1, M3, M4, R5, M5/R6</td>
</tr>
<tr>
<td>1968</td>
<td>Sept - INTELSAT III (Total 8, Final Launch 7/70)</td>
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<td></td>
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<tr>
<td>1969</td>
<td>July - LEMDE (Propulsion, Apollo 11)</td>
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<td>1970</td>
<td>Nov - DSP 1 (Total 23, Final Launch Projected 1/06)</td>
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<td>1971</td>
<td>Nov - DSCS II, 1; 2 (Total 16, Final Launch 10/82)</td>
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<tr>
<td>1972</td>
<td>Apr - Peacekeeper Start</td>
<td>Mar - Pioneer 10 (Total 2, Final Launch 4/73)</td>
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<td>1973</td>
<td>BDL (Laser)</td>
<td></td>
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<td>1974</td>
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<tr>
<td>1975</td>
<td></td>
<td>NACL (Laser)</td>
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<tr>
<td>1976</td>
<td>July, Sept - VIKING 1, 2</td>
<td></td>
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<tr>
<td>1978</td>
<td>Feb - FLTSATCOM 1 (Total 8, Final Launch 9/89)</td>
<td>July - TOMAHAWK (Propulsion)</td>
<td>MIRACL (Laser)</td>
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</tbody>
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*See acronym list  ** Primary building list, occupation or dedication date listed
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<th>Year</th>
<th>Project Milestones</th>
<th>Major Facilities Milestones**</th>
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<tr>
<td>1979</td>
<td>Sept - MILSTAR</td>
<td>Bld. O2 Start</td>
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<tr>
<td>1980</td>
<td>March - ABRES</td>
<td>Bld. 110, TF-1</td>
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<tr>
<td>1981</td>
<td>Apr - Small ICBM Start</td>
<td>Bld. O3, 140, D1</td>
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<td>1982</td>
<td>Apr - TDRS 1 (Total 7, Final Launch 7/95)</td>
<td>Bld. 134, T-1</td>
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<td>1983</td>
<td>Apr - GRO</td>
<td>Rancho Carmel</td>
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<td>1984</td>
<td>Jan - TDRS 2, Challenger</td>
<td>Bld. O4</td>
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<td>1985</td>
<td>ALPHA (Laser)</td>
<td></td>
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<tr>
<td>1986</td>
<td>July - TOMS</td>
<td></td>
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<td>1987</td>
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<td>1988</td>
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<td>1989</td>
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<td>1990</td>
<td>ALI (Laser)</td>
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<td>1998</td>
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<tr>
<td>1999</td>
<td>Jan - ROCSAT 1; July - Chandra; Dec - KOMPSAT</td>
<td>Sept – THEL (Laser, missile-salvo shoot-down)</td>
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<tr>
<td>2000</td>
<td>Sept – THEL (Laser, missile-salvo shoot-down)</td>
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<td>2001</td>
<td>May - EOS AQUA</td>
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<td>2002</td>
<td>Feb - DSP 22; July- EOS AURA ABL (Laser, “first light”)</td>
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<td>2003</td>
<td></td>
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<td>2004</td>
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<td>2005</td>
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</tr>
<tr>
<td>2006</td>
<td>Jan - DSP 23 (Projected)</td>
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</table>
Acronyms

Organizations

BR    Bunker Ramo
BTL    Bell Telephone Laboratories
CSD    Civil Systems Division
DSD    Defense Systems Division
E&D    Electronics and Defense Sector
E&TD   Electronics and Technology Division
EDG    Energy Development Group
GE     General Electric
GMRD   Guided Missile Research Division
NG     Northrop Grumman
S&TD   Space and Technology Division
S&TG   Space and Technology Group
STL    Space Technology Laboratories
Tapco  Thompson Aircraft Products Company
TRW    Thompson Ramo Wooldridge

Programs

ABL    Airborne Laser
ALI    Alpha Lamp Integration
AXAF   Advanced X-Ray Astrophysics Facility (Chandra)
BDL    Baseline Demonstration Laser
DSCS   Defense Satellite Communications System
DSP    Defense Support Program
EOS    Earth Observing System (Aqua and Aura)
FLOTSATCOM Fleet Satellite Communication System
GRO    Gamma Ray Observatory
HEAO   High Energy Astronomy Observatory
KOMPSAT Korea Multipurpose Satellite
LEMDE  Lunar Excursion Module Descent Engine
MILSTAR Military Strategic-Tactical and Relay
MIRACL Mid-Infrared Advanced Chemical Laser
MM     Minuteman
NACL   Navy ARPA Chemical Laser
OGO    Orbiting Geophysical Observatory
ROCSAT Republic of China Satellite
TDRSS  Tracking and Data Relay Satellite System
THEL   Tactical High Energy Laser
TOMS   Total Ozone Mapping Spectrometer – Earth Probe
Appendix A

Key Dates and Milestones

Thompson Products
Key Dates and Milestones
Thompson Products

December 1900  Incorporated as “Cleveland Cap Screw Co.” for producing machine screws by electrically welding heads to stems

August 1903  Alexander Winton (born 1860) bought stock in the company

1904  Charlie Thompson (born 1871) hired as electrician

1905  Winton Motor Co. acquired majority interest in Cleveland Cap Screw Co. with Winton as president

1906  Automobile valve production started using the electric-welding cap-screw method

Thompson appointed General Manager

1908  “Cleveland Cap Screw Co.” renamed “Electric Welding Products Co.”

1915  “Electric Welding Products Co.” renamed “Steel Products Co.”

Market expanded to aircraft valves

1916  Thompson hired Harvard graduate Fred Crawford (born 1891)

Thompson forced Winton and his investors to sell their interest in Steel Products Co.
Thompson became president

1926  Company renamed “Thompson Products”

1927  Produced valves for Lindberg's airplane, “Spirit of St. Louis”

1933  Thompson died suddenly

1934  Crawford successfully assumed company control

1941  Tapco (Thompson Aircraft Products Co.) founded
Produced 400,000 automobile and aircraft valves per month at peak

1953  Thompson Products provided the financial backing for The Ramo-Wooldridge Corporation

1958  Crawford retired (died at age 103 in 1994)
Dave Wright, Horace Shepard assumed management of Thompson Products
Appendix B

The Ramo-Wooldridge Organization Chart, 1955
Appendix C

STL Organization Announcement, 1957
THE RAMO-WOOLDRIDGE CORPORATION

Los Angeles 45, California

INTEROFFICE CORRESPONDENCE

To: All Employees

CC:

Date: November 22, 1957

Subject: Organizational Announcement

From: D. E. Wooldridge

The attached news story, to be released to the press tomorrow, tells of the creation and functions of the new Space Technology Laboratories as an autonomous division of The Ramo-Wooldridge Corporation.

Dr. Simon Ramo will be President; Dr. Louis G. Dunn, Executive Vice President and General Manager; and Dr. Ruben F. Mettler, Vice President and Assistant General Manager of the Laboratories.

D.E.W.

aj
LOS ANGELES, Calif. -- Establishment of the Space Technology Laboratories as an autonomous operating division of The Ramo-Wooldridge Corporation was announced today by Dean E. Wooldridge, President.

The new division is an outgrowth and extension of the former Guided Missile Research Division, a unit of the company responsible for the technical direction and systems engineering for the Air Force Ballistic Missile Program ATLAS, TITAN and THOR missiles.

Space Technology Laboratories will have its own completely separate personnel, facilities and services, according to Dr. Wooldridge. Transfer to the Laboratories of certain additional research facilities, technical and administrative supporting services previously provided on a company-wide basis, is also planned. In addition, transfer of several top R-W scientists and technical experts to the enlarged Laboratories' organization will shortly be announced.
In pointing out that all organization rearrangements are intended to increase the strength and flexibility of the Laboratories' technical support provided to expanding Air Force space weapons programs, Dr. Wooldridge revealed that only research, development, systems engineering, and technical study types of activities are planned. He added that "like its predecessor, the Guided Missile Research Division, Space Technology Laboratories will engage in no manufacturing operations, its objective being to serve the Government and its production contractors in the vital field of space weapon systems."

Ramo-Wooldridge Corporation executive changes, reflecting the importance of the Space Technology Laboratories' role, were also announced by Dr. Wooldridge. Dr. Simon Ramo will relinquish his duties as Executive Vice President and Secretary of the Corporation to devote full time as President of the Space Technology Laboratories. Dr. Ramo will remain as a Board member of the parent Ramo-Wooldridge Corporation. Other top officers in Space Technology Laboratories will include Dr. Louis G. Dunn, Executive Vice President and General Manager, and Dr. Ruben F. Mettler, Vice President and Assistant General Manager.
Appendix D

STL Organization Chart, April 1960
(just prior to formation of Aerospace Corp.)
Appendix E

TRW Inc. Organization Announcement, 1965
MEMORANDUM TO ALL DIRECTORS AND MANAGERS

GUIDELINES FOR USE OF OUR NEW NAME

Two significant name changes have been announced recently:

Thompson Ramo Wooldridge Inc. has been
changed to TRW Inc., and

Effective today, TRW Space Technology
Laboratories becomes TRW Systems Group

For use external to TRW it is preferred that the short version of our
name, TRW Systems, be used. Either TRW or TRW Inc. is correct
to describe the Corporation as a whole. When it is desired to main-
tain our separate identity within the Corporation, and/or to indicate
our position in the Corporation, our full name, TRW Systems Group,
should be used for clarity and emphasis. When space is limiting, and
if it is not essential to distinguish us from other units of the Corporation,
TRW is an appropriate abbreviation for TRW Systems. All other abbre-
viations, such as TRW/S, TRW-S, TRW-SG, etc., are not to be used.

External correspondence, other than that requiring the full corporate
name, should be signed as follows:

For one-page letter on
company letterhead

Sincerely,

For a letter of more than one
page (final sheet on plain bond)

Sincerely,

R. D. Jones, Director
Guidance Laboratory

R. D. Jones, Director
Guidance Laboratory
TRW Systems
For proposals, official contractual correspondence and other instances where the full corporate name should be used for formal or legal purposes, the following signature block applies:

TRW INC.

R. D. Jones, Director
Guidance Laboratory
TRW Systems Group

In this signature block, the use of TRW Systems instead of TRW Systems Group is optional. As a general rule, we will refer to ourselves as TRW Systems in the body of all letters, reports, etc., prepared for outside use.

External to TRW we will use new stationery, business forms, etc., prepared with our new name. Until such new material is available, a label, "Our New Name is TRW Systems, TRW Inc.," has been prepared for use with old forms.

Where it is desirable to identify our old name with our new name, a label, "Formerly TRW Space Technology Laboratories (STL)," is available for use with our new stationery.

Internal to TRW and TRW Systems, including interoffice correspondence, the TRW prefix may be dropped from our name. Here we will use either Systems Group or Systems. Internally our present stocks of stationery, business forms, and other materials will be utilized until they are exhausted.

Effective today our switchboards will answer "TRW Systems," and our official mailing address is:

TRW Systems
One Space Park
Redondo Beach, California 90278

E. B. DOLL
Appendix F

TRW Systems Organization Chart, 1965
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TRW Systems Organization Chart, 1971
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TRW Space & Electronics Group

Defense Systems Division
Donald C. Winter
Vice President and General Manager
Marvin S. Stone
Vice President and Deputy General Manager
- National defense space systems (DSP, F EWS, etc.)
- Systems engineering
- Operations and maintenance
- Remote Sensing Center

Federal Systems Division
Edward J. Nowacki
Vice President and General Manager
- NASA programs (TDRS, AXAF, TOMS, etc.)
- NOAA
- Commercial contracts

Electronic Systems Division
Paul Y. Sasaki
Vice President and General Manager
- Spacecraft payloads
- Communication links
- Payload subsystems
- Electronic components

Spacecraft Technology Division
Donald C. Stager
Vice President and General Manager
- Spacecraft engineering, fab, assembly and test
- Spacecraft technology
- Brilliant Pebbles
- Brilliant Eyes
- STEP

Electronic Technology Division
Robert M. Fielding
Vice President and General Manager
- Electronic technologies
- Electronic products design, fab, integration and test

Applied Technology Division
Joseph Miller
Vice President and General Manager
- Optical payloads
- Propulsion and combustion
- Directed energy
- Strategic technologies
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