



OFFICERS

PRESIDENT, 2017-18
Matthew Goldman
Ericsson

PAST PRESIDENT, 2017-18
Robert P. Seidel
CBS Television Networks

EXECUTIVE VICE PRESIDENT, 2017-18
Patrick Griffis
Dolby Laboratories

STANDARDS VICE PRESIDENT, 2018-19
Bruce Devlin
Mr MXF Ltd.

FINANCE VICE PRESIDENT, 2018-19
Hans Hoffmann
EBU

EDUCATION VICE PRESIDENT, 2017-18
Richard Welsh
Sundog Media Toolkit

MEMBERSHIP VICE PRESIDENT, 2018-19
Peter Wharton
BroadStream Solutions, Inc.

SECRETARY/TREASURER, 2018-19
John Ferder

EXECUTIVE DIRECTOR
Barbara H. Lange
SMPTE Headquarters

DIRECTORS

STANDARDS DIRECTORS
John Hurst
CineCert LLC
Dave Schnuelle
Dolby Laboratories, Inc.

John Snow
Cobalt Digital

EDUCATION DIRECTORS
Sara Kudrle
Imagine Communications

Sean Lancaster
University of Bristol

Yvonne Thomas
Arvato Systems

Jaclyn Pytlarz
Dolby Laboratories, Inc.

MEMBERSHIP DIRECTORS
Karl Kuhn
Tektronix Inc.
John Maizels
Entropy Enterprises
Herbert "Jay" Dunmore
Loyola University of Maryland

GOVERNORS

GOVERNORS-AT-LARGE, 2018
Michael DeValue
The Walt Disney Studios

Seth Hallen
Pixelogic Media Partners, LLC

ASIA/PACIFIC REGION

Ward Hansford, 2018-19
Grass Valley

Masayuki Sugawara, 2017-18
NEC Corporation

CANADIAN REGION

François Vaillant, 2017-18
CBC/Radio Canada

Paul Briscoe, 2018-19
Televisory Consulting

CENTRAL REGION

Brian Claypool, 2017-18
Christie Digital

EASTERN REGION

Renard Jenkins, 2018-19
PBS

George Hoover, 2017-18
Retired

HOLLYWOOD REGION

Paul Chapman, 2018-19
SIM Group

Andrew G. Setos, 2017-18
Blackstar Engineering

Christopher Fetner, 2017-18
Netflix

INTERNATIONAL REGION

Siegfried Foessel, 2018-19
Fraunhofer IIS

Francois Abbe, 2017-18
Quest Media

NEW YORK REGION

Douglas I. Sheer, 2017-18
DIS Consulting Corp.

Sara Kudrle, 2018-19
Imagine Communications

SOUTHERN REGION

Merrick Ackermans, 2018-19
MVA Broadcast Consulting

Michael Koetter, 2017-18
Turner Broadcasting

U.K. REGION

Mark Harrison, 2018-19
Digital Production Partnership (DPP)

WESTERN REGION

Gary Mandle, 2017-18
Sony Electronics Inc.

Ben Waggoner, 2018-19
Amazon

SECTION CHAIRS

ATLANTA
Bob Baker
Turner Broadcasting

AUSTRALIA

Paul Broderick
Telstra

CENTRAL TEXAS

Rick Ackermans (*Governor*)

CHICAGO

Brian Claypool (*Governor*)

DALLAS/FORT WORTH

Michael Koetter (*Governor*)

DETROIT

Frank J. Maynard
CBS Television Stations

FLORIDA

Ken Botelho
Principle Engineering Consultant

GERMANY

Siegfried Foessel (*Governor*)
Fraunhofer IIS

HOLLYWOOD

Jim DeFilippis
TMS Consulting

HONG KONG

Tony Ngai
Salon Films (H.K.) Ltd.

INDIA

Ujwal Nirgudkar
KPMG India

ITALY

Alfredo Bartelletti
BLT Italia srl

MONTREAL/QUEBEC

Daniel Guevin
Radio Canada

NASHVILLE

Michael Koetter (*Governor*)

NEW ENGLAND

Martin P. Feldman
The Camera Co., Inc.

NEW YORK

Jeff Cohen
IMT-Vislink

NORDIC

Francois Abbe (*Governor*)

OHIO

John R. Owen
Q Communications, LLC

PHILADELPHIA

James Lien
ACV Video Solutions

PACIFIC/NORTHWEST

Mark Siegel
Advanced Broadcast

PITTSBURGH

Daniel Turk
NEP Group

POLAND

Kamil Rutkowski
Di Factory

ROCHESTER

Ricardo R. Figueroa
Rochester Institute of Technology

ROCKY MOUNTAIN

Tom Craig
Rocky Mountain PBS

RUSSIA

Oleg Berezin
Nevafilm Co.

SACRAMENTO

Tim Walker
Grass Valley, A Belden Brand

SAN FRANCISCO

Keith Ian Graham
Graham Associates

TORONTO

Leigh Whitcomb
Imagine Communications

UNITED KINGDOM

Simon Gauntlett
Dolby

WASHINGTON, D.C.

Tom Hackett
Communications Engineering, Inc.

STUDENT CHAPTERS BY SECTION

AUSTRALIA

Charles Sturt University
Wagga Wagga, NSW,
Australia

Sydney Student Section
Sydney, Australia

DALLAS

Baylor University
Waco, TX

CHICAGO

Purdue University
West Lafayette, IN

FLORIDA

Full Sail University
Winterpark, FL

HOLLYWOOD

Los Angeles City College
Los Angeles, CA

Marymount
Rancho Palos Verdes, CA

Pasadena City College
Pasadena, CA

Media Arts Collaborative
Charter School
Albuquerque, NM

USC University of Southern
California
Los Angeles, CA

HONG KONG

Hong Kong Design Institute
(HKDI)

Hong Kong

Hong Kong Institute of
Vocational Education (IVE)
New Territories, Hong Kong

NEW ENGLAND

Stonehill College
Easton, MA

Fitchburg State University
Fitchburg, MA

NEW JERSEY

Rowan University
Glassboro, NJ

Stevens Institute of Technology
Hoboken, NJ

William Patterson University
Wayne, NJ

NEW YORK

Borough of Manhattan
Community College
New York, NY

Bronx Community College
Bronx, NY

New York City College
of Technology
Brooklyn, NY

Kingsborough Community College
Brooklyn, NY

PHILADELPHIA

Millersville University
Millersville, PA

ROCHESTER

Rochester Institute
of Technology
Rochester, NY

UNITED KINGDOM

Birmingham City University
Birmingham, U.K.

WASHINGTON, D.C.

Ravensbourne
London, U.K.

Southampton Solent University
Southampton, Hampshire, U.K.

University of Salford
Manchester, U.K.

University of Surrey
Guildford, U.K.

WASHINGTON, DC

George Mason University
Fairfax, VA

Loyola University
Baltimore, MD

BOARD OF EDITORS
John Belton, *Chairman*

Ioan Allen
Harvey Arnold

David Bancroft
Al Barton

Steve Bilow
V. Michael Bove

Wayne Bretl
John Brooks

Angela Bünger
Patrick Candy

Dominic Case
Curtis Chan

Philip Cianci
Andres C. Colpa

Greg Coppa
Don Craig

Michael DeValue
Michael A. Dolan

Thomas Edwards

John Emmett
Lincoln L. Endelman

John Ferder
Nuno Fonseca

John Footen
Norbert Gerfelder

Brad Gilmer
Paul R. Goldberg

Keith Graham
Eric Gsell

Scott Hamilton
John Hartwell

Paul Hearty
Hans Hoffmann

Randall Hoffner
Tomlinson Holman

Fred Huffman
Kim Iannone

Kees Schouhamer Immink
Stephen Jensen

Louis Kerofsky
Al Kovalick

Sara Kudrle
W. J. Kumeling

Vicki Lau
Michael Liebman

Peter Ludé
John Luff

Ian MacSpadden
Andrew H. Maltz

Tets Maniwa
Richard Marcus

Donald C. McCroskey
William C. Miller

Natalie Morningstar
Neil Neubert

James E. O'Neal
Pirkko Oittinen

Karl Paulsen
Glen Pensinger

Felix Poulin
Charles Poynton

Pete Putman
Ed Reuss

Adam Schadle
Mark Schubin

Gavin Schutz
Thomas A. Scott

Neil Shaw
Wes Simpson

Akash Singh
Michael Smith

James Snyder
Kevin Stec

Steve Storozum
Stephen A. Stough

Peter D. Symes
Paul Thurston

Aleksandar Todorović
Upasna Vishnoi

Reinhard E. Wagnerr
Evans Wetmore

Jerry Whitaker
Jim Wilkinson

William Y. Zou

SMPTE Motion Imaging Journal (ISSN: 1545-0279) published 10 times per year by the Society of Motion Picture and Television Engineers, Inc., 445 Hamilton Ave., Suite 601, White Plains, NY 10601. Periodicals postage paid at White Plains, NY, and at additional mailing office. Copyright © 2018 by the Society of Motion Picture and Television Engineers, Inc. No part of this issue may be reproduced without written permission of the publisher. Statements and opinions expressed in articles or editorials in the *SMPTE Motion Imaging Journal* are expressions of contributors and do not necessarily represent the policies or opinions of the Society. A complete list of SMPTE membership types and benefits is available at www.smpte.org. Advertisements appearing in this publication are the sole responsibility of the advertiser. Subscription rates: SMPTE Members, \$35 USD, included in membership dues; straight subscription: \$750 (shipping included); SMPTE owns the copyrights to all published material, unless otherwise stated. *SMPTE Motion Imaging Journal* is registered with Canada Post: CPM # 41003019. POSTMASTER: Send change of address to *SMPTE Motion Imaging Journal*, 445 Hamilton Ave., Suite 601, White Plains, NY 10601. All rights reserved.

PRINTED IN THE USA