

MULTIPLEX TELEPHONY AND TELEGRAPHY

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649445028

Multiplex Telephony and Telegraphy by George O. Squier

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

GEORGE O. SQUIER

**MULTIPLEX
TELEPHONY
AND TELEGRAPHY**

Professional Paper of the Signal Corps, U. S. Army

MULTIPLEX TELEPHONY AND TELEGRAPHY

BY MEANS OF ELECTRIC
WAVES GUIDED BY WIRES

BY

GEORGE O. SQUIER

Major (now Major General), Signal Corps, U. S. Army

Reprinted January, 1919



WASHINGTON
GOVERNMENT PRINTING OFFICE

1919

KF 3365



WAR DEPARTMENT
Document No. 300
OFFICE OF THE CHIEF SIGNAL OFFICER

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF STAFF,
Washington, March 29, 1911.

The following report on "Multiplex Telephony and Telegraphy by Means of Electric Waves Guided by Wires," prepared in the office of the Chief Signal Officer of the Army by Maj. George O. Squier, Signal Corps, is published as a professional paper of the Signal Corps for the information of the Regular Army and the Organized Militia.

By direction of the Secretary of War:

LEONARD WOOD,
Major General, Chief of Staff.



CONTENTS.

	Page.
I. INTRODUCTION.....	7
Apparatus and equipment.....	9
The 100,000 cycle generator.....	9
Constants of the telephone line.....	13
II. DUPLEX-DUPLEX TELEPHONY OVER WIRE CIRCUITS.....	14
Duplex telephony, using one grounded circuit.....	19
Silent-earth circuits.....	22
Duplex telephony, using metallic circuit.....	26
Resonance.....	29
III. DUPLEX-DUPLEX TELEGRAPHY.....	30
IV. MEASUREMENTS OF ELECTRIC WAVES OF FREQUENCIES FROM 20,000 TO 100,000 CYCLES PER SECOND ON A STANDARD TELE- PHONE CABLE LINE.....	33
Resonance curves.....	34
Coefficient of coupling.....	35
Stiffness function $\frac{L}{C}$	35
Selectivity curves.....	55
Electrical dimensions of tuning elements.....	57
Transmitting impedance at resonance by the voltmeter- ammeter method.....	60
Resonance curve at receiving end.....	61
Attenuation frequency curve.....	63
V. SUMMARY.....	64

MULTIPLEX TELEPHONY AND TELEGRAPHY BY MEANS OF ELECTRIC WAVES GUIDED BY WIRES.

I. INTRODUCTION.

Electrical transmission of intelligence, so vital to the progress of civilization, has taken a development at present into telephony and telegraphy over metallic wires; and telegraphy and, to a limited extent, telephony, through the medium of the ether by means of electric waves.

During the past 12 years the achievements of wireless telegraphy have been truly marvelous. From an engineering viewpoint, the wonder of it all is that, with the transmitting energy being radiated out over the surface of the earth in all directions, enough of this energy is delivered at a single point on the circumference of a circle, of which the transmitting antenna is approximately the center, to operate successfully suitable receiving devices by which the electromagnetic waves are translated into intelligence.

The "plant efficiency" for electrical energy in the best types of wireless stations yet produced is so low that there can be no comparison between it and that of the least efficient transmission of energy by conducting wires.

The limits of audibility, being a physiological function, are well known to vary considerably, but they may be taken to be in the neighborhood of 16 complete cycles per second as the lower limit and 15,000 to 20,000 cycles per second as the upper limit. If, therefore, we could impress upon a wire circuit for transmitting intelligence harmonic electromotive forces of frequencies between 0 and 16 cycles per second, or, again, above 15,000 to 20,000 cycles per second, we would be assured that whatever effects such electric-wave frequencies produced upon metallic lines, the present apparatus employed in operating them could not translate this effect into audible signals.