

# CONTENTS

## VOLUME XA

### Lasers

Yariv, A. and Gordon, J. P.: THE LASER. . . . .	3
Dicke, R. H.: THE COHERENCE BRIGHTENED LASER. . . . .	29

### Ruby Lasers

Maiman, T. H.: STIMULATED OPTICAL RADIATION IN RUBY . . . . .	51
Maiman, T. H.: STIMULATED OPTICAL EMISSION IN FLUORESCENT SOLIDS. I. THEORETICAL CONSIDERATIONS . . . . .	52
Maiman, T. H., Hoskins, R. H., D'Haenens, I. J., Asawa, C. K. and Evtuhov, V.: STIMULATED OPTICAL EMISSION IN FLUORESCENT SOLIDS. II. SPECTROSCOPY AND STIMULATED EMISSION IN RUBY. . . . .	58
Collins, R. J., Nelson, D. F., Schawlow, A. L., Bond, W., Garrett, C. G. B., and Kaiser, W.: COHERENCE, NARROWING DIREC- TIONALITY AND RELAXATION OSCILLATIONS IN THE LIGHT EMISSION FROM RUBY . . . . .	65
Collins, R. J. and Nelson, D. F.: THE PULSED RUBY OPTICAL MASER. . . . .	68
McClung, F. J. and Schwarz, S. E.: R <sub>2</sub> LINE OPTICAL MASER ACTION IN RUBY . . . . .	82
Kisliuk, P. P., and Boyle, W. S.: THE PULSED RUBY MASER AS A LIGHT AMPLIFIER . . . . .	84
Woodbury, E. J. and Ng, W. K.: RUBY LASER OPERATION IN THE NEAR IR. . .	89
Nelson, D. F. and Boyle, W. S.: A CONTINUOUSLY OPERATING RUBY OPTICAL MASER . . . . .	90
Johnson, L. F., Boyd, G. D., Nassau, K. and Soden, R. R.: CONTINUOUS OPERATION OF A SOLID-STATE OPTICAL MASER . . . . .	93
Geusic, J. E. and Scovil, H. E. D.: A UNIDIRECTIONAL TRAVELING- WAVE OPTICAL MASER. . . . .	99
Szabo, A. and Lipsett, F. R.: SIDE EMISSION FROM RUBY LASER RODS . . . . .	126
Schawlow, A. L., and Devlin, G. E.: SIMULTANEOUS OPTICAL MASER ACTION IN TWO RUBY SATELLITE LINES . . . . .	127
Ciftan, M., Krutchkoff, A. and Koozekanani, S.: ON THE RESONANT FREQUENCY MODES OF RUBY OPTICAL MASERS. . . . .	130
Duncan, R. C., Jr., Kiss, Z. J., and Wittke, J. P.: DIRECT OBSERVATION OF LONGITUDINAL MODES IN THE OUTPUT OF OPTICAL MASERS. . . . .	131
Baker, J. A., and Peters, C. W.: MODE SELECTION AND ENHANCEMENT WITH A RUBY LASER . . . . .	133
Evtuhov, V., and Neeland, J. K.: OBSERVATIONS RELATING TO THE TRANSVERSE AND LONGITUDINAL MODES OF RUBY LASER . . . . .	134
Dayhoff, E. S.: EMISSION PATTERNS OF A RUBY LASER. . . . .	138
Dayhoff, E. S.: THE EMISSION MODE PATTERNS OF RUBY LASERS . . . . .	139
Berkley, D. A., and Wolga, G. J.: COHERENCE STUDIES OF EMISSION FROM A PULSED RUBY LASER . . . . .	155
Lipsett, M. S. and Mandel, L.: COHERENCE TIME MEASUREMENTS OF LIGHT FROM RUBY OPTICAL MASERS . . . . .	159
Aagard, R. L., Hardwick, D. L. and Ready, J. F.: EMISSION PATTERN OF RUBY LASER OUTPUT. . . . .	165
Evtuhov, V. and Neeland, J. K.: MEASUREMENTS AND INTERPRETATION OF LASER BEAM DIVERGENCE . . . . .	166

Koozekanani, S., Debye, P. P., Krutchkoff, A., and Ciftan, M.: MEASUREMENTS OF THE LASER OUTPUT . . . . .	167
McMurtry, B. J.: INVESTIGATION OF RUBY OPTICAL MASER CHARACTERISTICS USING MICROWAVE PHOTOTUBES . . . . .	168
Kisliuk, P. and Walsh, D. J.: THE INTERFERENCE BETWEEN BEAMS FROM THE OPPOSITE ENDS OF A RUBY OPTICAL MASER . . . . .	188
Weisman, D.: SPATIAL DISTRIBUTION OF LIGHT ACROSS THE END OF A RUBY LASER . . . . .	193
D'Haenens, I. J. and Asawa, C. K.: STIMULATED AND FLUORESCENT OPTICAL EMISSION IN RUBY FROM 4.2° to 300° K: ZERO-FIELD SPLITTING AND MODE STRUCTURE . . . . .	195
Kaiser, W., Sugano, S. and Wood, D. L.: SPLITTING OF THE EMISSION LINES OF RUBY BY AN EXTERNAL ELECTRIC FIELD . . . . .	203
Ciftan, M., Luck, C. F., Shafer, C. G., and Statz, H.: A RUBY LASER WITH AN ELLIPTIC CONFIGURATION . . . . .	206
Devlin, G. E., McKenna, J., May, A. D., and Schawlow, A. L.: COMPOSITE ROD OPTICAL MASERS . . . . .	207
Abella, I. D., and Cummins, H. Z.: THERMAL TUNING OF RUBY OPTICAL MASER . . . . .	212
Dils, R. R., Martin, G. W., and Huggins, R. R.: OBSERVATIONS ON THE CHROMIUM DISTRIBUTION IN SYNTHETIC RUBY CRYSTALS . . . . .	214
Bortfeld, D. P., Congleton, R. S., Geller, M., McComas, R. S., Riley, L. D., Sooy, W. R. and Stitch, M. L.: THE INFLUENCE OF OPTICAL QUALITY ON RUBY LASER OSCILLATORS AND AMPLIFIERS . . . . .	219
Olt, R. D.: SYNTHETIC MASER RUBY . . . . .	230
Burns, G. and Nathan, M. I.: QUANTUM EFFICIENCY OF RUBY . . . . .	238

#### Relaxation Oscillations In Ruby Lasers

Hellwarth, R. W.: THEORY OF THE PULSATION OF FLUORESCENT LIGHT FROM RUBY . . . . .	243
DeMaria, A. J., Gagosz, R. and Barnard, G.: ULTRASONIC-REFRACTION SHUTTER FOR OPTICAL MASER OSCILLATORS . . . . .	247
DeMaria, A. J.: ULTRASONIC-DIFFRACTION SHUTTERS FOR OPTICAL MASER OSCILLATORS . . . . .	251
Stitch, M. L., Woodbury, E. J. and Morse, J. H.: REPETITIVE HAIR-TRIGGER MODE OF OPTICAL MASER OPERATION . . . . .	256
Basov, N. G., Zuev, V. S., and Krjukov, P. B.: INCREASE OF POWER OF THE IMPULSE OPTICAL QUANTUM GENERATOR ON RUBY BY MODULATION OF THE RESONATOR QUALITY FACTOR . . . . .	257
McClung, F. J., and Hellwarth, R. W.: CHARACTERISTICS OF GIANT OPTICAL PULSATIONS FROM RUBY . . . . .	259
Nedderman, H. C., Kiang, Y. C., and Unterleitner, F. C.: CONTROL OF RUBY LASER OSCILLATION BY AN INHOMOGENEOUS MAGNETIC FIELD . . . . .	267
Koozekanani, S., Ciftan, M., and Krutchkoff, A.: OBSERVATION OF QUASI C.W. OPERATION OF AN OPTICAL RUBY MASER . . . . .	268
Collins, R. J., and Kisliuk, P.: CONTROL OF POPULATION INVERSION IN PULSED OPTICAL MASERS BY FEEDBACK MODULATION . . . . .	270
Tang, C. L., Statz, H., and deMars, G.: REGULAR SPIKING AND SINGLE-MODE OPERATION OF RUBY LASER . . . . .	273
Tang, C. L., Statz, H. and deMars, G.: SPECTRAL OUTPUT AND SPIKING BEHAVIOR OF SOLID-STATE LASERS . . . . .	276
Tang, C. L.: ON MASER RATE EQUATIONS AND TRANSIENT OSCILLATIONS . . . . .	283

CONTENTS

ix

Kafalas, P., Masters, J. I., and Murray, E. M. E.: PHOTSENSITIVE LIQUID USED AS A NONDESTRUCTIVE PASSIVE Q-SWITCH IN A RUBY LASER . . . . .	289
---	-----

Rare Earth Lasers

Johnson, L. F.: OPTICAL LASER CHARACTERISTICS OF RARE-EARTH IONS IN CRYSTALS . . . . .	297
Snitzer, E.: OPTICAL MASER ACTION OF $Nd^{+3}$ IN A BARIUM CROWN GLASS . .	310
Snitzer, E.: NEODYMIUM GLASS LASER . . . . .	313
Maurer, R. D.: OPERATION OF A $Nd^{3+}$ GLASS OPTICAL MASER AT 9180 Å . . .	336
Gandy, H. W. and Ginther, R. J.: SIMULTANEOUS LASER ACTION OF NEODYMIUM AND YTTERBIUM IONS IN SILICATE GLASS. . . . .	338
Wittke, J. P., Kiss, Z. J., Duncan, R. C. and McCormick, J. J.: URANIUM-DOPED CALCIUM FLUORIDE AS A LASER MATERIAL . . . . .	339
Bostick, H. A. and O'Connor, J. R.: INFARED OSCILLATIONS FROM $CaF_2:U^{+3}$ MASERS . . . . .	346
Kaiser, W., Garrett, C. G. B. and Wood, D. L.: FLUORESCENCE AND OPTICAL MASER EFFECTS IN $CaF_2:Sm^{++}$ . . . . .	347
Preziosi, S., Soden, R. R. and Van Uitert, L. G.: LARGE ALKALI METAL AND ALKALINE EARTH TUNGSTATE AND MOLYBDATE CRYSTALS FOR RESONANCE AND EMISSION STUDIES . . . . .	358
Etzel, H. W., Gandy, H. W., and Ginther, R. J.: STIMULATED EMISSION OF INFARED RADIATION FROM YTTERBIUM ACTIVATED SILICATE GLASS . .	359
Gandy, H. W., Ginther, R. J.: STIMULATED EMISSION OF ULTRA-VIOLET RADIATION FROM GADOLINIUM-ACTIVATED GLASS. . . . .	361
Yariv, A., Porto, S. P. S., and Nassau, K.: OPTICAL MASER EMISSION FROM TRIVALENT PRASEODYMIUM IN CALCIUM TUNGSTATE . . . . .	372
Gandy, H. W. and Ginther, R. J.: STIMULATED EMISSION FROM HOLMIUM ACTIVATED SILICATE GLASS . . . . .	375
Gandy, H. W., Ginther, R. J., and Weller, J. F.: ENERGY TRANSFER IN SILICATE GLASS COACTIVATED WITH CERIUM AND NEODYMIUM . . . . .	376
Gandy, H. W., and Ginther, R. J., and Weller, J. F.: RADIATIONLESS RESONANCE ENERGY TRANSFER FROM $UO_2^{2+}$ TO $Nd^{3+}$ IN CO-ACTIVATED BARIUM CROWN GLASS <sup>1</sup> . . . . .	378
Gandy, H. W., Ginther, R. J., and Weller, J.: ENERGY TRANSFER IN SILICATE GLASS COACTIVATED WITH CERIUM AND YTTERBIUM . . . . .	381
Kiss, Z. J. and Duncan, R. C., Jr.: OPTICAL MASER ACTION IN $CaWO_4:Er^{3+}$ . .	386
Kiss, Z. J. and Duncan, R. C.: PULSED AND CONTINUOUS OPTICAL MASER ACTION IN $CaF_2:Dy^{2+}$ . . . . .	387
Kiss, Z. J.: ZEEMAN TUNING OF THE $CaF_2:Tm^{2+}$ OPTICAL MASER <sup>1</sup> . . . . .	389
Kiss, Z. J., Lewis, H. R., and Duncan, R. C., Jr.: SUN PUMPED CONTINUOUS OPTICAL MASER <sup>1</sup> OVER A RANGE OF $1.5\text{ CM}^{-1}$ . . . . .	391
Young, C. G.: CONTINUOUS GLASS LASER. . . . .	393
Frankl, D. R.: POWER AND EFFICIENCY CONSIDERATIONS IN CONTINUOUS LASER OPERATION . . . . .	395

Europium Chelate Lasers

Lempicki, A. and Samuelson, H.: OPTICAL MASER ACTION IN EUROPIUM BENZOYLACETONATE . . . . .	401
Wolff, N. E. and Pressley, R. J.: OPTICAL MASER ACTION IN AN $Eu^{+3}$ -CONTAINING ORGANIC MATRIX . . . . .	404
Lempicki, A. and Samuelson, H.: STIMULATED PROCESSES IN ORGANIC COMPOUNDS . . . . .	407

## Semiconductor Lasers

Hall, R. N., Fenner, G. E., Kingsley, J. D., Soltys, T. J., and Carlson, R. O.: COHERENT LIGHT EMISSION FROM GaAs JUNCTIONS . . . . .	413
Nathan, M. I., Dumke, W. P., Burns, G., Dill, F. H., and Lasher, G.: STIMULATED EMISSION OF RADIATION FROM GaAs p-n JUNCTIONS. . . . .	416
Quist, T. M., Rediker, R. H., Keyes, R. J., Krag, W. E., and Lax, B., McWhorter, A. L., Zeiger, H. J.: SEMICONDUCTOR MASER OF GaAs . . . . .	419
Holonyak, N. and Bevacqua, S. F.: COHERENT (VISIBLE) LIGHT EMISSION FROM Ga(As <sub>1-x</sub> P <sub>x</sub> ) JUNCTIONS . . . . .	421
Holonyak, N. Jr., Bevacqua, S. F., Bielan, C. V., Carranti, F. A., Hess, B. G., and Lubowski, S. J.: ELECTRICAL PROPERTIES OF Ga(As <sub>1-x</sub> P <sub>x</sub> ) p-n JUNCTIONS. . . . .	423
Holonyak, N., Jr.: PREPARATION AND PROPERTIES OF Ga(As <sub>1-x</sub> P <sub>x</sub> ) p-n JUNCTION LASERS . . . . .	424
Holonyak, N., Jr., Jillson, D. C., and Bevacqua, S. F.: HALOGEN VAPOR TRANSPORT AND GROWTH OF EPITAXIAL LAYERS OF INTERMETALLIC COMPOUNDS AND COMPOUND MIXTURES . . . . .	440
Holonyak, N. Jr., Bevacqua, S. F., Bielan, C. V., and Lubowski, S. J.: THE "DIRECT-INDIRECT" TRANSITION IN Ga(As <sub>1-x</sub> P <sub>x</sub> ) p-n JUNCTIONS <sup>1</sup> . . . . .	451
Burns, G. Nathan, M. I.: LINE SHAPE IN GaAs INJECTION LASERS. . . . .	454
McWhorter, A. L., Zeiger, H. J., and Lax, B.: THEORY OF SEMICONDUCTOR MASER OF GaAs . . . . .	456
Fowler, A. B.: QUENCHING OF GALLIUM-ARSENIDE INJECTION LASERS . . . . .	457
Melngailis, I. and Rediker: MAGNETICALLY TUNABLE CW InAs DIODE MASER. . . . .	460
Melngailis, I. Strauss, A. J., and Rediker, R. H.: SEMICONDUCTOR DIODE MASERS. . . . .	463
Yariv, A. and Leite, R. C. C.: DIELECTRIC-WAVEGUIDE MODE OF LIGHT PROPAGATION IN p-n JUNCTIONS. . . . .	463
Leite, R. C. C. and Yariv, A.: ON MODE CONFINEMENT IN p-n JUNCTIONS. . . . .	467
Bond, W. L., Cohen, B. G., Leite, R. C. C., and Yariv, A.: OBSERVATION OF THE DIELECTRIC-WAVEGUIDE MODE OF LIGHT PROPAGATION IN p-n JUNCTIONS. . . . .	468
McWhorter, A. L.: ELECTROMAGNETIC THEORY OF THE SEMI-CONDUCTOR JUNCTION LASER . . . . .	471
Nathan, M. I. and Burns, G.: RECOMBINATION RADIATION IN GaAs by OPTICAL AND ELECTRICAL INJECTION . . . . .	478
Keyes, R. W.: DOPING OF SEMICONDUCTORS FOR INJECTION LASERS. . . . .	480
Burns, G. and Nathan, M. I.: THE EFFECT OF TEMPERATURE ON THE PROPERTIES OF GaAs LASER . . . . .	481
Cheroff, G., Stern, F. and Triebwasser, S.: QUANTUM EFFICIENCY OF GaAs INJECTION LASERS. . . . .	483
Melngailis, I.: MASER ACTION IN InAs DIODES . . . . .	485
Weiser, K. and Levitt, R. S.: STIMULATED LIGHT EMISSION FROM INDIUM PHOSPHIDE <sup>1</sup> . . . . .	488
Burns, G., Levitt, R. S., and Weiser, K.: SOME PROPERTIES OF InP LASERS . . . . .	490
Nelson, D. F., Gershenson, M., Ashkin, A., D'Asaro, L. A., and Sarace, J. C.: BAND-FILLING MODEL FOR GaAs INJECTION LUMINESCENCE . . . . .	491
Bernard, M. G. A. and Duraffourg, G: LASER CONDITIONS IN SEMI-CONDUCTORS. . . . .	494
Basov, N. G., Krokhin, O. N., and Popov, Y. M.: USE OF INDIRECT TRANSITIONS IN SEMICONDUCTORS FOR THE DETERMINATION OF STATES WITH NEGATIVE ABSORPTION COEFFICIENTS. . . . .	499
Basov, N. G., Krokhin, O. N., and Popov, Y. M.: PRODUCTION OF NEGATIVE-TEMPERATURE STATES IN P-N JUNCTIONS OF DEGENERATE SEMICONDUCTORS. . . . .	504

## Other Papers Relating to Lasers

Van Uitert, L. G.: SOLID STATE MASER MATERIAL . . . . .	507
Nassau, K.: EFFECT OF GROWTH PARAMETERS ON THE THRESHOLD OF $\text{CaWO}_4\text{:Nd}$ CRYSTALS . . . . .	530
Tonks, L.: FILAMENTARY STANDING-WAVE PATTERN IN A SOLID- STATE MASER . . . . .	540
Becker, C. H.: QUARTZ ULTRAVIOLET LASERS . . . . .	547
Svelto, O. and DiDomenico, M., Jr.: HIGH-INDEX-OF-REFRACTION SPHERICAL SHEATH COMPOSITE-ROD OPTICAL MASERS . . . . .	551
Masters, J. I.: COUPLING OF LASER RODS . . . . .	560
Masters, J. I. and Parrent, G. B., Jr.: PROPAGATION IN LASER CRYSTALS . .	561
Houston, T. W., Johnson, L. F., Kisliuk, P. and Walsh, D. J.: TEMPERA- TURE DEPENDENCE OF THE REFRACTIVE INDEX OF OPTICAL MASER CRYSTALS . . . . .	562

## Gas Type Lasers

Bennett, W. R., Jr.: GASEOUS OPTICAL MASERS . . . . .	573
Lamb, W. E., Jr.: THEORY OF AN OPTICAL MASER . . . . .	611
Javan, A.: POSSIBILITY OF PRODUCTION OF NEGATIVE TEMPERATURE IN GAS DISCHARGE . . . . .	633
Basov, N. G. and Krokhin, O. N.: POPULATION INVERSION IN A DIS- CHARGE IN A MIXTURE OF TWO GASES . . . . .	636
Javan, A., Bennett, W. R., Jr., and Herriott, D. R.: POPULATION INVERSION AND CONTINUOUS OPTICAL MASER OSCILLATION IN A GAS DISCHARGE CONTAINING A He-Ne MIXTURE . . . . .	640
Dicke, R. H.: MOLECULAR AMPLIFICATION AND GENERATION SYSTEMS AND METHODS . . . . .	645
Herriott, D. R.: OPTICAL PROPERTIES OF A CONTINUOUS HELIUM- NEON OPTICAL MASER . . . . .	665
Javan, A., Ballik, E. A., and Bond, W. L.: FREQUENCY CHARACTERISTICS OF A CONTINUOUS-WAVE He-Ne OPTICAL MASER . . . . .	672
Bloom, A. L., Bell, W. E., and Rempel, R. C.: LASER OPERATION AT $3.39\mu$ IN A HELIUM-NEON MIXTURE . . . . .	674
Koster, G. F. and Stutz, H.: PROBABILITIES FOR THE NEON LASER TRANSITIONS . . . . .	676
Paananen, R. A.: RESONANT AMPLIFICATION IN A GAS MASER . . . . .	678
Van Bueren, H. G., Haisma, J., and DeLang, H.: A SMALL AND STABLE CONTINUOUS GAS LASER . . . . .	679
Patel, C. K. N.: OPTICAL POWER OUTPUT IN HeNe AND PURE Ne MASER . . .	681
McFarland, R. A., Faust, W. L., and Patel, C. K. N.: OSCILLATION ON f-d TRANSITIONS IN NEON IN A GAS OPTICAL MASER . . . . .	683
Luck, C. F., Paananen, R. A., and Stutz, H.: DESIGN OF A HELIUM- NEON GASEOUS OPTICAL MASER . . . . .	684
Watson, W. R., and Polanyi, R. G.: RADIATION PATTERNS OF CONFOCAL He-Ne LASER . . . . .	685
Rigden, J. D. and White, A. D.: SIMULTANEOUS GAS MASER ACTION IN THE VISIBLE AND INFRARED . . . . .	687
Bennett, W. R., Jr.: HOLE BURNING EFFECTS IN A He-Ne OPTICAL MASER . .	688
Bennett, W. R., Jr., Faust, W. L., McFarlane, R. A., and Patel, C. K. N.: DISSOCIATIVE EXCITATION TRANSFER AND OPTICAL MASER OSCILLATION IN Ne-O <sub>2</sub> RF DISCHARGE . . . . .	702
Bennett, W. R., Jr.: RELAXATION MECHANISMS, DISSOCIATIVE EXCITATION TRANSFER AND MODE PULLING EFFECTS IN GAS LASERS .	706

Kogelnik, H. and Patel, C. K. N.: MODE SUPPRESSION AND SINGLE FREQUENCY OPERATION IN GASEOUS OPTICAL MASERS . . . . .	724
Rigrod, W. W., Kogelnik, H., Brangaccio, D. J., and Herriott, D. R.: GASEOUS OPTICAL MASER WITH EXTERNAL CONCAVE MIRRORS . . . . .	725
Patel, C. K. N., McFarlane, R. A., and Faust, W. L.: OPTICAL MASER ACTION IN C, N, O, S, AND Br ON DISSOCIATION OF DIATOMIC AND POLYATOMIC MOLECULES . . . . .	727
Paananen, R., Tang, C. L., and Statz, H.: ZEEMAN EFFECTS IN GASEOUS HeNe OPTICAL MASERS . . . . .	732
Jaseja, T. S., Javan, A., and Townes, C. H.: FREQUENCY STABILITY OF He-Ne MASERS AND MEASUREMENTS OF LENGTH . . . . .	739
Patel, C. K. N., Faust, W. L., and McFarlane, R. A.: HIGH GAIN GASEOUS (Xe-He) OPTICAL MASERS . . . . .	742
Schawlow, A. L. and Townes, C. H.: INFRARED AND OPTICAL MASERS . . . . .	744
Rabinowitz, P., Jacobs, S., and Gould, G.: CONTINUOUS OPTICALLY PUMPED Cs LASER . . . . .	754
Jacobs, S., Gould, G., and Rabinowitz, P.: COHERENT LIGHT AMPLIFICA- TION IN OPTICALLY PUMPED Cs VAPOR . . . . .	758
Patel, C. K. N., Bennett, W. R., Jr., Faust, W. L., and McFarlane, R. A.: INFRARED SPECTROSCOPY USING STIMULATED EMISSION TECHNIQUES . . . . .	761
Faust, W. L., McFarlane, R. A., Patel, C. K. N., and Garrett C. G. B.: GAS MASER SPECTROSCOPY IN THE INFRARED . . . . .	764
Paananen, R. A. and Bobroff, D. L.: VERY HIGH GAIN GASEOUS (Xe-He) OPTICAL MASER AT $3.5\mu$ . . . . .	768
Bloom, A. L.: OBSERVATION OF NEW VISIBLE GAS LASER TRANSITIONS BY REMOVAL OF DOMINANCE . . . . .	770
White, A. D., Gordon, E. L., and Rigden, J. D.: OUTPUT POWER OF THE 6328-A GAS MASER . . . . .	772
White, A. D.: INCREASED POWER OUTPUT OF THE 6328A GAS MASER . . . . .	774
White, A. D. and Rigden, J. D.: CONTINUOUS GAS MASER OPERATION IN THE VISIBLE . . . . .	776
McFarlane, R. A., Bennett, W. R., Jr., and Lamb, W. E., Jr.: SINGLE MODE TUNING DIP IN THE POWER OUTPUT OF AN He-Ne OPTICAL MASER . . . . .	777
Gordon, E. I., Labuda, E. F., and Bridges, W. B.: CONTINUOUS VISIBLE LASER ACTION IN SINGLY IONIZED ARGON, KRYPTON, AND XENON . . . . .	779
Aisenberg, S.: THE EFFECT OF HELIUM ON ELECTRON TEMPERATURE AND ELECTRON DENSITY . . . . .	782
Fork, R. L. and Patel, C. K. N.: BROADBAND MAGNETIC FIELD TUNING OF OPTICAL MASERS . . . . .	785
White, A. D. and Rigden, J. D.: THE EFFECT OF SUPER-RADIANCE AT $3.39\mu$ ON THE VISIBLE TRANSITIONS IN THE He-Ne MASER . . . . .	787
Faust, W. L., McFarlane, R. A., Patel, C. K. N., and Garrett, C. G. B.: NOBLE GAS OPTICAL MASER LINES AT WAVELENGTHS BETWEEN 2 AND $35\mu$ . . . . .	789
Rigden, J. D. and White, A. D.: OPTICAL MASER ACTION IN IODINE AND MERCURY DISCHARGES . . . . .	800
Gas Lasers Employing Molecular Transitions	
Mathias, L. E. S. and Parker, J. T.: STIMULATED EMISSION IN THE BAND SPECTRUM OF NITROGEN . . . . .	805
Muller, M. W., Sher, A., Solomon, R. and Dow, D. G.: NON-EQUILIBRIUM DISTRIBUTIONS OF MOLECULAR VIBRATIONAL STATES . . . . .	808
Patel, C. K. N.: SELECTIVE EXCITATION THROUGH VIBRATIONAL ENERGY TRANSFER AND OPTICAL MASER ACTION IN N <sub>2</sub> -CO <sub>2</sub> . . . . .	811
Patel, C. K. N.: CW HIGH POWER N <sub>2</sub> -CO <sub>2</sub> LASER . . . . .	814