

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

FOR THE FISCAL YEAR ENDED DECEMBER 31, 1998

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

Commission File No. 0-25826

HARMONIC LIGHTWAVES, INC.

(Exact name of Registrant as specified in its charter)

DELAWARE

77-0201147

(State of incorporation)

(I.R.S. Employer Identification No.)

549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

(Address, including zip code, and telephone number,
including area code, of Registrant's principal executive offices)

Securities registered pursuant to section 12(b) of the Act: None

Securities registered pursuant to section 12(g) of the Act: Common Stock, par
value \$.001 per share

Indicate by check mark whether the Registrant (1) has filed all reports required
to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during
the preceding 12 months (or for shorter period that the Registrant was required
to file such reports), and (2) has been subject to such filing requirements for
the past 90 days.

Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405
of Regulation S-K is not contained herein, and will not be contained, to the
best of the Registrant's knowledge, in definitive proxy or information
statements incorporated by reference in Part III of this Form 10-K or any
amendment to this Form 10-K. _____

Based on the closing sale price of the Common Stock on the NASDAQ National
Market System on March 1, 1999, the aggregate market value of the voting stock
held by non-affiliates of the Registrant was \$85,570,254. Shares of Common Stock
held by each officer and director and by each person who owns 5% or more of the
outstanding Common Stock have been excluded in that such persons may be deemed
to be affiliates. This determination of affiliate status is not necessarily a
conclusive determination for other purposes.

The number of shares outstanding of the Registrant's Common Stock, \$.001 par
value, was 11,969,776 at March 1, 1999.

DOCUMENTS INCORPORATED BY REFERENCE

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The Board Compensation Committee Report and the Performance Graph to be
included with the 1999 Proxy Statement shall not be deemed to be "soliciting
material" or to be "filed" with the Commission or otherwise incorporated by
reference into this report.

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PART I

ITEM 1. BUSINESS

OVERVIEW

Harmonic designs, manufactures and markets digital and fiber optic systems for delivering video, voice and data services over cable, satellite and wireless networks. Our advanced solutions enable cable television and other network operators to provide a range of broadcast and interactive broadband services that include high-speed Internet access, telephony and video on demand. We offer a broad range of fiber optic transmission and digital headend products for hybrid fiber coax, satellite and wireless networks, and our acquisition of New Media Communication in January 1998 has allowed us to develop and expand our product offerings to include high-speed data delivery software and hardware.

INDUSTRY BACKGROUND

Demand for Broadband Access

The demand for broadband access has increased significantly in recent years due in large part to the dramatic growth of the Internet, which has facilitated commercial applications such as telecommuting and electronic commerce as well as widespread use of the Web for communicating and accessing information. IDC estimates that the number of devices that access the Internet worldwide will increase from approximately 78 million at the end of 1997 to approximately 515 million by the end of 2002. Rapid growth in the number of Internet users and the demand for more bandwidth-intensive video, voice and data content has strained existing communications networks and created bottlenecks, especially in the "last mile" of the communications infrastructure where homes connect to the local network. Increasingly, individuals who experience the value of high-speed Internet access from their work locations are demanding similar levels of speed from their home or laptop connection. Access to the Internet over the last mile using standard telephone dial-up connections, however, has been limited generally to speeds of up to 56Kbps.

Competition and Deregulation

Increased demand for high-speed broadband access, combined with recent and proposed regulatory reform, has spurred competition among communications service providers worldwide to offer combinations of video, voice and data services. Historically, U.S. long distance carriers and regional Bell operating companies, or RBOCs, were generally limited to providing only telephony services in the residential market. Cable television multiple system operators, or MSOs, also were generally limited to providing video programming. As a result, neither the RBOCs nor the cable operators had networks conducive to providing high-speed data services to residential subscribers. The Telecommunications Act of 1996,

however, permitted cable operators, long-distance carriers and local exchange carriers such as the RBOCs to enter each other's markets. As a result, AT&T has acquired TCI and announced plans to offer broadband and interactive services, including telephony, on a broad scale over TCI's cable systems in the next few years. Similarly, RBOCs are deploying various digital subscriber line technologies, or xDSL, for high-speed data services over their existing copper networks. A number of RBOCs also have deployed alternative delivery systems such as hybrid fiber coax, or HFC, fiber to the curb and wireless for data and video transmission. In certain major metropolitan areas, new carriers have entered the market. For example, companies such as RCN and 21st Century are building state of the art HFC networks to compete with incumbent RBOCs and cable operators.

Similar deregulation of telecommunications and broadcasting abroad has fostered substantial growth and competition in many foreign communications markets. The emergence of direct broadcast satellite, or DBS, systems internationally and in the United States has subjected cable operators to

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increasing competitive pressures. DBS systems offer consumers up to 200 channels of digital video programming. In addition, operators in other countries with more established DBS infrastructures are introducing data services to meet the growing demand from residential and small business customers for Internet access.

Response of the Cable Operators

To address increasing competition and demand for high-speed broadband services, cable operators are introducing voice and data services in addition to video. By offering bundled packages of broadband services, cable operators are seeking to obtain a competitive advantage over telephone companies and DBS providers and to create additional revenue streams.

In order to provide high-speed Internet access, cable operators are beginning to deploy cable modems in a number of major metropolitan areas. Cable modems provide significantly faster and easier access to the Internet than traditional 28Kbps or 56Kbps telephone modems. Cable modems are frequently offered in conjunction with Internet content services such as @Home or Road Runner by cable operators, which seek to accelerate customer adoption by providing a complete hardware and content package. The number of cable modem subscribers in the U.S. at the end of 1998 was estimated to be approximately 500,000, compared to approximately 100,000 in 1997. Forecasts from Paul Kagan Associates suggest that over five million cable modems will be deployed by 2001.

Similarly, cable operators are upgrading and rebuilding their networks to offer digital video, which enables cable operators to provide more channels and better picture quality. Paul Kagan Associates estimated that of the approximately 65 million U.S. cable subscribers, approximately one million homes would install digital set top boxes by the end of 1998 and approximately 7.7 million homes will install digital set top boxes by the end of 2000. Additionally, the FCC has mandated that broadcasters convert to digital format by 2006. Operators, nevertheless, will have to work with both analog and digital video signals for many years.

As telephone carriers are planning to offer broadband voice, data and video services, cable operators are also upgrading and building out their HFC network architectures to provide telephony services. AT&T has set targets of 30% local telephone market share in its initial deployments in TCI systems. In joint venture agreements with partners such as Time Warner, AT&T has guaranteed minimum levels of up to 25% telephony penetration within six years.

The ability of cable operators to deliver digital video, voice and high-speed data services on a broad scale, however, is constrained by the designs of their legacy networks. These networks, which pass more than 90% of U.S. homes, were built initially for one-way broadcast analog television and require substantial upgrades to make them capable of reliably supporting two-way digital services, such as high-speed Internet access and telephony.

Development of the Cable System Network Architecture

The introduction and deployment of hybrid fiber coax network architectures has significantly increased network capacity, quality and reliability. The higher bandwidth of fiber can increase capacity to up to 110 analog channels.

Video compression technologies can further extend the capacity of cable television systems to several hundred channels. However, to accommodate the interactive nature of telephony and Internet services, these networks require installation of return path equipment for the transmission of video, voice and data on the return path from the subscriber to the headend. Additionally, the introduction of telephony service will require the deployment of fiber closer to the subscriber and therefore increase the amount of optical fiber and fiber optic equipment in an HFC network. In order to reliably deliver telephony and data services for large numbers of subscribers, optical fiber will need to serve approximately 50-home groups, as opposed to the 500 to 1,000 home groups that are common in today's networks.

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In addition to upgrading and extending network infrastructure with fiber optics, it will be necessary for cable operators to invest in new digital headend equipment that can receive and process content from a variety of sources in different formats and protocols. Interfaces to wired and wireless, analog and digital, and local and remote sources will increase the complexity of local headends. Moreover, the desire to tailor services to specific groups of customers will require flexibility and ease of configuration at the local network headend.

The Market Opportunity

The upgrade and extension of existing networks to facilitate high-speed broadband video, voice and data services require substantial expenditure and the replacement of significant portions of the transmission network. To date, cable operators have been slow to upgrade their cable plants and network infrastructure due to capital constraints and the need to achieve significant economies of scale to justify such expenditures. Competitive pressures and the desire to capture new revenue opportunities, however, have induced major cable operators to focus on achieving economies of scale by increasing the size of their cable systems. This has been accomplished largely through cable system exchanges and the acquisition of smaller cable operators and independent operators, many of which could not afford the significant costs necessary to upgrade their systems. Having achieved a significant degree of consolidation, many cable operators are now turning their attention to investment in new infrastructure equipment.

As a result of growing demand for broadband services, development and deployment of enabling technologies, significant regulatory change, rapidly increasing competition and considerable industry consolidation, substantial new investments in the cable industry are providing the capital necessary to accelerate the upgrade of the cable infrastructure. Recent examples of this increased investment activity include:

- In 1997, Microsoft invested \$1 billion in Comcast;
- In 1998, Paul Allen acquired Charter Communications for \$4.5 billion and purchased a controlling interest in Marcus Cable for \$2.8 billion;
- In 1999, AT&T completed the acquisition of TCI for approximately \$60 billion and has entered into joint ventures with Time Warner and a number of smaller cable operators.

As cable operators upgrade their networks to meet market demands, we believe that increased recognition of the value of cable networks as a medium for high-speed, interactive video, voice and data, their strategic access to homes and the improved financial strength of cable operators represent a significant market opportunity for broadband communications equipment vendors. Moreover, we believe that these equipment vendors will also benefit from growth in the services offered by wireless, satellite and other broadband service providers.

THE HARMONIC SOLUTION

Harmonic develops, manufactures and markets digital and fiber optic systems for delivering video, voice and data services over cable, wireless and satellite networks. Our technical strengths in optics have allowed us to develop reliable, highly integrated systems that enable cable operators to transport digital video, a greater number of channels and a choice of programming packages over their fiber optic networks. In addition, our advanced solutions enable cable and

other network operators to provide a range of broadcast and interactive broadband services that include high-speed Internet access, telephony and video on demand.

Fiber Optics Products. Our optical transmission products, node and return path products, and element management hardware and software allow operators to deliver traditional broadcast video services while supporting the roll-out of emerging interactive services and managing the fiber network.

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Our new METROLink dense wave division multiplexing, or DWDM, solution also allows cable operators to provide video, voice and data services directly from the network headend to distributed nodes, thereby simplifying network architecture and eliminating the need to install complex electronics in multiple hubs, which significantly reduces the size of hubs and the associated building and maintenance costs.

TRANsend Digital Headend System. Our digital TRANsend platform gives cable, wireless and satellite service providers the flexibility to combine and customize content from a variety of sources for seamless integration and delivery of voice, video and data to different subscriber groups. The TRANsend system leverages our expertise in combining and transporting Internet Protocol, or IP, data together with digital video. In addition, the TRANsend platform is designed to be compliant with established international digital video standards, providing interoperability with equipment from other manufacturers, such as set-top boxes.

CyberStream System. Our CyberStream product line, which we developed and introduced in 1998 following our purchase of New Media Communication, provides a low cost, end to end hardware and software solution for high-speed data delivery, primarily over satellite and wireless networks to residential and business users. These products can support transmission rates of up to 48 Megabits per second.

Our products incorporate network management systems employing internally developed hardware and software to monitor and control the network and increase system availability. The "plug and play" design philosophy and network management employed in our products further enhance ease of installation and operation.

STRATEGY

The key elements of Harmonic's business strategy are as follows:

Develop New Products to Meet Cable Operators' Emerging Broadband Needs. We will continue to develop products to assist cable operators in the introduction of new broadband services and in the design of new network architectures. We believe that the strength of our core technologies and the expertise of our engineering and manufacturing personnel will contribute to the continued development of products that address customer needs in both their transmission networks and their headends. Our recently introduced DWDM and scaleable node products, for example, illustrate our commitment to assisting our customers to reliably and cost-effectively equip their networks for the deployment of new services. Our digital headend products provide operators with the flexibility to market services tailored to particular groups of subscribers. We will continue to design and manufacture products to meet emerging and existing industry standards to facilitate interoperability with other manufacturers' equipment.

Increase Penetration of Major Cable Operators. The five largest U.S. cable operators, which serve a majority of domestic cable subscribers, have purchased a significant amount of our products. We will continue to leverage our close relationships with these and other cable operators to promote increased usage and deployment of our products, particularly as they upgrade and expand their networks through internal build-out or by acquisition of smaller systems. Our sales force and technical personnel work closely with cable operators as part of the sales process to ensure that our products meet cable operators' evolving application needs and technical specifications. We have reorganized and intend to expand our direct sales force to maintain close contact and further develop our relationships with major cable operators.

Provide Highly Integrated Systems. We provide highly integrated systems that allow network operators to manage increasingly complex networks and thereby

reduce maintenance and operating costs. To address cable operators' requirements for comprehensive network and headend solutions, our

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products include a wide range of forward and return path optical transmitters and receivers and a growing portfolio of products for digital headends. We also incorporate network management functions into all of our products, enabling operators to enhance network reliability and optimize system performance. As operators introduce new services over more complex networks, the need for integration and sophisticated network management is becoming more critical. We also design "plug and play" capabilities into our products, enabling them to be easily installed in an existing network without complex and lengthy setup procedures.

Provide Fiber Optic Products to Telephone Companies. As RBOCs begin to upgrade and deploy networks to provide video programming, we seek to provide the high performance transmission systems required for delivery of this service. For example, we have deployed our transmitters and optical amplifiers at one RBOC. Our products are enabling this RBOC to provide video services in addition to voice and high-speed data in a fiber to the curb application. In order to address the needs of telephone company customers, we intend to expand our sales force to support sales to telephone companies or develop a strategic alliance with one or more current suppliers of telephony transmission equipment. We intend to develop closer working relationships with telephone companies as they deploy broadband services.

Expand in Broadband Wireless and Satellite Markets. Through our acquisition of New Media Communication in January 1998, we have developed and now offer our CyberStream high-speed, broadband data delivery hardware and software products, which enable satellite and broadband wireless operators as well as cable operators to offer high-speed Internet access and video distribution. In addition, our TRANsend digital headend platform allows wireless and satellite providers to combine content from a variety of sources for seamless integration and delivery of digital video and high-speed data. We intend to expand our presence in these emerging markets as wireless and satellite operators introduce broadband services.

Increase Sales in International Markets. We currently supply products to a number of large international customers, including cable operators in Canada, Europe, Asia and Latin America. We intend to continue to supply complete network and headend solutions to these and other operators in various international markets. Although certain international markets are currently depressed, we believe that many of the same factors which are driving the adoption of broadband services in the U.S. are present in foreign markets and will, in time, result in increasing opportunities for sales in these markets. Over the past year we have added regional sales and support centers in Europe and Asia and we intend to continue to expand our operations internationally to meet market demands.

PRODUCTS

Harmonic designs, develops, manufactures and markets fiber optic transmission and digital systems, comprised of three product families: fiber optic products, TRANsend digital headend products and CyberStream data delivery products. Our products employ internally developed hardware and software to facilitate a high degree of system integration. The "plug and play" design philosophy and network management employed in our products enhance ease of installation and operation.

FIBER OPTIC PRODUCTS

We have applied our technical strengths in optics and electronics, including expertise with lasers, modulators, and radio frequency technology, to develop products which provide enhanced network reliability and allow broadband service providers to deliver advanced services, including two-way interactive services. We have provided the operator with end-to-end capability in the fiber portion of the network.

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Optical Transmission Systems

We offer MAXLink transmitters and optical amplifiers, PWRLink transmitters and the METROLink system for a wide range of optical transmission requirements.

MAXLink Transmitters and Optical Amplifiers. The MAXLink transmitters and optical amplifiers operate at a wavelength of 1550nm and serve long-haul applications and fiber dense architectures that are beyond the capability of 1310nm transmitters. This system is suited to evolving cable networks employing such features as redundant rings, hub interconnects and broadcast layer transmission.

PWRLink Transmitters. The PWRLink series of optical transmitters incorporates semiconductor lasers and provides optical transmission primarily for use at a headend or hub for local distribution to optical nodes and for narrowcasting, which is the transmission of programming to a select set of subscribers.

METROLink System. Our METROLink system, the first DWDM system for the cable industry, allows operators to expand the capacity of a single strand of fiber and also to provide high-speed narrowcast services directly from the headend to nodes. This ability largely eliminates the need to locate expensive electronic equipment in each network hub, which significantly reduces the size of hubs and the associated building and equipment maintenance costs. By increasing the downstream and upstream capacity of existing optical fiber, METROLink also can eliminate the often significant expense associated with laying additional fiber.

Optical Node Receivers, Return Path and Network Management Products

We offer a number of optical nodes, return path transmitters and return path receivers to provide two-way transmission capability. In addition, we offer network management hardware and software to enable the network operator to monitor and control the entire transmission network.

PWRBlazer Optical Node Receivers. Our PWRBlazer optical node receivers convert optical signals received from the transmitters into radio frequency signals for transmission to the home via coaxial cable. We offer a variety of receiver products for applications including indoor and outdoor use, all of which can be fitted to support two-way traffic.

PWRBlazer Scaleable Optical Node. Our PWRBlazer scaleable optical node is a receiver which can be easily adapted to handle increasing traffic over a fiber network without major reconstruction. It is particularly suited to networks that are expected to handle increasing demands for two-way services and can be flexibly configured to support specific operator requirements.

Return Path Transmitters and Receivers. Our return path transmitters support two-way transmission capabilities by sending video, voice and data signals from the optical node to the headend. Signals originating at the home can be sent via the coaxial cable to the optical node and then transmitted in optical form to the headend by the return path transmitter. Our return path receivers operate at the headend to receive return path optical transmission from the return path transmitters.

NETWatch Management System. Our NETWatch management system consists of transponders and network management software. The transponders operate in broadband networks to capture measurement data. Harmonic's software enables the broadband service operator to monitor and control the entire HFC transmission network from a central office or remote locations. Our NETWatch software is designed to be integrated into larger network management systems through the use of simple network management protocol, or SNMP.

TRANSEND DIGITAL HEADEND PRODUCTS

Our TRANSend digital headend platform consists of a number of products for encoding, compressing, multiplexing and modulating digital signals prior to transmission over broadband networks. It also provides interfaces to incoming and outgoing data streams and various protocols and formats.

Video Transport Platform. Our VTP houses configurable combinations of application modules necessary to perform a variety of functions required at a

digital headend. It includes a bus system which routes data and control information between the application modules under network management control.

Encoders. Our encoders convert analog and digital video and audio signals to compressed digital format fully compliant with the MPEG-2 standard.

Integrated Receiver eXchange Modules. Our IRX modules receive a number of individually encoded digital program streams originating from multiple sources.

Multiplexers. Our multiplexer module combines multiple MPEG-2 streams into one transport stream as well as authorizing conditional access.

Modulators. Our modulators accept digital signals for modulation on to a radio frequency carrier for transmission over a broadband network.

CYBERSTREAM PRODUCTS

CyberStream System. This system enables Internet access and high-speed data delivery primarily over satellite or wireless networks to residential and business subscribers. It is capable of supporting transmission rates of up to 48 Megabits per second which enables applications such as video distribution and distance learning. This system includes a headend data encoder, a network management system and an end-user receiver card which is installed in either a PC or our Enterprisel product.

Enterprisel. The Enterprisel is a network router, which interfaces the CyberStream System with a local area network. It provides desktop broadband access by linking high-speed cable, satellite or wireless networks directly to a LAN.

Procast. Our Procast system is a software package that allows service providers to distribute multimedia information to selected groups of end-users at pre-authorized service levels.

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CUSTOMERS

We sell our products to a variety of broadband communications network operators. Set forth below is a representative list of our customers during 1998.

UNITED STATES

Armstrong
Charter
Comcast
Cox
Jones Intercable
Media One
RCN
TCI
Time-Warner

INTERNATIONAL

A provincial PTT in China
Golden Channels
NTL
Rogers
Shaw
Tele-2
Telewest
Videotron

Historically, the majority of our sales have been to relatively few customers, and we expect this customer concentration to continue in the foreseeable future. In 1998, sales to TCI accounted for 17% of net sales and sales to a Chinese distributor accounted for 11% of net sales. In 1997, Capella (our Canadian distributor) accounted for 17% of net sales. In 1996, sales to Tratec (our former U.K. distributor), Capella, and ANTEC accounted for 15%, 15%, and 13%, respectively, of net sales. No other customer accounted for more than 10% of our net sales in 1998, 1997 or 1996. The loss of a significant customer or any reduction in orders by any significant customer, or our failure to qualify our products with a significant cable operator could adversely affect our business and operating results.

Sales to customers outside of the United States in 1998, 1997 and 1996 represented 43%, 59% and 57% of net sales, respectively. We expect international

sales to continue to account for a substantial portion of our net sales for the foreseeable future. International sales are subject to a number of risks, including changes in foreign government regulations and telecommunications standards, import and export license requirements, tariffs, taxes and other trade barriers, fluctuations in foreign currency exchange rates, difficulty in collecting accounts receivable, difficulty in staffing and managing foreign operations, managing distributor relations and political and economic instability. In recent periods certain Asian and Latin American currencies have devalued significantly in relation to the U.S. dollar. We continue to evaluate the effect of recent developments in Asia and Latin America on our business, and we cannot assure you that our sales will not be materially adversely affected by such developments. We also cannot assure you that international markets will continue to develop or that we will receive future orders to supply our products in international markets at rates equal to or greater than those experienced in recent periods. See "Risk Factors -- We depend on our international sales and are subject to the risks associated with international operations."

SALES AND MARKETING

We sell our products in the United States through our own direct sales force which is organized geographically to support major network operators at both the corporate level and in their individual systems. Our sales force is supported by a highly qualified technical staff. Together, they work closely with customers to design systems and develop technical proposals to optimize system performance and economic benefits for the operators. The technical group also assists customers with installation and post-sale support.

International sales are made primarily to distributors, which are generally responsible for importing the products and providing installation and technical support and service to customers in their territory. However, a small direct sales force, based in Sunnyvale, California, and in Europe and

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Asia is responsible for account management and providing high-level technical support directly to customers as well as to distributors. Our technical group also supports the international sales force.

Because of the cable industry's 24 hour programming requirements, we provide round-the-clock technical support, both directly and through our distributors. We provide training for our customers and distributors, as required, both in our facilities and on-site.

Our marketing organization develops strategies for product lines and, in conjunction with our sales force, identifies evolving technical and application needs of customers so that our product development resources can be most effectively and efficiently deployed to meet anticipated product requirements. Our marketing organization is also responsible for setting price levels, demand forecasting and general support of the sales force, particularly at major accounts. We have many programs in place to heighten industry awareness of Harmonic and our products, including participation in technical conferences, publication of articles in industry journals and exhibiting at trade shows.

MANUFACTURING AND SUPPLIERS

Our manufacturing processes consist primarily of integration, final assembly and test, performed by highly trained personnel employing technologically advanced electronic equipment and proprietary test programs. The manufacturing of our products and subassemblies is a complex process and we cannot assure you that we will not experience production problems or manufacturing delays in the future. Because we utilize our own manufacturing facility for this production, and because such manufacturing capabilities are not readily available from third parties, any interruption in operations could materially and adversely affect our business and operating results.

We use third party contract manufacturers like Sanmina to assemble certain standard parts for our products, including such items as printed circuit boards, metal chassis and power supplies. We intend to subcontract an increasing number of tasks to third parties in the future. Our increasing reliance on subcontractors involves several risks, and we may not be able to obtain an adequate supply of components, subassemblies and modules on a timely basis.

Some components, subassemblies and modules necessary for the manufacture

and integration of our products are obtained from a sole supplier or a limited group of suppliers. In particular, we rely on Fujitsu as a major source of lasers for our PWRLink and return path transmitters, for which there are limited alternative suppliers. In addition, certain optical components used in our METROLink and MAXLink products are currently available only from Uniphase Corporation and JDS FITELE, which recently announced their intention to merge. Although we have qualified alternative suppliers for lasers, in the event that the supply of optical components is interrupted for any reason, products from alternative suppliers are unlikely to be immediately available in sufficient volume to meet our production needs. Further, sole suppliers are providing certain key elements of our digital products. The reliance on sole or limited suppliers, particularly foreign suppliers, involves several risks, including a potential inability to obtain an adequate supply of required components or subassemblies and reduced control over pricing, quality and timely delivery of components. Although we attempt to minimize supply risks by holding safety stocks and continuously evaluating other sources, any interruption in supply could materially adversely affect our business and operating results. We do not maintain long-term agreements with any of our suppliers. While we have been able historically to obtain adequate supplies of components in a timely manner from our principal suppliers, we cannot assure you that we will be able to obtain adequate supplies in the future. Because the purchase of certain key components involves long lead times, in the event of unanticipated increases in demand for our products, we could be unable to manufacture certain products in a quantity sufficient to meet our customers' demand. If we cannot obtain adequate deliveries of key components we may not be

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able to ship products on a timely basis. Delays in shipment could damage relationships with current and prospective customers and could harm our business and operating results.

INTELLECTUAL PROPERTY

We currently hold 12 issued United States patents and 9 issued foreign patents, and have a number of patent applications pending. Although we attempt to protect our intellectual property rights through patents, trademarks, copyrights, maintaining certain technology as trade secrets and other measures, we cannot assure you that any patent, trademark, copyright or other intellectual property right owned by us will not be invalidated, circumvented or challenged, that such intellectual property right will provide competitive advantages to us or that any of our pending or future patent applications will be issued with the scope of the claims sought by us, if at all. We cannot assure you that others will not develop technologies that are similar or superior to our technology, duplicate our technology or design around the patents that we own. In addition, effective patent, copyright and trade secret protection may be unavailable or limited in certain foreign countries in which we do business or intend to do business in the future.

We believe that the future success of our business will depend on our ability to translate the technological expertise and innovation of our personnel into new and enhanced products. We generally enter into confidentiality or license agreements with our employees, consultants, vendors and customers as needed, and generally limit access to and distribution of our proprietary information. Nevertheless, we cannot assure you that the steps taken by us will prevent misappropriation of our technology. In addition, we have taken in the past, and may take in the future, legal action to enforce our patents and other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others, or to defend against claims of infringement or invalidity. Such litigation could result in substantial costs and diversion of resources and could harm our business and operating results.

In order to successfully develop and market our planned products for digital headend applications, we may be required to enter into technology development or licensing agreements with third parties. Although many companies are often willing to enter into such technology development or licensing agreements, we cannot assure you that such agreements will be negotiated on terms acceptable to us, or at all. The failure to enter into technology development or licensing agreements, when necessary, could limit our ability to develop and market new products and could cause our business to suffer.

As is common in our industry, we have from time to time received

notification from other companies of intellectual property rights held by those companies upon which our products may infringe. Any claim or litigation, with or without merit, could be costly, time consuming and could result in a diversion of management's attention, which could harm our business. If we were found to be infringing on the intellectual property rights of any third party, we could be subject to liabilities for such infringement, which could be material, and could be required to seek licenses from other companies or to refrain from using, manufacturing or selling certain products or using certain processes. Although holders of patents and other intellectual property rights often offer licenses to their patent or other intellectual property rights, no assurance can be given that licenses would be offered, that the terms of any offered license would be acceptable to us or that failure to obtain a license would not cause our operating results to suffer.

BACKLOG

We schedule production of our systems based upon our backlog, informal commitments from customers and sales projections. Our backlog consists of firm purchase orders by customers for delivery within the next twelve months. At December 31, 1998, order backlog amounted to

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\$20.8 million, compared to \$5.5 million at December 31, 1997. Anticipated orders from customers may fail to materialize and delivery schedules may be deferred or canceled for a number of reasons, including reductions in capital spending by cable television operators or changes in specific customer requirements. In addition, due to weather-related seasonal factors and annual capital spending budget cycles at many major end-users, our backlog at December 31, 1998 or any other date, is not necessarily indicative of actual sales for any succeeding period.

COMPETITION

The markets for cable television equipment and other broadband communications equipment are extremely competitive and characterized by rapid technological change. The principal competitive factors in these markets include product performance, reliability, price, breadth of product line, network management capabilities, sales and distribution capability, technical support and service and relationships with network operators. Certain of these factors are outside of our control.

Our competitors for fiber optic transmission products include established suppliers of cable television and telecommunications equipment such as ADC Telecommunications, ANTEC, General Instrument, Philips and Scientific-Atlanta, as well as a number of smaller, more specialized companies. For digital headend products, our competitors include many of the same competitors as in fiber optic transmission products, and a number of new competitors, including Divicom, a division of C-Cube and Lucent Technologies. Competitors for CyberStream products in the satellite and wireless market include Broadlogic, Echostar, Hybrid Networks, SAGEM and Philips. Most of our competitors are substantially larger and have greater financial, technical, marketing and other resources than we do. Many of our larger competitors are in a better position to withstand any significant reduction in capital spending by cable television operators and other broadband service providers. In addition, many of our competitors have more long-standing and established relationships with domestic and foreign cable operators than we do.

RESEARCH AND DEVELOPMENT

We have historically devoted a significant amount of our resources to research and development. Research and development expenses in 1998, 1997 and 1996 were \$13.5 million, \$11.7 million, and \$9.2 million, respectively. We expect that research and development expenses will continue to increase in the future.

Our success in designing, developing, manufacturing and selling new or enhanced products will depend on a variety of factors, including the identification of market demand for new products, product selection, timely implementation of product design and development, product performance, effective manufacturing and assembly processes and sales and marketing. Because of the complexity inherent in such research and development efforts, we cannot assure you that we will successfully develop new products, or that new products

developed by us will achieve market acceptance. Our failure to successfully develop and introduce new products could harm our business and operating results.

EMPLOYEES

As of December 31, 1998, we employed a total of 293 people, including 101 in manufacturing operations, 82 in research and development, 77 in sales and marketing and 33 in a general and administrative capacity. We also employ a number of temporary employees and consultants on a contract basis. None of our employees is represented by a labor union with respect to his or her employment by Harmonic. We have not experienced any work stoppages and we consider our relations with our employees to be good. Our future success will depend, in part, upon our ability to attract and retain qualified personnel. Competition for qualified personnel in the communications industry and in our immediate geographic area is intense, and we cannot assure you that we will be successful in retaining our key employees or that we will be able to attract skilled personnel as we grow.

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ITEM 2. PROPERTIES

Our principal operations are located at our corporate headquarters in Sunnyvale, California. The lease on our headquarters building, of approximately 110,000 square feet, expires in July 2006. We have subleased approximately 25,000 square feet of our headquarters through December 1999. We also have several sales offices in the United States, sales and support centers in Europe and Asia and two subsidiaries, N.M. New Media Communication Ltd., and a research and development facility in Israel. We believe that our existing facilities will be adequate to meet our needs for the foreseeable future.

ITEM 3. LEGAL PROCEEDINGS

There are no material pending legal proceedings to which we are a party or to which any of our properties is subject.

ITEM 4. SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS

None.

PART II

ITEM 5. MARKET FOR THE REGISTRANT'S COMMON STOCK AND RELATED SECURITY HOLDER MATTERS

(a) The Company's Common Stock has been quoted on the Nasdaq National Market under the symbol HLIT since the Company's initial public offering on May 22, 1995. Prior to such time, there was no public market for the Common Stock of the Company. The following table sets forth, for the periods indicated, the high and low sales prices per share of the Common Stock as reported on the NASDAQ National Market:

1997 - - - - -	High - - - - -	Low - - - - -
First quarter	\$25.25	\$12.75
Second quarter	\$21.00	\$11.25
Third quarter	\$21.25	\$14.88
Fourth quarter	\$16.50	\$10.25
1998 - - - - -		
First quarter	\$16.25	\$10.63
Second quarter	\$19.00	\$12.13
Third quarter	\$18.00	\$7.63

Fourth quarter

\$18.88

\$8.75

(b) Holders of record: At March 1, 1999, there were 111 stockholders of record of the Company's Common Stock.

(c) Dividends: The Company has never declared or paid any dividends on its capital stock. The Company currently expects to retain future earnings, if any, for the use in the operation and expansion of its business and does not anticipate paying any cash dividends in the foreseeable future. The covenants made by the Company under its existing line of credit prohibit the payment of dividends.

ITEM 6. SELECTED FINANCIAL DATA

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YEAR ENDED DECEMBER 31, (IN THOUSANDS, EXCEPT PER SHARE DATA)	1998	1997	1996	1995	1994
STATEMENT OF OPERATIONS DATA:					
Net sales	\$ 83,857	\$ 74,442	\$ 60,894	\$ 39,180	\$ 18,224
Gross profit	30,555	34,605	27,731	17,851	6,467
Income (loss) from operations(1)	(21,943)	4,506	5,204	3,761	(2,189)
Net income (loss) (1)	(21,453)	4,929	5,918	4,121	(2,368)
Basic net income (loss) per share(2)	(1.85)	0.48	0.59	0.71	--
Diluted net income (loss) per share(2)	(1.85)	0.43	0.52	0.40	--
BALANCE SHEET DATA:					
Cash and cash equivalents	\$ 9,178	\$ 13,670	\$ 16,410	\$ 22,126	\$ 1,743
Working capital	32,318	38,772	34,321	32,495	6,893
Total assets	62,424	58,887	54,633	41,817	14,578
Long term debt, including current portion	577	--	--	--	1,480
Mandatorily Redeemable Convertible Preferred Stock	--	--	--	--	29,215
Stockholders' equity (deficit)	43,474	49,931	43,641	37,009	(20,717)

(1) The 1998 Loss from operations and Net loss include a one-time charge of \$14.0 million for acquired in-process technology. See Note 2 of Notes to Consolidated Financial Statements.

(2) Net loss per share data for periods prior to the commencement of public trading of the company's Common Stock on May 22, 1995 have not been presented as such presentation is not meaningful.

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ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

OVERVIEW

Harmonic designs, manufactures and markets digital fiber optic systems for delivering video, voice and data services over cable, satellite and wireless networks. Almost all of our sales have been derived directly or indirectly from sales of fiber optic transmission systems to cable television operators. With the introduction of our TRANsend digital headend products in 1997 and the subsequent purchase of New Media Communication Ltd., we have broadened our product offering to enable delivery of digital video, voice and data over satellite and wireless networks in addition to cable systems.

To date, a substantial majority of Harmonic's net sales have been to relatively few customers, and Harmonic expects this customer concentration to continue in the foreseeable future. In 1998, sales to TCI accounted for 17% of Harmonic's net sales and sales to a Chinese distributor accounted for 11% of Harmonic's net sales. In 1997, sales to Capella, Harmonic's Canadian distributor, accounted for 17% of Harmonic's net sales. In 1996, sales to Tratec, Harmonic's former U.K. distributor, Capella and ANTEC accounted for 15%, 15% and 13%, respectively, of Harmonic's net sales.

Sales to customers outside of the United States in 1998, 1997 and 1996 represented 43%, 59% and 57% of net sales, respectively. International sales are made primarily to distributors, which are generally responsible for importing the products and providing installation and technical support and service to customers within their territory. We expect international sales to continue to account for a substantial portion of our net sales for the foreseeable future.

Harmonic's net sales in the second half of 1997 and the first quarter of 1998 were negatively affected by a slow-down in spending by cable television operators in the U.S. and in foreign markets. The factors contributing to this slow-down in capital spending included:

- consolidation and system exchanges by our domestic cable customers, which generally have had the initial effect of delaying certain system upgrades;
- uncertainty related to development of digital video and cable modem industry standards;
- delays associated with the evaluation of new services and system architectures by many cable television operators;
- emphasis on marketing and customer service strategies by some international cable television operators instead of construction of networks; and
- general economic conditions in international markets.

While Harmonic's net sales increased in the last three quarters of 1998 from the level achieved in the first quarter of 1998 due to increased spending in the U.S. cable television industry, spending by international cable television operators generally remained weak. Harmonic cannot predict when international cable television spending will increase and whether U.S. cable television spending will continue to grow. In addition, cable television capital spending can be subject to the effects of seasonality, with fewer construction and upgrade projects typically occurring in winter months and otherwise being affected by inclement weather.

In 1998, 1997 and 1996, sales of optical transmitters accounted for approximately 54%, 63%, and 71%, respectively, of net sales and sales of optical node receivers, return path and network management products accounted for approximately 35%, 37%, and 29%, respectively, of net sales. In

1998, TRANsend and CyberStream digital products accounted for 11% of net sales. There were no significant sales of digital products in 1997 or 1996.

Harmonic generally recognizes revenue upon shipment of product. Harmonic does not provide for rights of return to end users or distributors. A provision for the estimated cost of warranty is recorded at the time revenue is recognized. To date, gross margins on sales of optical transmitter products have been higher than sales of receiver and return path products. In addition, sales made to customers outside of the United States have generally carried higher gross margins. In 1999, we expect our gross margins to be below 1997 levels principally due to anticipated softness in certain international markets, continued pricing pressure, our expected mix of products sold and manufacturing start-up costs associated with recent product introductions.

Harmonic often recognizes a substantial portion of its revenues in the last month of the quarter. Harmonic establishes its expenditure levels for product development and other operating expenses based on projected sales levels, and expenses are relatively fixed in the short term. Accordingly, variations in

timing of sales can cause significant fluctuations in operating results. In addition, because a significant portion of Harmonic's business is derived from orders placed by a limited number of large customers, the timing of such orders can also cause significant fluctuations in our operating results. Harmonic's expenses for any given quarter are typically based on expected levels of future sales and if sales are below expectations in any given quarter, the adverse impact of the shortfall on operating results may be magnified by Harmonic's inability to adjust spending to compensate for the shortfall. As a result of these and other factors, Harmonic's operating results in one or more future periods may fail to meet or exceed the expectations of securities analysts or investors. In that event, the trading price of our common stock would likely decline. See "Risk Factors -- Our operating results are likely to fluctuate significantly and may fail to meet or exceed the expectations of securities analysts or investors, causing our stock price to decline."

RESULTS OF OPERATIONS

Harmonic's historical consolidated statements of operations data for each of the three years ended December 31, 1996, 1997 and 1998 as a percentage of net sales, are as follows:

	FISCAL YEAR ENDED DECEMBER 31,		
	1998	1997	1996
Net sales.....	100%	100%	100%
Cost of sales.....	64	54	54
Gross profit.....	36	46	46
Operating expenses			
Research and development.....	16	16	15
Sales and marketing.....	21	18	16
General and administrative.....	8	6	6
Acquired in-process technology.....	17	--	--
Total operating expenses.....	62	40	37
Income (loss) from operations.....	(26)	6	9
Interest and other income, net.....	--	1	1
Income (loss) before income taxes.....	(26)	7	10
Provision for income taxes.....	--	--	--
Net income (loss).....	(26)%	7%	10%

Net Sales

Harmonic's net sales increased by 13% to \$83.9 million in 1998 as compared to \$74.4 million in 1997. This growth in net sales was primarily attributable to the sale of new products, including TRANsend digital headend products, METROLink DWDM systems and PWRBlazer Scaleable Nodes, which began volume shipment during the middle of 1998, as well as to an increase in spending by our domestic customers in the second half of 1998. During 1998 domestic sales increased by 55%, principally due to increased shipments to TCI, while international sales decreased by 17% due to continued weakness in many international markets. The increase in net sales was also due to higher unit sales of existing products partially offset by lower selling prices for certain products. Net sales increased by 22% to \$74.4 million in 1997 from \$60.9 million in 1996. This growth in net sales in 1997 was primarily attributable to higher unit sales of Harmonic's receiver and return path products and sales of the 1550 nm MAXLink transmission system, which began shipment during the second quarter of 1996. These factors were partially offset by lower unit sales of YAGLink transmitters due in part to the increasing acceptance of 1550 nm transmitters among cable operators for broadcast transmission.

Gross Profit

Gross profit decreased to \$30.6 million (36% of net sales) in 1998 from \$34.6 million (46% of net sales) in 1997. The decreases in gross profit and gross margins were principally due to a lower percentage of international sales resulting from reduced demand, a less favorable product mix which included a lower percentage of transmitters, and pricing pressure for certain products due to increased competition. In addition, gross profit and gross margins were negatively impacted by start-up costs associated with new product introductions and an increase in inventory reserves for existing products following the introduction of new products. Harmonic expects gross margins to continue to be below 1997 levels in 1999 due to anticipated softness in certain international markets, expected changes in product mix, pricing pressure for certain products and manufacturing start-up costs associated with recent product introductions. Gross profit increased to \$34.6 million (46% of net sales) in 1997 from \$27.7 million (46% of net sales) in 1996. The increase in gross profit was principally due to higher unit sales volume and lower manufacturing costs, particularly for Harmonic's MAXLink products, which commenced shipment during the second quarter of 1996, and improved margins on return path products resulting from product design changes. These factors were partially offset by a less favorable product mix which included lower sales of transmitters as a percentage of net sales, and lower selling prices for certain products.

Research and Development

Research and development expenses increased to \$13.5 million (16% of net sales) in 1998 from \$11.7 million (16% of net sales) in 1997. The increase in research and development expenses in 1998 was primarily due to increased headcount, particularly at Harmonic's subsidiary in Caesarea, Israel which is continuing to develop Harmonic's TRANsend digital headend products, and to the inclusion of NMC's research and development expenses starting in January 1998. Research and development expenses increased to \$11.7 million (16% of net sales) in 1997 from \$9.2 million (15% of net sales) in 1996. The increase in research and development expenses in 1997 both in absolute dollars and as a percentage of net sales was principally attributable to increased headcount and higher prototype material costs in connection with the node and digital development programs. Research and development expenses for 1998, 1997 and 1996 are net of grants of approximately \$346,000, \$120,000 and \$140,000, respectively. Harmonic anticipates that research and development expenses will continue to increase in absolute dollars, although they may vary as a percentage of net sales.

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Sales and Marketing

Sales and marketing expenses increased to \$18.2 million (21% of net sales) in 1998 from \$13.6 million (18% of net sales) in 1997. The increase in sales and marketing expenses in 1998 both in absolute dollars and as a percentage of net sales was primarily due to higher headcount and costs associated with expansion and reorganization of the direct sales force, technical support and marketing organizations, particularly to support the introduction of our new products. This increase was due to expenses incurred in connection with the recruiting and staffing for new international sales and technical support centers. In addition, higher promotional expenses and the inclusion of NMC's sales and marketing expenses starting in January 1998 contributed to the increase. Sales and marketing expenses increased to \$13.6 million (18% of net sales) in 1997 from \$9.8 million (16% of net sales) in 1996. The increase in sales and marketing expenses in 1997 was primarily due to higher headcount associated with expansion of the direct sales force, customer service and technical support organizations, expenses associated with establishing international sales offices, and higher promotional expenses. Harmonic expects that sales and marketing expenses will continue to increase in absolute dollars, although they may vary as a percentage of net sales.

General and Administrative

General and administrative expenses increased to \$6.8 million (8% of net sales) in 1998 from \$4.8 million (6% of net sales) in 1997. The increase in general and administrative expenses in 1998 was primarily due to the inclusion of NMC's expenses starting in January 1998, as well as costs of supporting Harmonic's growth in overall headcount, and the establishment of international sales and support offices. General and administrative expenses increased to \$4.8 million (6% of net sales) in 1997 from \$3.5 million (6% of net sales) in 1996.

The increase in absolute expenses in 1997 was principally attributable to costs of supporting Harmonic's growth in overall headcount and operations and providing for a higher accounts receivable reserve. Harmonic expects to incur higher levels of general and administrative expenses in the future, although such expenses may vary as a percentage of net sales.

Acquired In-Process Technology

On January 5, 1998, Harmonic acquired NMC, a privately-held Israeli development stage company with 15 employees, for \$17.6 million in a stock-for-stock transaction. Harmonic also assumed all outstanding stock options of NMC. The transaction was accounted for as a purchase and, accordingly, the fair value of the assets and liabilities were recorded based upon their fair value at the time of the transaction. Harmonic determined, with the aid of an independent appraisal, that technological feasibility of the acquired in-process technology had not yet been established. Harmonic also believed that NMC's existing technology would generate no further revenue on account of its obsolescence. Accordingly, no value was assigned to the existing technology. In accordance with generally accepted accounting principles, Harmonic wrote off acquired in-process research and development expenses of \$14.0 million as a one-time charge to operations in the first quarter of 1998.

Historically, NMC had developed receiver cards for data transmission over cable, wireless and satellite networks. These analog products operated at transmission speeds of 5.5Mbps and had been sold only to a limited number of customers. NMC concluded during 1997 that these analog products were rapidly becoming obsolete and discontinued research and development efforts. Based on customer feedback and expected market trends, NMC commenced technology development of the CyberStream System, a digital system designed to provide substantially increased transmission speeds of 48Mbps to 52Mbps and to incorporate differentiated service capabilities and sophisticated network management.

At the time of the NMC acquisition, NMC had commenced development of the CyberStream system, which was comprised of a data gateway at the satellite uplink or cable headend, network management and control features at the headend, and a receiver card for installation in a personal computer or a local area network router device. Just prior to the acquisition, NMC had initiated production of a limited number of prototype receiver cards in order to participate in pilot trials with two prospective customers. Shipment of the prototype cards commenced at the end of 1997.

Harmonic determined that since these products were intended for deployment in networks with large numbers of subscribers, NMC would have to engage in ongoing trials over an extended period to determine the products' technological feasibility. As part of these trials, NMC also shipped initial versions of operating software, but was several months away from completion of critical elements of the CyberStream system, such as quality of service, simple network management protocol and porting of the software to the Windows 98 and NT platforms. Subsequent to the acquisition, Harmonic expended \$1.9 million in 1998 in research and development costs to accelerate development and to incorporate changes resulting from field trial evaluations.

To estimate the value of NMC's existing and in-process technology, the total income forecasted was allocated to existing, in-process and future technology based on the products' scheduled release dates and expected lives. The forecasts assumed timely release of the products as anticipated by Harmonic and that NMC would utilize Harmonic distribution channels. Estimated revenues for the purchased in-process products were assumed to commence by the middle of fiscal year 1998 and increase through fiscal year 2002, at which time they were assumed to decrease through fiscal year 2007, as newer products would be released.

Rapid change and improvements in technology characterize the high-speed data delivery market. Harmonic's future success will depend on its ability to achieve scientific and technological advances and to translate such advances into commercially competitive products on a timely basis that keep pace with competing technological developments and address the increasingly sophisticated needs of our customers.

Interest and Other Income, Net

Interest and other income, net, consisting principally of interest income, was \$0.5 million in 1998, \$0.7 million in 1997 and \$1.0 million in 1996. The decreases in 1998 and 1997 were due primarily to lower interest income on lower

average cash and cash equivalents balances.

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Income Taxes

No provision for income taxes was recorded for 1998 due to the net loss incurred. The provision for income taxes for 1997 and 1996 was based on an estimated annual tax rate of 5% resulting from federal and state alternative minimum taxes and utilization of net operating loss carryforwards. Harmonic had available federal net operating loss carryforwards of approximately \$2.0 million at December 31, 1998. Under current tax law, Harmonic's utilization of its net operating loss carryforwards and tax credits may be limited in certain circumstances resulting from a change in ownership. In 1999, Harmonic expects to have an effective annual tax rate substantially lower than statutory rates, approximating 20% to 25%, due to the utilization of net operating loss carryforwards and tax credit carryforwards. Beyond 1999, Harmonic expects to have an effective annual tax rate that approximates statutory rates.

LIQUIDITY AND CAPITAL RESOURCES

Harmonic completed its initial public offering in May 1995, raising approximately \$24.2 million, net of offering costs. Prior to that, Harmonic satisfied its liquidity needs primarily from the net proceeds of private sales of preferred stock, and to a lesser extent, from capital equipment leases and bank borrowings.

Cash used in operations was \$2.0 million in 1998 compared to cash provided by operations of \$2.0 million in 1997 and \$0.3 million in 1996. The increase in cash used in operations in 1998 compared to 1997 was primarily due to the net loss and higher inventory levels, partially offset by improved customer collections and higher accounts payable and accrued liabilities. The increase in cash provided by operations in 1997 compared to 1996 was principally attributable to slower growth in receivables, inventory and prepaid expenses and other assets, partially offset by lower net income, accounts payable and accrued liabilities.

Net working capital was \$32.3 million at December 31, 1998, including \$9.2 million of cash and cash equivalents. During 1998, Harmonic had a bank line of credit and equipment term loan facilities which provided up to \$12.0 million and \$3.0 million in borrowings, respectively. There were no outstanding borrowings under the bank line at December 31, 1998, although Harmonic had guaranteed certain borrowing facilities of its subsidiaries totaling \$0.9 million with letters of credit and had total letters of credit issued under the line of \$2.7 million, which expire at various dates throughout fiscal year 1999. As of December 31, 1998, borrowings of \$577,000 were outstanding

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under the term loan. These facilities were available until December 1998. During the fourth quarter of 1998, Harmonic agreed to the principal terms of an amended and restated bank line of credit facility, which was finalized in March 1999. The new facility provides for borrowings of up to \$10.0 million with a \$3.0 million equipment term loan sub-limit. This new line, which expires in March 2000, bears interest at the bank's prime rate plus 0.5% (prime rate plus 1.0% under the term loan sub-limit). The line is secured by substantially all of the assets of Harmonic.

Additions to property, plant and equipment were approximately \$4.4 million during 1998 compared to \$4.8 million in 1997 and \$6.7 million in 1996 respectively. While Harmonic currently has no material commitments, it expects to spend approximately \$5.0 million on capital expenditures in 1999, primarily for manufacturing and test equipment.

Harmonic believes that its existing liquidity sources, including its new bank line of credit facility, and anticipated funds from operations will satisfy its cash requirements for at least the next twelve months.

QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market risk represents the risk of loss that may impact the financial

position, results of operations or cash flows of Harmonic due to adverse changes in market prices and rates. Harmonic is exposed to market risk because of changes in foreign currency exchange rates as measured against the U.S. Dollar and currencies of Harmonic's subsidiaries in Israel and in the United Kingdom. Harmonic has not engaged in hedging activities as of December 31, 1998 and does not expect to do so in the foreseeable future.

Harmonic has subsidiaries in Israel and the United Kingdom whose sales are generally denominated in U.S. dollars. While Harmonic does not anticipate that near-term changes in exchange rates will have a material impact on future operating results, fair values or cash flows, Harmonic cannot assure you that a sudden and significant change in the value of the Israeli Shekel or British Pound would not harm Harmonic's financial condition and results of operations.

YEAR 2000 READINESS DISCLOSURE

Many currently installed computer systems and software products are coded to accept only two digit entries in the date code field. These date code fields will need to accept four digit entries to distinguish twenty-first century dates from twentieth century dates. As a result, many companies' software and computer systems may need to be upgraded or replaced in order to comply with such "Year 2000" or "Y2K" requirements.

Harmonic has established a corporate-wide program to address the Y2K issue. This program encompasses product, internal systems and supplier and business partner compliance. The project is comprised of identification of risks, assessment of risks, development of remediation or contingency plans and implementation and testing.

Based upon the assessments to date, all hardware products currently under development or released, and all software products currently under development are Y2K compliant. Certain software products currently installed at customer sites are not Y2K compliant and Harmonic is working with its customers to provide migration paths for each product. Harmonic's significant internal systems have been purchased from outside vendors and are Y2K compliant. Harmonic is in the process of upgrading internal systems that are not currently Y2K compliant, and expects to have this process completed by mid-1999. To date, Y2K costs have not been material to Harmonic and Harmonic does not expect that its Y2K costs will exceed \$100,000 in the future. Harmonic currently does not have a contingency plan to address Y2K issues related to its products and internal systems, but will develop a contingency plan by mid-1999 if its products and internal systems are not yet Y2K compliant. In

addition, Harmonic is working with its suppliers and business partners to identify at what stage they are in the process of identifying and addressing the Y2K issue and to assess the resulting risks and develop appropriate contingency plans. Harmonic will continue to perform compliance reviews and tests to ensure compliance on an ongoing basis. Harmonic currently does not anticipate that the cost of its Y2K program will be material to its financial condition and results of operations.

Although Harmonic has established and commenced its program to address Y2K issues, the failure of Harmonic products to operate properly with regard to the Y2K requirements could (a) cause Harmonic to incur unanticipated expenses to remedy any problems, (b) cause a reduction in sales and (c) expose Harmonic to related litigation by its customers, each of which could harm our business, operating results and financial condition. In addition, Harmonic and third parties with whom it conducts business may utilize equipment or software that may not be Y2K compliant. Failure of Harmonic's or any such third party's equipment or software to operate properly with regard to the Y2K requirements could cause, among other things, Harmonic or any such third party to incur unanticipated expenses or efforts to remedy any problems, which could have a material adverse effect on its or their respective business, operating results and financial condition. Furthermore, the purchasing patterns of customers or potential customers may be affected by Y2K issues as companies expend significant resources to evaluate and to correct their equipment or software for Y2K compliance and as they simultaneously evaluate the preparedness of the third parties with whom they deal. These expenditures may result in reduced funds available to purchase products and services such as those offered by Harmonic, which could have a material adverse effect on Harmonic business, operating results and financial condition.

RISK FACTORS

You should carefully consider the risks described below together with all of the other information included in or incorporated by reference into this prospectus before making an investment decision. The risks and uncertainties described below are not the only ones facing our company. If any of the following risks actually occurs, our business, financial condition or results of operations could be materially adversely affected. In such case, the trading price of our common stock could decline, and you may lose all or part of your investment.

OUR OPERATING RESULTS ARE LIKELY TO FLUCTUATE SIGNIFICANTLY AND MAY FAIL TO MEET OR EXCEED THE EXPECTATIONS OF SECURITIES ANALYSTS OR INVESTORS, CAUSING OUR STOCK PRICE TO DECLINE.

Our operating results have fluctuated in the past and are likely to continue to fluctuate in the future, on an annual and a quarterly basis, as a result of several factors, many of which are outside of our control. Some of the factors that may cause these fluctuations include:

- the level of capital spending of our customers, both in the U.S. and in foreign markets;
- changes in market demand;
- the timing and amount of customer orders;
- competitive market conditions;
- our unpredictable sales cycles;
- new product introductions by our competitors or by us;
- changes in domestic and international regulatory environments;
- market acceptance of new or existing products;
- the cost and availability of components, subassemblies and modules;
- the mix of our customer base and sales channels;
- the mix of our products sold;
- our development of custom products;
- the level of international sales; and
- economic conditions specific to the cable television industry and general economic conditions.

In addition, we often recognize a substantial portion of our revenues in the last month of the quarter. We establish our expenditure levels for product development and other operating expenses based on projected sales levels, and expenses are relatively fixed in the short term. Accordingly, variations in timing of sales can cause significant fluctuations in operating results. In addition, because a significant portion of our business is derived from orders placed by a limited number of large customers, the timing of such orders can also cause significant fluctuations in our operating results. Our expenses for any given quarter are typically based on expected sales and if sales are below expectations in any given quarter, the adverse impact of the shortfall on our operating results may be magnified by our inability to adjust spending to compensate for the shortfall. As a result of all these factors, our operating results in one or more future periods may fail to meet or exceed the expectations of securities analysts or investors. In that event, the trading price of our common stock would likely decline.

WE DEPEND ON CABLE INDUSTRY CAPITAL SPENDING FOR SUBSTANTIALLY ALL OF OUR REVENUE.

Almost all of our sales have been derived, directly or indirectly, from

sales to cable television operators and we expect these sales to constitute a substantial majority for the foreseeable future. Demand for our products depends to a significant extent upon the magnitude and timing of capital spending by cable television operators for constructing, rebuilding or upgrading their systems. The capital spending patterns

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of cable television operators are dependent on a variety of factors, including:

- access to financing;
- cable television operators' annual budget cycles;
- the status of federal, local and foreign government regulation of telecommunications and television broadcasting;
- overall demand for cable television services and the acceptance of new broadband services;
- competitive pressures (including the availability of alternative video delivery technologies such as satellite broadcasting); and
- discretionary customer spending patterns and general economic conditions.

Our net sales in the second half of 1997 and the first quarter of 1998 were negatively affected by a slow-down in spending by cable television operators in the U.S. and in foreign markets. The factors contributing to this slow-down in capital spending included:

- consolidation and system exchanges by our domestic cable customers, which generally have had the initial effect of delaying certain system upgrades;
- uncertainty related to development of digital video and cable modem industry standards;
- delays associated with the evaluation of new services and system architectures by many cable television operators;
- emphasis on marketing and customer service strategies by some international cable television operators instead of construction of networks; and
- general economic conditions in international markets.

While our net sales increased in the last three quarters of 1998 from the level achieved in the first quarter of 1998 due to increased spending in the U.S. cable television industry, spending by international cable television operators generally remained weak. We cannot predict when international cable television spending will increase and whether U.S. cable television spending will continue to grow. In addition, cable television capital spending can be subject to the effects of seasonality, with fewer construction and upgrade projects typically occurring in winter months and otherwise being affected by inclement weather.

OUR CUSTOMER BASE IS CONCENTRATED AND THE LOSS OF ONE OR MORE OF OUR KEY CUSTOMERS WOULD HARM OUR BUSINESS.

Historically, a significant majority of our sales have been to relatively few customers. Sales to our ten largest customers in 1996, 1997 and 1998 accounted for approximately 72%, 56% and 66%, respectively, of net sales. Due in part to the consolidation of ownership of domestic cable television systems, we expect that sales to relatively few customers will continue to account for a significant percentage of our net sales for the foreseeable future. For example, in 1998, sales to TeleCommunications, Inc., or TCI, which was recently acquired by AT&T, represented approximately 17% of our net sales and sales to a Chinese distributor represented approximately 11%. Almost all of our sales are made on a purchase order basis, and none of our customers has entered into a long-term agreement requiring it to purchase our products. The loss of, or any reduction in orders from, a significant customer would harm our business.

WE DEPEND ON OUR INTERNATIONAL SALES AND ARE SUBJECT TO THE RISKS ASSOCIATED

WITH INTERNATIONAL OPERATIONS.

Sales to customers outside of the United States in 1996, 1997 and 1998 represented 57%, 59% and 43% of net sales, respectively, and we expect that international sales will continue to represent a substantial portion of our net sales for the foreseeable future. Our international operations are subject to a number of risks, including:

- changes in foreign government regulations and telecommunications standards;

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- import and export license requirements, tariffs, taxes and other trade barriers;
- fluctuations in currency exchange rates;
- difficulty in collecting accounts receivable;
- the burden of complying with a wide variety of foreign laws, treaties and technical standards;
- difficulty in staffing and managing foreign operations; and
- political and economic instability.

While our international sales are typically denominated in U.S. dollars, fluctuations in currency exchange rates could cause our products to become relatively more expensive to customers in a particular country, leading to a reduction in sales or profitability in that country. We do not currently engage in any foreign currency hedging transactions. Gains and losses on the conversion to U.S. dollars of accounts receivable, accounts payable and other monetary assets and liabilities arising from international operations may contribute to fluctuations in operating results. Furthermore, payment cycles for international customers are typically longer than those for customers in the United States. Unpredictable sales cycles could cause us to fail to meet or exceed the expectations of security analysts and investors for any given period. Further, we cannot assure you that foreign markets will continue to develop.

In recent periods, certain Asian and Latin American currencies have devalued significantly in relation to the U.S. dollar. We believe that financial developments in Asia and Latin America were a major factor contributing to lower international net sales in fiscal 1998 as compared to fiscal 1997. In addition, the uncertain financial situation in Asia has placed financial pressure on some of our distributors. In response, we increased accounts receivable reserves in the first quarter of 1998. We are continuing to evaluate the effect on our business of recent financial developments in Asia and Latin America. Given the current political and economic uncertainties in China and throughout Asia, we cannot assure you that shipment of orders to Asia, including China, will be made as scheduled, or at all. We cannot assure you that our sales and collection cycles in Asia and Latin America will not continue to be harmed by the uncertain financial climate. See "Management's Discussion and Analysis of Financial Condition and Results of Operations."

WE MUST BE ABLE TO MANAGE EXPENSES AND INVENTORY RISKS ASSOCIATED WITH MEETING THE DEMAND OF OUR CUSTOMERS.

From time to time, we receive indications from our customers as to their future plans and requirements to ensure that we will be prepared to meet their demand for our products. In the past, however, we have received such indications but, on occasion, we did not ultimately receive purchase orders for our products. We must be able to effectively manage expenses and inventory risks associated with meeting potential demand for our products. In addition, if we fail to meet customers' supply expectations, we may lose business from such customers. If we expend resources and purchase materials to manufacture products and such products are not purchased, our business and operating results could suffer.

THE MARKET IN WHICH WE OPERATE IS INTENSELY COMPETITIVE AND MANY OF OUR COMPETITORS ARE LARGER AND MORE ESTABLISHED.

The market for cable television transmission equipment is extremely

competitive and has been characterized by rapid technological change. Harmonic's current competitors include significantly larger corporations such as ADC Telecommunications, ANTEC (a company owned in part by TCI), General Instrument, Philips and Scientific-Atlanta. Additional competition could come from new entrants in the broadband communications equipment market, such as Lucent Technologies. Most of these companies are substantially larger and have greater financial, technical, marketing and other resources than we do. Many of these large organizations are in a better position to withstand any significant reduction in capital spending by cable television operators. In addition, many of our competitors have more long stand-

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ing and established relationships with domestic and foreign cable television operators than we do. We cannot assure you that we will be able to compete successfully in the future or that competition will not harm our business.

If any of our competitors' products or technologies were to become the industry standard or if any of our smaller competitors were to enter into or expand relationships with larger companies through mergers, acquisitions or otherwise, our business could be seriously harmed. Further, our competitors may bundle their products or incorporate functionality into existing products in a manner that discourages users from purchasing our products. See "Business -- Competition."

BROADBAND COMMUNICATIONS MARKETS ARE RELATIVELY IMMATURE AND CHARACTERIZED BY RAPID TECHNOLOGICAL CHANGE.

Broadband communications markets are relatively immature, making it difficult to accurately predict the markets' future growth rate, size and technological direction. In view of the evolving nature of these markets, it is possible that cable television operators, telephone companies or other suppliers of broadband wireless and satellite services will decide to adopt alternative architectures or technologies that are incompatible with our current or future products. If we are unable to design, develop, manufacture and sell products that incorporate or are compatible with these new architectures or technologies, our business would suffer.

WE NEED TO DEVELOP AND INTRODUCE NEW AND ENHANCED PRODUCTS IN A TIMELY MANNER TO REMAIN COMPETITIVE.

Broadband communications markets are characterized by continuing technological advancement, changes in customer requirements and evolving industry standards. To compete successfully, we must design, develop, manufacture and sell new or enhanced products that provide increasingly higher levels of performance and reliability. However, we may not be able to successfully develop or introduce these products. Moreover, these products may not achieve broad commercial acceptance and may have lower gross margins than our other products.

In addition, to successfully develop and market our planned products for digital applications, we may be required to enter into technology development or licensing agreements with third parties. We cannot assure you that we will be able to enter into any necessary technology development or licensing agreement on terms acceptable to us, or at all. The failure to enter into technology development or licensing agreements when necessary could limit our ability to develop and market new products and, accordingly, could materially and adversely affect our business and operating results.

WE NEED TO EFFECTIVELY MANAGE OUR GROWTH.

The growth in Harmonic's business has placed, and is expected to continue to place, a significant strain on Harmonic's personnel, management and other resources. Harmonic's ability to manage any future growth effectively will require us to attract, train, motivate and manage new employees successfully, to integrate new employees into our overall operations, to retain key employees and to continue to improve our operational, financial and management systems. If we fail to manage our future growth effectively, our business could suffer.

COMPETITION FOR QUALIFIED PERSONNEL IS INTENSE, AND WE MAY NOT BE SUCCESSFUL IN ATTRACTING AND RETAINING PERSONNEL.

Our future success will depend, to a significant extent, on the ability of

our management to operate effectively, both individually and as a group. We are dependent on our ability to retain and motivate high caliber personnel, in addition to attracting new personnel. Competition for qualified technical and other personnel is intense, particularly in the San Francisco Bay Area and Israel, and we may not be successful in attracting and retaining such personnel.

Competitors and others have in the past and may in the future attempt to recruit our employees. While our employees are required to

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sign standard agreements concerning confidentiality and ownership of inventions, we generally do not have employment contracts or noncompetition agreements with any of our personnel. The loss of the services of any of our key personnel, the inability to attract or retain qualified personnel in the future or delays in hiring required personnel, particularly engineers and other technical personnel, could negatively affect our business.

OUR ACQUISITION OF NMC HAS CREATED NUMEROUS RISKS AND CHALLENGES FOR US.

The acquisition of NMC has placed, and is expected to continue to place, a significant strain on our personnel, management and other resources. The acquisition of NMC in January 1998 has allowed us to develop and expand our product offerings to include broadband high-speed data delivery hardware and software and increased the scope of our international operations in Israel. The acquisition of NMC continues to impose challenges, including:

- the dependence on the evolution and growth of the market for wireless and satellite broadband services;
- difficulties in the assimilation of operations, research and development efforts, products, personnel and cultures of Harmonic and NMC;
- our ability to successfully develop, manufacture and gain market acceptance of the products of NMC; and
- the amortization of goodwill resulting from the acquisition of NMC.

We cannot assure you that we will be able to successfully address these challenges, and our failure to do so could materially and adversely affect our business, financial condition and operating results.

WE MAY BE SUBJECT TO RISKS ASSOCIATED WITH ACQUISITIONS.

We have made and may make investments in complementary companies, products or technologies. If we make acquisitions, we could have difficulty assimilating or retaining the acquired companies' personnel and operations or integrating the acquired technology or products into ours. These difficulties could disrupt our ongoing business, distract our management and employees and increase our expenses. Moreover, our profitability may suffer because of acquisition-related costs or amortization costs for acquired goodwill and other intangible assets. Furthermore, we may have to incur debt or issue equity securities to pay for any future acquisitions, the issuance of which could be dilutive to our existing shareholders. If we are unable to successfully address any of these risks, our business, financial condition and operating results could be harmed.

IF SALES FORECASTED FOR A PARTICULAR PERIOD ARE NOT REALIZED IN THAT PERIOD DUE TO THE UNPREDICTABLE SALES CYCLES OF OUR PRODUCTS, OUR OPERATING RESULTS FOR THAT PERIOD WILL BE HARMED.

The sales cycles of many of our products, particularly our newer products and products sold internationally, are typically unpredictable and usually involve:

- a significant technical evaluation;
- a commitment of capital and other resources by cable and other network operators;
- delays associated with cable and other network operators' internal procedures to approve large capital expenditures;
- time required to engineer the deployment of new technologies or services

within broadband networks; and

- testing and acceptance of new technologies that affect key operations.

For these and other reasons, our sales cycles generally last three to six months, but can last up to 12 months. If orders forecasted for a specific customer for a particular quarter do not occur in that quarter, our operating results for that quarter could be substantially lower than anticipated.

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OUR FAILURE TO ADEQUATELY PROTECT OUR PROPRIETARY RIGHTS MAY ADVERSELY AFFECT US.

We currently hold 12 issued United States patents and 9 issued foreign patents, and have a number of patent applications pending. Although we attempt to protect our intellectual property rights through patents, trademarks, copyrights, maintaining certain technology as trade secrets and other measures, we cannot assure you that any patent, trademark, copyright or other intellectual property right owned by us will not be invalidated, circumvented or challenged, that such intellectual property right will provide competitive advantages to us or that any of our pending or future patent applications will be issued with the scope of the claims sought by us, if at all. We cannot assure you that others will not develop technologies that are similar or superior to our technology, duplicate our technology or design around the patents that we own. In addition, effective patent, copyright and trade secret protection may be unavailable or limited in certain foreign countries in which we do business or may do business in the future.

We believe that the future success of our business will depend on our ability to translate the technological expertise and innovation of our personnel into new and enhanced products. We generally enter into confidentiality or license agreements with our employees, consultants, vendors and customers as needed, and generally limit access to and distribution of our proprietary information. Nevertheless, we cannot assure you that the steps taken by us will prevent misappropriation of our technology. In addition, we have taken in the past, and may take in the future, legal action to enforce our patents and other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others, or to defend against claims of infringement or invalidity. Such litigation could result in substantial costs and diversion of resources and could harm our business and operating results.

In order to successfully develop and market our planned products for digital applications, we may be required to enter into technology development or licensing agreements with third parties. Although many companies are often willing to enter into such technology development or licensing agreements, we cannot assure you that such agreements will be negotiated on terms acceptable to us, or at all. The failure to enter into technology development or licensing agreements, when necessary, could limit our ability to develop and market new products and could cause our business to suffer.

As is common in our industry, we have from time to time received notification from other companies of intellectual property rights held by those companies upon which our products may infringe. Any claim or litigation, with or without merit, could be costly, time consuming and could result in a diversion of management's attention, which could harm our business. If we were found to be infringing on the intellectual property rights of any third party, we could be subject to liabilities for such infringement, which could be material, and could be required to seek licenses from other companies or to refrain from using, manufacturing or selling certain products or using certain processes. Although holders of patents and other intellectual property rights often offer licenses to their patent or other intellectual property rights, we cannot assure you that licenses would be offered, that the terms of any offered license would be acceptable to us or that failure to obtain a license would not cause our operating results to suffer.

WE MAY NEED ADDITIONAL CAPITAL IN THE FUTURE AND MAY NOT BE ABLE TO SECURE ADEQUATE FUNDS IN TERMS ACCEPTABLE TO US.

We currently anticipate that our existing cash balances and available line of credit and cash flow expected to be generated from future operations, will be sufficient to meet our liquidity needs for at least the next twelve months.

However, we may need to raise additional funds if our estimates change or prove inaccurate or in order for us to respond to unforeseen technological or marketing hurdles or to take advantage of unanticipated opportunities.

In addition, we expect to review potential acquisitions that would complement our existing

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product offerings or enhance our technical capabilities. While we have no current agreements or negotiations underway with respect to any potential acquisition, any future transaction of this nature could require potentially significant amounts of capital. Funds may not be available at the time or times needed, or available on terms acceptable to us. If adequate funds are not available, or are not available on acceptable terms, we may not be able to take advantage of market opportunities, to develop new products or to otherwise respond to competitive pressures.

WE PURCHASE SEVERAL KEY COMPONENTS, SUBASSEMBLIES AND MODULES USED IN THE MANUFACTURE OR INTEGRATION OF OUR PRODUCTS FROM SOLE OR LIMITED SOURCES, AND WE ARE INCREASINGLY DEPENDENT ON CONTRACT MANUFACTURERS.

Many components, subassemblies and modules necessary for the manufacture or integration of our products are obtained from a sole supplier or a limited group of suppliers. Our reliance on sole or limited suppliers, particularly foreign suppliers, and our increasing reliance on subcontractors involves several risks, including a potential inability to obtain an adequate supply of required components, subassemblies or modules and reduced control over pricing, quality and timely delivery of components, subassemblies or modules. Certain key elements of our digital headend products are provided by a sole foreign supplier. We do not generally maintain long-term agreements with any of our suppliers or subcontractors. An inability to obtain adequate deliveries or any other circumstance that would require us to seek alternative sources of supply could affect our ability to ship our products on a timely basis, which could damage relationships with current and prospective customers and harm our business. We attempt to limit this risk by maintaining safety stocks of these components, subassemblies and modules. As a result of this investment in inventories, we may be subject to an increasing risk of inventory obsolescence in the future, which could harm our business. See "Business -- Manufacturing and Suppliers."

WE FACE RISKS ASSOCIATED WITH HAVING IMPORTANT FACILITIES AND RESOURCES LOCATED IN ISRAEL.

Harmonic maintains two facilities in the State of Israel with a total of approximately 60 employees. The personnel at these facilities represent a significant portion of our research and development operations. Accordingly, we are directly influenced by the political, economic and military conditions affecting Israel, and any major hostilities involving Israel or the interruption or curtailment of trade between Israel and its present trading partners could significantly harm our business.

In addition, most of our employees in Israel are currently obligated to perform annual reserve duty in the Israel Defense Forces and are subject to being called for active military duty at any time. We cannot predict the effect of these obligations on Harmonic in the future.

OUR BUSINESS COULD BE ADVERSELY IMPACTED BY YEAR 2000 COMPLIANCE ISSUES.

During the next year, many software programs may not recognize calendar dates beginning in the year 2000. This problem could force computers or machines which utilize date dependent software to either shut down or provide incorrect information. To address this problem, we have examined our computer and information systems, contacted our software and hardware providers, and, where necessary, made upgrades to our systems.

Based upon the assessments to date, all hardware products currently under development or released, and all software products currently under development are Y2K compliant. Certain software products currently installed at customer sites are not Y2K compliant and Harmonic is working with its customers to provide migration paths for each product. Undetected errors or defects may remain. Disruptions to our business or unexpected costs may arise because of undetected errors or defects in the technology used in our products,

manufacturing processes or internal information systems, which are comprised predominantly of third party software and hardware. If we, or any of our key

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suppliers or customers, fail to mitigate internal and external Year 2000 risks, we may temporarily be unable to process transactions, manufacture products, send invoices or engage in similar normal business activities or we may experience a decline in sales, which could materially and adversely affect our business, financial condition and results of operations. See "Management's Discussion and Analysis of Financial Condition and Results of Operations -- Year 2000 Readiness Disclosure."

OUR STOCK PRICE MAY BE VOLATILE.

The market price of our common stock has fluctuated in the past and is likely to fluctuate in the future. In addition, the securities markets have experienced significant price and volume fluctuations and the market prices of the securities of technology companies have been especially volatile. Investors may be unable to resell their shares of our common stock at or above the offering price. In the past, companies that have experienced volatility in the market price of their stock have been the object of securities class action litigation. If we were the object of securities class action litigation, it could result in substantial costs and a diversion of management's attention and resources. See "Price Range of Common Stock."

OUR CERTIFICATE OF INCORPORATION AND BYLAWS AND DELAWARE LAW CONTAIN PROVISIONS THAT COULD DISCOURAGE A TAKEOVER.

Provisions of our Amended and Restated Certificate of Incorporation, Bylaws, and Delaware law could make it more difficult for a third party to acquire us, even if doing so would be beneficial to our stockholders. See "Description of Capital Stock."

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(a) QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market risk represents the risk of loss that may impact the financial position, results of operations or cash flows of Harmonic due to adverse changes in market prices and rates. Harmonic is exposed to market risk because of changes in foreign currency exchange rates as measured against the U.S. Dollar and currencies of Harmonic's subsidiaries in Israel and in the United Kingdom. Harmonic has not engaged in hedging activities as of December 31, 1998 and does not expect to do so in the foreseeable future.

Harmonic has subsidiaries in Israel and the United Kingdom whose sales are generally denominated in U.S. dollars. While Harmonic does not anticipate that near-term changes in exchange rates will have a material impact on future operating results, fair values or cash flows, Harmonic cannot assure you that a sudden and significant change in the value of the Israeli Shekel or British Pound would not harm Harmonic's financial condition and results of operations.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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for the years ended
December 31, 1998, 1997, and 1996

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(b)

Financial Statement Schedules: All financial statement schedules have been omitted because the information is not required to be set forth herein, is not applicable or is included in the financial statements or notes thereto.

(c)

Selected Quarterly Financial Data: The following table sets forth for the period indicated selected quarterly financial data for the Company.

FISCAL YEARS BY QUARTER
(UNAUDITED, IN THOUSANDS,
EXCEPT PER SHARE DATA)

QUARTERLY DATA:	1998				1997			
	4TH	3RD	2ND	1ST	4TH	3RD	2ND	1ST

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Net sales	\$ 27,097	\$ 22,382	\$ 18,174	\$ 16,204	\$ 17,350	\$ 17,545	\$ 20,514	\$ 19,033
Gross profit	10,369	8,434	6,662	5,090	7,979	7,899	9,736	8,991
Income (loss) from operations	583	(1,044)	(2,929)	(18,553)	(97)	360	2,016	2,227
Net income (loss)	628	(831)	(2,885)	(18,365)	580	413	1,838	2,098
Basic net income (loss) per share	0.05	(0.07)	(0.25)	(1.60)	0.06	0.04	0.18	0.20
Diluted net income (loss) per share	0.05	(0.07)	(0.25)	(1.60)	0.05	0.04	0.16	0.18

(1) The Loss from operations and Net loss for the first quarter of 1998 includes a one-time charge of \$14.0 million for acquired in-process technology. See Note 2 of Notes to Consolidated Financial Statements.

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ITEM 9. CHANGES IN AND DISAGREEMENTS ON ACCOUNTING AND FINANCIAL DISCLOSURES

Not applicable.

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In our opinion, the accompanying consolidated balance sheets and the related consolidated statements of operations and stockholders' equity and of cash flows present fairly, in all material respects, the financial position of Harmonic Lightwaves, Inc. and its subsidiaries at December 31, 1998 and 1997, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 1998 in conformity with generally accepted accounting principles. These financial statements are the responsibility of the Company's management; our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with generally accepted auditing standards which require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for the opinion expressed above.

/s/ PricewaterhouseCoopers LLP

 PRICEWATERHOUSECOOPERS LLP

San Jose, CA
 January 20, 1999, except as to
 Note 14, which is as of March 15, 1999

Consolidated Balance Sheets

DECEMBER 31, (IN THOUSANDS, EXCEPT SHARE DATA)	1998	1997
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 9,178	\$ 13,670
Accounts receivable, net	17,646	16,458
Inventories	22,385	15,474
Prepaid expenses and other assets	1,175	1,774
	-----	-----
Total current assets	50,384	47,376
Notes receivable	--	1,300
Property and equipment, net	10,726	10,077
Intangibles and other assets	1,314	134
	-----	-----
	\$ 62,424	\$ 58,887
	=====	=====
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 7,534	\$ 3,708
Accrued liabilities	10,355	4,896
Current portion of long-term debt	177	--
	-----	-----
Total current liabilities	18,066	8,604
Long-term debt, less current portion	400	--
Other non-current liabilities	484	352
Commitments and Contingencies (Notes 11 and 13)		
Stockholders' equity:		
Preferred Stock, \$.001 par value, 5,000,000 shares authorized; no shares issued or outstanding	--	--
Common Stock, \$.001 par value, 50,000,000 shares authorized; 11,725,844 and 10,414,297 shares issued and outstanding	12	10
Capital in excess of par value	70,924	55,917
Accumulated deficit	(27,472)	(6,019)
Accumulated other comprehensive income	10	23
	-----	-----
Total stockholders' equity	43,474	49,931
	-----	-----
	\$ 62,424	\$ 58,887

The accompanying notes are an integral part of these consolidated financial statements.

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Consolidated Statement of Operations

YEAR ENDED DECEMBER 31, (IN THOUSANDS, EXCEPT PER SHARE DATA)	1998	1997	1996
Net sales	\$ 83,857	\$ 74,442	\$ 60,894
Cost of sales	53,302	39,837	33,163
	-----	-----	-----
Gross profit	30,555	34,605	27,731
	-----	-----	-----
Operating expenses:			
Research and development	13,524	11,676	9,237
Sales and marketing	18,162	13,599	9,827
General and administrative	6,812	4,824	3,463
Acquired in-process technology	14,000	--	--
	-----	-----	-----
Total operating expenses	52,498	30,099	22,527
	-----	-----	-----
Income (loss) from operations	(21,943)	4,506	5,204
Interest and other income, net	490	682	1,025
	-----	-----	-----
Income (loss) before income taxes	(21,453)	5,188	6,229
Provision for income taxes	--	259	311
	-----	-----	-----
Net income (loss)	\$ (21,453)	\$ 4,929	\$ 5,918
	=====	=====	=====
Net income (loss) per share:			
Basic	\$ (1.85)	\$ 0.48	\$ 0.59
	=====	=====	=====
Diluted	\$ (1.85)	\$ 0.43	\$ 0.52
	=====	=====	=====
Weighted average shares:			
Basic	11,622	10,345	10,106
	=====	=====	=====
Diluted	11,622	11,523	11,474
	=====	=====	=====

The accompanying notes are an integral part of these consolidated financial statements.

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Consolidated Statement of Stockholders' Equity

COMMON STOCK	STOCK	CAPITAL IN	ACCUMULATED	ACCUMULATED	OTHER	STOCKHOLDERS	COMPREHENSIVE
SHARES	AMOUNT	EXCESS OF	DEFICIT	INCOME	INCOME	EQUITY	INCOME (LOSS)
-----	-----	PAR VALUE	-----	-----	-----	-----	-----

(IN THOUSANDS)

Balance at December 31, 1995	9,904	\$ 10	\$ 53,865	\$ (16,866)	\$ --	\$ 37,009	
Net income	--	--	--	5,918	--	5,918	\$ 5,918
Other comprehensive income							----- 5,918 =====
Exercise of stock options	208	--	240	--	--	240	
Issuance of Common Stock under Stock Purchase Plan	49	--	474	--	--	474	
Balance at December 31, 1996	10,161	10	54,579	(10,948)	--	43,641	
Net income	--	--	--	4,929	--	4,929	4,929
Currency translation	--	--	--	--	23	23	23
Other comprehensive income							----- 4,952 =====
Exercise of stock options	185	--	612	--	--	612	
Issuance of Common Stock under Stock Purchase Plan	68	--	726	--	--	726	
Balance at December 31, 1997	10,414	10	55,917	(6,019)	23	49,931	
Net loss	--	--	--	(21,453)	--	(21,453)	(21,453)
Currency translation	--	--	--	--	(13)	(13)	(13)
Other comprehensive loss							----- \$(21,466) =====
Exercise of stock options	187	--	784	--	--	784	
Issuance of Common Stock under Stock Purchase Plan	87	--	830	--	--	830	
Acquisition of New Media Communications, Ltd.	1,038	2	13,393	--	--	13,395	
Balance at December 31, 1998	11,726	\$ 12	\$ 70,924	\$ (27,472)	\$ 10	\$ 43,474	

The accompanying notes are an integral part of these consolidated financial statements.

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Consolidated Statement of Cash Flows

YEAR ENDED DECEMBER 31, (IN THOUSANDS)	1998	1997	1996
Cash flows from operating activities:			
Net income (loss)	\$ (21,453)	\$ 4,929	\$ 5,918
Adjustments to reconcile net income (loss) to net cash (used in) provided by operating activities:			
Depreciation and amortization	4,283	3,441	2,506
Acquired in-process technology	14,000	--	--
Changes in assets and liabilities, net of effects of acquisition:			
Accounts receivable	(1,040)	(3,815)	(6,841)
Inventories	(6,393)	(692)	(5,606)
Prepaid expenses and other assets	1,697	139	(1,848)
Accounts payable	3,187	(1,896)	3,403
Accrued and other liabilities	3,694	(140)	2,781
Net cash (used in) provided by operating activities	(2,025)	1,966	313
Cash flows used in investing activities:			
Acquisition of property and equipment	(4,384)	(4,767)	(6,743)
Acquisition of New Media Communication Ltd., net of cash received	(280)	--	--
Long-term advances	--	(1,300)	--
Net cash used in investing activities	(4,664)	(6,067)	(6,743)
Cash flows from financing activities:			
Proceeds from issuance of Common Stock	1,614	1,338	714
Borrowings under bank line and term loan	1,377	--	--
Repayments under bank line and term loan	(800)	--	--
Net cash provided by financing activities	2,191	1,338	714
Effect of exchange rate changes on cash and cash equivalents	6	23	--
Net decrease in cash and cash equivalents	(4,492)	(2,740)	(5,716)
Cash and cash equivalents at beginning of period	13,670	16,410	22,126

Cash and cash equivalents at end of period	\$ 9,178	\$ 13,670	\$ 16,410
	=====	=====	=====
Supplemental disclosure of cash flow information:			
Interest paid during the period	\$ 80	\$ --	\$ 21
Income taxes paid during the period	\$ 146	\$ 323	\$ 285
	=====	=====	=====

The accompanying notes are an integral part of these consolidated financial statements.

Notes to Consolidated Financial Statements

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Harmonic Lightwaves, Inc. ("Harmonic" or the "Company") designs, manufactures and markets digital and fiber optic systems for delivering video, voice and data services over cable, satellite and wireless networks. Our advanced solutions enable cable television and other network operators to provide a range of broadcast and interactive broadband services that include high-speed Internet access, telephony and video on demand. We offer a broad range of fiber optic transmission and digital headend products for hybrid fiber coax, satellite and wireless networks, and our acquisition of New Media Communication in January 1998, has allowed us to develop and expand our product offerings to include high-speed data delivery software and hardware.

Reincorporation and Reverse Stock Split. The Company originally incorporated in California in June 1988. In May 1995, the Company reincorporated in Delaware. In conjunction with the reincorporation, all outstanding shares of the predecessor California company were exchanged into common stock of the Delaware company in a one-for-three reverse stock split.

Basis of Presentation. The consolidated financial statements of the Company include the financial statements of the Company and its wholly-owned subsidiaries. All intercompany accounts and balances have been eliminated. The Company's fiscal quarters end on the Friday nearest the calendar quarter end.

Use of Estimates. The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amount of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reported period. Actual results could differ from those estimates.

Cash Equivalents. The Company considers all highly liquid investments purchased with an original maturity date of three months or less at the date of purchase to be cash equivalents and are stated at amounts that approximate fair value, based on quoted market prices. The Company's investments are classified as held-to-maturity.

Fair Value of Financial Instruments. The carrying value of the Company's financial instruments, including cash and cash equivalents, accounts receivable, accounts payable and accrued liabilities approximate fair value due to their short maturities.

Revenue Recognition. Revenue is generally recognized upon shipment of product. The Company does not provide rights of return to end users or distributors. A provision for the estimated cost of warranty is recorded at the time revenue is recognized.

Inventories. Inventories are stated at the lower of cost, using the weighted average method, or market.

Property and Equipment. Property and equipment are recorded at cost. Depreciation and amortization are computed using the straight-line method based upon the shorter of the estimated useful lives of the assets, which range from two to ten years, or the lease term of the respective assets, if applicable. Depreciation and amortization expense related to equipment and improvements for the years ended December 31, 1998 and 1997 was \$3,979,000 and \$3,441,000, respectively.

Intangibles and Other Assets. Goodwill acquired in connection with the acquisition of businesses is included in "Intangibles and other assets." Amortization is provided on a straight-line basis over the estimated useful life of five years. See Notes 2 and 4.

Long-Lived Assets. The Company records impairment losses on long-lived assets used in operations, such as equipment and improvements, and intangible assets when indicators of impairment are present and the undiscounted cash flows estimated to be generated by those assets are less than the carrying amounts of the assets.

Concentrations of Credit Risk. Financial instruments which subject the Company to concentrations of credit risk consist primarily of cash and cash equivalents and accounts receivable. Cash and cash equivalents are maintained with high quality financial institutions and are invested in short-term, highly liquid investment grade obligations of government and commercial issuers, in accordance with the Company's investment policy. The investment policy limits the amount of credit exposure to any one financial institution or commercial issuer. The Company's accounts receivable are derived from sales to cable television and other network operators and distributors as discussed in Note 12. The Company performs ongoing credit evaluations of its customers and generally does not require collateral. The Company provides for expected losses but to date has not experienced any material losses. At December 31, 1998, receivables from three customers represented 24%, 15%, and 14%, respectively. At December 31, 1997, receivables from one customer represented 25% of accounts receivable.

Currency Translation. The Company's Israeli operations' functional currency is the U.S. Dollar. All other foreign subsidiaries use the respective local currency as the functional currency. When the local currency is the functional currency, gains and losses from translation are included in stockholders' equity. Realized gains and losses resulting from foreign currency transactions have not been material to the consolidated statements of operations for the years ended December 31, 1998, 1997, and 1996.

Income Taxes. Deferred tax assets and liabilities are recognized for the expected tax consequences of temporary differences between the tax bases of assets and liabilities and their financial statement reported amounts under the provisions of Statement on Financial Accounting Standards No. 109 ("SFAS 109"), which has been applied for all periods presented.

Accounting for Stock-Based Compensation. The Company's stock-based compensation plans are accounted for in accordance with Accounting Principles Board Opinion No. 25, "Accounting for Stock Issued to Employees." In January 1996, the Company adopted the disclosure requirements of Statement of Financial Accounting Standards 123 ("SFAS 123").

Comprehensive Income. Effective January 1, 1998, the Company adopted Statement of Financial Accounting Standards No. 130, "Reporting Comprehensive Income" ("SFAS 130"). SFAS No. 130 requires that all items recognized under accounting standards as components of comprehensive income be reported in an annual financial statement that is displayed with the same prominence as other annual financial statements. The Company's comprehensive income has been included in the Consolidated Statement of Stockholders' Equity for all periods presented.

Accounting for Derivatives and Hedging Activities. In June 1998, the Financial Accounting Standards Board issued Statement No. 133 "Accounting for Derivative Instruments and Hedging Activities" ("SFAS 133"). SFAS 133 requires companies to record derivatives on the balance sheet as assets or liabilities, measured at fair value. Gains or losses resulting from changes in the values of those derivatives will be reported in the statement of operations or as a deferred item, depending on the use of the derivatives and whether they qualify for hedge accounting. The Company does not expect SFAS 133 to have an impact upon the Company's consolidated financial statements, as the Company does not engage in hedging activities.

Reclassification. Certain amounts in prior years' financial statements and related notes have been reclassified to conform to the 1998 presentation. These reclassifications are not material.

NOTE 2: ACQUISITION OF NEW MEDIA COMMUNICATION LTD.

On January 5, 1998, the Company acquired New Media Communication Ltd. ("NMC"), a privately held supplier of broadband, high-speed data delivery software and hardware, in exchange for the issuance of 1,037,911 shares of Harmonic Common Stock and the assumption of all outstanding NMC stock options. The acquisition was accounted for using the purchase method of accounting. Accordingly, the results of operations of NMC have been included in the consolidated financial statements of the Company from the date of acquisition. The purchase price of approximately \$17.6 million was allocated to the acquired assets, in-process technology and goodwill. A one-time charge of \$14.0 million was recorded in the first quarter of 1998 for in-process technology acquired. Goodwill of approximately \$1.5 million is being amortized on a straight-line basis over the estimated useful life of five years. NMC has been a development stage company since its founding in 1996 and its revenues through 1998 were not material in relation to those of the Company.

The following table sets forth the pro-forma net sales, net income and net income per share of the Company for the year ended December 31, 1997, giving effect to the acquisition of NMC as if it had occurred as of the beginning of the period presented:

	PRO FORMA (UNAUDITED) ----- 1997
(IN THOUSANDS, EXCEPT PER SHARE DATA)	
Net sales	\$ 75,086
Net income	\$ 1,903
Net income per share:	
Basic	\$ 0.17
Diluted	\$ 0.15
Weighted average shares:	
Basic	11,383
Diluted	12,561

NOTE 3: CASH AND CASH EQUIVALENTS

At December 31, 1998 and 1997, the Company had the following amounts in cash and cash equivalents, with original maturity dates of three months or less at the date of purchase. Realized gains and losses for the years ended December 31, 1998 and 1997 and the difference between gross amortized cost and estimated fair value at December 31, 1998 and 1997 were immaterial.

DECEMBER 31, (IN THOUSANDS)	1998	1997
Commercial paper	\$ 2,154	\$ 7,956
Cash and money market accounts	7,024	5,714
Total cash and cash equivalents	\$ 9,178 =====	\$ 13,670 =====

NOTE 4: BALANCE SHEET DETAILS

DECEMBER 31, (IN THOUSANDS)	1998	1997
--------------------------------	------	------

Accounts receivable:		
Gross accounts receivable	\$ 18,646	\$ 17,208
Less: allowance for doubtful accounts	(1,000)	(750)
	-----	-----
	\$ 17,646	\$ 16,458
	=====	=====
Inventories:		
Raw materials	\$ 3,747	\$ 4,356
Work-in-process	4,557	3,127
Finished goods	14,081	7,991
	-----	-----
	\$ 22,385	\$ 15,474
	=====	=====
Property and equipment:		
Furniture and fixtures	\$ 2,051	\$ 1,585
Machinery and equipment	19,854	15,692
Leasehold improvements	2,779	2,779
	-----	-----
	24,684	20,056
Less: accumulated depreciation and amortization	(13,958)	(9,979)
	-----	-----
	\$ 10,726	\$ 10,077
	=====	=====
Intangibles and other assets:		
Other assets	\$ 98	\$ 134
Goodwill	1,520	--
	-----	-----
	1,618	134
Less: accumulated amortization	(304)	--
	-----	-----
	\$ 1,314	\$ 134
	=====	=====
Accrued liabilities:		
Accrued compensation	\$ 3,655	\$ 1,837
Customer deposits	2,234	101
Deferred revenue	1,466	402
Accrued warranties	575	626
Other	2,425	1,930
	-----	-----
	\$ 10,355	\$ 4,896
	=====	=====

NOTE 5: NET INCOME (LOSS) PER SHARE

During the quarter ended December 31, 1997, the Company adopted Statement of Financial Accounting Standards No. 128, "Earnings Per Share" ("SFAS 128"). SFAS 128 requires presentation of both Basic EPS and Diluted EPS on the face of the statement of operations. Basic EPS, which replaces primary EPS, is computed by dividing net income available to common stockholders (numerator) by the weighted average number of common shares outstanding (denominator) during the period. Unlike the computation of primary EPS, Basic EPS excludes the dilutive effect of stock options and warrants. Diluted EPS replaces fully diluted EPS and gives effect to all dilutive potential common shares outstanding during a period. In computing Diluted EPS, the average price for the period is used in determining the number of shares assumed to be purchased from exercise of stock options and warrants rather than the higher of the average or ending price as used in the computation of fully diluted EPS.

Following is a reconciliation of the numerators and denominators of the Basic and Diluted EPS computations:

	1998	1997	1996
(IN THOUSANDS, EXCEPT PER SHARE DATA)			
Net income (loss) (numerator)	\$ (21,453)	\$ 4,929	\$ 5,918
	=====	=====	=====
Shares calculation (denominator):			
Average shares outstanding--basic	11,622	10,345	10,106
Effect of Dilutive Securities:			

Potential Common Stock relating to stock options and warrants	--	1,178	1,368
	-----	-----	-----
Average shares outstanding--diluted	11,622	11,523	11,474
	=====	=====	=====
Net income (loss) per share--basic	\$ (1.85)	\$ 0.48	\$ 0.59
	=====	=====	=====
Net income (loss) per share--diluted	\$ (1.85)	\$ 0.43	\$ 0.52
	=====	=====	=====

Options and warrants to purchase 2,944,118, 514,150 and 79,750 shares of common stock were outstanding during 1998, 1997 and 1996, respectively, but were not included in the computation of diluted EPS because either the option's exercise price was greater than the average market price of the common shares or inclusion of such options would have been antidilutive. The price ranges of these options and warrants were from \$0.30 to \$22.75 per share for 1998, \$16.50 to \$22.75 per share for 1997 and \$16.88 to \$22.75 per share for 1996.

NOTE 6: LINE OF CREDIT

During 1998, the Company had a bank line of credit facility (the "line"), providing for borrowings of up to \$12,000,000. The line was available until December 1998. As discussed in Note 14, the Company renegotiated its bank line of credit facility in the fourth quarter of 1998 and finalized the amended and restated facility in March 1999. The line contained certain financial covenants and interest on borrowings was at the bank's prime rate or LIBOR plus 2%. The Company has guaranteed certain borrowings of its subsidiaries totaling \$0.9 million with letters of credit and has total letters of credit issued under the line of \$2.7 million which expire at various dates throughout fiscal year 1999. There were no outstanding borrowings at December 31, 1998 and 1997.

NOTE 7: LONG-TERM DEBT

During 1998, the Company had an equipment term loan (the "term loan") facility, providing for borrowings of up to \$3,000,000 on a secured basis. The outstanding principal balance of the term loan on December 31, 1998 is payable in 36 monthly installments beginning January 1999. As of December 31, 1998, borrowings of \$577,000 were outstanding under the term loan. Interest on borrowings is at the bank's prime rate plus 0.5%, payable monthly. Aggregate principal payments required under the term loan are \$177,000, \$191,000, and \$209,000 for the years ending December 31, 1999, 2000, and 2001, respectively. The term loan was available until December 1998. As discussed in Note 14, the Company renegotiated its term loan facility in the fourth quarter of 1998 and finalized the amended and restated facility in March 1999.

Long-term debt consists of the following:

DECEMBER 31, (IN THOUSANDS)	1998	1997
Equipment term loan	\$ 577	\$ -
Less: current portion	(177)	-
	-----	-----
	\$ 400	\$ -
	=====	=====

NOTE 8: CAPITAL STOCK

Initial Public Offering. In May 1995, the Company completed its initial public offering ("IPO") of 2,600,000 shares of Common Stock, 600,000 of which were sold by existing stockholders, at a price of \$13.50 per share. Net proceeds to the Company were approximately \$24.2 million, after underwriter commissions and associated costs. Upon the closing of the IPO, all outstanding shares of Mandatorily Redeemable Convertible Preferred Stock automatically converted into 7,094,748 shares of Common Stock. Also effective with the closing of the IPO, the Company was authorized to issue 5,000,000 shares of undesignated Preferred Stock, of which none were issued or outstanding at December 31, 1998 and 1997.

Common Stock Warrants. In June 1994, the Company entered into a distribution agreement, in connection with which it issued a warrant to purchase up to 798,748 shares of Common Stock at \$5.55 per share. The warrant had a fair value of \$200,000, which was charged to results of operations in the second quarter of 1994. The warrants will become exercisable in June 1999 and expire at the earlier of six years from the date of issuance or the closing of a significant acquisition transaction, as defined in the warrant. The Company has reserved 798,748 shares of Common Stock for issuance upon exercise of this warrant.

In 1993, the Company issued a warrant to purchase up to 22,222 shares of the Company's Common Stock at an exercise price of \$4.50 per share in conjunction with an equipment lease line facility. The fair value of the warrant was nominal, and the warrant expires at the earlier of seven years from the date of issuance or the merger or sale of the Company meeting certain criteria. The Company has reserved 22,222 shares of Common Stock for issuance upon exercise of this warrant.

NOTE 9: BENEFIT AND COMPENSATION PLANS

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Stock Option Plans. In 1988, the Company adopted an incentive and non-statutory stock option plan (the "1988 Plan") for which 1,125,917 shares have been reserved for issuance. Following adoption of the 1995 Stock Plan (the "1995 Plan") at the effectiveness of the Company's IPO, no further grants have been, or will be, made under the 1988 Plan. Options granted under the 1988 Plan and the 1995 Plan are for periods not to exceed ten years. Exercise prices of incentive stock option grants under both plans must be at least 100% of the fair market value of the stock at the date of grant and for nonstatutory stock options must be at least 85% of the fair market value of the stock at the date of grant. Under both plans, the options generally vest 25% at one year from date of grant, and an additional 1/48th per month thereafter. The Company has reserved 1,620,000 shares of Common Stock for issuance under the 1995 Plan. Upon the closing of the acquisition of New Media Communication Ltd. ("NMC") in January 1998, the 1997 Non-Statutory Option Plan (the "1997 Plan") became effective. The Company assumed all outstanding NMC options and issued new options at the closing totaling 400,000 shares. No further grants have been, or will be, made under the 1997 Plan. Options granted under the 1997 Plan were at fair market value and for periods not to exceed ten years with vesting generally under the same terms as the 1988 and 1995 plans.

Director Option Plan. Effective upon the IPO, the Company adopted the 1995 Director Option Plan (the "Director Plan") and reserved 50,000 shares of Common Stock for issuance thereunder. The Director Plan provides for the grant of nonstatutory stock options to certain nonemployee directors of the Company pursuant to an automatic, nondiscretionary grant mechanism.

The following table summarizes activities under the Plans:

	SHARES AVAILABLE FOR GRANT	STOCK OPTIONS OUTSTANDING	WEIGHTED AVERAGE EXERCISE PRICE
(IN THOUSANDS, EXCEPT EXERCISE PRICE)			
Balance at December 31, 1995	442	1,153	\$ 3.67
Options granted	(344)	344	12.72
Options exercised	--	(208)	0.98
Options canceled	7	(48)	5.75
	-----	-----	-----
Balance at December 31, 1996	105	1,241	6.56
Shares authorized	480	--	--

Options granted	(504)	504	18.08
Options exercised	--	(185)	3.31
Options canceled	154	(177)	14.26
	-----	-----	-----
Balance at December 31, 1997	235	1,383	10.22
Shares authorized	975	--	--
Options granted	(1,064)	1,064	12.48
Options exercised	--	(187)	4.21
Options canceled	120	(137)	14.56
	-----	-----	-----
Balance at December 31, 1998	266	2,123	\$11.60
	=====	=====	=====

The following table summarizes information regarding stock options outstanding at December 31, 1998:

RANGE OF EXERCISE PRICES	STOCK OPTIONS OUTSTANDING			STOCK OPTIONS EXERCISABLE	
	NUMBER OUTSTANDING AT DEC. 31, 1998	WEIGHTED-AVERAGE CONTRACTUAL LIFE REMAINING (YEARS)	WEIGHTED-AVERAGE EXERCISE PRICE	NUMBER EXERCISABLE AT DEC. 31, 1998	WEIGHTED-AVERAGE EXERCISE PRICE
(IN THOUSANDS, EXCEPT EXERCISE PRICE AND LIFE)					
\$ 0.30 - 1.80	345	3.8	\$ 0.72	345	\$ 0.72
2.25 - 4.65	125	8.1	3.36	118	3.35
7.20 -13.75	788	8.2	11.40	284	11.16
14.13 -22.75	865	8.9	17.30	181	18.55
	-----	-----	-----	-----	-----
	2,123	7.7	\$ 11.60	928	\$ 7.73
	=====	=====	=====	=====	=====

The weighted-average fair value of options granted in 1998 was \$13.58. The weighted-average fair value of options granted in 1997 and 1996 was \$18.28 and \$12.95, respectively.

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Employee Stock Purchase Plan. Effective upon the IPO, the Company adopted the 1995 Employee Stock Purchase Plan (the "Purchase Plan") for which 400,000 shares have been reserved for issuance. The Purchase Plan enables employees to purchase shares at 85% of the fair market value of the Common Stock at the beginning or end of each six month purchase period. The Purchase Plan is intended to qualify as an "employee stock purchase plan" under Section 423 of the Internal Revenue Code. 87,238, 68,271 and 48,977 shares were issued under the Purchase Plan during 1998, 1997 and 1996, respectively.

Fair Value Disclosures. The Company accounts for its stock-based compensation plans in accordance with the provisions of Accounting Principles Board Opinion No. 25. If compensation cost for the Company's stock-based compensation plans had been determined based on the fair value method at the grant dates, as prescribed in SFAS 123, the Company's net income (loss) and net income (loss) per share would have been as follows:

	1998	1997	1996
(IN THOUSANDS, EXCEPT PER SHARE DATA)			
Net income (loss):			
As reported	\$ (21,453)	\$ 4,929	\$ 5,918
Pro forma	(26,457)	3,209	4,474
Basic net income (loss) per share:			
As reported	\$ (1.85)	\$ 0.48	\$ 0.59
Pro Forma	(2.28)	0.31	0.44
Diluted net income (loss) per share:			
As reported	\$ (1.85)	\$ 0.43	\$ 0.52
Pro forma	(2.28)	0.28	0.39

The fair value of each option grant is estimated on the date of grant using the Black-Scholes option pricing model with the following weighted average

assumptions:

	Employee Stock Options			Employee Stock Purchase Plan		
	1998	1997	1996	1998	1997	1996
Dividend yield	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Volatility	65%	55%	47.5%	65%	55%	47.5%
Risk-free interest rate	4.4%-5.6%	5.6%-6.7%	5.2%-6.5%	4.6%-5.5%	5.1%-6.3%	5.7%
Expected life (years)	4	4	4	2	2	2

Retirement/Savings Plan. The Company has a retirement/savings plan which qualifies as a thrift plan under Section 401(k) of the Internal Revenue Code. This plan allows participants to contribute up to 20% of total compensation, subject to applicable Internal Revenue Service limitations. Effective April 1, 1997, the Company began to make discretionary contributions to the plan of \$0.25 per dollar contributed by eligible participants up to a maximum contribution per participant of \$750 per year.

NOTE 10: INCOME TAXES

The provision for income taxes consists of the following:

DECEMBER 31, (IN THOUSANDS)	1998	1997	1996
Current:			
Federal	\$ --	\$168	\$246
Foreign	--	90	41
State	--	1	24
	----	----	----
	\$ --	\$259	\$311
	=====	=====	=====

The income tax provision reconciles to the provision at the federal statutory rate as follows:

DECEMBER 31, (IN THOUSANDS)	1998	1997	1996
Provision at statutory rate	\$(7,294)	\$ 1,764	\$ 2,118
Differential in rates on foreign earnings	774	(111)	--

State taxes, net of federal benefit	--	1	16
Foreign sales corporation benefit	--	(176)	--
Acquired in-process technology and non-deductible goodwill	4,863	--	--
Utilization of net operating loss carryovers	--	(1,661)	
			(2,490)
Future benefits not currently recognized	2,116	364	429
Alternative minimum tax	--	51	162
Other	(459)	27	76
	-----	-----	-----
	\$ --	\$ 259	\$ 311
	=====	=====	=====

Deferred tax assets comprise the following:

DECEMBER 31, (IN THOUSANDS)	1998	1997	1996
Net operating loss carryovers	\$ 845	\$ 303	\$ 1,964
Research and development credit carryovers	3,285	2,452	
			2,112
Capitalized research and development costs	71	234	
			254
Reserves not currently deductible	2,814	1,657	1,187
Other	419	96	12
	-----	-----	-----
Total deferred tax assets	7,434	4,742	5,529
Valuation allowance	(7,434)	(4,742)	(5,529)
	-----	-----	-----
Net deferred assets	\$ --	\$ --	\$ --
	=====	=====	=====

The deferred tax assets valuation allowance at December 31, 1998, 1997 and 1996 is attributed to federal and state deferred tax assets. Management believes that sufficient uncertainty exists regarding the realizability of these items such that a full valuation allowance has been recorded.

At December 31, 1998, the Company had approximately \$1,968,000 of net operating loss carryovers for federal tax reporting purposes available to offset future taxable income; such carryovers will expire in the years ending 2009 through 2019. The federal net operating loss carryovers do not include approximately \$4,887,000 resulting from disqualifying dispositions or exercises of non-incentive stock options, the tax benefit of which, when realized, will be accounted for as an addition to capital in excess of par value, rather than as a reduction of the provision for income taxes. At December 31, 1998, the Company also had approximately \$2,175,000, and \$1,110,000, of research and development credit carryovers for federal and state tax reporting purposes, respectively. The federal research and development credit carryovers will expire in the years ending 2004 through 2019. The state research and development carryovers will be carried forward indefinitely, until utilized.

The amounts of and the benefit from net operating losses and tax credits that can be carried forward may be limited in the event of a cumulative stock ownership change of greater than 50% over a three year period.

NOTE 11: RESEARCH AND DEVELOPMENT GRANTS

BIRD. In accordance with separate agreements signed with the Israel-U.S. Binational Industrial Research and Development Foundation ("BIRD") in December 1994 and December 1997, the Company obtained grants for research and development projects amounting to 50% of the actual expenditures incurred on each of the two projects subject to a maximum of \$560,000 and \$845,000, respectively. The Company earned the maximum of \$560,000 under the first grant, which was offset against research and development expenses from 1995 through 1997. Under the second grant, the Company earned approximately \$81,000 in 1998, which was also offset against research and development expenses for the same period. The Company is not obligated to repay the grants regardless of the outcome of its development efforts; however, it is obligated to pay the BIRD royalties at the rate of 2.5%-5% of sales of any products or development resulting from such research, but not in excess of 150% of each grant. During 1998, approximately \$175,000 of royalty expense was incurred.

Chief Scientist. An agreement was signed in May 1998 with the Israeli Chief Scientist Office ("Chief Scientist") in which the Company obtained a grant for a research and development project amounting to 50% of the actual expenditures incurred, subject to a maximum of 1,113,000 Israeli Shekels which translated at the December 31, 1998 exchange rate approximates \$265,000. The Company earned \$265,000 during 1998, which was offset against research and development expense for the same period. The Company is not obligated to repay the grants regardless of the outcome of its development efforts; however, it is obligated to pay the Chief Scientist royalties at the rate of 3%-5% of sales of any products or development resulting from such research, but not in excess of 100% of the grant. During 1998, royalty expenses incurred were not significant.

NOTE 12: GEOGRAPHIC INFORMATION AND SIGNIFICANT CUSTOMERS

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The Company operates in one industry segment and markets its products worldwide through its own direct sales force and through systems integrators and distributors. The Company has a manufacturing facility located in the U.S., international sales and support centers in Europe and Asia, and its New Media Communication, Ltd. subsidiary and research and development facility in Israel.

YEAR ENDED DECEMBER 31, (IN THOUSANDS)	1998	1997	1996
Geographic information consists of the following:			
Net Sales:			
United States	\$47,422	\$30,651	\$26,122
Canada	7,208	12,806	9,119
China	11,647	8,254	1,139
United Kingdom	3,511	5,530	9,323
Other foreign countries	14,069	17,201	15,191
	-----	-----	-----
Total	\$83,857	74,442	\$60,894
	=====	=====	=====
Long-lived assets:			
United States	\$10,384	\$ 8,617	\$ 8,076
Israel	1,501	1,373	675
Other foreign countries	57	87	--
	-----	-----	-----
Total	\$11,942	\$10,077	\$ 8,751
	=====	=====	=====

The Company sells to a significant number of its end users through distributors. In 1998 sales to one domestic customer and one foreign distributor represented 17% and 11% of total net sales, respectively. In 1997, sales to one distributor represented 17% of total net sales. In 1996, sales to three distributors represented 15%, 15% and 13% of total net sales, respectively.

NOTE 13: COMMITMENTS AND CONTINGENCIES

Commitments. The Company leases its facilities under noncancelable operating leases which expire at various dates through 2006. Total rent expense related to these operating leases were \$1,602,000 \$1,413,000, and \$828,000, for 1998, 1997 and 1996, respectively. Future minimum lease payments under noncancelable operating leases at December 31, 1998, were as follows: (in thousands)

1999	\$ 1,479
2000	1,511
2001	1,415
2002	1,324
2003	1,352
Thereafter	3,848

	\$ 10,929
	=====

The Company has subleased a portion of its headquarters through December 1999. Under the terms of the sublease, the sublessee is required to make payments

aggregating \$399,000 for 1999.

Contingencies. The Company is a party to certain litigation matters and claims which are normal in the course of its operations and, while the results of litigation and claims cannot be predicted with certainty, management believes that the final outcome of such matters will not have a materially adverse effect on the Company's consolidated financial position or results of operations.

NOTE 14: SUBSEQUENT EVENTS

Amendment of Line of Credit. On March 5, 1999, the Company's amended and restated bank line of credit facility (the "line") was finalized, providing for borrowings of up to \$10,000,000 with a \$3,000,000 equipment term loan sub-limit (the "term loan"). The line contains certain financial covenants and is available until March 2000. Borrowings pursuant to the line bear interest at the bank's prime rate plus 0.5% (prime rate plus 1.0% under the term loan) and are payable monthly. The line is secured by substantially all of the assets of the Company. The outstanding principal balance of the term loan on March 5, 2000 will be payable in 36 monthly installments beginning April 2000.

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Exercise of Common Stock Warrants. In March 1999, the Common Stock warrants issued in connection with the 1994 distribution agreement was amended whereby the warrant shall become exercisable immediately prior to the effectiveness of a registration statement of the Company's Common Stock, subject to certain conditions. In consideration of the acceleration of exercisability of the warrant, the warrant holder agreed to reduce the number of shares issuable under the warrant from 798,748 shares to 720,000 shares.

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PART III

Certain information required by Part III is omitted from this Report on Form 10-K in that the Registrant will file its definitive Proxy Statement for its Annual Meeting of Stockholders to be held on May 12, 1999, pursuant to Regulation 14A of the Securities Exchange Act of 1934, as amended (the "1999 Proxy Statement"), not later than 120 days after the end of the fiscal year covered by this Report, and certain information included in the Proxy Statement is incorporated herein by reference.

ITEM 10. DIRECTORS AND EXECUTIVE OFFICERS OF THE REGISTRANT

- (a) Executive Officers - See the section entitled "Executive Officers" in Part I, Item 1 hereof.
- (b) Directors - The information required by this Item is incorporated by reference to the section entitled "Election of Directors" in the 1999 Proxy Statement.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this Item is included in the 1999 Proxy Statement under the caption "Executive Compensation" and is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

Information related to security ownership of certain beneficial owners and security ownership of management is set forth in the 1999 Proxy Statement under the caption "Security Ownership of Certain Beneficial Owners and Management" and is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND TRANSACTIONS

Not applicable.

PART IV

ITEM 14. EXHIBITS, FINANCIAL STATEMENT SCHEDULES AND REPORTS ON FORM 8-K

- (a) (1) Financial Statements. See Index to Financial Statements at Item 8 on page XX of this Report:
- (a) (2) Exhibits. The documents listed on the Exhibit Index appearing at page xx of this Report are filed herewith. The 1999 Proxy Statement shall be deemed to have been "filed" with the Securities and Exchange Commission only to the extent portions thereof are expressly incorporated herein by reference. Copies of the exhibits listed in the Exhibit Index will be furnished, upon request, to holders or beneficial owners of the Company's Common Stock.
- (b) Reports on Form 8-K. None.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant, Harmonic Lightwaves, Inc., a Delaware corporation, has duly caused this Report on Form 10-K to be signed on its behalf by the undersigned, hereunto duly authorized, in the City of Sunnyvale, State of California, on March 16, 1999.

HARMONIC LIGHTWAVES, INC.

By: /s/ Anthony J. Ley

 Anthony J. Ley, Chairman of the
 Board, President and Chief
 Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENT, that each person whose signature appears below constitutes and appoints Anthony J. Ley and Robin N. Dickson, jointly and severally, his attorneys-in-fact, each with the power of substitution, for him in any and all capacities, to sign any amendments to this Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorney-in-fact, or his substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities and Exchange Act of 1934, this registration statement has been signed by the following persons in the capacities and on the date indicated.

SIGNATURE -----	TITLE -----	DATE ----
/s/Anthony J. Ley ----- (Anthony J. Ley)	Chairman of the Board, President and Chief Executive Officer (Principal Executive Officer)	March 16, 1999
/s/Robin N. Dickson ----- (Robin N. Dickson)	Chief Financial Officer (Principal Financial and Accounting Officer)	March 16, 1999
/s/Barry Lemieux ----- (Barry Lemieux)	Director	March 16, 1999

/s/E. Floyd Kvamme ----- (E. Floyd Kvamme)	Director	March 16, 1999
/s/David A. Lane ----- (David A. Lane)	Director	March 16, 1999
/s/Moshe Nazarathy ----- (Moshe Nazarathy)	Director	March 16, 1999
/s/Michel L. Vaillaud ----- (Michel L. Vaillaud)	Director	March 16, 1999

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EXHIBIT INDEX

The following Exhibits to this report are filed herewith, or if marked with a (i), (ii), (iii), (iv), (v), (vi), or (vii) are incorporated herein by reference.

Exhibit Number -----	Description -----
3.1 (i)	Certificate of Incorporation of Registrant
3.2 (i)	Form of Restated Certificate of Incorporation of Registrant
3.3 (i)	Bylaws of Registrant
4.1 (i)	Form of Common Stock Certificate
10.1 (i)	+ Form of Indemnification Agreement
10.2 (i)	+ 1988 Stock Option Plan and form of Stock Option Agreement
10.3 (i)	+ 1995 Stock Plan and form of Stock Option Agreement
10.4 (i)	+ 1995 Employee Stock Purchase Plan and form of Subscription Agreement
10.5 (i)	+ 1995 Director Option Plan and form of Director Option Agreement
10.6 (i)	Registration and Participation Rights and Modification Agreement dated as of July 22, 1994 among Registrant and certain holders of Registrant's Common Stock
10.7 (i)	Distributor Agreement dated June 15, 1994 by and between Registrant and Scientific-Atlanta, Inc.
10.8 (i)	Warrant to purchase Common Stock of Registrant issued to Scientific-Atlanta, Inc. on June 15, 1994
10.10 (i)	Warrant to purchase Series D Preferred Stock of Registrant issued to Comdisco, Inc. on February 10, 1993
10.14 (ii)	Business Loan Agreement, Commercial Security Agreement and Promissory Note dated August 26, 1993, as amended on September 14, 1995, between Registrant and Silicon Valley Bank
10.15 (ii)	Facility lease dated as of January 12, 1996 by and between Eastrich No. 137 Corporation and Company

- 10.16 (iv) Amended and Restated Loan and Security Agreement dated December 24, 1997 between Registrant and Silicon Valley Bank
- 10.17 (iii) + Change of Control Severance Agreement dated March 27, 1997 between Registrant and Anthony J. Ley
- 10.18 (iii) + Form of Change of Control Severance Agreement between Registrant and certain executive officers of Registrant
- 10.19 (iv) Stock Purchase Agreement, dated September 16, 1997 among Registrant, N.M. New Media Communication Ltd., ("NMC") and Sellers of NMC.
- 10.20 (v) First Amendment to Stock Purchase Agreement, dated November 25, 1997 among Registrant, N. M. New Media Communication Ltd., ("NMC") and Sellers of NMC.
- 10.21 (vi) Registration Rights Agreement dated as of January 5, 1998 by and among the Registrant and the persons and entities listed on Schedule A thereto (the "NMC Shareholders").
- 10.22 Second Amended and Restated Loan and Security Agreement dated March 5, 1999 between Registrant and Silicon Valley Bank.
- 10.23 (vii) 1997 Nonstatutory Stock Option Plan.

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- 21.1 Subsidiaries of Registrant
- 23.1 Consent of Independent Accountants
- 24.1 Power of Attorney
- 27.1 Financial Data Schedule

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- (i) Previously filed as an Exhibit to the Company's Registration Statement on Form S-1 No. 33-90752.
- (ii) Previously filed as an Exhibit to the Company's 10-K for the year ended December 31, 1995.
- (iii) Previously filed as an Exhibit to the Company's 10-K for the year ended December 31, 1996.
- (iv) Previously filed as an Exhibit to the Company's Current Report on 8-K dated September 29, 1997.
- (v) Previously filed as an Exhibit to the Company's Current Report on 8-K dated January 6, 1998.
- (vi) Previously filed as an Exhibit to the Company's Registration Statement on Form S-3 dated January 8, 1998.
- (vii) Previously filed as an Exhibit to the Company's Registration Statement on Form S-8 dated January 14, 1998.
- + Management Contract or Compensatory Plan or Arrangement required to be filed as an exhibit to this report on Form 10-K.

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This SECOND AMENDED AND RESTATED LOAN AND SECURITY AGREEMENT, dated as of March 5, 1999, is between SILICON VALLEY BANK ("Bank") and HARMONIC LIGHTWAVES, INC. (doing business in California as DELAWARE HARMONIC LIGHTWAVES, INC.), a Delaware corporation ("Borrower").

The parties agree as follows:

1. DEFINITIONS AND CONSTRUCTION

1.1. Definitions. As used in this Agreement, the following terms shall have the following definitions:

"Accounts" means all presently existing and hereafter arising accounts, contract rights, and all other forms of obligations owing to Borrower arising out of the sale or lease of goods (including, without limitation, the licensing of software and other technology) or the rendering of services by Borrower, whether or not earned by performance, and any and all credit insurance, guaranties, and other security therefor, as well as all merchandise returned to or reclaimed by Borrower and Borrower's Books relating to any of the foregoing.

"Affiliate" means, with respect to any Person, any Person that owns or controls directly or indirectly such Person, any Person that controls or is controlled by or is under common control with such Person, and each of such Person's senior executive officers, directors, partners and, for any Person that is a limited liability company, such Persons, managers and members.

"Bank Expenses" means all reasonable costs or expenses (including reasonable attorneys' fees and expenses) incurred in connection with the preparation, negotiation, administration, and enforcement of the Loan Documents; and Bank's reasonable attorneys' fees and expenses incurred in amending, enforcing or defending the Loan Documents, (including fees and expenses of appeal or review, or those incurred in any Insolvency Proceeding) whether or not suit is brought.

"Borrower's Books" means all of Borrower's books and records including, without limitation: ledgers; records concerning Borrower's assets or liabilities, the Collateral, business operations or financial condition; and all computer programs, or tape files, and the equipment, containing such information if such equipment is necessary for the review of such information.

"Borrowing Base" means an amount equal to 70% of Eligible Accounts, as determined by Bank with reference to the most recent Borrowing Base Certificate delivered by Borrower.

"Business Day" means any day that is not a Saturday, Sunday, or other day on which banks in the State of California are authorized or required to close.

"Closing Date" means the date of this Agreement.

"Collateral" means the property described on Exhibit A attached hereto; provided that the "Collateral" does not include any Excluded Property.

"Contingent Obligation" means, as applied to any Person, any direct or indirect liability, contingent or otherwise, of that Person with respect to (i) any indebtedness, lease, dividend, letter of credit or other obligation of another, including, without limitation, any such

obligation directly or indirectly guaranteed, endorsed, co-made or discounted or sold with recourse by that Person, or in respect of which that Person is otherwise directly or indirectly liable; (ii) any obligations with respect to undrawn letters of credit issued for the account of that Person; and (iii) all obligations arising under any interest rate, currency or commodity swap agreement, interest rate cap agreement, interest rate collar agreement, or other

agreement or arrangement designated to protect a Person against fluctuation in interest rates, currency exchange rates or commodity prices; provided that the term "Contingent Obligation" shall not include endorsements for collection or deposit in the ordinary course of business. The amount of any Contingent Obligation shall be deemed to be an amount equal to the stated or determined amount of the primary obligation in respect of which such Contingent Obligation is made or, if not stated or determinable, the maximum reasonably anticipated liability in respect thereof as determined by such Person in good faith; provided that such amount shall not in any event exceed the maximum amount of the obligations under the guarantee or other support arrangement.

"Copyrights" means any and all copyright rights, copyright applications, copyright registrations and like protections in each work or authorship and derivative work thereof, whether published or unpublished and whether or not the same also constitutes a trade secret, now or hereafter existing, created, acquired or held.

"Credit Extension" means each Revolving Loan, Equipment Loan, Letter of Credit, or any other extension of credit by Bank for the benefit of Borrower hereunder.

"Current Assets" means, as of any applicable date, all amounts that should, in accordance with GAAP, be included as current assets on the consolidated balance sheet of Borrower and its Subsidiaries as at such date.

"Current Liabilities" means, as of any applicable date, all amounts that should, in accordance with GAAP, be included as current liabilities on the consolidated balance sheet of Borrower and its Subsidiaries, as at such date, plus, to the extent not already included therein, all outstanding Revolving Loans and the current portion of the outstanding Equipment Loans and Existing Equipment Loans, the aggregate outstanding face amount (including drawn but unreimbursed Letters of Credit) of outstanding Letters of Credit (including the Existing Letters of Credit) in excess of \$2,000,000 (exclusive of any cash collateral which secures Borrower's obligations to Bank in respect of such Letters of Credit, which cash collateral has been provided on terms and conditions acceptable to Bank), and all other Indebtedness that is payable upon demand or within one year from the date of determination thereof unless such Indebtedness is renewable or extendable at the option of Borrower or any Subsidiary to a date more than one year from the date of determination, but excluding Subordinated Debt.

"Default" means any condition or event which constitutes an Event of Default or which with the giving of notice or lapse of time or both would, unless cured or waived, become an Event of Default.

"Eligible Accounts" means those Accounts that arise in the ordinary course of Borrower's business that comply with all of Borrower's representations and warranties to Bank set forth in Section 5.4; provided that standards of eligibility may be revised from time to time by Bank in Bank's reasonable judgment effective upon 10 days prior notice to Borrower. Eligible Accounts shall not include the following:

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(a) Accounts that the account debtor has failed to pay within 90 days of invoice date;

(b) Accounts with respect to an account debtor, 50% of whose Accounts the account debtor has failed to pay within 90 days of invoice date;

(c) Accounts with respect to an account debtor, including Affiliates, whose total obligations to Borrower exceed 25% of all Accounts, to the extent such obligations exceed the aforementioned percentage, except as approved in writing by Bank;

(d) Accounts with respect to which the account debtor does not have its principal place of business in the United States except for Eligible Foreign Accounts;

(e) Accounts with respect to which the account debtor is a federal, state, or local governmental entity or any department, agency, or instrumentality thereof;

(f) Accounts with respect to which Borrower is liable to the account debtor, but only to the extent of any amounts owing to the account debtor (sometimes referred to as "contra" accounts, e.g. accounts payable, customer deposits, credit accounts etc.);

(g) Accounts generated by demonstration or promotional equipment, or with respect to which goods are placed on consignment, guaranteed sale, sale or return, sale on approval, bill and hold, or other terms by reason of which the payment by the account debtor may be conditional;

(h) Accounts with respect to which the account debtor is an Affiliate, officer, employee, or agent of Borrower;

(i) Accounts with respect to which the account debtor disputes liability or makes any claim with respect thereto as to which Bank believes, in its sole discretion, that there may be a basis for dispute (but only to the extent of the amount subject to such dispute or claim), or is subject to any Insolvency Proceeding, or becomes insolvent, or goes out of business;

(j) Accounts subject to any Lien;

(k) Accounts which are in whole or in part the direct or indirect proceeds of any Excluded Property; and

(l) Accounts the collection of which Bank reasonably determines after reasonable inquiry and consultation with Borrower to be doubtful.

"Eligible Foreign Accounts" means Accounts with respect to which the account debtor is Siemens A.G., a German corporation, or other account debtors, if any, as may be from time to time approved in writing by Bank.

"Equipment" means all present and future machinery, equipment, tenant improvements, furniture, fixtures, vehicles, tools, parts and attachments in which Borrower has any interest.

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"Equipment Availability End Date" has the meaning set forth in Section 2.1.3.

"Equipment Commitment" means a credit extension of up to \$1,500,000 during the period from the Closing Date to March 31, 1999, plus an additional \$1,500,000 thereafter.

"Equipment Loan" has the meaning set forth in Section 2.1.3.

"ERISA" means the Employment Retirement Income Security Act of 1974, as amended, and the regulations thereunder.

"Event of Default" has the meaning set forth in Section 8.

"Excluded Property" means any property, rights or licenses to the extent the granting of a security interest therein to Bank (i) would be contrary to applicable law or (ii) is prohibited by or would constitute a default under any agreement or document governing such property, rights or licenses (but only to the extent such prohibition is enforceable as against the Bank under applicable law).

"Existing Agreement" means the Amended and Restated Loan and Security Agreement, dated as of December 24, 1997.

"Existing Equipment Loans" means the "Equipment Advances" outstanding under the Existing Agreement, which Borrower acknowledges have a total outstanding principal amount of \$543,622.20 on the Closing Date.

"Existing Letters of Credit" means the following letters of credit issued under the Existing Agreement: (a) letter of credit no. SVB97IS0635 for a liability amount of US\$400,000 (as amended) in favor of Barclays Bank PLC as beneficiary, (b) letter of credit no. SVB98IS0890 for a liability amount of US\$500,000 in favor of Bank Hapoalim, B.M. as beneficiary, (c) letter of credit no. SVB98IS0905 for a liability amount of US\$450,000 (as amended) in favor of

Rockwell Semiconductor Systems as beneficiary, and (d) letter of credit no.SVB98IS1052 for a liability amount of US\$1,019,565 in favor of Golden Channel as beneficiary.

"GAAP" means generally accepted accounting principles as in effect in the United States from time to time.

"Guarantor" means any present or future guarantor of the Obligations.

"Indebtedness" means (a) all indebtedness for borrowed money or the deferred purchase price of property or services, including without limitation reimbursement and other obligations with respect to surety bonds and letters of credit, (b) all obligations evidenced by notes, bonds, debentures or similar instruments, (c) all capital lease obligations and (d) all Contingent Obligations.

"Insolvency Proceeding" means any proceeding commenced by or against any person or entity under any provision of the United States Bankruptcy Code, as amended, or under any other bankruptcy or insolvency law, including assignments for the benefit of creditors, formal or informal moratoria, compositions, extension generally with its creditors, or proceedings seeking reorganization, arrangement, or other relief.

"Intellectual Property Collateral" means all right, title, and interest of Borrower in any of the following, whether now existing or hereafter acquired or created:

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- (a) Copyrights, Trademarks, Patents, and Mask Works;
- (b) Any and all trade secrets, and any and all intellectual property rights in computer software and computer software products;
- (c) Any and all design rights;
- (d) Any and all claims for damages by way of past, present and future infringement of any of the rights included above, with the right, but not the obligation, to sue for and collect such damages for said use or infringement of the intellectual property rights identified above;
- (e) All licenses or other rights to use any of the Copyrights, Patents, Trademarks, or Mask Works, and all license fees and royalties arising from such use to the extent permitted by such license or rights;
- (f) All amendments, renewals and extensions of any of the Copyrights, Trademarks, Patents, or Mask Works; and
- (g) All proceeds and products of the foregoing, including without limitation all payments under insurance or any indemnity or warranty payable in respect of any of the foregoing.

"Inventory" means all present and future inventory in which Borrower has any interest, including merchandise, raw materials, parts, supplies, packing and shipping materials, work in process and finished products intended for sale or lease or to be furnished under a contract of service, of every kind and description now or at any time hereafter owned by or in the custody or possession, actual or constructive, of Borrower, including such inventory as is temporarily out of its custody or possession or in transit and including any returns upon any accounts or other proceeds, including insurance proceeds, resulting from the sale or disposition of any of the foregoing and any documents of title representing any of the above.

"Investment" means any beneficial ownership of (including stock, partnership interest or other securities) any Person, or any loan, advance or capital contribution to any Person.

"IRC" means the Internal Revenue Code of 1986, as amended, and the regulations thereunder.

"Letter of Credit" means the Existing Letters of Credit and any

letter of credit or similar undertaking issued by Bank pursuant to Section 2.1.2.

"Lien" means any mortgage, lien, deed of trust, charge, pledge, security interest or other encumbrance (or any agreement to grant any of the foregoing, whether or not contingent on the happening of any future event).

"Loan" means a Revolving Loan, an Equipment Loan, or an Existing Equipment Loan.

"Loan Documents" means, collectively, this Agreement, any note or notes executed by Borrower, and any other present or future agreement entered into between Borrower and/or for the benefit of Bank in connection with this Agreement, all as amended, extended or restated

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from time to time.

"Mask Works" means all mask work or similar rights available for the protection of semiconductor chips, now owned or hereafter acquired.

"Material Adverse Effect" means a material adverse effect on (i) the business operations or condition (financial or otherwise) of Borrower and its Subsidiaries taken as a whole, (ii) the ability of Borrower to repay the Obligations or otherwise perform its obligations under the Loan Documents, (iii) the enforceability or binding effect of the Loan Documents, or (iv) the attachment, perfection, or priority of Bank's security interests in the Collateral or the value of the Collateral.

"Negotiable Collateral" means all of Borrower's present and future letters of credit of which it is a beneficiary, notes, drafts, instruments, securities, documents of title, and chattel paper.

"Obligations" means all debt, principal, interest, Bank Expenses and other amounts owed to Bank by Borrower pursuant to this Agreement or any other Agreement (including, without limitation, Borrower's credit card facility with Bank), whether absolute or contingent, due or to become due, now existing or hereafter arising, including any interest that accrues after the commencement of an Insolvency Proceeding and including any debt, liability, or obligation owing from Borrower to others that Bank may have obtained by assignment or otherwise.

"Overadvance" means that at any time (a) the sum of Revolving Loans, the Equipment Loans, the Existing Equipment Loans, and the face amount of all outstanding Letters of Credit (including drawn but unreimbursed Letters of Credit) exceeds the lesser of the Revolving Commitment or the Borrowing Base, or (b) the Equipment Loans and the Existing Equipment Loans exceed the Equipment Commitment. For purposes of calculating whether or not an Overadvance exists, \$20,000 shall be deemed to be at all times outstanding as Revolving Loans (such amount being the credit limit of Borrower's credit card facility with Bank).

"Patents" means all patents, patent applications and like protections including without limitation improvements, divisions, continuations, renewals, reissues, extensions and continuations-in-part of the same.

"Payment Date" means the 23rd calendar day of each month.

"Permitted Indebtedness" means:

(a) Indebtedness of Borrower in favor of Bank arising under this Agreement or any other Loan Document;

(b) Subordinated Debt;

(c) Indebtedness existing on the Closing Date and disclosed in the Schedule;

(d) Indebtedness to trade creditors incurred in the ordinary course of business and not past due;

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(e) Indebtedness secured by Permitted Liens;

(f) Indebtedness of Borrower to any Subsidiary and Contingent Obligations of any Subsidiary with respect to obligations of Borrower (provided that the primary obligations are not prohibited hereby), and Indebtedness of any Subsidiary to any other Subsidiary and Contingent Obligations of any Subsidiary with respect to obligations of any other Subsidiary (provided that the primary obligations are not prohibited hereby);

(g) Capital leases or indebtedness incurred solely to purchase equipment which is secured in accordance with clause (c) of "Permitted Liens" below and is not in excess of the lesser of the purchase price of such equipment or the fair market value of such equipment on the date of acquisition;

(h) Other Indebtedness not otherwise permitted by Section 7.4 not exceeding \$500,000 in the aggregate outstanding at any time; and

(i) Extensions, refinancings, modifications, amendments and restatements of any items of Permitted Indebtedness (c) through (e) above, provided that the principal amount thereof is not increased or the terms thereof are not modified to impose more burdensome terms upon Borrower or its Subsidiary, as the case may be.

"Permitted Investment" means:

(a) Investments existing on the Closing Date disclosed in the Schedule;

(b) (i) marketable direct obligations issued or unconditionally guaranteed by the United States of America or any agency or any State thereof maturing within one (1) year from the date of acquisition thereof, (ii) commercial paper maturing no more than one (1) year from the date of creation thereof and currently having the highest rating obtainable from either Standard & Poor's Corporation or Moody's Investors Service, Inc., and (iii) certificates of deposit maturing no more than one (1) year from the date of investment therein issued by Bank;

(c) Investments consisting of negotiable instruments held for deposit or collection or similar transactions in the ordinary course of business;

(d) Investments consisting of receivables owing to Borrower or its Subsidiaries by Persons and advances to customers or suppliers, in each case, if created, acquired or made in the ordinary course of business; provided that this paragraph (d) shall not apply to Investments owing by Subsidiaries to Borrower;

(e) Investments consisting of (i) compensation of employees, officers and directors of Borrower or its Subsidiaries so long as the Board of Directors of Borrower determines that such compensation is in the best interests of Borrower, (ii) travel advances, employee relocation loans and other employee loans and advances in the ordinary course of business, (iii) loans to employees, officers or directors relating to the purchase of equity securities of Borrower or its Subsidiaries pursuant to employee stock purchase plans approved by Borrower's Board of Directors, and (iv) other loans to officers and employees approved by the Board of Directors in an aggregate amount not in excess of \$250,000 outstanding at any time;

(f) Investments (including debt obligations) received in connection with the bankruptcy or reorganization of customers or suppliers and in settlement of delinquent obligations of, and other disputes with, customers or suppliers arising in the ordinary course of business;

(g) Investments pursuant to or arising under currency agreements or interest rate

swap agreements entered into in the ordinary course of business to mitigate risks of fluctuation in exchange rates and interest rates and not for speculative purposes;

(h) Investments consisting of prepaid royalties and other credit extensions to, customers and suppliers who are not Affiliates, in the ordinary course of business;

(i) Investments constituting acquisitions permitted under Section 7.3;

(j) Deposit accounts of Borrower and its Subsidiaries maintained for the purpose of making deposits, collections, and payments in the ordinary course of business;

(k) Investments permitted by Borrower's investment policy, as amended from time to time, provided that such investment policy and any such amendment thereto has been approved by Bank;

(l) Investments in Subsidiaries or Investments of Subsidiaries in or to other Subsidiaries or the Borrower so long as (i) the Subsidiaries receiving such Investment were either Subsidiaries of the Borrower on the Closing Date or were acquired in a transaction permitted by Section 7.3 and (ii) the aggregate amount of all Investments in Borrower's direct and indirect Subsidiaries does not at any time exceed 15% of Tangible Net Worth; and

(m) Other Investments not otherwise permitted by Section 7.7 not exceeding \$500,000 in the aggregate outstanding at any time.

"Permitted Liens" means the following:

(a) Any Liens existing on the Closing Date and disclosed in the Schedule or arising under this Agreement or the other Loan Documents;

(b) Liens for taxes, fees, assessments or other governmental charges or levies, either not delinquent or being contested in good faith by appropriate proceedings and as to which adequate reserves are maintained on Borrower's Books in accordance with GAAP, provided the same have no priority over any of Bank's security interests;

(c) Liens (i) upon or in any Equipment acquired or held by Borrower or any of its Subsidiaries to secure the purchase price of such Equipment or indebtedness incurred solely for the purpose of financing the acquisition of such Equipment, or (ii) existing on such equipment at the time of its acquisition, provided that the Lien is confined solely to the property so acquired and improvements thereon, and the proceeds of such equipment;

(d) Liens on assets (including the proceeds thereof and accessions thereto) that existed at the time such assets were acquired by Borrower or any Subsidiary (including Liens on assets of any corporation that existed at the time it became or becomes a Subsidiary); provided such Liens are not granted in contemplation of or in connection with the acquisition of such asset by Borrower or a Subsidiary;

(e) Liens in favor of customs and revenue authorities arising as a matter of law to secure payments of customs duties in connection with the importation of goods;

(f) Deposits under worker's compensation, unemployment insurance, social security and other similar laws, or to secure the performance of bids, tenders or contracts (other

than for the repayment of borrowed money) or to secure indemnity, performance or other similar bonds for the performance of bids, tenders or contracts (other than for the repayment of borrowed money) or to secure statutory obligations (other than liens arising under ERISA or environmental liens) or surety or appeal bonds, or to secure indemnity, performance or other similar bonds in the ordinary course of business;

(d) Leases or subleases and non-exclusive licenses or sublicenses granted to others in the ordinary course of Borrower's business not

interfering in any material respect with the business of Borrower and its Subsidiaries taken as a whole, provided that such leases, subleases, licenses and sublicenses do not prohibit the grant of the security interest granted hereunder; and

(e) Liens arising from judgments, decrees or attachments in circumstances not otherwise constituting an Event of Default;

(f) Easements, reservations, rights-of-way, restrictions, minor defects or irregularities in title and other similar charges or encumbrances affecting real property not constituting a Material Adverse Effect;

(g) Liens that are not prior to the Lien of Bank which constitute rights of set-off of a customary nature or bankers' Liens with respect to amounts on deposit, whether arising by operation of law or by contract, in connection with arrangements entered into with banks in the ordinary course of business; and

(h) Liens incurred in connection with the extension, renewal or refinancing of the indebtedness secured by Liens of the type described in clauses (a) and (d) above, provided that any extension, renewal or replacement Lien shall be limited to the property encumbered by the existing Lien and the principal amount of the indebtedness being extended, renewed or refinanced does not increase.

"Person" means any individual, sole proprietorship, partnership, limited liability company, joint venture, trust, unincorporated organization, association, corporation, institution, public benefit corporation, firm, joint stock company, estate, entity or governmental agency.

"Prime Rate" means the variable rate of interest, per annum, most recently announced by Bank, as its "prime rate," whether or not such announced rate is the lowest rate available from Bank.

"Quick Assets" means, as of any applicable date, the consolidated cash, cash equivalents, accounts receivable (net of reserves) and investments with maturities of fewer than 90 days of Borrower determined in accordance with GAAP; provided that accounts receivable due from Golden Channel and any cash securing any letter of credit or other performance guaranty in favor of Golden Channel shall not be included in Borrower's Quick Assets.

"Responsible Officer" means each of the Chief Executive Officer, the President, the Chief Financial Officer and the Controller of Borrower.

"Revolving Commitment" means a credit extension of up to \$10,000,000.

"Revolving Loan" means a loan advance under the Revolving Commitment.

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"Revolving Maturity Date" means one day prior to the first anniversary of the Closing Date.

"Schedule" means the schedule of exceptions attached hereto, if any.

"Subordinated Debt" means any debt incurred by Borrower that is subordinated to the debt owing by Borrower to Bank on terms acceptable to Bank (and identified as being such by Borrower and Bank). "Subsidiary" means with respect to any Person, corporation, partnership, company association, joint venture, or any other business entity of which more than 50% of the voting stock or other equity interests is owned or controlled, directly or indirectly, by such Person.

"Tangible Net Worth" means as of any applicable date, the consolidated total assets of Borrower and its Subsidiaries minus, without duplication, (i) the sum of any amounts attributable to (a) goodwill, (b) intangible items such as unamortized debt discount and expense, patents, trade and service marks and names, copyrights and research and development expenses except prepaid expenses, and (c) all reserves not already deducted from assets, and (ii) Total Liabilities.

"Total Liabilities" means as of any applicable date, any date as of which the amount thereof shall be determined, all obligations that should, in accordance with GAAP be classified as liabilities on the consolidated balance sheet of Borrower, including in any event all Indebtedness, but specifically excluding Subordinated Debt.

"Trademarks" means any trademark and servicemark rights, whether registered or not, applications to register and registrations of the same and like protections, and the entire goodwill of the business of Borrower connected with and symbolized by such trademarks.

"UCC" means the California Uniform Commercial Code.

"Year 2000 Problem" means the inability of computers, as well as embedded microchips in non-computing devices, to properly perform date-sensitive functions with respect to certain dates prior to and after December 31, 1999.

1.2. Accounting and Other Terms. All accounting terms not specifically defined herein shall be construed in accordance with GAAP and all calculations and determinations made hereunder shall be made in accordance with GAAP. When used herein, the term "financial statements" shall include the notes and schedules thereto. In the computation of periods of time from a specified date to a later specified date, the word "from" means "from and including" and the words "to" and "until" each mean "to but excluding." Periods of days referred to in this Agreement shall be counted in calendar days unless otherwise stated. References to the plural include the singular and to the singular include the plural, references to any gender include any other gender, the part includes the whole, the term "including" is not limiting, and the term "or" has, except where otherwise indicated, the inclusive meaning represented by the phrase "and/or." The words "hereof," "herein," "hereby," "hereunder," and similar terms in this Agreement refer to this Agreement as a whole and not to any particular provision of this Agreement. Article, section, subsection, clause, exhibit and schedule references are to this Agreement, unless otherwise specified. All of the exhibits and schedules attached hereto shall be deemed incorporated herein by reference. All terms contained in this Agreement which are not otherwise specifically defined herein (including the term "good faith") shall have the meanings provided by

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the UCC to the extent the same are used or defined therein.

1.3. No Presumption Against Any Party. Neither this Agreement nor any other Loan Document nor any uncertainty or ambiguity herein or therein shall be construed or resolved using any presumption against any party hereto or thereto, whether under any rule of construction or otherwise. On the contrary, this Agreement and the other Loan Documents have been reviewed by each of the parties and their counsel and, in the case of any ambiguity or uncertainty, shall be construed and interpreted according to the ordinary meaning of the words used so as to fairly accomplish the purposes and intentions of all parties hereto.

2. LOAN AND TERMS OF PAYMENT

2.1. Credit Extensions. Borrower promises to pay to the order of Bank, in lawful money of the United States of America, the aggregate unpaid principal amount of all Credit Extensions made by Bank to Borrower hereunder. Borrower shall also pay interest on the unpaid principal amount of such Loans at rates in accordance with the terms hereof.

2.1.1. (a) Subject to and upon the terms and conditions of this Agreement, Bank agrees to make Revolving Loans to Borrower in an aggregate outstanding amount not to exceed the Revolving Commitment; provided that no such Loan shall result in an Overadvance. Subject to the terms and conditions of this Agreement, amounts borrowed pursuant to this Section 2.1 may be repaid and reborrowed at any time during the term of this Agreement without penalty or premium.

(b) Whenever Borrower desires a Revolving Loan, Borrower will notify Bank by facsimile transmission or telephone no later than 3:00 p.m. Pacific time, on the Business Day that such Revolving Loan is to be made. Each such notification shall be promptly confirmed by a Payment/Loan Form in substantially the form of Exhibit B hereto. Bank is authorized to make Loans

under this Agreement, based upon instructions received from a Responsible Officer or a designee of a Responsible Officer, or without instructions if in Bank's discretion such Loans are necessary to meet Obligations which have become due and remain unpaid. Bank shall be entitled to rely on any telephonic notice given by a person who Bank reasonably believes to be a Responsible Officer or a designee thereof, and Borrower shall indemnify and hold Bank harmless for any damages or loss suffered by Bank as a result of such reliance. Bank will credit the amount of Loans made under this Section 2.1 to Borrower's deposit account.

(c) Interest Rate. Except as set forth in Section 2.3(b), the outstanding principal amount of the Revolving Loans shall bear interest, on the average daily balance thereof, at a per annum rate equal to 0.50 percentage points above the Prime Rate.

(d) The Revolving Commitment shall terminate on the Revolving Maturity Date, at which time all Revolving Loans and accrued interest thereon shall be immediately due and payable.

2.1.2. Letters of Credit.

(a) On and after the Closing Date, the Existing Letters of Credit shall be deemed for all purposes, including for purposes of the fees to be collected pursuant to Section 2.5, and reimbursement of costs and expenses to the extent provided herein, Letters of Credit outstanding under this Agreement and entitled to the benefits of this Agreement and the other

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Loan Documents, and shall be governed by the applications and agreements pertaining thereto and by this Agreement. Subject to the terms and conditions of this Agreement, Bank agrees to issue or cause to be issued Letters of Credit for the account of Borrower in an aggregate outstanding face amount (including drawn but unreimbursed Letters of Credit) not to exceed \$5,000,000, including the Existing Letters of Credit; provided that the issuance of any such Letter of Credit shall not result in an Overadvance. Each Letter of Credit shall have an expiry date no later than 180 days after the Revolving Maturity Date; provided that Borrower's Letter of Credit reimbursement obligation shall be secured by cash on terms acceptable to Bank at any time after the Revolving Maturity Date if the term of this Agreement is not extended by Bank. All Letters of Credit shall be, in form and substance, acceptable to Bank in its sole discretion and shall be subject to the terms and conditions of Bank's form of standard Application and Letter of Credit Agreement.

(b) The obligation of Borrower to immediately reimburse Bank for drawings made under Letters of Credit shall be absolute, unconditional and irrevocable, and shall be performed strictly in accordance with the terms of this Agreement and such Letters of Credit, under all circumstances whatsoever. Borrower shall indemnify, defend, protect, and hold Bank harmless from any loss, cost, expense or liability, including, without limitation, reasonable attorneys' fees, arising out of or in connection with any Letters of Credit.

(c) Borrower may request that Bank issue a Letter of Credit payable in a currency other than United States Dollars. If a demand for payment is made under any such Letter of Credit, Bank shall treat such demand as a Revolving Loan to Borrower of the equivalent of the amount thereof (plus cable charges) in United States currency at the then prevailing rate of exchange in San Francisco, California, for sales of that other currency for cable transfer to the country of which it is the currency.

(d) Upon the issuance of any letter of credit payable in a currency other than United States Dollars, Bank shall create a reserve under the Revolving Commitment for letters of credit against fluctuations in currency exchange rates, in an amount equal to ten percent (10%) of the face amount of such letter of credit. The amount of such reserve may be amended by Bank from time to time to account for fluctuations in the exchange rate. The availability of funds under the Revolving Commitment shall be reduced by the amount of such reserve for so long as such letter of credit remains outstanding.

2.1.3. Equipment Loans.

(a) Availability. Subject to and upon the terms and

conditions of this Agreement, at any time from the date hereof through the Revolving Maturity Date (the "Equipment Availability End Date"), Bank agrees to make advances (each an "Equipment Loan") to Borrower in an aggregate amount not to exceed the Equipment Commitment. Borrower shall deliver to Bank, at the time of each Equipment Loan request, an invoice for the equipment to be financed by such Equipment Loan. The Equipment Loans shall be used only to purchase new Equipment purchased on or after 90 days prior to the date hereof and shall not exceed 100% of the invoice amount of such equipment approved from time to time by Bank, excluding taxes, shipping, warranty charges, freight discounts and installation expense. Software and used Equipment may, however, constitute up to 25% of each Equipment Loan. Each Equipment Loan must be in a minimum amount of \$50,000.

(b) Interest Rate. Except as set forth in Section 2.3(b), the outstanding principal amount of the Equipments Loans and the Existing Equipment Loans shall bear interest,

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on the average daily balance thereof, at a per annum rate equal to 1.00 percentage points above the Prime Rate. Accrued interest on each such Loan shall be payable monthly on each Payment Date and on the date the final installment of principal on the Equipment Loans is due.

(c) Repayment. Any Equipment Loans that are outstanding on the Equipment Availability End Date will be payable in 36 equal monthly installments of principal beginning on the Payment Date next following the Equipment Availability End Date and continuing on each Payment Date thereafter until the 35th such Payment Date, when any remaining balance on the Equipment Loans shall be immediately due and payable. Equipment Loans, once repaid, may not be reborrowed.

(d) Repayment (Existing Equipment Loans). The Existing Equipment Loans will be payable in 33 equal monthly installments of principal (i.e., \$16,473.40 per month) beginning on the Payment Date next following the Closing Date and continuing on each Payment Date thereafter until November 23, 2001, when any remaining balance on the Existing Equipment Loans shall be immediately due and payable.

(e) Notice of Borrowing. When Borrower desires to obtain an Equipment Loan, Borrower shall notify Bank (which notice shall be irrevocable) by facsimile transmission to be received no later than 3:00 p.m. Pacific time one Business Day before the day on which the Equipment Loan is to be made. Such notice shall be substantially in the form of Exhibit B. The notice shall be signed by a Responsible Officer or its designee and include a copy of the invoice for the Equipment to be financed.

2.2. Overadvances. If, at any time or for any reason, any Overadvance shall occur, Borrower shall immediately pay to Bank, in cash, the amount of such Overadvance.

2.3. Default Rates, Payments, and Calculations.

(a) Default Rate. All Obligations shall bear interest, from and after the occurrence and during the continuance of an Event of Default, at a rate equal to five percentage points above the interest rate applicable immediately prior to such occurrence of an Event of Default.

(b) Payments. Interest hereunder shall be due and payable on each Payment Date. Borrower hereby authorizes Bank to debit any accounts with Bank, including, without limitation, Account Number 341964970 for payments of principal and interest due on the Obligations and any other amounts owing by Borrower to Bank. Bank will notify Borrower of all debits which Bank has made against Borrower's accounts. Any such debits against Borrower's accounts in no way shall be deemed a set-off. Any interest not paid when due shall be compounded by becoming a part of the Obligations, and such interest shall thereafter accrue interest at the rate then applicable hereunder.

(c) Computation. In the event the Prime Rate is changed from time to time hereafter, the applicable rate of interest hereunder shall be increased or decreased effective as of 12:01 a.m. on the day the Prime Rate is changed, by an amount equal to such change in the Prime Rate. All interest chargeable under the Loan Documents shall be computed on the basis of a

360-day year for the actual number of days elapsed.

2.4. Crediting Payments. So long as no Event of Default has occurred and is continuing, Bank shall credit a wire transfer of funds, check or other item of payment to such deposit account

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or Obligation as Borrower specifies. After the occurrence and during the continuance of an Event of Default, the receipt by Bank of any wire transfer of funds, check, or other item of payment, whether directed to Borrower's deposit account with Bank or to the Obligations or otherwise, shall be immediately applied to conditionally reduce Obligations, but shall not be considered a payment in respect of the Obligations unless such payment is of immediately available federal funds or unless and until such check or other item of payment is honored when presented for payment. Notwithstanding anything to the contrary contained herein, any wire transfer or payment received by Bank after 12:00 noon Pacific time shall be deemed to have been received by Bank as of the opening of business on the immediately following Business Day. Whenever any payment to Bank under the Loan Documents would otherwise be due (except by reason of acceleration) on a date that is not a Business Day, such payment shall instead be due on the next Business Day, and additional fees or interest, as the case may be, shall accrue and be payable for the period of such extension.

2.5. Fees. Borrower shall pay to Bank the following:

(a) Facility Fees. The following facility fees which shall be fully earned and non-refundable on the date when payable:

(i) A revolving facility fee of \$50,000, which shall be payable as follows: (A) \$37,250 on the Closing Date and (B) \$12,750 on July 31, 1999; provided that such \$12,750 shall not be payable if as of July 2, 1999, Borrower's financial performance (including profit and loss and tangible net worth) equals or exceeds that set forth for such date and the forecasted fiscal period then ending in the financial forecasts delivered to Bank on October 2, 1998; and

(ii) An equipment facility fee of \$15,000, which shall be payable on the date the first Equipment Loan is made;

(b) Letter of Credit Fees. Borrower shall pay to Bank from time to time on demand the normal issuance, presentation, amendment and processing fees, and other standard costs and charges, of Bank relating to letters of credit as from time to time in effect.

(c) Financial Examination and Appraisal Fees. Bank's customary fees and out-of-pocket expenses for Bank's audits of Borrower's Accounts, and for each appraisal of Collateral and financial analysis and examination of Borrower performed from time to time by Bank or its agents;

(d) Bank Expenses. Upon demand from Bank, including, without limitation, upon the date hereof, all Bank Expenses incurred through the date hereof, including reasonable attorneys' fees and expenses, and, after the date hereof, all Bank Expenses, including reasonable attorneys' fees and expenses, as and when they become due.

2.6. Term. Except as otherwise set forth herein, this Agreement shall become effective on the Closing Date and, subject to Section 12.7, shall continue in full force and effect until the Loans and all interest thereon have been fully and finally paid. Notwithstanding the foregoing, Bank shall have the right to terminate its obligation to make Loans under this Agreement immediately and without notice upon the occurrence and during the continuance of an Event of Default.

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2.7 Existing Credit Agreement. This Agreement amends and restates the Existing Agreement in its entirety, and the rights, obligations, and remedies of the parties hereto shall be governed by this Agreement, the Loan Documents, and the Loan Documents under the Existing Agreement to the extent not modified hereby, and without limiting the generality of the foregoing (a) the

Existing Equipment Loans shall bear interest at the rate applicable to the Equipment Loans as set forth in this Agreement and (b) the Existing Letters of Credit shall be governed by Section 2.1.2(c) of this Agreement; provided that any rights existing in favor of Bank arising from any commitment fees, indemnification, yield protection, taxes, and similar provisions of the Existing Agreement, relating in each case to the period prior to the Closing Date, shall survive the effectiveness of this Agreement. Bank's agreement to modifications to the Existing Agreement pursuant to this Agreement in no way shall obligate Bank to make any future modifications to the Existing Agreement. Nothing in this Agreement shall constitute a satisfaction of the obligations under the Existing Agreement. It is the intention of Bank and Borrower to retain as liable parties all makers and endorsers of the Existing Agreement, unless the party is expressly released by Bank in writing. No maker, endorser, or guarantor will be released by virtue of this Agreement. Borrower agrees that it has no defenses against the obligations to pay any amounts under the Existing Agreement.

3. CONDITIONS OF LOANS

3.1. Conditions Precedent to Initial Credit Extension. The obligation of Bank to make the initial Credit Extension is subject to the condition precedent that Bank shall have received, in form and substance satisfactory to Bank, the following:

- (a) this Agreement;
- (b) a certificate of the Secretary of Borrower with respect to articles, bylaws, incumbency and resolutions authorizing the execution and delivery of this Agreement;
- (c) an intellectual property security agreement;
- (d) financing statements (Forms UCC-1);
- (e) insurance certificate, together with a loss payment endorsement in form satisfactory to Bank;
- (f) payment of the fees and Bank Expenses then due specified in Section 2.5 hereof;
- (g) certificate of foreign qualification (if applicable), together with evidence of an appropriate fictitious name filing for each county, if any, in which Borrower does business using any d/b/a or other fictitious name;
- (h) guaranties by the Guarantors, if applicable;
- (i) an operating budget for Borrower for the 1999 fiscal year; and
- (j) such other documents, and completion of such other matters, as Bank may reasonably deem necessary or appropriate.

3.2. Conditions Precedent to all Credit Extensions. The obligation of Bank to make each Credit Extension, including the initial Credit Extension, is further subject to the following

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conditions:

- (a) timely receipt by Bank of the Payment/Loan Form as provided in Section 2.1;
- (b) no Overadvance exists or will result from such Credit Extension; and
- (c) the representations and warranties contained in Section 5 shall be true and correct in all material respects on and as of the date of such Payment/Loan Form and on the effective date of each Credit Extension as though made at and as of each such date (except to the extent they relate specifically to an earlier date, in which case such representations and warranties shall continue to have been true and accurate as of such date), and no Default shall have occurred and be continuing, or would result from such

Credit Extension. The making of each Credit Extension shall be deemed to be a representation and warranty by Borrower on the date of such Credit Extension as to the accuracy of the facts referred to in this Section 3.2(b).

4. CREATION OF SECURITY INTEREST

4.1. Grant of Security Interest. Borrower grants and pledges to Bank a continuing security interest in all presently existing and hereafter acquired or arising Collateral in order to secure prompt payment of any and all Obligations and in order to secure prompt performance by Borrower of each of its covenants and duties under the Loan Documents. Borrower acknowledges that Bank may, upon the occurrence and during the continuance of an Event of Default, place a hold on any deposit account pledged as Collateral to secure the Obligations. Notwithstanding termination of this Agreement, Bank's Lien on the Collateral shall remain in effect for so long as any Obligations are outstanding.

4.2. Delivery of Additional Documentation Required. Borrower shall from time to time execute and deliver to Bank, at the request of Bank, all Negotiable Collateral, all financing statements and other documents that Bank may reasonably request, in form satisfactory to Bank, to perfect and continue perfected Bank's security interests in the Collateral and in order to fully consummate all of the transactions contemplated under the Loan Documents.

4.3. Right to Inspect. Bank (through any of its officers, employees, or agents) shall have the right, upon reasonable prior notice, from time to time during Borrower's usual business hours, to inspect Borrower's Books and to make copies thereof and to check, test, and appraise the Collateral in order to verify Borrower's financial condition or the amount, condition of, or any other matter relating to, the Collateral.

4.4. Release of Collateral. Bank agrees to terminate (at Borrower's cost and expense) its security interest in the Collateral if Borrower, pursuant to financial information delivered to Bank under Section 6.3, has a net income greater than zero for any two consecutive fiscal quarter period, beginning with the 4FQ98 and 1FQ99 and has a Quick Ratio of at least 2.00 to 1.00 as at the end of any such two fiscal quarter period; provided that Bank shall have no obligation to terminate any security interests (a) if a Default has occurred and is at that time continuing and (b) unless Bank has received the certificate, in form and substance satisfactory to Bank, of Borrower's chief financial officer that the foregoing financial tests have been satisfied and that the warranties and representations set forth in Article 5 below are true and correct on the date of such certificate with the same force and effect as though made on and as of such date, except to the extent that such representations and warranties expressly relate to an earlier date, in which case such representations and warranties shall continue to be true as of such date.

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5. REPRESENTATIONS AND WARRANTIES

Borrower represents and warrants as follows:

5.1. Due Organization and Qualification. Borrower and each Subsidiary is a corporation duly existing and in good standing under the laws of its state of incorporation and qualified and licensed to do business in, and is in good standing in, any state in which the conduct of its business or its ownership of property requires that it be so qualified, except where the failure to be so qualified could reasonably be expected to have a Material Adverse Effect.

5.2. Due Authorization; No Conflict. The execution, delivery, and performance of the Loan Documents are within Borrower's powers, have been duly authorized, and are not in conflict with nor constitute a breach of any provision contained in Borrower's Articles/Certificate of Incorporation or Bylaws, nor will they constitute an event of default under any material agreement to which Borrower is a party or by which Borrower is bound except to the extent that certain intellectual property agreements prohibit the assignment of the rights thereunder to a third party without Borrower's or other party's consent and the Loan Documents constitute an assignment. Borrower is not in default under any agreement to which it is a party or by which it is bound, which default could reasonably be expected to have a Material Adverse Effect.

5.3. No Prior Encumbrances, No Excluded Property. Borrower has good

and inalienable title to its property, free and clear of Liens, except as set forth in the Schedule and for Permitted Liens. Bank has a valid and perfected security interest in all Collateral, and such security interest constitutes a first priority security interest in all Collateral, except, in the case of Collateral other than accounts, inventory, and equipment financed with Equipment Loans and Existing Equipment Loans, as set forth in the Schedule and for Permitted Liens. There is no Excluded Property, except (a) as set forth in the Schedule, (b) for Equipment financed by lenders or lessors other than Bank, or (c) has been notified to Bank by Borrower under Section 7.1.

5.4. Bona Fide Eligible Accounts. The Eligible Accounts are bona fide existing obligations. The service or property giving rise to such Eligible Accounts has been performed or delivered to the account debtor or to the account debtor's agent for immediate shipment to and unconditional acceptance by the account debtor. Borrower has not received notice of actual or imminent Insolvency Proceeding of any account debtor whose accounts are included in any Borrowing Base Certificate as an Eligible Account.

5.5. Merchantable Inventory. All Inventory is in all material respects of good and marketable quality, free from all material defects.

5.6. Intellectual Property. Borrower is the sole owner of the Intellectual Property Collateral, except for non-exclusive licenses granted by Borrower to its customers in the ordinary course of business. Each of the Patents is valid and enforceable, and no part of the Intellectual Property Collateral has been judged invalid or unenforceable, in whole or in part, and no claim has been made that any part of the Intellectual Property Collateral violates the rights of any third party. Except for and upon the filing with the United States Patent and Trademark Office with respect to the Patents and Trademarks and the Register of Copyrights with respect to the Copyrights and Mask Works necessary to perfect the security interests created hereunder, and except as has been already made or obtained, no authorization, approval or other action by, and no notice to or filing with, any United States governmental authority or United States regulatory body is required either (i) for the grant by Borrower of the security interest granted hereby or for

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the execution, delivery or performance of Loan Documents by Borrower in the United States or (ii) for the perfection in the United States or the exercise by Bank of its rights and remedies hereunder.

5.7. Name; Location of Chief Executive Office. Except as disclosed in the Schedule, Borrower has not done business and will not without at least 30 days prior written notice to Bank do business under any name other than that specified on the signature page hereof. The chief executive office of Borrower is located at the address indicated in Section 10 hereof.

5.8. Litigation. Except as set forth in the Schedule, there are no actions or proceedings pending, or, to Borrower's knowledge, threatened by or against Borrower or any Subsidiary before any court or administrative agency in which an adverse decision could reasonably be expected to have a Material Adverse Effect.

5.9. No Material Adverse Change in Financial Statements. All consolidated financial statements related to Borrower and any Subsidiary that have been delivered by Borrower to Bank fairly present in all material respects Borrower's consolidated financial condition as of the date thereof and Borrower's consolidated results of operations for the period then ended. There has not been a material adverse change in the consolidated financial condition of Borrower since the date of the most recent of such financial statements submitted to Bank on or about the Closing Date.

5.10. Regulatory Compliance. Borrower and each Subsidiary has met the minimum funding requirements of ERISA with respect to any employee benefit plans subject to ERISA. No event has occurred resulting from Borrower's failure to comply with ERISA that is reasonably likely to result in Borrower's incurring any liability that could reasonably be expected to have a Material Adverse Effect. Borrower is not an "investment company" or a company "controlled" by an "investment company" within the meaning of the Investment Company Act of 1940. Borrower is not engaged principally, or as one of its important activities, in the business of extending credit for the purpose of purchasing or carrying margin stock (within the meaning of Regulation U of the Board of Governors of

the Federal Reserve System). Borrower has complied with all the provisions of the Federal Fair Labor Standards Act. Borrower has not violated any statutes, laws, ordinances or rules applicable to it, violation of which could reasonably be expected to have a Material Adverse Effect.

5.11. Environmental Condition. None of Borrower's or any Subsidiary's properties or assets has ever been used by Borrower or any Subsidiary or, to the best of Borrower's knowledge, by previous owners or operators, in the disposal of, or to produce, store, handle, treat, release, or transport, any hazardous waste or hazardous substance other than in accordance with applicable law; to the best of Borrower's knowledge, none of Borrower's properties or assets has ever been designated or identified in any manner pursuant to any environmental protection statute as a hazardous waste or hazardous substance disposal site, or a candidate for closure pursuant to any environmental protection statute; no lien arising under any environmental protection statute has attached to any revenues or to any real or personal property owned by Borrower or any Subsidiary; and neither Borrower nor any Subsidiary has received a summons, citation, notice, or directive from the Environmental Protection Agency or any other federal, state or other governmental agency concerning any action or omission by Borrower or any Subsidiary resulting in the release, or other disposition of hazardous waste or hazardous substances into the environment.

5.12. Taxes. Borrower and each Subsidiary has filed or caused to be filed all tax returns

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required to be filed on a timely basis, and has paid, or has made adequate provision for the payment of, all taxes reflected therein, except those being contested in good faith by proper proceedings with adequate reserves under GAAP.

5.13. Subsidiaries. Borrower does not own any stock, partnership interest or other equity securities of any Person, except for Permitted Investments.

5.14. Government Consents. Borrower and each Subsidiary has obtained all consents, approvals and authorizations of, made all declarations or filings with, and given all notices to, all governmental authorities that are necessary for the continued operation of Borrower's business as currently conducted except where the failure to obtain such consent, approval or authorization, to make any such declaration or filing or to give any such notice could not reasonably be expected to have a Material Adverse Effect.

5.15. Year 2000 Compliance. Borrower has conducted a comprehensive review and assessment of Borrower's systems and equipment applications with respect to the Year 2000 Problem. Based on that review and inquiry, Borrower does not believe the Year 2000 Problem, including costs of remediation, will have a Material Adverse Effect. Borrower has developed adequate contingency plans to ensure uninterrupted and unimpaired business operation in the event of a failure of its own systems or equipment due to the Year 2000 Problem, including a general failure of or interruption in its communications and delivery infrastructure.

5.16. Full Disclosure. No representation, warranty or other statement made by Borrower in any certificate or written statement furnished to Bank by Borrower in connection with the transaction contemplated by this Agreement, taken as a whole, contains any untrue statement of a material fact or omits to state a material fact necessary in order to make the statements contained in such certificates or statements not misleading it being recognized by the Bank that the projections and forecasts provided by Borrower are based on Borrower's reasonable and good faith assessment of the probabilities of future events and that actual results during the period or periods covered by any such projections and forecasts may differ from the projected or forecasted results).

6. AFFIRMATIVE COVENANTS

Borrower covenants and agrees that, until payment in full of all outstanding Obligations, and for so long as Bank may have any commitment to make a Credit Extension hereunder, Borrower shall do all of the following:

6.1. Good Standing. Borrower shall maintain, or cause to be maintained, its and each of its Subsidiaries' corporate existence and good standing in its jurisdiction of incorporation and maintain qualification in each

jurisdiction in which the failure to so qualify could reasonably be expected to have a Material Adverse Effect. Borrower shall maintain, and shall cause each of its Subsidiaries to maintain, to the extent consistent with prudent management of Borrower's business, in force all licenses, approvals and agreements, the loss of which would reasonably be expected to have a Material Adverse Effect.

6.2. Government Compliance. Borrower shall meet, and shall cause each Subsidiary to meet, the minimum funding requirements of ERISA with respect to any employee benefit plans subject to ERISA. Borrower shall comply, and shall cause each Subsidiary to comply, with all statutes, laws, ordinances and government rules and regulations to which it is subject, noncompliance with which could have a Material Adverse Effect.

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6.3. Financial Statements, Reports, Certificates. Borrower shall deliver to Bank: (a) as soon as available, but in any event within 30 days after the end of each month, a company prepared consolidated balance sheet and income statement covering Borrower's consolidated operations during such period, in a form and certified by an officer of Borrower reasonably acceptable to Bank; (b) as soon as available, but in any event within 90 days after the end of Borrower's fiscal year, audited consolidated financial statements of Borrower (which may be in the form of a Form 10-K of the Securities and Exchange Commission) prepared in accordance with GAAP, consistently applied, together with an unqualified opinion on such financial statements of an independent certified public accounting firm reasonably acceptable to Bank; (c) within five days of filing, copies of all statements, reports and notices sent or made available generally by Borrower to its security holders or to any holders of Subordinated Debt and all reports on Form 10-K, 10-Q and 8-K filed with the Securities and Exchange Commission; (d) promptly upon receipt of notice thereof, a report of any legal actions pending or threatened against Borrower or any Subsidiary that could result in damages or costs to Borrower or any Subsidiary of \$100,000.00 or more; (e) prompt notice of any material change in the composition of the Intellectual Property Collateral, including, but not limited to, any subsequent ownership right of Borrower in or to any Copyright, Patent or Trademark not specified in any intellectual property security agreement between Borrower and Bank or knowledge of an event that materially adversely effects the value of the Intellectual Property Collateral; and (f) such budgets, sales projections, operating plans or other financial information as Bank may reasonably request from time to time.

Within 30 days after the last day of each month, Borrower shall deliver to Bank a Borrowing Base Certificate signed by a Responsible Officer in substantially the form of Exhibit C hereto, together with aged listings of accounts receivable and accounts payable and an inventory schedule.

Within 30 days after the last day of each month, Borrower shall deliver to Bank with the monthly financial statements a Compliance Certificate signed by a Responsible Officer in substantially the form of Exhibit D hereto.

Bank shall have a right from time to time hereafter to audit Borrower's Accounts at Borrower's expense, provided that such audits will be conducted no more often than every six months unless an Event of Default has occurred and is continuing.

6.4. Inventory; Returns. Borrower shall keep all Inventory in good and marketable condition, free from all material defects. Returns and allowances, if any, as between Borrower and its account debtors shall be on the same basis and in accordance with the usual customary practices of Borrower, as they exist at the time of the execution and delivery of this Agreement. Borrower shall promptly notify Bank of all returns and recoveries and of all disputes and claims, where the return, recovery, dispute or claim involves more than \$50,000.00.

6.5. Taxes. Borrower shall make, and shall cause each Subsidiary to make, due and timely payment or deposit of all material federal, state, and local taxes, assessments, or contributions required of it by law, and will execute and deliver to Bank, on demand, appropriate certificates attesting to the payment or deposit thereof; and Borrower will make, and will cause each Subsidiary to make, timely payment or deposit of all material tax payments and withholding taxes required of it by applicable laws, including, but not limited to, those laws concerning F.I.C.A., F.U.T.A., state disability, and local, state, and federal income taxes, and will, upon

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request, furnish Bank with proof satisfactory to Bank indicating that Borrower or a Subsidiary has made such payments or deposits; provided that Borrower or a Subsidiary need not make any payment if the amount or validity of such payment is (I) contested in good faith by appropriate proceedings, (ii) is reserved against (to the extent required by GAAP) by Borrower and (iii) no lien other than a Permitted Lien results.

6.6. Insurance.

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(a) Borrower, at its expense, shall keep the Collateral insured against loss or damage by fire, theft, explosion, sprinklers, and all other hazards and risks, and in such amounts, as ordinarily insured against by other owners in similar businesses conducted in the locations where Borrower's business is conducted on the date hereof. Borrower shall also maintain insurance relating to Borrower's ownership and use of the Collateral in amounts and of a type that are customary to businesses similar to Borrower's.

(b) All such policies of insurance shall be in such form, with such companies, and in such amounts as are reasonably satisfactory to Bank. All such policies of property insurance shall contain a lender's loss payable endorsement, in a form satisfactory to Bank, showing Bank as an additional loss payee thereof and all liability insurance policies shall show the Bank as an additional insured, and shall specify that the insurer must give at least 20 days notice to Bank before canceling its policy for any reason. At Bank's request, Borrower shall deliver to Bank certified copies of such policies of insurance and evidence of the payments of all premiums therefor. All proceeds payable under any such policy shall, at the option of Bank, be payable to Bank to be applied on account of the Obligations; provided that so long as no Event of Default has occurred and is continuing, Borrower shall have the option of applying the proceeds of any casualty policy to the replacement or repair of destroyed or damaged property.

6.7. Principal Depository. Borrower shall maintain its principal depository and operating accounts with Bank.

6.8. Quick Ratio. Borrower shall maintain, as of the last day of each calendar month, a ratio of Quick Assets to Current Liabilities of at least 1.25 to 1.00 (2.00 to 1.00 following any termination of Bank's security interest in the Collateral pursuant to Section 4.4.).

6.9. Debt-Net Worth Ratio. Borrower shall maintain, as of the last day of each calendar month, a ratio of Total Liabilities less Subordinated Debt less deferred revenue to Tangible Net Worth plus Subordinated Debt of not more than 0.75 to 1.00.

6.10. Profitability. Borrower shall be profitable for each fiscal quarter, except Borrower may suffer a loss of up to \$200,000 in the fourth fiscal quarter of the 1998 fiscal year and a loss of up to \$1,000,000 in the first fiscal quarter of the 1999 fiscal year.

6.11. Registration of Intellectual Property Rights.

(a) Borrower shall register or cause to be registered (to the extent not already registered) with the United States Patent and Trademark Office or the United States Copyright Office, as applicable, those intellectual property rights listed on Exhibits A, B and C to the Intellectual Property Security Agreement delivered to Bank by Borrower in connection with this Agreement within 10 days of the date of this Agreement. Borrower shall register or cause to be registered with the United States Patent and Trademark Office or the United States Copyright Office, as applicable, those additional intellectual property rights developed or acquired by Borrower from time to time in connection with any product prior to the sale or licensing of such product to any third party, including without limitation revisions or additions to the intellectual property rights listed on such Exhibits A, B and C.

(b) Borrower shall execute and deliver such

additional instruments and documents from time to time as Bank shall reasonably request to perfect Bank's security interest

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in the Intellectual Property Collateral.

(c) Borrower shall (i) protect, defend and maintain the validity and enforceability of the Trademarks, Patents, Copyrights, and Mask Works, (ii) use its best efforts to detect infringements of the Trademarks, Patents, Copyrights and Mask Works and promptly advise Bank in writing of material infringements detected and (iii) not allow any Trademarks, Patents, Copyrights, or Mask Works to be abandoned, forfeited or dedicated to the public without the written consent of Bank, which shall not be unreasonably withheld.

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(d) Bank shall have the right, but not the obligation, to take, at Borrower's sole expense, any actions that Borrower is required under this section to take but which Borrower fails to take, after 15 days' notice to Borrower. Borrower shall reimburse and indemnify Bank for all reasonable costs and reasonable expenses incurred in the reasonable exercise of its rights under this section.

6.12. Further Assurances. At any time and from time to time Borrower shall execute and deliver such further instruments and take such further action as may reasonably be requested by Bank to effect the purposes of this Agreement.

7. NEGATIVE COVENANTS

Borrower covenants and agrees that, so long as any Credit Extension hereunder shall be available and until payment in full of the outstanding Obligations or for so long as Bank may have any commitment to make any Loans, Borrower will not do any of the following:

7.1. Dispositions. Convey, sell, lease, transfer or otherwise dispose of (collectively, a "Transfer"), or permit any of its Subsidiaries to Transfer, all or any part of its business or property, other than Transfers: (i) of inventory in the ordinary course of business, (ii) of non-exclusive licenses and similar arrangements for the use of the property of Borrower or its Subsidiaries in the ordinary course of business; (iii) that constitute payment of normal and usual operating expenses in the ordinary course of business;; (iv) of worn-out or obsolete Equipment, or (v) other Transfers not otherwise permitted under this Section 7.1 in an aggregate amount not to exceed \$10,000 in any fiscal year of the Borrower..

7.2. Changes in Business, Ownership, or Management, Business Locations. Engage in any business, or permit any of its Subsidiaries to engage in any business, other than the businesses currently engaged in by Borrower and any business substantially similar or related thereto (or incidental thereto), or suffer a material change in Borrower's ownership or management. Borrower will not, without at least 30 days prior written notification to Bank, relocate its chief executive office or add any new offices or business locations.

7.3. Mergers or Acquisitions. Merge or consolidate, or permit any of its Subsidiaries to merge or consolidate, with or into any other business organization, or acquire, or permit any of its Subsidiaries to acquire, all or substantially all of the capital stock or property of another Person except the merger or consolidation of one Subsidiary into another Subsidiary or into Borrower.

7.4. Indebtedness. Create, incur, assume or be or remain liable with respect to any Indebtedness, or permit any Subsidiary so to do, other than Permitted Indebtedness.

7.5. Encumbrances. Create, incur, assume or suffer to exist any Lien with respect to any of its property, or assign or otherwise convey any right to receive income, including the sale of any Accounts, or permit any of its Subsidiaries so to do, except for Permitted Liens.

7.6. Distributions. Pay any dividends or make any other distribution

or payment on account of or in redemption, retirement or purchase of any capital stock except for (i) repurchases of stock from former employees or consultants of Borrower in accordance with the

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terms of repurchase or similar agreements between Borrower and such employees in an aggregate amount not to exceed \$100,000 during the term of this Agreement, (ii) distributions payable solely in capital stock of Borrower, (iii) conversions and exchanges of securities of the Borrower into equity securities of the Borrower not constituting Indebtedness, and (iv) repurchases of Borrower's capital stock solely from the proceeds of the issuance by Borrower of capital stock but only if such repurchases are effectuated immediately upon the consummation of such transaction ; provided that in the case of (i) through (iv) above, immediately prior to and following such transaction, there exists no Event of Default.

7.7. Investments. Directly or indirectly acquire or own, or make any Investment in or to any Person, or permit any of its Subsidiaries so to do, other than Permitted Investments.

7.8. Transactions with Affiliates. Directly or indirectly enter into or permit to exist any material transaction with any Affiliate of Borrower except for transactions that are in the ordinary course of Borrower's business, upon fair and reasonable terms that are no less favorable to Borrower than would be obtained in an arm's length transaction with a nonaffiliated Person.

7.9. Intellectual Property Agreements. Borrower shall not permit the inclusion in any material contract to which it becomes a party of any provisions that could or might in any way prevent the creation of a security interest in Borrower's rights and interests in any property included within the definition of the Intellectual Property Collateral acquired under such contracts, except to the extent that such provisions are necessary in Borrower's exercise of its reasonable business judgement and has been notified to Bank.

7.10. Subordinated Debt. Make any payment in respect of any Subordinated Debt, or permit any of its Subsidiaries to make any such payment, except in compliance with the terms of such Subordinated Debt, or amend any provision contained in any documentation relating to the Subordinated Debt without Bank's prior written consent.

7.11. Inventory. Store the Inventory with a bailee, warehouseman, or similar party unless Bank has received a pledge of any warehouse receipt covering such Inventory. Except for Inventory sold in the ordinary course of business and except for such other locations as Bank may approve in writing, Borrower shall keep the Inventory only at the location set forth in Section 10 hereof and such other locations of which Borrower gives Bank prior written notice and as to which Borrower signs and files a financing statement where needed to perfect Bank's security interest.

7.12. Compliance. Become an "investment company" or a company controlled by an "investment company," within the meaning of the Investment Company Act of 1940, or become principally engaged in, or undertake as one of its important activities, the business of extending credit for the purpose of purchasing or carrying margin stock, or use the proceeds of any Loan for such purpose; fail to meet the minimum funding requirements of ERISA; permit a Reportable Event or Prohibited Transaction, as defined in ERISA, to occur; fail to comply with the Federal Fair Labor Standards Act or violate any other law or regulation, which violation could reasonably be expected to have a Material Adverse Effect; or permit any of its Subsidiaries to do any of the foregoing.

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8. EVENTS OF DEFAULT

Any one or more of the following events shall constitute an "Event of Default" by Borrower under this Agreement:

8.1. Payment Default. If Borrower fails to pay the principal (including Letter of Credit reimbursement obligations) of, or any interest on, any Credit Extensions when due and payable; or fails to pay any portion of any

other Obligations not constituting the principal (including Letter of Credit reimbursement obligations) or interest of such Credit Extensions, including without limitation Bank Expenses, within five days of receipt by Borrower of an invoice for such other Obligations;

8.2. Covenant Default.

(a) If Borrower fails to perform any obligation under Sections 6.3, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13 or 6.14 or violates any of the covenants contained in Article 7 of this Agreement, or

(b) If Borrower fails or neglects to perform, keep, or observe any other material term, provision, condition, covenant, or agreement contained in this Agreement, in any of the Loan Documents, or in any other present or future agreement between Borrower and Bank and as to any default under such other term, provision, condition, covenant or agreement that can be cured, has failed to cure such default within ten days after the occurrence thereof; provided that if the default cannot by its nature be cured within the ten day period or cannot after diligent attempts by Borrower be cured within such 10 day period, and such default is likely to be cured within a reasonable time, then Borrower shall have an additional reasonable period (which shall not in any case exceed 30 days) to attempt to cure such default, and within such reasonable time period the failure to have cured such default shall not be deemed an Event of Default (provided that no Loans will be required to be made during such cure period);

8.3. Attachment. If any material portion of Borrower's assets is attached, seized, subjected to a writ or distress warrant, or is levied upon, or comes into the possession of any trustee, receiver or person acting in a similar capacity and such attachment, seizure, writ or distress warrant or levy has not been removed, discharged or rescinded within ten days, or if Borrower is enjoined, restrained, or in any way prevented by court order from continuing to conduct all or any material part of its business affairs, or if a judgment or other claim becomes a lien or encumbrance upon any material portion of Borrower's assets, or if a notice of lien, levy, or assessment is filed of record with respect to any of Borrower's assets by the United States Government, or any department, agency, or instrumentality thereof, or by any state, county, municipal, or governmental agency, and the same is not paid within ten days after Borrower receives notice thereof, provided that none of the foregoing shall constitute an Event of Default where such action or event is stayed or an adequate bond has been posted pending a good faith contest by Borrower (provided that no Credit Extensions will be required to be made during such cure period);

8.4. Insolvency. If Borrower becomes insolvent, or if an Insolvency Proceeding is commenced by Borrower, or if an Insolvency Proceeding is commenced against Borrower and is not dismissed or stayed within 30 days (provided that no Loans will be made prior to the dismissal of such Insolvency Proceeding);

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8.5. Other Agreements. If there is:

(a) any event of default under the Existing Agreement; or

(b) a default in any agreement to which Borrower is a party with a third party or parties resulting in a right by such third party or parties, whether or not exercised, to accelerate the maturity of any Indebtedness in an amount in excess of \$100,000.00 or that could have a Material Adverse Effect;

8.6. Subordinated Debt. If Borrower makes any payment on account of Subordinated Debt, except to the extent such payment is allowed under any subordination agreement entered into with Bank;

8.7. Judgments. If a judgment or judgments for the payment of money in an amount, individually or in the aggregate, of at least \$100,000 shall be rendered against Borrower and shall remain unsatisfied and unstayed for a period of ten days (provided that no Credit Extensions will be made prior to the satisfaction or stay of such judgment); or

8.8. Misrepresentations. If any material misrepresentation or material misstatement exists now or hereafter in any warranty or representation

set forth herein or in any certificate or writing delivered to Bank by Borrower or any Person acting on Borrower's behalf pursuant to this Agreement or to induce Bank to enter into this Agreement or any other Loan Document.

8.9. Guaranty. Any guaranty of all or a portion of the Obligations ceases for any reason to be in full force and effect, or any Guarantor fails to perform any obligation under any guaranty of all or a portion of the Obligations, or any material misrepresentation or material misstatement exists now or hereafter in any warranty or representation set forth in any guaranty of all or a portion of the Obligations or in any certificate delivered to Bank in connection with such guaranty, or any of the circumstances described in Sections 8.4, 8.5 or 8.8 occur with respect to any Guarantor.

9. BANK'S RIGHTS AND REMEDIES

9.1. Rights and Remedies. Upon the occurrence and during the continuance of an Event of Default, Bank may, at its election, without notice of its election and without demand, do any one or more of the following, all of which are authorized by Borrower:

(a) Declare all Obligations, whether evidenced by this Agreement, by any of the other Loan Documents, or otherwise, immediately due and payable (provided that upon the occurrence of an Event of Default described in Section 8.5 all Obligations shall become immediately due and payable without any action by Bank);

(b) Cease advancing money or extending credit to or for the benefit of Borrower under this Agreement or under any other agreement between Borrower and Bank;

(c) Demand that Borrower (i) deposit cash with Bank in an amount equal to the amount of any Letters of Credit remaining undrawn, as collateral security for the repayment of any future drawings under such Letters of Credit, and Borrower shall forthwith deposit and pay such amounts, and (ii) pay in advance all Letters of Credit fees scheduled to be paid or payable over the remaining term of the Letters of Credit;

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(d) Settle or adjust disputes and claims directly with account debtors for amounts, upon terms and in whatever order that Bank reasonably considers advisable;

(e) Without notice to or demand upon Borrower, make such payments and do such acts as Bank considers necessary or reasonable to protect its security interest in the Collateral. Borrower agrees to assemble the Collateral if Bank so requires, and to make the Collateral available to Bank as Bank may designate. Borrower authorizes Bank to enter the premises where the Collateral is located, to take and maintain possession of the Collateral, or any part of it, and to pay, purchase, contest, or compromise any encumbrance, charge, or lien which in Bank's determination appears to be prior or superior to its security interest and to pay all expenses incurred in connection therewith. With respect to any of Borrower's premises, Borrower hereby grants Bank a license to enter such premises and to occupy the same, without charge in order to exercise any of Bank's rights or remedies provided herein, at law, in equity, or otherwise;

(f) Without notice to Borrower set off and apply to the Obligations any and all (i) balances and deposits of Borrower held by Bank, or (ii) indebtedness at any time owing to or for the credit or the account of Borrower held by Bank;

(g) Ship, reclaim, recover, store, finish, maintain, repair, prepare for sale, advertise for sale, and sell (in the manner provided for herein) the Collateral. Bank is hereby granted a non-exclusive, royalty-free license or other right, solely pursuant to the provisions of this Section 9.1, to use, without charge, Borrower's labels, patents, copyrights, mask works, rights of use of any name, trade secrets, trade names, trademarks, service marks, and advertising matter, or any property of a similar nature, as it pertains to the Collateral, in completing production of, advertising for sale, and selling any Collateral and, in connection with Bank's exercise of its rights under this Section 9.1, Borrower's rights under all licenses and all franchise agreements shall inure to Bank's benefit;

(h) Sell the Collateral at either a public or private sale, or both, by way of one or more contracts or transactions, for cash or on terms, in such manner and at such places (including Borrower's premises) as Bank determines is commercially reasonable, and apply the proceeds thereof to the Obligations in whatever manner or order it deems appropriate;

(i) Bank may credit bid and purchase at any public sale, or at any private sale as permitted by law; and

(j) Any deficiency that exists after disposition of the Collateral as provided above will be paid immediately by Borrower.

9.2. Power of Attorney. Effective only upon the occurrence and during the continuance of an Event of Default, Borrower hereby irrevocably appoints Bank (and any of Bank's designated officers, or employees) as Borrower's true and lawful attorney to: (a) send requests for verification of Accounts or notify account debtors of Bank's security interest in the Accounts; (b) endorse Borrower's name on any checks or other forms of payment or security that may come into Bank's possession; (c) sign Borrower's name on any invoice or bill of lading relating to any Account, drafts against account debtors, schedules and assignments of Accounts, verifications of Accounts, and notices to account debtors; (d) make, settle, and adjust all claims under and decisions with respect to Borrower's policies of insurance; and (e) settle and adjust disputes and

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claims respecting the accounts directly with account debtors, for amounts and upon terms which Bank determines to be reasonable; (f) to modify, in its sole discretion, any intellectual property security agreement entered into between Borrower and Bank without first obtaining Borrower's approval of or signature to such modification by amending Exhibit A, Exhibit B, Exhibit C, and Exhibit D, thereof, as appropriate, to include reference to any right, title or interest in any Copyrights, Patents, Trademarks, Mask Works acquired by Borrower after the execution hereof or to delete any reference to any right, title or interest in any Copyrights, Patents, Trademarks, or Mask Works in which Borrower no longer has or claims any right, title or interest; (g) to file, in its sole discretion, one or more financing or continuation statements and amendments thereto, relative to any of the Collateral without the signature of Borrower where permitted by law; and (h) to transfer the Intellectual Property Collateral into the name of Bank or a third party to the extent permitted under the UCC provided Bank may exercise such power of attorney to sign the name of Borrower on any of the documents described in Section 4.2 regardless of whether an Event of Default has occurred. The appointment of Bank as Borrower's attorney in fact, and each and every one of Bank's rights and powers, being coupled with an interest, is irrevocable until all of the Obligations have been fully repaid and performed and Bank's obligation to provide Loans hereunder is terminated.

9.3. Accounts Collection. Upon the occurrence and during the continuance of an Event of Default, Bank may notify any Person owing funds to Borrower of Bank's security interest in such funds and verify the amount of such Account. Borrower shall collect all amounts owing to Borrower for Bank, receive in trust all payments as Bank's trustee, and if requested or required by Bank, immediately deliver such payments to Bank in their original form as received from the account debtor, with proper endorsements for deposit.

9.4. Bank Expenses. If Borrower fails to pay any amounts or furnish any required proof of payment due to third persons or entities, as required under the terms of this Agreement, then Bank may do any or all of the following: (a) make payment of the same or any part thereof; (b) set up such reserves under the Revolving Commitment as Bank deems necessary to protect Bank from the exposure created by such failure; or (c) obtain and maintain insurance policies of the type discussed in Section 6.6 of this Agreement, and take any action with respect to such policies as Bank deems prudent. Any amounts so paid or deposited by Bank shall constitute Bank Expenses, shall be immediately due and payable, and shall bear interest at the then applicable rate hereinabove provided, and shall be secured by the Collateral. Any payments made by Bank shall not constitute an agreement by Bank to make similar payments in the future or a waiver by Bank of any Event of Default under this Agreement.

9.5. Bank's Liability for Collateral. So long as Bank complies with reasonable banking practices, Bank shall not in any way or manner be liable or

responsible for: (a) the safekeeping of the Collateral; (b) any loss or damage thereto occurring or arising in any manner or fashion from any cause; (c) any diminution in the value thereof; or (d) any act or default of any carrier, warehouseman, bailee, forwarding agency, or other person whomsoever. All risk of loss, damage or destruction of the Collateral shall be borne by Borrower.

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9.6. Remedies Cumulative. Bank's rights and remedies under this Agreement, the Loan Documents, and all other agreements shall be cumulative. Bank shall have all other rights and remedies not expressly set forth herein as provided under the UCC, by law, or in equity. No exercise by Bank of one right or remedy shall be deemed an election, and no waiver by Bank of any Event of Default on Borrower's part shall be deemed a continuing waiver. No delay by Bank shall constitute a waiver, election, or acquiescence by it. No waiver by Bank shall be effective unless made in a written document signed on behalf of Bank and then shall be effective only in the specific instance and for the specific purpose for which it was given.

9.7. Demand; Protest. Borrower waives demand, protest, notice of protest, notice of default or dishonor, notice of payment and nonpayment, notice of any default, nonpayment at maturity, release, compromise, settlement, extension, or renewal of accounts, documents, instruments, chattel paper, and guarantees at any time held by Bank on which Borrower may in any way be liable.

10. NOTICES

Unless otherwise provided in this Agreement, all notices or demands by any party relating to this Agreement or any other agreement entered into in connection herewith shall be in writing and (except for financial statements and other informational documents which may be sent by first-class mail, postage prepaid) shall be personally delivered or sent by a recognized overnight delivery service, by certified mail, postage prepaid, return receipt requested, or by telefacsimile to Borrower or to Bank, as the case may be, at its addresses set forth below for such party on the signature pages hereof. The parties hereto may change the address at which they are to receive notices hereunder, by notice in writing in the foregoing manner given to the other.

11. CHOICE OF LAW AND VENUE; WAIVER OF JURY TRIAL

The Loan Documents shall be governed by, and construed in accordance with, the internal laws of the State of California, without regard to principles of conflicts of law. Each of Borrower and Bank hereby submits to the exclusive jurisdiction of the state and Federal courts located in the County of Santa Clara, State of California. BORROWER AND BANK EACH HEREBY WAIVE THEIR RESPECTIVE RIGHTS TO A JURY TRIAL OF ANY CLAIM OR CAUSE OF ACTION BASED UPON OR ARISING OUT OF ANY OF THE LOAN DOCUMENTS OR ANY OF THE TRANSACTIONS CONTEMPLATED THEREIN, INCLUDING CONTRACT CLAIMS, TORT CLAIMS, BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW OR STATUTORY CLAIMS. EACH PARTY RECOGNIZES AND AGREES THAT THE FOREGOING WAIVER CONSTITUTES A MATERIAL INDUCEMENT FOR IT TO ENTER INTO THIS AGREEMENT. EACH PARTY REPRESENTS AND WARRANTS THAT IT HAS REVIEWED THIS WAIVER WITH ITS LEGAL COUNSEL AND THAT IT KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS FOLLOWING CONSULTATION WITH LEGAL COUNSEL.

12. GENERAL PROVISIONS

12.1. Successors and Assigns. This Agreement shall bind and inure to the benefit of the respective successors and permitted assigns of each of the parties; provided that neither this Agreement nor any rights hereunder may be assigned by Borrower without Bank's prior written consent, which consent may be granted or withheld in Bank's sole discretion. Bank shall have the right without the consent of or notice to Borrower to sell, transfer, negotiate, or grant

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participation in all or any part of, or any interest in, Bank's obligations, rights and benefits hereunder.

12.2. Indemnification. Borrower shall , indemnify ,defend, protect and hold harmless Bank and its officers, employees, and agents against: (a) all obligations, demands, claims, and liabilities claimed or asserted by any other

party in connection with the transactions contemplated by the Loan Documents; and (b) all losses or Bank Expenses in any way suffered, incurred, or paid by Bank as a result of or in any way arising out of, following, or consequential to transactions between Bank and Borrower whether under the Loan Documents, or otherwise (including without limitation reasonable attorneys fees and expenses), except for losses caused by Bank's gross negligence or willful misconduct.

12.3. Time of Essence. Time is of the essence for the performance of all obligations set forth in this Agreement.

12.4. Severability of Provisions. Each provision of this Agreement shall be severable from every other provision of this Agreement for the purpose of determining the legal enforceability of any specific provision.

12.5. Amendments in Writing, Integration. This Agreement cannot be amended or terminated except by a writing signed by Borrower and Bank. All prior agreements, understandings, representations, warranties, and negotiations between the parties hereto with respect to the subject matter of this Agreement, if any, are merged into this Agreement and the Loan Documents.

12.6. Counterparts. This Agreement may be executed in any number of counterparts and by different parties on separate counterparts, each of which, when executed and delivered, shall be deemed to be an original, and all of which, when taken together, shall constitute but one and the same Agreement.

12.7. Survival. All covenants, representations and warranties made in this Agreement shall continue in full force and effect so long as any Obligations remain outstanding. The obligations of Borrower to indemnify Bank with respect to the expenses, damages, losses, costs and liabilities described in Section 12.2 shall survive until all applicable statute of limitations periods with respect to actions that may be brought against Bank have run.

12.8. Confidentiality. In handling any confidential information Bank shall exercise the same degree of care that it exercises with respect to its own proprietary information of the same types to maintain the confidentiality of any non-public information thereby received or received pursuant to this Agreement except that disclosure of such information may be made (i) to the subsidiaries or affiliates of Bank in connection with their present or prospective business relations with Borrower, (ii) to prospective transferees or purchasers of any interest in the Loans, provided that they have entered into a comparable confidentiality agreement in favor of Borrower and have delivered a copy to Borrower, (iii) as required by law, regulations, rule or order, subpoena, judicial order or similar order, (iv) as may be required in connection with the examination, audit or similar investigation of Bank, and (v) as Bank may deem appropriate in connection with the exercise of any remedies hereunder. Confidential information hereunder shall not include information that either: (a) is in the public domain or in the knowledge or possession of Bank when disclosed to Bank, or becomes part of the public domain after disclosure to Bank through no fault of Bank; or (b) is disclosed to Bank by a third party, provided Bank does not have actual knowledge that such third party is prohibited from disclosing such information.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date first above written.

HARMONIC LIGHTWAVES, INC. (doing business in California as DELAWARE HARMONIC LIGHTWAVES, INC.), a Delaware corporation

By _____
Title: _____

By _____
Title: _____

Address for Notices:

Attention: Marty McFarland, Controller
549 Baltic Way

SILICON VALLEY BANK

By _____
Title: _____

Address for Notices:

Attention: Scott Poland, Vice President
Communications and Online Services
3003 Tasman Drive
Santa Clara, CA 95054

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DEBTOR: HARMONIC LIGHTWAVES, INC. ("Borrower")
SECURED PARTY: SILICON VALLEY BANK ("Bank")

EXHIBIT A

The Collateral shall consist of all right, title and interest of Borrower, whether now existing or hereafter acquired or created and wherever located, in and to the following:

(a) All goods, equipment, machinery, fixtures, vehicles (including motor vehicles and trailers), and any interest in any of the foregoing, and all attachments, accessories, accessions, replacements, substitutions, additions, and improvements to any of the foregoing;

(b) All inventory, merchandise, raw materials, parts, supplies, packing and shipping materials, work in process and finished products including such inventory as is temporarily out of Borrower's custody or possession or in transit and including any returns upon any accounts or other proceeds, including insurance proceeds, resulting from the sale or disposition of any of the foregoing and any documents of title representing any of the above;

(c) All contract rights, general intangibles, goodwill, trademarks, servicemarks, trade styles, trade names, patents, patent applications, leases, license agreements, franchise agreements, blueprints, drawings, purchase orders, customer lists, route lists, infringements, claims, computer programs, computer discs, computer tapes, literature, reports, catalogs, design rights, income tax refunds, payments of insurance and rights to payment of any kind;

(d) All accounts, contract rights, royalties, license rights and all other forms of obligations owing to Borrower, whether or not arising out of the sale or lease of goods, the licensing of technology or the rendering of services by Borrower, and whether or not earned by performance, and any and all credit insurance, guaranties, and other security therefor, as well as all merchandise returned to or reclaimed by Borrower;

(e) All documents, cash, deposit accounts, securities, investment property, letters of credit, certificates of deposit, instruments and chattel paper and Borrower's Books relating to the foregoing;

(f) All copyright rights, copyright applications, copyright registrations and like protections in each work of authorship and derivative work thereof, whether published or unpublished; all trade secret rights, including all rights to unpatented inventions, know-how, operating manuals, license rights and agreements and confidential information; all mask work or similar rights available for the protection of semiconductor chips; all claims for damages by way of any past, present and future infringement of any of the foregoing; and

(g) All Borrower's Books relating to the foregoing and any and all claims, rights and interests in any of the above and all substitutions for, additions and accessions to and proceeds thereof.

EXHIBIT B

LOAN PAYMENT/LOAN ADVANCE TELEPHONE REQUEST FORM
DEADLINE FOR SAME DAY PROCESSING IS 3:00 P.M., P.S.T.

TO: CENTRAL CLIENT SERVICE DIVISION DATE: _____
FAX#: (408) _____ TIME: _____

FROM: HARMONIC LIGHTWAVES, INC.

by _____
Name: _____
Title: _____
Telephone: _____

FROM ACCOUNT # _____ TO ACCOUNT# _____

REQUESTED TRANSACTION TYPE	REQUEST DOLLAR AMOUNT
PRINCIPAL INCREASE (Loan)	\$ _____
PRINCIPAL PAYMENT (ONLY)	\$ _____
INTEREST PAYMENT (ONLY)	\$ _____
PRINCIPAL AND INTEREST (PAYMENT)	\$ _____

OTHER INSTRUCTIONS:

All representations and warranties of Borrower stated in the Loan and Security Agreement are true, correct and complete in all material respects as of the date of the telephone request for and Loan confirmed by this Loan Request; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date.

BANK USE ONLY:
TELEPHONE REQUEST:

The following person is authorized to request the loan payment transfer/loan advance on the advance designated account and is known to me.

Authorized Requester: _____

Authorized Signature (Bank)
Phone # _____

EXHIBIT C

BORROWING BASE CERTIFICATE

TO: SILICON VALLEY BANK
FROM: HARMONIC LIGHTWAVES, INC. ("Borrower")

Commitment Amount: \$

ACCOUNTS RECEIVABLE	
1. Accounts Receivable Book Value as of _____	\$ _____
2. Additions (please explain on reverse)	\$ _____
3. TOTAL ACCOUNTS RECEIVABLE	\$ _____

ACCOUNTS RECEIVABLE DEDUCTIONS (without duplication)	
4. Amounts over 90 days due	\$ _____
5. Balance of 50% over 90 day accounts	\$ _____
6. Concentration Limits	\$ _____
7. Foreign Accounts	\$ _____
8. Governmental Accounts	\$ _____

9. Contra Accounts	\$ _____
10. Promotion or Demo Accounts	\$ _____
11. Intercompany/Employee Accounts	\$ _____
12. Other (please explain on reverse)	\$ _____
13. TOTAL ACCOUNTS RECEIVABLE DEDUCTIONS	\$ _____

CALCULATION OF LOAN VALUE

14. Eligible Accounts (#3 minus #13)	\$ _____
15. LOAN VALUE OF ACCOUNTS (____% of #14)	\$ _____

BALANCES

16. Maximum Loan Amount	\$ _____
17. Total Funds Available [Lesser of #16 or #15]	\$ _____
18. Present balance owing on Line of Credit	\$ _____
19. Outstanding under Sublimits ()	\$ _____
20. RESERVE POSITION (#17 minus #18 and #19)	\$ _____

The undersigned represents and warrants that the foregoing is true, complete and correct, and that the information reflected in this Borrowing Base Certificate complies with the representations and warranties set forth in the Loan and Security Agreement between the undersigned and Silicon Valley Bank.

BORROWER: _____

By: _____
 Authorized Signer

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 COMMENTS (FOR BANK USE ONLY):
 Received By: _____
 Date: _____
 Reviewed By: _____
 Compliance Status: Yes / No _____

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EXHIBIT C

COMPLIANCE CERTIFICATE

TO: SILICON VALLEY BANK
 FROM: HARMONIC LIGHTWAVES, INC. ("Borrower")

The undersigned authorized officer of the above Borrower hereby certifies that in accordance with the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"), (i) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below and (ii) all representations and warranties of Borrower stated in the Agreement are true and correct in all material respects as of the date hereof. Attached herewith are the required documents supporting the above certification. The Officer further certifies that these are prepared in accordance with Generally Accepted Accounting Principles (GAAP) and are consistently applied from one period to the next except as explained in an accompanying letter or footnotes. The Officer expressly acknowledges that no borrowings may be requested by Borrower at any time or date of determination that Borrower is not in compliance with any of the terms of the Agreement, and that such compliance is determined not just at the date this certificate is delivered.

PLEASE INDICATE COMPLIANCE STATUS BY CIRCLING YES/NO UNDER "COMPLIES" COLUMN.

REPORTING COVENANT -----	REQUIRED -----	COMPLIES -----	
Monthly financial statements	Monthly within 30 days	Yes	No
Annual (CPA Audited)	FYE within 90 days	Yes	No

FINANCIAL COVENANT -----	REQUIRED -----	ACTUAL -----	COMPLIES -----	
Maintain on a Monthly Basis: (unless otherwise stated)				
Minimum Quick Ratio	1.25:1.00	_____:1.0	Yes	No
Maximum Liabilities/ Net Worth Ratio	0.75:1.00	_____:1.0	Yes	No
Profitability	\$ _____	\$ _____	Yes	No

Sincerely,

SIGNATURE

TITLE

Date: _____

BANK USE ONLY
Received By: _____
Date: _____
Reviewed By: _____
Compliance Status: Yes / No

DISBURSEMENT REQUEST AND AUTHORIZATION

TO: SILICON VALLEY BANK
FROM: HARMONIC LIGHTWAVES, INC. ("Borrower")

LOAN TYPE. This is a Variable Rate, Revolving Line of Credit of a principal amount up to \$ _____.

PRIMARY PURPOSE OF LOAN. The primary purpose of this loan is for business.

SPECIFIC PURPOSE. The specific purpose of this loan is: _____.

DISBURSEMENT INSTRUCTIONS. Borrower understands that no loan proceeds will be disbursed until all of Bank's conditions for making the loan have been satisfied. Please disburse the loan proceeds as follows:

Amount paid to Borrower directly: \$ _____
Undisbursed Funds \$ _____
Principal \$ _____

CHARGES PAID IN CASH. Borrower has paid or will pay in cash as agreed the following charges:

Prepaid Finance Charges Paid in Cash: \$ _____
\$ _____ Loan Fee
\$ _____ Accounts Receivables Audit

Other Charges Paid in Cash: \$ _____
\$ _____ UCC Search Fees
\$ _____ UCC Filing Fees
\$ _____ PATENT FILING FEES
\$ _____ TRADEMARK FILING FEES
\$ _____ COPYRIGHT FILING FEES
\$ _____ OUTSIDE COUNSEL FEES AND EXPENSES
[ESTIMATE, DO NOT LEAVE BLANK]

Total Charges Paid in Cash \$ _____

AUTOMATIC PAYMENTS. Borrower hereby authorizes Bank automatically to deduct from Borrower's account numbered _____ the amount of any loan payment. If the funds in the account are insufficient to cover any payment, Bank shall not be obligated to advance funds to cover the payment.

FINANCIAL CONDITION. BY SIGNING THIS AUTHORIZATION, BORROWER REPRESENTS AND

WARRANTS TO BANK THAT THE INFORMATION PROVIDED ABOVE IS TRUE AND CORRECT AND THAT THERE HAS BEEN NO ADVERSE CHANGE IN BORROWER'S FINANCIAL CONDITION AS DISCLOSED IN BORROWER'S MOST RECENT FINANCIAL STATEMENT TO BANK. THIS AUTHORIZATION IS DATED AS OF _____, 19____.

BORROWER:

By: _____
Authorized Officer

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Mrs. Susan Wang
Bob Aeschliman, Esq.
Solectron Corporation
847 Gibraltar Drive
Milpitas, CA 95035

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HARMONIC LIGHTWAVES, INC. AND SUBSIDIARIES
SUBSIDIARIES OF THE REGISTRANT

The following table shows certain information with respect to the active significant subsidiaries of the Company as of December 31, 1999.

NAME - - - - -	STATE OR OTHER JURISDICTION OF INCORPORATION -----	PERCENT OF VOTING SECURITIES OWNED BY HARMONIC -----
Harmonic Lightwaves (Israel), Ltd.	Israel	100%
Harmonic Lightwaves (UK), Ltd.	United Kingdom	100%
New Media Communication, Ltd.	Israel	100%

CONSENT OF INDEPENDENT ACCOUNTANTS

We hereby consent to the incorporation by reference in the Prospectus constituting part of the Registration Statement on Form S-3 (No. 333-43903) and the Registration Statements on Form S-8 (Nos. 33-94138, 333-38025, 333-44265 and 333-65051) of Harmonic Lightwaves, Inc. of our report dated January 20, 1999, except as to Note 14, which is as of March 15, 1999, which appears on page 34 of this Annual Report on Form 10-K.

/s/ PRICEWATERHOUSECOOPERS LLP

San Jose, California
March 17, 1999

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