

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

OR

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

FOR THE TRANSITION PERIOD FROM _____ TO _____ .

COMMISSION FILE NUMBER: 0-24085

AMERICAN XTAL TECHNOLOGY, INC.
(EXACT NAME OF REGISTRANT AS SPECIFIED IN ITS CHARTER)

DELAWARE
(STATE OR OTHER JURISDICTION
OF INCORPORATION OR ORGANIZATION)

94-3031310
(I.R.S. EMPLOYER
IDENTIFICATION NO.)

4311 SOLAR WAY, FREMONT, CALIFORNIA
(ADDRESS OF PRINCIPAL EXECUTIVE OFFICES)

94538
(ZIP CODE)

REGISTRANT'S TELEPHONE NUMBER, INCLUDING AREA CODE: (510) 683-5900

SECURITIES REGISTERED PURSUANT TO SECTION 12(b) OF THE ACT: NONE

SECURITIES REGISTERED PURSUANT TO SECTION 12(g) OF THE ACT: COMMON STOCK, \$.001
PAR VALUE

Indicate by checkmark 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 such 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 checkmark 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 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.

The aggregate market value of the voting stock held by non-affiliates of
the registrant, based upon the closing sale price of the common stock on
December 31, 1998 as reported on the Nasdaq National Market, was approximately
\$115,515,000. Shares of common stock held by each officer, 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 a conclusive determination for other purposes.

As of December 31, 1998, 16,116,675 shares, \$.001 par value, of the registrant's common stock was outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive proxy statement for the registrant's 1999 annual meeting of stockholders to be filed with the Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this form are incorporated by reference into Part III of this Form 10-K report.

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PART I

This report includes forward-looking statements which reflect our current views with respect to future events and our potential financial performance. These forward-looking statements are subject to certain risks and uncertainties, including those discussed in "Business", "Management's Discussion and Analysis of Financial Condition and Results of Operations", and elsewhere in this report, that could cause actual results to differ materially from historical results or those anticipated. In this report, the words "anticipates," "believes," "expects," "intends," "future" and similar expressions identify forward-looking statements. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date of this report.

ITEM 1. BUSINESS

GENERAL

We use a proprietary vertical gradient freeze, commonly referred to as "VGF," technique to produce high-performance compound semiconductor substrates which are used in a variety of electronic and opto-electronic applications such as wireless and fiber optic telecommunications, lasers, LEDs, satellite solar cells and consumer electronics. We primarily manufacture and sell gallium arsenide, called GaAs, substrates. Sales of GaAs substrates accounted for approximately 81.8% of our product revenues in 1998. We also manufacture and sell indium phosphide, or InP, and germanium, or Ge, substrates and are currently developing other high-performance compound substrates including gallium phosphide, or GaP, and gallium nitride, or GaN. Our customers include:

- EMCORE,
- Hewlett Packard,
- Motorola,
- NEC,
- Nortel,
- Siemens,
- Sony,
- Spectrolab, and
- TRW.

BACKGROUND

Recent advances in communications and information technologies have created a growing need for power efficient, high-performance electronic systems that

operate at very high frequencies, have increased computational and display capabilities, and can be produced cost-effectively in commercial volumes. In the past, electronic systems manufacturers have relied on advances in silicon semiconductor technology to meet many of these demands. Silicon-based semiconductor devices, however, have performance limitations in power efficient, high-performance electronic applications. In addition, silicon-based semiconductor devices currently do not possess the electrical properties necessary to be used effectively in most opto-electronic applications such as LEDs and lasers.

As a result of the limitations of silicon, semiconductor device manufacturers are increasingly utilizing alternative substrates to improve the performance of semiconductor devices or to enable new applications. These alternative substrates may be composed of a single element, such as Ge, or multiple elements which may include:

- gallium,
- aluminum,
- indium,

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- arsenic,
- phosphorus, and
- nitrogen.

Substrates that consist of more than one element are commonly referred to as "compound substrates" and include GaAs, InP, GaP and GaN. GaAs is currently the most widely used compound substrate. In comparison to silicon, compound substrates have electrical properties that allow semiconductor devices to operate at much higher speeds or at the same speed with lower power consumption. For example, electrons move up to five times faster in GaAs than in silicon. Compound substrates also have better opto-electronic characteristics than silicon which allow them to convert energy into light and lasers, or to detect light and convert light into electrical energy. The GaAs substrate market is divided into two segments, semi-insulating and semi-conducting.

Semi-insulating GaAs substrates. The market for semi-insulating GaAs substrates is the fastest growing segment of the GaAs market. According to projections by Dataquest, IDC and Strategies Unlimited, the market for semi-insulating GaAs substrates was estimated at \$125 million in 1998 and is expected to grow to approximately \$400 million by the year 2002. This growth is being driven by increasing demand for semi-insulating GaAs substrates in a variety of power-efficient, high-performance applications, including cellular phones, radars, satellite communication systems and direct broadcast systems.

Manufacturers integrate semi-insulating GaAs substrates into devices using either an ion implantation or epitaxial process. Ion implantation is the process of implanting ions directly into the semi-insulating GaAs substrate to modify the electrical parameters of the substrate so that it can be used to manufacture many of today's high-performance electronic devices. This process requires the electrical parameters of the substrate to be as uniform as possible. Epitaxy, a more recently developed process, involves the growth of layers of other materials onto the semi-insulating GaAs substrate. While generally more expensive than the ion implantation process, the epitaxial process enables devices to achieve even greater performance advantages. The epitaxial process requires that the GaAs substrate have an extremely smooth surface, few physical imperfections, uniform electrical properties and low dislocation density, which is a measurement of the crystalline perfection of the substrate material.

Traditionally, crystals for semi-insulating GaAs substrates for the ion implantation and epitaxy markets have been grown using the liquid-encapsulated

czochralski, or LEC technique. The LEC technique requires a high temperature gradient in the manufacturing process. Because the temperature gradient in the LEC technique is high, the resulting crystals have a relatively high dislocation density which weakens a crystal's physical structure and increases the risk of breakage of the GaAs substrate during device manufacturing. In addition, as semi-insulating GaAs substrates continue to grow in size to support increasingly complex devices, the manufacturing challenges facing the LEC technique increase.

Semi-conducting GaAs substrates. We believe that the market for semi-conducting GaAs substrates, based on 1998 market data and annual growth rates projected by Dataquest, IDC and Strategies Unlimited, was approximately \$90 million in 1998 and we expect that the market will continue to grow. The market for semi-conducting GaAs substrates is being driven by increasing demand for a number of opto-electronic applications such as LEDs and lasers, which are incorporated into a variety of products including:

- traffic lights,
- digital versatile discs, more commonly known as DVD players,
- CD players,
- CD-ROMs,
- laser printers,
- automobile lights and
- electronic displays.

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In contrast to semi-insulating GaAs substrates which undergo either an ion implantation or epitaxial process, semi-conducting GaAs substrates only undergo an epitaxial process. As with semi-insulating GaAs substrates, semi-conducting GaAs substrates that undergo the epitaxial process must have a smooth surface, few physical imperfections, uniform electrical properties and a low dislocation density. The traditional method of growing crystals for producing semi-conducting GaAs substrates is the Horizontal Bridgeman, or HB, technique. With the HB technique, the crystal is grown in a semi-cylindrical container which results in a semi-circular, or D-shaped, substrate. In order to produce a round semi-conducting GaAs substrate, the HB technique requires that the D-shaped substrate be cut into a circle, resulting in a large amount of discarded substrate. In addition, crystals grown using the HB technique generally have a relatively high dislocation density and less uniform electrical properties. These and other inherent technical difficulties limit the ability of the HB technique to be used to cost-effectively produce high-quality substrates greater than three inches in diameter.

Other high-performance substrates. We believe there are significant growth opportunities in manufacturing other high-performance substrates. For example, we believe that the markets for InP and GaP substrates, based on 1997 market data and annual growth rates projected by Dataquest, IDC and Strategies Unlimited, were an aggregate of approximately \$150 million in 1998 and we expect that these markets will continue to grow. Semi-insulating InP substrates are used in power-efficient, high-performance electronic applications such as wireless and high-bandwidth communications and semi-conducting InP substrates are used in such applications as fiber optic communications and lasers. GaP substrates are used by manufacturers of LEDs. The traditional method for growing crystals for InP and GaP substrates has been the LEC, technique. In addition to compound substrates, the market for the element Ge is developing in response to the growing demand for solar cells in satellite communications. We believe that the market for Ge substrates used to manufacture solar cells was approximately \$60 million in 1998 and we expect that the market will continue to grow. This application requires the use of Ge substrates which must be manufactured with few defects and minimal breakage. We believe the further development of these markets depends on the ability of suppliers to cost-effectively manufacture

power-efficient, high-performance compound and single-element substrates.

THE AXT SOLUTION

We use a proprietary VGF technique to produce high-performance GaAs and other substrates for use in a variety of electronic and opto-electronic applications. We believe that our VGF technique, which we have developed over the past 12 years, provides certain significant advantages over traditional manufacturing methods for growing crystals used in the production of semi-insulating and semi-conducting GaAs substrates. We believe that we are currently the only high-volume supplier of GaAs substrates manufactured by using the VGF technique and are positioned to become a leading manufacturer and supplier of other compound and Ge substrates.

In the GaAs substrate market, crystals grown using our proprietary VGF technique have a dislocation density that is significantly lower than crystals grown using either the LEC or HB technique. As a result, we believe our GaAs substrates have greater mechanical strength which often results in reduced breakage during the ion implantation and epitaxial growth processes. Furthermore, we believe the low dislocation density of our semi-insulating and semi-conducting GaAs substrates translates into fewer defects in the materials layered onto the substrate during the epitaxy process. In addition, semi-insulating GaAs substrates produced using our VGF technique have more uniform electrical properties than LEC-produced GaAs substrates, which is important for the ion implantation process. In the semi-conducting GaAs substrate market, VGF-grown crystals, unlike those grown using the traditional HB technique, can be processed into round substrates with minimal wasted material. Using our VGF technique, we have been able to produce GaAs substrates as large as six inches in diameter.

In addition to the GaAs substrate market, we believe we can leverage our expertise in the VGF technique to manufacture and produce commercial volumes of other compound and single-element substrates. For example, in 1998, we shipped Ge and InP substrates to customers and qualified our wafers with many more potential customers.

STRATEGY

Our strategy is to be the leading developer and supplier of high-performance GaAs substrates for both the semi-insulating and semi-conducting markets, and to continue to expand into the development and supply of other substrates. The key elements of our strategy include:

Advance VGF technology leadership. We pioneered the commercial use of the VGF technique and have continued to develop and enhance our technology over the course of 12 years through substantial investments in research and development. Our efforts have led to significant improvements in the dislocation density, mechanical strength and uniformity of the electrical properties of GaAs substrates. We believe that our experience and expertise in VGF technology provides us with a competitive advantage over more recent market entrants who are utilizing variations of the VGF technology. We intend to continue to advance our VGF technology through continued investment in research and development and participation in certain government sponsored research programs.

Extend leadership in GaAs market. We are currently one of the largest suppliers of GaAs substrates worldwide. Historically, we have been a leading supplier of GaAs substrates in the epitaxy segment of the semi-insulating market and in the semi-conducting market for GaAs substrates for lasers. We intend to increase our share of these markets by continuing to provide high-quality, price-competitive substrates. In addition, in the semi-insulating GaAs substrate market, we intend to leverage our demonstrated success in the epitaxy segment to further penetrate the ion implantation segment. In the semi-conducting GaAs substrate market, we also intend to capitalize on our leadership to further penetrate the high-volume, cost-sensitive LED market.

Leverage VGF technology to manufacture additional substrates. We believe our VGF technology is a platform which we can leverage to rapidly develop and cost-effectively manufacture additional high-quality compound substrates for emerging applications in markets such as wireless and fiber optic communications. For example, we recently began shipping InP and Ge substrates developed using our VGF technique to customers. Unlike the more traditional methods of growing crystals, we can use our VGF technology to grow the crystals for these other substrates without having to make a significant investment in new capital equipment.

Increase manufacturing capacity to target high-volume markets. We increased our manufacturing capacity by approximately 30,000 square feet in the fourth quarter of 1998. In addition, in June 1998, we have purchased an additional 58,000 square foot facility in Fremont, California. In January 1999, we announced we had received a business license for operations in Beijing, China and had purchased a 30,000 square foot facility in a major tax-free industrial park in Beijing. These new facilities provide us with additional manufacturing capacity. We believe that this increased manufacturing capacity will enable us to further lower unit production costs and provide our high-performance substrates at competitive prices for high-volume markets such as LEDs.

Leverage existing customer relationships. We currently sell our GaAs substrates to over 200 customers, including:

- EMCORE,
- Hewlett Packard,
- Motorola,
- NEC,
- Nortel,
- Siemens,
- Sony,
- Spectrolab, and
- TRW.

We believe our past success in providing high-quality GaAs substrates to these customers will provide us with a competitive advantage in supplying them additional substrates as their needs develop. For example, we recently began shipments of InP substrates to TRW, which currently purchases a significant portion of its GaAs substrates from us. In addition, we intend to establish alliances and joint development arrangements with customers to develop new products, increase manufacturing efficiencies and more effectively serve our customers' needs.

CUSTOMERS

We sold our products to over 200 customers during 1998. Each of the customers listed below purchased substrates in excess of \$500,000 during 1998:

Alpha Industries	Picogiga
Alpha Photonics	Quantum Epitaxial Designs
Electronics & Materials, Inc.	RF Micro Devices
Epitaxial Products International	SDL, Inc.

EMCORE Co.
Hewlett Packard
Motorola
Nortel
Opto Power

Siemens
Sony
Spectrolab
Sumitomo Chemical
TRW Space & Defense

We have historically entered into significant contracts with a number of government agencies and customers for the development of certain products. For more information regarding our development efforts, see " Research and Development."

In the twelve months ended December 31, 1998, one customer accounted for 13.7% of our total revenues. No customer accounted for more than 10.0% of our total revenues in 1996 and 1997. In 1996, 1997 and 1998, our five largest customers accounted for 35.5%, 34.9% and 39.5%, respectively, of our total revenues. Generally, we do not have long-term or other non-cancelable commitments from our customers and usually sell products pursuant to customer purchase orders. The loss of any major customer could have a material adverse effect on our business and operating results.

TECHNOLOGY

AXT's VGF technique. Our proprietary VGF technique produces high-quality crystals from which we produce high-performance compound and single-element substrates for use in a variety of electronic and opto-electronic applications.

Our VGF technique is designed to control the crystal-growth process with minimal temperature variation. Unlike traditional techniques, our VGF technique places the hot GaAs melt above the cool crystal, thereby reducing the turbulence of the GaAs melt which results when the melt and crystal are inverted. The temperature gradient between the melt and the crystal in the VGF technique is significantly lower than in traditional techniques. These aspects of the VGF technique enable us to grow crystals that have a relatively low dislocation density and high uniformity. One of the benefits of these characteristics is that the crystal, and the substrate into which the crystal is manufactured, are mechanically strong. The mechanical strength often results in substrates with lower breakage rates during a customer's manufacturing process.

Under the VGF technique, the GaAs melt and growing crystal are contained in a closed chamber. A number of benefits result from the use of this closed system. Because the VGF system is sealed and the crystal growth is isolated, both semi-insulating and semi-conducting crystals can be grown in the same system without the time consuming and expensive process of completely reconfiguring the system. The closed system isolates the crystal from the outside environment during growth and significantly reduces potential contamination of the crystal by impurities. The closed system also allows for more precise control of the gallium-to-arsenic ratio which results in better consistency and uniformity of the crystals. Therefore, crystals grown using the VGF technique are consistently of a high quality. In addition, the use of cylindrical crucibles, which are sized to

meet a customer's requirements, enables us to produce circular substrates with a minimum amount of discarded material.

The VGF technique is highly automated and the temperature gradient is controlled electronically rather than by physically moving the crystal or furnace. As a result, there is no physical movement to disturb the sensitive crystal. The entire crystal growth process is run under computer control with minimal operator intervention. A single operator can supervise the control of many VGF furnaces which results in significant cost savings.

We believe the VGF technology is a platform which we can leverage to rapidly develop and cost-effectively manufacture additional high-quality

substrates. Unlike the more traditional methods of growing crystals, we can use the VGF technology to grow crystals from these other substrates without having to make a significant investment in new capital equipment. For example, we use the proprietary VGF technique to manufacture InP and Ge substrates.

VGF compared to traditional techniques for producing GaAs substrates. We believe our proprietary VGF technique provides significant advantages over the traditional crystal growth techniques. The LEC technique is the traditional method for producing semi-insulating GaAs substrates. Unlike the VGF technique, the LEC technique is designed so that the hotter GaAs melt is located beneath the cooler crystal, which results in greater turbulence in the melt. The LEC technique requires a temperature gradient between the GaAs melt and the cool crystal which is approximately 50 to 200 times higher than the temperature gradient of the VGF technique. The turbulence and the high temperature gradient cause LEC-grown crystals to have a higher dislocation density than VGF-grown crystals. This characteristic results in a higher rate of breakage of the LEC-developed substrate during the device manufacturing process. In addition, the LEC technique is essentially an open process whereby the melt and growing crystal are exposed to the environment for the entire duration of the crystal growth process. This exposure results in greater propensity for impurity contamination as well as difficulty in controlling the ratio of gallium to arsenic. Because the crystal is not contained in a crucible, fluctuations in temperature cause the diameter of the crystal to vary. Thus, to ensure proper size with the LEC technique, the crystal must be grown significantly larger than the desired size of the resulting substrate. During the LEC process, the crystal is grown by dipping a seed crystal through molten boric oxide into a melt and slowly pulling the seed up into the cool zone above the boric oxide where the crystal hardens. As the GaAs melt is consumed, the crucible containing the remaining liquid must be raised in coordination with the pulling of the crystal. These moving parts and the relative complexity of the system result in higher maintenance costs. Unlike the VGF technique, the LEC technique uses large, complex electro-mechanical systems that are expensive to acquire and require highly skilled personnel to operate.

The HB technique is the traditional method for producing semi-conducting GaAs substrates. The HB technique holds the GaAs melt in a semi-cylindrical "boat." Because of the semi-cylindrical shape of the boat, semi-conducting GaAs crystals grown using the HB technique have a semi-circular cross-section. As a result of this semi-circular shape, more crystal material must be discarded to cut the crystal ingot into a cylindrical shape from which round substrates can be produced. Furthermore, crystals grown using the HB technique have a higher dislocation density than VGF-grown crystals. These and other inherent technical difficulties limit the ability of the HB technique to be used to cost-effectively produce high-quality substrates greater than three inches in diameter. Since the HB technique uses a quartz crucible during the growth process which can contaminate the GaAs melt with silicon impurities, the HB technique is also unsuitable for making semi-insulating GaAs substrates.

PRODUCTS

We currently sell the compound substrates GaAs and InP, and the single-element substrate Ge. We supply various sizes of substrates in 2, 3, 4, and 6 square inches according to our customers' specifications and work closely with our customers to ensure that we manufacture substrates to each customer's particular specifications.

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The table below sets forth our products, their available sizes and selected applications:

SUBSTRATE MATERIAL	DIAMETER (IN INCHES)	APPLICATIONS
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GaAs semi-insulating	2,3,4,6	- Cellular phones - Direct broadcast television - High-performance transistors - Satellite communications
GaAs semi-conducting	2,3,4	- LEDs - Lasers - Optical couplers - Displays
InP semi-insulating	2,3	- Fiber optic communications - Satellite communications - High-performance transistors - Automotive collision avoidance radars
InP semi-conducting	2	- Fiber optic communications - Lasers
Ge	4	- Satellite solar cells

MANUFACTURING

Our manufacturing operations, which include crystal growth, slicing, testing, edge grinding, polishing, inspecting and packaging the substrates for shipment, are located at our headquarters in Fremont, California. Our Fremont facilities are ISO 9002 certified. Many of our manufacturing operations are computer monitored or controlled, enhancing reliability and yield.

We depend on a single or limited number of suppliers for certain critical materials, including gallium, for use in the production of substrates. We generally purchase these materials through standard purchase orders and not pursuant to long-term supply contracts. We seek to maintain sufficient levels of inventory for certain materials to guard against interruptions in supply and to meet our near term needs. To date, we have been able to obtain sufficient supplies of materials in a timely manner. However, a stoppage or delay in supply, receipt of defective or contaminated materials, or increases in the pricing of such raw materials could materially adversely affect our operating results.

In the third quarter of 1998, we completed the expansion of our approximately 50,000 square feet facility located in Fremont, California by approximately 30,000 square feet to meet anticipated production needs through 1999. Because we currently perform all steps in our manufacturing process at our Fremont facility, any interruption resulting from earthquake, fire, equipment failures or other causes would have a material adverse effect on our results of operations. For more information regarding the risks relating to our manufacturing process and our new facility, see "Factors Affecting Future Results -- If we do not achieve acceptable yields of crystals and the successful and timely production of substrates, the shipment of our products would be delayed and our business adversely affected." and "Factors Affecting Future Results -- We are subject to additional risks as a result of the recent completion of a new manufacturing facility," respectively.

Additionally, in connection with further expanding our manufacturing capacity, we purchased an additional 58,000 square foot facility in Fremont, California and a 30,000 square foot facility in Beijing, China in 1998.

SALES AND MARKETING

We sell our products worldwide through our direct sales force as well as through independent international sales representatives. Our direct sales force consists of highly trained, technically sophisticated sales engineers who are knowledgeable in the manufacturing and use of compound and single-element substrates. Our direct sales force operates out of our corporate office in Fremont, California and our Japanese subsidiary. Our sales engineers work with customers during all stages of the substrate manufacturing process, from developing the precise composition of the substrate through manufacturing and processing the substrate

to the customer's exact specifications. We believe that maintaining a close relationship with customers and providing customers with ongoing technical support improves customer satisfaction and will provide us with a competitive advantage in selling other substrates to our customers.

International sales, excluding Canada, as a percentage of total revenues in 1996, 1997 and 1998 were 35.0%, 34.1% and 28.8%, respectively. In addition to our direct sales force in Japan, we have independent sales representatives in France, Japan, South Korea, Taiwan and the United Kingdom. Except for sales by our Japanese subsidiary, which are denominated in yen, we receive all payments for products in U.S. dollars.

In order to raise market awareness of our products, we advertise in trade publications, distribute promotional materials, publish technical articles, conduct marketing programs and participate in industry trade shows and conferences. For more information regarding the risks relating to our international operations, see "Factors Affecting Future Results -- We derive a significant portion of our revenues from international sales and our ability to sustain and increase our international sales involve significant risks".

RESEARCH AND DEVELOPMENT

Our research and development efforts are focused on developing new substrates, improving the performance of existing products and processes, and reducing costs in the manufacturing process. We have assembled a multi-disciplinary team of highly skilled scientists, engineers and technicians to meet our research and development objectives. Among other projects, we have research and development projects involving the development of GaN and high purity GaAs epitaxy substrates.

Our research and development expenses in 1996, 1997 and 1998 were \$592,000, \$1.3 million and \$2.5 million, respectively. In addition to internally funded research and development, we have also funded a significant portion of our research and development efforts through contracts with the U.S. government and customer funded research projects. In 1996, 1997 and 1998, we received \$2.0 million, \$2.3 million and \$1.8 million, respectively, from U.S. government agencies and customer funded research contracts. Under our contracts, we retain rights to the VGF and wafer fabrication technology which we develop. The U.S. government retains rights to utilize the technologies we develop for government purposes only.

Our total research and development costs, including both contract funded and internally funded research and development expenses, for 1996, 1997 and 1998 totaled \$1.4 million, \$2.8 million and \$3.3 million, respectively. We expect to continue to expend substantial resources on research and development. The development of compound and single-element substrates is highly complex. There can be no assurance that we will successfully develop and introduce new products in a timely and cost-effective manner or that our development efforts will successfully permit our products to meet changing market demands. For more information regarding the risks relating to our research and development efforts, see "Factors Affecting Future Results -- We must effectively respond to rapid technological changes by continually introducing new products that achieve broad market acceptance."

COMPETITION

The markets for GaAs substrates are intensely competitive. Our principal competitors in the market for semi-insulating GaAs substrates currently include:

- Freiberger;
- Hitachi Cable;
- Litton Airtron; and
- Sumitomo Electric.

In the semi-conducting GaAs substrate market, our principal competitors currently are Sumitomo Electric and Hitachi Cable. We also face competition from manufacturers that produce GaAs substrates for their own use. In addition, we face competition from companies, such as IBM, that are actively developing alternative materials to GaAs. As we enter new markets, such as the Ge and InP substrate markets, we expect

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to face competitive risks similar to those for its GaAs substrates. Many of our competitors and potential competitors have been in the business longer than us and have greater manufacturing experience, more established technologies than our VGF technique, broader name recognition and significantly greater financial, technical and marketing resources than us. We cannot assure you that we will compete successfully against these competitors in the future or that our competitors or potential competitors will not develop enhancements to the LEC, HB or VGF techniques that will offer price and performance features that are superior to ours. Increased competitive pressure could also lead to intensified price-based competition, resulting in lower prices and margins, which would materially adversely affect our business, financial condition and results of operations.

We believe that the primary competitive factors in the markets in which our products compete are:

- quality,
- price,
- performance,
- customer support and satisfaction, and
- customer commitment to competing technologies.

Our ability to compete in target markets also depends on factors such as:

- the timing and success of the development and introduction of new products by us and our competitors,
- the availability of adequate sources of raw materials, and
- protection of our products by effective utilization of intellectual property laws and general economic conditions.

In order to remain competitive, we believe we must invest significant resources in developing new substrates and in maintaining customer satisfaction worldwide. There can be no assurance that our products will continue to compete favorably or that we will be successful in the face of competition from existing competitors or new companies entering our target markets. If we fail to compete successfully, our financial condition and results of operation would be materially adversely affected.

PROTECTION OF OUR INTELLECTUAL PROPERTY

Our success and competitive position for our VGF technique depends materially on our ability to maintain trade secrets, patents and other intellectual property protections. To protect our trade secrets, we take certain measures to ensure their secrecy, such as executing non-disclosure agreements with our employees, customers and suppliers. Despite our efforts, we cannot assure you that others will not gain access to our trade secrets, or that we can meaningfully protect our intellectual property. In addition, effective trade secret protection may be unavailable or limited in certain foreign countries. Although we intend to protect our rights vigorously, these measures may not be successful.

We rely primarily on the technical and creative ability of our personnel, rather than on patents, to maintain our competitive position. To date, we have been issued one U.S. patent, which relates to our VGF technique, and have two patent applications, one of which relates to our VGF technique, pending. We have one pending application for a Japanese patent but no issued foreign patents. There can be no assurance that our pending applications or any future U.S. or foreign patent applications will be approved, that any issued patents will protect our intellectual property or will not be challenged by third parties, or that the patents of others will not have an adverse effect on our ability to do business. Moreover, the laws of certain foreign countries may not protect our intellectual property rights to the same extent as the laws of the United States. We believe that, due to the rapid pace of technological innovation in the GaAs and other substrate markets, our ability to establish and maintain a position of technology leadership in the industry depends more on the skills of our development personnel than upon the legal protections afforded our existing technologies.

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Although there are currently no pending material lawsuits against us or unresolved notices that we are infringing intellectual property rights of others, we may be notified in the future that we are infringing the patent and/or other intellectual property rights of others. Litigation may be necessary in the future 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. We cannot assure you that we would prevail in any future litigation. Any litigation, whether or not determined in our favor or settled by us, would be costly and would divert the efforts and attention of our management and technical personnel from normal business operations, which would have a material adverse effect on our business, and results of operations. Adverse determinations in litigation could result in the loss of our proprietary rights, subject us to significant liabilities, require us to seek licenses from third parties or prevent us from licensing our technology, any of which could have a material adverse effect on our business and results of operations.

ENVIRONMENTAL REGULATIONS

We are subject to federal, state and local laws and regulations concerning the use, storage, handling, generation, treatment, emission, release, discharge and disposal of certain materials used in our research and development and production operations, as well as laws and regulations concerning environmental remediation and employee health and safety. The growing of crystals and the production of substrates involve the use of certain hazardous raw materials, including, but not limited to, arsenic. We cannot guarantee that our control systems will be successful in preventing a release of these materials or other adverse environmental conditions. Any release or other failure to comply with present or future environmental laws and regulations could result in the imposition of significant fines against us, the suspension of production or a cessation of operations. In addition, there can be no assurance that existing or future changes in laws or regulations will not require expenditures or liabilities to be incurred by us, or in restrictions on our operations. At December 31, 1998, we believe we were in substantial compliance with all applicable environmental regulations.

BACKLOG

We include in backlog only those customer orders which have been accepted by us and which shipment is generally expected within 12 months. As of December 31, 1998, our backlog was approximately \$8.7 million. Backlog can fluctuate greatly based upon, among other matters, the timing of orders. In addition, purchase orders in our backlog are subject to changes in delivery schedules or to reduction in size or cancellation at the option of the purchaser without significant penalty. We have experienced, and may continue to experience, cancellation, reduction and rescheduled delivery of orders in our backlog. Our

backlog may vary significantly from time to time depending upon the level of capacity available to satisfy unfilled orders. Accordingly, although useful for scheduling production, backlog as of any particular date may not be a reliable indicator of sales for any future period.

EMPLOYEES

As of December 31, 1998, we had 314 full-time employees, of whom 263 were principally engaged in manufacturing, 32 in sales, general and administration and 19 in research and development. Our success is in part dependent on our ability to attract and retain highly skilled workers, who are in high demand in the Silicon Valley area. None of our employees is represented by a union and we have never experienced a work stoppage. Management considers its relations with its employees to be good.

EXECUTIVE OFFICERS

As of December 31, 1998, our executive officers and directors were as follows:

NAME ----	AGE ---	POSITION -----
Morris S. Young, Ph.D. ...	53	Chairman of the Board of Directors, President and Chief Executive Officer
Theodore S. Young, Ph.D.	58	Senior Vice President, Marketing and Director
Davis Zhang.....	42	Senior Vice President, Production
Gary S. Young.....	55	Vice President, Sales
Guy D. Atwood.....	56	Vice President and Chief Financial Officer, Treasurer and Secretary
Xiao Gordon Liu.....	34	Vice President, Engineering and Development
Jesse Chen(1)(2).....	40	Director
B.J. Moore(1)(2).....	62	Director
Donald L. Tatzin(1)(2)....	46	Director

 (1) Member of the compensation committee.
 (2) Member of the audit committee.

Morris S. Young, Ph.D. co-founded AXT in 1986 and has served as our Chairman of the Board of Directors since February 1998 and President and Chief Executive Officer, as well as a director since 1989. Dr. Young holds a B.S. in Metallurgical Engineering from Chengkung University, Taiwan, an M.S. in Metallurgy from Syracuse University and a Ph.D. in Metallurgy from Polytechnic University.

Theodore S. Young, Ph.D. co-founded AXT in 1986 and has served as our Senior Vice President, Marketing since 1989 and served as President from 1987 to 1989. He has also acted as a director since our inception, including as the Chairman of the Board of Directors from January 1987 to January 1998. Dr. Young holds a B.S. in Physics from National Taiwan University, an M.S. in Geophysics from the University of Alaska and a Ph.D. in Plasma Physics from the Massachusetts Institute of Technology.

Davis Zhang co-founded AXT in 1986 and has served as our Senior Vice President, Production since January 1994. From 1987 to 1993, Mr. Zhang served as our Senior Production Manager. Mr. Zhang holds a B.S. in Mechanical Engineering from Northern Communication University, Beijing, China.

Gary S. Young joined us in 1991 and has served as our Vice President, Sales since July 1993. From 1991 to 1993, Mr. Young served as our Sales and Administrative Manager. From 1973 to 1991, Mr. Young worked in various

capacities with several companies, including as a Systems Engineer for IBM and as a software engineer for Boole & Babbage, Inc., an independent software vendor. Mr. Young holds a B.S. in Mathematics from National Taiwan Normal University, an M.A. in Mathematics from Northeast Missouri State University and an M.S. in Operations Research from Purdue University.

Guy D. Atwood joined us in August 1997 as our Vice President and Chief Financial Officer and has served as our Treasurer and Secretary since February 1998. From 1991 to August 1997, Mr. Atwood served at various times as Chief Financial Officer for several private companies, most recently the alumni association for the University of California at Berkeley and AvenuSoftware, a film and video software company, of which he was also its President. Mr. Atwood was self-employed as a financial consultant from 1994 to 1995, and also provided services in such capacity to the Company from June to September 1995. Mr. Atwood holds a B.S. in Accounting from the University of California at Berkeley.

Xiao Gordon Liu joined us in 1995 as Senior Engineer and was promoted to Vice President, Engineering and Development in November 1998. Prior to joining us, Mr. Liu was a postdoctoral fellow and associate specialist at University of California at Berkeley and a research associate at the University of Lund, Sweden. Mr. Liu holds a Ph.D. in Physics from the University of Lund, Sweden and has published more than 30 scientific papers.

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Jesse Chen has served as a director of AXT since February 1998. Since May 1997, Mr. Chen has served as a Managing Director of Maton Venture, an investment company. Prior to that, Mr. Chen co-founded BusLogic, Inc., a computer peripherals company and served as its Chief Executive Officer from 1990 to 1996. Mr. Chen serves on the Board of Directors of several private companies. Mr. Chen has a B.S. degree in Aeronautical Engineering from Chenkung University, Taiwan and an M.S. in Electrical Engineering from Loyola Marymount University.

B.J. Moore has served as a director of AXT since February 1998. Since 1991, Mr. Moore has been self-employed as a consultant and has served as a director to several technology-based companies. Mr. Moore currently serves on the Board of Directors for Adaptec, Inc., a computer peripherals company and Dionex Corporation, an ion chromatography systems company, as well as several private companies. From 1986 to 1991, Mr. Moore served as President and Chief Executive Officer of Outlook Technology, an electronics test equipment company. Mr. Moore holds a B.S. and an M.S. degree in Electrical Engineering from the University of Tennessee.

Donald L. Tatzin has served as a director of AXT since February 1998. Since 1993, Mr. Tatzin has served as Executive Vice President of Showboat, Inc., a gaming company. In addition, Mr. Tatzin served as a director for Sydney Harbour Casino, an Australian gaming company from 1995 to 1996 and as its Chief Executive Officer from April to October 1996. Prior to that, Mr. Tatzin was a director and consultant with Arthur D. Little, Inc., from 1976 to 1993. Mr. Tatzin holds an S.B. in Economics and an S.B. and masters degrees in City Planning from the Massachusetts Institute of Technology and an M.S. in Economics from Australian National University.

ITEM 2. PROPERTIES

In the third quarter of 1998, we completed the expansion of our approximately 50,000 square foot facility located in Fremont, California by approximately 30,000 square feet to meet anticipated production needs through 1999. Additionally, in connection with further expanding our manufacturing capacity, we purchased an additional 58,000 square foot facility in Fremont, California and a 30,000 square foot facility in Beijing, China in 1998.

ITEM 3. LEGAL PROCEEDINGS

In October 1998, a vendor submitted a claim against us to the Arbitration Commission in Shenzhen, China, alleging that we failed to honor our obligation

to take delivery of the full quantity of Ge under a purchase contract with the vendor. We believe that this action is without merit and will continue to vigorously defend our position. We expect the cost of defending this matter will not materially adversely affect our operating results through fiscal 1999. However, there can be no assurance that our defense of this matter will be successful.

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

None.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY AND RELATED STOCKHOLDER MATTERS

AXT common stock has been trading publicly on the Nasdaq National Market under the symbol "AXTI" since May 20, 1998, the date we consummated our initial public offering. The following table sets forth, for the periods indicated, the range of quarterly high and low closing sales prices for AXT's common stock on the Nasdaq National Market.

	HIGH -----	LOW -----
FISCAL 1998		
January 1, 1998 through May 19, 1998.....	Not Applicable	
May 20, 1998 through June 30, 1998.....	\$15.000	\$10.125
Third Quarter ended September 30, 1998.....	15.500	7.000
Fourth Quarter ended December 31, 1998.....	10.813	6.000

As of December 31, 1998, there were 181 holders of record of our common stock. Because many shares of AXT's common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders represented by these record holders.

We have never paid or declared any cash dividends on our common stock and do not anticipate paying cash dividends in the foreseeable future.

ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA

	YEARS ENDED DECEMBER 31,				
	1994 -----	1995 -----	1996 -----	1997 -----	1998 -----
	(IN THOUSANDS, EXCEPT PER SHARE DATA)				
STATEMENT OF OPERATIONS DATA:					
Revenues:					
Product revenues.....	\$5,666	\$11,520	\$14,222	\$23,014	\$41,493
Contract revenues.....	1,791	2,958	2,005	2,321	1,797
Total revenues.....	7,457	14,478	16,227	25,335	43,290
Cost of revenues:					
Cost of product revenues.....	3,091	6,030	9,270	13,674	24,550
Cost of contract revenues.....	1,422	2,234	795	1,553	804
Total cost of revenues.....	4,513	8,264	10,065	15,227	25,354
Gross profit.....	2,944	6,214	6,162	10,108	17,936
Operating expenses:					
Selling, general and administrative.....	921	1,716	2,033	2,959	5,016
Research and development.....	149	448	592	1,289	2,504

Total operating expenses.....	1,070	2,164	2,625	4,248	7,520
Income from operations.....	1,874	4,050	3,537	5,860	10,416
Interest expense.....	(3)	(12)	(170)	(570)	(781)
Interest and other income (expense).....	65	282	(72)	(34)	568
Income before provision for income taxes.....	1,936	4,320	3,295	5,256	10,203
Provision for income taxes.....	775	1,581	1,249	1,998	3,877
Net income.....	\$1,161	\$ 2,739	\$ 2,046	\$ 3,258	\$ 6,326
Basic net income per share.....	\$ 0.44	\$ 0.97	\$ 0.71	\$ 1.11	\$ 0.42
Diluted net income per share.....	\$ 0.10	\$ 0.23	\$ 0.17	\$ 0.25	\$ 0.42
Shares used in basic net income per share calculations.....	2,634	2,821	2,882	2,938	14,928
Shares used in diluted net income per share calculations.....	11,676	11,813	11,811	12,839	15,177

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DECEMBER 31,				
1994	1995	1996	1997	1998
(IN THOUSANDS)				

BALANCE SHEET DATA:

Cash, cash equivalents and short-term investments.....	\$1,446	\$ 835	\$ 756	\$ 3,054	\$16,122
Working capital.....	2,859	3,760	5,542	14,209	41,068
Total assets.....	5,757	11,316	17,384	30,613	75,023
Long-term debt, net of current portion.....	--	2,350	5,582	7,728	16,347
Stockholders' equity.....	4,213	7,005	8,999	18,591	51,168

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

This Management's Discussion and Analysis of Financial Condition and Results of Operations includes a number of forward-looking statements which reflect current views with respect to future events and financial performance. These forward-looking statements are subject to certain risks and uncertainties, including those discussed in the "Factors Affecting Future Results" and elsewhere in this report that could cause actual results to differ materially from historical results or those anticipated. In this report, the words "anticipates," "believes," "expects," "future," "intends," and similar expressions identify forward-looking statements. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date hereof.

RESULTS OF OPERATIONS

Overview

We use a proprietary VGF technique to produce high-performance compound semiconductor substrates for use in a variety of electronic and opto-electronic applications. We were founded in 1986 and commenced product sales in 1990. We currently sell GaAs, InP and GaN substrates to manufacturers of semiconductor devices for use in applications such as wireless and fiber optic telecommunications, lasers, LEDs, and consumer electronics. We also sell Ge substrates for use in satellite solar cells.

We have been profitable on an annual basis since 1990 and our total revenues were \$16.2 million, \$25.3 million and \$43.3 million for the years ended

December 31, 1996, 1997 and 1998, respectively. Total revenues consist of product revenues and contract revenues. Our product revenues were \$14.2 million, \$23.0 million and \$41.5 million for the years ended December 31, 1996, 1997 and 1998, respectively. Product revenues are generally recognized upon shipment of products to customers. Historically, virtually all of our product revenues have been derived from sales of GaAs substrates, which, in the years ended December 31, 1997 and 1998, accounted for 95.0% and 81.8%, respectively, of the our product revenues. We began selling InP and Ge substrates to our customers in late 1997 and GaN substrates in late 1998.

Our contract revenues were \$2.0 million, \$2.3 million and \$1.8 million for the years ended December 31, 1996, 1997 and 1998, respectively. Contract revenues are recognized under the percentage of completion method and related research costs are included in cost of contract revenues. Contract revenues consist of research and development contracts with U.S. government agencies and customer-funded research projects. The largest of the government contracts was a four-year U.S. Department of Defense Title III Program for development of GaAs substrates (the "Title III GaAs contract"), which was awarded to us in March 1994 and under which we were paid an aggregate of \$6.1 million. The Title III GaAs contract was completed in 1998. We retain rights to the VGF and wafer fabrication technology developed under these government and customer-funded research contracts and are therefore able to leverage these programs to continue to broaden our product and technology offerings.

In 1995, we established a wholly-owned subsidiary in Japan to distribute our products. This subsidiary serves primarily as a direct sales and support office for our customers in Japan. We also utilize independent sales representatives in France, Japan, South Korea, Taiwan and the United Kingdom. Domestic sales are generated by our direct sales force. International sales, excluding Canada, accounted for 35.0%, 34.1% and 28.8% of total revenues for the years ended December 31, 1996, 1997 and 1998, respectively. Except for sales in Japan, which are denominated in yen, we denominate and collect our international sales in U.S. dollars. Doing business in Japan subjects us to fluctuations in exchange rates between the U.S. dollar and the Japanese yen. We incurred foreign exchange losses of \$114,000, \$186,000 and \$24,000 for the years ended December 31, 1996, 1997 and 1998, respectively. During the year ended December 31, 1998, we bought foreign exchange contracts to hedge against certain trade accounts receivable in Japanese yen. The outstanding commitments with respect to such foreign exchange contracts had a total value of approximately \$1.6 million as of December 31, 1998.

Since July 1996, we have conducted all of our operations in a 50,000 square foot office and production facility located in Fremont, California. Prior to transitioning our manufacturing operations to this facility, we

leased a 20,000 square foot manufacturing facility in Dublin, California. In late 1998, we expanded the size of our current manufacturing facility by approximately 30,000 square feet to meet our anticipated future production needs through 1999. In June 1998, we purchased an additional 58,000 square foot facility in Fremont, California directly across the street from our existing manufacturing facility and moved marketing, sales, engineering and administrative personnel into a portion of the building. We believe that this new facility will not be used for production of substrates prior to the end of 1999. In January 1999, we announced we had received a business license for operations in Beijing, China and had purchased a 30,000 square foot facility in a major tax-free industrial park in Beijing. This facility is expected to be operational during the second quarter of 1999. We expect that our proprietary VGF crystal growth operations will continue to be housed in Fremont, California, and our other manufacturing operations will be conducted in both Fremont and Beijing.

In connection with the granting of stock options, we recorded aggregate deferred compensation of \$322,000 and \$203,000, representing the difference between the deemed fair value of the Common Stock for accounting purposes and

the option exercise price at the date of grant for the years ended December 31, 1997 and 1998, respectively. This deferred compensation will be amortized over the vesting period of the applicable options of which \$102,000 and \$96,000 was amortized during the years ended December 31, 1997 and 1998, respectively.

RESULTS OF OPERATIONS

The following table sets forth certain operating data as a percentage of total revenues for the periods indicated.

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
Revenues:			
Product revenues.....	87.6%	90.8%	95.8%
Contract revenues.....	12.4	9.2	4.2
Total revenues.....	100.0	100.0	100.0
Cost of revenues:			
Cost of product revenues.....	57.1	54.0	56.7
Cost of contract revenues.....	4.9	6.1	1.9
Total cost of revenues.....	62.0	60.1	58.6
Gross margin.....	38.0	39.9	41.4
Operating expenses:			
Selling, general and administrative.....	12.5	11.7	11.5
Research and development.....	3.6	5.1	5.8
Total operating expenses.....	16.1	16.8	17.3
Income from operations.....	21.9	23.1	24.1
Interest expense.....	(1.0)	(2.2)	(1.8)
Interest and other income (expense).....	(0.5)	(0.1)	1.3
Income before provision for income taxes.....	20.4	20.8	23.6
Provision for income taxes.....	7.7	7.9	9.0
Net income.....	12.7%	12.9%	14.6%

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The following table sets forth product and contract gross profits and gross margins for the periods indicated.

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
	(DOLLARS IN THOUSANDS)		
Product gross profit.....	\$4,952	\$9,340	\$16,943
Product gross margin.....	34.8%	40.6%	40.8%
Contract gross profit.....	\$1,210	\$ 768	\$ 993
Contract gross margin.....	60.3%	33.1%	55.3%

YEAR ENDED DECEMBER 31, 1997 COMPARED TO YEAR ENDED DECEMBER 31, 1998

Revenues. Total revenues increased 70.9% from \$25.3 million for the year ended December 31, 1997 to \$43.3 million for year ended December 31, 1998. Product revenues increased 80.3% from \$23.0 million for the year ended December 31, 1997 to \$41.5 million for the year ended December 31, 1998. The increase in

product revenues reflected an increase in the volume of sales of GaAs and InP substrates to existing domestic and international customers, the addition of new customers and the introduction of Ge substrates in the fourth quarter of 1997. Ge substrates totaled 15.6% of product revenues for the year ended December 31, 1998 compared to only 3.6% in 1997.

International revenues, excluding Canada, decreased from 34.1% of total revenues for the year ended December 31, 1997 to 28.8% of total revenues for the year ended December 31, 1998, primarily reflecting the introduction of Ge substrates in late 1997, which are currently sold only to domestic customers. We believe that Ge substrates will be sold only to U.S. customers for the foreseeable future, which is expected to cause our international revenues to decline as a percentage of total revenues.

Contract revenues decreased 22.6% from \$2.3 million for the year ended December 31, 1997 to \$1.8 million for the year ended December 31, 1998. Contract revenues in 1997 were higher than in 1998 primarily because we recognized significant revenue from a \$1.2 million customer-funded Ge substrates research contract that was completed in June 1997. Contract revenues declined from 9.2% of total revenues for the year ended December 31, 1997 to 4.2% for the year ended December 31, 1998 as a result of product revenue growth combined with a decline in contract revenues. In future periods, we expect contract revenues to continue to decline as a percentage of total revenues.

Gross margin. Gross margin increased from 39.9% for the year ended December 31, 1997 to 41.4% for the year ended December 31, 1998. Product gross margin increased slightly from 40.6% for the year ended December 31, 1997 to 40.8% for the year ended December 31, 1998, reflecting the higher yields achieved in GaAs and InP production, partially offset by lower margins from Ge substrates.

Contract gross margins increased from 33.1% for the year ended December 31, 1997 to 55.3% for the year ended December 31, 1998. This increase was due to a shift in contract revenue mix from a lower margin customer-funded contract for Ge substrates research completed in June 1997 to higher margin government contracts.

Selling, general and administrative expenses. Selling, general and administrative expenses increased 69.5% from \$3.0 million for the year ended December 31, 1997 to \$5.0 million for the year ended December 31, 1998. This increase resulted primarily from increased personnel and administrative expenses required to support additional sales volume. Selling, general and administrative expenses as a percentage of total revenues decreased slightly from 11.7% for the year ended December 31, 1997 to 11.5% for the year ended December 31, 1998.

Research and development expenses. Research and development expenses increased 94.3% from \$1.3 million for the year ended December 31, 1997 to \$2.5 million for the year ended December 31, 1998. This increase resulted primarily from the hiring of additional engineers and the purchase of materials to develop new products and to enhance existing products. In addition to our funded research and development, we incurred research and development expenses relating to government and customer-funded research contracts, which are included in the cost of contract revenues. For the year ended December 31, 1998, total research and

development costs, including both contract funded and internally funded research and development expenses, totaled \$3.3 million, or 7.6% of total revenues.

Interest expense. Interest expense increased from \$570,000 for the year ended December 31, 1997 to \$781,000 for the year ended December 31, 1998. This increase was primarily the result of additional borrowings in 1998 we incurred to finance the purchase of the our new building and to finance expansion of production facilities and related equipment purchases.

Interest and other income (expense). Interest and other income (expense)

increased from \$34,000 of expense for the year ended December 31, 1997 to \$568,000 of income for the year ended December 31, 1998. This increase was primarily the result of interest income earned on the \$25.8 million in net proceeds raised from our initial public offering in May 1998.

Provision for Income Taxes. Income tax expense remained at 38.0% of income before provision for income taxes for the years ended December 31, 1997 and 1998.

YEAR ENDED DECEMBER 31, 1996 COMPARED TO YEAR ENDED DECEMBER 31, 1997

Revenues. Total revenues increased 56.1% from \$16.2 million for the year ended December 31, 1996 to \$25.3 million for the year ended December 31, 1997. Product revenues increased 61.8% from \$14.2 million for the year ended December 31, 1996 to \$23.0 million for the year ended December 31, 1997. The increase in product revenues reflected an increase in the volume of sales of GaAs substrates to existing domestic and international customers, sales to new customers and the introduction of Ge substrates in the fourth quarter of 1997.

International revenues, excluding Canada, decreased from 35.0% of total revenues for the year ended December 31, 1996 to 34.1% of total revenues for the year ended December 31, 1997, primarily reflecting the introduction of Ge substrates in late 1997, which were sold only to U.S. customers.

Contract revenues increased 15.8% from \$2.0 million for the year ended December 31, 1996 to \$2.3 million for the year ended December 31, 1997. This increase was primarily due to revenues recognized from a \$1.2 million customer-funded Ge substrates research contract that was completed in 1997. This increase was partially offset by a reduction in government contract revenues. Contract revenues declined from 12.4% of total revenues for the year ended December 31, 1996 to 9.2% for the year ended December 31, 1997 as a result of product revenue growth exceeding contract revenue growth.

Gross margin. Gross margin increased from 38.0% for the year ended December 31, 1996 to 39.9% for the year ended December 31, 1997. Product gross margin increased from 34.8% for the year ended December 31, 1996 to 40.6% for the year ended December 31, 1997. The lower product gross margin in 1996 resulted primarily from duplicate expenses of approximately \$500,000 due to simultaneous operations of two facilities and manufacturing inefficiencies relating to the transition to our new production facility.

Contract gross margin declined from 60.3% for the year ended December 31, 1996 to 33.1% for the year ended December 31, 1997. This decrease was due to a shift in contract revenue mix from higher margin government research contracts in 1996 to a lower margin customer-funded contract for Ge substrates research. In addition, in 1996 gross margin was favorably impacted by large incentive awards which we were paid upon completion of certain milestones of the Title III GaAs contract.

Selling, general and administrative expenses. Selling, general and administrative expenses increased 45.5% from \$2.0 million for the year ended December 31, 1996 to \$3.0 million for the year ended December 31, 1997. This increase resulted primarily from increased domestic and international sales personnel and administrative expenses required to support increased sales volume.

Research and development expenses. Research and development expenses increased 117.7% from \$592,000 for the year ended December 31, 1996 to \$1.3 million for the year ended December 31, 1997. This increase resulted primarily from the hiring of additional engineers to develop new products and to enhance existing products. For the year ended December 31, 1997, total research and development costs, including

totalled \$2.8 million, or 11.2% of total revenues.

Interest expense. Interest expense increased from \$170,000 for the year ended December 31, 1996 to \$570,000 for the year ended December 31, 1997. This increase resulted primarily from additional borrowings incurred in 1996 to finance our new manufacturing facility, the expansion of production facilities in 1997 and related equipment purchases.

Interest and other income (expense). Interest and other income (expense) decreased from \$72,000 of expense for the year ended December 31, 1996 to \$34,000 of expense for the year ended December 31, 1997. This decrease was due to higher interest income generated on investments from the proceeds of a \$5.9 million private equity financing completed in March 1997, partially offset by foreign currency transaction losses incurred due to the increase in the value of the U.S. dollar compared to the Japanese yen.

Provision for income taxes. Income tax expense was virtually unchanged from 37.9% of income before provision for income taxes for the year ended December 31, 1996 to 38.0% of income before provision for income taxes for the year ended December 31, 1997.

SELECTED QUARTERLY RESULTS OF OPERATIONS

The following table sets forth unaudited quarterly results in dollars for the eight quarters ended December 31, 1998. We believe that all necessary adjustments, consisting only of normal recurring adjustments, have been included in the amounts stated below to present fairly such quarterly information. The operating results for any quarter are not necessarily indicative of results for any subsequent period.

	QUARTERS ENDED							
	MAR. 31, 1997	JUNE 30, 1997	SEPT. 30, 1997	DEC. 31, 1997	MAR. 31, 1998	JUNE 30, 1998	SEPT. 30, 1998	DEC. 31, 1998
	(IN THOUSANDS)							
Revenues:								
Product revenues.....	\$4,494	\$5,360	\$6,060	\$7,100	\$9,238	\$10,293	\$10,887	\$11,074
Contract revenues.....	600	842	447	432	492	497	508	301
Total revenues.....	5,094	6,202	6,507	7,532	9,730	10,790	11,395	11,375
Cost of revenues:								
Cost of product revenues.....	2,805	3,167	3,604	4,098	5,460	6,139	6,684	6,267
Cost of contract revenues.....	498	654	210	191	265	218	157	164
Total cost of revenues.....	3,303	3,821	3,814	4,289	5,725	6,357	6,841	6,431
Gross profit.....	1,791	2,381	2,693	3,243	4,005	4,433	4,554	4,944
Operating expenses:								
Selling, general and administrative.....	642	674	703	940	966	1,119	1,110	1,821
Research and development.....	222	296	306	465	640	669	736	459
Total operating expenses.....	864	970	1,009	1,405	1,606	1,788	1,846	2,280
Income from operations.....	927	1,411	1,684	1,838	2,399	2,645	2,708	2,664
Interest expense.....	(115)	(151)	(158)	(146)	(181)	(157)	(169)	(273)
Interest and other income (expense).....	(91)	77	(8)	(12)	21	(25)	206	365
Income before provision for income taxes.....	721	1,337	1,518	1,680	2,239	2,463	2,745	2,756
Provision for income taxes.....	274	508	577	639	854	943	1,037	1,043
Net income.....	\$ 447	\$ 829	\$ 941	\$1,041	\$1,385	\$ 1,520	\$ 1,708	\$ 1,713

The following table sets forth selected consolidated financial information as a percentage of total revenues for each of our last eight quarters.

	QUARTERS ENDED							
	MAR. 31, 1997	JUNE 30, 1997	SEPT. 30, 1997	DEC. 31, 1997	MAR. 31, 1998	JUNE 30, 1998	SEPT. 30, 1998	DEC. 31, 1998
Revenues:								
Product revenues.....	88.2%	86.4%	93.1%	94.3%	94.9%	95.2%	95.5%	97.4%
Contract revenues.....	11.8	13.6	6.9	5.7	5.1	4.8	4.5	2.6
Total revenues.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cost of revenues:								
Cost of product revenues.....	55.0	51.1	55.4	54.4	56.1	56.9	58.6	55.1
Cost of contract revenues.....	9.8	10.5	3.2	2.5	2.7	2.0	1.4	1.4
Total cost of revenues.....	64.8	61.6	58.6	56.9	58.8	58.9	60.0	56.5
Gross margin.....	35.2	38.4	41.4	43.1	41.2	41.1	40.0	43.5
Operating expenses:								
Selling, general and administrative.....	12.6	10.8	10.8	12.5	9.9	10.4	9.7	16.0
Research and development.....	4.4	4.8	4.7	6.2	6.6	6.2	6.5	4.0
Total operating expenses.....	17.0	15.6	15.5	18.7	16.5	16.6	16.2	20.0
Income from operations.....	18.2	22.8	25.9	24.4	24.7	24.5	23.8	23.5
Interest expense.....	(2.3)	(2.4)	(2.4)	(1.9)	(1.9)	(1.5)	(1.5)	(2.4)
Interest and other income (expense).....	(1.7)	1.2	(0.2)	(0.2)	0.2	(0.2)	1.8	3.2
Income before provision for income taxes.....	14.2	21.6	23.3	22.3	23.0	22.8	24.1	24.3
Provision for income taxes.....	5.4	8.2	8.9	8.5	8.8	8.7	9.1	9.2
Net income.....	8.8%	13.4%	14.4%	13.8%	14.2%	14.1%	15.0%	15.1%

The following table sets forth product and contract gross profits and gross margins for the eight quarters ended December 31, 1998.

	MAR. 31, 1997	JUNE 30, 1997	SEPT. 30, 1997	DEC. 31, 1997	MAR. 31, 1998	JUNE 30, 1998	SEPT. 30, 1998	DEC. 31, 1998
	(DOLLARS IN THOUSANDS)							
Product gross profit.....	\$1,689	\$2,193	\$2,456	\$3,002	\$3,778	\$ 4,154	\$ 4,203	\$ 4,807
Product gross margin.....	37.6%	40.9%	40.5%	42.3%	40.9%	40.4%	38.6%	43.4%
Contract gross profit.....	\$ 102	\$ 188	\$ 237	\$ 241	\$ 227	\$ 279	\$ 351	\$ 137
Contract gross margin.....	17.0%	22.3%	53.0%	55.8%	46.1%	56.1%	69.1%	45.5%

Our total revenues have increased in each of the eight quarters ended December 31, 1998, except for the quarter ended December 31, 1998, which was comparable to the prior quarter. These quarterly increases reflect increased product shipments to both the semi-insulating and semi-conducting GaAs and InP markets and the introduction of Ge substrates in the quarter ended December 31, 1997. In the quarter ended December 31, 1998, revenues from the sales of Ge substrates declined by \$1.2 million from the prior quarter as a result of a major customer having excess inventory and deferring shipments. This decline in revenues was offset by a \$1.2 million increase in GaAs shipments due primarily to increased orders from Southeast Asia for semi-conducting substrates. Contract revenues increased in the quarters ended March 31 and June 30, 1997 primarily as a result of revenues recognized from a \$1.2 million customer-funded Ge substrates research contract. Contract revenues decreased in the quarter ended December 31, 1998 due primarily to the temporary reduction in the level of work performed on contracts in progress.

We experienced higher product gross margins in the four quarters of 1997 primarily as a result of better product yields achieved from the new production facility completed in 1996 and improved manufacturing efficiencies from larger production volumes. In addition, due to a recycling program implemented in the quarter ended December 31, 1997, we were able to recycle scrapped inventory that had accumulated over prior quarters. This recycling program had a significant positive impact on the product gross margin for the quarter ended December 31, 1997. While we will continue the recycling program, we expect the program to have a less significant impact on product gross margins in the future as evidenced by the decline in product gross

margins for March 31, 1998. The increase in the overall product gross margin in the quarter ended December 31, 1997 was partially offset by lower product gross margins from sales of Ge substrates, which have lower gross margins than GaAs and InP substrates. The decrease in the overall product gross margins for the first three quarters of 1998 was primarily due to an increase in sales of Ge substrates. We experienced significantly lower contract gross margins for the quarters ended March 31, 1997 and June 30, 1997 due to a shift in contract revenue mix from higher margin government research contracts in prior quarters to a lower margin customer-funded contract for Ge substrates research. The decrease in contract gross margin from the quarter ended December 31, 1997 to the quarter ended March 31, 1998 was due to a shift in contract revenue mix from higher margin government research contracts in prior quarters to a lower margin cost sharing contract for InP substrates research. Contract gross margin in the quarter ended September 30, 1998 was favorably impacted by the recognition of certain performance incentives under the Title III GaAs contract. The lower contract gross margin in the quarter ended December 31, 1998 was primarily due to the lower margin on the cost sharing contract for InP substrates research.

Selling, general and administrative expenses for the quarter ended December 31, 1997 were higher than the quarters ended June 30 and September 30, 1997, as we built our management infrastructure to support its increased sales volume. Selling, General and administrative expenses for the quarter ended December 31, 1998 were significantly higher than the previous three quarters due primarily to increases in our bad debt allowance to cover exposure from increased international sales and for legal expenses in connection with an arbitration case.

Research and development expenses for the four quarters ended September 30, 1998 significantly increased over the prior three quarters ended September 30, 1997, primarily due to increased new product research and materials purchased for research on InP substrates. Research and development expenses for the quarter ended December 31, 1998 decreased primarily due to lower material purchases for three research projects.

We believe that our quarterly and annual revenues, expenses and operating results could vary significantly in the future and that period-to-period comparisons should not be relied upon as indications of future performance. There can be no assurance that our revenues will grow in future periods or that it will sustain its level of total revenues or its rate of revenue growth on a quarterly or annual basis. We may, in some future quarter, have operating results that will be below the expectations of stock market analysts and investors. In such event, the price of the our common stock could be materially adversely affected.

LIQUIDITY AND CAPITAL RESOURCES

During the past five years, we have funded our operations primarily from cash provided by operations, short-term and long-term borrowings and a private financing of \$5.9 million for preferred stock completed in March 1997. We completed our initial public offering in May 1998, and raised net proceeds of approximately \$25.8 million. As of December 31, 1998, we had working capital of \$40.8 million, including cash and cash equivalents of \$16.1 million, compared to working capital at December 31, 1997 of \$14.2 million, including cash of \$3.1 million, and compared to working capital at December 31, 1996 of \$5.5 million, including cash of \$756,000.

During the year ended December 31, 1996, net cash provided by operations of \$474,000 was due primarily to net income of \$2.0 million, depreciation of \$867,000 and an increase in accounts payable and accrued liabilities of \$629,000, offset in part by increases in inventory of \$2.3 million, and accounts receivable and other assets of \$727,000. The increase in inventory was primarily due to increases in raw material and work-in-process inventory to provide an adequate supply of material in anticipation of large orders for the upcoming year. These inventory increases resulted in a decrease in the inventory turnover ratio from 4.5 turns per year at December 31, 1995 to 3.3 turns per year at December 31, 1996. The increase in accounts receivable was primarily a result of

increased sales in Japan, which generally have longer payment cycles. The increase in sales to Japan also adversely impacted days sales outstanding, which increased from 49 days at December 31, 1995 to 60 days at December 31, 1996.

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During the year ended December 31, 1997, net cash used in operations of \$1.2 million was primarily due to increases in inventory of \$4.4 million and accounts receivable of \$3.0 million, offset in part by net income of \$3.3 million, depreciation of \$1.2 million and increases in accounts payable and accrued liabilities of \$1.6 million. The increase in inventory during this period included additional Ge inventory, which primarily resulted in a decrease in the inventory turnover ratio from 3.3 turns per year at December 31, 1996 to 2.2 turns per year at December 31, 1997. The increases in accounts payable and accrued liabilities, accounts receivable and inventory were primarily the result of a 56.1% increase in revenues from the prior year. In addition, accounts receivable increased due to the increase in international revenues, which historically have longer payment cycles. This increase in payment cycles resulted in an increase in days sales outstanding from 60 days at December 31, 1996 to 64 days at December 31, 1997.

During the year ended December 31, 1998, net cash used in operations of \$6.3 million was primarily due to increases in inventory of \$12.2 million, accounts receivable of \$2.9 million and prepaid and other assets of \$1.6 million, offset in part by net income of \$6.3 million, depreciation of \$2.0 million, and increases in accounts payable of \$1.7 million and accrued liabilities of \$496,000. The increases in accounts receivable, inventory and accounts payable were primarily the result of the 70.9% increase in total revenues from the prior year. In addition, inventory increased due to our decision to maintain the Ge substrates production line during the fourth quarter of 1998 in anticipation of future large orders, although shipments to a large customer had been deferred. Accordingly, the inventory turnover ratio declined from 2.2 turns per year at December 31, 1997 to 1.7 turns per year at December 31, 1998. The increase in prepaid and other assets was due primarily to deposits on manufacturing equipment and materials for our new Beijing, China facility and U.S. operations and for increases in prepaid insurance, taxable bond fees and bank fees. The increase in accrued liabilities was the result of an increase in legal expenses in connection with an arbitration case, and higher vacation and payroll expenses due to the increased number of personnel. Days sales outstanding decreased from 64 days at December 31, 1997 to 62 days at December 31, 1998, reflecting improved collection efforts.

Net cash used in investing activities was \$3.9 million, \$4.9 million, and \$16.4 million for the years ended December 31, 1996, 1997 and 1998, respectively, which amounts were attributed in each period to the purchase of property, plant and equipment. For the year ended December 31, 1998, the property acquired included our new 58,000 square foot building at a cost of \$9.0 million and the 30,000 square foot addition for \$2.0 million.

Net cash provided by financing activities was \$3.5 million, \$8.4 million and \$35.5 million for the years ended December 31, 1996, 1997 and 1998, respectively. For the year ended December 31, 1996, net cash provided by financing activities resulted primarily from long-term borrowings of \$3.5 million to complete our manufacturing facility. For the year ended December 31, 1997, net cash provided by financing activities resulted primarily from the issuance of \$5.9 million of preferred stock and \$2.7 million for long-term bank borrowings, partially offset by the repayment of \$300,000 of short-term borrowings. For the year ended December 31, 1998, net cash provided by financing activities consisted primarily of net proceeds of \$25.8 million from our initial public offering and long-term net borrowings of \$9.6 million. Long-term net borrowings reflected the issuance of \$11.6 million in taxable variable rate revenue bonds in November 1998 and equipment loans in the amount of \$2.3 million less repayment of existing long-term debts in the amount of \$4.3 million. Long-term borrowings were used for the purchase of the new 58,000 square foot facility, for construction of the additional 30,000 square foot manufacturing space and related equipment.

We have generally financed our equipment purchases through secured equipment loans over five-year terms at interest rates ranging from 6.0% to 9.0% per annum. Our manufacturing facilities have been financed by long-term borrowings, which were repaid by the taxable variable rate revenue bonds in 1998, except for a \$1.0 million SBA loan. The SBA loan has an interest rate of 7.3% per annum, matures in 2016 and is subordinated to the taxable variable rate revenue bonds. The taxable variable rate revenue bonds have a term of 25 years and mature in 2023 with an interest rate at 200 basis points below the prime rate and are traded in the public market. Repayment of principal and interest under the bonds is secured by a letter of credit from our bank and is paid on a quarterly basis. We have the option to redeem in whole or in part the bonds during their term. At December 31, 1998, \$11.6 million was outstanding under the taxable variable rate revenue bonds.

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We currently have a \$15.0 million line of credit with a commercial bank at an interest rate equal to the prime rate plus one-half percent. This line of credit is secured by all business assets, less equipment, and expires in May 1999. This line of credit is subject to certain financial covenants regarding current financial ratios and cash flow requirements, which were met as of December 31, 1998. We must obtain the lender's approval to obtain additional borrowings or to further pledge our assets, except for borrowings secured by the pledge of equipment or obtained in the normal course of business. At December 31, 1998, no amount was outstanding under the \$15.0 million line of credit.

We anticipate that the combination of existing working capital and the borrowings available under current credit agreements will be sufficient to fund working capital and capital expenditure requirements for the next 12 months. Our future capital requirements will depend on many factors, including the rate of revenue growth, our profitability, the timing and extent of spending to support research and development programs, the expansion of selling and marketing and administrative activities, and market acceptance of our products. We expect that we may need to raise additional equity or debt financing in the future, although we are not currently negotiating for additional financing nor do we have any plans to obtain additional financing at this time. There can be no assurance that additional equity or debt financing, if required, will be available on the acceptable terms or at all. If we are unable to obtain such additional capital, if needed, we may be required to reduce the scope of our planned product development and selling and marketing activities, which would have a material adverse effect on our business, financial condition and results of operations. In the event that we do raise additional equity financing, further dilution to our investors will result.

YEAR 2000 READINESS

Some computers, software, and other equipment include computer code in which calendar year data is abbreviated to only two digits. As a result of this design decision, some of these systems could fail to operate or fail to produce correct results if "00" is interpreted to mean 1900, rather than 2000. These problems are widely expected to increase in frequency and severity as the year 2000 approaches, and are commonly referred to as the "year 2000 problem."

Assessment. The year 2000 problem affects the computers, software and other equipment that we use, operate or maintain for our operations. Accordingly, we have organized a program team responsible for monitoring the assessment and remediation status of our year 2000 projects and reporting such status to our board of directors. This project team is currently assessing the potential effect and costs of remediating the year 2000 problem for our internal systems. To date, we have obtained verification or validation from our significant equipment and system vendors that the software programs and applications and related hardware that we use, operate or maintain for our operations are compliant with the year 2000.

Internal infrastructure. We believe that we have identified and evaluated all of the major computers, software applications and related equipment used in

connection with our internal operations to determine if they must be modified, upgraded or replaced to minimize the possibility of a material disruption to our business. We are in the process of modifying, upgrading, and replacing major systems that have been assessed as adversely affected, and expect to complete this process before the end of fiscal 1999. As of December 31, 1998, we have incurred approximately \$300,000 in this process.

Systems other than information technology systems. In addition to computers and related systems, the operation of office and facilities equipment, such as fax machines, telephone switches, security systems, and other common devices may be affected by the year 2000 problem. We are currently assessing the potential effect and costs of remediating the year 2000 problem on our office equipment at our facilities in Fremont, California. We estimate the total cost to us of completing any required modifications, upgrades or replacements of our internal systems will not exceed \$100,000, almost all of which we believe will be incurred during 1999. This estimate is being monitored and we will revise it as additional information becomes available.

Based on the activities described above, we do not believe that the year 2000 problem will have a material adverse effect on our business or operating results.

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Suppliers. We are in the process of contacting third-party suppliers of components used in the manufacture of our products to identify and, to the extent possible, resolve issues involving the year 2000 problem. However, we have limited or no control over the actions of these third-party suppliers. Thus, while we expect that we will be able to resolve any significant year 2000 problems with these third parties, there can be no assurance that these suppliers will resolve any or all year 2000 problems before the occurrence of a material disruption to the operation of our business. Any failure of these third parties to timely resolve year 2000 problems with their systems could have a material adverse effect on our business, operating results and financial condition.

Most likely consequences of year 2000 problems. We expect to identify and resolve all year 2000 problems that could materially adversely affect our business operations. However, we believe that it is not possible to determine with complete certainty that all year 2000 problems affecting us have been identified or corrected. The number of devices that could be affected and the interactions among these devices are simply too numerous. In addition, no one can accurately predict how many year 2000 problem-related failures will occur or the severity, duration, or financial consequences of these perhaps inevitable failures. As a result, we believe that the following consequences are possible:

- a significant number of operational inconveniences and inefficiencies for us, our contract manufacturers and our customers that will divert management's time and attention and financial and human resources from ordinary business activities;
- business disputes and claims for pricing adjustments or penalties due to year 2000 problems by our customers, which we believe will be resolved in the ordinary course of business; and
- business disputes alleging that we failed to comply with the terms of contracts or industry standards of performance, some of which could result in litigation or contract termination.

Contingency plans. We are currently developing contingency plans to be implemented if our efforts to identify and correct year 2000 problems affecting our internal systems are not effective. We expect to complete our contingency plans by the end of August 1999. Depending on the systems affected, these plans could include:

- accelerated replacement of affected equipment or software; short- to

medium-term use of backup equipment and software; increased work hours for our personnel; and use of contract personnel to correct on an accelerated schedule any year 2000 problems that arise or to provide manual workarounds for information systems.

Our implementation of any of these contingency plans could have a material adverse effect on our business, operating results and financial condition.

Disclaimer. The discussion of our efforts and expectations relating to year 2000 compliance are forward-looking statements. Our ability to achieve year 2000 compliance and the level of incremental costs associated therewith, could be adversely affected by, among other things, the availability and cost of programming and testing resources, third party suppliers' ability to modify proprietary software, and unanticipated problems identified in the ongoing compliance review.

RECENT ACCOUNTING PRONOUNCEMENTS

In June 1998, the Financial Accounting Standards Board issued Statement of Financial Accounting Standard No. 133, "Accounting for Derivative Instruments and Hedging Activities" ("SFAS 133"). SFAS 133 established a new model for accounting for derivatives and hedging activities and supersede and amend a number of existing accounting standards. SFAS 133 requires that all derivative be recognized in the balance sheet at their fair market value. In addition, corresponding derivative gains and losses should be either reported in the statement of operations or stockholders' equity, depending on the type of hedging relationship that exists with respect to such derivatives. Adopting the provisions of SFAS 133, which will be effective in fiscal year 2000, is not expected to have a material effect on the Company's consolidated financial statements.

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FACTORS AFFECTING FUTURE RESULTS

In addition to the other information in this report, the following factors should be considered carefully in evaluating our business before purchasing shares of our stock.

A number of factors could cause our quarterly financial results to be worse than expected, resulting in a decline in our stock price. Although we have been profitable on an annualized basis since 1990, due to the foregoing factors, we believe that period-to-period comparisons of our operating results cannot be relied upon as an indicator of our future performance. It is likely that in some future quarter, our operating results may be below the expectations of public market analysts or investors. If this occurs, the price of our common stock would likely decrease. For more information regarding our results, see "Management's Discussion and Analysis of Financial Condition and Results of Operations".

Our quarterly and annual revenues and operating results have varied significantly in the past and may vary significantly in the future due to a number of factors, including:

- fluctuations in demand for our substrates due to reduction in the value of Asian currencies and the turmoil in the Asian financial markets;
- our expense levels and expected research and development requirements;
- our ability to develop and bring to market new products on a timely basis;
- the volume and timing of orders from our customers;
- the availability of raw materials;

- fluctuations in manufacturing yields;
- our manufacturing expansion in Beijing, China;
- changes in the unit of products sold;
- introduction of products and technologies by our competitors; and
- costs relating to possible acquisitions and integration of technologies or businesses.

For more information regarding our results, see "Management's Discussion and Analysis of Financial Condition and Results of Operations."

VGF is a new technique for producing substrates which must achieve widespread acceptance if we are to succeed. We believe that our competitors principally utilize the traditional LEC or HB crystal growing processes for producing semi-insulating and semi-conducting GaAs substrates. We further believe that we are the only high-volume supplier of semi-insulating and semi-conducting GaAs substrates which utilize the VGF technique, a newer technology than either the LEC or HB techniques. We cannot assure you that our current customers will continue to use our VGF-produced substrates or that additional companies will purchase our products manufactured from the VGF technique. Failure to gain increased market acceptance of our VGF technique by either current or prospective customers could materially adversely affect our operating results.

A significant portion of our prospective customers are wireless communications manufacturers, fiber optic communications manufacturers and manufacturers of other high-speed semiconductor devices that use GaAs substrates produced using either the LEC or HB techniques. To establish the VGF technique as a preferred process for producing substrates for prospective customers, we must offer products with superior prices and performance on a timely basis and in sufficient volumes. We must also overcome the reluctance of these customers to purchase our GaAs substrates due to possible perceptions of risks relating to concerns about the quality and cost-effectiveness of our GaAs substrates when compared to substrates produced by the traditional LEC or HB techniques. In addition, potential GaAs substrate customers may be reluctant to rely on a relatively small company for critical materials used to manufacture their semiconductor devices.

If we do not achieve acceptable yields of crystals and the successful and timely production of substrates, the shipment of our products would be delayed and our business adversely affected. The highly complex

processes of growing crystals as well as other steps involved in manufacturing substrates which we engage in can be adversely affected by a number of factors, including the following:

- chemical or physical defects in the crystals;
- contamination of the manufacturing environment;
- substrate breakage;
- equipment failure; and
- performance of personnel involved in the manufacturing process.

We have been adversely affected in the past due to the occurrence of a combination of these factors which resulted in product shipment delays and adversely affected our business.

A significant portion of our manufacturing costs are fixed. As a result, we

must increase the production volume of substrates and improve yields in order to reduce unit costs, increase margins and maintain and improve our results of operations. Such decreases in production volume and yields could materially adversely affect our business, financial condition and results of operations.

In the past, we have sometimes manufactured substrates which have not met certain customers' manufacturing process requirements. We have fixed such occurrences through minor changes to the substrates or the manufacturing process. Recurrence of such problems and our inability to solve them may materially hurt our performance.

We have begun producing and shipping Ge and InP substrates in commercial volume. We also understand that we must achieve the same manufacturing capability for six inch GaAs wafers. We cannot assure you that we will be able to manufacture the Ge and InP substrate or the larger GaAs substrates in commercial volumes with acceptable yields. Our business, financial condition and results of operations would be materially adversely affected if we experience low yields of these substrates.

Because substantially all of our revenue is derived from sales of our GaAs substrates, we are dependent on widespread market acceptance of these products. We currently derive substantially all of our revenues from sales of our GaAs substrates. We expect that revenue from GaAs substrates will account for a significant majority of our revenues for the next several years. GaAs substrates are primarily used in electronic applications such as wireless communications, fiber optic communications and other high-speed semiconductor devices, as well as in opto-electronic applications such as lasers and LEDs. If there is a decrease in demand for GaAs substrates by semiconductor device manufacturers or if new substrates for these electronic and opto-electronic applications are developed and successfully introduced by competitors, our revenues may decline and our business will be materially adversely affected.

Further, other companies, including IBM, are actively involved in developing other devices which could provide the same high-performance, low power capabilities as GaAs-based devices at competitive prices, such as silicon-germanium based devices for use in certain wireless applications. If these silicon-germanium based devices are successfully developed and are adopted by semiconductor device manufacturers, demand for GaAs substrates could decrease. This development could cause our revenues to fall, which could adversely affect our business, financial condition and results of operations.

In order to be successful, we must develop and introduce in a timely manner new substrates and continue to improve our current substrates to address customer requirements and compete effectively on the basis of price and performance. Recently, we have begun commercial shipments of Ge and InP substrates and are currently developing other substrates, including gallium phosphide and gallium nitride. Factors that may affect the success of product improvements and product introductions include the development of markets for such improvements and substrates, achievement of acceptable yields, price and market acceptance. Many of these factors are beyond our control. We cannot assure you that our product development efforts will be successful or that our new products will achieve market acceptance. To the extent that product improvements and new product introductions do not achieve market acceptance, our business, financial condition and results of operations would be materially adversely affected.

Our limited ability to protect our intellectual property may adversely affect our ability to compete. We rely on a combination of patents, copyrights, trademarks and trade secret laws and contractual restrictions on employees, consultants and third parties from disclosure to protect our intellectual property rights. Despite our efforts to protect our proprietary rights, unauthorized parties may attempt to copy or otherwise obtain and use our products or technology. Policing unauthorized use of our products is difficult, and we cannot be certain that the steps we have taken will prevent misappropriation of our technology, particularly in foreign countries where the

laws may not protect our proprietary rights as fully as in the United States. We believe that, due to the rapid pace of technological innovation in the GaAs and other substrate markets, our ability to establish and maintain a position of technology leadership in the industry depends more on the skills of our development personnel than upon the legal protections afforded our existing technologies.

To date, we have been issued one U.S. patent, which relates to the VGF technique, and have two U.S. patent applications pending, one which relates to the VGF technique. Additionally, we have one pending application for a Japanese patent but no issued foreign patents. We cannot assure you that:

- the pending or any future U.S. or foreign patent applications will be approved;
- any issued patents will protect our intellectual property;
- third parties will not challenge the ownership rights of the patents or the validity of the patent applications;
- the patents owned by others will not have an adverse effect on our ability to do business; or
- others will not independently develop similar or competing technology or design around any patents issued to us.

Moreover, the laws of certain foreign countries may not lend protection to our patents to the same extent as the laws of the United States. See "Business-Intellectual property" for more information regarding risks relating to protecting our intellectual property rights.

If we infringe the proprietary rights of others, we may be forced to enter costly royalty or licensing agreements. We could in the future receive a claim that we are infringing the patent, trademark, copyright or other proprietary rights of other third parties. If any claims were asserted against us for violation of patent, trademark, copyright or other similar laws as a result of the use by us, our customers or other third parties of our products, those claims would be costly and time-consuming to defend, would divert our management's attention and could cause product delays. In addition, if we discovered we violated other third party rights, we could be required to enter into costly royalty or licensing agreements as a result of such claims. These royalty or licensing agreements may adversely affect our operating results.

If we fail to comply with stringent environmental regulations, we may be subject to significant fines or the cessation of our operations. We are subject to federal, state and local environmental laws and regulations. Any failure to comply with present or future environmental laws and regulations could result in the imposition of significant fines on us, the suspension of production or a cessation of operations. In addition, existing or future changes in laws or regulations may require us to incur further significant expenditures or liabilities, or additional restriction in our operations. For more information regarding environmental regulations that affect our operations, see "Business -- Environmental regulations."

We purchase critical raw materials required to grow crystals from single or limited sources, and could lose sales if these sources fail to fill our needs. We do not have any long-term supply contracts with any of our suppliers, and we currently purchase raw materials required to grow crystals from single or a limited number of suppliers. For example, we purchase a majority of the gallium we use from Rhone-Poulenc.

Due to our reliance on a limited group of suppliers, we are exposed to several risks such as the potential inability to obtain adequate supply of materials, reduced control over pricing of our products and meeting customer delivery schedules.

We have experienced delays receiving orders of certain materials due to shortages. We may continue to experience these delays due to shortages of

materials and as a result be subject to higher costs. Although we

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attempt to preempt supply interruptions by maintaining adequate levels of inventory of critical materials and attempts to obtain additional suppliers, shortages or price increases caused by suppliers may nevertheless recur.

If we are unable to receive adequate and timely deliveries of critical raw materials, relationships with current and future customers could be harmed, which could materially adversely affect our business, financial condition and results of operations.

We are subject to additional risks as a result of the recent completion of a new manufacturing facility. In connection with further expanding our manufacturing capacity, we purchased an additional 58,000 square foot facility in Fremont, California and a 30,000 square foot facility in Beijing, China. In 1998. The improvements to the new facility subject us to significant risks, including:

- unavailability or late delivery of process equipment;
- unforeseen engineering problems;
- work stoppages;
- unanticipated cost increases; and
- unexpected changes or concessions required by local, state or federal regulatory agencies with respect to necessary licenses, land use permits and building permits.

If any of the above occur, it could materially adversely affect operations under the new facility which in turn would materially adversely affect our business, financial condition and results of operations.

Finally, the operation of the new facility, together with the recent expansion of our current facility by approximately 30,000 square feet, will also expose us to additional risks. For example, the additional fixed operating expenses associated with the new facility may only be offset by sufficient increases in product revenues. We cannot assure you that the demand for our products will grow as we currently expect, and if this does not occur, we would not be able to offset the costs of operating the new facility, which may materially adversely affect our results of operations.

We must effectively respond to rapid technological changes by continually introducing new products that achieve broad market acceptance. We and our customers compete in a market that is characterized by rapid technological changes and continuous improvements in substrates. Accordingly, our future success depends upon whether we can apply our proprietary VGF technique to develop new substrates that meet the needs of customers and compete effectively on the basis of quality, price and performance. If we are unable to timely develop new, economically viable products that meet market demands, our revenues will decline, which could adversely affect our results of operation and cause the price of our stock to fall.

It is difficult to predict accurately the time required and the costs involved in researching, developing and engineering new products. Thus, our actual development costs could exceed budgeted amounts and our product development schedules could require extension. We have experienced product development delays in the past and may experience similar delays in the future which could materially adversely affect our business. For example, our introduction of InP substrates was delayed approximately six months as a result of delays in the finalization of the manufacturing process for these substrates. In addition, if we are unable to introduce reliable quality products, we could suffer from reduced orders, higher manufacturing costs, product returns and additional service expenses, all of which could result in lower revenues.

The sales cycle for our GaAs substrates is long and we may incur substantial, non-recoverable expenses or devote significant resources to sales that do not occur as anticipated. We have experienced and continue to experience delays in obtaining purchase orders for GaAs substrates while customers evaluate our substrates. A customer's decision to purchase our GaAs substrates is based upon whether the customer prefers substrates developed using our proprietary VGF technique or substrates developed using the more traditional LEC and HB techniques. The amount of time it takes for a customer to evaluate our GaAs substrates typically ranges from three months to a year or more, depending on the amount of time required to test and qualify substrates from new vendors. Since our substrates are generally incorporated into a customer's products at the design

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stage, the customer's decision to use our substrates often precedes volume sales, if any, by a significant period. If a customer decides at the design stage not to incorporate our substrates into its products, we may not have another opportunity to sell substrates for those products for many months or even years. Thus, our GaAs substrates typically have a lengthy sales cycle, during which we may expend substantial funds and sales, marketing and management efforts to attract the potential customer. However, there is a risk that these expenditures may not result in sales. Consequently, if sales forecasted from a specific customer for a particular quarter are not delivered in that quarter, we may be unable to compensate for the shortfall, which could materially adversely affect our operating results.

We anticipate that sales of any future products under development will have similar lengthy sales cycles and will, therefore, be subject to risks substantially similar to those inherent in the lengthy sales cycle of our GaAs substrates.

The loss of one or more of our key customers would significantly hurt our operating results. A small number of customers have historically accounted for a substantial portion of our revenues. We expect that a significant portion of our future sales will be due to a limited number of customers. Our top five customers accounted for approximately 35.5%, 34.9% and 39.5% of our revenues in 1996, 1997 and 1998, respectively. Our customers are not obligated to purchase any specified quantity of products or to provide us with binding forecasts of product purchases. In addition, our customers may reduce, delay or cancel orders at any time without any significant penalty.

Our substrates are typically one of many components used in semiconductor devices produced by our customers. Demand for our products is therefore subject to many factors beyond our control, including:

- demand for our customers' products;
- competition faced by our customers in their particular industries;
- the technical, sales and marketing and management capabilities of our customers; and
- the financial and other resources of our customers.

In the past, we have experienced reductions, cancellations and delays in customer orders. If any one of our major customers reduces, cancels or delays orders in the future, our business, financial condition and results of operation could be materially adversely affected.

Intense competition in the market for GaAs substrates could prevent us from increasing revenue and sustaining profitability. The market for GaAs substrates is intensely competitive. In the semi-insulating GaAs substrates market, our principal competitors currently include:

- Freiburger Compound Materials;

- Hitachi Cable;
- Litton Airtron; and
- Sumitomo Electric Industries.

We also compete with manufacturers that produce GaAs substrates for their own use. In addition, we compete with companies, such as IBM, that are actively developing alternative materials to GaAs. As we enter new markets, such as the Ge and InP substrate markets, we expect to face competitive risks similar to those for our GaAs substrates.

Many of our competitors and potential competitors have a number of significant advantages over us, including:

- having been in the business longer than we have;
- more manufacturing experience;
- more established technologies than our VGF technique;

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- broader name recognition; and
- significantly greater financial, technical and marketing resources.

Our competitors could develop enhancements to the LEC, HB or VGF techniques that are superior to ours in terms of price and performance. Our competitors also could intensify price-based competition, resulting in lower prices and margins. For more information regarding the risks we face from our competitors, see "Business -- Competition."

We derive a significant portion of our revenues from international sales and our ability to sustain and increase our international sales involve significant risks. Our ability to grow will depend in part on the expansion of international sales and operations which have and are expected to constitute a significant portion of our revenues. International sales, excluding Canada, represented 34.1% and 28.8% of our total revenues in 1997 and 1998, respectively. Sales to customers located in Japan and other Asian countries represented 23.5% and 18.7% of our total revenues in 1997 and 1998. Sales to customers in Japan, in particular, accounted for 17.1% and 11.5% of our total revenues in 1997 and 1998, respectively. We expect that sales to customers outside the United States, including device manufacturers located in Japan and other Asian countries who sell their products worldwide, will continue to represent a significant portion of our revenues.

Our dependence on international sales involves a number of risks, including:

- import restrictions and other trade barriers;
- unexpected changes in regulatory requirements;
- longer periods to collect accounts receivable;
- export license requirements;
- political and economic instability (in particular, the current instability of the economies of Japan and other Asian countries); and
- unexpected changes in diplomatic and trade relationships.

Our sales, except for sales by our Japanese subsidiary, are denominated in U.S. dollars. Thus, increases in the value of the dollar could increase the

price of our products in non-U.S. markets and make our products more expensive than competitors' products in such markets. For example, doing business in Japan subjects us to fluctuations in the exchange rates between the U.S. dollar and the Japanese yen. In 1996, 1997 and 1998, we incurred foreign exchange losses of \$114,000, \$186,000 and \$24,000, respectively. If we do not effectively manage the risks associated with international sales, our business, financial condition and results of operations could be materially adversely affected. In order to minimize our foreign exchange risk, we have bought foreign exchange contracts to hedge against certain trade accounts receivable in Japanese yen. Because we currently denominate sales in U.S. dollars except in Japan, we do not anticipate that the adoption of the Euro as a functional legal currency of certain European countries will materially affect our business.

If we lose certain key personnel or are unable to hire additional qualified personnel as necessary, we may not be able to successfully manage our business or achieve our objectives. Our success depends to a significant degree upon the continued service of Morris S. Young, Ph.D., AXT's President and Chief Executive Officer, as well as other key management and technical personnel. We neither have long-term employment contracts with, nor key person life insurance on, any of our key personnel. In addition, our management team has limited experience as executive officers of a public company.

We believe our future success will also depend in large part upon our ability to attract and retain highly skilled managerial, engineering, sales and marketing, finance and manufacturing personnel. The competition for these employees is intense, especially in Silicon Valley, and there can be no assurance that we will be successful in attracting and retaining new 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, could make it difficult for us to manage our business and meet key objectives, such as product introduction, on time.

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Continued rapid growth may strain our operations. We have recently experienced a period of rapid growth and expansion which has placed, and continues to place, a significant strain on our operations. To accommodate this anticipated growth, we will be required to:

- improve existing and implement new operational and financial systems, procedures and controls;
- hire, train and manage additional qualified personnel;
- effectively manage multiple relationships with our customers, suppliers and other third parties; and
- maintain effective cost controls.

We may not be able to install adequate control systems in an efficient and timely manner, and our current or planned personnel systems, procedures and controls may not be adequate to support our future operations. We are in the process of installing a new management information system; however, the functionality of this new system has not been fully implemented. The difficulties associated with installing and implementing these new systems, procedures and controls may place a significant burden on our management and our internal resources. In addition, international growth will require expansion of our worldwide operations and enhance our communications infrastructure. Any delay in the implementation of such new or enhanced systems, products and controls, or any disruption in the transition to such new or enhanced systems, products and controls, could adversely affect our ability to accurately forecast sales demand, manage manufacturing, purchasing and inventory levels, and record and report financial and management information on a timely and accurate basis. Our inability to manage growth effectively could affect our revenues and adversely impact our profitability.

Our failure and the failure of our key suppliers and customers to be year 2000 compliant could negatively impact our business. The year 2000 computer issue creates a risk for us. If systems do not correctly recognize date information when the year changes to 2000, there could be an adverse impact on our operations. The risk exists in four areas:

- potential warranty or other claims from our customers;
- systems we used to run our business;
- systems used by our suppliers; and
- the potential reduced spending by other companies on networking solutions as a result of significant information systems spending on year 2000 remediation.

We are currently evaluating our exposure in all of these areas.

We are in the process of conducting a comprehensive inventory and evaluation of the information systems used to run our business. We have a number of projects underway to replace older systems that are known to be year 2000 non-compliant. Other systems, which are identified as non-compliant, will be upgraded or replaced. For the year 2000 non-compliance issues identified to date, the cost of remediation is not expected to be material to our operating results. However, if implementation of replacement systems is delayed, or if significant new non-compliance issues are identified, our operating results or financial condition could be materially adversely affected.

We have contacted more than thirty key suppliers to determine if their operations and the products and services they provide are year 2000 compliant. Where practicable, we will attempt to mitigate our risks with respect to the failure of suppliers to be year 2000 ready. However, such failures remain a possibility and could have an adverse impact on our operating results or financial condition.

We believe our current products are year 2000 compliant; however, since all customer situations cannot be anticipated, we may see an increase in warranty and other claims as a result of the year 2000 transition. In addition, litigation regarding year 2000 compliance issues is expected to escalate. For these reasons, the impact of customer claims could have a material adverse impact on our operating results or financial condition.

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Year 2000 compliance is an issue for virtually all businesses whose computer systems and applications may require significant hardware and software upgrades or modifications. Companies owning and operating such systems may plan to devote a substantial portion of their information systems' spending to fund such upgrades and modifications and divert spending away from networking solutions. Such changes in customers' spending patterns could have a material adverse impact on our business, operating results or financial condition.

We may engage in future acquisitions that we must successfully integrate into our business and that may dilute our stockholders and cause us to assume contingent liabilities. As part of our business strategy, we may in the future review acquisition prospects that would complement our current product offerings, augment our market coverage or enhance our technical capabilities, or that may otherwise offer growth opportunities. In the event of any future acquisitions, we could:

- issue equity securities which would dilute current stockholders' percentage ownership;
- incur substantial debt; or
- assume contingent liabilities.

Such actions by us could materially adversely affect our operating results and/or the price of our common stock.

Any future acquisitions creates risks for us, including:

- difficulties in the assimilation of acquired personnel, operations, technologies or products;
- unanticipated costs associated with the acquisition could materially adversely affect our operating results;
- diversion of management's attention from other business concerns;
- adverse effects on existing business relationships with suppliers and customers;
- risks of entering markets where we have no or limited prior experience;
- potential loss of key employees of acquired organizations; and
- loss of customers that, through product acquisition, now become competitors.

These risks and difficulties could disrupt our ongoing business, distract our management and employees and increase our expenses. We may not be able to successfully integrate any businesses, products, technologies or personnel that we might acquire in the future, and our failure to do so could have a material adverse effect on our business, operating results and financial condition.

We may need additional capital to fund our future operations which may not be available. We believe that our cash balances and cash available from credit facilities and future operations will enable us to meet our working capital requirements for at least the next 12 months. We do not currently anticipate the need for additional capital but if cash from future operations is insufficient, or if cash is used for acquisitions or other currently unanticipated uses, we may need additional capital. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the issuance of such securities could result in dilution to existing stockholders.

On December 1, 1998, we raised approximately \$11.6 million by issuing variable rate taxable demand revenue bonds series 1998 for:

- the purchase of a commercial building and to finance tenant improvements at 4281 Technology Drive, Fremont, California;
- to refinance an existing loan and to finance tenant improvements on our principal offices; and
- the permanent financing for an existing bank construction loan.

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These debt securities have rights, preferences and privileges that are senior to holders of common stock, as other debt securities which we may issue in the future would be, and the term of any debt could impose restrictions on our operations. We cannot assure you that if we required additional capital, it will be available on acceptable terms, or at all. If we are unable to obtain additional capital, we may be required to reduce the scope of our planned product development and marketing efforts, which would materially adversely affect our business, financial condition and operating results. See "Management's Discussion and Analysis of Financial Condition and Results of Operations."

Our executive officers and directors control 21% of our common stock and are able to significantly influence matters requiring stockholder

approval. Executive officers, directors and entities affiliated with them, in the aggregate, currently beneficially own approximately 21% of our outstanding common stock. These stockholders, if acting together, are able to significantly influence all matters requiring our stockholder approval, including the election of directors and the approval of mergers or other business combination transactions. This concentration of ownership could delay or prevent a change of control of AXT and could reduce the likelihood of an acquisition of AXT at a premium price.

Provisions in our charter or agreements may delay or prevent a change of control. Provisions in our amended and restated certificate of incorporation and bylaws may have the effect of delaying or preventing a merger or acquisition or a change of control or changes in our management. These provisions include, among others:

- the division of the board of directors into three separate classes of three year terms;
- the right of the board to elect the director to fill a space created by the expansion of the board;
- the ability of the board to alter our bylaws;
- authorizing the issuance of up to 2,000,000 shares of "blank check" preferred stock; and
- the requirement that at least 10% of the outstanding shares are needed to call a special meeting of stockholders.

Furthermore, because we are incorporated in Delaware, we are subject to the provisions of section 203 of the Delaware General Corporation Law. These provisions prohibit certain large stockholders, in particular those owning 15% or more of the outstanding voting stock, from consummating a merger or combination with a corporation unless:

- 66 2/3% of the shares of voting stock not owned by this large stockholder approve the merger or combination, or
- the board of directors approves the merger or combination or the transaction which resulted in the large stockholder owning 15% or more of our outstanding voting stock.

Our stock price has been and may continue to be volatile and is dependent on external and internal factors. Our stock has fluctuate significantly since we began trading on the Nasdaq national market. In 1998, our stock price closed as low as \$6.00 and as high as \$15.50. Various factors could cause the price of our common stock to continue to fluctuate substantially, including:

- actual or anticipated fluctuations in our quarterly or annual operating results;
- changes in expectations as to our future financial performance or changes in financial estimates of securities analysts;
- announcements of technological innovations by us or our competitors;
- new product introduction by us or our competitors;
- large customer orders or order cancellations; and
- the operating and stock price performance of other comparable companies.

In addition, the stock market in general has experienced extreme volatility that often has been unrelated to the operating performance of particular

companies. These broad market and industry fluctuations may adversely affect the trading price of our common stock, regardless of our actual operating performance.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Since many of our Japanese invoices are denominated in yen, we have bought foreign exchange contracts to hedge against certain trade accounts receivable in Japanese yen. As of December 31, 1998, our outstanding commitments with respect to the foreign exchange contracts had a total value of approximately \$1.6 million equivalent. Many of the contracts were entered six months prior to the due date and the dates coincide with the receivable terms we have on the invoices. By matching the receivable collection date and contract due date, we attempt to minimize the impact of foreign exchange fluctuation.

ITEM 8. CONSOLIDATED FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The Consolidated Financial Statements and Supplementary Data required by this item are set forth at the pages indicated at Item 14(a).

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

None.

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PART III

The SEC allows us include information required in this report by referring to other documents or reports we have already or will soon be filing. This is called "Incorporation by Reference." We intend to file your definitive proxy statement pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this report, and certain information therein is incorporated in this report by reference.

ITEM 10. DIRECTORS AND EXECUTIVE OFFICERS OF THE REGISTRANT.

The information required by this Item is incorporated by reference to information set forth in our definitive proxy statement under the heading "Proposal No. 1 -- Election of Directors" and in Part I of this report under the heading "Executive Officers of the Registrant."

The information required by this Item with respect to compliance with Section 16(a) of the Securities Exchange Act of 1934 is incorporated by reference to information set forth in the definitive Proxy Statement under the heading "Executive Compensation and Other matters."

ITEM 11. EXECUTIVE COMPENSATION.

The information required by this Item is incorporated by reference to information set forth in our definitive proxy statement under the heading "Executive Compensation and Other matters."

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT.

The information required by this Item is incorporated by reference to information set forth in our definitive proxy statement under the heading "Stock Ownership of Certain Beneficial Owners and Management."

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS.

The information required by this Item is incorporated by reference to information set forth in our definitive proxy statement under the heading "Certain Relationships and Related Transactions."

PART IV

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

(a) The following documents are filed as part of this report:

(1) Financial Statements:

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

	PAGE

Report of Independent Accountants.....	37
Consolidated Balance Sheets as of December 31, 1997 and 1998.....	38
Consolidated Statements of Operations for the Years Ended December 31, 1996, 1997, and 1998.....	39
Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 1996, 1997 and 1998.....	40
Consolidated Statements of Cash Flows for the Years Ended December 31, 1996, 1997, and 1998.....	41
Notes to Consolidated Financial Statements.....	42

(2) Financial Statement Schedules

All schedules have been omitted because the required information is not present or not present in amounts sufficient to require submission of the schedules or because the information required is included in the Consolidated Financial Statements or Notes thereto.

(3) Exhibits

See Index to Exhibits on page 54 hereof. The exhibits listed in the accompanying Index to Exhibits are filed as part of this report.

(b) Reports on form 8-K

None

REPORT OF INDEPENDENT ACCOUNTANTS

To the Board of Directors and Stockholders of American Xtal Technology, Inc.

In our opinion, the accompanying consolidated balance sheets and the related consolidated statements of operations, stockholders' equity and cash flows present fairly, in all material respects, the financial position of American Xtal Technology, Inc. and its subsidiaries at December 31, 1997 and 1998, 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.

PRICEWATERHOUSECOOPERS LLP

San Jose, California
January 28, 1999

AMERICAN XTAL TECHNOLOGY, INC.
CONSOLIDATED BALANCE SHEETS
(IN THOUSANDS, EXCEPT SHARE DATA)

ASSETS

	DECEMBER 31,	
	1997	1998
	-----	-----
Current assets:		
Cash and cash equivalents.....	\$ 3,054	\$16,122
Accounts receivable, less allowance for doubtful accounts of \$100 and \$550.....	6,005	8,902
Inventories.....	8,361	20,579
Prepaid expenses and other current assets.....	858	2,507
Deferred income taxes.....	225	466
	-----	-----
Total current assets.....	18,503	48,576
Property, plant and equipment.....	12,110	26,447
	-----	-----
Total assets.....	\$30,613	\$75,023
	=====	=====
	LIABILITIES AND STOCKHOLDERS' EQUITY	
Current liabilities:		
Accounts payable.....	\$ 1,722	\$ 3,455
Accrued liabilities.....	1,827	2,323
Current portion of long-term debt.....	745	1,730
	-----	-----
Total current liabilities.....	4,294	7,508
Long-term debt, net of current portion.....	7,728	16,347
	-----	-----
Total liabilities.....	12,022	23,855
	-----	-----
Contingencies (Note 12)		
Stockholders' equity:		
Convertible preferred stock, no par value, 25,000,000 shares authorized, 10,128,737 and 0 shares issued and outstanding.....	8,553	--
Common stock, no par value, 100,000,000 shares authorized, 3,041,531 shares with no par value and 16,116,675 shares with \$0.001 par value issued and outstanding....	867	16
Additional paid in capital.....	--	35,537
Deferred compensation.....	(220)	(327)
Retained earnings.....	9,584	15,910

Accumulated other comprehensive income -- cumulative translation adjustments.....	(193)	32
	-----	-----
Total stockholders' equity.....	18,591	51,168
	-----	-----
Total liabilities and stockholders' equity.....	\$30,613	\$75,023
	=====	=====

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

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AMERICAN XTAL TECHNOLOGY, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS
(IN THOUSANDS, EXCEPT PER SHARE DATA)

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
	-----	-----	-----
Revenues:			
Product revenues.....	\$14,222	\$23,014	\$41,493
Contract revenues.....	2,005	2,321	1,797
	-----	-----	-----
Total revenues.....	16,227	25,335	43,290
Cost of revenues:			
Cost of product revenues.....	9,270	13,674	24,550
Cost of contract revenues.....	795	1,553	804
	-----	-----	-----
Total cost of revenues.....	10,065	15,227	25,354
Gross profit.....	6,162	10,108	17,936
Operating expenses:			
Selling, general and administrative.....	2,033	2,959	5,016
Research and development.....	592	1,289	2,504
	-----	-----	-----
Total operating expenses.....	2,625	4,248	7,520
Income from operations.....	3,537	5,860	10,416
Interest expense.....	(170)	(570)	(781)
Interest and other income (expense).....	(72)	(34)	568
	-----	-----	-----
Income before provision for income taxes.....	3,295	5,256	10,203
Provision for income taxes.....	1,249	1,998	3,877
	-----	-----	-----
Net income.....	\$ 2,046	\$ 3,258	\$ 6,326
	=====	=====	=====
Net income per share:			
Basic.....	\$ 0.71	\$ 1.11	\$ 0.42
	=====	=====	=====
Diluted.....	\$ 0.17	\$ 0.25	\$ 0.42
	=====	=====	=====
Shares used in net income per share calculations:			
Basic.....	2,882	2,938	14,928
	=====	=====	=====
Diluted.....	11,811	12,839	15,177
	=====	=====	=====

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

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AMERICAN XTAL TECHNOLOGY, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(IN THOUSANDS, EXCEPT SHARE DATA)

	CONVERTIBLE PREFERRED STOCK		COMMON STOCK		ADDITIONAL PAID IN CAPITAL	DEFERRED COMPENSATION	RETAINED EARNINGS	ACCUMULATED OTHER COMPREHENSIVE INCOME -- CUMULATIVE TRANSLATION ADJUSTMENTS
	SHARES	AMOUNT	SHARES	AMOUNT				
Balance at January 1, 1996.....	8,928,737	\$ 2,618	2,848,956	\$ 107	\$ --	\$ --	\$ 4,280	\$ --
Common stock options exercised.....	--	--	40,750	52	--	--	--	--
Comprehensive income								
Net income.....	--	--	--	--	--	--	2,046	--
Other comprehensive income								
Currency translation adjustment.....	--	--	--	--	--	--	--	(104)
Comprehensive income.....	--	--	--	--	--	--	--	--
Balance at December 31, 1996.....	8,928,737	2,618	2,889,706	159	--	--	6,326	(104)
Issuance of series C convertible preferred stock in March 1997 at \$5.00 per share, net of issuance costs.....	1,200,000	5,935	--	--			--	--
Common stock options exercised.....	--	--	151,825	386	--	--	--	--
Deferred compensation.....	--	--	--	322	--	(322)	--	--
Amortization of deferred compensation.....	--	--	--	--	--	102	--	--
Comprehensive income								
Net income.....	--	--	--	--	--	--	3,258	--
Other comprehensive income								
Currency translation adjustment.....	--	--	--	--	--	--	--	(89)
Comprehensive income.....	--	--	--	--	--	--	--	--
Balance at December 31, 1997.....	10,128,737	8,553	3,041,531	867	--	(220)	9,584	(193)
Common stock with no par value converted to common stock of \$0.001 par value.....	--	--	--	(864)	864	--	--	--
Conversion of preferred stock to common stock....	(10,128,737)	(8,553)	10,128,737	10	8,543	--	--	--
Common stock options exercised.....	--	--	71,407	--	138	--	--	--
Issuance of common stock upon initial public offering, net of issuance costs.....	--	--	2,875,000	3	25,789	--	--	--
Deferred compensation.....	--	--	--	--	203	(203)	--	--
Amortization of deferred compensation.....	--	--	--	--	--	96	--	--
Comprehensive income								
Net income.....	--	--	--	--	--	--	6,326	--
Other comprehensive income								
Currency translation adjustment.....	--	--	--	--	--	--	--	225
Comprehensive income.....	--	--	--	--	--	--	--	--
Balance at December 31, 1998.....	--	\$ --	16,116,675	\$ 16	\$35,537	\$ (327)	\$15,910	\$ 32

	TOTAL	COMPREHENSIVE INCOME
Balance at January 1, 1996.....	\$ 7,005	\$ --
Common stock options exercised.....	52	--
Comprehensive income		
Net income.....	2,046	2,046
Other comprehensive income		
Currency translation adjustment.....	(104)	(104)
Comprehensive income.....	--	\$ 1,942
Balance at December 31, 1996.....	8,999	
Issuance of series C convertible preferred stock in March 1997 at \$5.00 per share, net of issuance costs.....	5,935	--
Common stock options exercised.....	386	--
Deferred compensation.....	--	--
Amortization of deferred compensation.....	102	--
Comprehensive income		
Net income.....	3,258	3,258
Other comprehensive income		
Currency translation adjustment.....	(89)	(89)
Comprehensive income.....	--	\$ 3,169
Balance at December 31,		

1997.....	18,591	
Common stock with no par value converted to common stock of \$0.001 par value.....	--	--
Conversion of preferred stock to common stock....	--	--
Common stock options exercised.....	138	--
Issuance of common stock upon initial public offering, net of issuance costs.....	25,792	--
Deferred compensation.....	--	--
Amortization of deferred compensation.....	96	--
Comprehensive income		
Net income.....	6,326	6,326
Other comprehensive income		
Currency translation adjustment.....	225	225
Comprehensive income.....	--	\$ 6,551
Balance at December 31, 1998.....	\$51,168	=====

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

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AMERICAN XTAL TECHNOLOGY, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(IN THOUSANDS)

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
Cash flows from operating activities:			
Net income.....	\$ 2,046	\$ 3,258	\$ 6,326
Adjustments to reconcile net income to cash provided by (used in) operations:			
Depreciation and amortization.....	867	1,164	2,048
Deferred income taxes.....	(43)	264	(241)
Stock compensation.....	--	102	96
Changes in assets and liabilities:			
Accounts receivable.....	(578)	(3,013)	(2,897)
Inventories.....	(2,298)	(4,406)	(12,218)
Prepaid expenses and other current assets.....	(149)	(84)	(1,649)
Accounts payable.....	247	894	1,733
Accrued liabilities.....	382	665	496
Net cash provided by (used in) operating activities.....	474	(1,156)	(6,306)
Cash flows from investing activities:			
Purchases of property, plant and equipment.....	(3,946)	(4,856)	(16,385)
Net cash used in investing activities.....	(3,946)	(4,856)	(16,385)
Cash flows from financing activities:			
Proceeds from the issuance of common stock, net.....	52	386	25,930
Proceeds from the issuance of convertible preferred stock.....	--	5,935	--
Payments of short-term bank borrowings.....	(300)	(300)	--
Proceeds from long-term debt borrowings.....	3,469	2,654	13,942
Payments of long-term debt borrowings.....	--	--	(4,338)
Proceeds from (payments of) notes payable to related parties.....	276	(276)	--
Net cash provided by financing activities.....	3,497	8,399	35,534
Effect of exchange rate changes.....	(104)	(89)	225
Net increase (decrease) in cash and cash equivalents.....	(79)	2,298	13,068
Cash and cash equivalents at beginning of year.....	835	756	3,054

Cash and cash equivalents at end of year.....	----- \$ 756 =====	----- \$ 3,054 =====	----- \$ 16,122 =====
Supplemental disclosures:			
Interest paid.....	\$ 203 =====	\$ 579 =====	\$ 781 =====
Income taxes paid.....	\$ 794 =====	\$ 1,814 =====	\$ 4,378 =====

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

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AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 1. THE COMPANY AND ITS SIGNIFICANT ACCOUNTING POLICIES

American Xtal Technology, Inc. (the "Company") was incorporated in California in December 1986 and reincorporated in Delaware in 1998. The Company uses a proprietary vertical gradient freeze ("VGF") technique to produce high-performance compound semiconductor base materials, or substrates, for use in a variety of electronic and opto-electronic applications. The Company manufactures and sells gallium arsenide ("GaAs"), indium phosphide ("InP") and germanium ("Ge") substrates. The Company also has research and development contracts with the U.S. Department of Defense ("DOD") and other third parties for developing GaAs and other substrates.

In May 1998, the Company completed its initial public offering ("IPO") and issued 2,875,000 shares of its common stock at \$10.00 per share, including the shares from an over-allotment option. The Company received cash of approximately \$25,792,000 net of underwriting discounts, commissions and IPO expenses. Upon the closing of the IPO, all outstanding shares of the Company's then convertible preferred stock were automatically converted into shares of common stock.

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 amounts 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 reporting period. Actual results could differ from these estimates.

Principles of Consolidation

The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries. All material intercompany accounts and transactions have been eliminated.

Foreign Currency Translation

The functional currencies of the Company's Japanese and Chinese subsidiaries are the local currencies. Transaction gains and losses resulting from transactions denominated in currencies other than the US dollar for the Company or in the local currencies for the subsidiaries are included in the results of operations for the year.

The assets and liabilities of the subsidiaries are translated at the rates of exchange on the balance sheet date. Income and expense items are translated at the average rate of exchange for the period. Gains and losses from foreign currency translation are included as a separate component of stockholders' equity.

Revenue Recognition

Product revenues are generally recognized upon shipment. The Company provides an allowance for estimated returns at the time revenue is recognized. Contract revenues are recognized under the percentage of completion method based on costs incurred relative to total contract costs. Costs associated with contract revenues are included in cost of contract revenues. All costs of contract revenues are research and development expenses which are funded by the contract.

Concentration of Credit Risk

The Company manufactures and distributes GaAs, InP and Ge substrates and performs services under research and development contracts. Financial instruments which potentially subject the Company to concentration of credit risk consist primarily of trade accounts receivable. The Company invests primarily in

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AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

money market accounts and commercial paper instruments. Cash equivalents are maintained with high quality institutions and their composition and maturities are regularly monitored by management.

The Company performs ongoing credit evaluations of its customers' financial condition and limits the amount of credit extended when deemed necessary, but generally does not require collateral. No customer represented greater than 10.0% of product revenues in fiscal years 1996 and 1997, and one customer in 1998, represented 14.2% of product revenues. For fiscal 1996, one government entity represented 91.3% of contract revenues. For fiscal 1997, one government entity and a third party represented 47.4% and 52.6%, respectively, of contract revenues. For fiscal 1998, one government entity represented 100% of contract revenues. No customer accounted for 10% or more of the trade accounts receivable balance as of December 31, 1997, and 1998.

Cash Equivalents

The Company considers all highly liquid debt instruments purchased with an original maturity of three months or less to be cash equivalents.

Inventory

Inventory is stated at the lower of cost or market, cost being determined using the weighted average method.

Property, Plant and Equipment

Property, plant and equipment are stated at cost less accumulated depreciation computed using the straight-line method over the estimated economic lives of the assets, generally five years. Leasehold improvements are amortized over the shorter of the estimated useful life or the term of the lease.

Impairment of Long-Lived Assets

Pursuant to Statement of Financial Accounting Standard No. 121, "Accounting for the Impairment of Long-Lived Assets and for Long-Lived Assets to be Disposed of" ("SFAS 121"), the Company reviews long-lived assets based upon a gross cash flow basis and will reserve for impairment whenever events or changes in circumstances indicate the carrying amount of the assets may not be fully recoverable. Based on its most recent analysis, the Company believes that there was no impairment of its property, plant and equipment as of December 31, 1998.

Stock-Based Compensation

The Company accounts for stock-based employee compensation arrangements using the intrinsic value method as prescribed in Accounting Principles Board Opinion No. 25, "Accounting for Stock Issued to Employees" and related Interpretations thereof. Accordingly, compensation costs for stock options is measured as the excess, if any, of the market price of the Company's stock at the date of grant over the stock option exercise price. In addition, the Company complies with the disclosure provisions of Statement of Financial Accounting Standard No. 123, "Accounting for Stock-Based Compensation" ("SFAS 123").

Income Taxes

The Company accounts for deferred income taxes using the liability method, under which the expected future tax consequences of timing differences between the book and tax basis of assets and liabilities are recognized as deferred tax assets and liabilities.

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AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

Comprehensive Income

In 1998, the Company adopted Statement of Financial Accounting Standard No. 130 "Reporting Comprehensive Income" ("SFAS 130"). Comprehensive income is defined as the change in equity of a company during a period from transactions and other events and circumstances excluding transactions resulting from investment by owners and distribution to owners. The difference between net income and comprehensive income for the Company relates to foreign currency translation adjustments. Comprehensive income for the years ended December 31, 1996, 1997 and 1998 is disclosed in the Statement of Stockholders' Equity.

Segment Reporting

In 1998, the Company adopted Statement of Financial Accounting Standard No. 131, "Disclosures about Segments of an Enterprise and Related Information" ("SFAS 131"). SFAS 131 requires that companies report separately, in the financial statements, certain financial and descriptive information about operating segment profit or loss, certain specific revenue and expense items, and segment assets. Additionally, companies are required to report information about the revenues derived from their products and service groups, about geographic areas in which the Company earns revenues and holds assets, and about major customers. (See Note 11 for these disclosures).

Recent Accounting Pronouncements

In June 1998, the Financial Accounting Standards Board issued Statement of Financial Accounting Standard No. 133, "Accounting for Derivative Instruments and Hedging Activities" ("SFAS 133"). SFAS 133 established a new model for accounting for derivatives and hedging activities and supersedes and amends a number of existing accounting standards. SFAS 133 requires that all derivatives be recognized in the balance sheet at their fair market value. In addition, corresponding derivative gains and losses should be either reported in the statement of operations or stockholders' equity, depending on the type of hedging relationship that exists with respect to such derivatives. Adopting the provisions of SFAS 133, which will be effective in fiscal year 2000, is not expected to have a material effect on the Company's consolidated financial statements.

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AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

NOTE 2. BALANCE SHEET DETAIL

	DECEMBER 31,	
	1997	1998
	-----	-----
	(IN THOUSANDS)	
Inventories:		
Raw materials.....	\$ 2,224	\$ 7,687
Work in process.....	5,623	12,059
Finished goods.....	514	833
	-----	-----
	\$ 8,361	\$20,579
	=====	=====
Property, plant and equipment:		
Land.....	\$ 1,120	\$ 1,120
Building.....	4,731	14,191
Machinery and equipment.....	8,130	13,668
Leasehold improvements.....	240	256
Construction in progress.....	1,773	3,144
	-----	-----
	15,994	32,379
Less: Accumulated depreciation and amortization.....	3,884	5,932
	-----	-----
	\$12,110	\$26,447
	=====	=====
Accrued liabilities:		
Accrued compensation.....	\$ 690	\$ 934
Accrued income tax.....	282	--
Customer advances.....	260	--
Allowance for sales returns.....	247	336
Other.....	348	1,053
	-----	-----
	\$ 1,827	\$ 2,323
	=====	=====

NOTE 3. DEBT

On September 11, 1995, the Company obtained a bank loan of up to \$4.5 million to finance the construction of a new commercial building in Fremont, California. The loan, which was due on September 11, 1996, was refinanced with two new loans:

- (1) On October 1, 1996, the Company obtained a loan for \$3.5 million from a commercial bank. The loan has an interest rate of 8.3% per annum, matures in 2006 and is secured by the land and building. The loan was fully repaid as of December 31, 1998.
- (2) On August 15, 1996, the Company obtained a \$1.0 million debenture loan from the Bay Area Employment Development Company guaranteed by the U.S. Small Business Administration. The loan has an interest rate of 7.3% per annum, matures in 2016 and is subordinate to the \$3.5 million bank loan. As of December 31, 1997 and 1998, \$1.0 million and \$0.9 million was outstanding under this debenture loan, respectively.

The Company obtained equipment loans from several different banks through financing companies to finance the purchase of new manufacturing equipment for the Company's Fremont, California facility. These loans have a maturity of five years with interest rates ranging from 6.0% to 9.0% per annum. These loans are secured by the machinery and equipment purchased with the loans. As of December 31, 1997 and 1998, \$3.2 million and \$5.5 million was outstanding under these loans, respectively.

AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

In November 1996, the Company obtained a \$3.0 million line of credit ("LOC") with a bank which expired in April 1998. In March 1998, the Company obtained a \$15.0 million LOC which expires in May 1999 to replace the \$3.0 million LOC. The \$15.0 million LOC is secured by the Company's business assets, excluding equipment. Borrowings under the \$15.0 million LOC bear interest at the bank's prime interest rate plus one-half percent. The \$15.0 million LOC is subject to certain financial covenants regarding current financial ratios and cash flow requirements which have all been met as of December 31, 1998. At December 31, 1997 and 1998, no amount was outstanding under the LOC.

In May 1997, the Company obtained a bank loan for \$1.4 million under the \$3.0 million LOC. The loan was to finance construction of manufacturing facility. The loan consisted of two parts: (i) a loan for \$750,000 which bears interest at the bank's prime rate plus one percent and is secured by property and (ii) a loan for \$690,000 which bears interest at the bank's prime rate plus one-half percent and is secured by the Company's business assets, excluding equipment, which was assumed under the LOC. At the time of building completion, the \$750,000 loan is convertible into a new term loan with a maturity of ten years and an interest rate fixed at the nine-year U.S. Treasury Bond yield plus 2.3% and will be secured by the land and building. At December 31, 1997, \$106,000 was outstanding at an interest rate of 8.3% per annum. During the year ended December 31, 1998, this construction loan was fully prepaid.

In December 1998, the Company completed the sale of \$11.6 million bonds. The bonds, which are secured by a letter of credit from a bank, have a term of 25 years, bear interest at 200 basis points below prime (5.6% at December 31, 1998). Repayment of principal and interest under the bonds is by installment payments on a quarterly basis. The Company has an option to redeem in whole or in part of the bonds during the term of the bonds.

The aggregate future repayments of long-term debt outstanding at December 31, 1998 are \$2.8 million in 1999, \$2.9 million in 2000, \$2.9 million in 2001, \$2.6 million in 2002, \$1.7 million in 2003 and \$10.6 million thereafter. A total interest amount of \$5.4 million is included in these aggregate future repayments.

NOTE 4. RESEARCH AND DEVELOPMENT CONTRACTS

In March 1994, the Company was awarded a four-year, \$6.1 million contract under the DOD Title III program for the development of GaAs substrates. The Title III contract is comprised of three different contract components: A cost-plus-fixed-fee component totaling \$1.2 million, a firm-fixed-price ("FFP") component totaling \$4.4 million and a \$500,000 component consisting of a bonus award. The bonus award may be earned upon reaching specific contract milestones. Under the FFP component, 10.0% of the cost reimbursement is withheld by the DOD until the completion of the project in May 1998. The amounts relating to this 10.0% withholding were \$625,000, \$319,000, and \$325,000 at December 31, 1996, 1997 and 1998, respectively.

For the years ended December 31, 1996, 1997 and 1998, the Company recognized contract revenues of \$1.5 million, \$364,000 and \$416,000, respectively, under the Title III contract. For the years ended December 31, 1996, 1997 and 1998, the Company incurred costs of \$468,000, \$211,000 and \$87,000, respectively, under the Title III contract. As of December 31, 1998, the Title III contract was completed and the total contract revenue of \$6.1 million had been completely recognized.

Certain products were manufactured under the Title III contract and the costs were charged to such contracts. As permitted under the contract, the products were sold to third parties, generating product revenues of \$95,000, \$0 and \$0 for the years ended December 31, 1996, 1997 and 1998, respectively.

In January 1997, the Company was awarded a \$1.2 million contract from a third party. The contract was an FFP contract under which the Company produced Ge substrates. The contract was completed in July 1997. For the year ended December 31, 1997, the Company recognized contract revenues of \$1.2 million and incurred contract costs of \$1.1 million under the contract.

AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

In May 1997, the Company was awarded a \$2.5 million, 30-month contract under the DOD Title III program. In August 1998, the contract was amended such that the work scope was extended and the total contract amount was increased to \$3.1 million. The contract is a cost-sharing agreement for the development of InP substrates. Contract revenues are recognized under the percentage of completion method based on total estimated revenue and the proportion of costs incurred relative to total contract costs. For the years ended December 31, 1997 and 1998, the Company recognized contract revenues of \$661,000 and \$1,238,000, respectively and incurred contract costs of \$252,000 and \$628,000, respectively under this contract.

The Company has no additional obligations with regards to any of the above research and development contracts.

NOTE 5. FOREIGN EXCHANGE CONTRACTS AND TRANSACTION LOSSES

The Company uses short-term forward exchange contracts for hedging purposes to reduce the effects of adverse foreign exchange rate movements. During the year ended December 31, 1998, the Company bought foreign exchange contracts to hedge against certain trade accounts receivable in Japanese yen. These contracts are accounted for using hedge accounting, under which the change in the fair value of the forward contracts is recognized as part of the related foreign currency transactions as they occur. As of December 31, 1998, the Company's outstanding commitments with respect to the foreign exchange contracts, which were commitments to sell Japanese yen, had a total value of approximately \$1.6 million.

During the years ended December 31, 1996, 1997 and 1998, the Company incurred foreign transaction exchange losses of \$114,000, \$186,000 and \$24,000, respectively.

NOTE 6. INCOME TAXES

The components of the provision for income taxes were as follows:

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
	(IN THOUSANDS)		
Current:			
Federal.....	\$1,116	\$1,571	\$3,627
State.....	178	79	441
Foreign.....	--	84	50
	-----	-----	-----
Total current.....	1,294	1,734	4,118
	-----	-----	-----
Deferred:			
Federal.....	(36)	235	(228)
State.....	(9)	29	(13)
	-----	-----	-----

Total deferred.....	(45)	264	(241)
	-----	-----	-----
Total provision.....	\$1,249	\$1,998	\$3,877
	=====	=====	=====

AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

The following is a reconciliation of the effective income tax rates and the U.S. statutory federal income tax rate:

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
	-----	-----	-----
Statutory federal income tax rate.....	34.0%	34.0%	34.0%
State income taxes, net of federal tax benefits.....	4.7	4.1	2.7
Foreign sales corporation benefit.....	(2.4)	(1.7)	(1.7)
Foreign income taxed at higher rate.....	--	1.6	0.2
Other.....	1.6	0.0	2.8
	----	----	----
Effective tax rate.....	37.9%	38.0%	38.0%
	=====	=====	=====

Deferred tax assets (liabilities) are summarized as follows:

	DECEMBER 31,	
	1997	1998
	-----	-----
	(IN THOUSANDS)	
Deferred tax assets:		
Bad debt and inventory reserves.....	\$497	\$ 816
Vacation accrual.....	67	75
State taxes.....	13	137
Other.....	--	181
	----	-----
Deferred tax assets.....	577	1,209
Deferred tax liabilities:		
Depreciation.....	(352)	(743)
	----	-----
Net deferred tax asset.....	\$225	\$ 466
	=====	=====

NOTE 7. RETIREMENT SAVINGS PLAN

The Company has a 401(k) Savings Plan (the "Savings Plan") which qualifies as a thrift plan under Section 401(k) of the Internal Revenue Code. All full-time U.S. employees are eligible to participate in the Savings Plan after one year from the date of hire. Participants may contribute up to 6.0% of their earnings to the Savings Plan with a discretionary matching amount provided by the Company. The Company's contributions to the Savings Plan for the years ended December 31, 1996, 1997 and 1998 were \$69,000, \$87,000 and \$101,000, respectively.

NOTE 8. STOCK OPTION AND EMPLOYEE STOCK PURCHASE PLANS

Stock Option Plans

In 1993, the Company adopted the 1993 Stock Option Plan ("1993 Plan") which provides for granting of incentive and non-qualified stock options to employees, consultants, and directors of the Company. Under the 1993 Plan, 880,000 shares of common stock have been reserved for issuance as of December 31, 1998. Options granted under the 1993 Plan are generally for periods not to exceed ten years and are granted at the fair market value of the stock at the date of grant as determined by the board of directors. Options granted under the 1993 Plan generally vest 25.0% upon grant and 25.0% each year thereafter, with full vesting occurring on the third anniversary of the grant date.

In May 1997, the Company adopted the 1997 Stock Option Plan ("1997 Plan") which provides for granting of incentive and non-qualified stock options to employees, consultants and directors of the Company. Under the 1997 Plan, 2,800,000 shares of common stock have been reserved for issuance as of December 31,

AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

1998. Options granted under the 1997 Plan are generally for periods not to exceed ten years (five years if the option is granted to a 10.0% stockholder) and are granted at the fair market value of the stock at the date of grant as determined by the board of directors. Options granted under the 1997 Plan generally vest 25.0% at the end of one year and 2.1% each month thereafter, with full vesting after four years.

The following summarizes the Company's stock option activity under the 1993 Plan and the 1997 Plan and related weighted average exercise price within each category for each of the years ended December 31, 1996, 1997 and 1998:

	SHARES AVAILABLE	OPTIONS OUTSTANDING	WEIGHTED AVERAGE OPTION PRICE
	-----	-----	-----
Balance at December 31, 1995.....	322,594	244,900	\$1.53
Granted.....	--	--	--
Exercised.....	--	(40,750)	1.26
Canceled.....	--	--	--
	-----	-----	
Balance at December 31, 1996.....	322,594	204,150	1.58
Additional shares authorized.....	1,367,000	--	--
Granted.....	(1,315,100)	1,315,100	4.95
Exercised.....	--	(151,825)	2.54
Canceled.....	24,475	(24,475)	3.38
	-----	-----	
Balance at December 31, 1997.....	398,969	1,342,950	4.77
Additional shares authorized.....	1,500,000	--	--
Granted.....	(246,000)	246,000	7.10
Exercised.....	--	(71,407)	1.94
Canceled.....	100,968	(100,968)	5.39
	-----	-----	
Balance at December 31, 1998.....	1,753,937	1,416,575	5.25
	=====	=====	

At December 31, 1996, 1997 and 1998, options for 107,450, 76,725 and 956,827 shares, respectively, were vested.

During the years ended December 31, 1997 and 1998, the Company granted options for the purchase of 1,315,100 shares and 246,000 shares, respectively,

of common stock to employees at a weighted average exercise price of \$4.95 per share and \$7.10 per share, respectively. Management calculated deferred compensation of \$322,000 and \$203,000 related to options granted during the years ended December 31, 1997 and 1998, respectively. Such deferred compensation is amortized over the vesting period relating to these options of which approximately \$102,000 and \$96,000 was amortized during the years ended December 31, 1997 and 1998, respectively.

Information relating to stock options outstanding under the 1993 Plan and the 1997 Plan at December 31, 1998 is as follows:

	OPTIONS OUTSTANDING		
	NUMBER OUTSTANDING	WEIGHTED AVERAGE REMAINING CONTRACTUAL LIFE	WEIGHTED AVERAGE EXERCISE PRICE
Range of exercise prices:			
\$1.20 - \$1.90.....	43,675	6.6 years	\$1.56
\$5.00 - \$5.50.....	1,152,900	8.2 years	5.00
\$7.00 - \$8.25.....	220,000	9.6 years	7.29

\$1.20 - \$8.25.....	1,416,575	8.4 years	5.25
	=====		

AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

	OPTIONS VESTED	
	NUMBER VESTED	WEIGHTED AVERAGE EXERCISE PRICE
Range of exercise prices:		
\$1.20 - \$7.00.....	956,827	\$2.61

Certain Pro Forma Disclosures

In October 1995, SFAS 123 established a fair value based method of accounting for employee stock options. The weighted average grant-date fair value of options granted during the years ended December 31, 1997 and 1998 (no options were granted during the year ended December 31, 1996) was \$0.06 and \$0.98, respectively. Had compensation cost for the Company's options been determined based on the fair value at the grant dates, as prescribed in SFAS 123, the Company's pro forma net income and net income per share would have been as follows:

YEARS ENDED DECEMBER 31,		
1996	1997	1998
-----	-----	-----
(IN THOUSANDS,		

EXCEPT PER SHARE DATA)

Net income:			
As reported.....	\$2,046	\$3,258	\$6,326
Pro forma net income.....	2,032	3,111	6,131
Net income per share:			
As reported:			
Basic.....	\$ 0.71	\$ 1.11	\$ 0.42
Diluted.....	0.17	0.25	0.42
Pro forma net income:			
Basic.....	\$ 0.71	\$ 1.06	\$ 0.41
Diluted.....	0.17	0.24	0.40

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 used for grants during the years ended December 31, 1997 and 1998 (no options were granted during the year ended December 31, 1996); dividend yield of 0.0% for both periods; risk-free interest rates of 6.1% and 5.2% for options granted during the years ended December 31, 1997 and 1998, respectively; and expected lives of 4.5 and 5.0 years for options granted during the years ended December 31, 1997 and 1998, respectively; and volatility of 0.0% and 75% for the years ended December 31, 1997 and 1998.

Because additional option grants are expected to be made each year, the above pro forma disclosures are not representative of pro forma effects on reported net income for future years.

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AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

Employee Stock Purchase Plan

In May 1997, the Company's board of directors approved an Employee Stock Purchase Plan (the "1997 Purchase Plan"). Under this plan, employees of the Company were allowed to purchase a certain number of shares of Common Stock by December 31, 1997. A total of 67,000 shares were purchased as of December 31, 1997.

In February 1998, the Company's board of directors approved a 1998 Employee Stock Purchase Plan (the "1998 Purchase Plan") and reserved a total of 250,000 shares of the Company's common stock for issuance thereunder. The Company's shareholders approved the 1998 Purchase Plan in March 1998. The 1998 Purchase Plan permits eligible employees to acquire shares of the Company's common stock through payroll deductions. The common stock purchase price is determined as 85% of the lower of the market price of the common stock at the purchase date or the date of offer to the employee.

NOTE 9. NET INCOME PER SHARE

Statement of Financial Accounting Standard No. 128 "Earnings per Share" requires a reconciliation of the numerators and denominators of the basic and diluted net income per share calculations as follows:

	YEARS ENDED DECEMBER 31,								
	1996			1997			1998		
	INCOME	SHARES	PER SHARE AMOUNT	INCOME	SHARES	PER SHARE AMOUNT	INCOME	SHARES	PER SHARE AMOUNT
	(IN THOUSANDS, EXCEPT PER SHARE DATA)								
Basic EPS calculation.....	\$2,046	2,882	\$0.71	\$3,258	2,938	\$1.11	\$6,326	14,928	\$0.42
Effect of dilutive securities									
Common stock options.....	--	--	--	--	72	--	--	249	--

Convertible preferred stock....	--	8,929	--	--	9,829	--	--	--	--
Diluted EPS calculation.....	\$2,046	11,811	\$0.17	\$3,258	12,839	\$0.25	\$6,326	15,177	\$0.42

NOTE 10. RELATED PARTY TRANSACTIONS

During the years ended December 31, 1996, 1997 and 1998, the Company purchased \$760,000, \$1,540,000 and \$ 3,681,000, respectively, of raw materials and manufactured quartz from a supplier which is owned by a family member of an officer.

AMERICAN XTAL TECHNOLOGY, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED)

NOTE 11. SEGMENT AND FOREIGN OPERATIONS INFORMATION

The Company has two reportable segments: semiconductor substrates manufacturing and research and development contracting. In the semiconductor substrates manufacturing segment, the Company manufactures and sells high-performance compound semiconductor substrates for use in electronic and opto-electronic applications. In the research and development contracting segment, the Company contracts with the U.S. Department of Defense and other parties for developing semiconductor substrates. The research and development contracting segment did not meet the requirements for separate disclosure of a reportable segment as defined in SFAS 131.

The Company sells its substrates in the United States and in other parts of the world. The Company has operations in Japan and China. Revenues by geographic location based on the country of the customer, and income from operations and identifiable assets based on country in which the Company operates, were as follows:

	YEARS ENDED DECEMBER 31,		
	1996	1997	1998
	-----	-----	-----
	(IN THOUSANDS)		
Net revenues:			
United States.....	\$10,028	\$15,653	\$29,449
Europe.....	2,216	2,497	3,960
Canada.....	522	1,034	1,356
Japan.....	2,653	4,323	4,997
Asia Pacific and other.....	808	1,828	3,528
	-----	-----	-----
Consolidated.....	\$16,227	\$25,335	\$43,290
	=====	=====	=====
Income from operations:			
United States.....	\$ 3,529	\$ 5,662	\$10,334
Japan.....	8	198	82
	-----	-----	-----
Consolidated.....	\$ 3,537	\$ 5,860	\$10,416
	=====	=====	=====
Identifiable assets at end of year:			
United States.....	\$16,467	\$28,967	\$71,019
Japan.....	917	1,056	2,728
China.....	--	--	1,276
	-----	-----	-----
Consolidated.....	\$17,384	\$30,613	\$75,023
	=====	=====	=====

NOTE 12. CONTINGENT LIABILITIES

From time to time the Company is involved in litigation in the normal course of business. Management believes that the outcome of matters to date will not have a material adverse effect on the Company's financial position or results of operations.

SIGNATURES

Pursuant to the requirements of Section 13 or 15 (d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

AMERICAN XTAL TECHNOLOGY, INC.

By: /s/ MORRIS S. YOUNG

 Morris S. Young
 President and Chief Executive
 Officer
 (Principal Executive Officer)

Date: March 30, 1999

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Morris S Young and Guy D. Atwood, and each of them, his true and lawful attorney-in-fact and agent, with full power of substitution, each with power to act alone, to sign and execute on behalf of the undersigned any and all amendments to this Report on Form 10-K, and to perform any acts necessary in order to file the same, with all exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requested and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or their or his or her substitutes, shall do or cause to be done by virtue hereof.

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

SIGNATURE -----	TITLE -----	DATE ----
/s/ MORRIS S. YOUNG ----- Morris S. Young	President, Chief Executive Officer, and Chairman of the Board (Principal Executive Officer)	March 30, 1999
/s/ GUY D. ATWOOD ----- Guy D. Atwood	Vice President, Chief Financial Officer (Principal Financial and Accounting Officer)	March 30, 1999
/s/ THEODORE S. YOUNG ----- Theodore S. Young	Senior Vice President, Marketing, Director	March 30, 1999
/s/ DONALD L. TATZIN ----- Donald L. Tatzin	Director	March 30, 1999
/s/ JESSE CHEN ----- Jesse Chen	Director	March 30, 1999

Jesse Chen

/s/ B.J. MOORE

Director

March 30, 1999

B.J. Moore

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AMERICAN XTAL TECHNOLOGY, INC.

EXHIBITS
TO
FORM 10-K ANNUAL REPORT
FOR THE YEAR ENDED
DECEMBER 31, 1998

EXHIBIT
NUMBER

DESCRIPTION

2.1*	Agreement and Plan of Merger between American Xtal Technology, a California corporation, and American Xtal Technology Delaware Corporation, a Delaware corporation.
3.1	Restated Certificate of Incorporation.
10.1*	Form of Indemnification Agreement for directors and officers.
10.2*	1993 Stock Option Plan and forms of agreements thereunder.
10.3*	1997 Stock Option Plan and forms of agreements thereunder.
10.4*	1997 Employee Stock Purchase Plan and forms of agreements thereunder.
10.5*	1998 Employee Stock Purchase Plan and forms of agreements thereunder.
10.6*	Loan Agreement between U.S. Bank National Association and us dated March 4, 1998.
10.7**	Purchase and Sale Agreement by and between Limar Realty Corp. #23 and us dated April 1998.
10.8	Loan Agreement between U.S. Bank National Association and us dated September 18, 1998.
10.9	Letter of Credit and Reimbursement Agreement between U.S. Bank National Association and us dated December 1, 1998.
10.10	Bond Purchase Contract between Dain Rauscher Incorporated and us dated December 1, 1998.
10.11	Remarketing Agreement between Dain Rauscher Incorporated and us dated December 1, 1998.
21.1*	List of Subsidiaries.
23.1	Consent of Independent Accountants.
23.2**	Consent of Counsel (included in Exhibit 5.1).
24.1*	Power of Attorney (see signature page).
27.1	Financial Data Schedule.

* As filed with the SEC in our Registration Statement on Form S-1 on March 17, 1998.

** As filed with the SEC in our Registration Statement on Amendment No. 2 to Form S-1 on May 11, 1998.

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RESTATED
 CERTIFICATE OF INCORPORATION
 OF
 AMERICAN XTAL TECHNOLOGY, INC.

AMERICAN XTAL TECHNOLOGY, INC., a corporation organized and existing under the laws of the State of Delaware, hereby certifies as follows:

1. The name of the corporation is American Xtal Technology, Inc.
2. The original name of the corporation was American Xtal Technology Delaware Corporation.
3. The date of filing of its original Certificate of Incorporation with the Secretary of State of the State of Delaware was November 13, 1997.
4. This Restated Certificate of Incorporation was duly adopted in accordance with the provisions of Section 245 of the Delaware General Corporation Law. This Restated Certificate of Incorporation only restates and integrates and does not further amend the provisions of the corporation's certificate of incorporation as heretofore amended, and there is no discrepancy between those provisions and the provisions of this Restated Certificate of Incorporation.
5. This Restated Certificate of Incorporation restates and integrates the Certificate of Incorporation of this corporation as herein set forth in full:

- FIRST: The name of the corporation is American Xtal Technology, Inc. (hereinafter sometimes referred to as the "Corporation").
- SECOND: The address of the registered office of the Corporation in the State of Delaware is Incorporating Services, Ltd., 15 East North Street, in the City of Dover, County of Kent. The name of the registered agent at that address is Incorporating Services, Ltd.
- THIRD: The purpose of the Corporation is to engage in any lawful act or activity for which a corporation may be organized under the General Corporation Law of Delaware.

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FOURTH:

STOCK

The Corporation is authorized to issue two classes of stock to be designated, respectively, "Preferred Stock" and "Common Stock." The total number of shares of Preferred Stock the Corporation shall have authority to issue is 2,000,000, \$.001 par value per share, and the total number of shares of Common Stock the Corporation shall have authority to issue is 40,000,000, \$.001 par value per share. The shares of Preferred Stock shall initially be undesignated as to series.

The Board of Directors is hereby authorized, within the limitations and restrictions stated herein, to determine or alter the rights, preferences, privileges and restrictions granted to or imposed upon a wholly unissued series of Preferred Stock, and the number of shares constituting any such series and the designation thereof, or any of them; and to increase or decrease the number of shares constituting any such series and the designation thereof, or any of them; and to increase or decrease the number of shares of any series subsequent to the issue of shares of that series, but, in respect of decreases, not below the number of shares of such series then outstanding. If the number of shares of any such series of Preferred Stock shall be so decreased, the shares constituting such decrease shall be retired and shall not be reissued by the Corporation.

FIFTH: The following provisions are inserted for the management of the business and the conduct of the affairs of the Corporation, and for further definition, limitation and regulation of the powers of the Corporation and of its directors and stockholders:

- A. The business and affairs of the Corporation shall be managed by or under the direction of the Board of Directors. In addition to the powers and authority expressly conferred upon them by statute or by this Certificate of Incorporation or the Bylaws of the Corporation, the directors are hereby empowered to exercise all such powers and do all such acts and things as may be exercised or done by the Corporation.
- B. The directors of the Corporation need not be elected by written ballot unless the Bylaws so provide.
- C. Any action required or permitted to be taken by the stockholders of the Corporation must be effected at a duly called annual or special meeting of stockholders of the Corporation and may not be effected by any consent in writing by such stockholders.

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- D. Special meetings of stockholders of the Corporation may be called only (1) by the Board of Directors pursuant to a resolution adopted by a majority of the total number of authorized directors (whether or not there exist any vacancies in previously authorized directorships at the time any such resolution is presented to the Board for adoption) or (2) by the holders of not less than ten percent (10%) of all of the shares entitled to cast votes at the meeting.

SIXTH:

- A. The number of directors shall initially be set at five (5) and, thereafter, shall be fixed from time to time exclusively by the Board of Directors pursuant to a resolution adopted by a majority of the total number of authorized directors (whether or not there exist any vacancies in previously authorized directorships at the time any such resolution is presented to the Board for adoption). The directors shall be divided into three classes with the term of office of the first class (Class I) to expire at the first annual meeting of the stockholders; the term of office of the second class (Class II) to expire at the second annual meeting of stockholders; the term of office of the third class (Class III) to expire at the third annual meeting of stockholders; and thereafter for each such term to expire at each third succeeding annual meeting of stockholders after such election. Subject to the rights of the holders of any series of Preferred Stock then outstanding, a vacancy resulting from the removal of a director

by the stockholders as provided in Article SIXTH, Section C below may be filled at a special meeting of the stockholders held for that purpose. All directors shall hold office until the expiration of the term for which elected, and until their respective successors are elected, except in the case of the death, resignation, or removal of any director.

- B. Subject to the rights of the holders of any series of Preferred Stock then outstanding, newly created directorships resulting from any increase in the authorized number of directors or any vacancies in the Board of Directors resulting from death, resignation or other cause (other than removal from office by a vote of the stockholders) may be filled only by a majority vote of the directors then in office, though less than a quorum, and directors so chosen shall hold office for a term expiring at the next annual meeting of stockholders at which the term of office of the class to which they have been elected expires, and until their respective successors are elected, except in the case of the death, resignation, or removal of any director. No decrease in the number of directors constituting the Board of Directors shall shorten the term of any incumbent director.
- C. Subject to the rights of the holders of any series of Preferred Stock then outstanding, any directors, or the entire Board of Directors, may be

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removed from office at any time, with or without cause, but only by the affirmative vote of the holders of at least a majority of the voting power of all of the then outstanding shares of capital stock of the Corporation entitled to vote generally in the election of directors, voting together as a single class. Vacancies in the Board of Directors resulting from such removal may be filled by a majority of the directors then in office, though less than a quorum, or by the stockholders as provided in Article SIXTH, Section A above. Directors so chosen shall hold office for a term expiring at the next annual meeting of stockholders at which the term of office of the class to which they have been elected expires, and until their respective successors are elected, except in the case of the death, resignation, or removal of any director.

SEVENTH: The Board of Directors is expressly empowered to adopt, amend or repeal Bylaws of the Corporation. Any adoption, amendment or repeal of Bylaws of the Corporation by the Board of Directors shall require the approval of a majority of the total number of authorized directors (whether or not there exist any vacancies in previously authorized directorships at the time any resolution providing for adoption, amendment or repeal is presented to the Board). The stockholders shall also have power to adopt, amend or repeal the Bylaws of the Corporation. Any adoption, amendment or repeal of Bylaws of the Corporation by the stockholders shall require, in addition to any vote of the holders of any class or series of stock of the Corporation required by law or by this Certificate of Incorporation, the affirmative vote of the holders of at least sixty-six and two-thirds percent (66-2/3%) of the voting power of all of the then outstanding shares of the capital stock of the Corporation entitled to vote generally in the election of directors, voting together as a single class.

EIGHTH: A director of the Corporation shall not be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director, except for liability (i) for any breach of the director's duty of loyalty to the

Corporation or its stockholders, (ii) for acts or omissions not in good faith or which involved intentional misconduct or a knowing violation of law, (iii) under Section 174 of the Delaware General Corporation Law, or (iv) for any transaction from which the director derived an improper personal benefit.

If the Delaware General Corporation Law is hereafter amended to authorize the further elimination or limitation of the liability of a director, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the Delaware General Corporation Law, as so amended.

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Any repeal or modification of the foregoing provisions of this Article EIGHTH by the stockholders of the Corporation shall not adversely affect any right or protection of a director of the Corporation existing at the time of such repeal or modification.

NINTH: The Corporation reserves the right to amend or repeal any provision contained in this Certificate of Incorporation in the manner prescribed by the laws of the State of Delaware and all rights conferred upon stockholders are granted subject to this reservation; provided, however, that, notwithstanding any other provision of this Certificate of Incorporation or any provision of law which might otherwise permit a lesser vote or no vote, but in addition to any vote of the holders of any class or series of the stock of this Corporation required by law or by this Certificate of Incorporation, the affirmative vote of the holders of at least 66-2/3% of the voting power of all of the then outstanding shares of the capital stock of the Corporation entitled to vote generally in the election of directors, voting together as a single class, shall be required to amend or repeal this Article NINTH, Article FIFTH, Article SIXTH, Article SEVENTH or Article EIGHTH.

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IN WITNESS WHEREOF, this Restated Certificate of Incorporation has been executed on behalf of the Corporation by Morris S. Young, its President and Chief Executive Officer and attested by Guy D. Atwood, its Secretary, this 18th day of June, 1998.

AMERICAN XTAL TECHNOLOGY, INC.

By: /s/ Morris S. Young

Morris S. Young, President and
Chief Executive Officer

Attest:

By: /s/ Guy D. Atwood

Guy D. Atwood, Secretary

Affiliates."

Borrowing Base. The words "Borrowing Base" mean as determined by Lender from time to time, the lesser of (a) \$15,000,000.00; or (b) the sum of (i) 80.000% of the aggregate amount of Eligible Accounts, plus (ii) 50.000% of the aggregate amount of eligible Inventory (not to exceed in corresponding Loan amount based on Eligible Inventory of \$5,500,000.00). The Borrowing Base formula applies only when borrowings exceed \$5,000,000.00

Business Day. The words "Business Day" mean a day on which commercial banks are open for business in the State of California.

CERCLA. The word "CERCLA" means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.

Cash Flow. The words "Cash Flow" mean net income after taxes, and exclusive of extraordinary gains and income, plus depreciation and amortization.

Collateral. The word "Collateral" means and includes without limitation all property and assets granted as collateral security for a Loan, whether real or personal property, whether granted directly or indirectly, whether granted now or in the future, and whether granted in the form of a security interest, mortgage, deed of trust, assignment, pledge, chattel mortgage, chattel trust, factor's lien, equipment trust, conditional sale, trust receipt, lien, charge, lien or title retention contract, lease or consignment intended as a security device, or any other security or lien interest whatsoever, whether created by law, contract, or otherwise. The word "Collateral" includes without limitation all collateral described below in the section titled "COLLATERAL."

Debt. The word "Debt" means all of Borrower's liabilities excluding Subordinated Debt.

Eligible Accounts. The words "Eligible Accounts" mean, at any time, all of Borrower's Accounts which contain selling terms and conditions acceptable to Lender. The net amount of any Eligible Account against which Borrower may borrow shall exclude all returns, discounts, credits, and offsets of any nature. Unless otherwise agreed to by Lender in writing, Eligible Accounts do not include:

(a) Accounts with respect to which the Account Debtor is an officer, an employee or agent of Borrower.

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(b) Accounts with respect to which the Account Debtor is a subsidiary of, or affiliated with or related to Borrower or its shareholders, officers, or directors.

(c) Accounts with respect to which goods are placed on consignment, guaranteed sale, or other terms by reason of which the payment by the Account Debtor may be conditional.

(d) Accounts with respect to which Borrower is or may become liable to the Account Debtor for goods sold or services rendered by the Account Debtor to Borrower.

(e) Accounts which are subject to dispute, counterclaim, or setoff.

(f) Accounts with respect to which the goods have not been shipped or delivered, or the services have not been rendered, to the Account Debtor.

(g) Accounts with respect to which Lender, in its sole discretion, deems the creditworthiness or financial condition of the Account Debtor to be unsatisfactory.

(h) Accounts of any Account Debtor who has filed or has had filed against it a petition in bankruptcy or an application for relief under any

provision of any state or federal bankruptcy, insolvency, or debtor-in-relief acts; or who has had appointed a trustee, custodian, or receiver for the assets of such Account Debtor; or who has made an assignment for the benefit of creditors or has become insolvent or fails generally to pay its debts (including its payrolls) as such debts become due.

(i) Accounts with respect to which the Account Debtor is the United States government or any department or agency of the United States.

(j) Accounts which have not been paid in full within 90 DAYS from the invoice date. The entire balance of any Account of any single Account debtor will be ineligible whenever the portion of the Account which has not been paid within 90 DAYS from the invoice date is in excess of 25.000% of the total amount outstanding on the Account.

(k) That portion of the Accounts of any single Account Debtor which exceeds 20.000% of all of Borrower's Accounts.

(l) Accounts with respect to Datings, Progress Billings, Retainage, Cash Sales, Cash on Delivery, Potential Offsets and Service Charges.

(m) Accounts with respect to which the Account Debtor is not a resident of the United States, except to the extent such Accounts are supported by insurance, bonds or other assurances satisfactory to Lender. (Foreign advances will be allowed as pre-qualified by CRD).

Eligible Inventory. The words "Eligible Inventory" mean, at any time, all of Borrower's Inventory as defined below except:

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(a) Inventory which is not owned by Borrower free and clear of all security interests, liens, encumbrances, and claims of third parties.

(b) Inventory which Lender, in its sole discretion, deems to be obsolete, unsalable, damaged, defective, or unfit for further processing.

(c) Eligible inventory for purposes of determining the Borrower's Borrowing Base shall be defined as raw material at cost and scrap value of WIP and finished goods.

ERISA. The word "ERISA" means the Employee Retirement Income Security Act of 1974, as amended.

Event of Default. The words "Event of Default" mean and include without limitation any of the Events of Default set forth below in the section titled "EVENTS OF DEFAULT."

Expiration Date. The words "Expiration Date" mean the date of termination of Lender's commitment to lend under this Agreement.

Grantor. The word "Grantor" means and includes without limitation each and all of the persons or entities granting a Security Interest in any Collateral for the Indebtedness, including without limitation all Borrowers granting such a Security Interest.

Guarantor. The word "Guarantor" means and includes without limitation each and all of the guarantors, sureties, and accommodation parties in connection with any indebtedness.

Indebtedness. The word "Indebtedness" means and includes without limitation all Loans, together with all other obligations, debts and liabilities of Borrower to Lender, or any one or more of them, as well as all claims by Lender against Borrower, or any one or more of them; whether now or hereafter existing, voluntary or involuntary, due or not due, absolute or contingent, liquidated or unliquidated; whether Borrower may be liable individually or jointly with

others; whether Borrower may be obligated as a guarantor, surety, or otherwise; whether recovery upon such indebtedness may be or hereafter may become barred by any statute of limitations; and whether such Indebtedness may be or hereafter may become otherwise unenforceable.

Inventory. The word "Inventory" means all of Borrower's raw materials, work in process, finished goods, merchandise, parts and supplies, of every kind and description, and goods held for sale or lease or furnished under contracts of service in which Borrower now has or hereafter acquires any right, whether held by Borrower or others, and all documents of title, warehouse receipts, bills of lading, and all other documents of every type covering all or any part of the foregoing. Inventory includes inventory temporarily out of Borrower's custody or possession and all returns on Accounts.

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Lender. The word "Lender" means U.S. BANK NATIONAL ASSOCIATION, its successors and assigns.

Line of Credit. The words "Line of Credit" mean the credit facility described in the Section titled "LINE OF CREDIT" below.

Liquid Assets. The words "Liquid Assets" mean Borrower's cash on hand plus Borrower's readily marketable securities.

Loan. The word "Loan" or "Loans" means and includes without limitation any and all commercial loans and financial accommodations from Lender to Borrower, whether now or hereafter existing, and however evidenced, including without limitation those loans and financial accommodations described herein or described on any exhibit or schedule attached to this Agreement from time to time.

Note. The word "Note" means and includes without limitation Borrower's promissory note or notes, if any, evidencing Borrower's Loan obligations in favor of Lender, as well as any substitute, replacement or refinancing note or notes therefor.

Permitted Liens. The words "Permitted Liens" mean: (a) liens and security interests securing indebtedness owed by Borrower to Lender; (b) liens for taxes, assessments, or similar charges either not yet due or being contested in good faith; (c) liens of materialmen, mechanics, warehousemen, or carriers, or other like liens arising in the ordinary course of business and securing obligations which are not yet delinquent; (d) purchase money liens or purchase money security interests upon or in any property acquired or held by Borrower in the ordinary course of business to secure indebtedness outstanding on the date of this Agreement or permitted to be incurred under the paragraph of this Agreement titled "Indebtedness and Liens"; (e) liens and security interests which, as of the date of this Agreement, have been disclosed to and approved by the Lender in writing; and (f) those liens and security interests which in the aggregate constitute an immaterial and insignificant monetary amount with respect to the net value of Borrower's assets.

Related Documents. The words "Related Documents" mean and include without limitation all promissory notes, credit agreements, loan agreements, environmental agreements, guaranties, security agreements, mortgages, deeds of trust, and all other instruments, agreements and documents, whether now or hereafter existing, executed in connection with the Indebtedness.

Security Agreement. The words "Security Agreement" mean and include without limitation any agreements, promises, covenants, arrangements, understandings or other agreements, whether created by law, contract, or otherwise, evidencing, governing, representing, or creating a Security Interest.

Security Interest. The words "Security Interest" mean and include without limitation any type of collateral security, whether in the form of a lien, charge, mortgage, deed of trust, assignment, pledge, chattel mortgage, chattel

trust, factor's lien, equipment trust,

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conditional sale, trust receipt, lien or title retention contract, lease or consignment intended as a security device, or any other security or lien interest whatsoever, whether created by law, contract, or otherwise.

SARA. The word "SARA" means the Superfund Amendments and Reauthorization Act of 1986 as now or hereafter amended.

Subordinated Debt. The words "Subordinated Debt" mean indebtedness and liabilities of Borrower which have been subordinated by written agreement to indebtedness owed by Borrower to Lender in form and substance acceptable to Lender.

Tangible Net Worth. The words "Tangible Net Worth" mean Borrower's total assets excluding all intangible assets (i.e., goodwill, trademarks, patents, copyrights, organizational expenses, and similar intangible items, but including leaseholds and leasehold improvements) less total Debt.

Working Capital. The words "Working Capital" mean Borrower's current assets, excluding prepaid expenses, less Borrower's current liabilities.

LINE OF CREDIT. Lender agrees to make Advances to Borrower from time to time from the date of this Agreement to the Expiration Date, provided the aggregate amount of such Advances outstanding at any time does not exceed the Borrowing Base. Within the foregoing limits, Borrower may borrow, partially or wholly prepay, and reborrow under this Agreement as follows.

Conditions Precedent to Each Advance. Lender's obligation to make any Advance to or for the account of Borrower under this Agreement is subject to the following conditions precedent, with all documents, instruments, opinions, reports, and other items required under this Agreement to be in form and substance satisfactory to Lender:

(a) Lender shall have received evidence that this Agreement and all Related Documents have been duly authorized, executed, and delivered by Borrower to Lender.

(b) Lender shall have received such opinions of counsel, supplemental opinions, and documents as Lender may request.

(c) The security interests in the Collateral shall have been duly authorized, created, and perfected with first lien priority and shall be in full force and effect.

(d) All guaranties required by Lender for the Line of Credit shall have been executed by each Guarantor, delivered to Lender, and be in full force and effect.

(e) Lender, at its option and for its sole benefit, shall have conducted an audit of Borrower's Accounts, Inventory, books, records, and operations, and Lender shall be satisfied as to their condition.

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(f) Borrower shall have paid to Lender all fees, costs, and expenses specified in this Agreement and the Related Documents as are then due and payable.

(g) There shall not exist at the time of any Advance a condition which would constitute an Event of Default under this Agreement, and Borrower shall have delivered to Lender the compliance certificate called for in the

paragraph below titled "Compliance Certificate."

Making Loan Advances. Advances under the credit facility, as well as directions for payment from Borrower's accounts, may be requested orally or in writing by authorized persons. Lender may, but need not, require that all oral requests be confirmed in writing. Each Advance shall be conclusively deemed to have been made at the request of and for the benefit of Borrower (a) when credited to any deposit account of Borrower maintained with Lender or (b) when advanced in accordance with the instructions of an authorized person. Lender, at its option, may set a cutoff time, after which all requests for Advances will be treated as having been requested on the next succeeding Business Day.

Mandatory Loan Repayments. If at any time the aggregate principal amount of the outstanding Advances shall exceed the applicable Borrowing Base, Borrower, immediately upon written or oral notice from Lender, shall pay to Lender an amount equal to the difference between the outstanding principal balance of the Advances and the Borrowing Base. On the Expiration Date, Borrower shall pay to Lender in full the aggregate unpaid principal amount of all Advances then outstanding and all accrued unpaid interest, together with all other applicable fees, costs and charges, if any, not yet paid.

Loan Account. Lender shall maintain on its books a record of account in which Lender shall make entries for each Advance and such other debits and credits as shall be appropriate in connection with the credit facility. Lender shall provide Borrower with periodic statements of Borrower's account, which statements shall be considered to be correct and conclusively binding on Borrower unless Borrower notifies Lender to the contrary within thirty (30) days after Borrower's receipt of any such statement which Borrower deems to be incorrect.

COLLATERAL. To secure payment of the Line of Credit and performance of all other Loans, obligations and duties owed by Borrower to Lender, Borrower (and others, if required) shall grant to Lender Security Interests in such property and assets as Lender may require (the "Collateral"), including without limitation Borrower's present and future Accounts, general intangibles, and Inventory. Lender's Security Interests in the Collateral shall be continuing liens and shall include the proceeds and products of the Collateral, including without limitation the proceeds of any insurance. With respect to the Collateral, Borrower agrees and represents and warrants to Lender:

Perfection of Security Interests. Borrower agrees to execute such financing statements and to take whatever other actions are requested by Lender to perfect and continue Lender's Security Interests in the Collateral Upon request of Lender, Borrower will deliver to Lender any and all of the documents evidencing or constituting the Collateral, and Borrower will note Lender's interest upon any and all chattel paper if not delivered to Lender for

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possession by Lender. Contemporaneous with the execution of this Agreement, Borrower will execute one or more UCC financing statements and any similar statements as may be required by applicable law, and will file such financing statements and all such similar statements in the appropriate location or locations. Borrower hereby appoints Lender as its irrevocable attorney-in-fact for the purpose of executing any documents necessary to perfect or to continue any Security Interest. Lender may at any time, and without further authorization from Borrower, file a carbon, photograph, facsimile, or other reproduction of any financing statement for use as a financing statement. Borrower will reimburse Lender for all expenses for the perfection, termination, and the continuation of the perfection of Lender's security interest in the Collateral. Borrower promptly will notify Lender of any change in Borrower's name including any change to the assumed business names of Borrower. Borrower also promptly will notify Lender of any change in Borrower's Social Security Number or Employer Identification Number. Borrower further agrees to notify Lender in writing prior to any change in address or location of Borrower's principal governance office or should Borrower merge or consolidate with any other entity.

Collateral Records. Borrower does now, and at all times hereafter shall, keep correct and accurate records of the Collateral, all of which records shall be available to Lender or Lender's representative upon demand for inspection and copying at any reasonable time. With respect to the Accounts, Borrower agrees to keep and maintain such records as Lender may require, including without limitation information concerning Eligible Accounts and Account balances and agings. With respect to the Inventory, Borrower agrees to keep and maintain such records as Lender may require, including without limitation information concerning Eligible Inventory and records itemizing and describing the kind, type, quality, and quantity of Inventory, Borrower's Inventory costs and selling prices, and the daily withdrawals and additions to Inventory.

Collateral Schedules. Concurrently with the execution and delivery of this Agreement, Borrower shall execute and deliver to Lender schedules of Accounts and Inventory and Eligible Accounts and Eligible Inventory, in form and substance satisfactory to the Lender. Thereafter and at such frequency as Lender shall require, Borrower shall execute and deliver to Lender such supplemental schedules of Eligible Accounts and Eligible Inventory and such other matters and information relating to the Accounts and Inventory as Lender may request.

Representations and Warranties Concerning Accounts. With respect to the Accounts, Borrower represents and warrants to Lender: (a) Each Account represented by Borrower to be an Eligible Account for purposes of this Agreement conforms to the requirements of the definition of an Eligible Account; (b) All Account information listed on schedules delivered to Lender will be true and correct, subject to immaterial variance; and (c) Lender, its assigns, or agents shall have the right at any time and at Borrower's expense to inspect, examine, and audit Borrower's records and to confirm with Account Debtors the accuracy of such Accounts.

Representations and Warranties Concerning Inventory. With respect to the Inventory, Borrower represents and warrants to Lender: (a) All Inventory represented by

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Borrower to be Eligible Inventory for purposes of this Agreement conforms to the requirements of the definition of Eligible Inventory; (b) All Inventory values listed on schedules delivered to Lender will be true and correct, subject to immaterial variance; (c) The value of the Inventory will be determined on a consistent accounting basis; (d) Except as agreed to the contrary by Lender in writing, all Eligible Inventory is now and at all times hereafter will be in Borrower's physical possession and shall not be held by others on consignment, sale on approval, or sale or return; (e) Except as reflected in the Inventory schedules delivered to Lender, all Eligible Inventory is now and at all times hereafter will be of good and merchantable quality, free from defects; (f) Eligible Inventory is not now and will not at any time hereafter be stored with a bailee, warehouseman, or similar party without Lender's prior written consent, and, in such event, Borrower will concurrently at the time of bailment cause any such bailee, warehouseman, or similar party to issue and deliver to Lender, in form acceptable to Lender, warehouse receipts in Lender's name evidencing the storage of Inventory; and (g) Lender, its assigns, or agents shall have the right at any time and at Borrower's expense to inspect and examine the Inventory and to check and test the same as to quality, quantity, value, and condition.

REPRESENTATIONS AND WARRANTIES. Borrower represents and warrants to Lender, as of the date of this Agreement, as of the date of each disbursement of Loan proceeds, as of the date of any renewal, extension or modification of any Loan, and at all times any Indebtedness exists:

Organization. Borrower is a corporation which is duly organized, validly existing, and in good standing under the laws of the State of California and is validly existing and in good standing in all states in which Borrower is doing business. Borrower has the full power and authority to own its properties and to transact the businesses in which it is presently engaged or presently proposes

to engage. Borrower also is duly qualified as a foreign corporation and is in good standing in all states in which the failure to so qualify would have a material adverse effect on its businesses or financial condition.

Authorization. The execution, delivery, and performance of this Agreement and all Related Documents by Borrower, to the extent to be executed, delivered or performed by Borrower, have been duly authorized by all necessary action by Borrower; do not require the consent or approval of any other person, regulatory authority or governmental body; and do not conflict with, result in a violation of, or constitute a default under (a) any provision of its articles of incorporation or organization, or bylaws, or any agreement or other instrument binding upon Borrower or (b) any law, governmental regulation, court decree, or order applicable to Borrower.

Financial Information. Each financial statement of Borrower supplied to Lender truly and completely disclosed Borrower's financial condition as of the date of the statement, and there has been no material adverse change in Borrower's financial condition subsequent to the date of the most recent financial statement supplied to Lender. Borrower has no material contingent obligations except as disclosed in such financial statements.

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Legal Effect. This Agreement constitutes, and any instrument or agreement required hereunder to be given by Borrower when delivered will constitute, legal, valid and binding obligations of Borrower enforceable against Borrower in accordance with their respective terms.

Properties. Except for Permitted Liens, Borrower owns and has good title to all of Borrower's properties free and clear of all Security Interests, and has not executed any security documents or financing statements relating to such properties. All of Borrower's properties are titled in Borrower's legal name, and Borrower has not used, or filed a financing statement under, any other name for at least the last (5) years.

Hazardous Substances. The terms "hazardous waste," "hazardous substance," "disposal," "release," and "threatened release," as used in this Agreement, shall have the same meanings as set forth in the "CERCLA," "SARA," the Hazardous Materials Transportation Act, 49 U.S.C. Section 1801, et seq., the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901, et seq., Chapters 6.5 through 7.7 of Division 20 of the California Health and Safety Code, Section 25100, et seq., or other applicable state or Federal laws, rules, or regulations adopted pursuant to any of the foregoing. Except as disclosed to and acknowledged by Lender in writing, Borrower represents and warrants that: (a) During the period of Borrower's ownership of the properties, there has been no use, generation, manufacture, storage, treatment, disposal, release or threatened release of any hazardous waste or substance by any person on, under, about or from any of the properties. (b) Borrower has no knowledge of, or reason to believe that there has been (i) any use, generation, manufacture, storage, treatment, disposal, release, or threatened release of any hazardous waste or substance on, under, about or from the properties by any prior owners or occupants of any of the properties, or (ii) any actual or threatened litigation or claims of any kind by any person relating to such matters. (c) Neither Borrower nor any tenant, contractor, agent or other authorized user of any of the properties shall use, generate, manufacture, store, treat, dispose of, or release any hazardous waste or substance on, under, about or from any of the properties; and any such activity shall be conducted in compliance with all applicable federal, state, and local laws, regulations, and ordinances, including without limitation those laws, regulations and ordinances described above. Borrower authorizes Lender and its agents to enter upon the properties to make such inspections and tests as Lender may deem appropriate to determine compliance of the properties with this section of the Agreement. Any inspections or tests made by Lender shall be at Borrower's expense and for Lender's purposes only and shall not be construed to create any responsibility or liability on the part of Lender to Borrower or to any other person. The representations and warranties contained herein are based on Borrower's due diligence in

investigating the properties for hazardous waste and hazardous substances. Borrower hereby (a) releases and waives any future claims against Lender for indemnity or contribution in the event Borrower becomes liable for cleanup or other costs under any such laws, and (b) agrees to indemnify and hold harmless Lender against any and all claims, losses, liabilities, damages, penalties, and expenses which Lender may directly or indirectly sustain or suffer resulting from a breach of this section of the Agreement or as a consequence of any use, generation, manufacture, storage, disposal, release or threatened release of a hazardous waste or substance on the properties. The provisions of this section of the Agreement, including the obligation to

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indemnify, shall survive the payment of the Indebtedness and the termination or expiration of this Agreement and shall not be affected by Lender's acquisition of any interest in any of the properties, whether by foreclosure or otherwise.

Litigation and Claims. No litigation, claim, investigation, administrative proceeding or similar action (including those for unpaid taxes) against Borrower is pending or threatened, and no other event has occurred which may materially adversely affect Borrower's financial condition or properties, other than litigation, claims, or other events, if any, that have been disclosed to and acknowledged by Lender in writing.

Taxes. To the best of Borrower's knowledge, all tax returns and reports of Borrower that are or were required to be filed, have been filed, and all taxes, assessments and other governmental charges have been paid in full, except those presently being or to be contested by Borrower in good faith in the ordinary course of business and for which adequate reserves have been provided.

Lien Priority. Unless otherwise previously disclosed to Lender in writing, Borrower has not entered into or granted any Security Agreements, or permitted the filing or attachment of any Security Interests on or affecting any of the Collateral directly or indirectly securing repayment of Borrower's Loan and Note, that would be prior or that may in any way be superior to Lender's Security Interests and rights in and to such Collateral.

Binding Effect. This Agreement, the Note, all Security Agreements directly or indirectly securing repayment of Borrower's Loan and Note and all of the Related Documents are binding upon Borrower as well as upon Borrower's successors, representatives and assigns, and are legally enforceable in accordance with their respective terms.

Commercial Purposes. Borrower intends to use the Loan proceeds solely for business or commercial related purposes.

Employee Benefit Plans. Each employee benefit plan as to which Borrower may have any liability complies in all material respects with all applicable requirements of law and regulations, and (i) no Reportable Event nor Prohibited Transaction (as defined in ERISA) has occurred with respect to any such plan, (ii) Borrower has not withdrawn from any such plan or initiated steps to do so, (iii) no steps have been taken to terminate any such plan, and (iv) there are no unfunded liabilities other than those previously disclosed to Lender in writing.

Location of Borrower's Offices and Records. Borrower's place of business, or Borrower's chief executive office, if Borrower has more than one place of business, is located at 4311 SOLAR WAY, FREMONT, CA 94538. Unless Borrower has designated otherwise in writing this location is also the office or offices where Borrower keeps its records concerning the Collateral.

Information. All information heretofore or contemporaneously herewith furnished by Borrower to Lender for the purposes of or in connection with this Agreement or any transaction contemplated hereby is, and all information hereafter furnished by or on behalf

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of Borrower to Lender will be, true and accurate in every material respect on the date as of which such information is dated or certified; and none of such information is or will be incomplete by omitting to state any material fact necessary to make such information not misleading.

Survival of Representations and Warranties. Borrower understands and agrees that Lender, without independent investigation, is relying upon the above representations and warranties in extending Loan Advances to Borrower. Borrower further agrees that the foregoing representations and warranties shall be continuing in nature and shall remain in full force and effect until such time as Borrower's Indebtedness shall be paid in full, or until this Agreement shall be terminated in the manner provided above, whichever is the last to occur.

AFFIRMATIVE COVENANTS. Borrower covenants and agrees with Lender that, while this Agreement is in effect, Borrower will:

Litigation. Promptly inform Lender in writing of (a) all material adverse changes in Borrower's financial condition, and (b) all existing and all threatened litigation, claims, investigations, administrative proceedings or similar actions affecting Borrower or any Guarantor which could materially affect the financial condition of Borrower or the financial condition of any Guarantor.

Financial Records. Maintain its books and records in accordance with generally accepted accounting principles, applied on a consistent basis, and permit Lender to examine and audit Borrower's books and records at all reasonable times.

Financial Statements. Furnish Lender with, as soon as available, but in no event later than ninety (90) days after the end of each fiscal year, Borrower's balance sheet and income statement for the year ended, audited by a certified public accountant satisfactory to Lender, and, as soon as available, but in no event later than forty-five (45) days after the end of each fiscal quarter, Borrower's balance sheet and profit and loss statement for the period ended, prepared and certified as correct to the best knowledge and belief by Borrower's chief financial officer or other officer or person acceptable to Lender. All financial reports required to be provided under this Agreement shall be prepared in accordance with generally accepted accounting principles, applied on a consistent basis, and certified by Borrower as being true and correct.

Additional Information. Furnish such additional information and statements, lists of assets and liabilities, agings of receivables and payables, inventory schedules, budgets, forecasts, tax returns, and other reports with respect to Borrower's financial condition and business operations as Lender may request from time to time.

Financial Covenants and Ratios. Comply with the following covenants and ratios:

Net Worth Ratio. Maintain a ratio of Total Liabilities to Tangible Net Worth of less than 1.00 TO 1.00.

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Working Capital. Maintain Working Capital in excess of \$30,000,00.00.

Current Ratio. Maintain a ratio of Current Assets to Current Liabilities in excess of 1.50 TO 1.00.

Cash Flow Requirements. Maintain Cash Flow at not less than the following level: 1.50 TO 1.00 DEFINED AS: NET PROFIT AFTER TAXES PLUS DEPRECIATION PLUS AMORTIZATION PLUS INTEREST EXPENSE MINUS DIVIDENDS MINUS WITHDRAWS MINUS INTERNALLY FUNDED FIXED ASSETS DIVIDED BY CURRENT PORTION LONG TERM DEBT PLUS

INTEREST EXPENSE. (ONE TIME ALLOWANCE OF \$1,760,000.00 TO BE ADDED BACK TO CASH FLOW FOR FISCAL YEAR 1998 TO COMPENSATE FOR NON-FINANCEABLE PORTION OF TECHNOLOGY DRIVE PROPERTY PURCHASE EFFECTIVE JUNE 30, 1998). Except as provided above, all computations made to determine compliance with the requirements contained in this paragraph shall be made in accordance with generally accepted accounting principles, applied on a consistent basis, and certified by Borrower as being true and correct.

Insurance. Maintain fire and other risk insurance, public liability insurance, and such other insurance as Lender may require with respect to Borrower's properties and operations, in form, amounts, coverages and with insurance companies reasonably acceptable to Lender. Borrower, upon request of Lender, will deliver to Lender from time to time the policies or certificates of insurance in form satisfactory to Lender, including stipulations that coverages will not be canceled or diminished without at least ten (10) days' prior written notice to Lender. Each insurance policy also shall include an endorsement providing that coverage in favor of Lender will not be impaired in any way by any act, omission or default of Borrower or any other person. In connection with all policies covering assets in which Lender holds or is offered a security interest for the Loans, Borrower will provide Lender with such loss payable or other endorsements as Lender may require.

Insurance Reports. Furnish to Lender, upon request of Lender, reports on each existing insurance policy showing such information as Lender may reasonably request, including without limitation the following: (a) the name of the insurer; (b) the risks insured; (c) the amount of the policy; (d) the properties insured; (e) the then current property values on the basis of which insurance has been obtained, and the manner of determining those values; and (f) the expiration date of the policy. In addition, upon request of Lender (however not more often than annually), Borrower will have an independent appraiser satisfactory to Lender determine, as applicable, the actual cash value or replacement cost of any Collateral. The cost of such appraisal shall be paid by Borrower.

Other Agreements. Comply with all terms and conditions of all other agreements, whether now or hereafter existing, between Borrower and any other party and notify Lender immediately in writing of any default in connection with any other such agreements.

Loan Fees and Charges. In addition to all other agreed upon fees and charges, pay the following: BORROWER AGREES TO PAY LENDER A NONREFUNDABLE LOAN FEE (FOR LETTER OF CREDIT) IN THE AMOUNT OF \$59,933.00.

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Loan Proceeds. Use all Loan proceeds solely for Borrower's business operations, unless specifically consented to the contrary by Lender in writing.

Taxes, Charges and Liens. Pay and discharge when due all of its indebtedness and obligations, including without limitation all assessments, taxes, governmental charges, levies and liens, of every kind and nature, imposed upon Borrower or its properties, income, or profits, prior to the date on which penalties would attach, and all lawful claims that, if unpaid, might become a lien or charge upon any of Borrower's properties, income, or profits. Provided however, Borrower will not be required to pay and discharge any such assessment, tax, charge, levy, lien or claim so long as (a) the legality of the same shall be contested in good faith by appropriate proceedings, and (b) Borrower shall have established on its books adequate reserves with respect to such contested assessment, tax, charge, levy, lien, or claim in accordance with generally accepted accounting practices. Borrower, upon demand of Lender, will furnish to Lender evidence of payment of the assessments, taxes, charges, levies, liens and claims and will authorize the appropriate governmental official to deliver to Lender at any time a written statement of any assessments, taxes, charges, levies, liens and claims against Borrower's properties, income, or profits.

Performance. Perform and comply with all terms, conditions, and provisions

set forth in this Agreement and in the Related Documents in a timely manner, and promptly notify Lender if Borrower learns of the occurrence of any event which constitutes an Event of Default under this Agreement or under any of the Related Documents.

Operations. Maintain executive and management personnel with substantially the same qualifications and experience as the present executive and management personnel; provide written notice to Lender of any change in executive and management personnel; conduct its business affairs in a reasonable and prudent manner and in compliance with all applicable federal, state and municipal laws, ordinances, rules and regulations respecting its properties, charters, businesses and operations, including without limitation, compliance with the Americans With Disabilities Act and with all minimum funding standards and other requirements of ERISA and other laws applicable to Borrower's employee benefit plans.

Inspection. Permit employees or agents of Lender at any reasonable time to inspect any and all Collateral for the Loan or Loans and Borrower's other properties and to examine or audit Borrower's books, accounts, and records and to make copies and memoranda of Borrower's books, accounts, and records. If Borrower now or at any time hereafter maintains any records (including without limitation computer generated records and computer software programs for the generation of such records) in the possession of a third party, Borrower, upon request of Lender, shall notify such party to permit Lender free access to such records at all reasonable times and to provide Lender with copies of any records it may request, all at Borrower's expense.

Compliance Certificate. Unless waived in writing by Lender, provide Lender QUARTERLY (WITHIN 45 DAYS) and at the time of each disbursement of Loan proceeds with a certificate executed by Borrower's chief financial officer, or other officer or person acceptable

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to Lender, certifying that the representations and warranties set forth in this Agreement are true and correct as of the date of the certificate and further certifying that, as of the date of the certificate, no Event of Default exists under this Agreement.

Environmental Compliance and Reports. Borrower shall comply in all respects with all environmental protection federal, state and local laws, statutes, regulations and ordinances; not cause or permit to exist, as a result of an intentional or unintentional action or omission on its part or on the part of any third party, on property owned and/or occupied by Borrower, any environmental activity where damage may result to the environment, unless such environmental activity is pursuant to and in compliance with the conditions of a permit issued by the appropriate federal, state or local governmental authorities; shall furnish to Lender promptly and in any event within thirty (30) days after receipt thereof a copy of any notice, summons, lien, citation, directive, letter or other communication from any governmental agency or instrumentality concerning any intentional or unintentional action or omission on Borrower's part in connection with any environmental activity whether or not there is damage to the environmental and/or other natural resources.

Additional Assurances. Make, execute and deliver to Lender such promissory notes, mortgages, deeds of trust, security agreements, financing statements, instruments, documents and other agreements as Lender or its attorneys may reasonably request to evidence and secure the Loans and to perfect all Security Interests.

RECOVERY OF ADDITIONAL COSTS. If the imposition of or any change in any law, rule, regulation or guideline, or the interpretation or application of any thereof by any court or administrative or governmental authority (including any request or policy not having the force of law) shall impose, modify or make applicable any taxes (except U.S. federal, state or local income or franchise taxes imposed on Lender), reserve requirements, capital adequacy requirements or

other obligations which would (a) increase the cost to Lender for extending or maintaining the credit facilities to which this Agreement relates, (b) reduce the amounts payable to Lender under this Agreement or the Related Documents, or (c) reduce the rate of return on Lender's capital as a consequence of Lender's obligations with respect to the credit facilities to which this Agreement relates, then Borrower agrees to pay Lender such additional amounts as will compensate Lender therefore, within five (5) days after Lender's written demand for such payment, which demand shall be accompanied by an explanation of such imposition or charge and a calculation in reasonable detail of the additional amounts payable by Borrower, which explanation and calculations shall be conclusive in the absence of manifest error.

NEGATIVE COVENANTS. Borrower covenants and agrees with Lender that while this Agreement is in effect, Borrower shall not, without the prior written consent of Lender:

Indebtedness and Liens. (a) Except for trade debt incurred in the normal course of business and indebtedness to Lender contemplated by this Agreement, create, incur or assume indebtedness for borrowed money, including capital lease, (b) except as allowed as a Permitted Lien, sell, transfer, mortgage, assign, pledge, lease, grant a security interest in, or

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encumber any of Borrower's assets, or (c) sell with recourse any of Borrower's accounts, except to Lender.

Continuity of Operations. (a) Engage in any business activities substantially different than those in which Borrower is presently engaged, (b) cease operations, liquidate, merge, transfer, acquire or consolidate with any other entity, change ownership, change its name, dissolve or transfer or sell Collateral out of the ordinary course of business, (c) pay any dividends on Borrower's stock (other than dividends payable in its stock), provided, however that notwithstanding the foregoing, but only so long as no Event of Default has occurred and is continuing or would result from the payment of dividends, if Borrower is a "Subchapter S Corporation" (as defined in the Internal Revenue Code of 1986, as amended), Borrower may pay cash dividends on its stock to its shareholders from time to time in amounts necessary to enable the shareholders to pay income taxes and make estimated income tax payments to satisfy their liabilities under federal and state law which arise solely from their status as Shareholders of a Subchapter S Corporation because of their ownership of shares of stock of Borrower, or (d) purchase or retire any of Borrower's outstanding shares or alter or amend Borrower's capital structure.

Loans, Acquisitions and Guaranties. (a) Loan, invest in or advance money or assets, (b) purchase, create or acquire any interest in any other enterprise or entity, or (c) incur any obligation as surety or guarantor other than in the ordinary course of business.

CESSATION OF ADVANCES. If Lender has made any commitment to make any Loan to Borrower, whether under this Agreement or under any other agreement, Lender shall have no obligation to make Loan Advances or to disburse Loan proceeds if: (a) Borrower or any Guarantor is in default under the terms of this Agreement or any of the Related Documents or any other agreement that Borrower or any Guarantor has with Lender; (b) Borrower or any Guarantor becomes insolvent, files a petition in bankruptcy or similar proceedings, or is adjudged a bankrupt; (c) there occurs a material adverse change in Borrower's financial, condition, in the financial condition of any Guarantor, or in the value of any Collateral securing any Loan; or (d) any Guarantor seeks, claims or otherwise attempts to limit, modify or revoke such Guarantor's guaranty of the Loan or any other loan with Lender.

ADDITIONAL DEFINITIONS.

Current Assets. The words "Current Assets" mean Borrower's cash on hand

plus Borrower's receivables plus inventory.

Current Liabilities. The words "Current Liabilities" mean all Borrower's notes payable plus Borrower's accounts payable plus Borrower's income taxes payable plus Borrower's accruals plus Borrower's current portion of long term debt.

Current Ratio. The words "Current Ratio" mean Borrower's total Current Assets divided by Borrower's total Current Liabilities.

BORROWING BASE CERTIFICATE. Unless waived in writing by Lender, Borrower

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agrees to provide Lender with a Borrower's Certificate within THIRTY (30) days after the end of each month (if borrowings exceeds \$5,000,000.00). Each "Borrower's Certificate" shall be in a form (Lender form #63-5900) acceptable to Lender, duly executed by Borrower and detailing the status of the Line of Credit as of the date thereon.

AGING AND LISTING OF ACCOUNTS RECEIVABLE AND PAYABLE. Borrower covenants and agrees with Lender that, while this Agreement is in effect, Borrower shall deliver to Lender within THIRTY (30) DAYS after the end of each month (if borrowings exceed \$5,000,000.00), a detailed aging of Borrower's accounts and contracts receivable and accounts payable as of the last day of that month together with an explanation of any adjustments made at the end of that month, all in a form acceptable to Lender.

CUSTOMER LISTING. Borrower agrees with Lender that, while this Agreement is in effect, Borrower will furnish Lender with, as soon as available after the end of each fiscal year, a listing of Account Debtors and their addresses, current as of the year end, in form satisfactory to Lender.

COLLATERAL AUDITS. Borrower covenants and agrees with Lender that, while this Agreement is in effect, collateral audits will be performed annually.

TANGIBLE NET WORTH. Maintain a Minimum Tangible Net Worth of not less than \$44,000,000.00 (step-up by 100% of any new equity).

INVENTORY REPORTING. Borrower covenants and agrees with Lender that, while this Agreement is in effect, Borrower shall deliver to Lender after the end of each month, a schedule of Eligible Inventory to include raw materials at cost plus scrap value of work in progress and finished goods when borrowings exceed \$5,000,000.00.

INVESTMENT ACQUISITIONS. Borrower covenants and agrees with Lender that, while this Agreement is in effect, Borrower shall not, without prior written consent of Lender, make any Investment Acquisitions over \$250,000.00

PROFITABILITY. Borrower covenants and agrees with Lender that, while this Agreement is in effect, Borrower shall maintain semi-annual profitability greater than zero.

ACCESS LAWS. An exhibit, titled "ACCESS LAWS," is attached to this Agreement and by this reference is made a part of this Agreement just as if all the provisions, terms and conditions of the Exhibit had been fully set forth in this Agreement.

EVENTS OF DEFAULT. Each of the following shall constitute an Event of Default under this Agreement:

Default on Indebtedness. Failure of Borrower to make any payment when due on the Loans.

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Other Defaults. Failure of Borrower or any Grantor to comply with or to perform when due any other term, obligation, covenant or condition contained in this Agreement or in any of the Related Documents, or failure of Borrower to comply with or to perform any other term, obligation, covenant or condition contained in any other agreement between Lender and Borrower.

Default in Favor of Third Parties. Should Borrower or any Grantor default under any loan, extension of credit, security agreement, purchase or sales agreement, or any other agreement, in favor of any other creditor or person that may materially affect any of Borrower's property or Borrower's or any Grantor's ability to repay the Loans or perform their respective obligations under this Agreement or any of the Related Documents.

False Statements. Any warranty, representation or statement made or furnished to Lender by or on behalf of Borrower or any Grantor under this Agreement or the Related Documents is false or misleading in any material respect at the time made or furnished, or becomes false or misleading at any time thereafter.

Defective Collateralization. This Agreement or any of the Related Documents ceases to be in full force and effect (including failure of any Security Agreement to create a valid and perfected Security Interest) at any time and for any reason.

Insolvency. The dissolution or termination of Borrower's existence as a going business, the insolvency of Borrower, the appointment of a receiver for any part of Borrower's property, any assignment for the benefit of creditors, any type of creditor workout, or the commencement of any proceeding under any bankruptcy or insolvency laws by or against Borrower.

Creditor or Forfeiture Proceedings. Commencement of foreclosure or forfeiture proceedings, whether by judicial proceeding, self-help, repossession or any other method, by any creditor of Borrower, any creditor of any Grantor against any collateral securing the Indebtedness, or by any governmental agency. This includes a garnishment, attachment, or levy on or of any of Borrower's deposit accounts with Lender.

Events Affecting Guarantor. Any of the preceding events occurs with respect to any Guarantor of any of the Indebtedness or any Guarantor dies or becomes incompetent, or revokes or disputes the validity of, or liability under, any Guaranty of the Indebtedness.

Change in Ownership. Any change in ownership of twenty-five percent (25%) or more of the common stock of Borrower.

Adverse Change. A material adverse change occurs in Borrower's financial condition, or Lender believes the prospect of payment or performance of the Indebtedness is impaired.

EFFECT OF AN EVENT OF DEFAULT. If any Event of Default shall occur, except where otherwise provided in this Agreement or the Related Documents, all commitments and

obligations of Lender under this Agreement or the Related Documents or any other agreement immediately will terminate (including any obligation to make Loan Advances or disbursements), and, at Lender's option, all Indebtedness immediately will become due and payable, all without notice of any kind to Borrower, except that in the case of an Event of Default of the type described in the "Insolvency" subsection above, such acceleration shall be automatic and not optional. In addition, Lender shall have all the rights and remedies provided in the Related Documents or available at law, in equity, or otherwise. Except as may be prohibited by applicable law, all of Lender's rights and remedies shall be cumulative and may be exercised singularly or concurrently.

Election by Lender to pursue any remedy shall not exclude pursuit of any other remedy, and an election to make expenditures or to take action to perform an obligation of Borrower or of any Grantor shall not affect Lender's right to declare a default and to exercise its rights and remedies.

MISCELLANEOUS PROVISIONS. The following miscellaneous provisions are a part of this Agreement:

Amendments. This Agreement, together with any Related Documents, constitutes the entire understanding and agreement of the parties as to the matters set forth in this Agreement. No alteration of or amendment to this Agreement shall be effective unless given in writing and signed by the party or parties sought to be charged or bound by the alteration or amendment.

APPLICABLE LAW. THIS AGREEMENT HAS BEEN DELIVERED TO LENDER AND ACCEPTED BY LENDER IN THE STATE OF CALIFORNIA. IF THERE IS A LAWSUIT, BORROWER AGREES UPON LENDER'S REQUEST TO SUBMIT TO THE JURISDICTION OF THE COURTS OF SACRAMENTO COUNTY, THE STATE OF CALIFORNIA. THIS AGREEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF CALIFORNIA.

Caption Headings. Caption headings in this Agreement are for convenience purposes only and are not to be used to interpret or define the provisions of this Agreement.

Multiple Parties; Corporate Authority. All obligations of Borrower under this Agreement shall be joint and several, and all references to Borrower shall mean each and every Borrower. This means that each of the persons signing below is responsible for ALL obligations in this Agreement.

Consent to Loan Participation. Borrower agrees and consents to Lender's sale or transfer, whether now or later, of one or more participation interests in the Loans to one or more purchasers, whether related or unrelated to Lender. Lender may provide, without any limitation whatsoever, to any one or more purchasers, or potential purchasers, any information or knowledge Lender may have about Borrower or about any other matter relating to the Loan, and Borrower hereby waives any rights to privacy it may have with respect to such matters. Borrower additionally waives any and all notices of sale of participation interests, as well as all notices of any repurchase of such participation interests. Borrower also agrees that the purchasers of any such participation interests will be considered as the absolute owners of such interests in the Loans and will have all the rights granted under the participation agreement or

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agreements governing the sale of such participation interests. Borrower further waives all rights of offset or counterclaim that it may have now or later against Lender or against any purchaser of such a participation interest and unconditionally agrees that either Lender or such purchaser may enforce Borrower's obligation under the Loans irrespective of the failure or insolvency of any holder of any interest in the Loans. Borrower further agrees that the purchaser of any such participation interests may enforce its interests irrespective of any personal claims or defenses that Borrower may have against Lender.

Costs and Expenses. Borrower agrees to pay upon demand all of Lender's expenses, including without limitation attorneys' fees, incurred in connection with the preparation, execution, enforcement, modification and collection of this Agreement or in connection with the Loans made pursuant to this Agreement. Lender may pay someone else to help collect the Loans and to enforce this Agreement, and Borrower will pay that amount. This includes, subject to any limits under applicable law, Lender's attorneys' fees and Lender's legal expenses, whether or not there is a lawsuit, including attorneys' fees for bankruptcy proceedings (including efforts to modify or vacate any automatic stay or injunction), appeals, and any anticipated post-judgment collection services. Borrower also will pay any court costs, in addition to all other sums provided by law.

Notices. All notices required to be given under this Agreement shall be given in writing, may be sent by telefacsimile (unless otherwise required by law), and shall be effective when actually delivered or when deposited with a nationally recognized overnight courier or deposited in the United States mail, first class, postage prepaid, addressed to the party to whom the notice is to be given at the address shown above. Any party may change its address for notices under this Agreement by giving formal written notice to the other parties, specifying that the purpose of the notice is to change the party's address. To the extent permitted by applicable law, if there is more than one Borrower, notice to any Borrower will constitute notice to all Borrowers. For notice purposes, Borrower will keep Lender informed at all times of Borrower's current address(es).

Severability. If a court of competent jurisdiction finds any provision of this Agreement to be invalid or unenforceable as to any person or circumstance, such finding shall not render that provision invalid or unenforceable as to any other persons or circumstances. If feasible, any such offending provision shall be deemed to be modified to be within the limits of enforceability or validity; however, if the offending provision cannot be so modified, it shall be stricken and all other provisions of this Agreement in all other respects shall remain valid and enforceable.

Subsidiaries and Affiliates of Borrower. To the extent the context of any provisions of this Agreement makes it appropriate, including without limitation any representation, warranty or covenant, the word "Borrower" as used herein shall include all subsidiaries and affiliates of Borrower. Notwithstanding the foregoing however, under no circumstances shall this Agreement be construed to require Lender to make any Loan or other financial accommodation to any subsidiary or affiliate of Borrower.

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Successors and Assigns. All covenants and agreements contained by or on behalf of Borrower shall bind its successors and assigns and shall inure to the benefit of Lender, its successors and assigns. Borrower shall not, however, have the right to assign its rights under this Agreement or any interest therein, without the prior written consent of Lender.

Survival. All warranties, representations, and covenants made by Borrower in this Agreement or in any certificate or other instrument delivered by Borrower to Lender under this Agreement shall be considered to have been relied upon by Lender and will survive the making of the Loan and delivery to Lender of the Related Documents, regardless of any investigation made by Lender or on Lender's behalf.

Time Is of the Essence. Time is of the essence in the performance of this Agreement.

Waiver. Lender shall not be deemed to have waived any rights under this Agreement unless such waiver is given in writing and signed by Lender. No delay or omission on the part of Lender in exercising any right shall operate as a waiver of such right or any other right. A waiver by Lender of a provision in this Agreement shall not prejudice or constitute a waiver of Lender's right otherwise to demand strict compliance with that provisions or any other provision of this Agreement. No prior waiver by Lender, nor any course of dealing between Lender and Borrower, or between Lender and any Grantor, shall constitute a waiver of any of Lender's rights or of any obligations of Borrower or of any Grantor as to any future transactions. Whenever the consent of Lender is required under this Agreement, the granting of such consent by Lender in any instance shall not constitute continuing consent in subsequent instances where such consent is required, and in all cases such consent may be granted or withheld in the sole discretion of Lender.

BORROWER ACKNOWLEDGES HAVING READ ALL THE PROVISIONS OF THIS LOAN AGREEMENT, AND BORROWER AGREES TO ITS TERMS. THIS AGREEMENT IS DATED AS OF

SEPTEMBER 18, 1998.

BORROWER:

AMERICAN XTAL TECHNOLOGY

By: /s/ MORRIS S. YOUNG

Authorized Officer (Title)

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LENDER:

U.S. BANK NATIONAL ASSOCIATION

By: /s/ JASON FLOYD

Authorized Officer

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LETTER OF CREDIT
AND REIMBURSEMENT AGREEMENT

This Letter of Credit and Reimbursement Agreement ("Agreement") is made and entered into as of December 1, 1998, by and between American Xtal Technology, Inc. (the "Borrower") and U.S. Bank National Association (the "Bank").

RECITALS

A. The Borrower and Harris Trust Company of California (the "Trustee") have entered into an Indenture dated as of December 1, 1998 (the "Indenture"), pursuant to which the Borrower will issue its Variable Rate Taxable Demand Revenue Bonds Series 1998 (the "Bonds") in an aggregate principal amount of \$11,615,000.

B. To assure payment of the principal and interest with respect to the Bonds when due, the Borrower has requested that the Bank issue an irrevocable, direct pay letter of credit in favor of the Trustee in substantially the form of Exhibit A hereto (such letter of credit and any successor letter of credit being the "Letter of Credit"), in the amount of \$11,986,680 (the "Commitment"), of which \$11,615,000 shall support the payment of principal with respect to the Bonds and \$371,680 shall support the payment of 96 days of interest with respect to the Bonds at a rate not to exceed 12% per annum based on a 360-day year (actual days elapsed).

C. As more fully set forth in this Agreement, the Borrower has agreed to reimburse the Bank for drawings under the Letter of Credit and to grant to the Bank a security interest in certain Collateral (as hereafter defined) to secure the Obligations (as hereafter defined) of the Borrower under this Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the parties agree as follows:

ARTICLE I
DEFINITIONS

SECTION 1.1 Certain Defined Terms. For purposes of this Agreement (including the Recitals hereof), the following terms shall have the respective meanings specified below.

"Agreement" shall mean this Letter of Credit and Reimbursement Agreement, including the exhibits hereto.

"Annual Letter of Credit Fee" shall have the meaning assigned to that term in Section 8.1(a) hereof.

"Bank" shall mean U.S. Bank National Association.

"Bank Documents" shall mean the Loan Agreement, the Pledge Agreement, the Deeds of Trust, the Security Agreement, and the Third Party Lienholder Agreement.

"Business Day" shall mean a day of the year which is not (i) a Saturday or Sunday or (ii) a day on which banks located in Sacramento, California, or banks located in the city in which the principal office of the Trustee or the Tender Agent (as such terms are defined in the Indenture) is located are authorized or obligated by law or executive order to close or (iii) a day on which the New

York Stock Exchange is closed.

"Bonds" shall have the meaning assigned to that term in Recital A hereto.

"Closing Date" shall mean the date that all conditions precedent to the issuance of the Letter of Credit are satisfied in accordance with the terms hereof.

"Collateral" shall mean, collectively, (i) the "Collateral" as defined in the Security Agreement and (ii) the "Property" and the "Collateral" as defined in the Deeds of Trust.

"Commitment" shall have the meaning assigned to that term in Recital B hereto.

"Deeds of Trust" shall mean, collectively, each Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing executed and delivered by the Borrower for the benefit of the Bank securing the Obligations (in whole or in part) and encumbering the Collateral or any portion thereof, in each case, as the same may be amended, supplemented or otherwise modified from time to time in writing in accordance therewith.

"Event of Default" shall have the meaning assigned to that term in Section 7.1 hereof.

"Fixed Interest Rate" shall mean a fixed, nonfloating interest rate with respect to the Bonds established in accordance with the terms of Section 2.03(D) of the Indenture.

"Improvements" shall have the meaning assigned to that term in the Deeds of Trust.

"Indenture" shall have the meaning assigned to that term in Recital A hereto.

"Interest Drawing" shall have the meaning assigned to that term in the Letter of Credit.

"Interest Purchase Drawing" shall have the meaning assigned to that term in the Letter of Credit.

"Letter of Credit" shall have the meaning assigned to that term in Recital B hereto.

"Letter of Credit Origination Fee" shall have the meaning assigned to that term in Section 8.1(b) hereof.

"Loan Agreement" means that certain Loan Agreement dated as of September 18, 1998, by and between the Borrower and the Bank, as the same may be amended, supplemented or otherwise modified from time to time in writing in accordance therewith.

"Obligations" shall mean all obligations of the Borrower to the Bank under this Agreement and the Related Documents, including without limitation the obligation to reimburse the Bank for amounts paid under the Letter of Credit, the obligation to pay the fees due hereunder, and the obligation to prepay obligations on account of the Letter of Credit during the continuance of an Event of Default.

"Outstanding" with respect to the Bonds shall have the meaning assigned to that term in the Indenture.

"Pledge Agreement" means that certain Pledge Agreement and Security Agreement of even date herewith made by the Borrower in favor of the Bank, as

the same may be amended, supplemented or otherwise modified from time to time in writing in accordance therewith.

"Potential Default" shall mean an event which, with the passage of time or the giving of notice, or both, would constitute an Event of Default.

"Principal Drawing" shall have the meaning assigned to that term in the Letter of Credit.

"Principal Purchase Drawing" shall have the meaning assigned to that term in the Letter of Credit.

"Property" shall have the meaning assigned to that term in the Deeds of Trust.

"Reference Rate" shall mean the fluctuating per annum rate announced from time to time by the Bank in Sacramento, California as its "prime rate." The prime rate is a rate set by the Bank based upon various factors including the Bank's costs and desired return and general economic conditions, and is used as a reference point for pricing some loans, which may be priced at, above, or below the prime rate.

"Related Documents" shall mean, collectively, the Bank Documents, the Letter of Credit, the Bonds and the Indenture.

"Security Agreement" shall mean that certain Security Agreement of even date herewith by and between the Borrower, as debtor, and the Bank, as secured party, as the same may be amended, supplemented or otherwise modified from time to time in writing in accordance therewith.

"Third Party Lienholder Agreement" means that certain Third Party Lienholder Agreement dated as of November 30, 1998, by and between the Bank and the United States Small Business Administration, and acknowledged and consented to by the Borrower, as the same may be amended, supplemented or otherwise modified from time to time in writing in accordance therewith.

SECTION 1.2 Accounting Terms. All accounting terms used herein and not specifically defined herein shall be construed in accordance with generally accepted accounting principles, consistently applied.

ARTICLE II
AMOUNT AND TERMS OF THE LETTER OF CREDIT

SECTION 2.1 The Letter of Credit. The Borrower requests the Bank to issue the Letter of Credit, and the Bank agrees, on the terms and conditions hereinafter set forth, to issue the Letter of Credit to the Trustee. The Borrower agrees to execute and deliver such additional application materials with respect to the Letter of Credit and such other documents as the Bank shall reasonably request in connection therewith.

SECTION 2.2 Issuing the Letter of Credit. The Letter of Credit shall be issued to the Trustee on the Closing Date upon fulfillment of the conditions set forth in Article III hereof. The Borrower shall reimburse the Bank for any and all draws under the Letter of Credit in accordance with the terms and conditions set forth below.

SECTION 2.3 Reimbursement. In satisfaction of its obligation to reimburse the Bank for any amount drawn under the Letter of Credit, the Borrower hereby agrees to (i) pay to the Bank the amount of each Interest Drawing and each Interest Purchase Drawing on the day such drawing is honored by the Bank and (ii) to pay to the Bank the amount of each Principal Drawing and each Principal Purchase Drawing on the day such drawing is honored by the Bank.

SECTION 2.4 Grant of Security. As security for its obligation to reimburse

the Bank for any amounts paid pursuant to any drawing under the Letter of Credit and for all other obligations of the Borrower hereunder, including any interest due pursuant to Section 2.9, the Borrower hereby pledges and assigns to the Bank, and grants to the Bank a lien and security interest in, all of the Borrower's right, title, and interest in and to the Collateral. The Borrower agrees to maintain and preserve the Collateral and to take such actions as the Bank shall, from time to time, reasonably request to create, establish, maintain and perfect the Bank's security interest therein.

SECTION 2.5 Reimbursement and Computations. All payments made on account of the Obligations shall be made by the Borrower, without setoff or counterclaim, in lawful money of the United States of America in immediately available funds, free and clear of and without deduction for any taxes, fees or other charges of any nature whatsoever imposed by any taxing authority and must be received by the Bank by 1:00 p.m. California time on the day of payment, it being expressly agreed and understood that if a payment is received after 1:00 p.m. California time by the Bank, such payment will be considered to have been made by the Borrower on the next succeeding Business Day and interest thereon shall be payable by the Borrower at the rate specified in Section 2.9 hereof during such extension. All payments to the Bank hereunder shall be made at the following address: U.S. Bank National Association, 980 Ninth Street, Suite 1200, Sacramento, California 95814, Attention: International Department.

SECTION 2.6 Non-Business Days. Whenever any payment or reimbursement to be made hereunder, or any bond redemption required to be made pursuant to Section 5.1(f), shall be due or required on a day which is not a Business Day, such payment, reimbursement or redemption shall be made on the next succeeding Business Day, and such extension of time shall

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in such case be included in the computation of any such payment, reimbursement or redemption (if applicable).

SECTION 2.7 Evidence of Obligation. The Bank shall maintain in accordance with its usual practice an account or accounts evidencing the obligation of the Borrower resulting from each drawing under the Letter of Credit. In any legal action or proceeding in respect of this Agreement, the entries made in such account or accounts shall, in the absence of error in calculation, be conclusive evidence of the existence and amounts of the obligations of the Borrower therein recorded.

SECTION 2.8 Obligations Absolute. The payment or reimbursement obligations of the Borrower under this Agreement shall be unconditional and irrevocable, and shall be paid strictly in accordance with and subject to the terms and conditions of this Agreement under all circumstances, including, without limitation, the following circumstances:

(a) any lack of validity or enforceability of any of the Related Documents;

(b) any amendment or waiver of or any consent to departure from all or any of the Related Documents;

(c) the existence of any claim, set-off, defense, or other right which the Borrower may have at any time against the Trustee or any other beneficiary, or any transferee, of the Letter of Credit (or any persons or entities for whom the Trustee, any such beneficiary, or any such transferee may be acting), the Bank, or any other person or entity, whether in connection with this Agreement, the transactions contemplated herein or in the Related Documents, or any unrelated transaction;

(d) any statement or any other document presented under the Letter of Credit proving to be forged, fraudulent, or invalid in any respect or any statement therein being untrue or inaccurate in any respect;

(e) payment by the Bank under the Letter of Credit against presentation of a draft or certificate which does not comply with the terms of the Letter of Credit; or

(f) any other circumstance or happening whatsoever, whether or not similar to any of the foregoing.

SECTION 2.9 Default Interest. If an Event of Default has occurred and is continuing, the Obligations shall bear interest, payable on demand, at the Reference Rate plus 5% per annum (such sum, the "Default Rate") until such required payment plus interest thereon has been paid; provided, however, that nothing contained in this Section 2.9 shall be construed to waive or limit any of the rights and remedies of the Bank with respect to such nonpayment under this Agreement or the Related Documents.

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SECTION 2.10 Tranches of Debt. The obligations owing at any time by the Borrower to the Bank shall, solely for the purpose of identifying which portions of the Obligations are secured by specific items of Collateral, be divided into the following tranches ("Tranches"):

Tranche -----	Maximum Principal Amount of Tranche -----
A	\$4,900,000
B	\$5,440,000
C	All remaining indebtedness and Obligations owing hereunder or under the Related Agreements at any time

Any payments received by the Bank hereunder shall be applied to the Obligations payable under each of the Tranches on a pro rata basis. As the maximum amount of the Letter of Credit is reduced in connection with each partial redemption of the Bonds required under Section 5.1(f) hereof, the reduction of the maximum principal amount of Obligations payable under each of the Tranches shall be as set forth in Schedule I attached hereto.

SECTION 2.11 Repayment of Bank Debt. The Borrower hereby agrees that, simultaneously with its issuance of the Bonds and the Bank's issuance of the Letter of Credit, a portion of the proceeds derived from the sale of the Bonds shall be paid directly to the Bank for the purpose of paying in full all indebtedness owing under (a) that certain promissory note dated as of October 1, 1996, in favor of Commercial Bank of Fremont (now the Bank) in the original principal amount of \$3,537,355.00 (the "Fremont Note"), and (b) that certain promissory note dated as of May 27, 1997, in favor of U.S. Bank (now the Bank) in the original principal amount of \$750,000.00 (the "USB Note"). The amount of principal and interest owing under (i) the Fremont Note is \$3,481,838.90 of principal and accrued and unpaid interest, and (ii) the USB Note is \$709,117.68 of principal and accrued and unpaid interest. (The amounts listed in the preceding clauses (i) and (ii) represent principal and accrued and unpaid interest outstanding under the Fremont Note and the USB Note, respectively, as of December 5, 1998. To the extent that the Fremont Note and the USB Note are repaid prior to December 5, 1998, as is currently anticipated by the parties, the Bank will promptly refund to the Borrower the amount of any overpayment.)

ARTICLE III
CONDITIONS OF ISSUANCE

SECTION 3.1 Conditions Precedent to Issuance of the Letter of Credit. The obligation of the Bank to issue the Letter of Credit is subject to the condition precedent that the Bank shall have received on or before the date of the

issuance of the Letter of Credit each of the following, in form and substance satisfactory to the Bank:

- (a) a fully executed copy of the Indenture;
- (b) a fully executed copy of the Pledge Agreement;

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(c) a fully executed copy of each Deed of Trust, acknowledged and in recordable form;

(d) evidence satisfactory to the Bank that all the Collateral has been duly pledged to the Bank;

(e) an opinion of counsel to the Borrower, opining as to such matters (including, but not limited to, the validity and enforceability of this Agreement and the other Related Documents to which the Borrower is a party), and otherwise in such form and substance as the Bank shall reasonably require;

(f) certified copies of all documents evidencing any necessary action approving this Agreement and each Related Document to which the Borrower is a party and all other necessary action with respect to each such document;

(g) policies of title insurance insuring, to the Bank's satisfaction, the first priority liens (or, in the case of the lien on the Solar Way property that is to be junior to the lien on such property held by the SBA, as specified in the Third Party Lienholder Agreement, such lower priority as the Bank may accept in its discretion) of the Deeds of Trust encumbering the land described in Exhibit A to each Deed of Trust ("Land"), in such form, and with such endorsements, as the Bank shall require;

(h) a fully executed Third Party Lienholder Agreement in form and substance acceptable to the Bank;

(i) a UCC-1 Financing Statement executed by the Borrower and recorded in the Office of the Secretary of State of California; and

(j) such credit applications, financial statements, authorizations and such information concerning the Borrower and its operations and condition (financial and otherwise) as the Bank may reasonably request.

SECTION 3.2 Additional Conditions Precedent to Issuance of the Letter of Credit. The obligation of the Bank to issue the Letter of Credit shall be subject to the further conditions precedent that on the date of the issuance of the Letter of Credit:

(a) the following statements shall be true, and the Bank shall have received a certificate signed by the Borrower, dated the date of such issuance, stating that:

(i) the representations and warranties contained in Section 4.1 of this Agreement, Section 4 of each Deed of Trust and Section 4 of the Security Agreement are correct on and as of the date of issuance of the Letter of Credit as though made on and as of such date; and

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(ii) no event has occurred and is continuing, or would result from the issuance of the Letter of Credit, which constitutes an Event of Default or would constitute an Event of Default but for the requirement that notice be given or time elapse or both; and

(b) the Bank shall have received such other filings or recordations,

approvals, opinions, or documents as the Bank may reasonably request.

ARTICLE IV
REPRESENTATIONS AND WARRANTIES

SECTION 4.1 Representations and Warranties of the Borrower. The Borrower represents and warrants as follows:

(a) The Borrower is a corporation duly organized, validly existing and in good standing under the laws of the jurisdiction of its incorporation, is qualified to do business and is in good standing in each jurisdiction in which the failure so to qualify or be in good standing would result in a material adverse effect on the business or condition (financial or otherwise) of the Borrower, and has all requisite power and authority to own its assets and carry on its business and to execute, deliver and perform its obligations hereunder and under the Related Documents to which it is a party.

(b) The execution, delivery, and performance by the Borrower of this Agreement and each Related Document to which it is a party (i) are within its powers, (ii) have been duly authorized by all necessary action, (iii) do not contravene any law or contractual restriction binding on or affecting the Borrower, and (iv) do not result in or require the creation of any lien, security interest, or other charge or encumbrance (except as provided in or contemplated by this Agreement or any of the Related Documents) upon or with respect to any of its properties.

(c) No consent, authorization, approval, or other action by, and no notice to or filing with, any governmental authority or regulatory body is required for the due execution, delivery, and performance by the Borrower of this Agreement and each Related Document to which it is a party other than that which has been obtained or will be obtained when required.

(d) This Agreement is, and each Related Document to which the Borrower is a party when delivered hereunder will be, the legal, valid, and binding obligation of the Borrower enforceable against the Borrower in accordance with its terms, except to the extent that such enforcement may be limited by applicable bankruptcy, insolvency, and other similar laws affecting creditors' rights generally, and by the application of equitable principles.

(e) There is no pending or threatened action, investigation, or proceeding before any court, governmental agency, or arbitrator against or affecting the Borrower which may materially adversely affect the ability of the Borrower to perform its obligations hereunder or under any Related Document to which it is a party.

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(f) The pledge and assignment pursuant to this Agreement and the Related Documents of the Collateral and any and all amounts on deposit from time to time in any accounts which are part of the Collateral, create a valid binding first priority security interest therein securing the Obligations purported to be secured thereby.

(g) All financial statements, copies of which have heretofore been furnished to the Bank, are complete and correct and present fairly in accordance with generally accepted accounting principles, the financial condition of the Borrower, and since the date of such statements there has been no material adverse change in the Borrower or the Collateral.

ARTICLE V
COVENANTS

SECTION 5.1 Affirmative Covenants of the Borrower. So long as a drawing is available under the Letter of Credit or the Borrower shall have any obligation to pay any amount to the Bank hereunder, the Borrower will, unless the Bank shall otherwise consent in writing:

(a) preserve and maintain its existence and its rights, and franchises that Borrower reasonably deems necessary in the operation of its business,

(b) comply with the requirements of the Related Documents to which it is a party, and all applicable laws, ordinances, rules, and regulations of any governmental authority, the non-compliance with which would have a material adverse effect on the Borrower's operations, properties, ownership, assets, management, or condition (financial or otherwise) or which could materially impair the Borrower's ability to perform its obligations under this Agreement or any Related Document;

(c) promptly, upon learning thereof, give written notice to the Bank of:

(1) the occurrence of any Potential Default or Event of Default;

(2) any litigation or proceeding affecting the Borrower which could have a material adverse effect on the condition of the Borrower or the Property; and

(3) a material adverse change in the business, operations, property or financial or other condition of the Borrower;

(d) comply with all agreements, conditions, covenants, restrictions and other instruments which affect or impose a lien upon the Property or any of the other Collateral, except as permitted under the Bank Documents;

(e) comply with all agreements, conditions, covenants and restrictions set forth in the Loan Agreement and the other Bank Documents; and

(f) cause the Bonds to be redeemed on or prior to the dates (subject to Section 2.6) and in the minimum principal amounts set forth on Schedule 1 hereto.

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SECTION 1.18 Negative Covenants of the Borrower. So long as a drawing is available under the Letter of Credit or the Borrower shall have any obligation to pay any amount to the Bank hereunder, the Borrower will not, without the written consent of the Bank:

(a) sell, lease, transfer, or otherwise dispose of the Collateral, except in connection with the transactions contemplated or permitted herein and in the Bank Documents;

(b) create or permit to exist any lien, security interest or other charge or encumbrance, or any other type of preferential arrangement, upon or with respect to the Collateral, except as permitted under the Bank Documents;

(c) enter into or consent to any amendment or modification of the Indenture;

(d) request a conversion of interest on the Bonds to the Fixed Interest Rate; or

(e) issue or incur, as the case may be, any bond, note, loan, advance or other indebtedness or obligation (including lease and installment sale obligations) having a lien senior to or on a parity with the Bank's lien on all or any portion of the Collateral, except as permitted under the Bank Documents.

ARTICLE VI

ADDITIONAL PROVISIONS RELATING TO COLLATERAL

SECTION 6.1 Exercise of Rights with Respect to Collateral. Upon the

occurrence and during the continuance of any Event of Default hereunder, the Bank is authorized to (a) apply the Collateral in satisfaction of the Obligations; and (b) in the name of the Bank or in the name of the Borrower, (i) exercise all other rights and remedies provided for herein, in any Related Document or otherwise available to it in respect of the Collateral and to exercise all the rights and remedies of a secured party under the Uniform Commercial Code and other laws in effect in the State of California, (ii) without notice, retain the Collateral or any part thereof, and (iii) dispose of the Collateral in any manner permitted by law; provided, however, that the Bank shall not be obligated to make any sale of Collateral or the proceeds thereof regardless of any notice of sale having been given. The Bank may adjourn any public or private sale from time to time by announcement at the time and place fixed therefor, and such sale may, without further notice, be made at the time and place to which it was so adjourned.

SECTION 6.2 Bank to Exercise Reasonable Care. The Bank shall be deemed to have exercised reasonable care in the custody and preservation of any Collateral in its possession if such Collateral is accorded treatment substantially equal to that which the Bank accords its own property of similar nature, it being understood that the Bank shall not have any responsibility for taking any necessary steps to preserve rights against any parties with respect to any Collateral.

SECTION 6.3 Further Assurances. The Borrower agrees that at any time, and from time to time, at the expense of the Borrower, the Borrower will promptly execute and deliver all further instruments and documents, and take all further action, that may be necessary or reasonably desirable, as the Bank may request, in order to protect any security interest granted or

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purported to be granted hereby or by any Related Document or to enable the Bank to exercise and enforce its rights and remedies hereunder or under any Bank Document with respect to any Collateral.

ARTICLE VII EVENTS OF DEFAULT

SECTION 7.1 Events of Default. The occurrence of any of the following events shall be an "Event of Default" hereunder:

(a) the Borrower shall fail to pay any amount payable by it under this Agreement or any Related Document when due; or

(b) any representation or warranty made, or deemed made, by the Borrower under or in connection with this Agreement or any Related Document shall prove to have been incorrect in any material respect when made, or

(c) the Borrower shall fail to perform or observe its covenant contained in Section 5.1(f) or the Bonds shall otherwise not be redeemed on or prior to the dates and in the minimum principal amounts set forth on Schedule 1 hereto; or

(d) the Borrower shall fail to perform or observe any other term, covenant, or agreement contained in this Agreement on its part to be performed or observed and any such failure shall remain unremedied for 30 days after written notice thereof shall have been given to the Borrower by the Bank; or

(e) the Borrower shall generally not pay its debts as such debts become due, or shall admit in writing its inability to pay its debts generally, or shall make a general assignment for the benefit of creditors; or any proceeding shall be instituted by or against the Borrower seeking to adjudicate it a bankrupt or insolvent or seeking liquidation, winding up, reorganization, arrangement, adjustment, protection, relief or composition of it or its debts under any law relating to bankruptcy, insolvency, or reorganization or relief of debtors, or seeking the entry of an order for relief or the appointment of a

receiver, trustee, or other similar official for it or for any substantial part of its property (and, in the case of an involuntary proceeding, such proceeding shall remain undismissed or unstayed for a period of 60 days); or the Borrower shall take any action to authorize any of the actions set forth above in this subsection (e); or

(f) any provision of this Agreement or any Related Document to which the Borrower is a party shall at any time for any reason cease to be valid and binding on the Borrower or shall be declared to be null and void, or the validity of any provision of this Agreement or any such Related Document shall be contested by the Borrower or the enforceability of any provision of this Agreement or any such Related Document shall be contested by the Borrower, or a proceeding shall be commenced by any governmental agency or authority having jurisdiction over the Borrower seeking to establish the invalidity of this Agreement or any such Related Document or the unenforceability in any respect thereof; or

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(g) any event of default under any Related Document shall have occurred.

SECTION 7.2 Upon an Event of Default. If any Event of Default shall have occurred and be continuing, the Bank may do any, all, or none of the following: (i) declare that all amounts available for drawing under the Letter of Credit are due and payable, (ii) give notice to the Trustee to demand the immediate prepayment of the Bonds as contemplated in Section 7.01(e) of the Indenture, and (iii) exercise in respect of the Collateral any or all rights and remedies as if a draft representing the full amount then available under the Letter of Credit had been presented to the Bank and paid by it.

ARTICLE VIII FEES AND PAYMENTS

SECTION 8.1 Fees.

(a) Annual Letter of Credit Fee. The Borrower shall pay to the Bank commencing on the Closing Date, an annual fee (the "Annual Letter of Credit Fee") for providing the Letter of Credit in an amount equal to one and one-quarter percent (1.25%) per annum calculated on the basis of a 360-day year and actual days elapsed, based on the actual daily amount of the Letter of Credit available to be drawn upon in such year. Such fee shall be due and payable to the Bank annually in advance on the Closing Date and on each anniversary thereof.

(b) The Letter of Credit Origination Fee. The Borrower shall pay to the Bank a fee (the "Letter of Credit Origination Fee") for providing the Letter of Credit in an amount equal to one-half of one percent (.50%) of the Commitment. Such fee shall be due and payable upon the issuance of the Letter of Credit.

ARTICLE IX MISCELLANEOUS

SECTION 9.1 Amendments, Etc. No amendment or waiver of any provision of this Agreement, nor consent to any departure by the Borrower therefrom, shall in any event be effective unless the same shall be in writing and signed by the Bank and then such waiver or consent shall be effective only in the specific instance and for the specific purpose for which given.

SECTION 9.2 Notices, Etc. All notices and other communications provided for hereunder shall be in writing and mailed by registered mail, return receipt requested, or delivered, or shall be by facsimile transmission promptly confirmed in writing, addressed as follows:

To the Trustee:

Harris Trust Company of California
601 South Figueroa Street, 49th Floor

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Los Angeles, CA 90017
Attention: Corporate Trust Department
Facsimile: (213) 239-0631

To the Borrower:

American Xtal Technology, Inc.
4311 Solar Way
Fremont, CA 94538
Attention: Guy D. Atwood
Facsimile: (510) 683-5901

To the Bank:

U.S. Bank National Association
Fremont Business Banking
39510 Paseo Padre Parkway
Fremont, CA 94538
Attention: Jason A. Floyd
Facsimile: (510) 791-1340

or, as to each party, to such other person or at such other address as shall be designated by such party in a written notice to the other party. All such notices and communications shall be effective (i) if delivered by hand, when delivered; (ii) if sent by mail, upon the earlier of the date of receipt or five Business Days after deposit in the mail, first class (or air mail, with respect to communications to be sent to or from the United States), postage prepaid; and (iii) if sent by facsimile transmission, when sent, except that notices to the Bank pursuant to the provisions of Article II hereof shall not be effective until received by the Bank.

SECTION 9.3 No Waiver; Remedies. No failure on the part of any party hereto to exercise, and no delay in exercising, any right hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right hereunder preclude any other or further exercise thereof or the exercise of any other right. The remedies herein provided are cumulative and not exclusive of any remedies provided by law.

SECTION 9.4 Indemnification.

(a) The Borrower hereby indemnifies and holds the Bank harmless from and against any and all claims, damages, losses, liabilities, costs, or expenses which the Bank may incur or which may be claimed against the Bank by reason of (i) any conditions, occupancy, use, possession, conduct or management of, or work done in or about, or from the planning, design, acquisition, installation, or construction of the Property, or any part thereof, or (ii) carrying out of any of the transactions contemplated by this Agreement and the Related Documents, including, but not limited to, any certifications or representations made by the Borrower in connection therewith; provided, however, that the Borrower shall not be obligated to indemnify the Bank for

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claims, damages, losses, liabilities, costs and expenses resulting solely from the Bank's gross negligence or willful misconduct.

(b) Nothing in this Section 9.4 is intended to limit the Borrower's obligations contained in Article II hereof. Without prejudice to the survival of

any other obligation of the Borrower hereunder, the indemnities and obligations of the Borrower contained in this Section 9.4 shall survive the payment in full of amounts payable pursuant to Article II hereof and the termination of the Letter of Credit.

(c) In the event that any applicable law, order, regulation, treaty or directive issued by any central bank or other governmental authority, agency or instrumentality or any governmental or judicial interpretation or application thereof, or compliance by the Bank with any request or directive (whether or not having the force of law) issued by any central bank or other governmental authority, agency or instrumentality:

(1) does or shall subject the Bank to any tax of any kind whatsoever with respect to this Agreement or the Letter of Credit, or change the basis of taxation of payments to the Bank of any reimbursement, fee, interest or any other amount payable hereunder (except for change in the rate of tax on the overall net income of the Bank);

(2) does or shall impose, modify or hold applicable any reserve, capital requirement, special deposit, compulsory loan or similar requirements against assets held by, or deposits or other liabilities in or for the account of, advances or loans by, or other credit extended by, or any other acquisition of funds by, any office of the Bank which is not otherwise included in the determination of interest payable on the Obligations; or

(3) does or shall impose on the Bank any other condition;

and the result of any of the foregoing is to increase the cost to the Bank of issuing, renewing or maintaining the Letter of Credit or to reduce any amount receivable in respect thereof or the rate of return on the capital of the Bank or any corporation controlling the Bank, then, in any such case, the Borrower agrees to promptly pay to the Bank, upon its written demand, any additional amounts necessary to compensate the Bank for such additional cost or reduced amounts receivable or rate of return as determined by the Bank with respect to this Agreement or the Letter of Credit. If the Bank becomes entitled to claim any additional amounts pursuant to this subparagraph (c), it shall promptly notify the Borrower of the event by reason of which it has become so entitled. A certificate as to any additional amounts payable pursuant to the foregoing sentence containing the calculation thereof in reasonable detail submitted by the Bank to the Borrower shall be conclusive in the absence of manifest error. The provisions hereof shall survive the termination of this Agreement and payment of the Obligations and all other amounts payable hereunder.

SECTION 9.5 Liability of the Bank. As between the Borrower and the Bank, the Borrower assumes all risks of the acts or omissions of the Trustee and any other beneficiary or transferee of the Letter of Credit with respect to its use of the Letter of Credit. Neither the Bank nor any of its officers or directors shall be liable or responsible for: (a) the use which may be

made of the Letter of Credit or any acts or omissions of the Trustee and any other beneficiary or transferee in connection therewith; (b) the validity, sufficiency, or genuineness of documents presented to the Bank, or of any endorsements thereon, even if such documents should prove to be in any or all respects invalid, insufficient, fraudulent, or forged; (c) payment by the Bank against presentation of documents which do not comply with the terms of the Letter of Credit, including failure of any documents to bear any reference or adequate reference to the Letter of Credit; or (d) any damage, deficiency, loss, cost, or expense arising out of any action, claim, or other circumstance of any nature whatsoever relating to the payment or failure to make payment under the Letter of Credit, except that the Borrower shall have a claim against the Bank, and the Bank shall be liable to the Borrower, to the extent of any direct, as opposed to consequential, damages suffered by the Borrower which the Borrower proves were caused by (i) the Bank's willful misconduct or gross negligence in determining whether documents presented under the Letter of Credit comply with

the terms of the Letter of Credit or (ii) the Bank's willful failure to make lawful payment under the Letter of Credit after the presentation to it by the Trustee or a successor trustee under the Indenture of a draft and certificate strictly complying with the terms and conditions of the Letter of Credit. In furtherance and not in limitation of the foregoing, the Bank may accept documents that appear on their face to be in order, without responsibility for further investigation, regardless of any notice or information to the contrary, unless acceptance of such documents after receipt of such notice constitutes gross negligence or willful misconduct.

SECTION 9.6 Costs, Expenses, and Taxes. The Borrower agrees to pay immediately following demand therefor all reasonable costs and expenses in connection with the preparation, execution, delivery, filing, and recording of this Agreement, the Bank Documents, and any other documents which may be delivered in connection with this Agreement, including, without limitation, the reasonable fees and out-of-pocket expenses of counsel for the Bank with respect thereto and with respect to advising the Bank as to its rights and responsibilities under this Agreement and the Related Documents, the costs of substituting a letter of credit or other credit enhancement, and any and all other costs, expenses, fees, liabilities, and claims of any nature whatsoever (including reasonable counsel fees and expenses) arising out of or in connection with (i) the enforcement of this Agreement, the Related Documents and such other documents as may be delivered in connection therewith, (ii) any action or proceeding relating to a court order, injunction, or other process or decree restraining or seeking to restrain the Bank from paying any amount under the Letter of Credit and (iii) amending or supplementing this Agreement or the Related Documents for any purpose. In addition, the Borrower shall pay any and all stamp and other taxes and fees payable or determined to be payable in connection with the execution, delivery, filing, and recording of all instruments required by the Bank to be filed in connection with the transactions contemplated hereby, and, to the extent permitted by law, agrees to hold the Bank harmless from and against any and all liabilities with respect to or resulting from any delay in paying or omission to pay such taxes and fees. The Borrower shall be furnished with copies of bills relating to the foregoing upon request.

SECTION 9.7 Participations, Etc. The Borrower acknowledges that the Bank may elect to sell, assign and otherwise transfer to other persons (each, a "Transferee") all or portions of, and participations in, the Bank's interests hereunder and under the Related Documents from time to time and expressly agrees that each Transferee shall be entitled to the rights of the

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"Bank" hereunder. For purposes of this Section 9.7, the Bank may disclose to a potential or actual Transferee any and all information supplied to the Bank by or on behalf of the Borrower. The Borrower agrees to execute and deliver to the Bank such documents, instruments and agreements, including, without limitation, amendments to the Related Documents, deemed necessary or desirable by the Bank to effect such transfers.

SECTION 9.8 Binding Effect. This Agreement shall become effective when it shall have been executed by the parties hereto and thereafter shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns (including Transferees, as described in Section 9.7 hereof.

SECTION 9.9 Assignments. The Borrower may not assign its rights or obligations under this Agreement without the prior written consent of the Bank in its sole discretion. Subject to the foregoing, all provisions contained in this Agreement or any document or agreement referred to herein or relating hereto shall inure to the benefit of the Bank, its successors and assigns, and shall be binding upon the Borrower and its successors and assigns.

SECTION 9.10 Severability. Any provision of this Agreement which is prohibited, unenforceable, or not authorized in any jurisdiction shall, as to

such jurisdiction, be ineffective to the extent of such prohibition, unenforceability, or nonauthorization without invalidating the remaining provisions hereof or affecting the validity, enforceability or legality of such provision in any other jurisdiction.

SECTION 9.11 Governing Law. This Agreement shall be governed by, and construed in accordance with, the laws of the State of California (without giving effect to principles of conflict of laws).

SECTION 9.12 Headings. Section headings in this Agreement shall have no substantive or interpretative effect, are included herein for convenience of reference only and shall not constitute a part of this Agreement for any other purpose.

SECTION 9.13 Counterparts. This Agreement may be executed in several counterparts, each of which shall be regarded as the original and all of which shall constitute one and the same Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed and delivered by their respective officers thereunto duly authorized as of the date first above written.

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AMERICAN XTAL TECHNOLOGY, INC.

By: /s/ GUY ATWOOD

Its: Vice President

U.S. BANK NATIONAL ASSOCIATION

By: /s/ GLEN V. GUGLIELIMINA

Its: Senior Vice President

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EXHIBIT A
TO LETTER OF CREDIT AND
REIMBURSEMENT AGREEMENT

Irrevocable Letter of Credit

U.S. Bank National Association

980 Ninth Street, Suite 1200
Sacramento, California 95814

Date: [_____]

CREDIT No. [_____]

Harris Trust Company of California
601 South Figueroa Street, 49th Fl.
Los Angeles, CA 90077
Attention: Corporate Trust Department

Ladies & Gentlemen:

You, as Trustee under that certain Indenture dated as of December 1, 1998 (the "Indenture"), between you and American Xtal Technology, Inc. (the "Borrower"), pursuant to which the Borrower has executed and delivered U.S. \$11,615,000 in aggregate principal amount of its Variable Rate Taxable Demand Revenue Bonds Series 1998 (Xtal Project) (the "Bonds"), are hereby irrevocably authorized to draw on this Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association (the "Bank"), for the account of the Borrower, available by your drafts at sight upon the terms and conditions hereinafter set forth, an aggregate amount that does not exceed the sum of the Principal Component and the Interest Component as set forth below, which in no event will exceed U.S. \$11,986,680 (such sum, subject to such maximum amount, being herein referred to as the "Stated Amount"). This Letter of Credit is effective immediately and expires on the close of business at the Bank's Office (as defined below) on December 1, 2008 (the "Expiration Date").

The amount available under Principal Drawings (as defined in paragraph (A) below) and Principal Purchase Drawings (as defined in paragraph (C) below) shall not exceed, in the aggregate, U.S. \$11,615,000, as such amount shall be decreased as hereinafter provided (the "Principal Component"). The amount available under Interest Drawings (as defined in paragraph (B) below) and Interest Purchase Drawings (as defined in paragraph (D) below) shall not exceed U.S. \$371,680, representing payment of up to 96 days' interest accrued on the Bonds at or prior to the Expiration Date, calculated at the rate of twelve percent (12%) per annum on the basis of a 360-day year (actual days elapsed), as such amount may be decreased and/or increased as hereinafter provided (the "Interest Component"). At no time may the aggregate drawing outstanding hereunder exceed the Stated Amount.

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Funds under this Letter of Credit are available to you against your sight drafts drawn on us, stating on their face: "Drawn under Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association, 980 Ninth Street, Suite 1200, Sacramento, California 95814."

(A) Subject to paragraph (C) below, if the drawing is being made with respect to any payment of principal with respect to the Bonds (a "Principal Drawing"), the sight draft shall be accompanied by your written certificate purporting to be signed by you in the form of Exhibit A attached hereto appropriately completed.

(B) If the drawing is being made with respect to a payment of interest with respect to the Bonds (an "Interest Drawing"), the sight draft shall be accompanied by your written certificate purporting to be signed by you in the form of Exhibit B hereto appropriately completed.

(C) If the drawing is being made in accordance with Section 2.04 of the Indenture with respect to payment of the portion of the purchase price of Bonds delivered to the Trustee or the Tender Agent appointed pursuant to the Indenture (the "Tender Agent") equal to the principal amount of such Bonds (a "Principal Purchase Drawing"), the sight draft shall be accompanied by your written certificate purporting to be signed by you in the form of Exhibit C attached hereto appropriately completed.

(D) If the drawing is being made with respect to payment of the portion of the purchase price of Bonds referred to in paragraph (C) above equal to the amount of accrued and unpaid interest with respect to such Bonds to the date of purchase of such Bonds (an "Interest Purchase Drawing"), the sight draft shall be accompanied by your written certificate purporting to be signed by you in the form of Exhibit D attached hereto appropriately completed, and such Interest Purchase Drawing shall be made simultaneously with the related Principal Purchase Drawing.

Presentation of such draft(s) and certificate(s) shall be made at the

Bank's office located at 980 Ninth Street, Suite 1200, Sacramento, California 95814, Attention: International Department, Fax No. (916) 556-5763 or at any other office in the United States that may be designated by us by written notice delivered to you (the "Bank's Office").

We hereby agree that all drafts drawn under and in compliance with the terms of this Letter of Credit will be duly honored by us upon delivery of the certificate(s) as specified herein if presented at such office on or before the Expiration Date. Provided that in each case the documents presented in connection with a drawing conform to the terms and conditions hereof, the following time schedule shall prevail:

(A) If a drawing is made by you hereunder and received by us at or prior to 9:00 a.m. Pacific time, on a Business Day (as hereinafter defined), payment shall be made to you or to your order of the amount specified, in immediately available funds, at or prior to 1:00 p.m. Pacific time, on the same Business Day.

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(B) If a drawing is made by you hereunder and received by us after 9:00 a.m. Pacific time, on a Business Day, payment shall be made to you or to your order of the amount specified, in immediately available funds, at or prior to 9:30 a.m. Pacific time, on the following Business Day.

If requested by you, payment under this Letter of Credit shall be made by deposit of immediately available funds into an account designated by you.

As used herein, "Business Day" shall mean a day other than (i) a Saturday, or a Sunday or (ii) a day on which banks located in Sacramento, California, or banks located in the city in which your principal office or the principal office of the Tender Agent is located are authorized or obligated by law or executive order to close or (iii) a day on which the New York Stock Exchange is closed. All payments hereunder shall be made with our own funds.

Each drawing honored by the Bank under this Letter of Credit shall immediately reduce the Principal Component or the Interest Component (as the case may be) by the amount of such drawing, and the Stated Amount shall be correspondingly reduced. The Principal Component shall also be decreased without amendment and without notice to you by the amount specified by the Trustee from time to time pursuant to a notice to the Bank in the form attached hereto as Exhibit E, such decrease to be effective upon receipt by the Bank of such notice. The Principal Component and the Interest Component (and correspondingly, the Stated Amount) so reduced shall be reinstated only as follows:

(A) The Interest Component (and correspondingly the Stated Amount) so reduced shall be reinstated, in the case of a reduction resulting from an Interest Drawing only, automatically as of the Bank's close of business in Sacramento, California, on the day the Bank honors such Interest Drawing, to an amount equal to 96 days' interest on the Bonds Outstanding, calculated at the rate of Twelve Percent (12%) per annum on the basis of a 360-day year (actual days elapsed).

(B) The Interest Component and the Principal Component (and correspondingly the Stated Amount) so reduced shall be reinstated, in the case of a reduction resulting from an Interest Purchase Drawing or a Principal Purchase Drawing pursuant to Section 2.04 of the Indenture only, automatically upon and to the extent the Bank has received from you notice of the reimbursement of such payment in immediately available funds pursuant to your certificate in the form of Exhibit F; in such case, the Principal Component shall be reinstated in an amount equal to the portion of such payment attributable to reimbursement of the Principal Purchase Drawing and the Interest Component shall be reinstated to an amount equal to 96 days' interest on the Bonds Outstanding, calculated at the rate of Twelve Percent (12%) per annum on the basis of a 360-day year (actual days elapsed).

If the amount available under this Letter of Credit has been decreased pursuant to a Principal Drawing, the Bank shall have the right to amend this Letter of Credit or the right to require you to surrender this Letter of Credit to the Bank, and to accept a substitute Letter of Credit which has an express Principal

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Component and Interest Component equal to the Principal Component and Interest Component as so decreased, but otherwise in a form and having terms identical to this Letter of Credit.

Only you as Trustee may make a drawing under this Letter of Credit. Upon the payment to you or to your order of the amount specified in a sight draft drawn hereunder, we shall be fully discharged on our obligation under this Letter of Credit with respect to such sight draft, and we shall not thereafter be obligated to make any further payments under this Letter of Credit in respect of such sight draft to you or any other person who may have made to you or makes to you a demand for payment of principal of, purchase price of, or interest on, any Bond.

Upon the earliest of (i) the making by you of the final drawing available to be made hereunder, (ii) our receipt of a certificate purporting to be signed by your duly authorized officer and a duly authorized officer of the Borrower stating that: "(a) the conditions precedent to the acceptance of an Alternate Letter of Credit set forth in the Indenture have been satisfied, (b) the Trustee has accepted the Alternate Letter of Credit, and (c) upon receipt by U.S. Bank National Association of this certificate, Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association, shall terminate," or (iii) the Expiration Date, this Letter of Credit shall automatically terminate and be delivered to the Bank for cancellation.

This Letter of Credit is subject to the Uniform Customs and Practice for Documentary Credits (1993 Revision), International Chamber of Commerce, Publication No. 500 (the "Uniform Customs"), excluding Article 41 thereof. In addition, the Bank agrees that, notwithstanding the second sentence of Article 17 of the Uniform Customs, if the Expiration Date occurs on a Business Day upon which the Bank's Office is closed by virtue of an interruption of the nature described in Article 17, the Expiration Date will be extended to the next Business Day upon which the Bank's Office is open. As to matters not governed by the Uniform Customs, this Letter of Credit shall be governed by and construed in accordance with the laws of the State of California, without giving effect to conflicts of law principles. Communications with respect to this Letter of Credit shall be in writing and shall be addressed to the Bank's Office, specifically referring thereon to "Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association, 980 Ninth Street, Suite 1200, Sacramento, California 95814."

This Letter of Credit may be transferred more than once, but only in the amount of the full utilized balance hereof and only after receipt from the Borrower of the Bank's then applicable transfer fee, to any single transferee who has succeeded Harris Trust Company of California as trustee under the Indenture. Transfers may be effected only through ourselves and only upon presentation to us of a duly executed instrument of transfer in the form attached hereto as Exhibit G. Any transfer of this Letter of Credit as aforesaid must be endorsed by us on the reverse hereof and may not change the place of presentation from our Letter of Credit office in Sacramento, California.

This Letter of Credit sets forth in full our undertaking, and such undertaking shall not in any way be modified, amended, amplified or limited by reference to any document, instrument or agreement referred to herein (including, without limitation, the Bonds), except only

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the certificate(s) and the sight draft(s) referred to herein; and any such reference shall not be deemed to incorporate herein by reference any document, instrument or agreement except for such certificate(s) and such sight draft(s).

Very truly yours,

U.S. BANK NATIONAL ASSOCIATION

By: _____

Name: _____

Title: _____

By: _____

Name: _____

Title: _____

CERTIFICATE FOR PRINCIPAL DRAWING

EXHIBIT A TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

CERTIFICATE FOR PRINCIPAL DRAWING

The undersigned, [Insert Name of Beneficiary] (the "Trustee") hereby certifies to U.S. Bank National Association (the "Bank"), with reference to Irrevocable Letter of Credit No. [_____] (the "Letter of Credit"; any capitalized term used herein and not defined shall have its respective meaning as set forth in the Letter of Credit) issued by the Bank in favor of the Trustee, that:

1. The Trustee is the Trustee under the Indenture for the holders of the Bonds.

2. The Trustee is making a drawing under the Letter of Credit with respect to the payment of the principal amount with respect to all or a portion of the Bonds by reason of acceleration or prepayment pursuant to the terms of the Indenture or by their maturity.

3. The amount of the sight draft accompanying this Certificate does not exceed the Principal Component under the Letter of Credit.

4. The amount of the sight draft accompanying this Certificate was computed in accordance with the terms and conditions of the Bonds and the Indenture.

IN WITNESS WHEREOF, the Trustee has executed and delivered this Certificate as of the _____ day of _____.

Very truly yours,

[Insert Name], as Trustee

By: _____
[Insert Name and Title of Authorized Officer]

CERTIFICATE FOR INTEREST DRAWING

EXHIBIT B TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

CERTIFICATE FOR INTEREST DRAWING

The undersigned, [Insert Name of Beneficiary] (the "Trustee") hereby certifies to U.S. Bank National Association (the "Bank"), with reference to Irrevocable Letter of Credit No. [_____] (the "Letter of Credit"; any capitalized term used herein and not defined shall have its respective meaning as set forth in the Letter of Credit) issued by the Bank in favor of the Trustee, that:

- 1. The Trustee is the Trustee under the Indenture for the holders of the Bonds.
- 2. The Trustee is making a drawing under the Letter of Credit with respect to the payment of interest accrued with respect to the Bonds that is due and payable and that has accrued on or before the Expiration Date.
- 3. The amount of the sight draft accompanying this Certificate does not exceed the Interest Component under the Letter of Credit.
- 4. The amount of the sight draft accompanying this Certificate was computed in accordance with the terms and conditions of the Bonds and the Indenture.

IN WITNESS WHEREOF, the Trustee has executed and delivered this Certificate as of the _____ day of _____.

Very truly yours,

[Insert Name], as Trustee

By: _____
[Insert Name and Title of Authorized Officer]

CERTIFICATE FOR PRINCIPAL PURCHASE DRAWING

EXHIBIT C TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

CERTIFICATE FOR PRINCIPAL PURCHASE DRAWING

The undersigned, [Insert Name of Beneficiary] (the "Trustee") hereby certifies to U.S. Bank National Association (the "Bank"), with reference to Irrevocable Letter of Credit No. [_____] (the "Letter of Credit"; any capitalized term used herein and not defined shall have its respective meaning as set forth in the Letter of Credit) issued by the Bank in favor of the Trustee, that:

- 1. The Trustee is the Trustee under the Indenture for the holders of the Bonds.
- 2. The Trustee is making a drawing under the Letter of Credit to pay the portion of the purchase price of Bonds delivered to the Trustee or the Tender Agent, as the case may be, pursuant to Section 2.04 of the Indenture equal to the principal amount with respect to such Bonds.
- 3. The principal amount with respect to the purchased Bonds for which

this drawing is made is \$[insert Amount], and the Trustee has not heretofore made a drawing which has been honored under the Letter of Credit with respect to the principal amount, or any portion thereof, of the Bonds for such purchase. The amount of the sight draft accompanying this Certificate does not exceed such amount.

4. The amount of the sight draft accompanying this Certificate does not exceed the Principal Component under the Letter of Credit.

5. The amount of the sight draft accompanying this Certificate was computed in accordance with the terms and conditions of the Bonds and the Indenture.

IN WITNESS WHEREOF, the Trustee has executed and delivered this Certificate as of the _____ day of _____.

Very truly yours,

[Insert Name], as Trustee

By: _____
[Insert Name and Title of Authorized Officer]

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CERTIFICATE FOR INTEREST PURCHASE DRAWING

EXHIBIT D TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

CERTIFICATE FOR INTEREST PURCHASE DRAWING

The undersigned, [Insert Name of Beneficiary] (the "Trustee") hereby certifies to U.S. Bank National Association (the "Bank"), with reference to Irrevocable Letter of Credit No. [_____] (the "Letter of Credit"; any capitalized term used herein and not defined shall have its respective meaning as set forth in the Letter of Credit) issued by the Bank in favor of the Trustee, that:

1. The Trustee is the Trustee under the Indenture for the holders of the Bonds.

2. The Trustee is making a drawing under the Letter of Credit to pay the portion of the purchase price of Bonds delivered to the Trustee or the Tender Agent, as the case may be, pursuant to Section 2.04 of the Indenture equal to the amount of accrued and unpaid interest with respect to such Bonds to the date of purchase thereof.

3. The amount of accrued and unpaid interest with respect to the purchased Bonds for which this drawing is made is \$[Insert Amount], and the Trustee has not heretofore made a drawing which has been honored under this Letter of Credit for the accrued and unpaid interest, or any portion thereof, with respect to the purchased Bonds for such purchase. The amount of the sight draft accompanying this certificate does not exceed the amount of interest accrued and unpaid with respect to such Bonds to the date of purchase thereof.

4. The amount of the sight draft accompanying this Certificate does not exceed the Interest Component under the Letter of Credit.

5. The amount of the sight draft accompanying this Certificate was computed in accordance with the terms and conditions of the Bonds and the Indenture.

IN WITNESS WHEREOF, the Trustee has executed and delivered this Certificate as of the _____ day of _____.

Very truly yours,

[Insert Name], as Trustee

By: _____
[Insert Name and Title of Authorized Officer]

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CERTIFICATE FOR REDUCTION OF STATED AMOUNT

EXHIBIT E TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

U.S. Bank National Association
980 9th Street
Suite 1100
Sacramento, California 95814

Re: Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association

Ladies & Gentlemen:

The undersigned (the "Trustee"), as beneficiary under the Irrevocable Letter of Credit No. [_____] (the "Letter of Credit"; any capitalized term used herein and not defined shall have its respective meaning as set forth in the Letter of Credit), hereby consents to a reduction of the [Principal Component to \$_____] [AND/OR] [Interest Component to \$_____].

IN WITNESS WHEREOF, the Trustee has executed and delivered this Certificate as of the _____ day of _____.

Very truly yours,

[Insert Name], as Trustee

By: _____
[Insert Name and Title of Authorized Officer]

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REIMBURSEMENT CERTIFICATE

EXHIBIT F TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

U.S. Bank National Association
980 9th Street
Suite 1100
Sacramento, California 95814

Re: Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association

Ladies & Gentlemen:

The undersigned, [Insert Name of Beneficiary] (the "Trustee") hereby certifies to U.S. Bank National Association (the "Bank"), with reference to Irrevocable Letter of Credit No. [_____] (the "Letter of Credit"; any capitalized term used herein and not defined shall have its respective meaning as set forth in the Letter of Credit) issued by the Bank in favor of the Trustee, that:

1. The Trustee is the Trustee under the Indenture for the holders of the Bonds.

2. The Trustee has today paid to you by wire transfer of immediately available funds the amount of \$_____, for the reimbursement to you of [\$_____ of unpaid principal with respect to the Bonds in connection with a Principal Purchase Drawing and] \$_____ of accrued interest with respect to the Bonds in connection with an Interest Purchase Drawing [, in each case] honored pursuant to the Trustee's draft dated _____ in the aggregate amount of \$_____.

IN WITNESS WHEREOF, the Trustee has executed and delivered this Certificate as of the _____ day of _____.

Very truly yours,

[Insert Name], as Trustee

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TRANSFER CERTIFICATE

EXHIBIT G TO IRREVOCABLE LETTER OF CREDIT NO. [_____]

[Date]

U.S. Bank National Association
980 9th Street
Suite 1100
Sacramento, California 95814

Re: Irrevocable Letter of Credit No. [_____] issued by U.S. Bank National Association

Ladies & Gentlemen:

For value received, the undersigned beneficiary hereby irrevocably transfers to:

[Insert Name and Address of Transferee]

all rights of the undersigned beneficiary to draw under the above Letter of Credit in its entirety.

By this transfer, all rights of the undersigned beneficiary in such Letter of Credit are transferred to the transferee, and the transferee shall have the sole rights as beneficiary thereof, including sole rights relating to any amendments, whether increases or extensions or other amendments and whether now existing or hereafter made. The Letter of Credit may hereafter be amended, extended or increased without necessity of any consent of or notice to the undersigned beneficiary, and you will give notice thereof directly to the transferee.

The advice of such Letter of Credit is returned herewith, and we ask you to endorse the transfer on the reverse thereof and forward it directly to the transferee with your customary notice of transfer.

SIGNATURE AUTHENTICATED

Yours very truly,

(Bank)

Signature of Beneficiary

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SCHEDULE 1
TO LETTER OF CREDIT AND REIMBURSEMENT AGREEMENT

[See attached.]

BOND PURCHASE CONTRACT

\$11,615,000
AMERICAN XTAL TECHNOLOGY, INC.
VARIABLE RATE TAXABLE DEMAND REVENUE BONDS
SERIES 1998
(XTAL PROJECT)

dated

December 1, 1998

among

AMERICAN XTAL TECHNOLOGY, INC., Issuer

and

DAIN RAUSCHER INCORPORATED, Underwriter

BOND PURCHASE CONTRACT

\$11,615,000
AMERICAN XTAL TECHNOLOGY, INC.
VARIABLE RATE TAXABLE DEMAND REVENUE BONDS SERIES 1998
(XTAL PROJECT)

December 1, 1998

American Xtal Technology, Inc
Attn: Mr. Guy D. Atwood
4311 Solar Way
Fremont, California 94538

Dear Mr. Atwood:

Dain Rauscher Incorporated (the "Underwriter") hereby offers to enter into this Bond Purchase Contract (the "Purchase Contract") with American Xtal Technology, Inc. (the "Issuer"). The offer is hereby made subject to acceptance by the Issuer (by the execution and delivery of this Purchase Contract to the Underwriter) on or before 8:00 a.m., Pacific Standard Time, on December 1, 1998 and upon such acceptance, this Purchase Contract shall be in full force and effect in accordance with its terms and shall be binding upon the Issuer and the Underwriter. Capitalized terms used herein and not otherwise defined have the meaning set forth in the Official Statement hereinafter defined.

The Issuer is entering into this Purchase Contract in order to induce the Underwriter to enter into this Purchase Contract and to purchase the \$11,615,000 aggregate principal amount of American Xtal Technology, Inc. Variable Rate Taxable Demand Revenue Bonds Series 1998 (Xtal Project) (the "Bonds") on the terms set forth herein. The Issuer, by its acceptance of the offer made herein,

requests the Underwriter to purchase the Bonds.

The Bonds are issued pursuant to an Indenture, dated as of December 1, 1998 (the "Indenture"), by and between the Issuer and Harris Trust Company of California, as trustee (the "Trustee"), in the form heretofore delivered to us authorizing the Bonds.

The Issuer will enter into a Letter of Credit and Reimbursement Agreement dated December 1, 1998 (the "Reimbursement Agreement") with U.S. Bank National Association (the "Bank"), pursuant to which the Bank will issue on or before the Date of Delivery of the Bonds (the "Bond Issuance Date") to the Trustee for the account of the Issuer, an irrevocable direct-pay letter of credit (the "Letter of Credit"), which will permit the Trustee to draw an amount equal to the principal and up to 96 days' interest on the Bonds at a maximum rate of twelve percent (12%) per annum. The Reimbursement Agreement will provide for reimbursement by the Issuer to the Bank in the event of drawings under the Letter of Credit. The Indenture, this Purchase Contract and the Reimbursement Agreement are herein referred to as the "Program Documents." References in this Purchase Contract to the authorization, execution and delivery of and performance under the Program Documents by a person or an entity shall be deemed to refer only to those Program Documents to which such person or entity is a party.

The Issuer's obligation under the Reimbursement Agreement will be secured by a first lien and third lien Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing, a Security Agreement and other security as set forth in the Reimbursement Agreement.

SECTION 1. PURCHASE AND PURCHASE PRICE. Under the terms and conditions and in reliance upon the representations, warranties and agreements set forth herein, the Issuer agrees to execute and deliver \$11,615,000 aggregate principal amount of the Bonds and the Underwriter agrees to purchase all (but not less than all) of said Bonds at an aggregate Purchase Price of par.

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The Bonds will bear interest as provided in the Indenture.

SECTION 2. OFFICIAL STATEMENT. The Issuer shall deliver or cause to be delivered to the Underwriter, promptly after acceptance hereof and prior to the Closing, copies of the Official Statement dated November 23, 1998, relating to the Bonds and approved for distribution by the Issuer (which Official Statement, including the cover page and all appendices, exhibits, reports and statements included therein or attached thereto being herein called the "Official Statement"), signed on behalf of the Issuer by a duly authorized officer of the Issuer.

The Issuer hereby ratifies, approves and authorizes the use by the Underwriter, prior to the date hereof, in connection with the offer and sale of the Bonds, of the Program Documents, the Letter of Credit and all information contained herein and therein of all other documents, certificates or statements furnished by the Issuer to the Underwriter in connection with the transactions contemplated by this Purchase Contract. The Underwriter agrees that it will not confirm the sale of any Bonds unless the settlement of such sale is accompanied by or preceded by the delivery of a copy of the final Official Statement.

In the event that the Bonds, or the remarketing of the Bonds, should become subject to the continuing disclosure requirements of Rule 15c2-12 under the Securities Exchange Act of 1934 (the "Rule"), the Issuer will furnish to the Underwriter all information reasonably required by the Underwriter to comply with the Rule. To the extent necessary to comply with the Rule, if applicable, the Issuer will notify the Underwriter if it becomes aware of any fact or event which might or would cause the Official Statement, as then supplemented or amended, to contain any untrue statement of a material fact or to omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading, and the Issuer will cooperate with the

Underwriter by furnishing such information as is reasonably required to amend or supplement the Official Statement, and prepare or file any other papers, in compliance with the Rule.

SECTION 3. CLOSING; BONDS. At 8:00 a.m., Pacific Standard Time, December 1, 1998, or at such other time or on such earlier or later date as the Underwriter and the Issuer mutually agree upon, the Issuer will deliver or cause to be delivered to the Underwriter the Bonds in definitive form, duly executed, and authenticated together with the other documents hereinabove mentioned, and the Underwriter will accept such delivery and pay the Purchase Price of the Bonds set forth in Section 1 hereof in federal funds payable to the order of the Trustee for the account of the Issuer. Delivery and payment shall be simultaneously, as aforesaid, made at such place in New York, New York as the Underwriter shall designate or in such other city as the Underwriter and the Issuer mutually agree upon. This payment and delivery shall be called the "Closing." The Bonds shall be in fully registered form, registered in such names as the Underwriter shall submit to the Trustee prior to the Closing and shall be in denominations of One Hundred Thousand Dollars (\$100,000) or any integral multiple of \$5,000 above such amount, except as otherwise provided in the Indenture. The Bonds shall be made available to the Underwriter for checking at least one (1) Business Day prior to the Closing. Notwithstanding the foregoing and any other references in this Purchase Contract to delivery of Bonds, or similar statements, the Bonds are registered in the name of Cede & Co. as nominee of the Depository Trust Company ("DTC") and DTC procedures will be followed and take precedence over any conflicting procedures or provisions.

SECTION 4. REPRESENTATIONS, WARRANTIES AND COVENANTS OF THE ISSUER. The Issuer represents warrants and covenants to the Underwriter that:

(a) The Issuer is a Delaware corporation and is duly qualified to transact business in California. The Issuer has full power and authority to own its property (including, without limitation, the Project), to carry on its business as presently being conducted and as contemplated to be conducted by the Program Documents and to execute, deliver and perform its obligations under the Program Documents.

(b) Both at the date of the Official Statement and at the date of Closing, the statements and information in the Official Statement (as the same may be supplemented or amended with the written approval of the Underwriter), to the extent they relate or pertain to the Issuer, do not contain any untrue statement of material fact or omit to state any fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which such statements were made, not misleading in any material respect. The Issuer makes no

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representation with respect to information in the Official Statement relating to the Underwriter, the Trustee, the Bank or any other party.

(c) The execution, delivery and performance of the Program Documents and the taking of any and all other actions and the execution, delivery and performance of all such documents as may be required of it pursuant to the provisions of the Program Documents including, without limitation, the authorization of the use by the Underwriter of the Official Statement in connection with the offering, sale and distribution of the Bonds, have been duly authorized by the Issuer.

(d) This Purchase Contract has been duly executed and delivered by the Issuer and when executed and delivered by the other parties hereto will constitute a legal, valid and binding obligation of the Issuer, enforceable in accordance with its terms, except as limited by bankruptcy, insolvency, reorganization, moratorium and other similar laws affecting the rights of creditors generally. Upon the execution and delivery of the Program Documents by the Issuer and the other parties thereto, the Program Documents will constitute legal, valid and binding obligations of the Issuer, enforceable in accordance

with their respective terms, except as limited by bankruptcy, insolvency, reorganization, moratorium or other similar laws affecting creditors' rights generally.

(e) If at any time the Issuer becomes aware that any event shall have occurred of which the Issuer believes it has unique knowledge not available to the Underwriter and which might cause the Official Statement to contain any untrue statement of material fact or omit to state any fact necessary to make the statements therein not misleading in any material respect, the Issuer shall notify the Underwriter. In addition, the Issuer shall promptly advise the Underwriter of the institution of any action, suit, proceeding, inquiry or investigation of which it has any knowledge seeking to prohibit, restrain or otherwise affect the use of the Official Statement in connection with the offering, sale or distribution of the Bonds. The Issuer promptly shall furnish the Underwriter any information concerning the Issuer which the Underwriter might reasonably request in connection with any amendment of or supplement to the Official Statement.

(f) The execution, delivery and performance of the Program Documents and the consummation of the transactions contemplated thereby will not conflict with, or constitute a breach of, or default under any indenture, mortgage, deed of trust, lease, note, commitment, agreement or other instrument or obligation to which the Issuer is a party or by which the Issuer or any of its respective properties is bound, or under any law, rule, regulation, judgment, order or decree to which the Issuer or any of its respective properties are bound which breach might have a material adverse effect on the ability of the Issuer to perform under the Program Documents. The Issuer is not now and never has been in default under any order or decree of any court or any order, regulation or demand of any federal, state, municipal or governmental agency or any document, instrument or commitment to which the Issuer is subject or in the payment of the principal of, or premium or interest on, or otherwise in default with respect to, any Bonds, notes or other obligations which it has issued, assumed or guaranteed, directly or indirectly, as to payment of principal, premium or interest.

(g) To the Issuer's knowledge, there is no action, suit, proceeding, inquiry or investigation by or before any court, governmental agency, public board or body pending, or to the knowledge of the Issuer, threatened against the Issuer (nor, to the best of its knowledge, is there any basis therefore), which (i) affects or seeks to prohibit, restrain or enjoin the issuance, sale or delivery of the Bonds or the issuance of the Letter of Credit or the use of the Official Statement or the execution and delivery of the Program Documents or (ii) affects or questions the validity or the enforceability of the Bonds, (iii) questions the completeness or accuracy of the Official Statement or (iv) questions the power or authority of the Issuer to carry out the transactions contemplated by the Program Documents or the power of the Issuer to acquire, own, construct, equip, operate or lease the Project.

(h) To the Issuer's knowledge, it has made all filings with and received all approvals, consents and orders of any governmental authority, legislative body, board, agency or commission having jurisdiction which are necessary to permit the Issuer to perform its obligations under the Program Documents, to carry out the transactions contemplated by the Program Documents and to acquire, own, construct, equip, operate and lease the Project.

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(i) Any certificate signed for the Issuer by an authorized representative thereof and delivered to the Underwriter or the Issuer in connection with the transactions contemplated by the Program Documents shall be deemed to be a representation and warranty by the Issuer to the Underwriter as to the statements therein.

SECTION 5. CONDITIONS TO THE OBLIGATIONS OF THE UNDERWRITER. The obligation of the Underwriter to accept delivery of and pay for the Bonds on the Closing shall be subject, at the option of the Underwriter, to the accuracy in

all material respects of the representations, warranties and agreements on the part of the Issuer contained herein as of the date hereof and as of the Closing, to the accuracy in all material respects of the statements of the officers and other officials of the Trustee, the Bank and the Issuer made in any certificates or other documents furnished pursuant to the provisions hereof or of the Program Documents, and to the performance by the Issuer of its obligations, as applicable, to be performed hereunder and under the Program Documents at or prior to the Closing and to the following additional conditions:

(a) At the Closing, the Bonds, the Program Documents, the Letter of Credit and the Official Statement shall have been duly authorized, executed and delivered by the respective parties thereto, in substantially the forms heretofore submitted to the Underwriter with any such changes as shall have been agreed to in writing by the Underwriter, and said agreements shall not have been amended, modified or supplemented, except as may have been agreed to in writing by the Underwriter, and there shall have been taken in connection therewith, with the issuance of the Bonds and with the transactions contemplated thereby and by this Purchase Contract, all such actions as Bond Counsel and Underwriter's Counsel shall deem to be necessary and appropriate.

(b) The representations and warranties of the Issuer contained in this Purchase Contract shall be true, correct and complete in all material respects on the date hereof and on the Closing, as if made again on the Closing, and the Official Statement (as the same may be supplemented or amended with the written approval of the Underwriter) shall be true, correct and complete in all material respects and shall not contain any untrue statement of fact or omit to state any fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which such statements were made, not misleading.

(c) Between the date hereof and the Closing, the market price or marketability, at the initial offering prices set forth in the Official Statement, of the Bonds shall not have been materially adversely affected, in the reasonable judgment of the Underwriter by reason of any of the following:

(1) legislation enacted or introduced in the Congress or recommended for passage by the President of the United States, or a decision rendered by a court established under Article III of the Constitution of the United States, or an order, ruling, regulation (final, temporary or proposed) or official statement issued or made:

(i) [RESERVED]

(ii) by or on behalf of the Securities and Exchange Commission, or any other governmental agency having jurisdiction of the subject matter, to the effect that the Bonds, as secured by the Letter of Credit, including any or all underlying arrangements, are not exempt from registration under the Securities Act of 1933, as amended or that the Indenture is not exempt from qualification under the Trust Indenture Act of 1939, as amended;

(2) the declaration of war or engagement in major military hostilities by the United States or the occurrence of any other national emergency or calamity relating to the effective operation of the government of, or the financial community in, the United States;

(3) the declaration of a general banking moratorium by federal, New York or California authorities, or the general suspension of trading on any national securities exchange;

(4) the imposition by the New York Stock Exchange or other national securities exchange, or any governmental authority, of any material restrictions not now in force with respect to the Bonds or obligations of the general character of the Bonds or securities generally, or the material increase of any such restrictions now in force, including those relating to the extension of credit by, or the charge to the net capital requirements of, underwriters;

(5) an order, decree or injunction of any court of competent jurisdiction, or order, filing, regulation or official statement by the Securities and Exchange Commission, or any other governmental agency having jurisdiction of the subject matter, issued or made to the effect that the issuance, offering or sale of obligations of the general character of the Bonds, or the issuance, offering or sale of the Bonds, including any or all underlying obligations, as contemplated hereby or by the Official Statement, is or would be in violation of the federal securities laws as amended and then in effect;

(6) the withdrawal or downgrading of any rating of the Bonds by a national rating agency or any rating of the Bank by a nationally recognized rating service;

(7) the occurrence of any adverse change of a material nature in the business, financial condition, results of operation or properties of the Bank, the Issuer, or of any change or development in, or affecting particularly, the economy or the Issuer generally; or

(8) any event occurring, or information becoming known which, in the reasonable judgment of the Underwriter, makes untrue in any material respect any statement or information contained in the Official Statement, or has the effect that the Official Statement contains any untrue statement of material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading.

(d) At or prior to the Closing, the Underwriter shall have received the following documents, in each case satisfactory in form and substance to the Underwriter:

(1) the Program Documents, duly executed and delivered by the respective parties thereto, with such amendments, modifications or supplements as may have been agreed to in writing by the Underwriter, the Official Statement, duly executed by a duly authorized officer of the Issuer, and a copy of the Letter of Credit;

(2) a final opinion, dated the date of the Closing, of Bond Counsel, in the form attached as Appendix A to the Official Statement and addressed to the Issuer, and a separate letter addressed to the Underwriter (or a comparable statement in the supplemental opinion) to the effect that the final opinion may be relied upon by the Underwriter to the same extent as if it had been addressed to it, together with supplemental opinion dated the date of the Closing and addressed to the Underwriter substantially in the form of Exhibit A hereto;

(3) the opinion of counsel to the Bank dated the date of the Closing and addressed to the Issuer, the Rating Agency and the Underwriter, substantially in the form of Exhibit B hereto;

(4) the opinion of counsel to the Issuer, dated the date of Closing and addressed to the Issuer, the Bank, Bond Counsel and the Underwriter, substantially in the form of Exhibit C hereto;

(5) [RESERVED];

(6) the opinion of Underwriter's Counsel, dated the date of Closing, addressed to the Underwriter, substantially in the form of Exhibit D hereto;

(7) a certificate of the Issuer, dated the date of Closing, signed by the Issuer, confirming the representations set forth in Section 5 hereof as if given on the Closing;

(8) a certificate of the Trustee dated the date of Closing, signed by a duly authorized officer of the Trustee, to the effect that:

(i) such officer is a duly authorized officer of the Trustee;

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(ii) the Trustee is a trust company and is duly organized and in good standing and qualified to do business in the State of California, is authorized to carry out corporate trust powers and has all necessary power and authority to enter into and perform its duties under the Indenture and upon the execution and delivery thereof by the Trustee, the same shall constitute legally valid and binding obligations of the Trustee, enforceable in accordance with their respective terms;

(iii) the trusts, duties and obligations of the Trustee under the Indenture have been duly accepted by the Trustee;

(iv) the Trustee is duly authorized to enter into the Indenture and to authenticate and deliver the Bonds to the Underwriter under instruction by the Issuer pursuant to the terms of the Indenture, and the Indenture constitutes a legally binding obligation of the Trustee, enforceable in accordance with its respective terms;

(v) to the best knowledge of such officer, the acceptance by the Trustee of the duties and obligations under the Indenture and the execution and delivery of the Indenture and compliance with provisions thereof, will not conflict with, or constitute a breach of or default under, the Trustee's duties under said documents or any law, administrative regulation, court decree, resolution, charter, bylaws or other agreement to which the Trustee is subject or by which it is bound;

(vi) the representations and agreements of the Trustee in the Indenture are true, complete and correct in all material respects as of the Closing;

(vii) to the best of such officer's knowledge, no litigation is pending or threatened (either in state or federal courts) against the Trustee (A) to restrain or enjoin the execution or delivery of any of the Bonds or the collection of Revenues (as defined in the Indenture) pledged under the Indenture, or (B) in any way contesting or affecting any authority for the authentication or delivery of the Bonds or the validity or enforceability of the Bonds or the Indenture; and

(viii) the Bonds in the principal amount of \$11,615,000 have been validly authenticated, registered and delivered by the Trustee;

(9) the opinion of counsel to the Trustee, dated the date of Closing and addressed to the Issuer, the Bank and the Underwriter, substantially in the form of Exhibit E hereto;

(10) a certificate of the Issuer, dated the date of Closing, signed by an authorized representative as is acceptable to the Underwriter, to the effect that:

(i) the representations and agreements of the Issuer contained in the Program Documents are true and correct in all material respects as of the Closing;

(ii) the Issuer has complied with all agreements, covenants and conditions to be complied with by the Issuer at or prior to the Closing under the Program Documents;

(iii) to the best of such official's knowledge, no event affecting the Issuer has occurred since the date of the Official Statement which either makes untrue or incorrect in any material respect as of the Closing the statements or information concerning the Issuer contained in the Official Statement or is not reflected in the Official Statement but should be reflected therein in order to make the statements and information concerning the Issuer therein not misleading in any material respect; and

(iv) except as set forth in the Official Statement, to the best knowledge of the Issuer after reasonable investigation, no litigation is pending or, to the knowledge of the Issuer, threatened in any court in any way affecting the existence of the Issuer, or in any way challenging the respective

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powers of the several offices of the officials holding those respective offices, or seeking to restrain or to enjoin the issuance, sale or delivery of the Bonds, or the collection of Revenues (as defined in the Indenture) pledged under the Indenture, or the pledge thereof, or in any way contesting or affecting the validity or enforceability of the Bonds or the Program Documents or contesting in any way the completeness or accuracy of the Official Statement, or contesting the powers of the Issuer or its authority with respect to the Bonds or the Program Documents (but in lieu of or in conjunction with such certificate, the Underwriter may, in its sole discretion accept certificates or opinions of counsel to the Issuer, acceptable to the Underwriter, that in the opinion of such counsel the issues raised in any such pending or threatened litigation are without substance or that the contentions of all plaintiffs therein are without merit);

(11) a certificate of the Bank dated the date of Closing, signed by an authorized representative thereof, to the effect that:

(i) all conditions precedent to the issuance of the Letter of Credit, including those specified in the Reimbursement Agreement, have been satisfied or have been waived by the Bank;

(ii) to the actual knowledge of such authorized representative, there is no action, suit, litigation, proceeding, inquiry or investigation at law or in equity or by or before any judicial or administrative court, agency, body or other entity, pending or threatened against the Bank or any of its properties, wherein an unfavorable decision, ruling or finding (A) would adversely affect the validity or enforceability of the Letter of Credit or (B) would otherwise adversely affect the legal ability of the Bank to comply with its obligations under the Letter of Credit; and

(iii) the information contained in the Official Statement under the heading "THE BANK" and the sub-heading "Letter of Credit", is true and correct in all material respects and such information does not contain any untrue or misleading statement of a material fact necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading;

(12) [RESERVED];

(13) evidence satisfactory to the Underwriter to the effect that the Bonds have received a rating satisfactory to the Underwriter from Standard & Poor's; and

(14) such additional legal opinions, certificates, proceedings, instruments and other documents as the Underwriter, Bond Counsel or

Underwriter's Counsel may reasonably request to evidence compliance by the Bank, the Trustee and the Issuer with legal requirements, the truth and accuracy, as of the Closing, of the representations of the Issuer, the Bank and the Trustee, and the due performance or satisfaction by the Issuer, the Bank and the Trustee at or prior to such time of all agreements then to be performed and all conditions then to be satisfied by the Issuer, the Bank and the Trustee.

SECTION 6. AMENDMENT OF OFFICIAL STATEMENT. After the Closing, (1) the Issuer will not adopt any amendment of or supplement to the Official Statement to which, after having been furnished with a copy, the Underwriter shall object in writing and (2) if any event relating to or affecting the Issuer or the Bank shall occur as a result of which it is necessary, in the opinion of the Underwriter, to amend or supplement the Official Statement in order to make the Official Statement not misleading in the light of the circumstances existing at the time it is delivered to the Underwriter, the Issuer shall cause to be forthwith prepared and furnished to the Underwriter (at the expense of the Issuer for ninety (90) days from the Closing and otherwise at the expense of the Underwriter) a reasonable number of copies of an amendment of or supplement to the Official Statement (in form and substance satisfactory to the Underwriter) that will amend or supplement the Official Statement so that it will not contain an untrue statement of material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances existing at the time it is delivered to the Underwriter, not misleading.

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SECTION 7. OBLIGATIONS OF ISSUER. The Issuer's obligations hereunder shall be subject to (i) there being no order, decree, injunction, ruling or regulation of any court or the enactment of any legislation with the purpose or effect of prohibiting the issuance, offering or sale of the Bonds, (ii) receipt of the documents listed above other than those documents delivered by the Issuer and those documents specifically addressed solely to the Underwriter and (iii) the performance by the Issuer and the Underwriter of their obligations to be performed hereunder at or prior to the Closing.

SECTION 8. INDEMNIFICATION.

(a) The Issuer shall indemnify, protect, defend and hold harmless the Underwriter and each person who controls the Underwriter, within the meaning of the Securities Act of 1933, as amended, or the Securities Act of 1934, as amended (collectively, the "Securities Acts"), against any and all losses, claims, damages, liabilities, costs and expenses (including, without limitation, fees and disbursements of counsel and other expenses) incurred by them or any of them in connection with defending any loss, claim, damage, liability or any suit, action or proceeding, joint or several, to which they or any of them may become subject under the Securities Acts, or any other federal or state law or regulation, at common law or otherwise, insofar as such losses, claims, damages, liabilities, costs and expenses (or any suit, action or proceeding in respect thereof) arise out of or are based upon any untrue statement or alleged untrue statement of a material fact contained in the Official Statement or in any amendment or supplement thereto approved by the Issuer (which approval shall not be unreasonably withheld) or arise out of or are based upon the omission or alleged omission to state therein a fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that the Issuer shall not be liable in any such case to the extent that any such loss, claim, damage, liability or action arises out of, or is based upon, any untrue statement or alleged untrue statement of a material fact contained in that particular part of the Official Statement, or any amendment thereof or supplement thereto, under the captions "THE BOOK-ENTRY ONLY SYSTEM" or "THE BANK." Notwithstanding the foregoing, this indemnity shall not cover any losses, claims, damages or liabilities caused solely by the gross negligence of the indemnified party or solely by breach of this agreement by the indemnified party.

(b) The Underwriter shall indemnify, protect, defend and hold

harmless the Issuer against any and all losses, claims, damages, liabilities, costs and expenses (including, without limitation, fees and disbursements of counsel and other expenses) incurred by them or any of them in connection with defending any loss, claim, damage, liability or any suit, action or proceeding, joint or several, to which they or any of them may become subject under the Securities Acts, or any other federal or state law or regulation, at common law or otherwise, insofar as such losses, claims, damages, liabilities, costs and expenses (or any suit, action or proceeding in respect thereof) arise out of or are based upon any untrue statement or alleged untrue statement of a material fact contained in the "THE UNDERWRITER" caption of the Official Statement or in the "THE UNDERWRITER" caption of any amendment or supplement thereto approved by the Issuer (which approval shall not be unreasonably withheld), or arise out of or are based upon the omission or alleged omission to state therein a fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading. Notwithstanding the foregoing, this indemnity shall not cover any losses, claims, damages or liabilities caused solely by the negligence of the indemnified party or solely by breach of this agreement by the indemnified party.

(c) Promptly after receipt by any party entitled to indemnification under this Section 8 of notice of the commencement of any suit, action or proceeding, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party under this Section 8, notify the indemnifying party in writing of the commencement thereof; but the omission so to notify the indemnifying party shall not relieve it from any liability which it may have to any indemnified party otherwise than under this Section 8 or from any liability under this Section 8 unless the failure to provide notice prejudices the defense of such suit, action or proceeding. In case any such action is brought against any indemnified party, and it notifies the indemnifying party, the indemnifying party shall be entitled to participate in, and to the extent that it may elect by written notice delivered to the indemnified party promptly after receiving the aforesaid notice from such indemnified party, to assume the defense thereof, with counsel satisfactory to such indemnified party; provided, however, if the defendants in any such action include both the indemnified party and the indemnifying party and the indemnified party shall have reasonably concluded that there may be legal defenses available to it and/or other indemnified parties which are different from or additional to those available to the indemnifying party, the indemnified party or parties shall have the right to select separate counsel to

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assert such legal defenses and to otherwise participate in the defense of such action on behalf of such indemnified party or parties. Upon receipt of notice from the indemnifying party to such indemnified party of its election so to assume the defense of such action and approval by the indemnified party of counsel, the indemnifying party shall not be liable to such indemnified party under this Section 8 for any legal or other expenses subsequently incurred by such indemnified party in connection with defense thereof unless (i) the indemnified party shall have employed separate counsel in connection with the assertion of legal defenses in accordance with the proviso to the next preceding sentence (it being understood, however, that the indemnifying party shall not be liable for the expenses of more than one separate counsel, approved by the Underwriter, the Issuer in the case of the subparagraph (a), representing the indemnified parties under the subparagraph (a) who are parties to such action), (ii) the indemnifying party shall not have employed counsel satisfactory to the indemnified party to represent the indemnified party within a reasonable time after notice of commencement of the action or (iii) the indemnifying party has authorized the employment of counsel for the indemnified party at the expense of the indemnifying party; and except that, if clause (i) or (iii) is applicable, such liability shall be only in respect of the counsel referred to in such clause (i) or (iii).

(d) The Issuer shall not be liable for any settlement of any such action effected without its consent by any indemnified party, but if settled

with the consent of the Issuer or if there be a final judgment for the plaintiff in any such action against the Issuer or any indemnified party, with or without the consent of the Issuer, then the Issuer agrees to indemnify and hold harmless such indemnified party to the extent provided herein.

SECTION 9. EXPENSES. Whether or not the sale of the Bonds by the Issuer to the Underwriter is consummated, the Underwriter shall be under no obligation to pay any costs or expenses incident to the performance of the obligations of the Issuer hereunder. All costs and expenses to effect the authorization, preparation (including word processing and printing costs), issuance, sale and delivery, as the case may be, of the Official Statement (together with any amendments or supplements thereof), the Bonds, the Program Documents, the Letter of Credit, any rating agency fees, Trustee's fees and expenses, Trustee's counsel fees and disbursements, financial consultant fees and disbursements, the fees and disbursements of Bond Counsel, fees and disbursements of counsel for the Issuer and the amount to be paid to the Underwriter pursuant to Section 1 of this Purchase Contract, shall be paid out of the sources provided therefor in the Indenture, or if the Bonds are not delivered by the Issuer to the Underwriter, such costs and expenses shall be paid by the Issuer. All out-of-pocket expenses of the Underwriter, including fees and expenses of its counsel (except for word processing costs incurred in the production of the Official Statement), Blue Sky expenses and the cost of obtaining federal funds for the Purchase Price of the Bonds hereunder shall be paid by the Underwriter.

In the event that, for any reason, the Issuer fails to deliver the Bonds as provided herein by 10:00 a.m. Pacific Standard time, on December 1, 1998, the Issuer will pay to the Underwriter any losses resulting from the Underwriter being required to hold Bonds prior to delivery to ultimate purchasers thereof. This preceding sentence shall not be construed as a waiver of any condition to the Underwriter's obligations under the Purchase Contract.

SECTION 10. SURVIVAL OF CERTAIN REPRESENTATIONS AND OBLIGATIONS. The respective agreements, covenants, representations, warranties and other statements of the Issuer and each of their respective officials or officers set forth in or made pursuant to this Purchase Contract shall remain in full force and effect, regardless of any investigation, or statements as to the results thereof, made by or on behalf of the Underwriter and will survive delivery of and payment for the Bonds.

SECTION 11. NOTICES. Any notice or other communication hereunder shall be in writing, and, if sent to the Underwriter, will be mailed, delivered or telecopied and confirmed to the Underwriter care of Dain Rauscher Incorporated, One Market Plaza, 1100 Steuart Street Tower, San Francisco, California 94105, and if sent to the Issuer shall be mailed, delivered, or telecopied and confirmed at its address respectively set forth above.

SECTION 12. GOVERNING LAW. This Purchase Contract shall be governed by and construed in accordance with the laws of the State of California, without giving effect to the principles of conflict of laws in the State of California.

SECTION 13. COUNTERPARTS. This Purchase Contract may be executed in several counterparts, each of which shall be an original and all of which shall constitute but one and the same instrument.

SECTION 14. SUCCESSORS. This Purchase Contract shall be binding upon and inure to the benefit of the parties hereto and their respective successors, and no other person shall acquire or have any right or obligation under or by virtue of this Purchase Contract.

Very truly yours,
Dain Rauscher Incorporated,
as Underwriter

By: /s/ John Geesman

John Geesman
Managing Director

By: /s/ Pamela Becker

Pamela Becker
Vice President

THE FOREGOING SHALL BE EFFECTIVE AND IS HEREBY ACCEPTED AND AGREED TO AS OF THIS
1ST DAY OF DECEMBER, 1998:

AMERICAN XTAL TECHNOLOGY, INC.

By: /s/ Guy Atwood, V.P.

Authorized Representative

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EXHIBIT A
TO BOND PURCHASE CONTRACT

FORM OF SUPPLEMENTAL OPINION
BOND COUNSEL

The supplemental opinion of Bond Counsel should be dated the date of the
Closing and addressed to the Underwriter, and opine that:

(i) the Bonds are not subject to the registration requirements of the Securities Act of 1933, as amended (the "Securities Act") pursuant to Section 3(a)(2) of the Securities Act. The Indenture is exempt from qualification pursuant to the Trust Indenture Act of 1939, as amended (the "Trust Indenture Act") in reliance upon an exemption contained in the Trust Indenture Act. No opinion is expressed with respect to the Letter of Credit;

(ii) the Purchase Contract has been duly authorized, executed and delivered by the Issuer and (assuming due authorization, execution and delivery by and validity against the other party thereto) is a valid and binding agreement of the Issuer; and

(iii) the statements contained in the Official Statement, dated November 23, 1998, with respect to the Bonds, under the captions "THE BONDS," "SECURITY AND SOURCES OF PAYMENT FOR THE BONDS" and "SUMMARY OF THE INDENTURE," insofar as such statements expressly summarize certain provisions of the Bonds and the Indenture are accurate in all material respects.

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EXHIBIT B
TO BOND PURCHASE CONTRACT

FORM OF OPINION
COUNSEL TO THE BANK

The opinion of counsel to the Bank should be dated the date of the Closing and addressed to the Issuer, the Rating Agency and the Underwriter, and opine that:

(i) the Bank is a corporation duly organized, validly existing and in good standing under the laws of the State of California;

(ii) the Bank is qualified to conduct a commercial banking business in California, and, as part of such commercial banking business, has the power and authority to execute and deliver the Reimbursement Agreement and the Letter of Credit;

(iii) the Letter of Credit constitutes the legal, valid and binding obligation of the Bank, enforceable against the Bank in accordance with its terms, except (i) as limited by bankruptcy, insolvency, reorganization, moratorium and other laws relating to or affecting generally the enforcement of creditors' rights and remedies against the Bank as the same may be applied in the event of the bankruptcy, insolvency, liquidation, reorganization, or similar situation or moratorium applicable to the Bank; and (ii) general principles of equity including, without limitation, concepts of materiality, reasonableness, good faith and fair dealing, and limitation upon the specific enforceability of any remedies, covenants or other provisions of relevant documents and upon the availability of injunctive relief or other equitable remedies, regardless of whether considered in a proceeding in equity or in law;

(iv) the issuance of the Letter of Credit by the Bank is exempt from the registration requirements of the Securities Act of 1933, as amended (the "Act") pursuant to Section 3(a)(2) of the Act; and

(v) the statements contained in the Official Statement under the Captions "SECURITY AND SOURCES OF PAYMENT FOR THE BONDS - The Letter of Credit" and "SUMMARY OF THE REIMBURSEMENT AGREEMENT," insofar as such statements purport to summarize certain provisions of the Letter of Credit and Reimbursement Agreement, present an accurate summary of such provisions in all material respects.

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EXHIBIT C
TO BOND PURCHASE CONTRACT

FORM OF OPINION
COUNSEL TO THE ISSUER

The opinion of counsel to the Issuer should be dated the date of the Closing and addressed to the Bond Counsel and the Underwriter, and opine that:

(i) the Issuer is a corporation duly organized and validly existing under the laws of the state of Delaware and has full legal rights, power and authority to (a) execute and deliver and to perform its obligations under the Program Documents and (b) transact in the State of California the business in which the Issuer is now engaged;

(ii) the Program Documents have been duly authorized, executed and delivered by the Issuer and, assuming proper authorization, execution and delivery by the other parties thereto, constitute legal, valid and binding obligations of the Issuer enforceable against Issuer in accordance with their respective terms except to the extent the enforceability thereof may be limited by

bankruptcy, insolvency, moratorium, reorganization, other laws affecting or relating to the rights of creditors generally, the application of equitable principles and judicial discretion, and by the implied covenant of good faith and fair dealing;

(iii) the execution and delivery by the Issuer of the Program Documents and performance by the Issuer of its obligations thereunder will not result in a violation of, a breach of, or a default under the bylaws and articles of incorporation of the Issuer or any statute, indenture, mortgage, deed of trust, note agreement, other agreement or instrument to which the Issuer is a party or by which it is bound and no approval or other action by any governmental authority or agency of the State of California or the United States of America is required in connection therewith; provided however that no opinion concerning compliance with the federal securities laws or securities or "Blue Sky" laws of the various states is expressed; and

(iv) except as disclosed in the Official Statement, no action, suit, proceeding, inquiry, or investigation at law or in equity before or by any judicial or administrative court or agency is pending or threatened against the Issuer or its assets, properties or operations, which if determined adversely to the Issuer would likely materially adversely affect the transactions contemplated by the Program Documents.

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EXHIBIT D
TO BOND PURCHASE CONTRACT

FORM OF OPINION
COUNSEL TO THE UNDERWRITER

The opinion of counsel to the Underwriter should be dated the date of the Closing and addressed to the Underwriter, and opine that:

(i) under existing laws, the Bonds may be offered and sold without registration under the Securities Act of 1933, as amended, and the Indenture is not required to be qualified under the Trust Indenture Act of 1939, as amended; and

(ii) because the primary purpose of their professional engagement was not to establish factual matters and because of the wholly or partially non-legal character of any determinations involved in the preparation of the Official Statement as counsel to the Underwriter, they are not passing upon and do not assume any responsibility for the accuracy, completeness or fairness of any of the statements contained in the Official Statement and make no representation that they independently verified the accuracy, completeness or fairness of the statements contained in the Official Statement; however, on the basis of their conferences with the representatives of the Issuer, representatives of the Bank and representatives of the Underwriter and in reliance thereon and on the certificates, opinions and other documents they have examined, no information has come to their attention which would cause them to believe that the Official Statement as of its date and as of the date of their opinion contains any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading.

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EXHIBIT E

FORM OF OPINION
COUNSEL TO THE TRUSTEE

The opinion of counsel to the Trustee should be dated the date of Closing and addressed to the Issuer, the Bank and the Underwriter and opine that:

(i) the Trustee has been duly organized and is a lawfully existing trust company and is qualified to do business in the State of California and has full corporate power to undertake the trust of the Indenture;

(ii) the Trustee has duly authorized, executed and delivered the Indenture and by all necessary corporate action has authorized the acceptance of the trust of the Indenture; and

(iii) assuming the due authorization, execution and delivery by the other parties thereto, the Indenture constitutes a valid and binding obligation of the Trustee, enforceable against the Trustee in accordance with its terms except as enforcement may be limited by bankruptcy, insolvency, moratorium or other similar laws, or equitable principles relating to or limiting creditors' rights generally.

REMARKETING AGREEMENT

AMERICAN XTAL TECHNOLOGY, INC. PROJECT

REMARKETING AGREEMENT, dated and effective as of December 1, 1998, between AMERICAN XTAL TECHNOLOGY, INC., a Delaware corporation (the "Issuer"), and DAIN RAUSCHER INCORPORATED (the "Remarketing Agent").

WHEREAS, on December 1, the Issuer issued its Variable Rate Taxable Demand Revenue Bonds Series 1998 in the aggregate principal amount of \$11,615,000 (the "Bonds"), pursuant to that certain Trust Indenture dated as of December 1, 1998 (the "Indenture"), between the Issuer and Harris Trust Company of California, as trustee (the "Trustee"); and

WHEREAS, to support the payment of the principal of, interest on and Purchase Price of the Bonds, U.S. Bank National Association, Fremont, California (the "Bank"), issued its irrevocable direct pay letter of credit (the "Letter of Credit") to the Trustee; and

WHEREAS, the outstanding Bonds are subject to purchase upon notice and delivery to the Trustee or the Tender Agent (as such term is defined in the Indenture) as provided in the Indenture; and

WHEREAS, the Issuer and the Remarketing Agent desire to make contract provisions regarding the Remarketing Agent's role as the remarketing agent for the Bonds, in addition to those set forth in the Indenture.

NOW, THEREFORE, for and in consideration of the covenants herein made, the Issuer and the Remarketing Agent hereby agree as follows:

SECTION 1. DEFINITIONS. All capitalized terms used in this Remarketing Agreement, which are not otherwise defined herein, shall have the meanings ascribed to them in the Indenture.

SECTION 2. DUTIES. In reliance upon the representations and agreements, but subject to the terms and conditions contained in the Indenture and in this Remarketing Agreement, the Issuer hereby appoints the Remarketing Agent, and the Remarketing Agent hereby accepts the appointment, as exclusive remarketing agent in connection with the offering and sale of the Bonds from time to time in the secondary market, subsequent to the initial offering, issuance and sale of the Bonds. The Issuer and Remarketing Agent acknowledge that this appointment of the Remarketing Agent is made with the approval of the Issuer and the Bank.

The Remarketing Agent will perform the duties specified for the Remarketing Agent under the Indenture, all of which are incorporated herein by reference, and this Remarketing Agreement. In acting as Remarketing Agent, the Remarketing Agent will act as agent and not as principal except as expressly provided in this Section.

The Remarketing Agent may, if it determines to do so in its sole discretion, buy as principal any Bonds but it will not in any event be obligated to do so.

SECTION 3. DISCLOSURE STATEMENT.

(a) If the Remarketing Agent determines that it is necessary or desirable to use a disclosure statement ("Disclosure Statement") in connection with its offering of the Bonds, the Remarketing Agent will notify the Issuer and the Issuer will provide the Remarketing Agent with a Disclosure Statement satisfactory to the Remarketing Agent and its counsel in respect of the Bonds. The Issuer will supply the Remarketing Agent with the number of copies of the Disclosure Statement and documents related thereto as the Remarketing Agent

requests from time to time and will amend the Disclosure Statement (and/or the documents incorporated by reference in it) so that at all times the Disclosure Statement and any documents related thereto will not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements in such documents, in the light of the circumstances under which they were made, not misleading. In addition, the Issuer will take all steps reasonably

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requested by the Remarketing Agent which the Remarketing Agent or its counsel may consider necessary or desirable to register the sale of the Bonds by the Remarketing Agent under any Federal or state securities law or to qualify the Indenture under the Trust Indenture Act of 1939, as amended, and will provide the Remarketing Agent such officers' certificates, counsel opinions, accountants' letters and other documents as may be customary in similar transactions. If the Issuer does not perform its obligations under this Section, the Remarketing Agent may immediately cease remarketing efforts.

(b) The Issuer has authorized the use by the Remarketing Agent of the Official Statement in connection with the remarketing of Bonds. For purposes of this Remarketing Agreement, the Official Statement and any other documents provided to the Remarketing Agent pursuant to paragraph (a) of this Section shall be considered to be the Disclosure Statement.

SECTION 4. REPRESENTATIONS, WARRANTIES, COVENANTS AND AGREEMENTS OF THE REMARKETING AGENT. The Remarketing Agent, by its acceptance hereof, represents, warrants, covenants and agrees with the Issuer as follows:

(a) It is authorized by law to perform all of the duties required of it by the Indenture and this Remarketing Agreement.

(b) The execution and delivery of this Remarketing Agreement and the consummation of the transactions contemplated herein and in the Indenture will not conflict with or constitute on the part of the Remarketing Agent a breach of or a default under its charter documents, its by-laws, or any statute, indenture, mortgage, deed of trust, lease, note agreement or other agreement or instrument to which the Remarketing Agent is a party or by which it or its properties are bound, or any order, rule or regulation of any court or governmental agency or body having jurisdiction over the Remarketing Agent or any of its activities or properties.

(c) This Remarketing Agreement has been duly authorized, executed and delivered by the Remarketing Agent.

(d) It has full power and authority to take all actions required or permitted to be taken by it or under, and to perform and observe the covenants and agreements on its part contained in, this Remarketing Agreement and any other instrument or agreement relating thereto to which it is a party.

(e) It has, on or before the date hereof, duly taken all action necessary to be taken by it prior to such date for: (i) the execution, delivery and performance of this Remarketing Agreement and any other instrument or agreement relating thereto to which it is a party and which have been executed by the Remarketing Agent in connection with the transactions contemplated by the foregoing documents, and (ii) the carrying out, giving effect to, consummation and performance of the transactions and obligations contemplated hereby and by the Official Statement.

(f) This Remarketing Agreement and any other instrument or agreement relating thereto to which it is a party which have been executed by the Remarketing Agent in connection with the consummation of the transactions contemplated hereby and by the Official Statement will constitute its legal, valid and binding obligations, enforceable against it in accordance with their respective terms, except as enforcement may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws, or equitable principles

relating to or limiting creditors' rights generally.

(g) The Remarketing Agent will use its best efforts to remarket the Bonds pursuant to the Indenture.

SECTION 5. REPRESENTATIONS, WARRANTIES, COVENANTS AND AGREEMENTS OF THE ISSUER. The Issuer, by its acceptance hereof, represents, warrants, covenants, and agrees with the Remarketing Agent as follows:

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(a) It has full power and authority to take all actions required or permitted to be taken by it or under, and to perform and observe the covenants and agreements on its part contained in, the Program Documents (as that term is defined in the Bond Purchase Contract) and any other instrument or agreement relating thereto to which it is a party (collectively, the "Closing Documents").

(b) It has, on or before the date hereof, duly taken all action necessary to be taken by it prior to such date for: (i) the execution, delivery and performance of the Closing Documents, which have been executed by the Issuer in connection with the transactions contemplated thereby, and (ii) the carrying out, giving effect to, consummation and performance of the transactions and obligations contemplated hereby and by the Official Statement; provided that no representation is made with respect to compliance with the securities or Blue Sky laws of the various states of the United States.

(c) The Closing Documents which have been executed by the Issuer in connection with the consummation of the transactions contemplated hereby and by the Official Statement will constitute its legal, valid and binding obligations, enforceable against it in accordance with their respective terms, except as enforcement may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws, or equitable principles relating to or limiting creditors' rights generally.

(d) The execution and delivery of the Closing Documents which have been executed in connection with the consummation of the transactions contemplated hereby and by the Official Statement, the compliance with the terms, conditions or provisions thereof, and the consummation of the transactions therein contemplated do not and will not violate any law, regulation, order, writ, injunction or decree of any court or governmental body or result in a breach of any of the terms, conditions or provisions of, or constitute a default under, or result in the creation or imposition of any mortgage, lien, charge or encumbrance of any nature whatsoever upon any of the properties or assets of the Issuer pursuant to any mortgage, resolution, agreement or instrument to which the Issuer is a party or by which it or any of its properties is bound other than those provided for in the Closing Documents or contemplated by the parties.

(e) All authorizations, consents and approvals of, notices to, registrations or filings with, or actions in respect of any governmental body, agency or other instrumentality or court required in connection with the execution, delivery and performance by the Issuer of the Closing Documents and which have been executed in connection with the consummation of the transactions contemplated hereby and by the Official Statement have been obtained, given or taken and are in full force and effect; provided that no representation is made with respect to compliance with the securities or Blue Sky laws of the various states of the United States.

(f) To the knowledge of the Issuer, other than as described in the Official Statement, there is no action, suit, proceeding, inquiry or investigation before or by any court, public board or body pending or threatened against or affecting him wherein an unfavorable decision, ruling or finding is likely to have a materially adverse effect on the financial condition or solvency of the Issuer or the ability of the Issuer to perform its obligations under the Closing Documents or any other agreement or instrument to which it is

a party and which is used or contemplated for use in consummation of the transactions contemplated hereby or by the Official Statement.

(g) The Issuer will cooperate with the Remarketing Agent in the qualification of the Bonds for offering and sale and the determination of the eligibility of the Bonds for investment under the laws of such jurisdictions as the Remarketing Agent shall designate and will use its best efforts to continue any such qualifications in effect so long as required for the distribution of all the Bonds by the Remarketing Agent; provided that the Issuer shall not be required to incur any expense, consent to service of process in any such jurisdiction or qualify to do business in any jurisdiction where it is not now so subject.

SECTION 6. CONDITIONS TO REMARKETING AGENT'S OBLIGATIONS. The obligations of the Remarketing Agent under this Remarketing Agreement have been undertaken in reliance on, and shall be subject to, the due performance by the Issuer of its obligations and agreements to be performed hereunder and to the accuracy of and compliance with the representations, warranties, covenants and agreements of the Issuer contained herein, on and as of the Date of Delivery of this Remarketing Agreement. The obligations of the Remarketing Agent on and as of

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each date on which Bonds are to be offered and sold pursuant to this Remarketing Agreement are also subject to the following further conditions:

(a) Each of the Closing Documents shall be in full force and effect and shall not have been amended, modified or supplemented in any way which would materially adversely affect the Bonds, except as may have been agreed to in writing by the Remarketing Agent, and there shall be in full force and effect such additional resolutions, agreements, certificates and opinions, which resolutions, agreements, certificates and opinions shall be satisfactory in form and substance to the Remarketing Agent; and

(b) No Event of Default (as such term is defined in any of the Closing Documents) shall have occurred and be continuing and no event shall have occurred and be continuing which, with the passage of time or giving of notice or both, would constitute such an Event of Default.

SECTION 7. INDEMNIFICATION AND CONTRIBUTION.

(a) The Issuer will indemnify, protect, defend and hold harmless the Remarketing Agent, each of its directors, officers, agents and employees and each person who controls the Remarketing Agent within the meaning of Section 15 of the Securities Act of 1933, as amended (such Act being herein called the "Act" and any such person being herein sometimes called an "Indemnified Party"), against any and all losses, claims, damages or liabilities, joint or several, to which such Indemnified Party may become subject under any statute or at law or in equity or otherwise, and shall reimburse any such Indemnified Party for any legal or other expenses incurred by it in connection with defending any actions, but only to the extent that such losses, claims, damages, liabilities or actions arise out of or are based upon (i) an allegation or determination that the Bonds, the obligations of the Issuer under the Indenture or this Remarketing Agreement, or the obligations of the Bank under the Letter of Credit should have been registered under the Act or the Indenture should have been qualified under the Trust Indenture Act of 1939, as amended (the "Trust Indenture Act"), or (ii) any untrue statement or alleged untrue statement of a material fact contained in any Disclosure Statement or any amendment thereof or supplement thereto, or the omission or alleged omission to state therein a material fact necessary to make the statements therein not misleading, but the Issuer shall not be liable in any such case to the extent that any such loss, claim, damage, liability or action arises out of, or is based upon, any such untrue statement or alleged untrue statement or omission or alleged omission made therein in reliance upon and in conformity with written information furnished to the Issuer by the Remarketing Agent specifically for use in connection with the preparation thereof, or if the person asserting any such loss, claim, damage or liability purchased Bonds from

the Remarketing Agent, if delivery to such person of the Disclosure Statement or any amendment or supplement to it would have been a valid defense to the action from which such loss, claim, damage or liability arose and if the same was not delivered to such person by or on behalf of the Remarketing Agent. This indemnity agreement shall not be construed as a limitation on any other liability which the Issuer may have to any Indemnified Party. Notwithstanding the foregoing, this indemnification shall not cover any losses, claims, damages or liabilities caused solely by the negligence of the Indemnified Party or solely by breach of this agreement by the Indemnified Party.

(b) The Remarketing Agent shall indemnify, protect, defend and hold harmless the Issuer, and each of its directors, officers, agents or employees and each person who controls the Issuer within the meaning of Section 15 of the Act (for purposes of this paragraph (b), an "Indemnified Party") against all losses, damages or liabilities, joint or several, to which such Indemnified Party may become subject under any statute or at law or in equity or otherwise, and will reimburse any such Indemnified Party for any legal or other expenses incurred by it in connection with defending any actions, insofar as such losses, damages, liabilities or actions arise out of or are based upon any untrue statement or alleged untrue statement of a material fact contained in a Disclosure Statement or any amendment thereof or supplement thereto, or the omission or alleged omission to state therein a material fact necessary to make the statements therein not misleading, but only with reference to written information, if any, relating to the Remarketing Agent furnished to the Issuer by the Remarketing Agent specifically for use in the preparation of a Disclosure Statement. The Issuer and the Remarketing Agent agree that any statements set forth in the Official Statement or a future Disclosure Statement furnished in writing by or on behalf of the Remarketing Agent for inclusion in such documents shall be contained in a subsection entitled "Remarketing of Bonds" and that the Remarketing Agent's indemnification pursuant to this paragraph (b) shall be limited to such Section. This

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indemnity agreement shall not be construed as a limitation on any other liability which the Remarketing Agent may otherwise have to any Indemnified Party, but in no event shall the Remarketing Agent be obligated for double indemnification. Notwithstanding the foregoing, this indemnity shall not cover any losses, claims, damages or liabilities caused solely by the negligence of the Indemnified Party or solely by breach of this agreement by the Indemnified Party.

(c) An Indemnified Party (as defined in paragraph (a) or paragraph (b) of this Section 7) shall, promptly after the receipt of notice of the commencement of any action against such Indemnified Party in respect of which indemnification may be sought against the Remarketing Agent or the Issuer, as the case may be (in either case the "Indemnifying Party"), notify the Indemnifying Party in writing of the commencement thereof. In case any such action shall be brought against an Indemnified Party and such Indemnified Party shall notify the Indemnifying Party, the Indemnifying Party may, or if so requested by such Indemnified Party shall, participate therein or assume the defense thereof, with counsel reasonably satisfactory to such Indemnified Party, and after notice from the Indemnifying Party to such Indemnified Party of an election so as to assume the defense thereof, such Indemnified Party shall reasonably cooperate in the defense thereof, including without limitation, the settlement of outstanding claims, and the Indemnifying Party will not be liable to such Indemnified Party under this Section 7 for any legal or other expenses subsequently incurred by such Indemnified Party in connection with the defense thereof other than reasonable costs of investigation incurred with the consent of the Indemnifying Party, which consent shall not be unreasonably withheld; provided, however, that unless and until the Indemnifying Party assumes the defense of any such action at the request of such Indemnified Party, the Indemnifying Party shall have the right to participate at its own expense in the defense of any such action. If the Indemnifying Party shall not have employed counsel to have charge of the defense of any such action or if any Indemnified Party shall have reasonably concluded that there may be defenses available to it

or them which are different from or additional to those available to the Indemnifying Party (in which case the Indemnifying Party shall not have the right to direct the defense of such action on behalf of such Indemnified Party), legal and other expenses incurred by such Indemnified Party shall be borne by the Indemnifying Party. Notwithstanding the foregoing, the Indemnifying Party shall not be liable for any settlement of any action or claim affected without its consent, which consent shall not be unreasonably withheld.

(d) In order to provide for just and equitable contribution in circumstances in which the indemnification provided for in paragraph (a) or (b) of this Section 7 is due in accordance with its terms but is for any reason held by a court to be unavailable from the Issuer or the Remarketing Agent on grounds of policy or otherwise, the Issuer and the Remarketing Agent shall contribute to the aggregate losses, claims, damages and liabilities (including legal or other expenses reasonably incurred in connection with investigating or defending same) to which the Issuer and the Remarketing Agent may be subject (i) in such proportion as is appropriate to reflect the relative benefits received by the Issuer on the one hand and the Remarketing Agent on the other from the remarketing of the Bonds or (ii) if the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Issuer and the Remarketing Agent in connection with the failure to register or qualify certain instruments as described in Section 7(a) (i) or in connection with the statements or omissions which resulted in such losses, claims, damages or liabilities, as well as any other relevant equitable considerations. The relative benefits received by the Issuer on the one hand and the Remarketing Agent on the other shall be deemed to be in the same proportion as the aggregate principal amount of the Bonds remarketed pursuant to this Agreement bear to the total remarketing fees received by the Remarketing Agent. The relative fault of the Issuer on the one hand and of the Remarketing Agent on the other shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied and opportunity to correct or prevent such statement or omission. The amount paid or payable by a party as a result of the losses, claims, damages and liabilities referred to above shall be deemed to include any legal or other fees or expenses reasonably incurred by such party in connection with investigating or defending any action or claim.

(e) The Issuer and the Remarketing Agent agree that it would not be just and equitable if contribution pursuant to this Section 7 were determined by pro rata allocation or by any other method of allocation which does not take account of the equitable considerations referred to in the immediately preceding paragraph.

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Notwithstanding the provisions of this Section 7, (i) the Remarketing Agent shall not be required to contribute any amount in excess of the remarketing fee applicable to the Bonds remarketed pursuant to this Remarketing Agreement; and (ii) no person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Act) shall be entitled to contribution from any person who is not guilty of such fraudulent misrepresentation.

(f) The indemnification and contribution obligations of all parties to this Remarketing Agreement contained in this Section 7 shall remain operative and in full force and effect, regardless of (i) any investigation made by or on behalf of the Remarketing Agent, by or on behalf of any person controlling the Remarketing Agent or by or on behalf of the Issuer or (ii) any termination of this Remarketing Agreement.

(g) For purposes of this Section 7, each person who controls the Remarketing Agent within the meaning of Section 15 of the Act shall have the same rights as the Remarketing Agent and each person who controls the Issuer within the meaning of Section 15 of the Act shall have the same rights as the Issuer. Any party entitled to contribution shall, promptly after receipt of

notice of commencement of any action, suit or proceeding against such party in respect of which a claim for contribution may be made against another party or parties notify such party or parties from whom contribution may be sought, but the omission so to notify such party or parties shall not relieve the party or parties from whom contribution may be sought from any other obligation it or they may have hereunder.

SECTION 8. FEES AND EXPENSES. In consideration of the Remarketing Agent's services under this Remarketing Agreement, the Issuer will pay the Remarketing Agent an annual amount equal to one eighth of one percent (1/8 of 1%) of the aggregate principal amount of Bonds outstanding under the Indenture, payable semi-annually in arrears on the first Business Day of each January and July commencing in July, 1999, and computed on the basis of the aggregate principal amount of the Bonds then outstanding. The Issuer also will pay all expenses in connection with the preparation of any Disclosure Statement and the registration of the Bonds and any other documents relating to the Bonds under any securities laws, qualifying the Indenture under the Trust Indenture Act and will reimburse the Remarketing Agent for all its direct out of pocket expenses incurred by it as Remarketing Agent under this Remarketing Agreement and the Indenture, including counsel fees and disbursements. This expense reimbursement obligation shall not be construed as covering the expenses of the initial issuance of the Bonds.

SECTION 9. DEALING IN BONDS BY TENDER AGENT, BANK AND REMARKETING AGENT. The Tender Agent, the Bank or the Remarketing Agent, in their respective individual capacities may in good faith buy, sell, own, hold and deal in any of the Bonds, and may join in any action which any Bond owners may be entitled to take with like effect as if it did not act in any capacity hereunder. The Tender Agent or the Remarketing Agent, in their respective individual capacities, either as principal or agent, may also engage in or be interested in any financial or other transaction with the Issuer, and may act as depository, trustee or agent for other obligations of the Issuer as freely as if it did not act in any capacity hereunder.

SECTION 10. INTENTION OF PARTIES. It is the intention of the parties hereto that no purchase, sale or transfer of any Bonds, as herein provided and provided in the Indenture, shall constitute or be construed to be extinguishment of any Bonds or the indebtedness represented thereby or the reissuance of any Bonds.

SECTION 11. FAILURES. The Remarketing Agent will not be liable to the Issuer, the Trustee, the Tender Agent or the Bank on account of the failure of any person to whom the Remarketing Agent has sold a Bond to pay for such Bond or to deliver any document in respect of the sale. It is understood and agreed that the Remarketing Agent shall not be obligated to advance its own funds to purchase, or to effect the purchase of, any Bonds.

SECTION 12. REMARKETING AGENT'S PERFORMANCE.

(a) The duties and obligations of the Remarketing Agent as Remarketing Agent shall be determined solely by the express provisions of this Remarketing Agreement and the Indenture, and the Remarketing Agent shall not be responsible for the performance of any other duties and obligations than as are specifically set

forth in this Remarketing Agreement and the Indenture, and no implied covenants or obligations shall be read into this Remarketing Agreement or the Indenture against the Remarketing Agent.

(b) The Remarketing Agent may conclusively rely upon any notice or document given or furnished to the Remarketing Agent and conforming to the requirements of this Remarketing Agreement or the Indenture and shall be protected in acting upon any such notice or document reasonably believed by it to be genuine and to have been given, signed or presented by the proper party or

statute, rule or public policy, or any other reason, such circumstances shall not have the effect of rendering the provisions in question invalid, inoperative or unenforceable in any other case or circumstance, or of rendering any other provisions of this Remarketing Agreement invalid, inoperative or unenforceable to any extent whatsoever.

(f) This Remarketing Agreement may be executed in several counterparts, each of which shall be regarded as an original and all of which shall constitute one and the same document.

(g) The terms of this Remarketing Agreement shall not be waived, altered, modified, amended or supplemented in any manner whatsoever except by written instrument signed by all of the parties hereto.

(h) This Remarketing Agreement shall be governed by and construed in accordance with the laws of the State of California.

IN WITNESS WHEREOF, the Remarketing Agent and the Issuer have caused this Remarketing Agreement to be signed in their names by the undersigned officers, hereunto duly authorized, all as of the day and year first above written.

REMARKETING AGENT:

DAIN RAUSCHER INCORPORATED

By: /s/ Pamela Becker

Authorized Representative

ISSUER:

AMERICAN XTAL TECHNOLOGY, INC.,

By: /s/ Guy Atwood

Authorized Representative

CONSENT OF INDEPENDENT ACCOUNTANTS

We hereby consent to the incorporation by reference in the Registration Statement on Form S-8 filed with the Securities and Exchange Commission on November 13, 1998 of American Xtal Technology Inc. of our report dated January 28, 1999 appearing on page 37 of this Annual Report on Form 10-K.

PRICEWATERHOUSECOOPERS LLP

San Jose, California
March 30, 1999

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