

# **Getting Started with Your TC-GPIB (or Digital's IET11) and the NI-488.2M™ Software for OSF/1**

**May 1994 Edition**

**Part Number 320717-01**

## **Note to Digital Equipment Corporation Customers**

The IET11 is the Digital Distributed Hardware (DDH) version of the National Instruments TC-GPIB interface board. The DDH product kit also includes the NI-488.2M software. Throughout this manual, all references to the TC-GPIB apply equally to the IET11.

If you have any technical problems with the IET11, contact your local Digital Service Representative.

**National Instruments Corporate Headquarters**

6504 Bridge Point Parkway

Austin, TX 78730-5039

(512) 794-0100

Technical support fax: (800) 328-2203

(512) 794-5678

**Branch Offices:**

Australia (03) 879 9422, Austria (0662) 435986, Belgium 02/757.00.20,

Canada (Ontario) (519) 622-9310, Canada (Québec) (514) 694-8521,

Denmark 45 76 26 00, Finland (90) 527 2321, France (1) 48 14 24 24,

Germany 089/741 31 30, Italy 02/48301892, Japan (03) 3788-1921,

Netherlands 03480-33466, Norway 32-848400, Spain (91) 640 0085,

Sweden 08-730 49 70, Switzerland 056/20 51 51, U.K. 0635 523545

## Limited Warranty

### Note to Digital Equipment Corporation Customers

If your interface board is an IET11 unit bought from Digital Equipment Corporation, the following warranty does not apply. Warranty information for the IET11 is governed by the terms established in the Digital Equipment Corporation warranty.

The TC-GPIB is warranted against defects in materials and workmanship for a period of two years from the date of shipment, as evidenced by receipts or other documentation. National Instruments will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

The media on which you receive National Instruments software are warranted not to fail to execute programming instructions, due to defects in materials and workmanship, for a period of 90 days from date of shipment, as evidenced by receipts or other documentation. National Instruments will, at its option, repair or replace software media that do not execute programming instructions if National Instruments receives notice of such defects during the warranty period. National Instruments does not warrant that the operation of the software shall be uninterrupted or error free.

A Return Material Authorization (RMA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. National Instruments will pay the shipping costs of returning to the owner parts which are covered by warranty.

National Instruments believes that the information in this manual is accurate. The document has been carefully reviewed for technical accuracy. In the event that technical or typographical errors exist, National Instruments reserves the right to make changes to subsequent editions of this document without prior notice to holders of this edition. The reader should consult National Instruments if errors are suspected. In no event shall National Instruments be liable for any damages arising out of or related to this document or the information contained in it.

EXCEPT AS SPECIFIED HEREIN, NATIONAL INSTRUMENTS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S RIGHT TO RECOVER DAMAGES CAUSED BY FAULT OR NEGLIGENCE ON THE PART OF NATIONAL INSTRUMENTS SHALL BE LIMITED TO THE AMOUNT THEREFORE PAID BY THE CUSTOMER. NATIONAL INSTRUMENTS WILL NOT BE LIABLE FOR DAMAGES RESULTING FROM LOSS OF DATA, PROFITS, USE OF PRODUCTS, OR INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY THEREOF. This limitation of the liability of National Instruments will apply regardless of the form of action, whether in contract or tort, including negligence.

Any action against National Instruments must be brought within one year after the cause of action accrues. National Instruments shall not be liable for any delay in performance due to causes beyond its reasonable control. The warranty provided herein does not cover damages, defects, malfunctions, or service failures caused by owner's failure to follow the National Instruments installation, operation, or maintenance instructions; owner's modification of the product; owner's abuse, misuse, or negligent acts; and power failure or surges, fire, flood, accident, actions of third parties, or other events outside reasonable control.

## **Copyright**

Under the copyright laws, this publication may not be reproduced or transmitted in any form, electronic or mechanical, including photocopying, recording, storing in an information retrieval system, or translating, in whole or in part, without the prior written consent of National Instruments Corporation.

## **Trademarks**

NAT4882<sup>®</sup>, NI-488<sup>®</sup>, Turbo488<sup>®</sup>, NI-488.2<sup>™</sup>, and NI-488.2M<sup>™</sup> are trademarks of National Instruments Corporation.

Product and company names listed are trademarks or trade names of their respective companies.

## **Warning Regarding Medical and Clinical Use of National Instruments Products**

National Instruments products are not designed with components and testing intended to ensure a level of reliability suitable for use in treatment and diagnosis of humans. Applications of National Instruments products involving medical or clinical treatment can create a potential for accidental injury caused by product failure, or by errors on the part of the user or application designer. Any use or application of National Instruments products for or involving medical or clinical treatment must be performed by properly trained and qualified medical personnel, and all traditional medical safeguards, equipment, and procedures that are appropriate in the particular situation to prevent serious injury or death should always continue to be used when National Instruments products are being used. National Instruments products are NOT intended to be a substitute for any form of established process, procedure, or equipment used to monitor or safeguard human health and safety in medical or clinical treatment.

# **FCC/DOC Radio Frequency Interference Compliance**

This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, may cause interference to radio and television reception. This equipment has been tested and found to comply with the following two regulatory agencies:

## **Federal Communications Commission**

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules for a Class A digital device. Operation is subject to the following two conditions:

1. This device may not cause harmful interference in commercial environments.
2. This device must accept any interference received, including interference that may cause undesired operation.

## **Canadian Department of Communications**

This device complies with the limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications (DOC).

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère des communications du Canada.

## **Instructions to Users**

These regulations are designed to provide reasonable protection against harmful interference from the equipment to radio reception in commercial areas. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

There is no guarantee that interference will not occur in a particular installation. However, the chances of interference are much less if the equipment is installed and used according to this instruction manual.

If the equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, one or more of the following suggestions may reduce or eliminate the problem.

- Operate the equipment and the receiver on different branches of your AC electrical system.

- Move the equipment away from the receiver with which it is interfering.
- Reorient or relocate the receiver's antenna.
- Be sure that the equipment is plugged into a grounded outlet and that the grounding has not been defeated with a cheater plug.

**Notice to user:** Changes or modifications not expressly approved by National Instruments could void the user's authority to operate the equipment under the FCC Rules.

If necessary, consult National Instruments or an experienced radio/television technician for additional suggestions. The following booklet prepared by the FCC may also be helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock Number 004-000-00345-4.

Für Bundesrepublik Deutschland  
For Federal Republic of Germany  
Pour la République fédérale d'Allemagne

Hochfrequenzgerätezulassung und Betriebsgenehmigung

### **Bescheinigung des Herstellers/Importeurs**

Hiermit wird bescheinigt, daß die Einrichtung in Übereinstimmung mit den Bestimmungen der DBP-Verfügung 523/1969, Amtsblatt 113/1969, und Grenzwertklasse "A" der VDE0871, funkenstört ist.

Das Zentralamt für Zulassungen im Fernmeldewesen der Deutschen Bundespost (DBP), hat diesem Gerät im Zusammenhang mit den Geräten DECstation 5000, Modell 120 und 200, der Digital Equipment GmbH eine FTZ-Serienprüfnummer zugeteilt.

### **Betreiberhinweis**

Das Gerät wurde funktechnisch sorgfältig entstört und geprüft.

Sollten bei diesen Geräten ausnahmsweise trotzdem, z.B. im ungünstigen Fall beim Zusammenschalten mit anderen EDV-Geräten, Funkstörungen auftreten kann das im Einzelnen zusätzliche Funkentstörungsmaßnahmen durch den Benutzer erfordern. Bei Fragen hierzu wenden Sie sich bitte an die örtlich zuständige Funkstörungsmeßstelle Ihres Fernmeldeamtes.

# TC-GPIB Hardware Safety Information

Read this information before you install the TC-GPIB interface board.

## Safety Instructions

To avoid personal injury, fire, or damage to equipment, follow these guidelines when you unpack and install your TC-GPIB board.

- Before removing the TC-GPIB board from its plastic bag, touch the plastic bag to a metal part of your computer chassis.
- Inspect the TC-GPIB board for loose components or any other sign of damage prior to installing it. Do *not* install a damaged board into your computer.
- Before you install or remove the TC-GPIB board or change the shield ground jumper connection setting, turn off the power switch on the computer and unplug the power cord.
- Ensure that the two back panel screws are securely fastened when you attach the mounting bracket of the TC-GPIB board to the back panel of the computer.

**Warning:** All the devices that you connect to the TC-GPIB board must be compliant with the local product-safety regulations such as the UL1950, EN60950, and CSA950 standards that include the Safety Extra Low Voltage (SELV) requirements.

# SIKKERHEDSINFORMATIONER FOR TC-GPIB-HARDWARE

Læs nedenstående sikkerhedsinformationer før De installerer interfacekortet TC-GPIB.

## Sikkerhedsinformationer

Følg disse retningslinier når De pakker TC-GPIB-kortet ud og installerer det, for at undgå personskade, brand og skade på udstyret.

- Før TC-GPIB-kortet tages ud af plasticposen, skal posen bringes i berøring med en metaldeel på computerrammen.
- Inspicér TC-GPIB-kortet for løse genstande eller andre tegn på beskadigelse, før De installerer det. De må ikke installere et beskadiget kort, i computeren.
- Sluk altid for computeren og tag ledningen ud, før De installerer eller fjerner TC-GPIB-kortet, eller ændrer indstillingen på den afskærmede jordforbindelse.
- Sørg for at de to skruer på bagpanelet sidder godt fast, når De monterer TC-GPIB-kortets fastspændingsknægt på computerens bagpanel.

Advarsel: Alle anordninger, der sluttes til TC-GPIB-kortet, skal være i overensstemmelse med lokale forskrifter for produktsikkerhed, som f.eks. standarderne UL1950-, EN60950- og CSA950, der omfatter kravene for »Safety Extra Low Voltage« (SELV).

# Veiligheidsinformatie voor TC-GPIB hardware

Lees deze informatie voordat u de TC-GPIB interface-kaart installeert.

## Instructies betreffende veiligheid

Teneinde lichamelijk letsel, brand of schade aan de apparatuur te voorkomen dient u zich aan deze richtlijnen te houden bij het uitpakken en installeren van uw TC-GPIB kaart.

- Breng, voordat u de TC-GPIB kaart uit de plastic zak haalt, de zak met een metalen deel van uw computerrek in aanraking.
- Kijk, voordat u de TC-GPIB kaart installeert, of onderdelen op deze kaart los zitten of de kaart tekenen van beschadiging vertoont. Installeer *geen* beschadigde kaart in uw computer.
- Voordat u de TC-GPIB kaart installeert of verwijdert, of de stand van de geleiderbrug afscherming-massa verandert, dient u de aan-uitschakelaar op de computer uit te zetten en de stekker uit het stopcontact te halen.
- Verzekert u ervan dat de twee schroeven van het achterpaneel goed vastgedraaid zijn, wanneer u de montagebeugel van de TC-GPIB kaart aan het achterpaneel van de computer bevestigt.

Waarschuwing: Alle apparaten die u met de TC-GPIB kaart verbindt, moeten aan de plaatselijke veiligheidsvoorschriften voldoen zoals de normen UL1950, EN60950 en CSA950, waarin de SELV (Safety Extra Low Voltage ofwel Veiligheid extra lage spanning) eisen zijn opgenomen.

# Turvallisuusohjeet TC-GPIB laitteistolle

Lue tämä informaatio ennen kuin asennat TC-GPIB-liitäntäpiirilevyn.

## Turvallisuusohjeet

Vältäaksesi luokkaantumis- ja tulipalovaaraa tai laitteiston vahingoittumista, noudata näitä ohjeita kun purat TC-GPIB-levyn pakkauksesta ja kun asennat sen.

- Ennen kuin otat TC-GPIB-levyn muovipakkauksestaan, anna muovipussin koskettaa tietokoneesi asennuspohjan metalliosaa.
- Varmista ennen asennusta, ettei TC-GPIB-levyssä ole irrallisia osia ja ettei se ole muutoin vahingoittunut. *Älä* asenna vahingoittunutta levyä tietokoneeseen.
- Ennen TC-GPIB-levyn asennusta tai siirtoa tai suojamaadoitetun kytkentäjohdon kuormituksen muutosta, laita tietokone pois päältä katkaisimesta ja vedä sähköjohto seinästä.
- Asentaessasi TC-GPIB-levyn kiinnitysuloketta tietokoneen takapaneeliin, varmista, että takapaneelin kaksi ruuvia ovat lujasti kiinni.

**Varoitus:** Kaikkien TC-GPIB-levyyn asentamiesi laitteiden tulee olla paikallisten turvallisuusmääräysten mukaisia, kuten UL1950-, EN60950- ja CSA950-vaatimukset, jotka sisältävät Safety Extra Low Voltage Requirements (SELV)-määräykset.

# Matériel TC-GPIB Sécurité

Veillez prendre connaissance des mesures de sécurité suivantes avant de procéder à l'installation de la carte d'interface TC-GPIB.

## Mesures de sécurité

Afin d'éviter toute blessure corporelle, incendie ou dégât de l'équipement, il faudra se conformer aux directives suivantes lors du déballage et de l'installation de la carte d'interface TC-GPIB.

- Avant de retirer la carte TC-GPIB de son sac plastique, faire entrer celui-ci en contact avec la partie métallique du châssis de l'ordinateur.
- Avant de procéder à l'installation de la carte TC-GPIB, vérifier qu'elle ne présente aucun signe de dégât visible et que tous ses composants sont bien en place. *Ne pas* installer une carte endommagée dans l'ordinateur.
- Avant d'installer ou de retirer la carte TC-GPIB, ou de procéder à la modification du réglage du cavalier de protection de mise à la terre, mettre l'ordinateur hors circuit et débrancher le câble d'alimentation.
- S'assurer que les deux vis du panneau arrière sont bien serrées lors du montage du dispositif de fixation de la carte TC-GPIB au panneau arrière de l'ordinateur.

**Avertissement :** Tous les périphériques connectés à la carte TC-GPIB devront être conformes aux normes de sécurité des produits précisées par les réglementations locales (normes UL1950, EN60950 et CSA950, par exemple), notamment en ce qui concerne les conditions de très basse tension de sécurité (SELV).

# Sicherheitshinweise für TC-GPIB Hardware

Vor der Installation der TC-GPIB Karte diese Hinweise durchlesen!

## Sicherheitshinweise

Zur Vermeidung von Verletzungen, Feuer bzw. Geräteschäden sind diese Hinweise beim Auspacken und bei der Installation der TC-GPIB Karte unbedingt zu beachten.

- Vor der Entnahme der TC-GPIB Karte aus dem Plastikbeutel ein Metallteil des Computergehäuses mit dem Plastikbeutel berühren.
- Vor der Installation der TC-GPIB Karte diese auf lose Bauteile oder andere Schäden überprüfen. Eine beschädigte Karte darf *nicht* im Computer installiert werden!
- Vor dem Ein- oder Ausbau der TC-GPIB Karte bzw. vor einer Änderung der Einstellung des abgeschirmten Masse-Jumpers den Netzschalter des Computers ausschalten und das Netzkabel abziehen.
- Bei der Montage der Halterung für die TC-GPIB Karte an der Rückwand des Computers darauf achten, daß die beiden Schrauben in der Rückwand sicher befestigt sind.

**ACHTUNG!** Alle an die TC-GPIB Karte angeschlossenen Geräte müssen den entsprechenden Produktsicherheitsvorschriften der Normen wie UL1950, EN60950 und CSA950 entsprechen, die auch Vorschriften zur Sicherheitskleinspannung (SELV) beinhalten.

# INFORMAZIONI DI SICUREZZA PER HARDWARE TC-GPIB

Leggere queste informazioni prima di installare la scheda di interfaccia TC-GPIB.

## Istruzioni per la sicurezza

Per evitare lesioni personali, incendi o danni alle attrezzature, seguire queste direttive di massima al momento di disimballare ed installare la scheda TC-GPIB.

- Prima di estrarre la scheda TC-GPIB dal sacchetto di plastica, mettere a contatto il sacchetto con una parte metallica del telaio del computer in dotazione.
- Ispezionare la scheda TC-GPIB prima di installarla, in modo da verificare l'assenza di componenti allentati o di altri segni di danneggiamento. *Non* installare una scheda danneggiata nel proprio computer.
- Prima di installare o rimuovere una scheda TC-GPIB o di modificare l'impostazione del ponticello di massa dello schermo, mettere fuori tensione il computer ed estrarre la spina di alimentazione dalla presa di rete.
- Al momento di collegare la staffa di supporto della scheda TC-GPIB al pannello posteriore del computer, accertarsi che le due viti del pannello posteriore siano avvitate saldamente.

Avvertenza - Tutti i dispositivi collegati alla scheda TC-GPIB devono conformarsi ai requisiti di sicurezza delle apparecchiature previsti dalla normativa locale vigente, come li standard UL1950, EN60950 e CSA950 comprendenti i requisiti SELV (Safety Extra Low Voltage o tensione molto bassa di sicurezza).

# SIKKERHETINFORMASJON FOR TC-GPIB-MASKINVARE

Les informasjonen nedenfor før du installerer grensesnittkortet TC-GPIB.

## Sikkerhetsinformasjon

Følg disse retningslinjene når du pakker ut TC-GPIB-kortet og installerer det, slik at du unngår personskade, brann og skade på utstyret.

- Før du tar TC-GPIB-kortet ut av plastposen, skal posen bringes i berøring med en metalldel på datamaskinrammen.
- Før du installerer kortet bør du kontrollere at TC-GPIB-kortet ikke har noen løse deler eller andre tegn på beskadigelse. Du må *ikke* installere et skadet kort i datamaskinen.
- Slå alltid av datamaskinen og trekk ut ledningen før du installerer eller fjerner TC-GPIB-kortet, eller endrer innstillingen på den skjermede jordforbindelsen.
- Sørg for at de to skruene på bakpanelet sitter godt fast når du fester TC-GPIB-kortets monteringsbrakett til bakpanelet på datamaskinen.

Advarsel: Alle enheter som koples til TC-GPIB-kortet skal være i overensstemmelse med lokale forskrifter for produktsikkerhet, som f.eks. standardene UL1950, EN60950 og CSA950 som omfatter kravene for «Safety Extra Low Voltage» (SELV).

# Medidas de Segurança para a placa TC-GPIB

Leia a informação abaixo antes de instalar a placa de interface TC-GPIB.

## Medidas de Segurança

Para evitar lesão pessoal, incêndio ou danificação de equipamento, observe estas instruções ao desembalar e instalar a placa TC-GPIB.

- Antes de retirar a placa TC-GPIB do envoltório de plástico, toque com ele uma parte metálica do chassis do seu computador.
- Antes de instalar, inspecione a placa TC-GPIB para verificar se não há componentes soltos ou outros sinais de danificação. Não instale placa danificada no seu computador.
- Antes de instalar ou remover a placa TC-GPIB, ou de mudar de posição os conectores de ponte da blindagem de terra, desligue o computador e remova a tomada.
- Ao prender o suporte da placa TC-GPIB ao painel traseiro do computador, verifique se estão firmemente atarraxados os dois parafusos que o prendem.

**Atenção:** Todos os dispositivos que você ligar à placa TC-GPIB devem obedecer aos critérios de segurança estabelecidos nos regulamentos locais, como os padrões UL1950, EN60950 e CSA950, que requerem segurança para voltagem extra baixa (SELV).

# Información de seguridad para el Hardware TC-GPIB

Lea esta información antes de instalar la tarjeta de interfaz TC-GPIB.

## Instrucciones de seguridad

Para evitar lesiones corporales, incendios o daños al equipo, observe estas pautas al desembalar e instalar la tarjeta TC-GPIB.

- Antes de sacar la tarjeta TC-GPIB de su bolsa de plástico, tóquela con la parte metálica del chasis de su ordenador.
- Antes de instalarla, inspeccione la tarjeta TC-GPIB para comprobar que no tenga componentes sueltos o cualquier otro tipo de daño. No instale una tarjeta dañada en su ordenador.
- Antes de instalar o retirar la tarjeta TC-GPIB o de cambiar el ajuste del cable de puente de tierra blindado, apague el interruptor de alimentación del ordenador y desenchufe el cordón de alimentación.
- Asegúrese de que los dos tornillos del panel posterior estén firmemente sujetos al colocar el soporte de montaje de la tarjeta TC-GPIB en el panel posterior del ordenador.

**Advertencia:** Todos los dispositivos que conecte a la tarjeta TC-GPIB deben cumplir con las normas de seguridad de los productos de acuerdo con los reglamentos locales tales como UL1950, EN60950 y CSA950 que incluyen los requisitos de Seguridad de Voltaje Extraordinariamente Bajo (SELV).

# Säkerhetsinformation för TC-GPIB-hårdvara

Ta del av denna information före installation av gränssnittskort TC-GPIB.

## Säkerhetsinstruktioner

Följ dessa riktlinjer vid upppackning och installation av TC-GPIB-kortet för att undvika personskada, eld eller skada på utrustning.

- För plastpåsen som omsluter TC-GPIB-kortet lätt mot en del av datorchassit som är av metall innan kortet tas ut.
- Kontrollera att kortets komponenter ej är lösa och att inga andra tecken på skada förekommer innan kortet installeras. Installera *inte* ett skadat kort i datorn.
- Bryt strömförsörjningen till datorn och dra ut elkabeln ur dess uttag före installation eller avlägsnande av TC-GPIB-kortet eller före ändring av skärmjordförbindelsen.
- Säkerställ att de två skruvarna i datorns bakplåt är helt fastdragna när TC-GPIB-kortets fäste monteras i plåten.

Varning: Alla enheter som ansluts till TC-GPIB-kortet måste uppfylla lokala produktsäkerhetsföreskrifter av samma typ som standarderna UL1950, EN60950 och CSA950, vilka innehåller de så kallade "Safety Extra Low Voltage (SELV)"-fordringarna.

# Contents

---

<b>About This Manual</b> .....	xx
Organization of This Manual .....	xx
Conventions Used in This Manual.....	xxi
Related Documentation .....	xxi
Customer Communication .....	xxi
<b>Chapter 1</b>	
<b>Introduction</b> .....	1-1
How to Use This Manual.....	1-1
What You Need to Get Started .....	1-2
Software Description .....	1-2
Hardware Description .....	1-2
<b>Chapter 2</b>	
<b>Hardware Configuration and Installation</b> .....	2-1
Setting the Shield Ground Configuration (Optional).....	2-1
Install the Hardware.....	2-2
<b>Chapter 3</b>	
<b>Software Installation and Configuration</b> .....	3-1
NI-488.2M Software Components .....	3-1
Remove an Existing Driver .....	3-1
Install the Software .....	3-2
Configure the Software with ibconf (Optional).....	3-3
<b>Chapter 4</b>	
<b>Installation Verification and Troubleshooting</b> .....	4-1
Run the Software Diagnostic Program .....	4-1
Troubleshooting ibtsta Messages.....	4-1
Presence Test of Driver .....	4-1
Presence Test of GPIB Board.....	4-2
GPIB Cables Connected .....	4-2
Common Questions .....	4-3
<b>Chapter 5</b>	
<b>Using Your NI-488.2M Software</b> .....	5-1
Introduction to ibic.....	5-1
Programming Considerations.....	5-1

**Appendix A**  
**Hardware Specifications** ..... A-1

**Appendix B**  
**Customer Communication** ..... B-1

**Glossary** ..... Glossary-1

**Figures**

Figure 2-1. Ground Configuration Jumper Settings ..... 2-1

Figure 2-2. Installing the TC-GPIB Board ..... 2-3

**Tables**

Table A-1. Electrical Characteristics ..... A-1

Table A-2. Physical Characteristics ..... A-1

Table A-3. Environmental Characteristics ..... A-1

# About This Manual

---

This manual contains instructions for installing and configuring the National Instruments TC-GPIB interface board and the NI-488.2M multitasking software for use with a DEC Alpha AXP workstation running the OSF/1 operating system. This manual is meant to be used with the *NI-488.2M Software Reference Manual* (Part Number 320351-01).

## Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, explains how to use this manual, lists what you need to get started, and includes a brief description of the NI-488.2M software and the TC-GPIB board.
- Chapter 2, *Hardware Configuration and Installation*, contains instructions for setting the shield ground configuration and installing your TC-GPIB board.
- Chapter 3, *Software Installation and Configuration*, contains instructions for installing and configuring your NI-488.2M software.
- Chapter 4, *Installation Verification and Troubleshooting*, describes how to verify the installation and troubleshoot problems.
- Chapter 5, *Using Your NI-488.2M Software*, describes the `ibic` utility and lists some programming considerations.
- Appendix A, *Hardware Specifications*, describes the electrical, physical, and environmental characteristics of the TC-GPIB interface board and the recommended operating conditions.
- Appendix B, *Customer Communication*, contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The *Glossary* contains an alphabetical list and a description of terms that this manual uses, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.

## Conventions Used in This Manual

The following conventions are used in this manual.

<b><i>bold italic</i></b>	Bold italic text denotes a note, caution, or warning.
<b>bold monospace</b>	Bold text in this font denotes the messages and responses that the computer automatically prints to the screen.
<i>italic</i>	Italic text denotes a cross reference.
monospace	Text in this font denotes text or characters that are to be literally input from the keyboard. It is also used for the proper names of disk drives, directories, programs, device names, variables, and filenames.
<i>italic monospace</i>	Italic text in this font denotes that you must supply the appropriate words or values in place of these items.

Abbreviations, acronyms, metric prefixes, mnemonics, symbols, and terms are listed in the *Glossary*.

## Related Documentation

The following documents contain information that you may find helpful as you read this manual.

- ANSI/IEEE Standard 488.1-1987, *IEEE Standard Digital Interface for Programmable Instrumentation*.
- ANSI/IEEE Standard 488.2-1987, *IEEE Standard Codes, Formats, Protocols, and Common Commands*.

## Customer Communication

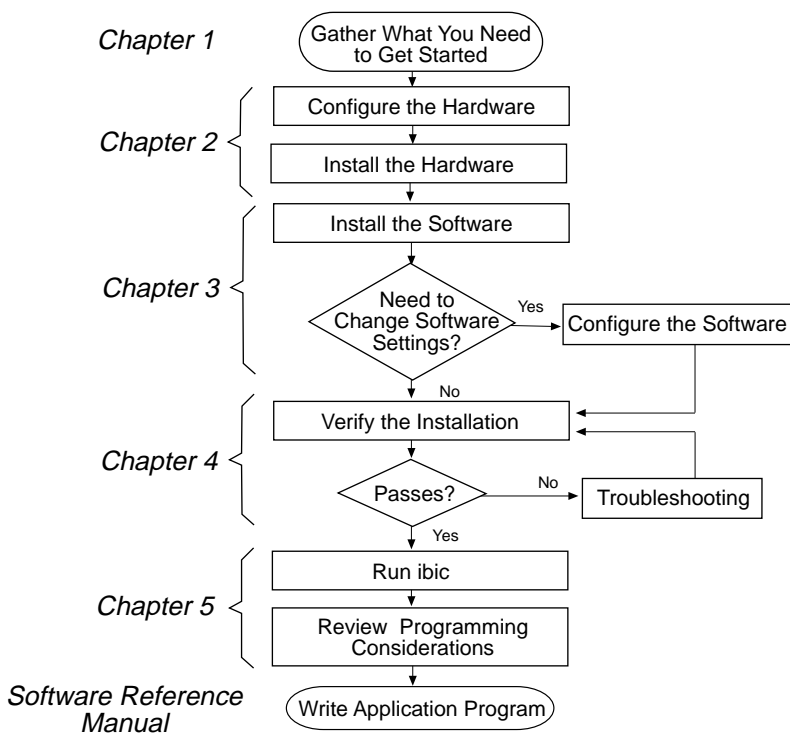
National Instruments want to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you to complete. These forms are in Appendix B, *Customer Communication*, at the end of this manual.

# Chapter 1 Introduction

---

This chapter explains how to use this manual, lists what you need to get started, and includes a brief description of the NI-488.2M software and the TC-GPIB board.

## How to Use This Manual



## What You Need to Get Started

- TC-GPIB board (part number 181235-01)
- 3.5 in. NI-488.2M Distribution Disk for TC-GPIB and OSF/1 (part number 413155-70)
- or
- NI-488.2M Distribution Tape for TC-GPIB and OSF/1 (part number 443155-70)
- OSF/1 version 1.0 or higher installed on your computer
- Super-user privilege

## Software Description

The NI-488.2M software for OSF/1 includes a multitasking driver and utilities that transform a DEC Alpha AXP workstation running OSF into a GPIB Controller with complete communications and bus management capabilities. The NI-488.2M software also includes a C language interface, a program to test the installation of the software, an interactive control program, and an interactive configuration program.

The NI-488.2M driver supports up to four TC-GPIB boards and is completely compatible with both IEEE 488 and IEEE 488.2 instruments.

**Note:** *For DEC IET11 customers, the Software Support Addendum (SSA), included in the IET11 kit, lists the platforms supported by the IET11. The software licensing and warranty information for the IET11 kit is included in the envelope with your distribution media.*

## Hardware Description

The TC-GPIB board is fully compatible with other IEEE 488.1 and IEEE 488.2 devices, the NEC  $\mu$ PD7210 chip, and the TI 9914A chip. You can use standard GPIB cables to connect the TC-GPIB with up to 14 instruments. If you want to use more than 14 instruments, you can order a bus extender or expander from National Instruments. You can also order single-shielded and double-shielded cables from National Instruments. Refer to Appendix A, *Hardware Specifications*, for more information about the TC-GPIB electrical, environmental, and physical specifications and operating conditions.

# Chapter 2

## Hardware Configuration and Installation

---

This chapter contains instructions for setting the shield ground configuration and installing your TC-GPIB board.

**Warning:** *Several components on your TC-GPIB board can be damaged by electrostatic discharge. To avoid such damage in handling the board, touch the antistatic plastic package to a metal part of your computer chassis before removing the board from the package.*

### Setting the Shield Ground Configuration (Optional)

The TC-GPIB board is set at the factory with the jumper in place to connect the logic ground of the TC-GPIB board to its shield ground. This configuration minimizes EMI emissions.

**Caution:** *The TC-GPIB board was tested for compliance with FCC standards with the shield ground connected to logic ground. Removing the jumper might cause EMI emissions to exceed any or all of the applicable standards.*

If your application requires that logic ground be disconnected from shield ground, follow these steps:

1. Locate the jumper W1 on your TC-GPIB board.
2. Remove the jumper and place it across the jumper pins as shown in Figure 2-1.

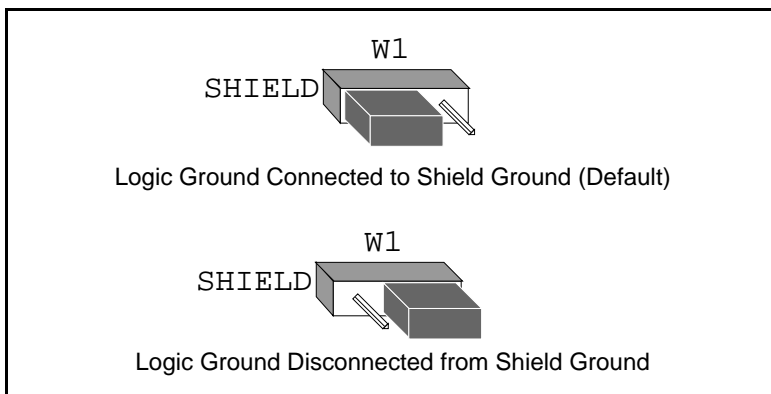


Figure 2-1. Ground Configuration Jumper Settings

3. Record the jumper setting on the form in Appendix B, *Customer Communication*.

## **Install the Hardware**

Before you install the TC-GPIB board, consult the manual that came with your workstation for specific instructions and warnings. You must have super-user privileges to install the hardware and software. This requires you to log on as `root`.

Perform the following steps to install the TC-GPIB board:

1. Shut down your system by entering the following command at the command line prompt:

```
halt
```

2. Turn off your computer after it has been shut down.
3. Remove the cover of the system unit.
4. Select an empty slot, and remove the slot opening cover.
5. Insert the TC-GPIB interface board into the available slot with the GPIB connector sticking out of the opening on the back panel. Figure 2-2 shows how to install the TC-GPIB board.

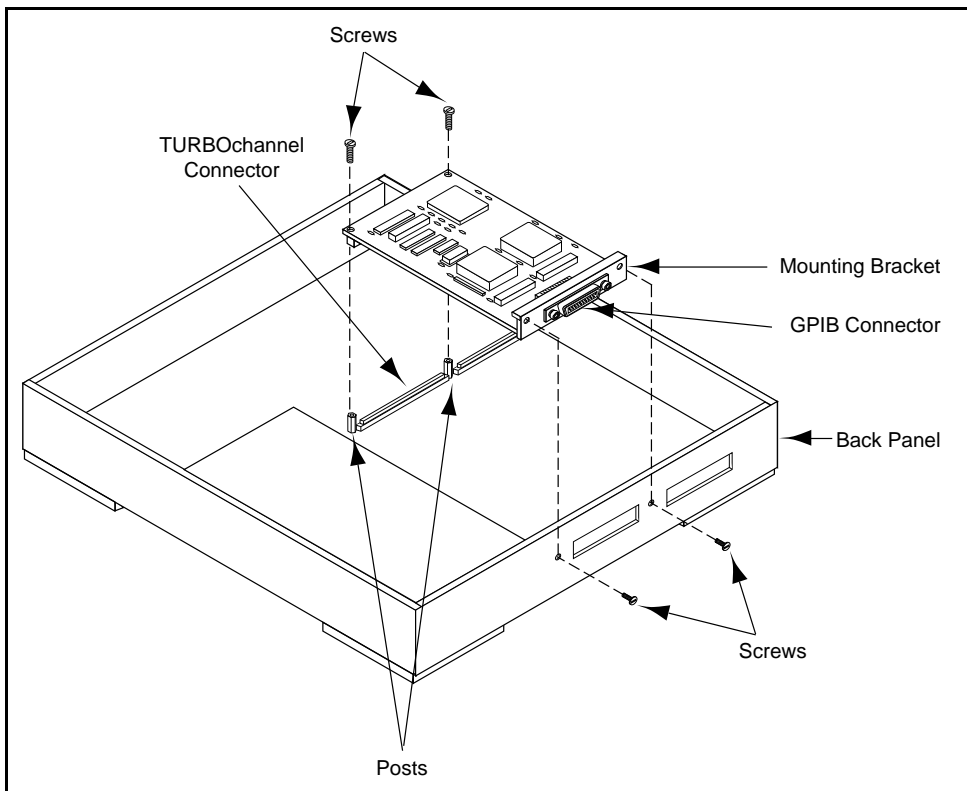


Figure 2-2. Installing the TC-GPIB Board

7. Secure the mounting bracket of the TC-GPIB to the back panel of the computer using the back panel screws that came with your computer.
8. Screw the TC-GPIB board to the posts on the motherboard at either end of the TURBOchannel connector by using the two screws that are supplied with your TC-GPIB kit.

**Note:** *Some computers may have plastic posts that clip onto the board rather than posts that require screws.*

9. Replace the system unit cover.
10. Plug in the power cord.
11. Turn on your computer. The TC-GPIB interface board is now installed.

# Chapter 3

## Software Installation and Configuration

---

This chapter contains instructions for installing and configuring your NI-488.2M software.

### NI-488.2M Software Components

The NI-488.2M software includes the following components:

- NI-488.2M driver (`gpib.o`)
- An include file for user programs (`ugpib.h`)
- C language interfaces library (`libgpib.a` and `libgpib.so`)
- Source code of C language interface library (`cib.c`)
- An interactive configuration utility (`ibconf`)
- A software diagnostic utility (`ibtsta`)
- An interactive GPIB control program (`ibic`)

### Remove an Existing Driver

If you have a previous version of the NI-488.2M software for the TC-GPIB installed in your system, you must remove it before you install the new version.

To check for an existing driver, enter the following command:

```
/usr/sbin/setld -i | grep TCGPIB
```

If the following message appears, you have an existing driver installed in your system:

```
TCGPIBXXX installed National Instruments GPIB Driver verx.xx
```

where `XXX` is a three-digit number corresponding to the version number. If you have installed and removed the driver, the same message appears without the word **installed**.

You must be a super user to remove the driver from the kernel configuration. To remove the driver, enter the following command:

```
/usr/sbin/setld -d TCGPIBXXX
```

where `XXX` is a three-digit number corresponding to the version number.

## Install the Software

After you have removed any existing driver for the TC-GPIB, follow these steps to install your NI-488.2M software. Remember you must be a super user to install the software.

1. Run the system utility `setld` to install the software. The commands you enter depend on whether you are installing the software from tape or diskette.

If you are installing from tape, insert the distribution tape into the tape drive and enter the following command:

```
/usr/sbin/setld -l /dev/rmt0h
```

If you are installing from diskette, insert the distribution diskette into the disk drive and enter the following commands:

```
mkdir /tmp/tcgpib
cd /tmp/tcgpib
tar xvf /dev/rzxc
/usr/sbin/setld -l .
cd ..
rm -r tcgpib
```

where `/dev/rzxc` is the special file for your floppy disk drive. `x` is an integer equal to the SCSI bus index multiplied by 8 and added to the SCSI ID value. If you do not know the name of your floppy disk special file, ask your system administrator.

2. Rebuild a new kernel using the `doconfig` system utility. Enter the following command:

```
/usr/sbin/doconfig
```

3. Save the old kernel and move the new kernel to `/vmunix`, so it becomes the system default boot kernel. Then reboot your computer. Enter the following commands:

```
mv /vmunix /vmunix.save
mv /sys/XXX/vmunix /vmunix
reboot
```

where `XXX` is the name of the configuration that you entered while running `doconfig`. The default is the host name of the computer.

After you have installed your software, you might want to view or modify the driver configuration. Refer to the next section for instructions on running the configuration utility `ibconf`. If you do not need to run `ibconf`, refer to Chapter 4, *Installation Verification and Troubleshooting*, for further instructions.

## Configure the Software with `ibconf` (Optional)

The `ibconf` utility is the National Instruments GPIB driver configuration utility. After installing the software, you can run `ibconf` to examine or modify the software configuration. You also might want to run `ibconf` to change configuration options such as device names or timeout values. Follow these steps to run `ibconf`.

1. Log on as super-user (`root`).
2. Start `ibconf` by entering the following command:

```
/usr/bin/ibconf filename
```

where *filename* is optional and refers to the UNIX kernel built with the NI-488.2M driver. The default UNIX kernel file is `/vmunix`. To run `ibconf` on the kernel `/vmunix`, enter the following command:

```
/usr/bin/ibconf
```

3. Use the help instructions on your screen to move around the screen, make changes, and exit the program.
4. If you made any changes, reboot your computer from the changed kernel so that the new settings become active.

For more information about `ibconf`, refer to the *NI-488.2M Software Reference Manual*.

After you have installed and configured the software, you should verify the installation. Refer to Chapter 4 for instructions on verifying the software and hardware installation.

# Chapter 4

## Installation Verification and Troubleshooting

---

This chapter describes how to verify the installation and troubleshoot problems.

### Run the Software Diagnostic Program

To verify and test the hardware and software installation, run the `ibtsta` software diagnostic program that came with your NI-488.2M software. The `ibtsta` program is an NI-488.2M application that makes calls to the driver just as an application does. `ibtsta` checks for correct access to the device driver and to the GPIB boards.

Follow these steps to run `ibtsta`:

1. Disconnect all GPIB cables.
2. Enter the following command:

```
/usr/bin/ibtsta
```

If `ibtsta` completes with no errors, you have installed the NI-488.2M software correctly. If `ibtsta` returns an error message, refer to the next section for troubleshooting instructions.

### Troubleshooting `ibtsta` Messages

The following sections explain common error messages generated by `ibtsta`.

**Note:** *In the following paragraphs, `gpibx` refers to board `gpib0`, `gpib1`, `gpib2`, or `gpib3` as appropriate.*

#### Presence Test of Driver

The `ibtsta` program tests for proper installation of the NI-488.2M driver. It displays the following message if it detects a problem:

```
Driver is not properly installed.  
Cannot access node /dev/gpib or /dev/gpibx.
```

If this error message appears, verify the following items:

- Make sure that the GPIB driver is installed.
- Verify that you built a kernel with the driver and that you booted the computer from the new kernel.
- If the two items above are true, run the system utility `kmknod` by entering the following command:

```
/sbin/kmknod
```

If `ibtsta` fails again, fill out the forms in Appendix B, *Customer Communication*, and contact National Instruments.

## Presence Test of GPIB Board

The following error message appears if no hardware is installed for `gpibx`:

```
Interface board gpibx is not installed.
```

You can ignore this message when it applies to a nonexistent board. The `ibtsta` program always tries to test for four TC-GPIB boards. In most cases you will have fewer than four boards installed in your computer. This message appears when `ibtsta` tries to test a board that does not exist. Refer to Chapter 2 for instructions to install a TC-GPIB board.

## GPIB Cables Connected

The following error message appears if a GPIB cable is connected to the board when you run `ibtsta`.

```
ibcmd " "  
ERROR: status 0x174 returned when 0x8130 expected.  
ERROR: error ENOL expected.
```

Disconnect all GPIB cables before trying the test again.

## Common Questions

### How do I know that my GPIB board is installed correctly?

The `ibtsta` test verifies that both the hardware and software are installed correctly. If the test fails, and you cannot correct the problem, fill out the forms in Appendix B and contact National Instruments.

### What do I do if `ibtsta` fails with an error?

If you cannot correct the problem by following the troubleshooting instructions in this chapter, fill out the forms in Appendix B, *Customer Communication*, and contact National Instruments.

### What could be causing a problem with accessing the NI-488.2M distribution diskette?

Check the name of the special file for your tape drive or floppy disk drive. It should be `/dev/rmtxh` or `/dev/rzxc`, where `x` is an integer number. Contact your system administrator for more information.

Another possibility is that the data on the distribution diskette is corrupted.

### Why can't I run `ibconf`?

If you do not have the necessary reading and writing permission, you cannot run `ibconf` because `ibconf` changes the binary code of the kernel (`/vmunix`). For your own protection, only the super user has permission to write to the kernel on most systems. If you are not a super user, ask your system administrator (super user) to change the configuration for you.

If you are a super user and you cannot run `ibconf`, then either the driver is not built into the kernel or the kernel file is corrupted. Try reinstalling the driver and rebuilding the kernel.

### Why does `ibfind` return -1 with an `iberr` value of EDVR?

The driver might not be properly installed. Check your installation. Otherwise, some of the GPIB special files might be missing. Try running `kmknod` again by entering `/sbin/kmknod` at the command prompt.

**Where is my GPIB base directory?**

Your GPIB base directory is `/usr/opt/TCGPIB`. It includes all of your GPIB-related files.

**How do I use the NI-488.2M language interface?**

For information about using the NI-488.2M language interface refer to Chapter 5, *Using Your NI-488.2M Software*.

**When would I use `ibic`?**

You can use `ibic` to test and verify instrument communication, troubleshoot problems, and develop your application program. For more information about `ibic`, refer to the *NI-488.2M Software Reference Manual*.

**What should I do if I have problems with my IET11 kit?**

If you need technical support for your IET11, contact your local Digital Services Representative.

**What information should I have before I call National Instruments?**

When you call National Instruments, you should have the results of the diagnostic test `ibtsta`. You should also have run `ibic` to try to find the source of your problem. Also, make sure you have filled out the configuration form in Appendix B, *Customer Communication*.

# Chapter 5

## Using Your NI-488.2M Software

---

This chapter describes the `ibic` utility and lists some programming considerations.

### Introduction to `ibic`

The Interface Bus Interactive Control utility, `ibic`, comes with your NI-488.2M software. You can use `ibic` to enter NI-488 functions and NI-488.2 routines interactively and display the results of the function calls automatically. Without writing an application, you can use `ibic` to do any of the following:

- Verify GPIB communication with your device quickly and easily.
- Learn the syntax of the NI-488 functions and NI-488.2 routines before writing your application.
- Become familiar with the commands of your device.
- Receive data from your GPIB device.
- Learn new NI-488 functions and NI-488.2 routines before integrating them into your application.

For more information about `ibic`, refer to the *NI-488.2M Software Reference Manual*.

### Programming Considerations

To create an executable program, complete the following steps:

1. Include the header file `ugpib.h` in your application.  

```
#include <sys/ugpib.h>
```
2. Compile the application program (assume that the example program you just created is in a file called `test.c`) by entering one of the following commands:

- a. If you want to use the shared library `/usr/shlib/libgpib.so`, enter the following command:

```
cc test.c -o test -no_archive -lgpib
```

The `-no_archive` option is positional and can be used more than once. It affects only those options that follow it.

- b. If you want to use the non-shared library `/usr/lib/libgpib.a`, enter the following command:

```
cc test.c -o test -non_shared -lgpib
```

- c. Optionally, you can enter the command without specifying the `no_archive` or `non_shared` flag as follows:

```
cc test.c -o test -lgpib
```

In this case, the compiler, by default, first tries to use the shared library. If that library is not available, it tries to link to the non-shared library.

For more detailed information about compiling, refer to the man pages on `cc` and `ld`.

3. Run the program by entering the following command:

```
test
```

For detailed information about each NI-488 function and NI-488.2 routine, refer to the *NI-488.2M Software Reference Manual*.

# Appendix A

## Hardware Specifications

---

This appendix describes the electrical, physical, and environmental characteristics of the TC-GPIB board and the recommended operating conditions.

Table A-1. Electrical Characteristics

Characteristic	Specification
Transfer Rates GPIB Reads GPIB Writes GPIB Commands	over 1 Mbytes/s* over 1 Mbytes/s* over 320 kbytes/s*
Power Requirement (from TURBOchannel Bus)	+5 VDC      4.0 A Maximum 2.1 A Typical
* Actual speed may vary considerably from those shown due to instrumentation capabilities.	

Table A-2. Physical Characteristics

Characteristic	Specification
Dimensions	5.68 in. by 4.6 in. (14.42 cm by 11.7 cm)
I/O Connector	IEEE 488 Standard 24-pin

Table A-3. Environmental Characteristics

Characteristic	Specification
Operating Environment Ambient Temperature Relative Humidity	0° to 40° C 5% to 90%, noncondensing
Storage Environment Temperature Relative Humidity	-20° to 70° C 5% to 90%, noncondensing
EMI	FCC Class A Verified VCCI Class 1 Certified VDE Class A Certified

# Appendix B

## Customer Communication

---

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve technical problems you might have as well as a form you can use to comment on the product documentation. Filling out a copy of the *Technical Support Form* before contacting National Instruments helps us help you better and faster.

**Note to Digital Equipment Corporation Customers:** *If you need technical support for your IET11, please contact your local Digital Service Representative.*

National Instruments provides comprehensive technical assistance around the world. In the U.S. and Canada, applications engineers are available Monday through Friday from 8:00 a.m. to 6:00 p.m. (central time). In other countries, contact the nearest branch office. You may fax questions to us at any time.

### Corporate Headquarters

(512) 795-8248

Technical support fax: (800) 328-2203  
(512) 794-5678

<b>Branch Offices</b>	<b>Phone Number</b>	<b>Fax Number</b>
Australia	(03) 879 9422	(03) 879 9179
Austria	(0662) 435986	(0662) 437010-19
Belgium	02/757.00.20	02/757.03.11
Denmark	45 76 26 00	45 76 71 11
Finland	(90) 527 2321	(90) 502 2930
France	(1) 48 14 24 00	(1) 48 14 24 14
Germany	089/741 31 30	089/714 60 35
Italy	02/48301892	02/4830191 5
Japan	(03) 3788-1921	(03) 3788-1923
Netherlands	03480-33466	03480-30673
Norway	32-848400	32-848600
Spain	(91) 640 0085	(91) 640 0533
Sweden	08-730 49 70	08-730 43 70
Switzerland	056/20 51 51	056/20 51 55
U.K.	0635 523545	0635 523154

# Technical Support Form

---

Photocopy this form and update it each time you make changes to your software or hardware, and use the completed copy of this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

If you are using any National Instruments hardware or software products related to this problem, include the configuration forms from their user manuals. Include additional pages if necessary.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

Fax (\_\_\_\_) \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_

Computer brand \_\_\_\_\_

Model \_\_\_\_\_ Processor \_\_\_\_\_

Operating system \_\_\_\_\_

Speed \_\_\_\_\_MHz RAM \_\_\_\_\_MB

Display adapter \_\_\_\_\_

Mouse \_\_\_\_\_yes \_\_\_\_\_no

Other adapters installed \_\_\_\_\_

Hard disk capacity \_\_\_\_\_MB Brand \_\_\_\_\_

Instruments used \_\_\_\_\_

National Instruments hardware product model \_\_\_\_\_

Revision \_\_\_\_\_

Configuration \_\_\_\_\_

(continues)

National Instruments software product \_\_\_\_\_

Version \_\_\_\_\_

Configuration \_\_\_\_\_

The problem is \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

List any error messages \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

The following steps will reproduce the problem \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

# TC-GPIB Hardware and Software Configuration Form

---

Record the settings and revisions of your hardware and software on the line to the right of each item. Update this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration.

## National Instruments Products

- TC-GPIB Hardware Revision \_\_\_\_\_
- NI-488.2M Software Version  
Number on Distribution Medium \_\_\_\_\_
- Shield Ground Connected to Logic Ground (yes or no) \_\_\_\_\_
- Number of TC-GPIB Boards in System \_\_\_\_\_

## Other Products

- Computer Make and Model \_\_\_\_\_
- Clock Frequency \_\_\_\_\_
- Operating System Version \_\_\_\_\_
- Other Boards in System \_\_\_\_\_





# Glossary

---

Prefix	Meaning	Value
c-	centi-	$10^{-2}$
M-	mega-	$10^6$

°	degrees
%	percent
A	amperes
ANSI	American National Standards Institute
C	Celsius
EMI	electromagnetic interference
FCC	Federal Communications Commission
GPIB	General Purpose Interface Bus
Hz	hertz
IEEE	Institute of Electrical and Electronic Engineers
in.	inches
I/O	input/output
m	meters
MB	megabytes of memory
RAM	random access memory
s	seconds
SCSI	Small Computer System Interface (bus)
VCCI	Voluntary Control Council for Interference
VDC	volts direct current
VDE	Verbandes Deutscher Elektrotechniker (German)