



**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

TM 503 POWER MODULE

Francais Deutsch 日本語

INSTRUCTION MANUAL

**Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077**

070-1305-01
Product Group 75

Serial Number _____

First Printing MAY 1972
Revised MAY 1984

Scans By *Artek Media*

Artek Media
1042 Plummer Cir. SW
Rochester, MN 55902

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INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B000000	Tektronix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

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WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

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OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

Terms In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

Terms As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

Symbols In This Manual



This symbol indicates where applicable cautionary or other information is to be found.

Symbols As Marked on Equipment



DANGER — High voltage.



Protective ground (earth) terminal.



ATTENTION — refer to manual.

Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before

connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

Use the Proper Power Cord

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

For detailed information on power cords and connectors, see Maintenance Section.

Refer cord and connector changes to qualified service personnel.

Use the Proper Fuse

To avoid fire hazard, use only the fuse of correct type, voltage rating and current rating as specified in the parts list for your product.

Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

SERVICING SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary.

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing With Power On

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

CONSIGNES DE SECURITE

Ce rappel des consignes générales de sécurité s'adresse à la fois aux utilisateurs et au personnel de maintenance. Avertissements et précautions à respecter sont annotés au long de ce manuel à chaque fois que l'utilisation du TM 504 l'exige. Il est à noter que ceux-ci peuvent ne pas figurer dans cette rubrique de rappel.

TERMES

Dans ce manuel

Les paragraphes intitulés ATTENTION identifient les circonstances ou opérations pouvant entraîner la détérioration de l'appareil ou de tout autre équipement.

Les paragraphes intitulés AVERTISSEMENT indiquent les circonstances dangereuses pour l'utilisateur (danger de mort ou risque de blessure).

Repères gravés sur l'appareil

CAUTION (ATTENTION) : ce mot identifie les zones de risque non immédiatement perceptibles ou un risque éventuel de détérioration de l'appareil.

DANGER (DANGER) : ce mot indique les zones de risque immédiat pouvant entraîner blessures ou mort.

SYMBOLES

Dans ce manuel



Ce symbole signifie «se reporter au manuel».

Gravés sur l'appareil



DANGER — Haute tension



Borne de masse de protection (terre)



ATTENTION — se reporter au manuel

Source d'alimentation

L'appareil est conçu pour fonctionner à partir d'une source d'alimentation maximale de 250 V efficaces entre les conducteurs d'alimentation ou entre chaque conducteur d'alimentation et la terre. Pour utiliser l'appareil en toute sécurité, une connexion à la masse, réalisée au moyen d'un conducteur prévu dans le cordon d'alimentation, est indispensable.

Mise à la masse de l'appareil

Une fois installé dans le châssis d'alimentation, l'appareil est relié à la masse à l'aide d'un conducteur du cordon d'alimentation. Pour éviter tout choc électrique, insérer la prise du cordon d'alimentation dans une prise de distribution correspondante, avant de connecter l'entrée ou les sorties de l'appareil. Pour utiliser l'appareil en toute sécurité, une connexion à la masse, réalisée au moyen d'un conducteur prévu dans le cordon d'alimentation, est indispensable.

Danger provoqué par la coupure de connexion de masse

En cas de coupure de la connexion de masse, tous les éléments conducteurs accessibles (y compris boutons et commandes apparaissant isolants) peuvent provoquer un choc électrique.

Utiliser le cordon d'alimentation approprié

N'utiliser que le cordon d'alimentation et la prise recommandés pour votre appareil.

Utiliser un cordon d'alimentation en parfait état.

Pour toute information détaillée concernant cordons et prises d'alimentation, se reporter au chapitre «Maintenance» du manuel en Anglais.

Seul, un personnel qualifié peut procéder à un changement de cordon et prises.

Utiliser le fusible approprié

Pour éviter tout risque d'accident (incendie...) n'utiliser que le fusible recommandé pour votre appareil.

Le fusible de remplacement doit toujours correspondre au fusible remplacé : même type, même tension et même courant. Un remplacement de fusible ne doit être effectué que par un personnel qualifié.

Ne pas utiliser l'appareil en atmosphères explosives

Pour éviter toute explosion, ne pas utiliser cet appareil dans une atmosphère de gaz explosifs.

Ne pas démonter les capots ou les panneaux

Pour éviter toute blessure, ne pas ôter les capots ou les panneaux. N'utiliser l'appareil que si ceux-ci ont été correctement remis en place.

SICHERHEITSGANGABEN FÜR DEN ANWENDER

Die allgemeinen Sicherheitsinformationen in diesem Teil der Angaben dienen dem Anwender- und Servicepersonal. Spezielle Warnungen und Hinweise sind überall im Handbuch zu finden, müssen jedoch in diesen Angaben nicht erscheinen.

BEGRIFFE

In diesem Handbuch

VORSICHTSHINWEISE erläutern Bedingungen, die zur Zerstörung des Gerätes oder anderer Gegenstände führen können.

WARNUNGSHINWEISE erläutern Bedingungen, die zu Personenschäden führen können oder lebensgefährlich sind.

Markierungen auf dem Gerät

CAUTION – VORSICHT weist darauf hin, daß durch zufälliges Berühren an einer nicht unmittelbar zugänglichen Stelle Personenschaden entstehen kann, oder Schaden am Gerät selbst.

DANGER – GEFAHR weist darauf hin, daß durch zufälliges Berühren an einer zugänglichen Stelle Personenschaden entstehen kann.

SYMBOLE

In diesem Handbuch



Dieses Symbol zeigt an, wo Vorsicht walten zu lassen ist, oder wo Informationen zu finden sind.

Markierungen auf dem Gerät



GEFAHR – Hochspannung.



Schutzerdungskontakt.



ACHTUNG – beziehen Sie sich auf das Handbuch.

Netzspannungsversorgung

Die Betriebsspannung für dieses Gerät darf $250 V_{eff}$ nicht überschreiten und ist an die Versorgungsleitungen bzw. an eine Versorgungsleitung und Masse anzulegen. Innerhalb des Netzanschlußkabels muß ein Schutzleiter vorhanden sein, der mit Gerätemasse verbunden ist.

Masseanschluß des Gerätes

Dieses Gerät wird über den Schutzleiter der Versorgungseinheit mit Erdpotential verbunden. Zur Vermeidung von elektrischen Schlägen ist vor der Beschaltung der Ein- und Ausgänge der Netzstecker in eine korrekt verdrahtete Steckdose einzustecken. Verwenden Sie den Schutzleiter nicht als einzige Verbindung zwischen zwei oder mehreren Geräten. Zur Vermeidung von elektrischen Schlägen sind die Geräte untereinander mit separaten Leitungen zu verbinden.

Gefahr durch fehlende Schutzerde

Durch eine fehlende Schutzerde, können alle berührbaren, leitenden Teile (einschließlich Knöpfe und andere Bedienungselemente, die isoliert sind) einen elektrischen Schlag bei der Berührung auslösen.

Verwendung eines richtigen Netzkabels

Verwenden Sie nur Netzkabel, die für die Versorgungseinheit geeignet sind und die sich in gutem Zustand befinden.

Für detaillierte Informationen über Kabel und Stecker beziehen Sie sich bitte auf Abbildungen innerhalb des Handbuchs.

Ein Austausch von Kabeln und Steckern ist nur von geschultem Personal vorzunehmen.

Verwendung einer richtigen Sicherung

Zur Vermeidung von Brandschäden sind nur Sicherungen zu verwenden, die in den Teilelisten dieses Gerätes aufgeführt sind und die in Spannungs- und Stromwert entsprechend sind.

Ersatz von Sicherungen ist nur von geschultem Personal vorzunehmen.

Arbeiten Sie nicht in explosiver Umgebung

Zur Vermeidung von Explosionen ist die Inbetriebnahme dieses Gerätes in explosiver Umgebung zu unterlassen, wenn das Gerät nicht dafür geeignet ist.

Entfernen Sie keine Gehäuseabdeckungen

Zur Vermeidung von Personenschäden sind keine Gehäuseteile zu entfernen. Auch ist das Gerät ohne Gehäuse nicht in Betrieb zu nehmen.

ご使用の前に

この章では操作する方およびサービス・エンジニアの方に安全にお取扱いただくための注意事項が述べられています。

用語

マニュアル中の用語

注意の項は本機器または他の接続機器に損傷を及ぼす恐れのある場合の注意です。

警告の項は人体に損傷を与えたり生命に危険を及ぼす恐れのある場合の注意です。

機器上に記されている用語

CAUTIONは人体および本機器または周辺機器に損傷を及ぼす恐れがある部分を示しています。

DANGERは人体に損傷を及ぼしたり生命に危険を与える恐れがある部分を示しています。

記号

この取扱説明書に出てくる記号



このマークは適切な注意、または他の項目を参照する必要がある場合を指示しています。

機器に記された記号



危険——高電圧



保護用接地ターミナル



注意——取扱説明書参照

電源

本機器は電源コードの線間、あるいは電源コードとグラウンド間が250Vrms以内の範囲の電源で作動します。安全のために電源コードのアース線で接地して下さい。

機器の接地

本機器は電源コードのアース線で接地されます。電氣的ショックを避けるために、電源コードをコンセントに差し込んでから、機器の入、出力端子への接続を行って下さい。電源コード中のアース線は必ず接地して下さい。

電源本体の接地

電氣的ショックを防止するため、電源本体は確実に接地して下さい。接地が行われていないと、導体の部品（絶縁処理されたノブおよびコントロールつまみを含む。）により電氣的ショックを受けることがあります。

電源コード

電源コードとコネクタは機器に適合するものをお使い下さい。

電源コードに損傷がないことをお確かめ下さい。

電源コードとコネクタに関する詳細は本体取扱説明書をご参照下さい。

電源コードとコネクタの交換については当社エンジニアにおたずね下さい。

ヒューズ

危険防止のため、マニュアルに記載されている仕様に適合するヒューズをご使用下さい。

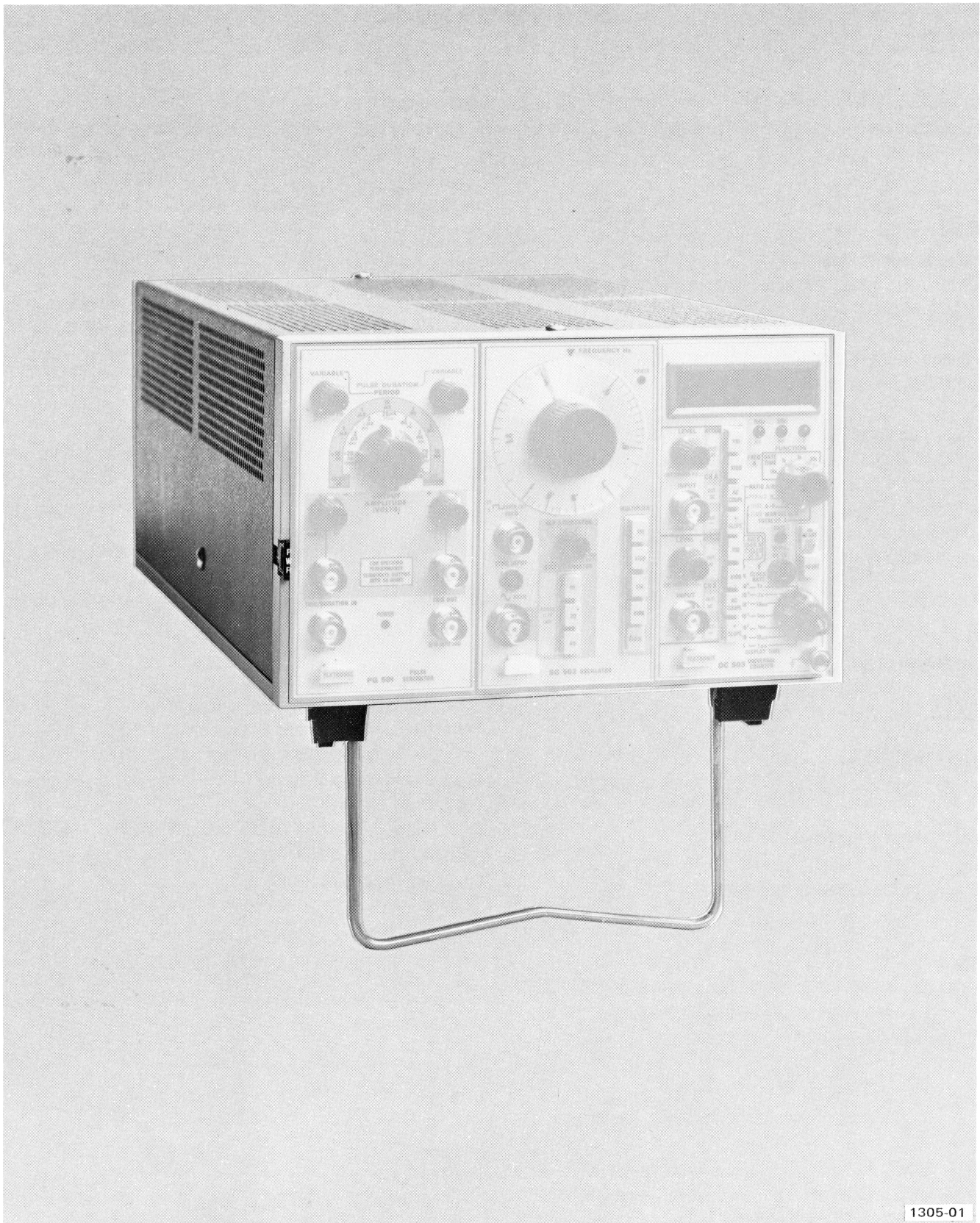
ヒューズの交換に関する詳細は、当社フィールド・エンジニアにおたずね下さい。

爆発防止

危険防止のため、爆発性のガスが周囲にあるような所では作動させないで下さい。

カバー、パネルについて

プラグインのカバーやパネルを取りはずしたまま作動させないで下さい。



TM 503 Power Module with plug-ins.

SPECIFICATION

INTRODUCTION

Description

The TM 503 is a three-wide power module compatible with all TM 500 plug-ins. It provides unregulated dc and ac supplies and non-dedicated power transistors for plug-in usage. Option 2 rear interface allows interconnection of

special features between plug-ins or with external devices through the back panel.

Performance Conditions

The values listed below are valid only when the instrument is operated at an ambient temperature between 0°C and 50°C.

Table 1-1
ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
SUPPLIES		
+33.5 Vdc		
Tolerance ^a		+23.7 V to +40.0 V
PARD (Periodic and Random Deviation)		≤2.5 Vpp
Maximum load		350 mA
Maximum load di/dt		10 mA/μs
−33.5 Vdc		
Tolerance ^a		−23.7 V to −40.0 V
PARD		≤2.5 Vpp
Maximum load		350 mA
Maximum load di/dt		10 mA/μs
+11.5 Vdc		
Tolerance ^a		+7.6 V to +16.0 V
PARD		≤2.5 Vpp
Maximum load		1.3 A
Maximum load di/dt		20 mA/μs
25 Vac (2 each)		
Range		25.0 Vrms +10%, −15% floating
Maximum load		25 Vac
Maximum floating voltage		350 V peak

Table 1-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
17.5 Vac ^b		
Range		With a grounded center tap 20.5 Vrms +10%, -20%
Maximum load		30 VA
Maximum plug-in power drawn from mainframe ^c		35 Wdc or 75 VAac
Combined power drawn sharing limitation ^c		VAac +2.1 (Wdc) ≤ VAac
Fuse data		
+33.5 Vdc		2.5 A, 3 AG, fast blow
-33.5 Vdc		2.5 A, 3 AG, fast blow
+11.5 Vdc		7.5 A, 3 AG, fast blow
SERIES PASS TRANSISTORS		
Type		One each NPN or PNP per compartment.
Maximum dissipation		7.5 W each, 15 W total
SOURCE POWER REQUIREMENTS		
Voltage ranges		Selectable 100 V, 110 V, 120 V, 200 V, 220 V, and 240 V nominal line ±10%
Line frequency		48 Hz to 440 Hz
Max power consumption		Approximately 120 W
Fuse data		
100 V, 110 V, 120 V ranges		1.6A slow blow
200 V, 220 V, 240 V ranges		0.8A slow blow
MISCELLANEOUS		
Maximum recommended plug-in power dissipation		
One-wide		10 to 15 W
Two-wide		25 to 35 W

^a Worst case; low line-full load and high line-no load values including PARD.

^b Floating in high-power compartment, 350 V peak.

^c At nominal line voltage.

Table 1-2
PHYSICAL CHARACTERISTICS

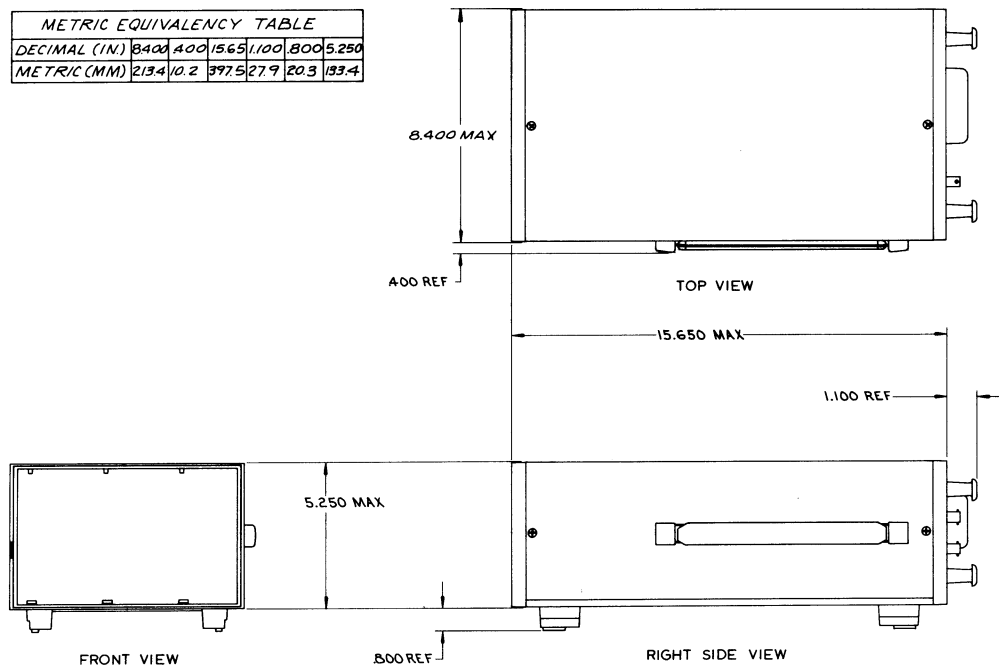
Characteristics	Supplemental Information
ENVIRONMENTAL^{a,b}	
Overall	Meets or exceeds MIL-T-28800B, Class 5 requirements with exception for vibration, shock, and EMC.
Temperature	
Operating	0°C to +50°C
Non-operating	–55°C to +75°C
Humidity	95% RH, 0°C to +30°C 75% RH, to +40°C 45% RH, to +50°C
Altitude	
Operating	4.6 km (15,000 ft)
Non-operating	15 km (50,000 ft)
Vibration ^b	0.25 mm (0.015"), 5 Hz to 55 Hz, 75 minutes.
Shock ^b	20 g's (1/2 sine), 11 ms, 18 shocks
Bench handling	45°, 4", or equilibrium, whichever occurs first
Transportation	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.
MECHANICAL	
Net weight	9.5 lbs (4.3 kg)
Overall dimensions	6.0 in (15.2 cm) H, 8.7 in (22.1 cm) W, 15.3 in (43.2 cm) L

^aWith plug-ins. Some plug-ins require additional limitations.

^bMeets MIL-T-28800B, Class 5 without plug-ins (0.015" displacement, 30 g's shock).

Specification—TM 503

METRIC EQUIVALENCY TABLE						
DECIMAL (IN)	8.400	4.00	15.65	1.100	.800	5.250
METRIC (MM)	213.4	101.6	397.5	279.4	203.2	133.4



TM 503 MODULE

1305-13

OPERATING INSTRUCTIONS

GENERAL

Installation

For full installation instructions refer to the procedure at the end of this section.

Power Source

The TM 503 is designed to operate from a power source with its neutral at or near earth (ground) potential with a separate safety-earth conductor. It is not intended for operation from two phases of a multi-phase system.

Power Usage

With three plug-ins installed, the TM 503 may require up to 120 watts at the upper limits of high line voltage ranges. Actual power consumption depends on the particular plug-in configuration and operating modes selected.

Loading Considerations. The power capability of the TM 503 can best be used by carefully planning the plug-in configuration, the external loads, and the resulting power distributions. Optimum conditions may be obtained by:

1. Having equal loads in all compartments.
2. Dissipating as much power as possible in the external loads.
3. Operating the system in an ambient temperature near 25°C.

Each plug-in is provided access to a pair of heat-sinked, series-pass transistors, one NPN and the other PNP. These transistors enable the plug-in to operate in power ranges not possible if the power were to be dissipated in the plug-ins themselves.

Operating Temperatures

The TM 503 can be operated in an ambient air temperature of 0°C to 50°C. Thermal cutout devices protect the system by disconnecting the power to the TM 503 Power Module when internal temperatures rise above a safe operating level. These devices automatically return power to the unit when the internal temperatures return to a safe level.

Since the TM 503 can be stored in temperatures between -40°C and +75°C, allow the instrument's chassis to return to within the operating limits before applying power.

Power Modules

It is not necessary that all the plug-in compartments be utilized in order to operate the Power Module. The only modules needed are those necessary to complete the task.



Turn the Power Module off before inserting the plug-in; otherwise damage may occur to the plug-in circuitry.

Module Installation

1. Check the location of the white plastic barrier keys on the TM 503 interconnecting jack to ensure that their locations match the slots in the edge of the plug-in module's circuit board.
2. Align the plug-in module chassis with the upper and lower guides of the selected compartment. Push the module in and press firmly to seat the circuit board in the interconnecting jack. (Remove the plug-in module by pulling on the white release latch in the lower left corner of each module.)

Turn-on Procedure

After completing the installation procedure, found at the end of this section, and installing the plug-ins, pull the PWR switch on the left side of the TM 503. Some plug-ins have independent power switches, usually labeled OUTPUT, controlling application of mainframe power to the plug-in. Press this button to activate the plug-in.

BUILDING A SYSTEM

Family Compatibility

Mechanically, the plug-in modules are very similar to other Tektronix product families. However, they are not electrically compatible. Therefore, the TM 503 interface has barriers on the mating connectors between pins 6 and

Operating Instructions—TM 503

7 to ensure that incompatible modules cannot be inserted. See Fig. 2-1. A compatible module will have a matching slot between pins 6 and 7 of its main circuit board edge connector. This slot and barrier combination is the primary keying assignment.

TM 500-compatible plug-in modules are also identified by the white color of the release latch.

Customizing the Interface

The modularity of this instrumentation system provides for many different functions to be performed by the plug-in modules. Specific functions are grouped into families or classes, of which there may be several plug-in module members. For instance, some classes are Power Supplies, Signal Sources, Measurement, and so forth. Each modular member of a functional family will have a second slot peculiar to its family assignment located in its edge connector. The TM 503 user can "program" one or more compartments to accept only members of that family by installing a second barrier in the interface connector to match the module's slot location. An entire TM 503 can be "programmed" in this manner to set up instruction systems for specific work functions. For extra barriers, order Tektronix Part No. 214-1593-02.

Jumper wires can be used to further specialize the interface. Compartments can be made to "talk" to each other by connecting jumpers on the back side of the interface board, using pins 14 through 28 (A-side and B-side both) of the interconnecting jacks. See the following description of Option 2. Refer to each plug-in module's Manual for the I/O assignments of each pin at the rear interface. Once having made interconnections of a specialized nature, it is recommended that barriers be installed on the interconnecting jacks to ensure module compatibility with the customized wiring.

Rear Panel

The rear subpanel has a connector mounting plate for BNC and multi-pin connector mountings. Customer or factory-installed connectors and wiring (see following description of Option 2) could provide external access to the interface for external I/O control. This feature makes the TM 500 Series Modular Instrumentation System very flexible in bench-top or rackmounted systems.

Option 2. This factory-installed option adds 25-mil square-pin connectors to the rear of the interconnecting jacks at all pin locations from pins 14A and B through pins 28A and B. This will keep the interface flexible by making it

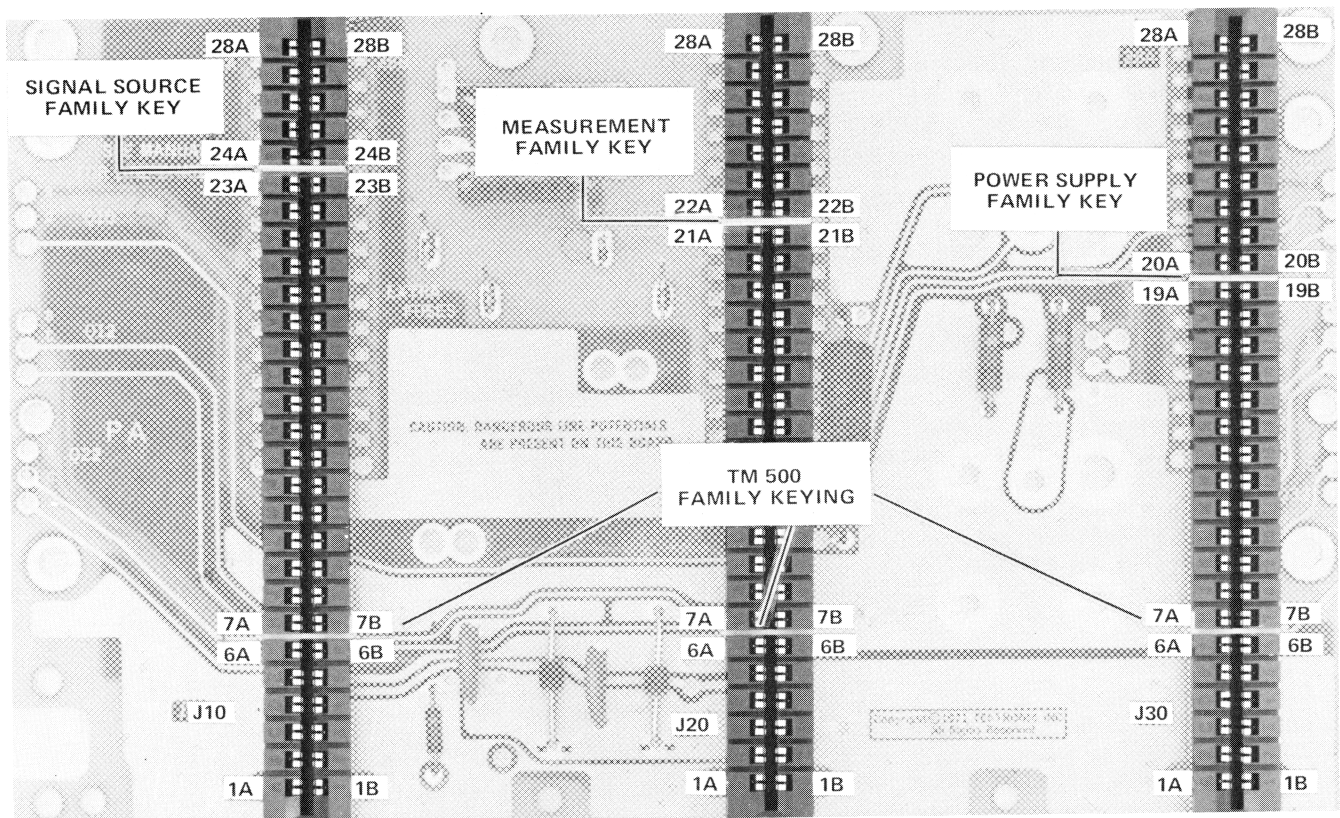


Fig. 2-1. Keying assignments for family functions. One of many possible sequence combinations.

easy and fast to change customized wiring using prepared wires with square-pin receptacles and long-nose pliers or tweezers. It also protects the circuit board from damage by repeated soldering and unsoldering of jumper wires. This option also adds six BNC connectors and one 50-pin connector to the rear panel. These connectors are not pre-wired. Instead, prepared jumpers, coaxial cables, and interconnection jack barriers are included in a kit. This gives a system designer as much flexibility as possible.

Option 7. The following described bus wires and keys are added to the connector boards of the above named TM 500-Series Power Modules to provide rear interface connections between the DC 502 Option 7, the TR 502, and the SW 503.

BUS WIRES. Six-conductor ribbon cable (Tektronix Part No. 175-0829-00) is used to make bus runs between the following points:

- B14 on J10, J20, and J30
- B15 on J10, J20, and J30
- B16 on J10, J20, and J30
- B17 on J10, J20, and J30
- B18 on J10, J20, and J30
- A18 on J10, J20, and J30

BARRIER KEYS. Plastic barrier keys (Tektronix Part No. 214-1593-02) are inserted between pins 21 and 22 on J10 between pins 23 and 24 on J20 and between pins 17 and 18 on J30.

Once the above bus connections are made and barrier keys inserted, the three connectors so changed the system dedicated and the three slots should only be used for system-dedicated plug-ins.

Stacking and Rackmounting

TM 503's with their cabinets and feet in place may be stacked on top of each other. The feet provide clearance for the lower unit's handle and at the same time give adequate spacing for the necessary ventilation.

The TM 503 is designed to be half-rack width. Field conversion kits with slide-out tracks are available to mount one or two TM 503's in a standard 19-inch rack. Vertical space needed is 5 1/4 inches.

For the necessary hardware and instructions to mount two TM 503's side-by-side with slide-out assemblies, order Tektronix Part Number 040-0616-02.

To mount a single TM 503 with a half-rack assembly and slide-out tracks, order Tektronix Part Number 040-0617-02.

To convert from a rackmount to a bench configuration for a single TM 503, order Tektronix Part Number 040-0618-01.

INSTALLATION AND PRE-TURN ON PROCEDURE

Check the rear panel markings. If the factory settings are compatible with the available line voltage and frequency, insert the desired plug-ins and use the bail to raise the front of the instrument. If a change is needed, refer a qualified service person to the procedure in the Maintenance section of this manual.

INSTRUCTIONS D'UTILISATION

Installation

Les instructions complètes d'installation figurent à la fin de ce chapitre.

Source d'alimentation

Le TM 503 est conçu pour fonctionner à partir d'une source d'alimentation dont le neutre se trouve au potentiel de la terre ou en est très peu différent, avec un conducteur de protection mis à la terre et séparé. Il n'a pas été prévu pour fonctionner entre deux phases s'un réseau multiphasé.

Consommation

Avec 3 tiroirs installés dans le châssis d'alimentation, le TM 503 peut nécessiter jusqu'à 120 W de puissance dans la gamme supérieure de la tension réseau. La consommation effective est fonction des caractéristiques du tiroir et du mode d'utilisation sélectionnés.

Considérations de charge. Afin d'employer au mieux la capacité de puissance du TM 503, il faut déterminer avec grand soin la configuration des tiroirs, les charges externes ainsi que les consommations respectives. Une utilisation optimale consiste :

1. A répartir des charges égales dans tous les compartiments.
2. A consommer le maximum de puissance dans les charges extérieures.
3. A utiliser l'ensemble à une température ambiante d'environ 25°C.

Le TM 503 alimente chaque tiroir par l'intermédiaire d'une paire de transistors (un NPN et un PNP) montés sur châssis servant de radiateur. Ces transistors, montage série, permettent d'abaisser les tensions d'alimentation nécessaires au tiroir utilisé sans dissiper de puissance dans les tiroirs eux-mêmes.

Température de fonctionnement

Le TM 503 peut être utilisé à une température ambiante comprise entre 0°C et 50°C. Un disjoncteur thermique protège l'ensemble en déconnectant la source d'alimentation du TM 503 lorsque la température interne dépasse un seuil de fonctionnement de sécurité. Ce dispositif rétablit automatiquement l'alimentation de l'appareil lorsque la température interne est redevenue normale.

Puisque le TM 503 peut être stocké à une température comprise entre -40°C et +75°C, il faut laisser au châssis le temps d'atteindre la température normale d'utilisation avant de mettre l'appareil sous tension.

Tiroirs

Il n'est pas nécessaire d'utiliser tous les compartiments pour faire fonctionner le châssis d'alimentation. Les seuls modules nécessaires sont ceux requis pour réaliser une fonction.

ATTENTION

Couper l'alimentation du TM 503 avant l'insertion ou l'extraction de tout tiroir, des arcs électriques risquant de détériorer les circuits.

Installation du module

1. Vérifier que les détrompeurs en plastique, situés sur les connecteurs du TM 503 correspondent aux encoches du circuit imprimé du tiroir utilisé.
2. Aligner les rainures supérieures et inférieures du tiroir avec les guides du compartiment sélectionné. Insérer le tiroir et le pousser à fond pour que le circuit imprimé se place correctement dans le connecteur (pour extraire le tiroir, tirer sur la tirette de verrouillage située au coin inférieur gauche du panneau avant).

Mise en service

Après avoir terminé les opérations de mise en service (informations détaillées à la fin de ce chapitre) et installé les tiroirs, tirer le commutateur PWR (POWER), situé sur le côté gauche du TM 503. Certains tiroirs sont munis de commutateurs de mise en service indépendants, normalement dénommés OUTPUT. Ceux-ci transmettent les alimentations du châssis d'alimentation vers le tiroir sélectionné. Appuyer sur ces boutons pour mettre ces tiroirs en service.

CONCEPTION D'UN SYSTEME

Compatibilité

Mécaniquement, les tiroirs modulaires de la série TM 500 sont très similaires aux autres familles de produits Tektronix. Cependant, ils ne sont pas compatibles électriquement. Par

conséquent, l'interface du TM 503 est muni de détrompeurs situés sur les connecteurs correspondants, entre les broches 6 et 7. Cette conception empêche l'insertion de tout tiroir qui ne serait pas compatible. Se reporter à la figure 2-1. Un tiroir compatible doit posséder une encoche correspondant au détrompeur entre les broches 6 et 7 sur le connecteur de son circuit imprimé principal. L'association d'une encoche et de son détrompeur permet l'identification de la fonction et assure la compatibilité des tiroirs.

La tirette de sécurité de couleur blanche est un autre moyen d'identifier la compatibilité des tiroirs de la série TM 500.

Conception de l'interface selon les besoins spécifiques du client

La modularité de ce système permet de réaliser une multitude de fonctions à l'aide des tiroirs. Des fonctions spécifiques sont regroupées par familles ou catégories, chacune de ces familles pouvant comprendre plusieurs tiroirs, par exemple, les familles d'alimentations, de générateurs de signaux, d'instruments de mesures, etc... Chaque tiroir modulaire, membre d'une famille réalisant la même fonction possède une seconde encoche assignée à cette famille et située sur le connecteur. L'utilisateur du TM 503 peut donc « programmer » un ou plusieurs compartiments afin que ceux-ci n'acceptent que les membres d'une même famille. Pour cela,

il suffit d'installer un second détrompeur sur le connecteur d'interface en face de l'encoche correspondante. Un appareil TM 503 complet peut être personnalisé de cette manière, en permettant l'élaboration du système d'instructions pour des fonctions spécifiques. Pour se procurer des détrompeurs supplémentaires, passer commande de la référence Tektronix 214-1593-02.

Des cavaliers câblés peuvent spécialiser l'interface. Des compartiments peuvent ainsi « se parler » en connectant des cavaliers du côté arrière de la carte d'interface par l'intermédiaire des broches d'interconnexion 14 à 28 (côtés A et B ensemble). Pour de plus amples informations, se reporter à la description de l'option 02. Se reporter également au manuel d'instructions concerné afin de connaître l'assignation de chaque broche I/O (entrée/sortie) placée sur l'interface arrière. Après avoir réalisé les interconnexions pour une utilisation spécialisée, il est recommandé d'installer les détrompeurs de telle sorte qu'ils garantissent la compatibilité du module avec le câblage effectué.

Panneau arrière

Le panneau arrière est perforé afin de recevoir des prises BNC et un connecteur multi-broches. Les connecteurs et le câblage, montés en usine ou installés par l'utilisateur (se reporter à la description de l'option 02) donnent accès aux entrées/sorties externes par l'intermédiaire de l'interface.

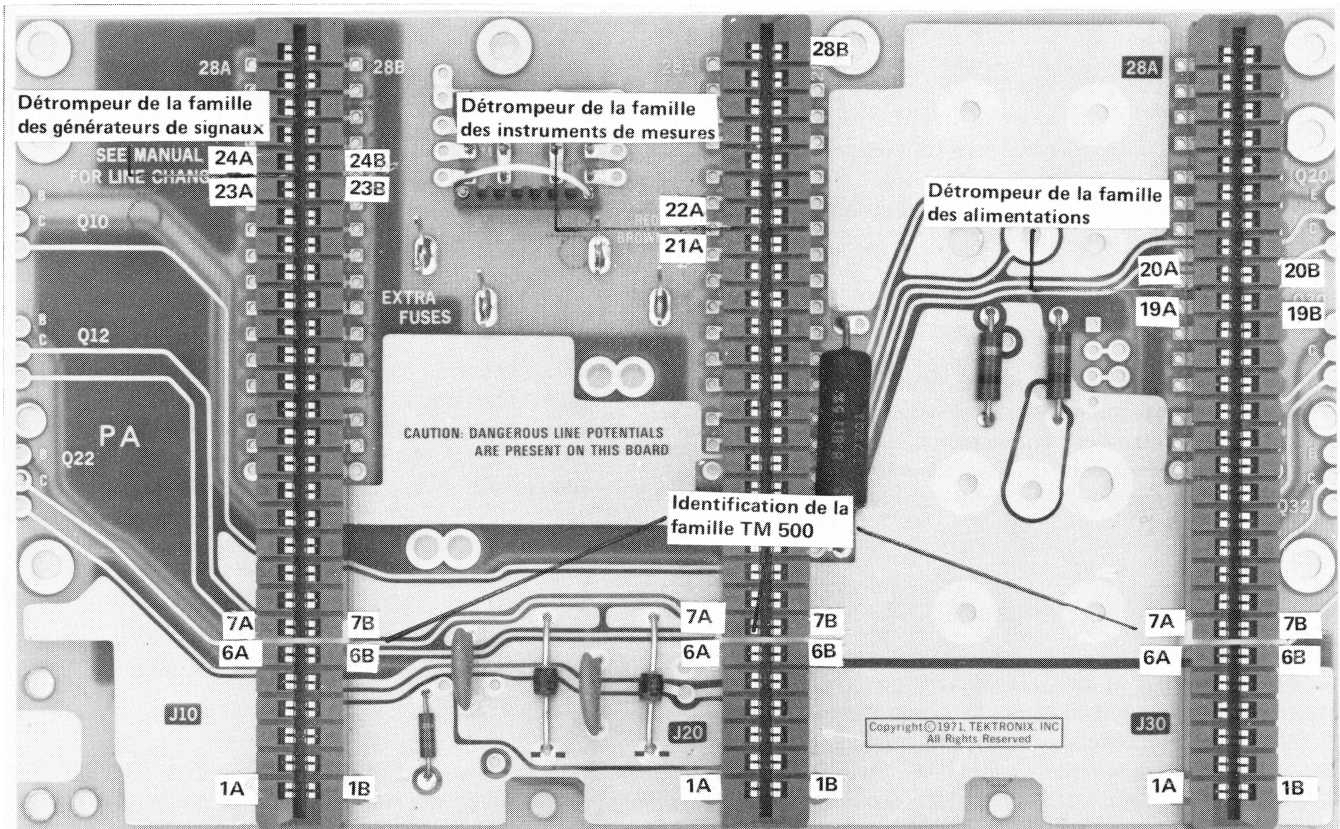


Fig. 2-1. Identification des fonctions par familles. Un exemple des nombreuses combinaisons possibles.

Cette caractéristique confère aux systèmes de mesures de la série modulaire TM 500 une grande souplesse d'emploi qu'il s'agisse de systèmes en coffret ou en baie.

Option 02. Cette option, installée en usine, consiste à adjoindre des connecteurs à broches carrées sur l'arrière de l'interface. Ils sont montés sur les emplacements des broches 14A et B à 28A et B. Cette souplesse d'utilisation de l'interface favorise la modification rapide et aisée du câblage pour une utilisation propre aux besoins du client. On utilise alors des câbles préparés et munis de prises femelles pour broches carrées et de pinces à longs crochets. Ce système protège également le circuit imprimé des détériorations pouvant provenir des soudures et dessoudures répétées. Cette option comprend 6 connecteurs BNC et un connecteur à 50 broches sur le panneau arrière. Ces connecteurs ne sont pas précâblés afin que l'utilisateur puisse concevoir son système avec souplesse. Des détrompeurs font partie du kit global.

Option 07. Les câblages décrits ci-dessous viennent s'ajouter aux cartes du connecteur du châssis d'alimentation sélectionné de la série TM 500 afin de permettre les connexions entre le DC 508 option 07, le TR 502 et le SW 503, par l'interface arrière.

CABLAGES. Un câble à six conducteurs (réf. Tektronix 175-0829-00) est utilisé pour effectuer les liaisons entre les points suivants :

- B14 sur J10, J20 et J30
- B15 sur J10, J20 et J30
- B16 sur J10, J20 et J30
- B17 sur J10, J20 et J30
- B18 sur J10, J20 et J30
- A18 sur J10, J20 et J30

DETROMPEURS. Des détrompeurs (réf. Tektronix 214-1593-02) sont insérés entre les broches 21 et 22 sur le connecteur J10, entre les broches 23 et 24 sur le connecteur J20 et entre les broches 17 et 18 sur le connecteur J30.

Une fois les connexions ci-dessus effectuées et les détrompeurs insérés, les trois connecteurs modifient le système initial. Les trois fentes ne doivent être utilisées que pour les tiroirs constituant ce système.

Empilage et montage en baie

Les TM 503, avec capôts et pieds, peuvent être empilés l'un en dessus de l'autre. La hauteur des pieds tient compte de la poignée et de la ventilation.

Le TM 503 occupe la moitié de la largeur d'une barre 19 pouces. Des kits de conversion avec rails à glissières sont disponibles pour monter un ou deux TM 503 dans une baie standard de 19 pouces. L'espace vertical nécessaire est de 13,40 cm.

Commande des instructions de montage et des pièces d'assemblage permettant de monter deux TM 503 côte-à-côte (avec jeux de glissières) : référence Tektronix 040-0617-02.

Montage d'un seul TM 503 dans la moitié de la baie (assemblages et glissières), référence Tektronix 040-0616-02.

Conversion d'un TM 503, montage en baie en coffret normal, référence Tektronix 040-0618-01.

INSTALLATION ET PROCEDURE DE MISE EN ROUTE

Vérifier les repères du panneau arrière. Si les montages effectués en usine sont compatibles avec la tension réseau et la fréquence disponibles, insérer les tiroirs souhaités et utiliser la barre d'appui pour incliner l'avant de l'appareil. Si une modification est nécessaire, faire appel à un personnel qualifié et se reporter à la méthode figurant au chapitre « Maintenance » du manuel en Anglais.

BEDIENUNGSANLEITUNG

ALLGEMEINES

Einbau

Die gesamten Einbauanweisungen finden Sie am Ende dieses Kapitels.

Netzspannung

Die Versorgungseinheit TM 503 muß an ein Lichtnetz mit neutralem oder geerdetem separatem Nulleiter angeschlossen werden. Sie ist nicht für den Anschluß an Zwei- oder Mehrphasennetze geeignet.

Leistungsaufnahme

Bestückt mit 3 Einschüben nimmt die Versorgungseinheit TM 503 bis zu 120 Watt an einem 220 V Netz auf. Die tatsächliche Leistungsaufnahme hängt von der Kombination der einzelnen Einschübe und deren momentanen Betriebsarten ab.

Belastungsmöglichkeiten. Der optimale Leistungsverbrauch der Versorgungseinheit TM 503 kann durch Planung der Einschubzusammensetzung, der externen Lasten und der resultierenden Verlustwärme bestimmt werden. Optimale Bedingungen werden erhalten durch:

1. Gleiche Belastung aller Einschubkanäle.
2. Verbrauch von soviel Leistung wie möglich in den externen Lasten.
3. Betrieb des Systems in einer Umgebungstemperatur von etwa 25°C.

Jeder Einschub hat Zugriff zu einem, auf ein Kühlblech montierten Leistungstransistorpaar (als Längstransistoren arbeitend). Diese Transistoren, je ein NPN- und PNP-Typ, ermöglichen den Einschüben in Leistungsbereichen zu arbeiten, die nicht erreichbar wären, würde die Verlustleistung innerhalb der Einschübe abfallen.

Betriebstemperaturen

Die TM 503 kann in einem Umgebungstemperaturbereich von 0°C bis 50°C arbeiten. Die Geräte sind durch thermische Abschaltvorrichtungen, die bei hohen Temperaturen ansprechen, wirkungsvoll geschützt. Nach der Wiederherstellung der Betriebstemperatur schaltet sich die TM 503 automatisch wieder ein.

Die Lagerung der TM 503 kann in einem Temperaturbereich von -40°C bis +75°C erfolgen. Die Inbetriebnahme hat jedoch in den vorgeschriebenen Temperaturgrenzen zu erfolgen.

Versorgungseinheit

Für die Inbetriebnahme der TM 503 Versorgungseinheit ist es nicht zwingend, alle Einschubfächer zu bestücken, es sind nur die Einschübe einzubauen, die für die Anwendung erforderlich sind.



Die Versorgungseinheit TM 503 sollte vor Einfügen oder Herausnahme eines Einschubs ausgeschaltet werden, da Funkenbildung entstehen und die Schaltkreise beschädigen könnte.

Einschubeinbau

1. Überprüfen Sie, ob der Plastiksteg in der rückwärtigen Buchsenleiste der TM 503 Versorgungseinheit so positioniert ist, daß er mit der Aussparung in der Steckerleiste der Einschübe übereinstimmt.

2. Setzen Sie den Einschub in die obere und untere Führung der Versorgungseinheit und schieben Sie ihn bis er in der hinteren Buchsenleiste einrastet. (Entfernen Sie den Einschub durch Ziehen an der weißen Entriegelungsklinke in der linken unteren Ecke jedes Frontpanels.)

Einschaltvorgang

Zum Einschalten ist der Netzschalter an der Geräte-seite der TM 503 Versorgungseinheit zu ziehen. Einige Einschübe verfügen über einen Schalter, der nach dem Einschalten der TM 503 Versorgungseinheit zu betätigen ist.

AUFBAU EINES MESSYSTEMS

Kompatibilität

Mechanisch sind die Einschübe anderen Tektronix-Produkten sehr ähnlich, jedoch elektrisch nicht kompatibel. Aus diesem Grund besitzt die TM 503 in den Buchsenleisten zwischen den Stiften 6 und 7 Sperriegel, wodurch das Einsetzen eines falschen Einschubes verhindert wird. Siehe Abb. 2-1.

Kapitel 2 – TM 503

Ein kompatibler Einschub verfügt in seiner Steckerleiste zwischen den Stiften 6 und 7 über eine Aussparung. Diese Kombination von Riegel und Aussparung ist die grundsätzliche Verschlüsselung zwischen Einschüben und Versorgungseinheiten.

Darüber hinaus sind die kompatiblen TM 500-Einschübe durch einen weißen Entriegelungshebel zum Herausnehmen gekennzeichnet.

Anwenderbezogenes Interface

Durch die Modularität dieses Gerätesystems ergibt sich je nach Kombination eine vielseitige Funktionserfüllung. Die speziellen Funktionen sind in Familien bzw. Klassen zusammengefaßt, denen verschiedene Einschübe zugeordnet sind, z. B. Netzteile, Signalgeneratoren und Meßgeräte. Jeder Einschub verfügt daher je nach Familienzugehörigkeit über eine weitere Aussparung in seiner hinteren Steckeranschlußleiste, die ihn klassifiziert. Dem Anwender wird hierdurch ermöglicht, durch Einbau von weiteren Isolierstegen seine Versorgungseinheit so zu programmieren, daß die Einschubfächer nur Einschübe mit bestimmten Funktionen aufnehmen. Zusätzliche Isolierstege haben die Tektronix Bestell-Nr. 214-1593-02.

Zur weiteren Spezialisierung des Interface sind Drahtbrücken zu verwenden, die eine Kommunikation der einzelnen Einschubfächer untereinander gestatten. Hierzu sind die Stifte 14 bis 28 der A- und B-Seiten zu verwenden. Eine Beschreibung hiervon ist unter Option 2 dieses Handbuches zu entnehmen. Darüber hinaus ist in jeder Einschubbeschreibung die Stiftbelegung der Steckerleiste zu beachten. Sind solche Zwischenverbindungen hergestellt, so ist es zwingend, auch Isolierstege einzubauen, die die Kompatibilität in der Verdrahtung sicherstellen.

Rückseite

Auf der Rückseite der Versorgungseinheit TM 503 ist zum Einbau von BNC- und Mehrfachsteckern eine Montageplatte vorgesehen. Ein werkseitig oder vom Anwender vorgenommener Einbau und Anschluß von Steckerverbindungen (Beschreibung siehe unter Option 2) ermöglicht über das Interface, durch Zugriff von außen an das Interface, eine externe I/O-Steuerung. Durch diese Möglichkeit wird aus der TM 500-Serie ein sehr flexibles modulares Instrumentensystem.

Option 2. Mit dieser werkseitig installierten Option verfügt die Versorgungseinheit TM 503 über 25polige Steckverbindungen mit quadratischen Stiften, die mit den Stiften 14A und B bis 28A und B der rückseitigen Steckver-

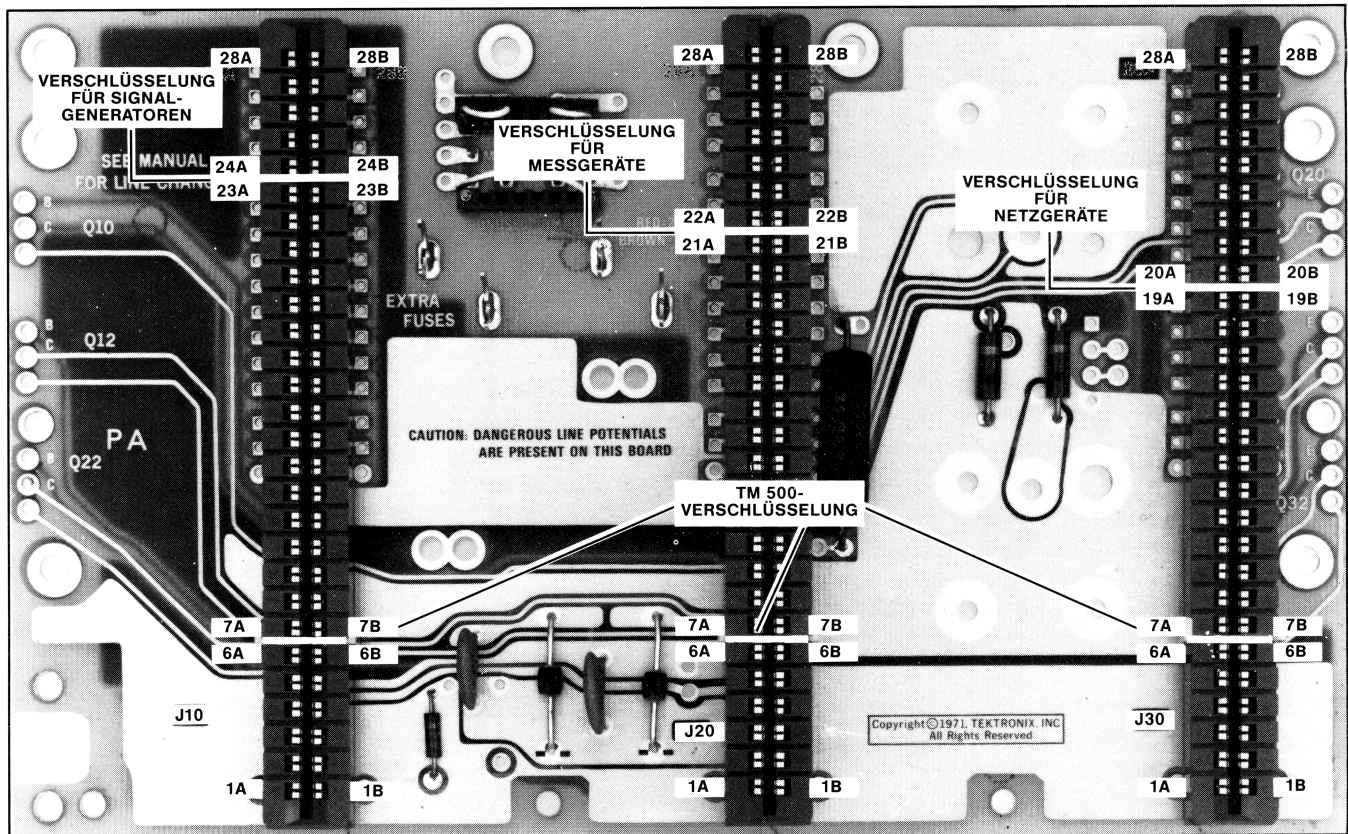


Abb. 2-1. Verschlüsselungsangaben für die Familien-Funktionen. Eine von vielen möglichen Kombinationen.

bindung der TM 503 verbunden sind. Hierdurch wird das Interface flexibel, da mit speziellen Verbindungsschnüren eine anwenderbezogene Verdrahtung schnell hergestellt werden kann, ohne daß auf der Platine nachträgliche Lötarbeiten durchgeführt werden müssen.

Darüber hinaus beinhaltet die Option noch BNC- und einen 50poligen Stecker auf der Geräte-Rückseite. Diese Stecker sind nicht verdrahtet, um dem Anwender individuelle Möglichkeiten zu bieten. Ein mitgelieferter Kit verfügt über Stecker, Koaxialkabel und Isolierstege.

Option 7. Die nachfolgend beschriebenen Busverdrahtungen und Schlüssel sind zusätzlich auf der Verbindungsplatine der Versorgungseinheit, um eine rückseitige Interface-Verbindung zwischen dem DC 508 Option 7, dem TR 502 und dem SW 503 zu ermöglichen.

BUSVERBINDUNGEN. Ein 6-adriges Bandkabel (Tektronix Best.-Nr. 175-0829-00) wird zur Verbindung folgender Punkte benutzt:

- B14 auf J10, J20 und J30
- B15 auf J10, J20 und J30
- B16 auf J10, J20 und J30
- B17 auf J10, J20 und J30
- B18 auf J10, J20 und J30
- A18 auf J10, J20 und J30

SPERRSCHLÜSSEL. Plastikstege (Tektronix Best.-Nr. 214-1593-02) werden zwischen die Pins 21 und 22 auf J10, Pins 23 und 24 auf J20 und zwischen die Pins 17 und 18 auf J30 eingesetzt. Wenn die Verbindungen einmal

gemacht worden sind und die Stege eingesetzt wurden, sollte das Gerät nur in der bestimmten Systemkonfiguration benutzt werden.

Stapeln und Gestelleinbau

Es lassen sich mehrere TM 503 Versorgungseinheiten übereinander stapeln. Die Füße der Geräte sorgen für den nötigen Abstand für Bedienung und Belüftung der unteren Einschübe.

Die Versorgungseinheit TM 503 besitzt eine halbe Gestelleinbaubreite. Zum Einbau von einer oder zwei TM 503 Versorgungseinheiten in einem Standard 19 Zoll-Gestell ist ein Kit mit Einschubschienen lieferbar.

Der benötigte vertikale Raum beträgt 13,3 cm. Die mechanischen Teile und Einbauanweisungen für die Montage von zwei Geräten nebeneinander sind unter der Bestell-Nr. 040-0616-02 zu bestellen.

Für den Gestell-Einbau einer einzelnen TM 503 sind die Teile unter der Nr. 040-0617-02 zu bestellen.

Zum Umrüsten einer TM 503 Versorgungseinheit von der Gestelleinbauversion in ein Tischgerät sind die Teile unter der Nr. 040-0618-01 zu bestellen.

EINBAU UND ANLEITUNG VOR DER INBETRIEBNAHME

Beachten Sie die Angaben auf der Rückseite. Stimmt die werkseitig erfolgte Einstellung der Betriebsspannung und Frequenz mit der vorhandenen überein, setzen Sie den Stecker ein. Ist eine Änderung nötig, sollte sich ein qualifizierter Techniker auf die entsprechende Anleitung in diesem Manual beziehen.

TM503型 取扱説明

はじめに

取付け

取付け手順に関しては本章の最後の部分に述べられています。

電源

TM503型はアース電位の中性点を持った電源で使用するように設計されています。多相システムの2相または単相3線システムの2線で動作させることはできません。

消費電力

3台のプラグインが組み込まれた場合、TM503型は最高120Wの電力を必要とします。実際の消費電力はプラグインの組み合わせや動作状態によって変わります。

負荷について

実際の消費電力はプラグインの組合せによって異なります。

電力はプラグインの機能的な組合せ、外部負荷、各々のプラグインの消費電力に注意して効率よくご使用下さい。

最適の状態とは、

- (1) 3つのプラグイン・ホールがすべて同じ負荷で、高電力プラグイン・ホールでは負荷が最大であること。
- (2) 電力はできる限り外部負荷で消費すること。
- (3) 約25℃の周囲温度で使用する。

TM503型は、各プラグインに対してシャーシでヒートシンクされたNPN、PNP各1個ずつのシリーズ・トランジスタにより電力を供給しています。

動作温度

TM503型は0～50℃の周囲温度で動作することができます。内部温度が安全動作温度以上に上がった場合には、サーマル・カットアウト装置により自動的に電源が切断されTM503型を保護します。この装置は内部温度が安全動作温度になれば再び電源は復帰します。

TM503型の格納温度は-40℃～+75℃までですが、機器のシャーシが動作温度範囲内に戻ってから電源を投入して下さい。

電源投入

プラグイン

本体を動作させるのにすべてのプラグイン・ホールにプラグインを組み込む必要はありません。必要なプラグインのみ組み込んで下さい。

注意

本体の電源スイッチを必ず切ってからプラグインを抜き差しして下さい。電源を入れたままプラグインを抜き差ししますと、プラグインの回路を破損する恐れがあります。

プラグインの取付け

1. TM503型のコネクタ内にはいつているプラスチックの位置決めスペーサとプラグインのエッジ・コネクタのカット部分が一致しているかどうかを確認します。
2. TM503型のプラグイン・ホールの上下のガイドに沿ってプラグインを差し込み、さらにコネクタにプラグインのエッジ・コネクタがしっかりと固定されるまで押して下さい。プラグインを取りはずす場合には、左下隅にあるつまみを引っぱりそのまま引き抜きます。

電源投入方法

この章の最後の項を実行した後TM503型の右側のPULL ON POWERボタンを引き出します。プラグインの中には独立した電源スイッチを持っているものもあり、通常OUTPUTと前面パネルに書かれています。プラグインを動作させるにはこのボタンを押します。

システム構成

互換性

当社のプラグインは外観上、他のプラグインと類似しています。しかし電気的には互換性がありません。ですから他のシリーズのプラグインと組み合わせができないよう、**TM503型**のインターフェイス・コネクタのピン6と7に位置決めスペーサがはいつています。(1図参照) **TM500**シリーズのプラグインはメインのプリント基板上のピン6と7の部分がカットされています。このスペーサとカット部分が一一致していることを確認します。

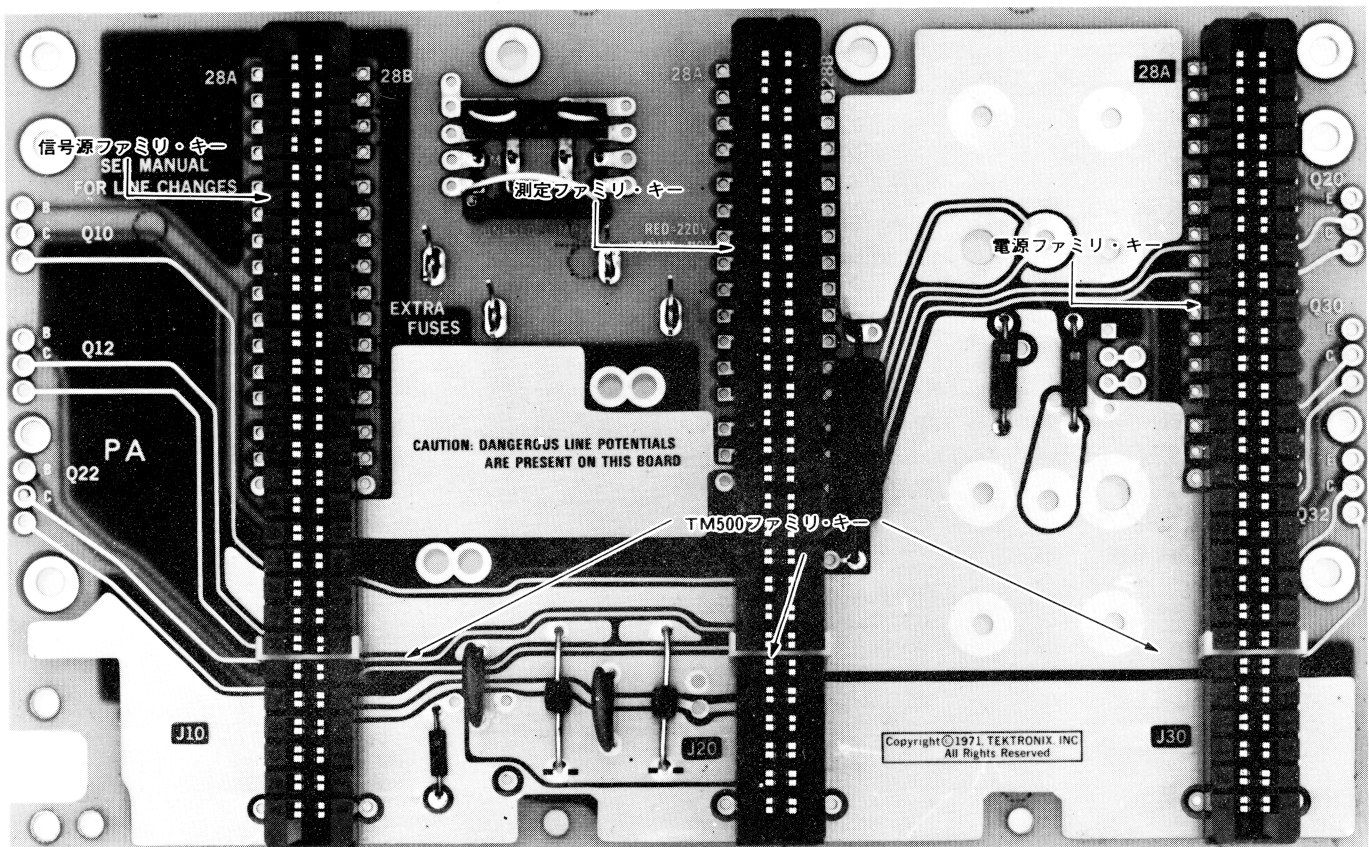
T ユニシリーズ・プラグインの正面左下隅のレリーズ・ラッチの色は白ですので、他のシリーズのプラグインと簡単に識別できます。

インターフェイス

TM500シリーズはプラグイン方式になっていますので多くの異なった機能を持たせることができます。また**TM500**シリーズを信号源、電源、測定器などいくつかの群に分けることができ、それら同種のプラグインに特定のプラグイン・ホールを割り当てるため、別に位置決めスペーサを挿入することもできます。この位置決めスペーサの追加によって、同種のプラグイン群のみ使用可能なプラグイン・ホールをプログラムすることができます。この方法で**TM503**型のすべてのプラグイン・ホールに特定の機能を持たせる

ことができます。位置決めスペーサの部品番号は**214-1593-02**です。

さらにジャンパ線を使うと内部でインターフェイスすることができます。内部コネクタのA面とB面のピン14~28を使って、インターフェイス・ボードの後側をジャンパ線で接続することによりプラグインの信号を内部でやりとりすることができます。本マニュアルの**オプション02型**の説明の項をご参照下さい。後部インターフェイスの各ピンのI/Oの割り当てについては各プラグインの取扱説明書をお読み下さい。一旦特殊目的用にジャンパ線を接続したら内部インターフェイス・コネクタに位置決めスペーサを取付けて、ジャンパ線の配線に合わせたプラグインの適合性を保持するようにします。



1図 機能によるキー割当

後部パネル

後部補助パネルはBNCおよびマルチピン・コネクタを取付けるパンチ穴をあけることができます。オプションで最初から穴のあいたものもあります。穴があいていると後から取付けたコネクタや配線で、外部I/O信号をインターフェイス・基板に接続するのに便利です。この特徴によりTM500シリーズ総合テストシステムをベンチ形またはラックマウント形いずれの場合にも非常に汎用性の高いシステムにしています。

オプション02型

オプション02型を指定しますと、インターフェイス・コネクタの後側の14A～28Aおよび14B～28Bのすべてのピンの位置に25ミルの四角いピンが立てられます。これにより付属の角ピン・コネクタ付きワイヤをラジオ・ペンチまたはピンセットを使って簡単に早く配線したり変更したりすることができますのでインターフェイスが容易になります。またジャンパ線のハンダ付けの繰返しによるプリント基板の損傷を防ぐことができます。オプション02型ではさらに後部パネルにBNCコネクタ3個および50ピンコネクタ1個が取付けられます。これらのコネクタは配線されていませんので、システム設計者が任意に、用途に合わせて配線することができます。ジャンパ線、同軸ケーブル、位置決めスペーサがオプション02型には付属しています。

オプション07型

TM500シリーズ・オプション07型本体は、DC502オプション07型、TR502型およびSW503型を後部インターフェイスで接続するために、次に述べる接続ケーブル及び位置決めスペーサがコネクタ基板に追加されます。

接続ケーブル 6個の導線を持つリボン・ケーブルで(部品番号175-0829-00)以下のポイントを接続しています。

J10、J20およびJ30のB14	
“	B15
“	B16
“	B17
“	B18
“	A18

位置決めスペーサ プラスチック製のスペーサで(部品番号214-1593-02) J10のピン21と22、J20のピン23と24およびJ30のピン17と18の間に挿入されます。

一度上記の接続ケーブルおよび位置決めスペーサが挿入された本体には、それ専用のプラグインを御使用下さい。

積み重ねとラックマウンティング

TM503型キャビネットには足台がついており、重ね合わせる時に便利です。この足台によって下の機器のハンドルの分の透き間ができ、空気の流通に必要なスペースがつけられます。

TM503型は $\frac{1}{2}$ ラック幅です。スライド・アウト・トラックの変換キットは、標準の19インチ・ラックに1または2台のTM503型を取付ける際に便利です。この場合、高さは13.3cm(5 $\frac{1}{4}$ インチ)が必要です。2台のTM503型を並べて取付けるラック変換キットの部品番号は040-0616-02です。

$\frac{1}{2}$ ラック幅に1台のTM503型を取付けるラック変換キットの部品番号は040-0617-02です。

ラック型のTM503型をキャビネット型にかえる変換キットの部品番号は040-0618-01です。

取付けおよび電源投入の手順

後部パネルのマークをチェックして下さい。電源電圧および周波数が、工場出荷時の設定に適合しているならば、プラグインを取付け、底部金具で機器前面を持ち上げて下さい。設定をかえる必要がある場合には、当社フィールド・エンジニアにおたずね下さい。

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

MAINTENANCE

GENERAL

Introduction

This section of the manual is meant to support the entire TM 500 Series family of modules with a general coverage of the most commonly-needed service information pertinent to preventive maintenance, troubleshooting, ordering parts, and replacing components and sub-assemblies.

Cabinet Removal

WARNING

Dangerous potentials exist at several points throughout the system. When the system must be operated with the cabinet removed, do not touch exposed connections or components. Some transistors have voltage present on their cases. Disconnect power before cleaning the system or replacing parts.

Five screws secure the cabinet to the TM 503 frame. Remove them and lift the cabinet straight up. Do not operate the system with the cabinet removed any longer than necessary for troubleshooting and calibration. Re-install the cabinet to protect the interior from dust and to remove personnel shock hazards.

Cleaning

CAUTION

Avoid using chemical cleaning agents which might damage plastic parts. Avoid chemicals containing benzene, toluene, xylene, acetone, or similar solvents.

Exterior. Loose dust may be removed with a soft cloth or a dry brush. Water and a mild detergent may be used. However, abrasive cleaners should not be used.

Interior. Cleaning the interior of a unit should precede calibration since the cleaning processes could alter the settings of calibration adjustments. Use low-velocity compressed air to blow off accumulated dust. Hardened

dirt can be removed with a soft brush, cotton-tipped swab, or a cloth dampened in a solution of water and mild detergent.

Preventive Maintenance

Preventive maintenance steps performed on a regular basis will enhance the reliability of the instrumentation systems. However, periodic checks of the semiconductors in the absence of a malfunction are not recommended as preventive maintenance measures. See the semiconductor checking information under Troubleshooting Techniques which follow. A convenient time to perform preventive maintenance is just before instrument calibration.

Calibration

To ensure accurate signal generation and measurement, the performance of individual units comprising the system should be checked periodically. Refer to the Instruction Manual for each unit for complete calibration and verification procedures.

TROUBLESHOOTING AIDS

Introduction

The following is provided to augment information contained elsewhere in this and other TM 500 series family manuals when troubleshooting becomes necessary.

Circuit Description

Each manual has a section devoted to explaining circuit operating theory. Used with the schematics, this can be a powerful analytic tool.

Diagrams

Block diagrams and detailed circuit schematics are located on foldout pages in the service section of most of the TM 500 Series family manuals. The schematic diagrams show the component values and assigned circuit reference numbers of each part necessary to the circuit design. Usually the first page of the service section defines the circuit symbols and reference designators

used in that particular instrument. Major circuits are usually identifiable by a series of component numbers. Important waveforms and voltages may be shown within the diagrams or on adjoining aprons. Those portions of the circuits located on circuit boards are enclosed with a grey tint outline.

Cam Switch Charts

Cam switches shown on the diagrams are coded on charts to located the cam number of the switch contact in the complete switch assembly, counting from the front, or knob end, toward the rear of the switch. The charts also indicate with a solid dot when each contact is closed.

Circuit Board Illustrations

Line illustrations showing component locations keyed with a grid scheme for each circuit board are usually placed on the back of a foldout page and sequenced as close as possible to an associated schematic. The GRID LOC columns, located near the Parts Location Grid, keys each component to easy location on the board.

Component and Wiring Color Codes

Colored stripes or dots on electrical components signify electrical values, tolerances, etc., according to EIA standards. Components not color-coded usually have information printed on the body. The wiring coding follows the same EIA standards with the exception of the ac power cord of the Power Modules. It is coded like this:

Power Cord Conductor Identification

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

Testing Equipment

Generally, a wide-band oscilloscope, a probe, and a multimeter are all that is needed to perform basic waveform and voltage checks for diagnostic purposes. The calibration procedures in the manual for each plug-in module list specific test equipment and the features necessary to adequately check out that particular module.

TROUBLESHOOTING TECHNIQUES

Introduction

This troubleshooting procedure is arranged in an order which checks the simple trouble possibilities before proceeding to extensive troubleshooting.

Control Settings

Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control, see the Operating Instructions section of the manual for the instrument involved.

System and Associated Equipment

Before proceeding with troubleshooting the TM 500 Series system, check that the instruments in the system are operating correctly. Check for proper interconnection between the power module and the plug-in modules. Check the line voltage at the power source. Check that the signal is properly connected and that the interconnecting cables and signal source are not defective.

The associated plug-in modules can be checked for proper operation quickly by substituting other like units known to be operating properly. If the trouble persists after substitution, then the power module is probably at fault. Moving a properly operating plug-in from compartment to compartment will help determine if one or more compartments have a problem.

Visual Check

Inspect the portion of the system in which the trouble is suspected. Many troubles can be located by visual clues such as unsoldered connections, broken wires, damaged circuit board, damaged components, etc.

Instrument Calibration

Check the calibration of the suspected plug-in module or the affected circuit if the trouble is obviously in a certain circuit. The trouble may only be a result of misadjustment or may be corrected by re-calibration. Complete calibration instructions are given in the manual for each instrument in the system.

Circuit Isolation

Note the trouble symptoms. These often identify the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by making waveform and voltage measurements.

Incorrect operation of all circuits often means trouble in the power supplies. Using a multimeter, check first for correct voltages of the individual regulated supplies according to the plug-in module schematics and calibration procedures. Then check the unregulated supplies of the power modules. Defective components elsewhere in the instruments can appear as power supply problems. In these instances, suspected circuits should be dis-

connected from apparently bad power supplies one at a time to narrow the search.

Voltages and Waveforms

Often defective components can be located by using waveform and voltage indications when they appear on the schematic or in the calibration procedures. Such waveforms and voltage labels are typical indications and will vary between instruments. To obtain operating conditions similar to those used to take these readings, refer to the first diagram in the service sections.

Component Checking

If a component cannot be disconnected from its circuit, then the effects of the associated circuitry must be considered when evaluating the measurement. Except for soldered-in transistors and integrated circuits, most components can be lifted at one end from the circuit board.

Transistors and IC's. Turn the power switch off before removing or replacing any semiconductor.

A good check of transistor operation is actual performance under operating conditions. A transistor can most effectively be checked by substituting a new component for it (or one which has been checked previously). However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Static-type testers are not recommended, since they do not check operation under simulated operating conditions. A suction-type desoldering tool must be used to remove soldered-in transistors; see component replacement procedure for details.

Integrated circuits can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit description is essential to troubleshooting circuits using IC's. Operating waveforms, logic levels, and other operating information for the IC's are given in the circuit description information of the appropriate manual. Use care when checking voltages and waveforms around the IC's so that adjacent leads are not shorted together. A convenient means of clipping a test probe to the 14- and 16-pin in-line IC's is with an integrated circuit test clip. This device also doubles as an extraction tool.

Diodes. Do not use an ohmmeter that has a high internal current. High currents may damage the diode.

A diode may be checked for an open or shorted condition by measuring the resistance between terminals.

With an ohmmeter scale having an internal source of between 800 mV, and 3 V, the resistance should be very high in one direction and very low when the leads are reversed.

Resistors. Check the resistors with an ohmmeter. Resistor tolerances are given in the Electrical Parts List in every manual. Resistors do not normally need to be replaced unless the measured value varies widely from the specified value.

Capacitors. A leaky or shorted capacitor can be detected by checking resistance with an ohmmeter on the highest scale. Use an ohmmeter that will not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An open capacitor can best be detected with a capacity meter, or by checking whether it passes ac-signals.

PARTS ORDERING AND REPLACING

Ordering

Obtaining Replacement Parts. Most electrical and mechanical parts can be obtained through your local Tektronix field office or representative. However, you should be able to obtain many of the standard electronic components from a local commercial source in your area. Before you purchase or order a part from a source other than Tektronix Inc., please check the electrical parts list for the proper value, rating, tolerance and description.

Special Parts. Some parts are manufactured or selected by Tektronix, Inc. to satisfy particular requirements, or are manufactured for Tektronix, Inc., to our specifications. Most of the mechanical parts used in this system have been manufactured by Tektronix, Inc. Order all special parts directly from the local Tektronix Field Office or representative.

Ordering Procedure. When ordering replacement parts from Tektronix, Inc., please include the following minimum information:

1. Instrument Type (PS 501, SG 502, DC 501, etc.)
2. Instrument Serial Number (For example, B010251)
3. A description of the part (if electrical include the circuit number)
4. Tektronix part number

Please do not return any instruments or parts before receiving directions from Tektronix, Inc.

A listing of Tektronix Field Offices, Service Center and Representatives can be found in the Tektronix Product Catalog and Supplements.

Replacing

The exploded view drawings with the Mechanical Parts List, located to the rear of most manuals, may be especially helpful when disassembling or reassembling individual components or sub-assemblies.

Circuit Boards. If a circuit board is damaged beyond repair, either the entire assembly including all soldered-on components, or the board only, can be replaced.

To remove or replace a board, proceed as follows:

1. Disconnect all leads connected to the board (both soldered lead connections and solderless pin connections).
2. Remove all screws holding the board to the chassis or other mounting surface. Some boards may be held fast by plastic mounting clips around the board edges. For these, push the mounting clips away from the circuit board edges to free the board. Also, remove any knobs, etc., that would prevent the board from being lifted out of the instrument.
3. Lift the circuit board out of the unit. Do not force or bend the board.
4. To replace the board, reverse the order of removal. Use care when replacing pin connectors. If forced into place incorrectly positioned, the pin connectors may be damaged.

Transistors and IC's. Transistors and IC's should not be replaced unless they are actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement or switching of semiconductor devices may affect the calibration of the instruments. When a transistor is replaced, check the operation of the part of the instrument that may be affected.

Replacement semiconductors should be of the original type or a direct replacement. Figure 3-1 shows the lead configurations of the semiconductors used in this instru-

ment system. When removing soldered-in transistors, use a suction-type desoldering tool to remove the solder from the holes in the circuit board.

Static-Sensitive Components

CAUTION

Static discharge can damage any semiconductor component in this instrument.

This instrument contains electrical components that are susceptible to damage from static discharge. See Table 3-1 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only special antistatic suction type or wick type desoldering tools.

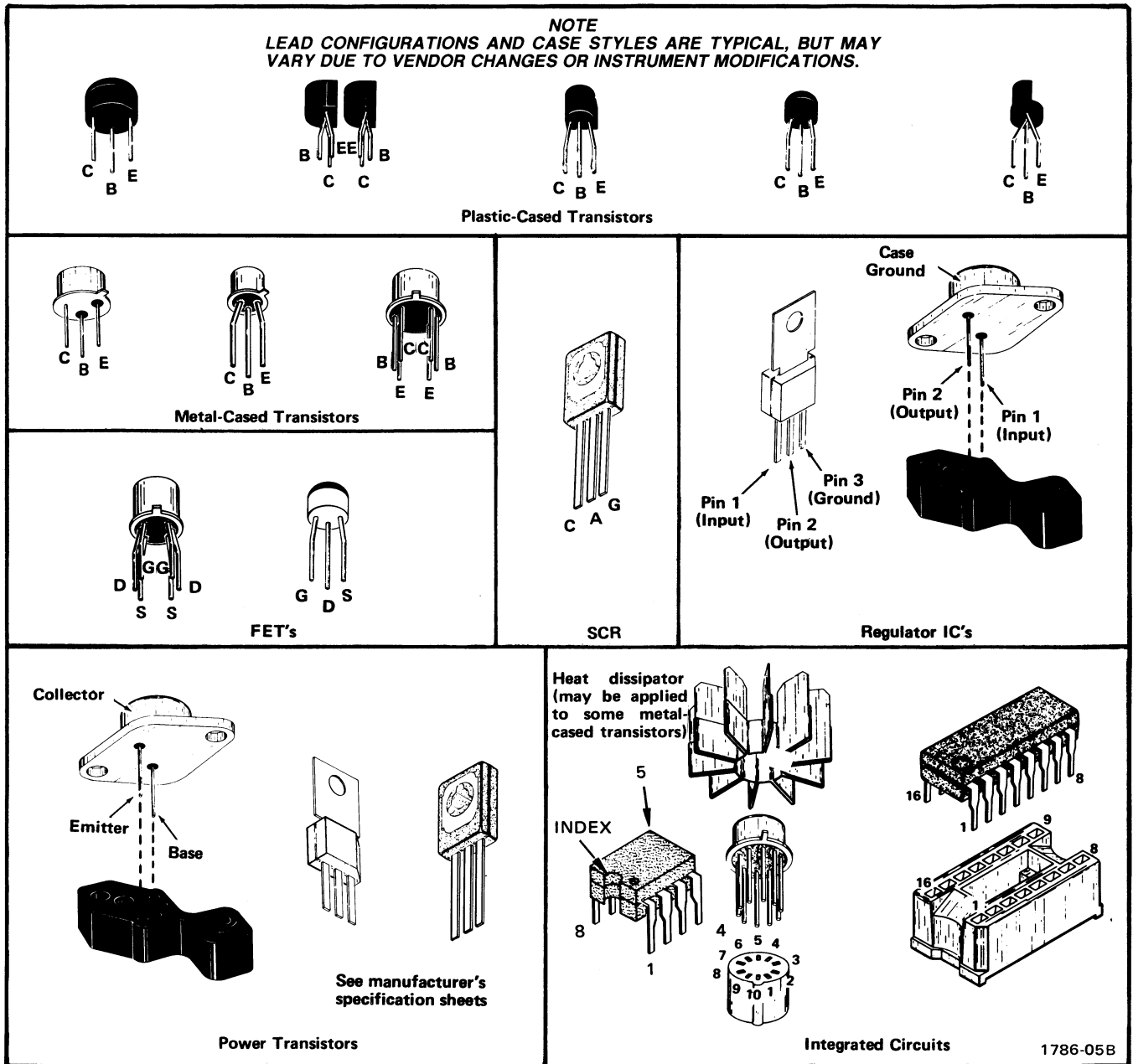


Fig. 3-1. Semiconductor device lead configurations found in the TM 500 family.

Test Equipment

Before using any test equipment to make measurements on static-sensitive components or assemblies, be certain that any voltage or current supplied by the test equipment does not exceed the limits of the component to be tested.

Table 3-1

RELATIVE SUSCEPTIBILITY TO STATIC DISCHARGE DAMAGE

Semiconductor Classes	Relative Susceptibility Levels ^a
MOS or CMOS microcircuits or discretes, or linear microcircuits with MOS inputs (Most Sensitive)	1
ECL	2
Schottky signal diodes	3
Schottky TTL	4
High-frequency bipolar transistors	5
JFETs	6
Linear Microcircuits	7
Low-power Schottky TTL	8
TTL (Least Sensitive)	9

^a Voltage equivalent for levels:

1 = 100 to 500 V 4 = 500 V 7 = 400 to 1000 V (est.)
 2 = 200 to 500 V 5 = 400 to 600 V 8 = 900 V
 3 = 250 V 6 = 600 to 800 V 9 = 1200 V

(Voltage discharged from a 100 pF capacitor through a resistance of 100 ohms.)

Interconnecting Pins. To replace a pin that is mounted on a circuit board, first disconnect any pin connectors. Then, unsolder the damaged pin and pull it out of the board with a pair of pliers. Be careful not to damage the wiring on the board with too much heat. Ream out the hole in the circuit board with a 0.031-inch drill. Remove the ferrule from the new interconnecting pin and press the new pin into the hole in the circuit board. Position the pin in the same manner as the old pin and solder it in. If the old pin was bent at an angle to mate with a connector, bend the new pin to match the associated pins.

NOTE

A pin replacement kit including necessary tools, instructions, and replacement pins is available from Tektronix, Inc. Order Tektronix Part No. 040-0542-00.

Cam Switches. Repair of cam-type switches should be undertaken only by experienced maintenance personnel. Switch alignment and spring tension of the contacts must be carefully maintained for proper operation of the switch. For assistance, contact your local Tektronix Field Office or representative.

NOTE

A cam-type switch repair kit including necessary tools, instructions, and replacement contacts is available from Tektronix, Inc. Order Tektronix Part No. 040-0541-00.

The cam-type switches consist of rotating cam drums which are turned by front-panel knobs, and sets of spring-leaf contacts mounted on adjacent circuit boards. The contacts are actuated by lobes on the cams. These switches can be disassembled for inspection, cleaning, repair, or replacement as follows:

1. Remove the screws which hold the metal cover on the switch, and lift the cover off the switch. The switch is now open for inspection or cleaning.

2. To completely remove a switch from the circuit board, first remove any knobs or shaft extensions. Loosen the coupling at the potentiometer at the rear of the switch, and pull the long shaft out of the switch assembly.

3. Remove the screws (from the opposite side of the circuit board) that holds the cam drum to the board.

4. To remove the cam drum from the front support block, remove the retaining ring from the shaft on the front of the switch and slide the cam drum out of the support block. Be careful not to lose the small detent roller.

5. To replace defective switch contacts, follow the instructions given in the switch repair kit.

6. To re-install the switch assembly, reverse the above procedure.

Pushbutton Switches. The pushbutton switches are not repairable and should be replaced as a unit if defective. Use a suction-type desoldering tool to remove solder from the circuit board when removing these switches.

Incandescent Bulbs. Most of these light bulbs are mounted on the sub-panel using plastic sleeve stand-offs. Unsolder the lead wires and pull the bulb out of the sleeve from the rear of the sub-panel.

Light-Emitting Diodes. LED's used as indicators are mounted on the sub-panels with plastic sleeve sockets similar to the incandescent bulb mountings or they are soldered directly to a sub-assembly and so mounted that they protrude through holes in the panel. In these cases, the sub-assembly must be exposed and the anode and cathode lead orientations carefully noted before unsoldering the defective LED. See Fig. 3-2 for LED lead identifying information.

Power Transformer. Replace the transformer only with a Tektronix direct replacement transformer. Refer to the exploded view drawing at the rear of the Power Module manuals for disassembly of the rear panel to expose the power transformer. Refer to the schematic diagram color-coding information for correct wiring. After replacement check out the power supply voltages before installing a plug-in module.

Option 2

This factory installed option adds 25-mil square pin connectors to the rear of the interconnecting jacks at all pin locations from pins 14A and B. This will keep the interface flexible by making it easy and fast to change customized wiring using prepared wires with square pin receptacles. It also protects the circuit board from damage by repeating soldering and unsoldering of jumper wires. This option also adds six bnc connectors and one 50-pin connector to the rear panel. These connectors are not prewired in order to give a system designer as much flexibility as possible. Instead, prepared jumpers, coaxial cables and interconnection jack barriers are included in the TM 504.

System Design Directions.

1. Plan the plug-in location based on the front-panel controls and operator convenience as well as interface connections.
2. Plan the wiring between interconnecting jacks and to the rear panel connectors carefully before starting

assembly. A mating rear panel 50-pin connector and cover are provided for external cabling.

NOTE

There are no pin assignments for the rear panel connectors, due to the great variety of possible connections.

When high frequency or fast digital signals are involved, plan the wires so as to minimize crosstalk. Make allowance for the possible need to make auxiliary ground connections.

The 50-pin rear panel connector may be easier to connect if it is removed from the rear panel and remounted after connections are made. Remove the top rear cabinet piece for ease of access.

If more than 50 pins are needed, an AMP HD-22 series connector with 104 pins may be mounted in the same cut out. It is suggested that these parts be obtained directly from AMP Inc., Harrisburg, PA or their distributors. For further application information, contact Tektronix' TM 500 Marketing Group, Beaverton, OR.

3. Pin assignments for individual plug-ins will be found in the appropriate instruction manual.
4. Install an interconnection jack barrier at the appropriate location on the interconnection jack. Refer back to operating instructions for keying assignments for family functions.
5. Select and install the wires (hook-up or coax) following the guidelines in the Wire Use part of these instructions.
6. Wires or cables which may be at large potential differences should be dressed or bundled so as to avoid contact. Keep all interface wiring away from the TM 506 primary line wiring.

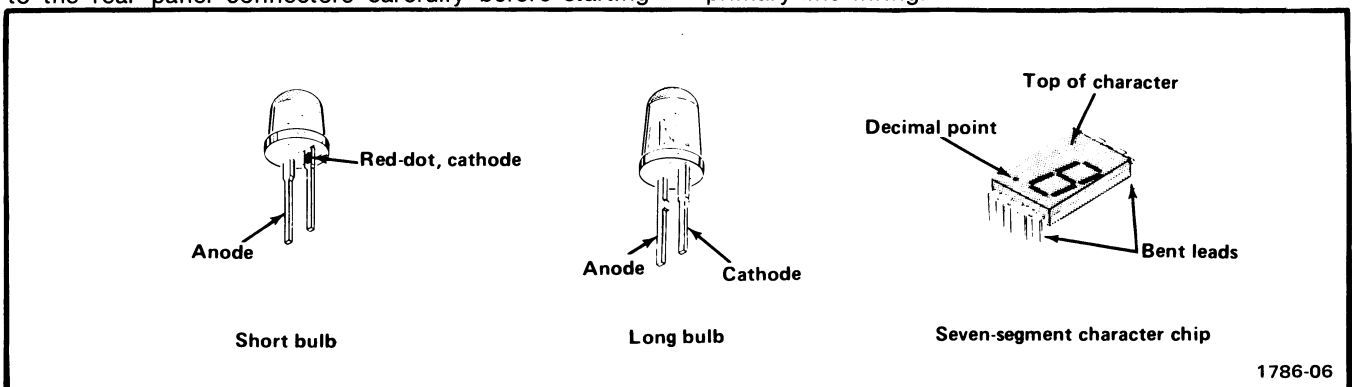


Fig. 3-2. Light-emitting diode (LED) lead orientation illustration.

7. There is an empty cut-out which will mount the standard IEC digital interface connector. The connector is not supplied with this option.

Wire Use.

1. Hook up wire with square-pin receptacle on both ends. These may be used for low frequency or dc circuits where impedance levels and crosstalk are not a problem. The wire is supplied in four lengths for connection between compartments (adjacent or nonadjacent) or between a compartment and the rear panel. For connection to the rear panel, cut to length then tin and solder the end going to the rear panel.

2. Coaxial wire with square pin receptacles on both ends. These are used for connections which require shielding or which must maintain a 50 Ω characteristic impedance. The outer conductor should be connected to either chassis ground or circuit ground. Plug-in lines which require coax leads usually have a specified ground pin assignment. If necessary, establish auxiliary ground connections at the appropriate wire ends. The coaxial wire is supplied in four lengths for connection between compartments (adjacent or non-adjacent) or between a compartment and the rear panel. For connection to the rear panel, cut to length then tin and solder the end going to the rear panel.

Packaging Information

A list of standard accessories (and part numbers) is located in the Replaceable Mechanical Parts list.

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing owner (with address) and the name of an individual at your firm that can be contacted. Include the complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

Surround the instrument with polyethylene sheeting to protect the finish of the instrument. Obtain a carton of corrugated cardboard of the correct carton strength and having inside dimensions of no less than 6 inches more than the instrument dimensions. Cushion the instrument by tightly packing 3 inches of dunnage or urethane foam between carton and instrument on all sides. Seal the carton with shipping tape or an industrial stapler.

The carton test strength for this instrument is 275 pounds per square inch.

INSTALLATION PROCEDURE

Due to regional variations in the power source line voltage the TM 503 has selectable transformer primary taps. The taps are located on the interface board and are implemented by using the appropriate selector blocks. See Figs. 3-3, 3-4, and 3-5.

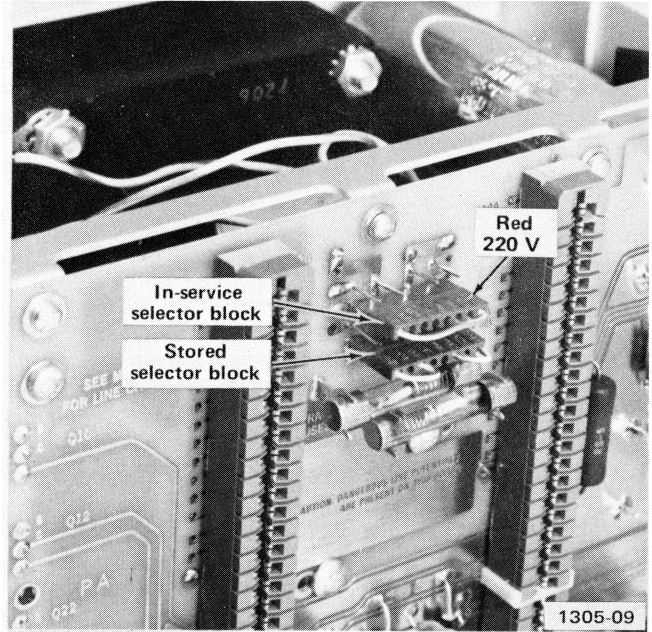


Fig. 3-3. 220 V Selector block in service.

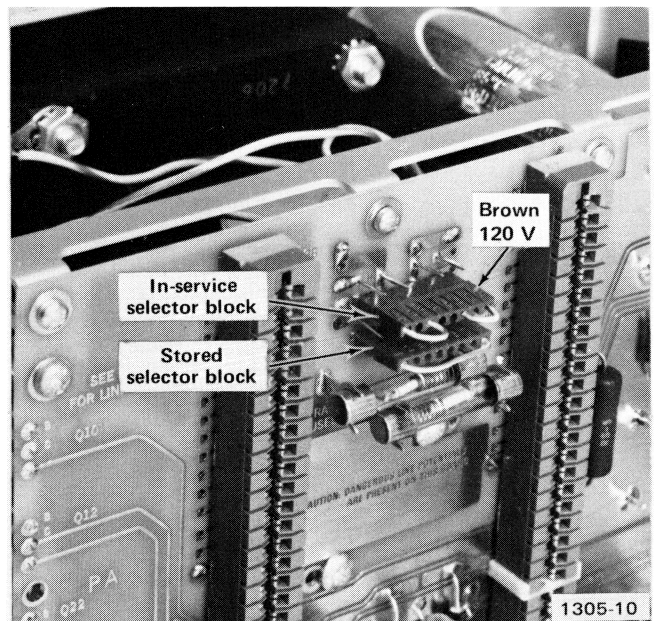


Fig. 3-4. 120 V Selector block in service.

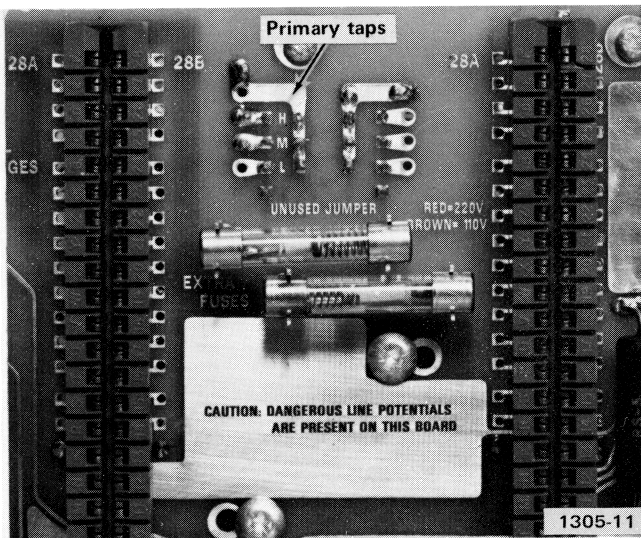


Fig. 3-5. Primary taps locations.

Table 3-2 shows which position the selector block should be in for specific line voltages. The brown selector block should be used for nominal line voltages of 120 V, and the red selector block for 220 V nominal line voltages. For example, if the power source is 120 V nominal and found to be exactly 115 V then the brown selector should be used on the high (H) primary taps.

Table 3-2
UNIVERSAL TRANSFORMER
(SN B040000 - up)

Line Selector Block Position	Regulating Ranges	
	120 Volts Nominal	220 Volts Nominal
L	90 VAC to 110 VAC	180 VAC to 220 VAC
M	99 VAC to 121 VAC	198 VAC to 242 VAC
H	108 VAC to 132 VAC	216 VAC to 264 VAC
Line Fuse Data	1.6 slow-blow	0.8A slow-blow

STANDARD TRANSFORMER
(SN B039999 - below)

Line Selector Block Position	Regulating Ranges
L Do not use	Internally Disconnected
M (110 V Nominal)	99 VAC to 121 VAC
H (120 V Nominal)	108 VAC to 132 VAC

To determine how the TM 503 is set and if a change is necessary, the following procedure should be used:

1. Determine what the actual line voltage of the power source is and note.
2. Remove the five hold-down screws on the top of the dust cover cabinet and lift off.
3. Locate and determine the position of the line selector block.
4. Using the above noted line voltage and Table 3-2, determine if a change is necessary.
5. If a change is necessary place the selector block on the appropriate taps. If no change is needed go on to the next step.
6. Replace the cabinet and hold-down screws.
7. After completing change record new setting on back panel (see Fig. 3-6).

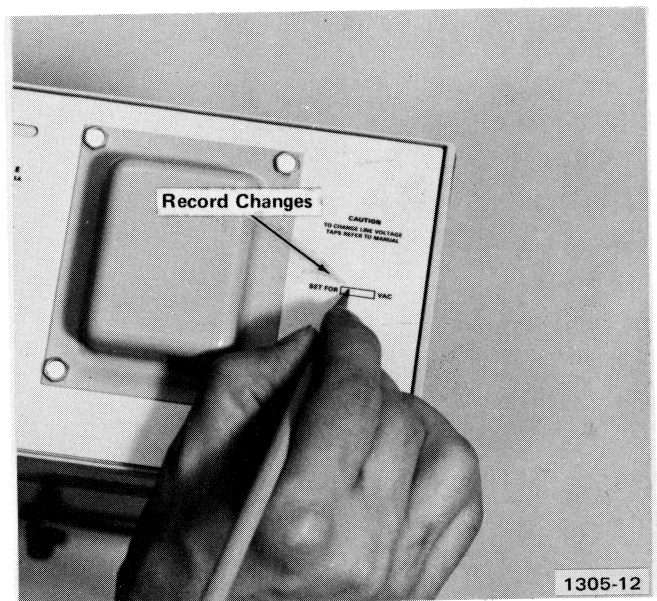


Fig. 3-6. Line voltage indicator.

OPTIONS

Option 2. Information about this option may be found in the following sections:

Section 2 - Operating Instructions

Section 3 - Maintenance

Section 7 - Replaceable Mechanical Parts

Option 7. Information about this option may be found in Section 2 - Operating Instructions.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

Replaceable Electrical Parts—TM 503

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
14099	SEMTECH CORP.	652 MITCHELL RD.	NEWBURY PARK, CA 91320
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
59660	TUSONIX INC.	2155 N FORBES BLVD	TUCSON, AZ 85705
59821	CENTRALAB INC	7158 MERCHANT AVE	EL PASO, TX 79915
71400	SUB NORTH AMERICAN PHILIPS CORP BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST. P O BOX 500	ST. LOUIS, MO 63107 BEAVERTON, OR 97077
80009	TEKTRONIX, INC.	1320 S MAIN, P O BOX 1538	MANSFIELD, OH 44907
81439	THERM-O-DISC, INC.	3029 E. WASHINGTON STREET	
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	P. O. BOX 372	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
91929	HONEYWELL, INC., MICRO SWITCH DIV.	CHICAGO & SPRING STS.	FREEMONT, IL 61032
95238	CONTINENTAL CONNECTOR CORP.	34-63 56TH ST.	WOODSIDE, NY 11377

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2024-00			CKT BOARD ASSY:INTERFACE	80009	670-2024-00
A1	-----			(STANDARD AND OPTION 7 ONLY)		
A1	670-3405-00			CKT BOARD ASSY:INTERFACE	80009	670-3405-00
A1	-----			(OPTION 2 ONLY)		
C2	283-0022-00			CAP.,FXD,CER DI:0.02UF,1400VDCAC	59660	3888017Z500203Z
C10	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
C12	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
C14	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
C20	290-0520-00			CAP.,FXD,ELCTLT:4500UF,+100-0%,40V	56289	68D10474
C22	290-0520-00			CAP.,FXD,ELCTLT:4500UF,+100-0%,40V	56289	68D10474
C30	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	59821	SDDH69L103Z
C32	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	59821	SDDH69L103Z
C35	290-0321-00	B010100	B113569	CAP.,FXD,ELCTLT:11000UF,+100-10%,15V	90201	FP113DR350P
C35	-----			(STANDARD AND OPTION 7 ONLY)		
C35	290-0508-00	B113670		CAP.,FXD,ELCTLT:18,000UF,+100-10%,15V	56289	68D10444
C35	-----			(STANDARD AND OPTION 7 ONLY)		
C35	290-0321-00	B010100	B113719	CAP.,FXD,ELCTLT:11000UF,+100-10%,15V	90201	FP113DR350P
C35	-----			(OPTION 2 ONLY)		
C35	290-0508-00	B113720		CAP.,FXD,ELCTLT:18,000UF,+100-10%,15V	56289	68D10444
C35	-----			(OPTION 2 ONLY)		
C40	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
C42	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
C44	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	59821	SDDH69J203Z
CR10	152-0488-00			SEMICONV DEVICE:SILICON,200V,1500MA	04713	SDA317
CR30	152-0198-00	B010100	B059999	SEMICONV DEVICE:SILICON,200V,3A	03508	1N5624
CR30	152-0198-02	B060000		SEMICONV DEVICE:SILICON,200V,3A	14099	SS4986
CR32	152-0198-00	B010100	B059999	SEMICONV DEVICE:SILICON,200V,3A	03508	1N5624
CR32	152-0198-02	B060000		SEMICONV DEVICE:SILICON,200V,3A	14099	SS4986
F2	159-0003-00			FUSE,CARTRIDGE:3AG,1.6A,250V,SLOW-BLOW	71400	MDX 1 6/10
F2	-----			(FOR 120 VOLT OPERATION)		
F2	159-0018-00			FUSE,CARTRIDGE:3AG,0.8A,250V,SLOW-BLOW	71400	MDL 8/10
F2	-----			(FOR 220 VOLT OPERATION)		
J10	131-1078-00			CONNECTOR,RCPT.,:28/56 CONTACT	95238	600-1156Y25GDF30
J20	131-1078-00			CONNECTOR,RCPT.,:28/56 CONTACT	95238	600-1156Y25GDF30
J30	131-1078-00			CONNECTOR,RCPT.,:28/56 CONTACT	95238	600-1156Y25GDF30
Q10	151-0373-00			TRANSISTOR:SILICON,PNP	80009	151-0373-00
Q12	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE280	04713	SJE924
Q20	151-0373-00			TRANSISTOR:SILICON,PNP	80009	151-0373-00
Q22	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE280	04713	SJE924
Q30	151-0373-00			TRANSISTOR:SILICON,PNP	80009	151-0373-00
Q32	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE280	04713	SJE924
R2	308-0704-00			RES.,FXD,WW:8.8 OHM,5%,5W	91637	CW5-8R800J
R20	301-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.5W	01121	EB2025
R22	301-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.5W	01121	EB2025
R30	302-0102-00			RES.,FXD,CMPSN:1K OHM,10%,0.50W	01121	EB1021
R35	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
S2	260-1222-00			SWITCH,PUSH-PUL:10A,250VAC	91929	2DM301
S3	260-0551-00			SW,THERMOSTATIC:NC,10A,240VAC	81439	36 T 21 3780
S4	260-0551-00			SW,THERMOSTATIC:NC,10A,240VAC	81439	36 T 21 3780
T1	120-0792-00	B010100	B039999	XFMR,SUB,STPDN:	80009	120-0792-00
T1	120-0793-00	B040000		XFMR,PWR,STPDN:	80009	120-0793-00

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

- Y14.15, 1966 Drafting Practices.
- Y14.2, 1973 Line Conventions and Lettering.
- Y10.5, 1968 Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

American National Standard Institute
1430 Broadway
New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

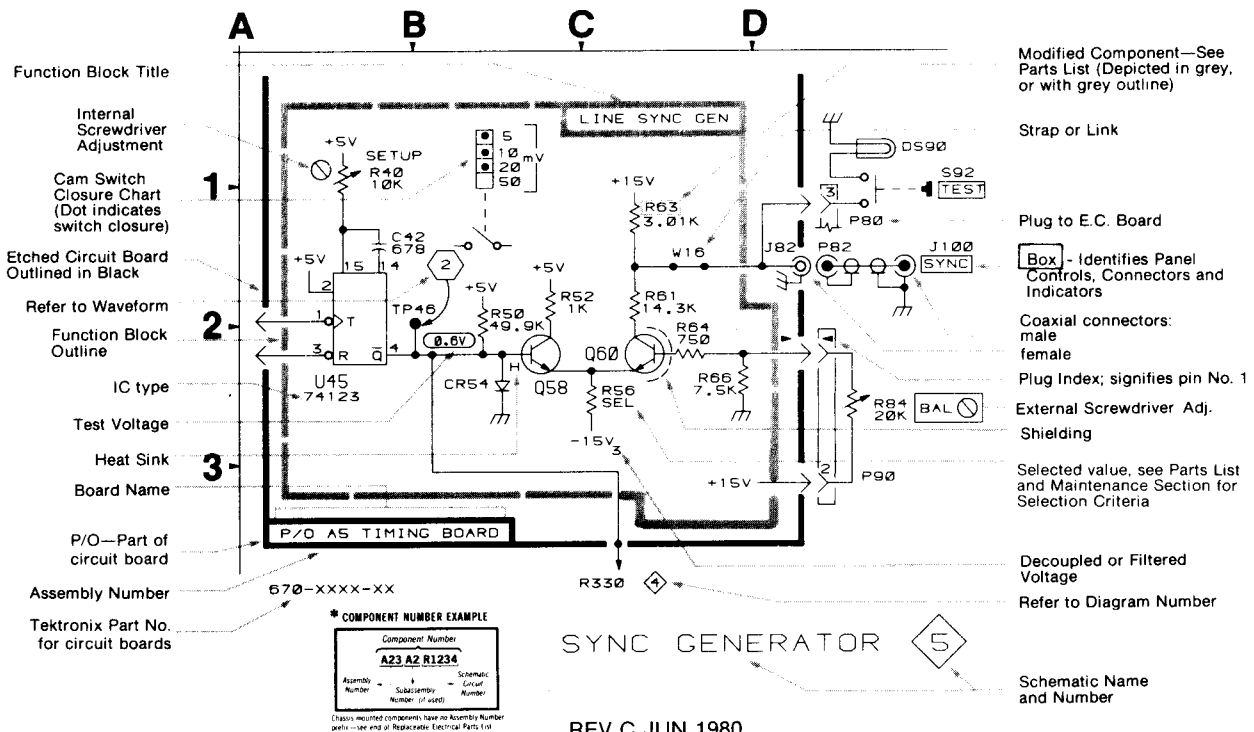
- Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μ F).
- Resistors = Ohms (Ω).

———— The information and special symbols below may appear in this manual. ————




Assembly Numbers and Grid Coordinates

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence; the components are listed by component number *(see following illustration for constructing a component number).

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.

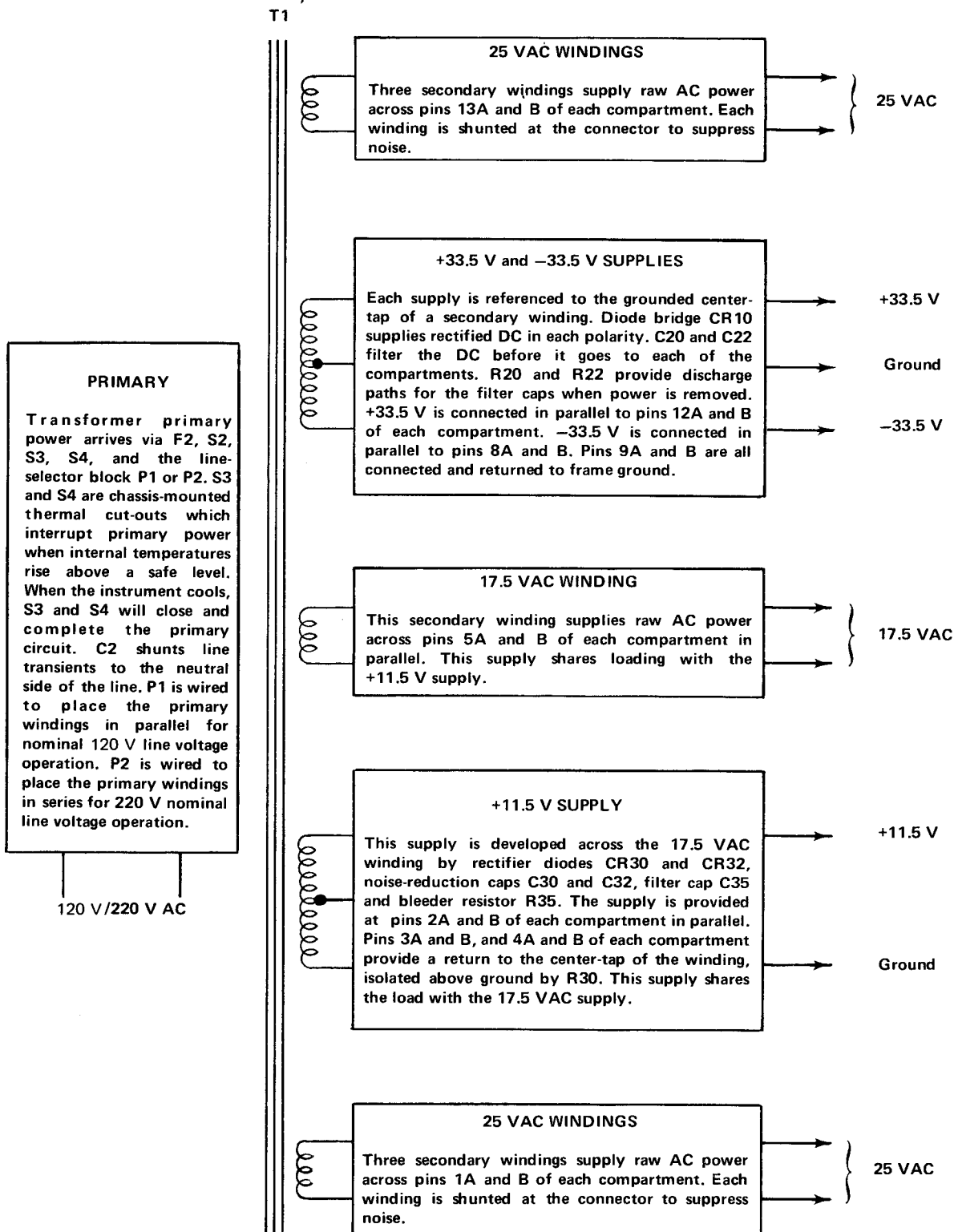


POWER MODULE INTERFACE PIN ASSIGNMENTS FRONT VIEW

	A		B	
	28		28	No permanent I/O assignments. Refer to plug-in module manuals for specific assignments.
	27		27	
	26		26	
	25		25	
	24		24	
	23		23	
	22		22	
	21		21	
	20		20	
	19		19	
	18		18	
	17		17	
	16		16	
	15		15	
	14		14	
	13		13	No permanent I/O assignments. Refer to plug-in module manuals for specific assignments.
25 VAC winding.	12		12	
+33.5 V filtered DC.	11		11	
Base lead of PNP Series-Pass.	10		10	
Emitter lead of PNP Series-Pass.	9		9	
±33.5 V common return.	8		8	
-33.5 V filtered DC.	7		7	
Emitter lead of NPN Series-Pass.	6		6	
Base lead of NPN Series-Pass.	5		5	
17.5 VAC winding.	4		4	
+11.5 V common return.	3		3	
+11.5 V common return.	2		2	
+11.5 V filtered DC.	1		1	
25 VAC winding.	A		B	

1305-05

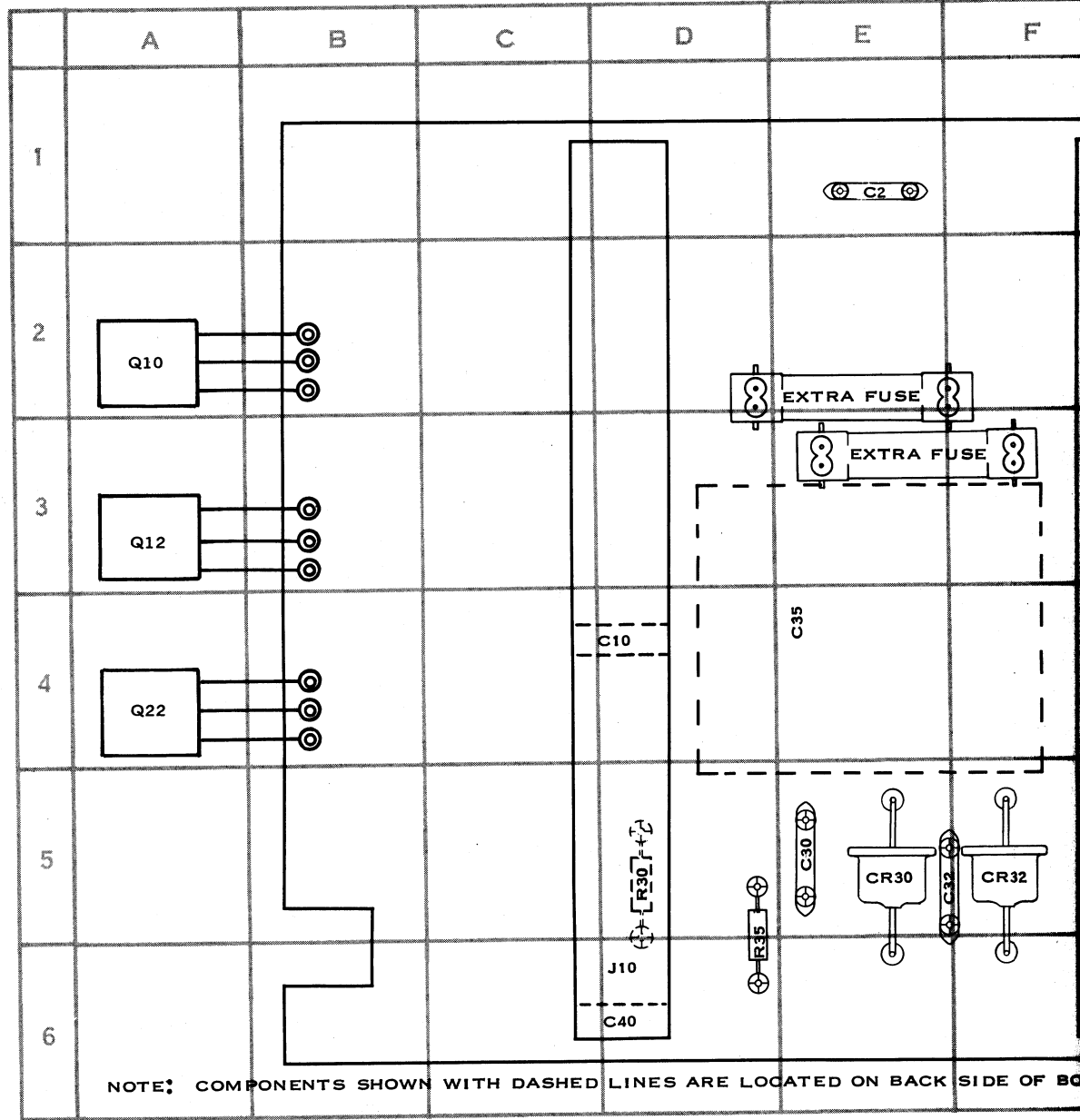
DETAILED BLOCK DIAGRAM



INTERFACE ASSIGNMENTS AND BLOCK DIAGRAM

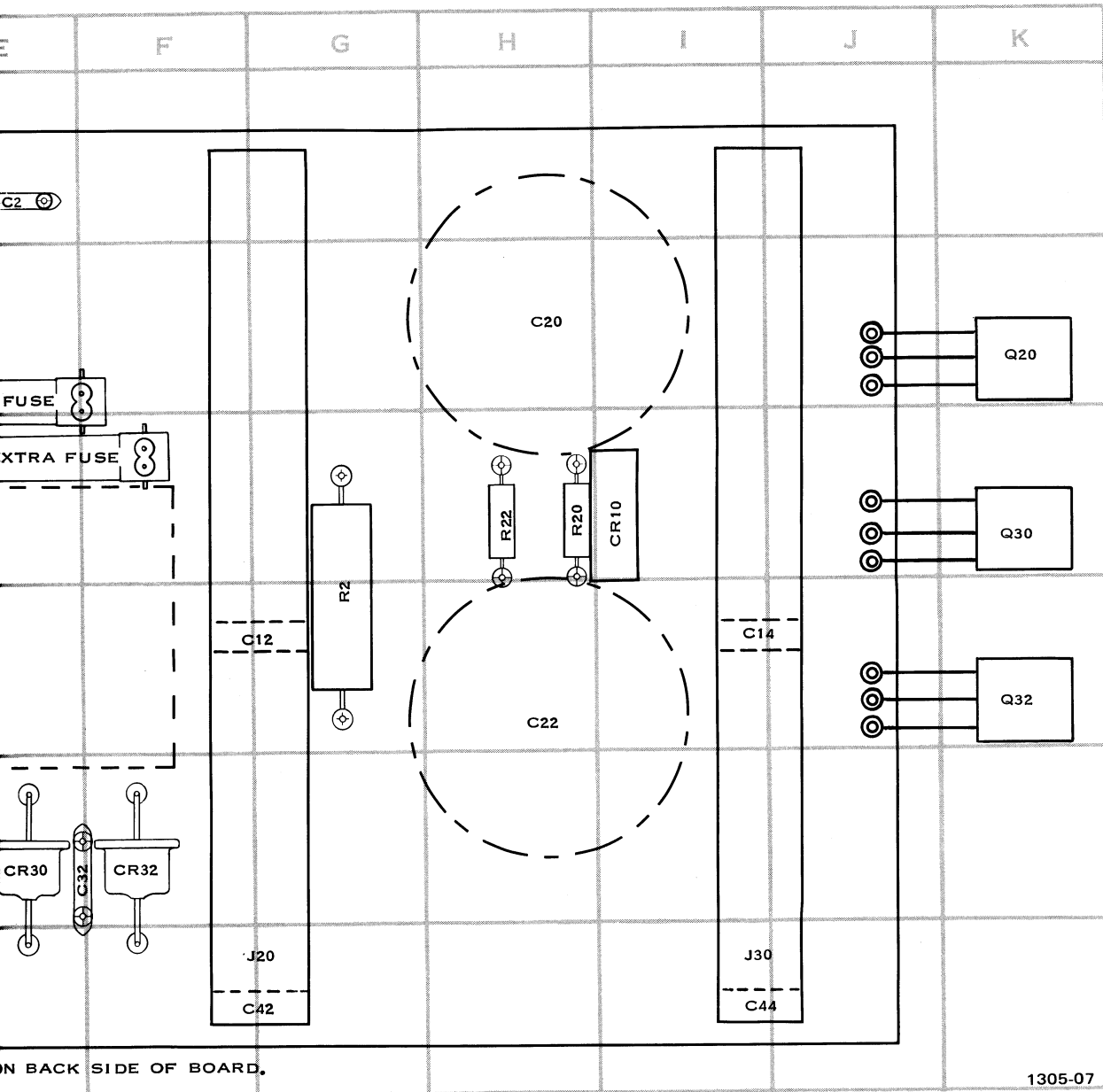
PARTS LOCATION

PARTS LOCATION GRID



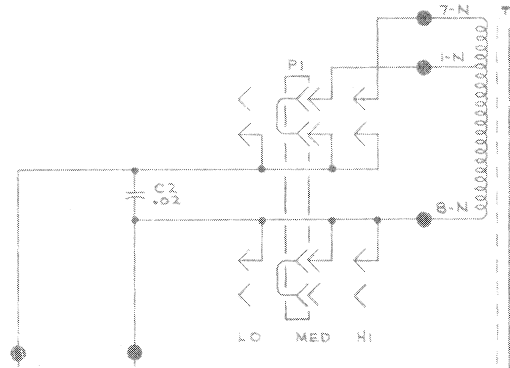
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C2	E1	CR10	I3	Q22	A4
C10	D4	CR30	E5	Q30	K3
C12	G4	CR32	F5	Q32	K4
C14	I4	CR32	F5		
C20	H2			R2	G4
C22	H4	J10	D6	R20	H3
C30	E5	J20	G6	R22	H3
C32	E5	J30	I6	R30	D5
C35	E4			R35	D6
C40	D6	Q10	A2		
C42	F6	Q12	A3		
C44	I6	Q20	K2		

LOCATION GRID

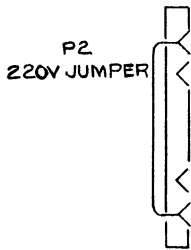




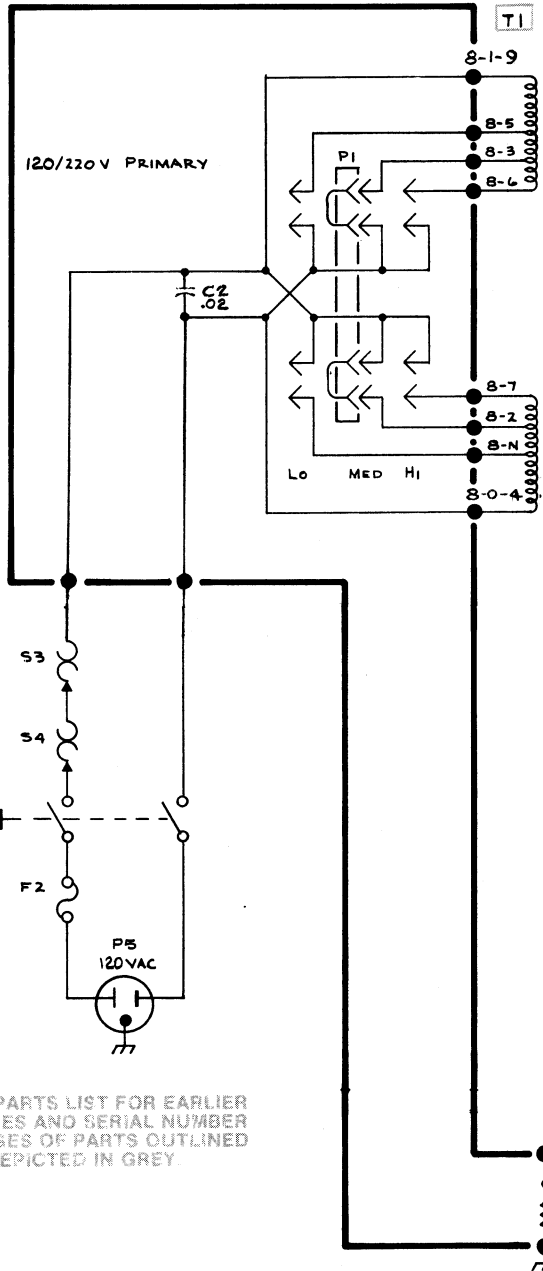
USED BEFORE SN 8040000



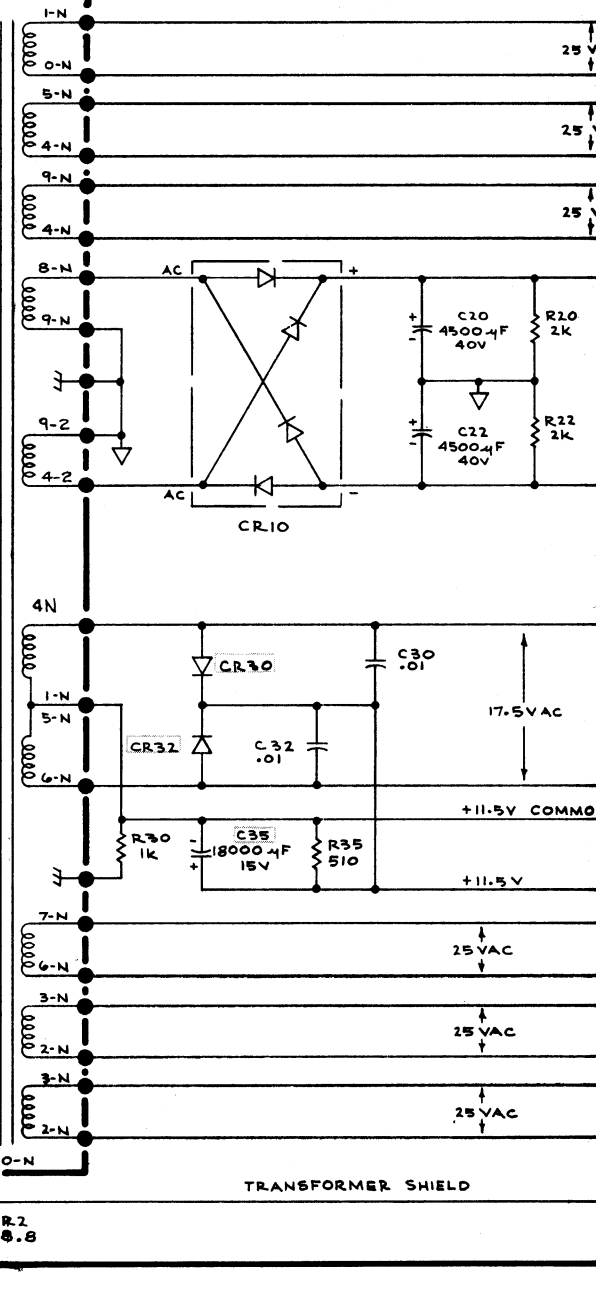
* LOCATED ON BACK OF INTERCONNECTING JACKS

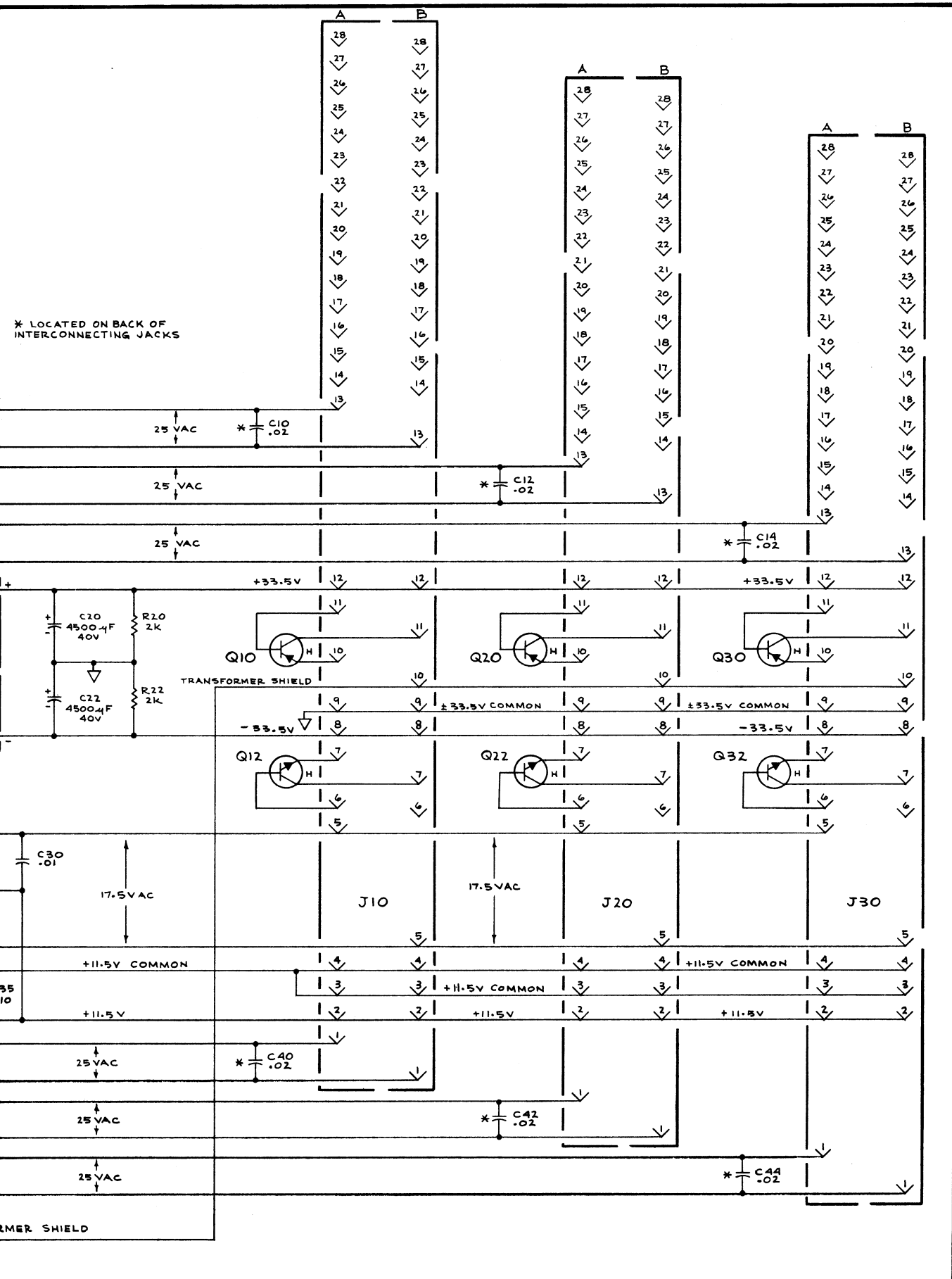


P1
120V JUMPER



SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.





POWER SUPPLY

1

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number
00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
-----
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
-----
Parts of Detail Part
Attaching parts for Parts of Detail Part
-----

```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

#	INCH NUMBER SIZE	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
ACTR	ACTUATOR	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ADPTR	ADAPTER	ELCLTL	ELECTROLYTIC	INSUL	INSULATOR	SEMICON	SEMICONDUCTOR
ALIGN	ALIGNMENT	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
AL	ALUMINUM	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
ASSEM	ASSEMBLED	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSY	ASSEMBLY	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ATTEN	ATTENUATOR	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
AWG	AMERICAN WIRE GAGE	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
BD	BOARD	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BRKT	BRACKET	FLTR	FILTER	OB	ORDER BY DESCRIPTION	SQ	SQUARE
BR	BRASS	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRZ	BRONZE	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BSHG	BUSHING	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
CAB	CABINET	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAP	CAPACITOR	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CER	CERAMIC	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CHAS	CHASSIS	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CKT	CIRCUIT	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
COMP	COMPOSITION	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
CONN	CONNECTOR	HLCP	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
COV	COVER	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
CPLG	COUPLING	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CRT	CATHODE RAY TUBE	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
DEG	DEGREE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DWR	DRAWER	IDNT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
		IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

Replaceable Mechanical Parts—TM 503

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000BK	STAUFFER SUPPLY	105 SE TAYLOR	PORTLAND, OR 97214
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
07707	USM CORP., USM FASTENER DIV.	510 RIVER RD.	SHELTON, CT 06484
12136	PHILADELPHIA HANDLE COMPANY, INC.	1643 HADDON AVENUE	CAMDEN, NJ 08103
12360	ALBANY PRODUCTS CO., DIV. OF PNEUMO DYNAMICS CORPORATION	145 WOODWARD AVENUE	SOUTH NORWALK, CT 06586
13511	AMPHENOL CARDRE DIV., BUNKER RAMO CORP.		LOS GATOS, CA 95030
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
26365	GRIES REPRODUCOR CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
45722	USM CORP., PARKER-KALON FASTENER DIV.		CAMPBELLSVILLE, KY 42718
53387	MINNESOTA MINING AND MFG. CO., ELECTRO PRODUCTS DIVISION	3M CENTER	ST. PAUL, MN 55101
57771	STIMPSON, EDWIN B., CO. INC.	900 SYLVAN AVENUE	BAYPORT, NY 11705
70485	ATLANTIC INDIA RUBBER WORKS, INC.	571 W. POLK ST.	CHICAGO, IL 60607
70903	BELDEN CORP.	2000 S BATAVIA AVENUE	GENEVA, IL 60134
71468	ITT CANNON ELECTRIC	666 E. DYER RD.	SANTA ANA, CA 92702
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
77250	PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP.	5700 W. ROOSEVELT RD.	CHICAGO, IL 60650
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78471	TILLEY MFG. CO.	900 INDUSTRIAL RD.	SAN CARLOS, CA 94070
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86445	PENN FIBRE AND SPECIALTY CO., INC.	2032 E. WESTMORELAND ST.	PHILADELPHIA, PA 19134
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
93907	TEXTRON INC. CAMCAR DIV	600 18TH AVE	ROCKFORD, IL 61101
95238	CONTINENTAL CONNECTOR CORP.	34-63 56TH ST.	WOODSIDE, NY 11377

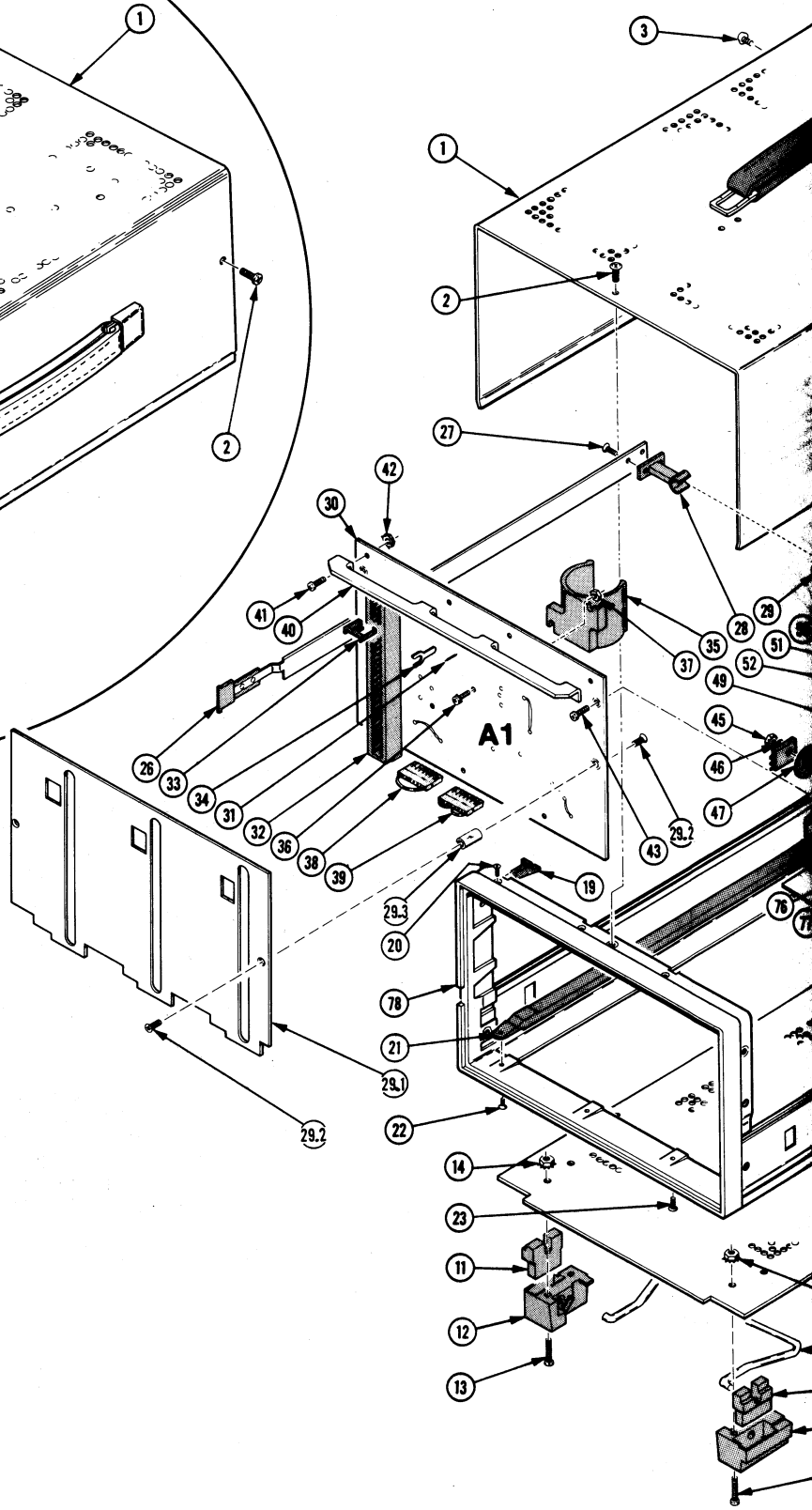
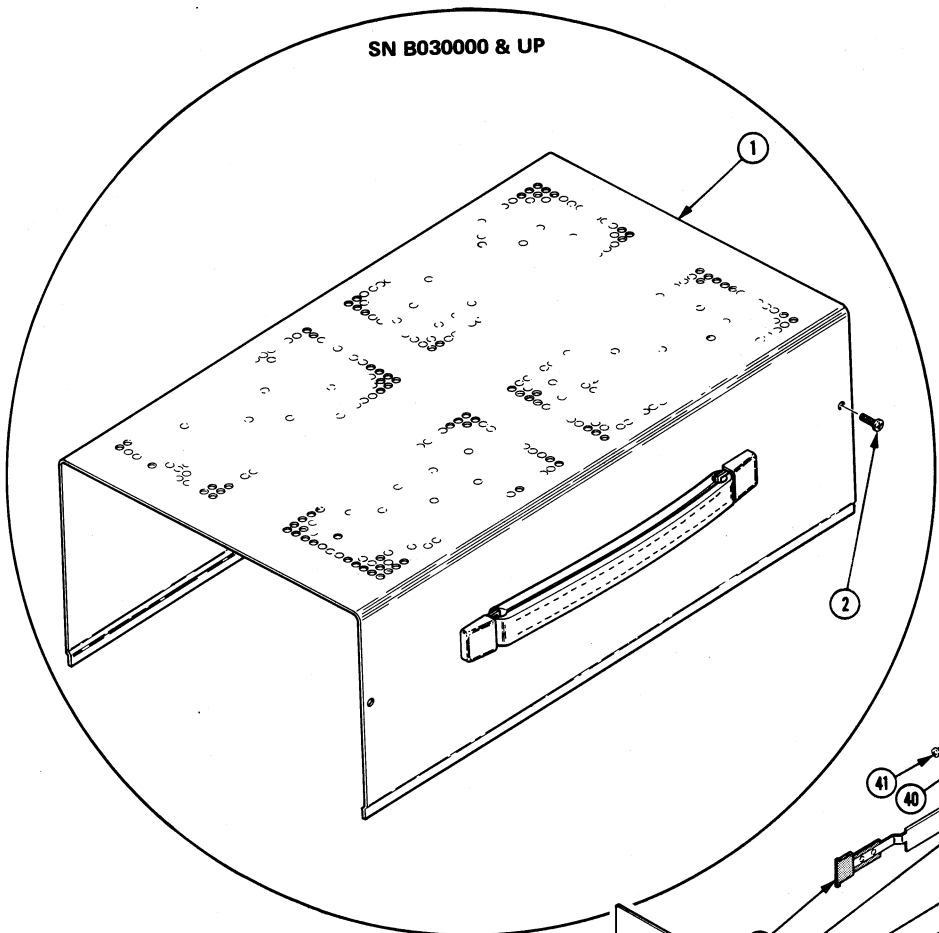
Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont					
1-1	390-0285-00	B010100	B029999	1		COVER,PWR SPLY:WRAPAROUND	80009	390-0285-00
	390-0285-01	B030000	B089999	1		COVER,PWR SPLY:WRAPAROUND	80009	390-0285-01
	390-0285-02	B090000		1		COVER,PWR SPLY:WRAPAROUND *****ATTACHING PARTS*****	80009	390-0285-02
-2	211-0622-00	B010100	B029999	2		SCREW,MACHINE:6-32 X 0.188,TRH,SST,POZ	12360	ORD BY DESCR
	211-0622-00	B030000		4		SCREW,MACHINE:6-32 X 0.188,TRH,SST,POZ	12360	ORD BY DESCR
-3	212-0112-00	B060000		1		SCREW,MACHINE:8-32 X 0.188,TRH,SST *****END ATTACHING PARTS*****	000BK	ORD BY DESCR
-4	367-0171-00			1		.HANDLE,CARRYING: *****ATTACHING PARTS*****	12136	845-R-372-140-37
-5	210-0586-00	B010100	B089999	2		.NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-6	210-0958-00	B010100	B089999	2		.WASHER,FLAT:0.115 ID X 0.469 INCH OD,ST	78471	ORD BY DESCR
-7	211-0012-00	B010100	B089999	2		.SCREW,MACHINE:4-40 X 0.375,PNH STL CD PL	83385	ORD BY DESCR
	210-0783-00	B090000		2		.RIVET,BLIND:0.125 OD X 0.357 L,DOMED HE	07707	AD 44 ABS
	210-0993-00	B090000		2		.WSHR,SHOULDERED:0.143" ID X 0.75" OD,BRS *****END ATTACHING PARTS*****	86928	ORD BY DESCR
	348-0187-00	B010100	B079999	4		FOOT,CABINET:0.780 X 1.650 INCH LONG *****ATTACHING PARTS*****	80009	348-0187-00
	211-0511-00	B010100	B079999	4		SCREW,MACHINE:6-32 X 0.500,PNH,STL,CD PL *****END ATTACHING PARTS*****	83385	ORD BY DESCR
	348-0026-00	B010100	B079999	8		HINGE BLOCK,STA:LEFT	80009	348-0026-00
	348-0027-00	B010100	B079999	8		HINGE BLOCK,STA:RIGHT	80009	348-0027-00
-8	348-0348-00	B010100	B079999	4		STAND,ELEC EQPT:	83385	OBD
	348-0275-00	B080000		4		FLIPSTAND,CAB.:	80009	348-0275-00
-9	390-0274-00	B010100	B062278	4		COVER,PWR SPLY:BOTTOM	80009	390-0274-00
	390-0388-00	B062279	B079999	4		COVER,PWR SPLY:BOTTOM	80009	390-0388-00
	390-0438-01	B080000		4		COVER,PWR SPLY:BOTTOM *****ATTACHING PARTS*****	80009	390-0438-01
-10	211-0105-00			4		SCREW,MACHINE:4-40 X 0.188,100 DEG,FLH ST *****END ATTACHING PARTS*****	83385	ORD BY DESCR
	390-0438-00	B080000		1		.COVER,PWR SPLY:BOTTOM	80009	390-0438-00
-11	348-0208-00	B080000		2		.FOOT,CABINET:LEFT FRONT AND RIGHT REAR	80009	348-0208-00
-12	348-0073-00	B080000		2		.HINGE BLOCK,STA:L FR,R REAR,BLACK ACETAL *****ATTACHING PARTS*****	80009	348-0073-00
	211-0532-00	B080000		2		.SCREW,MACHINE:6-32 X 0.75 INCH,FILH STL	83385	ORD BY DESCR
-14	210-0457-00	B080000	B132839	2		.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL *****END ATTACHING PARTS*****	83385	ORD BY DESCR
-15	348-0207-00	B080000		2		.FOOT,CABINET:RIGHT FRONT AND LEFT REAR	80009	348-0207-00
-16	348-0074-00	B080000		2		.HINGE BLOCK,STA:R FR,L REAR,BLACK ACETAL *****ATTACHING PARTS*****	80009	348-0074-00
	211-0532-00	B080000		2		.SCREW,MACHINE:6-32 X 0.75 INCH,FILH STL	83385	ORD BY DESCR
-18	210-0457-00	B080000	B132839	2		.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL *****END ATTACHING PARTS*****	83385	ORD BY DESCR
-19	351-0334-00	B010100	B029999	3		GUIDE,PL-IN UNI:	80009	351-0334-00
	351-0379-01	B030000		3		GUIDE,PL-IN:UPPER *****ATTACHING PARTS*****	80009	351-0379-01
-20	213-0254-00	B010100	B029999	3		SCREW,TPG,TF:2-32 X 0.250,100 DEG,FLH	45722	ORD BY DESCR
	211-0087-01	B030000		3		SCREW,MACHINE:2-56 X 0.188,FLH 82 DEG,STL *****END ATTACHING PARTS*****	83385	ORD BY DESCR
-21	351-0286-00	B010100	B019999	3		GUIDE,PL-IN UNI:	80009	351-0286-00
	351-0286-01	B020000	B069999	3		GUIDE,PL-IN UNI:	80009	351-0286-01
	351-0286-02	B070000	B089999	3		GUIDE,PL-IN UNI:	80009	351-0286-02
	351-0286-04	B090000	B121599	3		GUIDE,PL-IN UNI:LOWER,BLACK NYLON	80009	351-0286-04
	351-0286-07	B121600		3		GUIDE,PL-IN UNI:LOWER,NYLON *****ATTACHING PARTS*****	80009	351-0286-07
-22	211-0101-00	B010100	B121599	1		SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	83385	ORD BY DESCR
	213-0814-00	B121600		1		SCREW,TPG,TR:4-20,0.25 L,PLASTITE	93907	ORD BY DESCR
-23	211-0038-00	B010100	B121599	2		SCREW,MACHINE:4-40 X 0.312,FLH,100 DEG	83385	ORD BY DESCR
	213-0813-00	B121600		2		SCREW,TPG,TR:4-20,0.312 L,PLASTITE *****END ATTACHING PARTS*****	93907	ORD BY DESCR
-24	131-1254-00			3		CONTACT,ELEC:GROUNDING,PH BRZ *****ATTACHING PARTS*****	80009	131-1254-00
-25	210-0617-00			3		EYELET,METALLIC:0.089 OD X 0.125" L,BRASS *****END ATTACHING PARTS*****	57771	2245

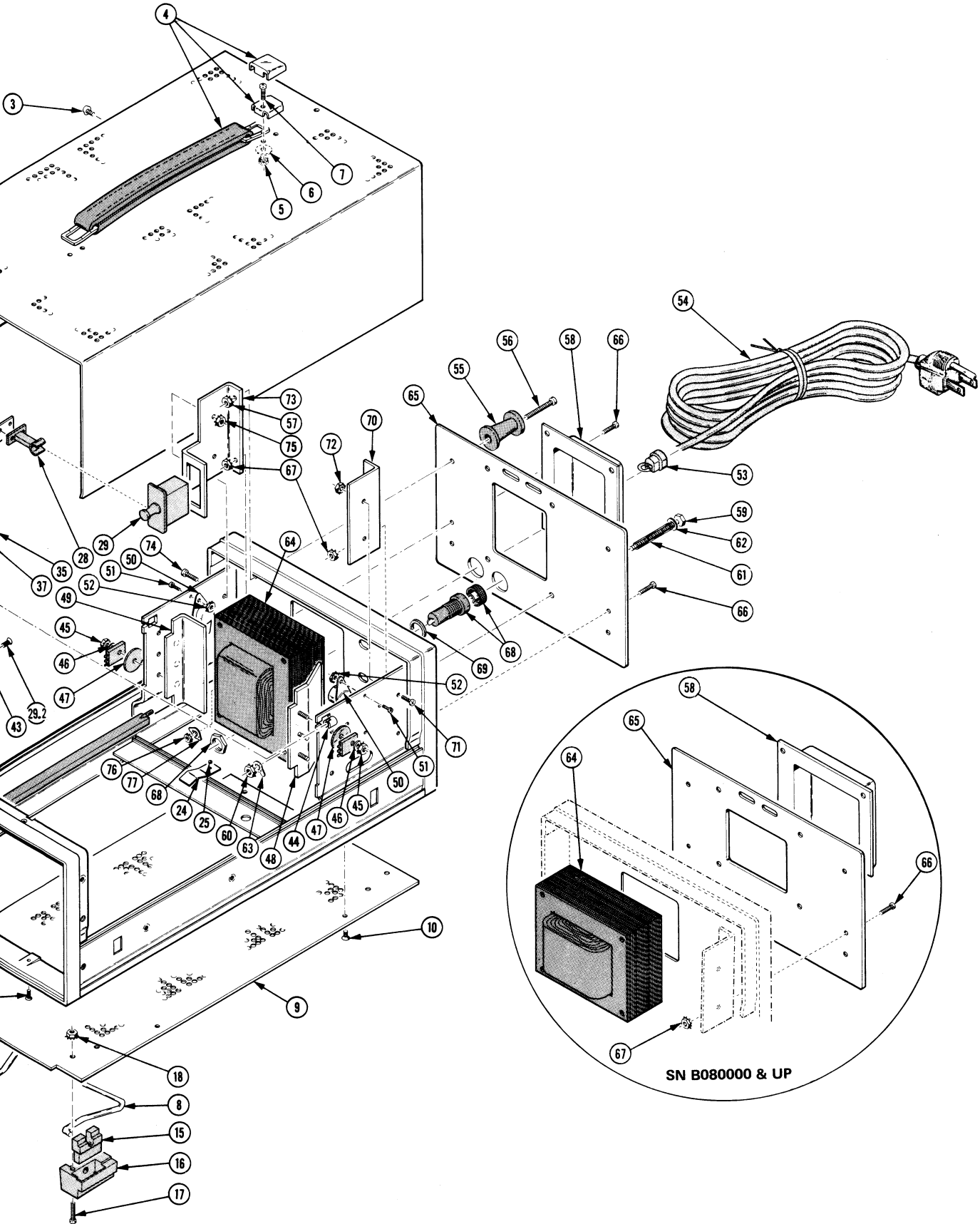
Replaceable Mechanical Parts—TM 503

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-26	384-1166-00	B010100	B029999	1						EXTENSION SHAFT:13.612 L X 0.048 STL W/PB	80009	384-1166-00
	384-1166-01	B030000		1						EXTENSION SHAFT:13.612 L X 0.048 STL W/PB ***** (ATTACHING PARTS) *****	80009	384-1166-01
-27	211-0101-00	B010100	B121599	2						SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	83385	ORD BY DESCR
	213-0815-00	B121600		2						SCREW,TPG,TR:4-20,0.188L,PLASTITE ***** (END ATTACHING PARTS) *****	93907	ORD BY DESCR
-28	214-1790-00			1						ADAPTR,SW ACTR:POWER	80009	214-1790-00
-29	-----			1						SWITCH,PUSH-PUL:10A,250VAC(SEE S2 REPL)		
-29.1	337-2913-00			1						SHIELD,ELEC:INTERFACE CKT BD ***** (ATTACHING PARTS) *****	80009	337-2913-00
-29.2	211-0040-00			4						SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC ***** (END ATTACHING PARTS) *****	26365	ORD BY DESCR
-29.3	361-0046-00			2						SPACER,POST:0.5 L W/4-40 THRU,ACETAL	80009	361-0046-00
-30	-----			1						CKT BOARD ASSY:INTERFACE(SEE A1 REPL)		
-31	131-0608-00			14						.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-32	131-1078-00			3						.CONNECTOR,RCPT,:28/56 CONTACT	95238	600-1156Y25GDF30
-33	214-1593-02			3						.KEY,CONN PLZN:CKT BD CONN	80009	214-1593-02
-34	344-0154-00			4						.CLIP,ELECTRICAL:FUSE,CKT BD MT	80009	344-0154-00
-35	352-0322-00	B010100	B129285	1						.RETAINER,CAP:1.375 DIA,HORIZ MOUNT	80009	352-0322-00
	352-0322-01	B129286		1						.RETAINER,CAP:1.375 DIA,HORIZ MOUNT ***** (ATTACHING PARTS) *****	80009	352-0322-01
-36	211-0534-00			2						.SCR,ASSEM,WSHR:6-32 X 0.312 INCH,PNH STL	83385	ORD BY DESCR
-37	210-0407-00			2						.NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS ***** (END ATTACHING PARTS) *****	73743	3038-0228-402
-38	131-1895-00			1						.LINK,TERM. CONN:8,22 AWG,1.5 L	80009	131-1895-00
-39	131-1896-00			1						.LINK,TERM. CONN:8,22 AWG,1.5 L	80009	131-1896-00
-40	386-1938-00			1						.REINF,CKT BD:INTERFACE ***** (ATTACHING PARTS) *****	80009	386-1938-00
-41	211-0008-00	B010100	B074839	4						.SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-42	210-0586-00	B010100	B074839	4						.NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
	210-0777-00	B074840		4						.RIVET,BLIND:0.125 DIA GRIP,AL ***** (END ATTACHING PARTS) ***** ***** (ATTACHING PARTS FOR CKT BD ASSY) ***	45722	AD42AB5
-43	211-0510-00			2						SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	ORD BY DESCR
-44	220-0546-00			2						NUT,CHASSIS MTG:6-32 X 0.312 OD X 0.312 L	80009	220-0546-00
-45	210-0457-00			6						NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	ORD BY DESCR
-46	210-0071-00			6						WASHER,SPR TNSN:0.146 ID X 0.323" OD,STL	78189	4706-05-01-0531
-47	342-0136-00			6						INSULATOR,WSHR:0.812 OD X 0.0025 INCH THK ***** (END ATTACHING PARTS) *****	04713	ORD BY DESCR
-48	214-1764-00			1						HEAT SINK,XSTR:ALUMINUM	80009	214-1764-00
-49	214-1791-00			1						HEAT SINK,XSTR:ALUMINUM	80009	214-1791-00
-50	-----			2						SWITCH,THERMO:(SEE S3,S4 REPL) ***** (ATTACHING PARTS) *****		
-51	211-0008-00			4						SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ	83385	ORD BY DESCR
-52	210-0586-00			4						NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL ***** (END ATTACHING PARTS) *****	78189	211-041800-00
-53	358-0365-00			1						BSHG,STRAIN RLF:	80009	358-0365-00
-54	161-0033-04	B010100	B120989	1						CABLE ASSY,PWR:		
	161-0033-25	B120990		1						CABLE ASSY,PWR:3,18 AWG,125V,84.0 L	70903	KH902
-55	348-0190-00	B080000	B099999	4						FOOT,CABINET:	80009	348-0190-00
	348-0191-00	B100000		4						LEG,ELEC EQUIP.:PLASTIC ***** (ATTACHING PARTS) *****	80009	348-0191-00
-56	212-0022-00	B080000		4						SCREW,MACHINE:8-32 X 1.5 INCH,PNH,STL	83385	ORD BY DESCR
-57	210-0458-00	B080000		4						NUT,PL,ASSEM WA:8-32 X 0.344 INCH,STL ***** (END ATTACHING PARTS) *****	83385	ORD BY DESCR
	210-0205-00			1						TERMINAL,LUG:SE #8	86928	5442-7
-58	200-0772-02			1						COVER,ELEC XFMR:3.125 X 3.75 X 0.875 ***** (ATTACHING PARTS) *****	80009	200-0772-02
-59	212-0516-00	B010100	B039999	4						SCREW,MACHINE:10-32 X 2 INCH,HEX HD STL	77250	ORD BY DESCR
	212-0515-00	B040000		4						SCREW,MACHINE:10-32 X 2.250" HEX,HD STL	83385	ORD BY DESCR
-60	220-0410-00			4						NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	ORD BY DESCR
-61	166-0227-00			4						INS SLV,ELEC:0.187 ID X 1.50 INCH LONG	80009	166-0227-00
-62	210-0812-00	B050000	B074839	4						WASHER,NONMETAL:#10,FIBER	86445	ORD BY DESCR
	210-0010-00	B074840		4						WASHER,LOCK:#10 INTL,0.02 THK,STL	78189	1210-00-00-0541C
-63	210-0206-00	B074840		1						TERMINAL,LUG:SE #10 ***** (END ATTACHING PARTS) *****	86928	A373-147-1

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	Name & Description					Mfr Code	Mfr Part Number
		Eff	Dscont		1	2	3	4	5		
1-	334-2990-00	B136610		1	MARKER,IDENT:CAUTION					80009	334-2990-00
-64	-----			1	TRANSFORMER:(SEE T1 REPL)						
-65	333-1597-00	B010100	B079999	1	PANEL,REAR:					80009	333-1597-00
	333-1901-00	B080000		1	PANEL,REAR:					80009	333-1901-00
					*****ATTACHING PARTS*****						
-66	211-0510-00	B080000		2	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL					83385	ORD BY DESCR
-67	210-0457-00	B080000		2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL					83385	ORD BY DESCR
					*****END ATTACHING PARTS*****						
-68	352-0076-00	B010100	B049999	1	FUSEHOLDER:W/HARDWARE					75915	342012-L
	352-0362-00	B050000		1	FUSEHOLDER: W/MOUNTING HARDWARE					75915	345603
-69	210-0873-00			1	WASHER,NONMETAL:0.5 ID X 0.688 INCH OD,NPR					70485	ORD BY DESCR
-70	407-1062-00	B010100	B114739	1	BRACKET,ANGLE:CKT BOARD,RIGHT,ALUMINUM					80009	407-1062-00
	407-1062-01	B114740		1	BRACKET,ANGLE:CKT BOARD,RIGHT,ALUMINUM					80009	407-1062-01
					*****ATTACHING PARTS*****						
-71	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL					83385	ORD BY DESCR
-72	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL					83385	ORD BY DESCR
					*****END ATTACHING PARTS*****						
-73	407-1178-00	B010100	B114739	1	BRACKET,ANGLE:CKT BOARD,LEFT,ALUMINUM					80009	407-1178-00
	407-1178-01	B114740		1	BRACKET,ANGLE:CKT BOARD,LEFT,ALUMINUM					80009	407-1178-01
					*****ATTACHING PARTS*****						
-74	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL					83385	ORD BY DESCR
-75	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL					83385	ORD BY DESCR
					*****END ATTACHING PARTS*****						
-76	210-0204-00			1	TERMINAL,LUG:0.146 INCH DIA DE,45 DEG BE					78189	2157-06-01-2520N
					*****ATTACHING PARTS*****						
-77	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL					78189	211-041800-00
					*****END ATTACHING PARTS*****						
-78	426-0919-00	B010100	B029999	1	FRAME ASSY,CAB.:					80009	426-0919-00
	426-0919-01	B030000	B079999	1	FRAME ASSY,CAB.:					80009	426-0919-01
	426-0919-02	B080000	B106689	1	FRAME ASSY,CAB.:					80009	426-0919-02
	426-0919-04	B106690		1	FRAME SECT,CAB.:					80009	426-0919-04
	334-2709-00			1	MARKER,IDENT:MARKED "CAUTION"					80009	334-2709-00
	334-2037-00			2	MARKER,IDENT:					80009	334-2037-00
	334-3379-01	B119080		1	MARKER,IDENT:MARKED GROUND SYMBOL					80009	334-3379-01

SN B030000 & UP





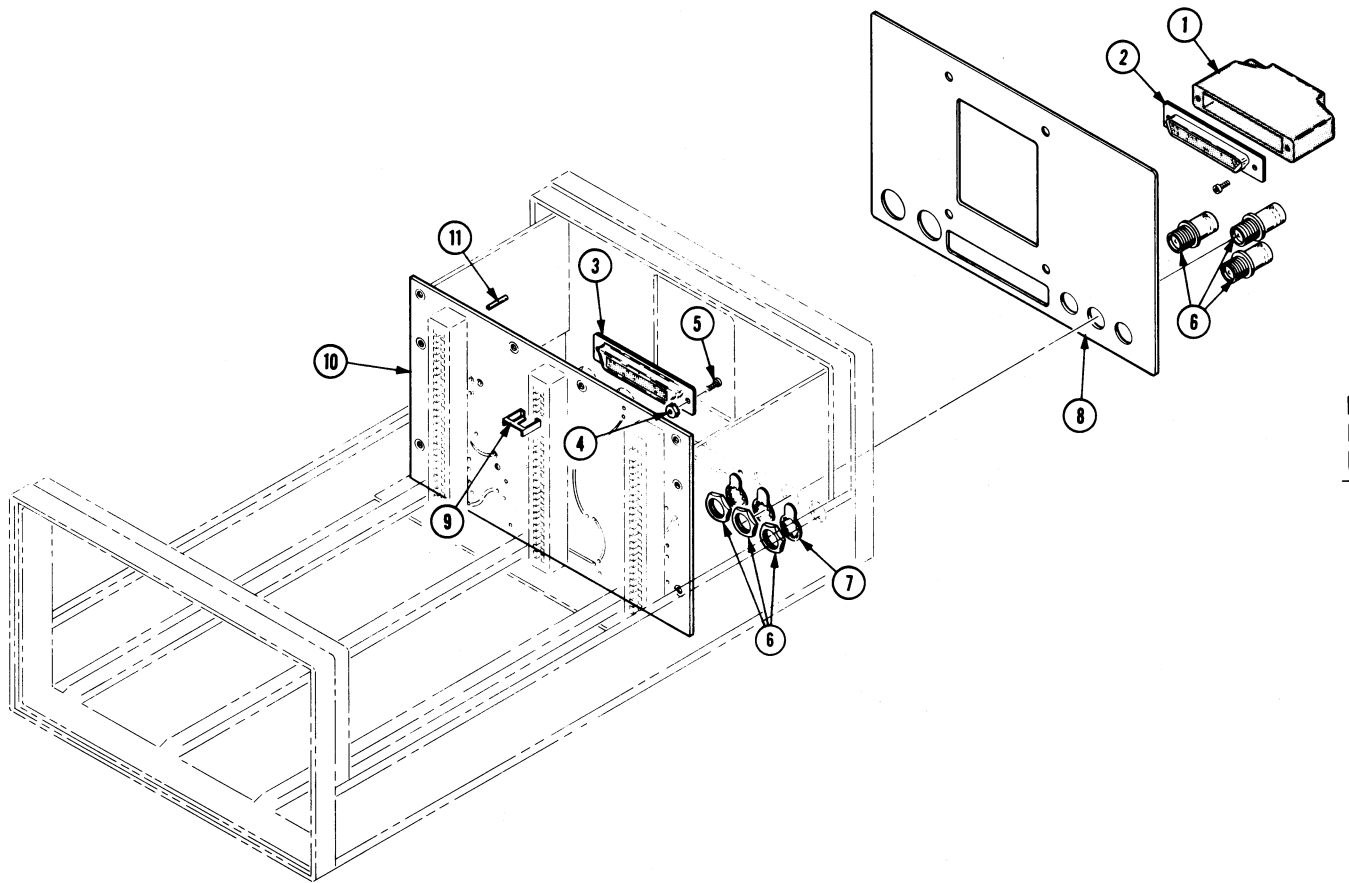


Fig. &
Index
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OPTION 2

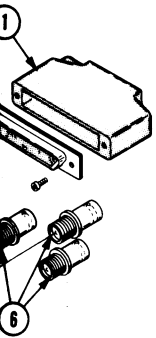
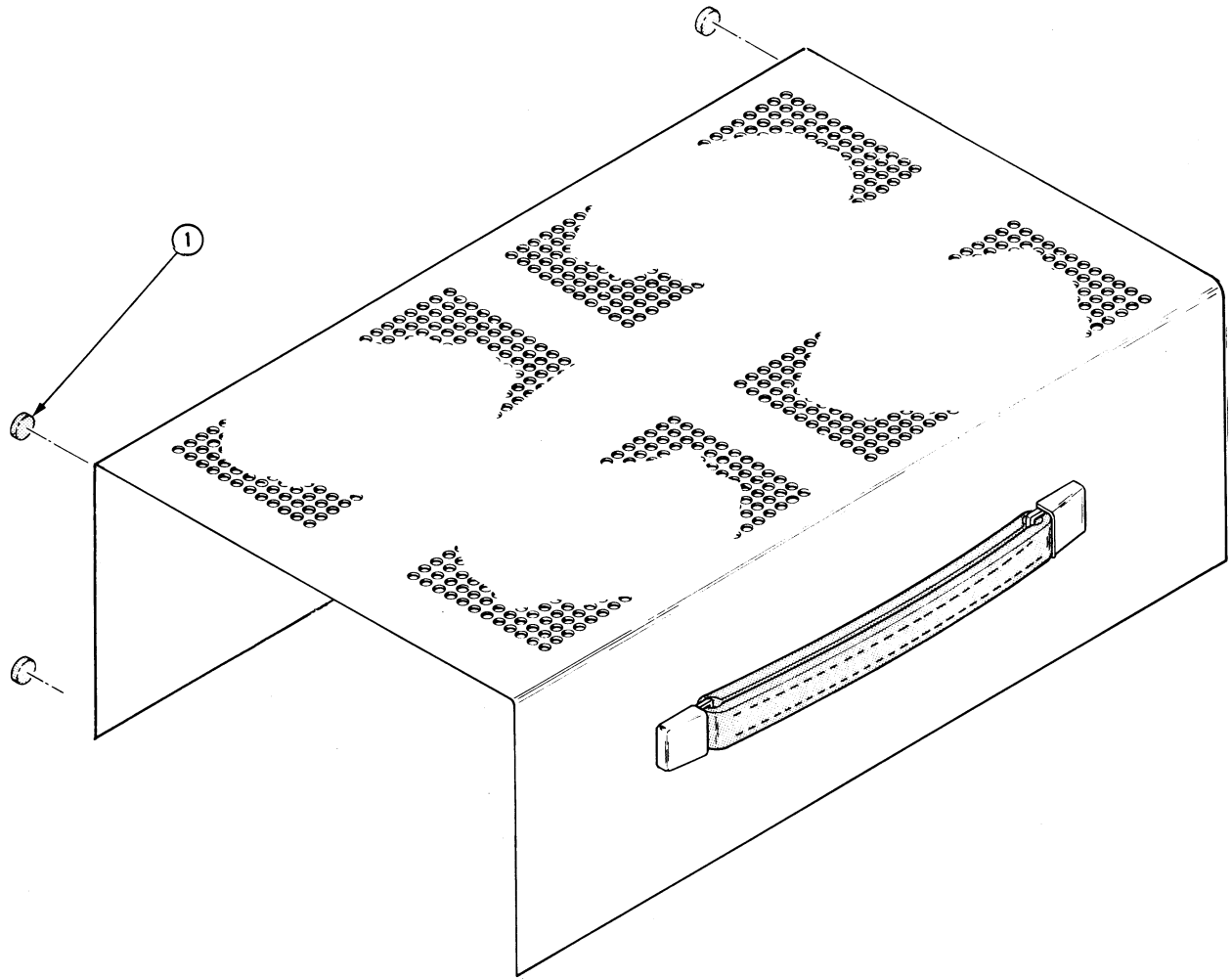


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
2-1	131-1319-00		1						SHLD,ELEC CONN:	71468	DD51216-1
-2	131-1345-00		1						CONNECTOR,RCPT,:50 FEMALE CONTACT	71468	DD-50S
-3	131-1344-00		1						CONNECTOR,PLUG,:50 CONT,MALE D (ATTACHING PARTS)	71468	DD-50P
-4	210-0586-00		2						NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	83385	OBD
-5	211-0008-00		2						SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-6	131-0955-00		3						CONNECTOR,RCPT,:CKT BD,28/56 CONTACT (ATTACHING PARTS)	13511	31-279
-7	210-0255-00		3						TERMINAL,LUG:0.391" ID INT TOOTH - - - * - - -	80009	210-0255-00
-8	333-1701-00	B010100	1						PANEL,REAR:	80009	333-1701-00
	333-1900-00	B080000	1						PANEL,REAR:	80009	333-1900-00
-9	214-1593-02		15						KEY,CONN PLZN:CKT BD CONN	80009	214-1593-02
-10	-----		1						CKT BOARD ASSY:INTERFACE(SEE A1 REPL)		
-11	131-0608-00		84						. TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
	-----		-						. (OTHER SUBPARTS SAME AS STANDARD INTERFACE		
	-----		-						. CIRCUIT BOARD)		
	020-0074-00		1						WIRE KIT:TM503,OPTION 2	80009	020-0074-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	1 2 3 4 5	Name & Description	Mfr	
		Eff	Dscont				Code	Mfr Part Number
2-1	131-1319-00			1		SHLD,ELEC CONN:	71468	DD51216
-2	131-1345-00			1		CONNECTOR,RCPT,;50 FEMALE CONTACT	71468	DD-50S
-3	131-1344-00			1		CONNECTOR,PLUG,;50 CONT,MALE D *****ATTACHING PARTS*****	71468	DD-50P
-4	210-0586-00			2		NUT,PL,ASSEM WA:4-40 X 0.25,STL,CD PL	78189	211-041800-00
-5	211-0008-00			2		SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ *****END ATTACHING PARTS*****	83385	ORD BY DESCR
-6	131-0955-00			3		CONN,RCPT,ELEC:BNC,FEMALE *****ATTACHING PARTS*****	13511	31-279
-7	210-0255-00			3		TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL *****END ATTACHING PARTS*****	80009	210-0255-00
-8	333-1701-00	B010100	B079999	1		PANEL,REAR:	80009	333-1701-00
	333-1900-00	B080000		1		PANEL,REAR:	80009	333-1900-00
-9	214-1593-02			15		KEY,CONN PLZN:CKT BD CONN	80009	214-1593-02
-10	-----			1		CKT BOARD ASSY:INTERFACE(SEE A1 REPL)		
-11	131-0608-00			84		.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
	-----			-		(OTHER SUBPARTS SAME AS STANDARD INTERFAC		
	-----			-		.CIRCUIT BOARD)		
	020-0074-00			1		WIRE KIT:	80009	020-0074-00

STANDARD ACCESSORIES



ACCESSORIES

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	1	2	3	4	5	Name & Description	Mfr	
		Eff	Dscont								Code	Mfr Part Number
-1	348-0429-00 070-1305-01			4						BUMPER, PLASTIC: BLACK POLYURETHANE	53387	SJ-5003
				1						MANUAL, TECH: INSTRUCTION	80009	070-1305-01

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