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WIZARDS' WORKSHOP

TEKTRONIX INTERNAL USE ONLY

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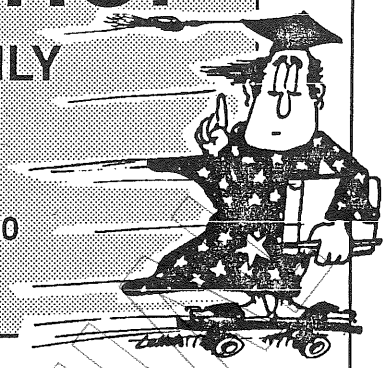

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TEK WIZARDS' WORKSHOP
TECHNICAL INFORMATION FOR SERVICE PERSONNEL

April 29, 1988

WIZARDS' WORKSHOP STATEMENT OF PURPOSE

WIZARDS' WORKSHOP is published by Service Operations Support, Building #53, Merlo Road. It provides timely service-related technical information regarding servicing of Tektronix products, on a regular schedule to an established distribution list. It is published twice each Account Period.

Anyone with service-related information may contribute to *WIZARDS' WORKSHOP*. A **Service Programs Manager** must approve of any articles submitted for publication.

Deadline for submission of articles is Noon on day 1 of weeks 1 and 3 of each AP. Publishing schedule: Day 5 of weeks 2 and 4 of each AP (Thanksgiving and Christmas holiday shutdowns may impact this schedule). To be added to or deleted from the Distribution List, call the Distribution Clerk at 642-8917, Beaverton.

WIZARDS' WORKSHOP articles are microfiched (with the exception of personnel changes) and a microfiched index of articles is prepared quarterly and distributed to all persons on the active *WIZARDS' WORKSHOP* distribution list.

Certain *WIZARDS' WORKSHOP* articles are designated by the writer for inclusion in *SERVICE TEKNOTES*, a quarterly publication that provides technical information to customers who service their own Tektronix products. These articles are edited to remove names of Tektronix employees, delivery stations, or phone numbers. Any reference to customers, prices, etc., are deleted by the editor. *SERVICE TEKNOTES* is distributed to Tektronix customers, worldwide, at the request of their Tektronix Sales Representatives.

Please Note: All pullouts appear at the end of Wizards' Workshop issues.

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GENERAL

PERSONNEL CHANGES

Promotions:

Seattle F.O.

4/3/88: David F. Fish, was promoted from Field Service Specialist Trainee to Field Associate Electronic Technician.

4/3/88: Robert J. Gregory, was promoted from Field Associate Service Specialist to Field Service Specialist.

CONGRATULATIONS

TO

DAVID & ROBERT!

CHANGE OF LOCATION

Friday, April 29, 1988, is a moving day for me. I have been transferred from Service Operations Support to Corporate Service Training at Walker Road. My new mail station and phone number are listed below.

We will continue to publish the following Service Publications from the Walker Road site: *Service Organization Bulletin*, *Wizards' Workshop*, *ServiceTekNotes*, and *Softalk* as a viable means of communication for technical information.

Although we will continue to publish these editions: our ability to function effectively — and our potential for growth — will be directly dependent on the support of those groups and individuals who have contributed articles up to this point in time.

Please continue to direct all articles (floppy disks and hard copies) for *Wizards'*, *STN*, *SOB*, and *Softalk* in the established way, except send them to me at the new mail station: 94-925/629-1167.

Your cooperation and support will be greatly appreciated during this time of transition.

Thanks,

Wanda Gram, Editor
94-925, (503) 629-1167
Issue: 18-8

WARRANTY PARTS FOR EVALUATION

By direction of the Management Council the Warranty Non-CRT parts for evaluation program is being discontinued.

You no longer need to send warranty failed parts to Clair Gruver, 53-114.

Thank you for your cooperation and involvement in this program over the past 22 years.

Clair Gruver
Service Operations Support
53-114/642-8006
Issue: 18-8

IN-HOUSE

PEP301 SERVICE MAINTENANCE INFORMATION

The Service Maintenance Information is included in this issue as Pullout "A". The SMI information should extend your understanding of service related needs, and operation of the PEP301 as an extension of the service manual, P/N 070-6948-99. The manual is now available from Customer Service.

Tom Fox
Clark County Service Support
C1-866, (206) 253-5608
Issue: 18-8

PG606A VARIABLE AMPLITUDE LOCKUP

Mod: #65878

S/N: B010166

Some early production PG506A's exhibit an error display lock-up when the variable amplitude control is slowly rotated through the zero error region. This lock-up is caused by DVM oscillation.

To correct the lock-up, remove A2U3080, Tek P/N 156-0582-00, and install a 74F00 at A2U3080, Tek P/N 156-1707-00. Also, add A2C3072, a 1000 pF capacitor, Tek P/N 281-0770-00, in parallel to A2R3070. These changes have been installed at the factory in all PG506A's starting at S/N B010166.

Craig Vogel
Clark County Service Support
C1-866, (206) 253-5616
Issue: 18-8

TSG271 FIRMWARE UPDATE

REF: TSG271 INTERIM MANUAL
P/N 061-3457-00
Mod #65679

In order to improve some of the remote control operation parameters, and to improve instrument performance in the presence of noise, some changes have been made to the software code in A2-1U333.

A new P/N 160-4338-02 should be installed at A2-1U333, as required, to address noise and remote control problems.

This change will be in new instruments from the factory starting with S/N B020270.

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

WFM300 CENTER DOT DRIFT WITH TEMPERATURE

REF: WFM300 INSTRUCTION MANUAL
P/N 070-6039-00
Mod #66452

New WFM300's will now have a modification installed that is designed to eliminate a small amount of horizontal center dot drift that was seen at elevated temperatures.

The change consists of altering the value of A3R843 from 27 K ohms to 13K ohms (P/N 315-0133-00), and installation of this change is

(Article continued on next page)

WFM300 CENTER DOT DRIFT WITH TEMPERATURE (Continued)

recommended on an "as required" basis to address the stated symptom.

This change will be factory installed starting with S/N B010761.

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

650HRC PROCEDURE UPDATE FOR MII STANDARD

REF: 650HRC INSTRUCTION MANUAL
P/N 070-2646-02

Enclosed with this issue as Pullout "B" are the new calibration procedures that will allow the 650HRC to be properly adjusted for the MII analog component standard.

New 650HRC manuals will have this information included.

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

760 BOARD CHANGE TO PREVENT CABLE DAMAGE

REF: 760 INSTRUCTION MANUAL
P/N 070-5992-00
Mod #64543

Starting at S/N B020593, new 760's will have a Main Board that has had the connectors for J115 and J413 redesigned to provide increased vertical clearance.

J115's connector was changed to one with a right angle configuration, P/N 131-3363-00, and J413's connector was replaced by 20 terminal pins, P/N 131-0608-00.

In addition, the 20 wire cable has been secured to the 34 wire cable with a strain relief, P/N 358-0723-00.

These changes are for your information only. Removal and replacement of the connectors is only recommended upon failure.

An additional change in these newer instruments is to C254. A new part, P/N 290-0536-00, will provide better resistance to oscillations occasionally seen in the -12 V regulators. The capacitor should be changed when required to address this symptom.

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1480 SERIES, OPT. 6 & 7 SLOW SWEEP TRIGGER IMPROVEMENT

REF: 1480 SERIES INSTRUCTION MANUAL, P/N 070-2338-00

1480 SERIES OPT. 6 INSTRUCTION MANUAL P/N 070-2064-00

Mod #65536

To improve slow sweep triggering when bounce signals are applied, the trigger comparator has been changed as follows.

On the Slow Sweep board, A13, resistor R9412 has been changed to a "test selectable" with a nominal value of 64.9K ohms (P/N 321-0367-00) and a range of selection of ± 8K ohms.

To properly select this part when the nominal value may be inadequate, the technician should choose a value such that both parts B and C of Performance Check Step 43 function as stated in the manual.

This change will be installed in new instruments from the factory starting with S/N B094615 (1480C) and B106311 (1480R).

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1710B SERIES, 1720 SERIES, 1730 SERIES, 1705, WFM300 CHANGE TO CRT HEATER VOLTAGE

REF: 1710B INSTRUCTION MANUAL P/N 070-5522-00

1720 INSTRUCTION MANUAL P/N 070-5846-00

1730 INSTRUCTION MANUAL P/N 070-4474-02

1705 INSTRUCTION MANUAL P/N 070-6355-00

WFM300 INSTRUCTION MANUAL P/N 070-6039-00 Mod #65298

Mod #65298 has been implemented in the listed (above) instruments in order to extend CRT life. The change consists of a new value for R124 on the Power Supply board. The new value to use is 10 ohms (P/N 315-0100-00).

Install this new part on any of the listed instruments brought in for service, if not already done.

This change will be factory installed starting with the following serial numbers.

1705	B020321
1710B	B021445
1711B	B020297
1720	B013189
1721	B011056
1730	B023586
1731	B021129
1735	B010166
WFM300	B010631

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1711B, 1731, 1735 GRATICULES CHANGED TO INCLUDE 12.4 HORIZONTAL DIVISIONS

REF: 1710B SERIES INSTRUCTION MANUAL, P/N 070-5522-00

1730 SERIES INSTRUCTION MANUAL, P/N 070-4474-02

Mod #65861

Due to customer input, the Horizontal scale of PAL graticules in the listed instruments has been changed to reflect 12.4 divisions.

Since this is an internal CRT graticule, the change will be seen by our customers only when a new instrument is purchased, or when a CRT is replaced due to failure. There will be no formal update program.

In the 1711B and 1731, CRT P/N 154-0904-01 changes to 154-0904-02. In the 1735, CRT P/N 154-0916-00 becomes 154-0916-01.

The instrument cal procedures, etc., are not affected.

This change will be installed in new units from the factory starting with S/N B020309 (1711B), B021240 (1731) and B010203 (1735).

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1720 SERIES GAIN CHANGES WITH PHASE SHIFTER ROTATION

REF: 1720 SERIES INSTRUCTION MANUAL, P/N 070-5846-00

Mod #66051

In order to alleviate some gain changes that may be noticed when the phase shifter is rotated, changes have been made to the phase shifter drive circuitry to increase loop gain.

A3R223 is changing from 2.2K ohms to 1K ohm, P/N 315-0102-00, and A3R333 is changing from 18K ohms to 33K ohms, P/N 315-0333-00.

Install this change, as required, to address the stated symptoms.

This change will be installed in new instruments from the factory starting with S/N B013693 (1720) and B011067 (1721).

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1730 SERIES COMPONENT CHANGE

REF: 1730 SERIES INSTRUCTION MANUAL, P/N 070-4474-02

Mod #66481

Increased reliability of raw parts from our vendors has allowed us to change A3U541 from P/N 156-2009-01 to 156-2009-00 in the 1730 Series.

Use this new part on an "as fails" basis.

This change will be implemented in new instruments from the factory starting with S/N B024507 (1730), B021281 (1731) and B010203 (1735).

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1750/1751 SERVICE UPDATE PROGRAM

A Service Update Program, #3026, was recently developed and announced to the Field to address reliability concerns due to power supply boards showing signs of overheating in the 1750 and 1751 TV Waveform/Vector Monitors. This update applies to the following instruments:

1750 S/N B010100 - B032090
1751 S/N B010100 - B031093

The update kit is P/N 045-0146-00 and it should be installed in every unit coming into a Service Center. More details can be found in the kit instructions and/or in the Service Update Plan distributed to Service Management on February 15, 1988.

Rich Andrusco
Beaverton Service Support
53-108, 642-8694
Issue: 18-8

1910 MATRIX SIGNAL LIMITATIONS

REF: 1910 OPERATORS MANUAL P/N 070-4466-00

When attempting to build a Matrix signal in the 1910, you may encounter what, at first, appears to be a problem if you are trying to define one of the signals as SMPTE Bars, or a few other signals. This is not really a problem, it just requires a work-around.

The situation is that a 1910 Matrix signal will not accept as one of its components another signal that is a split field signal. Some of these are SMPTE Bars, Bars/Y, Bars/Red, Hi-Lo APL Bounce, Field Square Wave, Window and Convergence. For instance, SMPTE Bars consists of EIA Bars, Reverse Blue Bars, and IYQB.

The solution is relatively easy. When defining a Matrix, just use the base signal components that are the desired parts of split field signals. This may seem to limit your selections somewhat, but with over 30 basic patterns to chose from stored internally, the available combinations should satisfy the most demanding test requirements.

Section 6 of the Operators Manual gives thorough descriptions of each signal type, details the components contained in split field signals and provides some application hints.

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

1910 PART NUMBER CHANGE

REF: 1910 SERVICE MANUAL
P/N 070-4523-00

Mod #65876

Due to increased reliability of parts from our vendors, A10Q805 is being changed to a non-burned in part, P/N 151-0103-00.

The new part number should be used to replace a failed device at Q805.

This change will be factory installed beginning with S/N B021656.

Bill Bean
Beaverton Service Support
53-108, 642-8695
Issue: 18-8

2220/2221/2230 X10 MAG SWEEP START IS NONLINEAR

Mod: #66300

The start of sweep may not meet linearity specification over the first 2 divisions. This is most noticeable at 5 µSec/div. To correct this, change A1R584 to a 560 ohm resistor, Tektronix P/N 313-1561-00, and A1C527 to a 22 pF capacitor, Tektronix P/N 281-0759-00.

Margaret Grant
Clark County Service Support
C1-866, (206) 253-5948
Issue: 18-8

2220 /2221/ 2230 40 MHz CLOCK DISPLAYED ON SCREEN

Mod: #66300

The system 40 MHz clock may couple through the cable harness and display on screen. To correct this, C530 was added from the TSEL line to ground.

To install this mod, use Tektronix P/N 281-0773-00. Solder the capacitor from the junction of R531-TSEL and the ECB ground pad near R531. The resistor will need to stand on one end on the board. R531 can be changed to a 313-1472-00 (which has a smaller diameter lead) that will make it easier to insert the two parts in one hole.

Margaret Grant
Clark County Service Support
C1-866, (206) 253-5948
Issue: 18-8

2220 USE OF VARIABLE HOLDOFF CONTROL CAUSES VERTICAL DEFLECTION IN CHANNEL 2

Mod: #66300

At 5 µsec/div and faster, vertical deflection at the beginning of the trace may occur when moving the variable Holdoff out of the norm position. This is especially noticeable at 2 mV/div in channel 2.

To correct this, add W6120 in the holes silk-screened for C6121 (vacant in a 2220) and add W7954 in the holes silk-screened for VR954 (also vacant). Both parts are Tektronix P/N 131-0566-00.

Margaret Grant
Clark County Service Support
C1-866, (206) 253-5948
Issue: 18-8

2710 SERVICE UPDATE PLAN

REF: Mod #M65871

A Service Update Program, #3027, was recently developed and announced to the Field to address firmware updates in the 2710 Spectrum Analyzer. This update applies to and should be installed in all instruments with S/N B010267 and below by ordering the update kit, P/N 046-0025-00, from the **Exchange Centers**. Further details are available within the 046 kit instructions or in the Service Update Plan distributed to Field Service management on February 19, 1988.

Rich Andrusco
Beaverton Service Support
53-108, 642-8694
Issue: 18-8

11300 CALIBRATION AND REPAIR

The 11300 calibration software specifies the John Fluke 6061A Synthesized Signal Generator. However, you may have other equipment that will work. The HP8640B has similar key specifications. The HP8640B is being field evaluated; we will communicate the results.

Your experience is requested on the HP8640B's or other generators that work.

Four U.S. Service Centers have the calibration software and the John Fluke 6061A. These centers can provide complete repair and calibration services on the 11300 oscilloscopes. With this additional support capability it is no longer necessary to return all 11300's to Beaverton for services.

The four centers are Beaverton (Factory Service), Boston, Dallas, and Santa Clara.

Frank Tucker
Beaverton Service Support
D/S 53/108, Tel. 642-8691
Issue: 18-8

ON-SITE

604/604A, 603/603A HAZARD ALERT

In extreme cases, it is possible for a 604/604A or a 603/603A power transformer to smolder and even ignite when a combination of incorrect fuse values and power supply failures occur. Please verify correct fuse values on any 604/604A and 603/603A that enter the service center. The following chart gives the correct values:

FUSE	VALUE	TEK PART #	FUNCTION/ LOCATION
F800	1.25A SLO	159-0041-00	LINE FUSE, REAR PANEL
F830	0.25A FAST	159-0028-00	215V SUPPLY FUSE, RECT. BD.
F840	1.0A SLO	159-0019-00	HV OSC. SUPPLY, RECT BD.

The 604/604A and 603/603A are small screen X-Y monitors, discontinued about 1983. The pre-1978 instruments were not UL rated so are at more risk than the later UL approved versions, which have a thermal cutout in the power transformer. The above fuse values apply to all instruments regardless of manufacturing date.

This article was Written by J. W. ST. Louis of Beaverton.

Bill Hatch
Wilsonville Service Support
63-171, 685-3787
Issue: 18-8

SERVICE MAINTENANCE INFORMATION

PEP301

by Tom Fox

Date: April 7, 1988

OVERVIEW

The PEP301 is an enhanced Personal Computer configured for Tektronix compatible GPIB controller operations, with very fast and complex mathematic capabilities, and multi-function text and graphic display modes. The system unit (or CPU) contains two 8-bit expansion slots, five 8/16-bit slots, and one 32-bit memory expansion slot that can extend memory to 32M bytes. The Standard PEP301 contains a Prisma PEGA 11 display driver board, a serial/parallel I/O board, the PC2A GPIB board, and the WFC-A Winchester fixed and floppy disk controller board. The CPU also contains the Main Processing board, 200 Watt power supply, one 40M byte fixed disk, and one 1.2M byte floppy drive. A full multi-function monitor and 101-key keyboard are part of this package. The PEP301 also includes enhanced MS-DOS, GW-BASIC, Prisma Utility, and GURU II software. PC commercial software (dated before Jan '88) should be fully compatible, however, do report any unusual observations to the PEPP center via 1-800-TEK-WIDE.

SERVICE METHOD

The PEP301 is serviced In-House or On-Site to the functional replaceable unit level using the exchange method for major FRU's. Portions of On-Site service will be billed to our customer. The process for billing the customer is being determined. Contact Dick Freshour, 206-253-5615 with any concerns about On-Site service. The PEP301 is serviced in or from eleven locations across the United States:

ATLANTA	CHICAGO
BOSTON	DENVER
ORLANDO	DALLAS
WASHINGTON D.C.	FACTORY SERVICE
WOODBRIDGE	IRVINE
	SANTA CLARA

The initial service inquiry procedure is as follows:

I. Contact the PEPP center by dialing 1-800-TEK-WIDE.

II. The PEPP center will attempt to determine whether the problem is the PEP301 setup, application software, or hardware.

III. Suspected hardware faults are communicated to either Service Support for final analysis or to the appropriate Service Center.

IV. Confirmed defective monitors and keyboards can be exchanged through any Tektronix Field Office the Beaverton Exchange Center or the European Board Exchange Center.

V. Confirmed defective mainframes are either returned to the appropriate Service Center for exchange repair or repaired On-Site.

DETAILED DESCRIPTION

HARDWARE

MAIN BOARD

The main circuit board contains one 32-bit 80386 microprocessor, a 80387 math co-processor, 1M bytes DRAM functioning at 0-wait state read and write, and a battery backed CMOS RAM clock driver with 64 bytes of internal save RAM. The main board contains numerous other IC's, but their function is beyond the need of our present service repair level.

CMOS RAM CONFIGURATION

DIAGNOSTIC STATUS BYTE - 0EH
(TTL LOW= GOOD)
- POWER INPUT STATUS BIT 7
- CHECKSUM BIT 6
- DISK AND DISPLAY SETUP BIT 5
- MEMORY SIZE BIT 4
- HARDRIVE BOOT INIT BIT 3
- TIME VALID BIT 2
- RESERVED BITS 1 AND 0

SHUTDOWN STATUS BYTE - 0FH

FLOPPY DRIVE TYPE BYTE - 10H
- BITS 7-4 DRIVE A:
- BITS 3-0 DRIVE B:

HARD DRIVE TYPE BYTE - 12H
- BITS 7-4 FIXED DRIVE ONE
- BITS 3-0 FIXED DRIVE TWO

EQUIPMENT BYTE - 14H
- NUMBER OF FLOPPY DRIVES (1 OR 2) BITS 7-6
- DISPLAY CARD TYPE BITS 5-4
- RESERVED BITS 3-2
- 80387 EXISTS? BIT 1
  - TTL HIGH = YES
- FLOPPY DRIVE PRESENT BIT 0
  - TTL HIGH = YES

DOS MEMORY SIZE BYTES = 15H-16H

MEMORY EXPANSION BYTES - 17H-18H
- ONE HALF OF 32 BITS

HARDRIVE ONE EXTENDED BYTE - 19H
- TYPES 16-255

HARDRIVE TWO EXTENDED BYTE - 1AH

CMOS RAM CHECKSUM - 2EH-2FH

MEMORY EXPANSION BYTES - 30H-31H
- OTHER HALF OF 32 BITS

DATE CENTURY BYTE - 32H
- BCD VALUE

INFORMATION FLAG - 33H
- ON BOARD EXPANSION MEMORY BIT 7
- SETUP UTILITY BIT 6
- RESERVED BITS 5-0

MATH COPROCESSOR

DATA TYPE	BITS	SIGNIFICANT BITS	APPROXIMATE RANGE
WORD INTEGER	16	4	-32,768 TO 32,767
SHORT INTEGER	32	9	-2E9 TO 2E9
LONG INTEGER	64	18	-9E18 TO 9E18
PACKED BCD	80	18	+ OR - 18 DIGITS
SINGLE PRECISION	32	6-7	8.43E-37 TO 3.37E38
DOUBLE PRECISION	64	15-16	4.19E-307 TO 1.67E308
EXTENDED PRECISION	80	19	3.4E-4932 TO 1.2E4932

SWITCH SETTINGS

SWITCH	1/O	DESCRIPTION
SW1-1	1	ROM TYPE 27128
2	1	↕
3	O	↕
4	O	↕
5	1	EGA CARD
6	1	SMART SPEED MODE
7	O	MEM MODE 4
8	O	↕
SW2-1		NOT USED
2	1	256K BEYOND 1M DRAM
3	1	ZERO WAIT STATE
4		NOT USED

DISK CONTROLLER BOARD

The Winchester disk controller can drive up to four drives, e.g. two floppies and two hard drives or any combination limited by space. The floppies can be either $5^1/_4$ inch or $3^1/_2$ inch and the hard drive size can be up to 138M bytes.

GPIB BOARD

The PC2A board is fully capable as a talker, listener, implements serial and parallel poll, SRQ, and controls up to 14 instruments on the bus. Data transfers can occur at speeds as fast as 300k byte per second for a maximum system speed of approximately 4E-6 seconds per byte. (16Mhz fixed clock, 16 clock periods to process and transfer 8-bit data as a result of a command).

The GURU II USER'S MANUAL P/N 070-6177-01 contains information and software for setting up the PC2A board. The hardware setup and switch location is on page 2-6. Verifying the board and operation is found in section 3 of the GURU manual. If the hard disk is being rebuilt, then start with page 3-9. The diagnostic files are IBDIAG and IBTEST, pages 3-13 and 3-14. Before running the GPIB diagnostic tests, the GPIB.COM file must reside in the boot CONFIG.SYS file. If not, modify the CONFIG.SYS file to include this statement: **device= <path\>gpib.com.** If GPIB.COM is in the root directory the path is redundant. Don't forget to RESET the CPU after modifying the CONFIG.SYS file.

SERIAL / PARALLEL I/O BOARD

The PEP301 I/O includes both COM1 and COM2 serial ports and a parallel port soft configurable as either LPT1 or LPT2. Both serial ports are standard RS-232C. The baud rate is from 50 to 9600 with 5, 6, 7, or 8 bit characters and 1, 1.5, or 2 stop bits. COM1 uses a 9-pin D type male connector and COM2 uses a 25-pin D type male connector with only 10-pins present.

The parallel port is Centronics compatible with a 25-pin D type female connector.

SETUP

PORT	I/O ADDRESS	INTERRUPT REQUEST
LPT	378h-37Ah	IRQ7
LPT	278h-27Ah	IRQ5
COM1	3F8h-3FEh	IRQ4
COM2	2F8h-2FEh	IRQ3

SWITCH SETTINGS

SWITCH	ON/OFF	DESCRIPTION
SW1-1	ON	enable COM1
2	ON	enable IRQ4
3	ON	enable COM2
4	ON	enable IRQ3
5	ON	choose 378h LPT
6	ON	choose IRQ7
7	OFF	not choose 278h LPT
8	OFF	not choose IRQ5

DISPLAY DRIVER BOARD

The Prisma Full House PEGA 11 display board drives both standard EGA graphics and multi-function graphics available from the PEP301 CPU. Features include compatibility with color setup drivers from any application software and custom drivers provided by the GEM software, supplied with the PEP. The GEM SETEGA.EXE file can be used in custom programming to set up any one of 51 different color or mono modes from four drivers; EGA, CGS, MONO, and MULTISYNC. A full description is available by entering SETEGA from the the appropriate directory on your hard drive.

SWITCH SETTINGS

SWITCH	ON/OFF	DESCRIPTION
1	OFF	Enhanced Color Mode
2	ON	↕
3	ON	↕
4	OFF	↕
5	ON	Multisync Mode
6	ON	↕

JUMPER POSITIONS

JUMPER	POSITION/S	DESCRIPTION
J1	1&2 + 4&5	27128 Eprom BIOS
alt J1	2&3 + 5&6	27256 Eprom BIOS
J2	2&3	I/O 3xx
alt J2	1&2	I/O 2xx
J3	1&2	Enhanced Monitor Attached
alt J3	2&3	Standard Monitor or BW

HARD DRIVE

The hard drive is a 40M byte, five surface , five head, servo type drive that has a 28ms average access time. It is a model 6053 type 17 with 977 tracks (or sectors) and 42.519M bytes maximum capacity. The drive comes from Tek with the physical format complete and partitions established. A logical format may have been done, but it is recommended a logical format be done on a new PEP to ensure that the included DOS is compatible with the system boot files. An alternate is to run the SYS.COM file from the newest DOS to reload the system: Syntax > **sys c:.**

DOS can only talk to a maximum of 32M bytes of hard disk. This restriction is surmounted by the DOS files FDISK.COM and HARDRIVE.SYS. The FDISK file can set up a maximum of four partitions to a size of 770 sectors or approximately 33M bytes. The HARDRIVE file enables the partitions by relocating the partition data into the operating system DRAM. The HARDRIVE.SYS file must be in the CONFIG.SYS file to access the D: <E:> <F:> partitions for any purpose, including the logical format.

Syntax: **device= hardrive.sys.**

FLOPPY DRIVE

The floppy drive is a 1.2M byte drive with capability to read and write 120k, 160k, 320k, 360k, and 1.2M byte removable disks. This capability is not totally error free. Occasionally, a format error or write error may occur when attempting to write to any floppy, except 1.2M types. Usually a second attempt will work, but, some other PC utility such as PCTOOLS does seem to perform formats and file transfers without error. This implies that the DOS FORMAT program and write control files may have an elusive bug, though the only difference between MSDOS and PCTOOLS is in how the utility controls the floppy drive itself. Please note: A floppy should only be made bootable in the PC it is intended to be used. This is because the SYSTEM files transferred to the floppy are usually only compatible in that PC or its relative.

POWER SUPPLY

The power supply is a 200 watt single module, including the power source connector, power switch, line voltage selector, and an internal fuse. The fuse is accessible only after removing the supply from the mainframe and then removing the rear cover. However, the service method is for the supply to be exchanged for any failure.

POWER SUPPLY MEASURABLE PARAMETERS

INPUT

VOLTAGE RANGES
85 to 135 vac
170 to 270 vac

FREQUENCY RANGES
47 to 73 Hz
57 to 63 Hz

OUTPUT

NOMINAL VOLTAGE	TOLERANCE RANGE VOLTS	CURRENT (AMPS) MIN.	MAX.
5	4.75 to 5.25	7.0	19.8
-5	-4.50 to -5.50	0.0	0.3
12	11.40 to 12.60	0.5	7.3
-12	-10.80 to -13.20	0.0	0.3

VOLTAGE BY WIRE COLOR

P1, P2, P3

RED	+5
BLACK	GND
BLUE	+12

P4

WHITE	+5 (TTL)
RED	+5
BLUE	+12
YELLOW	-12
BLACK	GND

P5

BLACK	GND
ORANGE	-5
RED	+5

VOLTAGE AND CURRENT AT CONNECTORS

LOAD POINT	VOLTS	MAX CURRENT
P1-1	+12	1.00A
2	GND	
3	GND	
4	+ 5	1.00A
P2-1	+12	2.80A
2	GND	
3	GND	
4	+ 5	1.80A

P3-1	+12	2.80A
2	GND	
3	GND	
4	+ 5	1.80A
P4-1	TTL (POWER GOOD LINE)	10mA
2	+ 5	3.80A
3	+12	0.70A
4	-12	0.30A
5	GND	
6	GND	
P5-1	GND	
2	GND	
3	- 5	0.30A
4	+ 5	3.80A
5	+ 5	3.80A
6	+ 5	3.80A

MONITOR

The PEP301 monitor is a multi-function color display device with digital input, color select button, 14 inch CRT, 800 x 600 resolution, and 4800 character cells in a 10 x 10 dot matrix configuration. The front panel controls include Intensity, Contrast, Power, and the Color Select. The top panel controls include Horizontal Width (two widths possibilities), Horizontal Position, Vertical Phase, Vertical Size, Vertical Hold, and Vertical Position. The Vertical Phase control is present on -02 monitors and above.

The monitor is considered one FRU and should be exchanged if a problem is not correctable using an external control. One exception is a magnetic-field-induced-display-color-fade-out problem created by a coil added to the power supply to control EMI. The symptom can be seen on the lower left side of the display. The color, intensity and contrast settings affect the fade amount. Only the monitors below S/N TW10350 may show this problem. The effect can be reduced by rotating the coil 90° toward the back; e.g. push back and down to the power supply board. This coil is accessed by removing the cover, next remove the top metal shield. Using safety measures standard around high voltage, reach down past the left side of the CRT and press the large black coil on the bottom board (the power supply) back and down. Install the shield and cover.

KEYBOARD

The PEP keyboard has 101 keys, four lights, separate number pad, separate curser controls, separate editing keys, and twelve function keys aligned using the standard AT configuration. The lights indicate when the number pad is on, the Caps Lock is set, and the Scroll Lock is on. The last light is the power indicator which is lit when the CPU is on and the keyboard is properly connected. This keyboard is switchable between the XT type CPU and the AT type. The switch is located on the top center back of the keyboard. The switch positions are:

1 Enhanced PC/XT (101 key)
2 AT (The PEP301 uses this setting)
3 Standard PC/XT

If you change the switch setting you **must cycle power** for the CPU to understand the new selection. Soft-reboot does not reload the keyboard setup.

SOFTWARE

DOS

The PEP301 Disk Operating System is an enhanced version of the MS-DOS originated by Microsoft for the IBM AT. Tektronix applies our own label to the floppy through standard licensing with Microsoft. This DOS is version 3.2, however the difference between various DOS is indicated by the R/N number. Our DOS is R/N 308-R8701. Any other version or R/N of DOS is not guaranteed to properly function with the BIOS in the PEP301. See the PEP301 user's guide on Microsoft MS-DOS Operation System for complete details.

BIOS

The PEP301 Basic Input/Output System is specifically designed for the hardware on the Main board and Drive Controller board. At power on a read of the setup status copies the BIOS into DRAM starting at address A0000. This is memory mode four set by the switches on the Main board.

> Note: The DOS SYSENV.COM file can change the memory mode and processor clock rate after boot.
>
> SYNTAX <path\>sysenv<memory mode|speed>
>
> Entering *sysenv* will return the status.
>
> Enter *sysenv 16m* and the clock is changed from smart to a fixed 16M Hz.
>
> Enter *sysenv rom* to use ROM BIOS. Switch back to RAM BIOS by entering *sysenv ram*.

The RAM BIOS continues to boot the system by verifying the presences of the keyboard, display board, I/O board, drive control board, checks the DRAM, and then initializes the drives. The floppy is initialized first, the light comes on and the drive spins. Next the hard drive is initialized. If BIOS finds an active partition on the hard drive the system is set to boot from that partition or seeks a bootable floppy.

The BIOS completes the boot by relocating the system files from the drive and transferring control to the user specified format. The following files are looked for during the final boot stage and relocated into the DRAM for fast operation:

```
IO.SYS
MSDOS.SYS
COMMAND.COM
CONFIG.SYS (if exists)
AUTOEXEC.BAT (if exists)
```

Users can continue the boot into application programs and menus through device and file calls located in the config.sys and autoexec.bat.

What should the CONFIG and AUTOEXEC files contain to properly operate the PEP301? Only one program is absolutely necessary for the standard PEP configuration and that is the HARDRIVE.SYS file. The following config.sys file is one example of a possible setup.

TYPE CONFIG.SYS (a DOS command for showing the file)

```
device= c:\dos\hardrive.sys
device= c:\dos\ansi.sys
buffers= 20
files= 40
lastdrive= e
device= ramdrive.sys 256 126 64 /e
break= on
```

The hardrive.sys file establishes the hard drive partition into the operating system in DRAM.

The ansi.sys driver permits ANSI commands to allow total control of the CRT display including color, all 256 ansi characters, and ansi commands for date, time, current directory, and cursor position on screen.

The autoexec.bat file is used to implement ansi commands and any command that can be entered from the keyboard.

TYPE AUTOEXEC.BAT

```
echo off        (no display = faster operation)

path e:\;c:\;c:\dos;c:\bat;c:\work;c:\misc;d:\

     (tells the processor where to search for a
     user or software request for a file)
```

```
prompt $e[1;33;44m$t$h$h$h$h$h$h $d$_ $e[1;36;44m
$p$_$e[0;37;44m
```

(The $e[is the ANSI escape sequence. The 1;33;44m sets yellow on blue for the time call, $t. The $h is a back space to clear the seconds and tenth of seconds. The $d gets the date and the $_ is a carriage return. The 1;36;44m sets the current directory display, called by $p, to cyan on blue. The last color call 0;37;44m sets all future screen displays to white on blue. Note the 1 leading the first two color calls sets the color to high intensity).

```
a:\diagnos1
```

(Calls the PEP301 diagnostic program menu on the A: drive).

```
echo on
```

(This should be obvious).

```
cls
```

(Clears the screen - an erase command).

Several sources are readily available for self training on PC's and DOS. I especially liked the MS DOS POWER USER GUIDE, by Jonathan Kamin, for learning both how DOS operates and how to maximize PC capabilities. Peter Norton's PROGRAMMER'S GUIDE TO THE IBM PC is a good general reference for PC hardware operation and assembly level programming. Many other publications are available and may be more preferable to your desire and goals. e.g. If you are just beginning to learn computers or DOS, Microsoft has an interactive PC program that teaches the various DOS commands and operation. The software is called MICROSOFT-LEARNING DOS.

DIAGNOSTIC DISK

The diagnostics are specifically tuned for the PEP301 and the service strategy. The tests focus on various components and at the board level, however the reporting scheme will always indicate the FRU regardless of the test results. The one exception is the keyboard test, which does show any malfunctioning key. The disk itself contains several files and I will recommend a few more be added from your DOS disks.

Notes: One ANSI.SYS replacement program has gained popularity among users and that is NANSI.SYS. Using this form of ANSI will cause a bug in the display diagnostic test. NANSI does not support full multisync graphics in the text mode which results in only one column of characters to be written to the screen during the text display tests.

A second problem involves a conflict in main board EXTENDED memory in DRAM where the main board SETUP and DIAGNOSTIC use this 256k of memory for working storage. If the user has established a RAMDRIVE in extended memory then the operation of the clock setup routine and diagnostics will be blocked by the memory allocator. Note: Extended memory is the 256K DRAM beyond the normal 640K DOS manages.

These bugs can be surmounted by always booting from the diagnostic floppy before attempting to check the clock setup or running diagnostics.

The following DOS files are very useful to have on your diagnostic disk. They will allow your floppy to rebuild the PEP hard drive. You should add these from your DOS as soon as you can. Keep your DOS secure to maintain licensing agreements.

HARDRIVE.SYS - for accessing pre-defined partitions.
ANSI.SYS - for display control.
FDISK.COM - for defining and modifying the logical partitions.
SETUP.COM - for interleave and physical format.
FORMAT.COM - for logical format.
SYS.COM - for transfer of boot files.
MGCTEST.COM - for running display RAM and monitor screen tests.
BACKUP.COM - for backing up drive C: before logical format.
RESTORE.COM - for restoring backed up files.

HARD DRIVE MAINTENANCE

HOW TO PROTECT FILES FROM THE FORMAT COMMAND

If a hard drive is partitioned and there is sufficient room on one partition (D) to hold all files on the other partition (C), then partition C can be backed up to D before a logical format is performed. This operation can save the users files if the only problem is that the PEP will not boot from the hard drive and

1. The drive is setup to type 17. [ctrl&alt&exc].
2. Partition 1 is set to active. [fdisk].
3. SYS C: does not restore the boot.

Next: Copy the BACKUP.COM file into the **root** directory on the C drive. Enter, from that directory, BACKUP C:*.* D:\/S. The /S specifies to also backup all subdirectories and their files. After the format of C is complete and the boot files copied over into the C root directory, then reboot the PC from the hard drive. If the boot is successful then copy RESTORE.COM to the root directory and enter RESTORE D:\ C:*.*/S. The /S is for restoring all subdirectories and their files. Note: The backup operation may not be possible after a logical partition change or the implemented of a physical format.

FORMATTING THE HARD DRIVE

The hard drive format involves three levels of operation that build on top of each other. Caution: Implementing any one of these format commands can destroy all data beyond normal DOS recovery schemes. (However, some utilities can recover data on a formatted hard disk, e.g. Norton Utilities). The levels are typically called the PHYSICAL format, LOGICAL PARTITION, and LOGICAL format. (Or high and low level format). If a physical format is implemented, then the partition and logical format **must** be completed. If a logical partition change occurs then the logical format **must** completed. Usually only a logical format is necessary to restore a hard drive. This is done by running the dos FORMAT file using the following syntax:

LOGICAL FORMAT

Note: Press CTRL&ALT&ESC and check the setup for a hard disk type 17. Next enter FDISK and check that partition 1 is active. And always try a SYS C: command before beginning this format. This will reload the system files from the diagnostic or DOS floppy. If these attempts are unsuccessful then perform the following process.

```
BACKUP C:\*.* D:\/S

FORMAT C:/V/S
```

Where the /S (with the format) says to load the boot files IO.SYS, MSDOS.SYS, and COMMAND.COM onto the hard drive. (These programs must exist on the floppy your using before a successful re-build can take place).

Note: If your going to perform a logical format you will need to know the present label. Run CHKDSK C: from the DOS floppy and the label will be displayed. If the disk is unreadable then just enter a carriage return for the label when it is requested.

Now restore the backed files onto the C drive using the RESTORE command. Enter:

```
RESTORE D:\ C:\*.*/S
```

The HARDRIVE.SYS file must be loaded through the CONFIG.SYS before formatting the D: drive if necessary. Push the front panel RESET to reboot the diagnostic disk. Then enter:

```
FORMAT D:/V
```

The switch /V is optional and is used to name the partition or disk. Place the option before the /S. Or use the DOS LABEL.COM to add or change a label, anytime. e.g. label d:

LOGICAL PARTITION

A logical partition change or build up is started by entering:

FDISK/M or FDISK

The /M says you want to setup at least two partitions. Follow the screen prompts and set the sectors for partition 1 to 512 for 20M byte hard drives, or set the partition to 700 for one 30M drive and one 12M drive. Or set it to the owners specification. Before ending you must make partition 1 active, follow the screen prompt to do this. The active partition is the one the BIOS looks for to continue the boot sequence.

PHYSICAL FORMAT

The physical format should not be necessary unless a logical format failed or the base disk size information is lost. That is, FDISK doesn't show the expected disk size and/or the logical format fails.

Two different physical format methods are available to you. One is in the diagnostics and called by entering DIAGNOS. However it lacks one function that the DOS physical format provides and that is the means to check and change the hard disk interleave scheme. The drive manufacturer recommends an interleave of 3, so an 80286 PC can keep up with the disk rotation. But, the PEP301 has an 80386 and fast architecture which allows an interleave of 2. The physical sector order on the disk with interleave 2 is:

1 10 2 11 3 12 4 13 5 14 6 15 7 16 8 17 9

The interleave and physical format is entered by running the DOS SETUP.COM file. Enter SETUP and select hard disk format. Push the F3 or F4 key to change the interleave to 2, if necessary, which is shown in the lower right corner. Next select the format hard disk 1. Enter the hard drive defects which are shown on the table on the top of the hard drive. (Remove the cover to access the table). Follow the screen prompts to complete the defect entering process, however, the program may reject entrees above cylinder 977. If this occurs it is not a problem, just don't enter them or delete them and let the format continue.

```
FORMAT SUMMARY
     BACKUP C TO D
     LOGICAL FORMAT
          FORMAT C:/V/S
          RESTORE C FROM D
          FORMAT D:/V
          <FORMAT E:/V>
          <FORMAT F:/V>
     PARTITION
          FDISK/M
               IF ONLY 2 PARTITIONS
                    700 CYLINDERS = 30M BYTES
                    512 CYLINDERS = 20M BYTES
                    DEFAULT PARTITION 2
               PARTITION 1 SET ACTIVE
          PERFORM LOGICAL FORMAT - SKIP BACKUP, TOO LATE
     PHYSICAL FORMAT
          SETUP
               HARD DISK FORMAT
                    INTERLEAVE 2
                    DISK #1
                         ENTER DEFECTS
                              CYL#       HEAD#
          PERFORM PARTITION
          PERFORM LOGICAL FORMAT
```

The diagnostic disk also contains a program that displays a cross hair pattern that can be used to check the monitor alignment. This test is found by entering DIAGNOS from the diagnostic disk in the A: drive and selecting F5. If the display is not centered then use the top controls to align. If the display it rotated then remove the cover and top panel, loosen the yoke lock and very very carefully rotate the yoke. Do not force the yoke to turn. Refasten the yoke lock and assemble. If our customer still objects to the display, then exchange the entire monitor.

OPERATING GPIB

The GURU software should be loaded onto the hard drive and GPIB.COM must in the config.sys file as a device driver before testing. Also check the path in the autoexec.bat file for access to the subdirectory containing the GURU files. The following statements will help test the boards operation:

IBCONF

A GPIB configure command that allows you to talk with any Tek and some HP instruments. The default settings allow the PEP to talk with a 2430, 7D20, or TM5000. See pages 3-14, 15, 16, and 17 in the GURU manual for details.

IBDIAG

A command that verifies the hardware on the PC2A board.

IBTEST

A command that tests the software installation. This is why the GURU files should be together on the c: drive and their subdirectory on the path.

IBIC

This is an important command set that allows interactive operation of the GPIB bus. Initiate by entering IBIC. The returned prompt is a colon ":", which can expand to include the port name or test instrument name. The following is an example command sequence:

:ibfind tekdev1	open the GPIB port
TEKDEV1: set 2430	open instrument
2430: ibwrt "ID?"	ID query
"ID TEK/2430, V81/1, <fw version>"	2430 response
2430: e	exit to DOS

See sections 3 and E in the GURU II manual for full details on using the IBIC command. Also reference the GPIB Interface Manual for commands used with the GPIB instrument attached to the PEP GPIB port.

TROUBLESHOOTING

BOOT SEQUENCE REPORTS

The PEP301 boots in a specific pattern and can report some failures using the speaker and display.

BEEP CODES

one short & boots Ok	All is good.
one short & floppy drive light stays on	Floppy fail.
one short & hard drive light off	Hard disk fail.
one short & hard drive light blinks	Hard disk fail.
none, constant or repeating pulse	Power supply fail.
one long & one short	Main board fail.
one long & two short	Display board fail or board setup error

DISPLAY MESSAGES

Keyboard fail	Keyboard not hooked up or stuck key or failed hardware.
Parity error Segment xxxx Terminated	Replace main board.
Hard disk boot fail	Can't read boot track on drive. Check setup, format, drive, control board.

FILES

Some files must be present and properly loaded for many other programs to work. The HARDRIVE.SYS requires a valid partition. Many application programs expect the ANSI.SYS to be loaded. There are an unlimited other ways for a PC to appear to have failed and the only fault may be a missing device driver or an error in the path. Experience is the best teacher.

SETUP

The system setup resides in the clock driver/RAM IC. Some of its content can be easily modified through several methods. DOS provides the SETUP file, also used for the physical format, which accesses the user changeable data. An easier method is to press the CTRL&ALT&ESC keys, at the same time which directly accesses the table of attributes. I suggest you do not enter an "A" for all; do the changes one at a time to prevent confusion.

1.	DATE:	04/06/88	
2.	TIME:	09:28:31	
3.	FLOPPY DRIVE	A:	1.2m FLOPPY DRIVE
4.	FLOPPY DRIVE	B:	NOT PRESENT
5.	FIXED DISK	1:	TYPE 017
6.	FIXED DISK	2:	NOT PRESENT
7.	PRIMARY DISPLAY:		SPECIAL ADAPTER
8.	MEMORY BELOW 1 MEG:		00640K
9.	MEMORY ABOVE 1 MEG:		00256K

DAUGHTER BOARD COMPATIBILITY SETTINGS

BOARD/DEVICE	DMA CHANNEL	IRQ	BASE ADDRESS hex
DMA CASCADE	4	2 (2nd to 1st)	000 (1) /0C0 (2)
MATH PROCESSOR	---	13	0F0
DRIVE CONTROL	2		
FLOPPY		6	3F0
FIXED		14	1F0
GPIB	1 (default)	7 (default)	2E1 (default)
DISPLAY	---	---	3C0 (EGA)
I/O			
COM1	---	4	3F8
COM2	---	3	2F8
LPT	---	7 (default)	378 (default)
KEYBOARD	---	1	---

USER ADDED			
SUN 3C501	3 (set to)	5 (set to)	300 (default)

Note: A user may need to set the GPIB interrupt to NOT USED to obtain fully compatibility with the printer port (they have the same IRQ value).

RECOVERING LOST FILES

When a file is deleted (not a partition change or format) the first byte in the file header is changed to "E5". You can change it back to a usable file by entering the DOS DEBUG program and modify the file. Be sure and run CHKDSK/F so the FAT is updated. However, both PCTOOLS and NORTON UTILITIES have much friendlier recovery methods and can find the file for you, which is a tedious job of calculating the file address on disk when using DEBUG.

DRIVE REPLACEMENT

The floppy and hard drives are designed to be easily replaced when necessary. However, there is one trap that can fool a technician into thinking the drive is bad when the real problem is improper installation of the bus connectors. The bus cables are transmission lines that can experience the same standing wave affects as any other high frequency signal. If the last or only drive is not connected to the last bus connector, standing/reflected waves will disable the drive operation. RULE: Always locate the end of the bus cable before connecting.

TEST EQUIPMENT AND MANUALS

Monitor	118-7444-00
Keyboard, U.S.	118-7073-00
MS-DOS User's Guide	118-7453-00
MS-DOS Supplement	118-7449-00
Service Manual	070-6948-99 (Internal Only)
System Software MS-DOS	118-7734-00
Diagnostic disk	118-7763-00
GURU II manual	070-6177-01
PRISMA manual/software	not available at printing
Connector, 25 pin D female	131-0569-00
Connector, 25 pin D male	131-0570-00
Connector, 9 pin D female	131-1006-00

REPLACEABLE PART NUMBERS

118-7073-00	KEYBOARD, U.S.A.
118-5054-00	GPIB BOARD, PC2A, NATIONAL (Internal Only)
118-7074-00	DISK CONTROLLER BOARD
118-7075-00	HARD DISK DRIVE
118-7076-00	SERIAL/PARALLEL I/O BOARD
118-7077-00	EGA BOARD
118-7078-00	POWER SUPPLY
118-7437-00	MATH CO-PROCESSOR, 80387
118-7441-00	TEK LOGO FRONT PANEL, MAINFRAME

118-7442-00	MICRO PROCESSOR, 80386
118-7443-00	FLOPPY DISK DRIVE, 1.2M BYTES
118-7444-02	MONITOR, U.S.A
118-7444-03	MONITOR, EUROPE
118-7445-00	MAIN CIRCUIT BOARD
118-7448-00	MANUAL, INSTALLING YOUR COMPUTER
118-7449-00	USER'S GUIDE, SUPPLEMENT TO MS-DOS
118-7450-00	USER'S GUIDE, KEYBOARD
118-7451-00	USER'S GUIDE, PEP301
118-7452-00	USER'S GUIDE, GWBASIC
118-7453-00	USER'S GUIDE, MS-DOS
118-7454-00	USER'S GUIDE, SERIAL/ PARALLEL I/O BOARD
118-7463-00	RESET PAD BOARD
118-7464-00	BATTERY, SAVE RAM
118-7596-00	CABLE, 20 PIN For WDD
118-7597-00	CABLE, 34 PIN For FDD
118-7598-00	CABLE, 34 PIN For WDD
118-7798-00	CABLE, EGA CARD TO MONITOR
118-7601-00	KEYBOARD, DENMARK
118-7602-00	KEYBOARD, FRENCH
118-7603-00	KEYBOARD, GERMAN
118-7604-00	KEYBOARD, ITALY
118-7605-00	KEYBOARD, NORWAY
118-7606-00	KEYBOARD, SPAIN
118-7607-00	KEYBOARD, SWEDEN/FINLAND
118-7608-00	KEYBOARD, SWISS
118-7609-00	KEYBOARD, UNITED KINGDOM
118-7642-00	USER'S GUIDE, MONITOR
118-7734-00	SYSTEM SOFTWARE, MS-DOS AND GWBASIC
118-7735-00	HARDWARE REPLACEMENT KIT
118-7736-00	KEYCAP REPLACEMENT KIT - U.S
118-7789-00	KEYCAP REPLACEMENT KIT - FRENCH
118-7790-00	KEYCAP REPLACEMENT KIT - GERMAN
118-7791-00	KEYCAP REPLACEMENT KIT - ITALIAN
118-7792-00	KEYCAP REPLACEMENT KIT - SPANISH
118-7793-00	KEYCAP REPLACEMENT KIT - U.K.
118-7794-00	KEYCAP REPLACEMENT KIT - DANISH
118-7795-00	KEYCAP REPLACEMENT KIT - NORWEGIAN
118-7796-00	KEYCAP REPLACEMENT KIT - SWEDEN
118-7797-00	KEYCAP REPLACEMENT KIT - SWISS
118-7737-00	KEY/LOCK REPLACEMENT KIT
118-7764-00	COVER, UPPER, TEK DOVE GRAY
118-7765-00	COVER, LOWER, TEK DOVE GRAY
159-0014-00	FUSE, POWER SUPPLY
161-0066-00	POWER CORD, U.S. STANDARD
161-0066-09	POWER CORD, EUROPE
161-0066-10	POWER CORD, U.K.
161-0066-11	POWER CORD, AUSTRALIA
161-0066-12	POWER CORD, NORTH AMERICAN
161-0154-00	POWER CORD, SWISS

END NOTES

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HP is a trademark of Hewlett Packard Corporation.

USING THE 650HR-C SERIES WITH MII

The three-wire component analog signals from Panasonic's MII tape machines differ slightly from the SMPTE format standard.

MII incorporates a 7.5 IRE black level setup on the luminance (Y) signal whereas the SMPTE format does not. Since the peak white video level is maintained at 700 mV on MII, the black level setup reduces the peak-to-peak voltage of the luminance signal (in comparison to SMPTE). The MII color difference signals are also scaled to the same peak-to-peak voltage as the luminance; i.e. all three signals are lower in amplitude than the SMPTE component standard.

If MII is chosen as the secondary component format by only selecting the MII switch positions (see the following table) and readjusting the three "offset" pots, the result is an internal (to the 650HR-C) GBR signal that is 92.5% of correct amplitude. The resulting light output of the 650HR-C is 83% of the intended level. This reduction in light output is just perceptible if the comparison is made on adjacent monitors. If this light output difference can be tolerated then the monitor can easily be switched between GBR and MII.

Component Format Selection

Component Format	S9004, S9005, S9070 Sections Open	S9004, S9005, S9070 Sections Closed
GBR	All	None
SMPTE	3, 4, 5, 6	1, 2, 7*
BetaCam®	2, 5, 6	1, 3, 4, 7*
M	2, 3	1, 4, 5, 6, 7*
MII	3, 4, 5, 6	1, 2, 7*

*Section 7 of each switch is closed to apply the proper offset for the secondary component format choice.

For installations where switching between the GBR and MII formats is not needed and/or a difference in light output between the Composite and Component displayed picture can not be tolerated, the calibration procedure which follows is recommended. However, to achieve a calibrated light output from the 650HR-C with an MII format signal, MII must be the secondary component format choice after misadjusting GBR as the primary format selection.

650HR-C / MII CALIBRATION

Overview

Briefly stated, this procedure first adjusts the GBR white levels to be 108% of nominal. Then MII format is selected and the black level offset pots are adjusted to compensate for MII's 7.5 IRE black level setup.

Procedure

1. Ensure that all sections of switches S9004, S9005 and S9070 are open.

2. Connect a color bar signal from the composite test signal generator to the VIDEO INPUT A. Loop the color bar signal through to the CHANNEL 1, 2 and 3 inputs and terminate in 75Ω. Set the color bar signal R-Y and B-Y (or U and V) to Off, setup (or pedestal) to Off and white reference to 100 IRE (or 100%). Set the 650HR-C Series STANDARD switch to COMPONENT. Monitor TP5730 (on A5 OUTPUT AMPLIFIER board) with the test oscilloscope.

3. Use the Volts/Div Variable control to set the black reference pulse-to-white reference pulse distance to six divisions. See Figure C-4.

4. **ADJUST** - R9238 so the color bar white level is six major and 2.5 minor divisions from the 650HR-C Series CHANNEL 1 black reference. See Figure C-4 for the location of the black and white reference pulses.

5. Repeat step **4** (above) monitoring TP5700 (on A5) and adjusting R9208 (white level) for

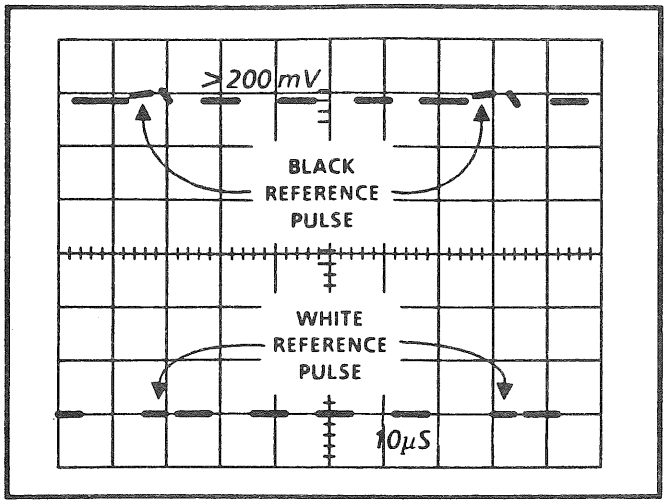

Fig. C-4. Location of 650HR-C black and white reference pulses.

CHANNEL 2, and monitoring TP5760 (on A5) and adjusting R9277 (white level) for CHANNEL 3.

6. Perform step 5 of the Component Input board calibration procedure (page C-6 of the COMPONENT INPUT information insert). Use the Table on the previous page for MII switch settings.