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INSTRUCTION MANUAL
ISOTROPIC ELECTRIC FIELD PROBE
DATA PROCESSING/INTERFACE UNIT
MODEL 7110

399088
Revision D

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Funkentstörung

Bescheinigung des Herstellers

Hiermit wird bescheinigt, dass das Gerät Serie 7100 Isotropic, Broadband, E-Field Probe System (bestehend aus Model 7110 Data Processing/Interface Unit, Model 7120 Metering Unit and Model 7130 Probe) in Übereinstimmung mit den Bestimmungen der Vfg 1046/1984 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmung eingeräumt.

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RFI DECLARATION

We hereby certify that the Series 7100 Isotropic, Broadband, E-Field Probe System (consisting of Model 7110 Data Processing/Interface Unit; Model 7120 Metering Unit and Model 7130 Probe) complies with the RFI suppression requirements of Vfg 1046/1984. The German Postal Service was notified that equipment is being marketed. The German Postal Service has the right to re-test the equipment and verify compliance.

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WARRANTY

The Electro-Mechanics Company (EMCO) warrants that our products are free from defects in materials and workmanship for a period of two years from the date of shipment. If you notify us of a defect within the warranty period, we will, at our option, either repair or replace those products which prove to be defective. If applicable, we will also recalibrate the product.

There will be no charge for warranty services performed at the location we designate. You must however, prepay inbound shipping costs and any duties or taxes. We will pay outbound shipping costs for a carrier of our choice, exclusive of any duties or taxes. You may request warranty services to be performed at your location, but it is our option to do so. If we determine that warranty service can only be performed at your location, you will not be charged for our travel related costs.

This warranty does not apply to:

1. Normal wear and tear of materials
2. Consumable items such as fuses, batteries, etc.
3. Products which have been improperly installed, maintained, or used.
4. Products which have been operated outside of specifications.
5. Products which have been modified without authorization.
6. Calibration of products, unless necessitated by defects.

THIS WARRANTY IS EXCLUSIVE. NO OTHER WARRANTY, WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

THE REMEDIES PROVIDED BY THIS WARRANTY ARE YOUR SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT ARE WE LIABLE FOR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Please contact our Sales Department for a Return Material Authorization Number before shipping equipment to us.

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DESCRIPTION:

Model 7110 Data Processing/Interface Unit is designed to provide the user of Model 7100 isotropic, electric field probe system easy access to the measured field strength and other information which Model 7120 Metering Unit transmits. The Data Processing/Interface Unit provides the user with a softkey based front panel control and a liquid crystal display (LCD) to display the desired available information. The unit also employs a built-in GPIB interface which conforms to the ANSI/IEEE standard 488-1978 and IEEE standard 728-1982.

The 7110 unit is capable of supporting up to eight (8) model 7120 Metering Units (each of which supports one field probe at a time) simultaneously. The Data Processing/Interface Unit also processes the information further in order to provide the user with more options on how to view the electric field, such as finding the maximum, the minimum, and the average of the field strength over a period of time and over more than one probe at a time or finding the peak value of the field.

SPECIFICATIONS:

Input Data Link	Fiber Optic
Probe Input	Up to Eight (8) Field Probes via Eight (8) Metering Units
Input Communication Protocol	Serial 9600 bps 7 Data Bits Even Parity 1 Stop Bit
Minimum Processing Time	1 sec.
Output	Front Panel Display and GPIB
Power	110 VAC/60 Hz, 220 VAC/50 Hz, 100 VAC/50 Hz
Operating Temperature	0 - 40 Degrees C
Length	19 in (48.3 cm)
Width	17.5 in (44.5 cm)
Height	3.5 in (8.9 cm)
Weight	18 lb (8.2 kg)

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OPERATION:

- Inputs:

There are eight probe input channels on the rear panel of the Data Processing/Interface Unit. Each channel employs a fiber optic receiver and is programmed to receive the data serially using the following protocol:

Data Reception Rate	9600 bps
Data Bits	7
Parity	Even
Stop Bits	1

The eight Active Data Channel Indicator LEDs on the front panel correspond to the input channels. Whenever an input channel is receiving data, its corresponding LED is lit indicating that a 7120 Metering Unit is transmitting information to that channel and, thus, the channel is active.

- Front Panel Configuration:

Besides the power switch, there are six switches on the front panel of the unit. Five of the switches (F1 - F5), which are located under the LCD and have built-in LEDs, are used to control the processing of data and to configure the system's operation. The functions of these five "function" switches depend on the state of operation of the unit and change as the unit's operation state changes. In each operation state of the unit, the function that each switch performs, if any, is written on the LCD directly above the switch and its LED is turned on. The LEDs of the switches which perform no function are turned off.

The sixth switch (LOCAL) is located at the top right corner of the front panel and is used to transfer the control of the unit from the GPIB (remote) to the front panel (local). While the operation of the 7110 unit is being controlled via the GPIB, the REMOTE LED is turned on. The ADDR LED is lit only during the time which the unit is addressed by the GPIB controller.

- The Operation States:

The operation states of Model 7110 fall into two major categories; the "data display" and the "configuration and status" states. During the operation of these states, in some of the menus switches F4 and F5 perform the functions DISPLAY and CNFG, respectively. By pressing the DISPLAY switch (F4) the operation of the unit is transferred to the data display state. The CNFG

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switch (F5) transfers the operation to the configuration and status state. The following sections explain the operation of these states.

-- Data Display State:

The data display state represents the measured electric field information, which is transmitted by Model 7120 Metering Unit, in various available formats as configured by the user.

The functions of switches F3 and F5 are common among all the formats of the data display state. Switch F3 changes the representation of the electric field. There are three available representations; electric field strength in V/m, mean squared electric field strength in V^2/m^2, and power density in mW/cm^2. The power density representation is accurate only for far zone measurements. The CNFG switch, F5, changes the state of operation to configuration and status.

The formats of the data display state are described below.

--- Maximum, Minimum, and Average of the Field:

This format displays the maximum, the minimum, and the average values of the field over a period of time. RMAX# and RMIN#, where # is an integer between 1 and 8 which represents the channel number, display the maximum and minimum field values which were sensed by the selected, connected probes which occur during a selected period of time. RAVG represents the average of the field values sensed by all of the selected, connected probes over the same time period.

--- Polar Coordinate Representation of the Field:

In this format, the field measurement of only one probe over a time period is displayed in its polar coordinate representation. The display shows the average values of R, Theta, and Phi of a selected, connected probe over a selected period of time. For a description of R, Theta, and Phi refer to the instruction manual for Model 7120 Metering Unit.

--- Cartesian Coordinate Representation of the Field:

The average values of X, Y, and Z of one selected, connected probe over a selected period of time are displayed in this format. For a description of X, Y, and Z refer to the instruction manual for Model 7120 Metering Unit.

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--- Peak Hold:

By selecting the peak hold function (please see the Peak Hold Selection section below), upon entry to the data display state the unit searches for the peak value of R of a selected probe and displays the corresponding field information in polar or cartesian coordinate representation. This information is held on the display and in the memory until a higher peak value is reached or the RESET function switch (F4) is pressed. By pressing the RESET switch, the unit erases the previously displayed peak value from the display and the memory and searches for a new peak value, which may or may not be less than the previous value. If the CNFG switch (F5) is pressed during the display state, the peak information will be retained in memory and will be displayed upon re-entry to the data display state. The peak information is lost by pressing SEL PR (F1) or TM/PK (F2) switches during the configuration and status state.

-- Configuration and Status State:

By pressing the CNFG switch (F5) during the data display state, the unit enters the configuration and status state and gives the user the opportunity to view the current configuration and status of the system as well as the ability to change the configuration.

During this state the top line of the display shows the current status and configuration of the system. It displays the number(s) of the selected, connected probe(s) as well as the time over which the averaging of the field values is performed if the unit is not in the peak hold mode. If the unit is performing peak hold function, the status is indicated on the top line of the display.

There are two configuration and status state formats. The format depends on whether option ONE or SUBSET or ALL was chosen to select probe(s). The description of these probe selection options and the difference between the two formats of this state are given below.

The following sections describe the available configuration functions during the configuration and status state.

--- Probe Selection:

By pressing the SEL PR switch (F1) the user is given a menu for selecting probes. the menu consists of ONE (switch F1), SUBSET (switch F2), and ALL (switch F3). By selecting the ONE option the user will have a chance to select only one of the connected probes. The SUBSET option gives the user the opportunity to

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select one or more of the connected probes. Selecting the ALL option automatically selects all of the connected probes and takes the unit into the data display state, displaying RMAX#, RMIN#, and RAVG. Upon power up the unit automatically selects this last option by default.

When the ONE or SUBSET function switch is pressed, a second probe selection menu appears which allows the user to program in the desired probe number(s). The descriptions of the menu options are as follows:

The INC. (F1) and DEC. (F2) switches increment and decrement the probe number at the location of the blinking cursor. The number of any inactive probe input channel does not appear at this location.

Once a desired probe number is present at the location of the blinking cursor, by pressing the NEXT switch (F3), which is functional only when the SUBSET option has been selected, the blinking cursor moves to the right allowing the user to choose another probe, if available.

By pressing the DISPLAY switch (F4) the unit returns to the data display state, displaying the field information of the selected probe(s). If the SUBSET option has been selected, the data display state would display RMAX#, RMIN#, and RAVG. If the ONE option has been selected, polar or cartesian coordinate representation of the field sensed by the selected probe would be displayed.

By pressing the CNFG switch (F5) the unit returns to the configuration and status state, giving the user a chance to continue system configuration.

--- Setting the Time Period:

The time over which the RMAX#, RMIN#, and the field average values are taken is set by the user. The minimum and maximum values of this time period are 1.0 second and 10 minutes, respectively. By default, upon power up the time period is set to 1.0 second. The description of how to set the time period is as follows.

If the probe(s) has (have) been selected using the SUBSET or the ALL option of the probe selection menu, by pressing switch F2 of the configuration menu, SET TM, a time setting menu would appear on the display. But, if the ONE option has been used to select a probe, switch F2 of the configuration menu, TM/PK, when pressed, would lead the user to a second menu. At this time the same

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switch, F2, performs the SET TM function and, when pressed, displays the time setting menu. The time setting menu is described below:

When the time setting menu is displayed, the top line of the display shows the currently set time as AA:BB.C. The AA field displays the minutes, the BB field displays the seconds and the C field displays the decimal fraction of a second. Upon entry to this menu the cursor is blinking in the AA field. The user can move the blinking cursor to the BB, C, and back to the AA fields by pressing the NEXT switch (F3).

The value of the field where the blinking cursor is located may be incremented and decremented by pressing the INC. (F1) and DEC. (F2) switches, respectively. The range of the AA field is from 00 to 10, the range of the BB field is from 00 to 59, and the C field may assume only one of the two values of 0 and 5. Therefore, the overall allowable minimum and maximum time periods are 00:01.0 and 10:00.0 respectively and the time setting resolution is 0.5 second.

The DISPLAY (F4) and CNFG (F5) switches perform the same functions as described under the Probe Selection section above.

--- Polar and Cartesian Coordinate Representation Selection:

When a probe has been selected by using the ONE option in the probe selection menu, in the configuration menu switch F3 is used to select between the polar and cartesian representations of the field information. When switch F3 performs CART function, by pressing it, the representation format of the data display state changes from polar to cartesian coordinates and the function of switch F3 changes to POLAR. In exactly the same way, by pressing switch F3 when it performs POLAR function, the format of the data display state changes to the polar coordinate representation of the field information and the function of switch F3 changes to CART.

--- Peak Hold Selection:

When the ONE option has been used to select a probe in the probe selection menu, by pressing the TM/PK switch (F2) of the configuration menu a second menu appears. In this second configuration menu, the PK HLD switch (F3) allows the user to select the peak hold feature of the system. By pressing the PK HLD switch the unit returns to the data display state and performs the peak hold function as described in the Peak Hold section above.

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--- Probe Gain Information:

By pressing the PRG switch (F5) of the configuration menu, information about the gain of the amplifier channels of Model 7120 Metering Unit(s) which is (are) connected to the input channel(s) of Model 7110 Data Processing/Interface Unit is displayed. This information is a series of eight, four-digit numbers. The first digit of each number represents the input channel number of the Data Processing/Interface Unit.

The other three digits of each number are the gain codes of the three amplifier channels of the Metering Unit which is connected to the input channel of the Data Processing/Interface Unit. The second digit is the code for amplifier channel X, the third and the fourth digits are the codes for amplifier channels Y and Z, respectively. For a description of these amplifier channels refer to the Model 7120 Instruction Manual. Description of the gain codes is as follows:

CODE	AMPLIFIER GAIN
1	1
2	25
3	1000

A "---" appears in place of the gain code whenever there is no connected Metering Unit to the input channel or the Metering Unit is connected but is transmitting a MUB packet. For a description of the MUB packet refer to the Model 7120 Instruction Manual.

- GPIB Interface:

Model 7110 Data Processing/Interface Unit employs a GPIB interface which is based on the ANSI/IEEE 488-1978 and the IEEE 728-1982 standards. The unit is configured as a basic talker/listener.

-- GPIB Address:

The unit's bus address is preset to 15 at the factory. The bus address of the unit is displayed on the LCD during the power-up initialization procedure. The address may be changed by changing positions 4 through 8 of the DIP switch which is located on the GPIB interface board. This board is marked "brb488" and is located under the cover of the inside shield. For each switch position "on" represents a binary 1 and "off" represents a binary

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0. Positions 1, 2, and 3 of the switch must not be changed. Positions 4 and 8 are the most and the least significant bits of the address, respectively.

-- GPIB Commands:

The GPIB commands fall under two categories; "Control and Configuration" and "Query". The commands under each category are described below.

--- Control and Configuration:

A - Selects display of the average values of the field. Peak hold feature is disabled.

C# - Selects coordinate representation. # = 1 selects polar coordinate and # = 2 selects cartesian coordinate representations.

DPG - Displays probe gain information on the LCD.

DS - Displays current configuration of the unit on the LCD.

IR - Instrument reset. Executes power-up initialization procedure. System is configured to the default settings.

IT - Instrument trigger. Transfers operation to the data display state. If the system is already in the data display state, the field information is erased and new values are calculated and displayed. If the system is configured to display the average values of the field information over a selected period of time, the execution of the command marks the start of the averaging time period. The command does not reset the peak hold function. It is recommended, but not necessary, to execute this command after the system configuration is changed so that the displayed information fully correspond to the new configuration settings.

PHLD - Selects peak hold function when the probe selection option ONE has been chosen (see command PR# below).

PHR - Resets the peak hold operation. The command is valid only when the peak hold function has been selected.

PR# - Selects the probe selection option. # = 1 selects option ALL, # = 2 selects option SUBSET, and # = 3 selects option ONE.

PS# - Selects probe number #. # may be an integer between 1 and 8.

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PD# - Deselects probe number #. # may be an integer between 1 and 8.

TAA,BB,C - Sets the time period to AA:BB.C. See Setting the Time Period section above.

U# - Selects representation of the electric field. # = 1 selects the electric field strength value in V/m, # = 2 selects the mean squared electric field strength in V2/m2, and # = 3 selects the power density in mW/cm2.

--- Query:

C? - Returns the type of the coordinate representation. A returned 1 represents polar, a returned 2 represents cartesian.

PG#? - Returns probe gain information of probe number #. # may be an integer between 1 and 8. If the specified probe number is not connected a 0 is returned, otherwise a three-digit gain code is returned. The first digit represents the gain code for the amplifier channel X and the second and the third digits are the gain codes for the amplifier channels Y and Z, respectively. See the Probe Gain Information section above.

PHS? - Returns peak hold status. A returned 1 indicates that the system is performing peak hold function. A returned 0 indicates that the peak hold function is disabled and the average values of the field information are available.

PR? - Returns the probe selection option. A returned 1 indicates that the ALL option is in effect, a returned 2 indicates that the SUBSET option is in effect, and a returned 3 indicates that the ONE option is in effect.

PA? - Returns the connected probe number(s). A 0 is returned if there is no connected probe.

PS? - Returns the selected, connected probe number(s). A 0 is returned if there is no selected, connected probe.

T? - Returns the value of the time period. The value is returned in the following format: AA,BB,C. See Setting the Time Period section above.

RMX? - Returns the value of RMAX and its corresponding probe number. The first returned number, which may be an integer between 1 and 8, indicates the probe number which the value of RMAX was sensed by. The second number is the value of RMAX. If the system is not configured to find and display RMAX or if the value of RMAX has not been updated since the last time it was returned, a

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0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

RMN? - Returns the value of RMIN and its corresponding probe number. The first returned number, which may be an integer between 1 and 8, indicates the probe number which the value of RMIN was sensed by. The second number is the value of RMIN. If the system is not configured to find and display RMIN or if the value of RMIN has not been updated since the last time it was returned, a 0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

RA? - Returns the value of RAVG. If the system is not configured to calculate and display RAVG or if a new RAVG value has not been calculated since the last time RAVG was returned, a 0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

R? - Returns the value of R. If the system is not configured to calculate and display the polar coordinate representation of the field value sensed by a selected probe or if a new average value of R has not been calculated since the last time R's value was returned, a 0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

TH? - Returns the value of Theta in degrees. If the system is not configured to calculate and display the polar coordinate representation of the field value sensed by a selected probe or if a new average value of Theta has not been calculated since the last time Theta's value was returned, a 0 is returned. A 0 U is returned if the corresponding value of R is less than the lower limit of the specified dynamic range calibration of the probe.

PHI? - Returns the value of Phi in degrees. If the system is not configured to calculate and display the polar coordinate representation of the field value sensed by a selected probe or if a new average value of Phi has not been calculated since the last time Phi's value was returned, a 0 is returned. A 0 U is returned if the corresponding value of R is less than the lower limit of the specified dynamic range calibration of the probe.

X? - Returns the value of X. If the system is not configured to calculate and display the cartesian coordinate representation of the field value sensed by a selected probe or if a new average value of X has not been calculated since the last time X's value was returned, a 0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

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Y? - Returns the value of Y. If the system is not configured to calculate and display the cartesian coordinate representation of the field value sensed by a selected probe or if a new average value of Y has not been calculated since the last time Y's value was returned, a 0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

Z? - Returns the value of Z. If the system is not configured to calculate and display the cartesian coordinate representation of the field value sensed by a selected probe or if a new average value of Z has not been calculated since the last time Z's value was returned, a 0 is returned. A 0 U is returned if the value is less than the lower limit of the specified dynamic range calibration of the probe.

--- Example:

The following is a short BASIC program demonstrating the Model 7110's system configuration and data query over the GPIB. It is listed for purposes of example only. The Electro-Mechanics Co. makes no representations or warranties, expressed or implied, as to the fitness of the program for a particular purpose or otherwise of the example program.

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```
10 REM ************************************************************
20 REM * THE FOLLOWING PROGRAM CHECKS THE CONFIGURATION OF MODEL 7110 AND *
30 REM * READS THE VALUES OF RAVG, RMAX#, AND RMIN# UPON POWER-UP.  THE   *
40 REM * COMMANDS ARE BASED ON THE NATIONAL INSTRUMENTS PCIIA CONTROLLER. *
50 REM ************************************************************
60              CLEAR ,,38900!
70              IBINIT1 = 38900!
80              IBINIT2 = IBINIT1 + 3
90              BLOAD "bib.m", IBINIT1
100             CALL IBINIT1(IBFIND, IBTRG, IBCLR, IBPCT, IBSIC, IBLOC, IBPPC,
IBBNA, IBONL, IBRSC, IBSRE, IBRSV, IBPAD, IBSAD, IBIST, IBDMA, IBEOS, IBTMO,
IBEOT, IBRDF, IBWRTF, IBTRAP)
110             CALL IBINIT2(IBGTS, IBCAC, IBWAIT, IBPOKE, IBWRT, IBWRTA,
IBCMD, IBCMDA, IBRD, IBRDA, IBSTOP, IBRPP, IBRSP, IBDIAG, IBXTRC, IBRDI,
IBWRTI, IBRDIA, IBWRTIA, IBSTA%, IBERR%, IBCNT%)
120 BD$ = "GPIB0"
130 CALL IBFIND(BD$,BD%)
140 BD$ = "I7110"
150 CALL IBFIND(BD$,BD%)
160 WRT1$ = "U2"
170 WRT2$ = "IT"
180 WRT3$ = "RMX?"
190 WRT4$ = "RMN?"
200 WRT5$ = "RA?"
210 WRT6$ = "T?"
220 WRT7$ = "PA?"
230 WRT8$ = "PS?"
240 WRT9$ = "PR?"
250 M$ = SPACE$(3)
260 S1$ = SPACE$(1)
270 S$ = SPACE$(2)
280 S2$ = SPACE$(1)
290 HS$ = SPACE$(3)
300 REM *
310 REM **
320 REM ***  CHECK THE TIME PERIOD:
330 REM **
340 REM *
350 CALL IBWRT(BD%,WRT6$)
360 CALL IBRD(BD%,M$)
370 CALL IBRD(BD%,S1$)
380 CALL IBRD(BD%,S$)
390 CALL IBRD(BD%,S2$)
400 CALL IBRD(BD%,HS$)
410 PRINT "AVERAGING TIME =" M$ ":" S$ "." HS$
420 PR$ = SPACE$(2)
430 DM$ = SPACE$(2)
440 PA$ = SPACE$(20)
450 PS$ = SPACE$(20)
460 REM *
470 REM **
480 REM ***  CHECK THE PROBE SELECTION OPTION:
490 REM **
500 REM *
510 CALL IBWRT(BD%,WRT9$)
520 CALL IBRD(BD%,PR$)
530 CALL IBRD(BD%,DM$)
```

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```
540 IF PR$ = " 1" THEN PSO$ = "ALL"
550 IF PR$ = " 2" THEN PSO$ = "SUBSET"
560 IF PR$ = " 3" THEN PSO$ = "ONE"
570 PRINT "PROBE SELECTION OPTION: " PSO$ DM$
580 REM *
590 REM **
600 REM ***  CHECK THE CONNECTED AND SELECTED, CONNECTED PROBE NUMBERS:
610 REM **
620 REM *
630 CALL IBWRT(BD%,WRT7$)
640 CALL IBRD(BD%,PA$)
650 PRINT "CONNECTED PROBE(S) NUMBER(S):" PA$
660 CALL IBWRT(BD%,WRT8$)
670 CALL IBRD(BD%,PS$)
680 PRINT "SELECTED, CONNECTED PROBE(S) NUMBER(S):" PS$
690 REM *
700 REM **
710 REM ***  CONFIGURE THE REPRESENTATION TO MEAN SQUARED E-FIELD STRENGTH:
720 REM **
730 REM *
740 CALL IBWRT(BD%,WRT1$)
750 CALL IBWRT(BD%,WRT2$)
760 RD1$ = SPACE$(2)
770 RD2$ = SPACE$(1)
780 RD3$ = SPACE$(1)
790 RDVAL$ = SPACE$(20)
800 REM *
810 REM **
820 REM ***  READ IN RAVG, RMAX#, AND RMIN#:
830 REM **
840 REM *
850 CALL IBWRT(BD%,WRT5$)
860 CALL IBRD(BD%,RD1$)
870 CALL IBRD(BD%,RD2$)
880 CALL IBRD(BD%,RD3$)
890 IF RD3$ = STRING$(1,10) GOTO 760 ELSE
900 CALL IBRD(BD%,RDVAL$)
910 PRINT "RAVG =" RD1$ RD2$ RD3$ RDVAL$
920 RDPN1$ = SPACE$(1)
930 RDPN2$ = SPACE$(1)
940 RDCOM$ = SPACE$(1)
950 RDVAL$ = SPACE$(22)
960 CALL IBWRT(BD%,WRT3$)
970 CALL IBRD(BD%,RDPN1$)
980 CALL IBRD(BD%,RDPN2$)
990 CALL IBRD(BD%,RDCOM$)
1000 CALL IBRD(BD%,RDVAL$)
1010 IF RDPN2$ = STRING$(1,48) GOTO 1030 ELSE
1020 GOTO 1050
1030 PRINT "RMAX =" RDPN1$ RDPN2$ RDCOM$ RDVAL$
1040 GOTO 1060
1050 PRINT "RMAX" RDPN1$ RDPN2$ " =" RDVAL$
1060 RDPN1$ = SPACE$(1)
1070 RDPN2$ = SPACE$(1)
1080 RDCOM$ = SPACE$(1)
1090 RDVAL$ = SPACE$(22)
1100 CALL IBWRT(BD%,WRT4$)
1110 CALL IBRD(BD%,RDPN1$)
```

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```
1120 CALL IBRD(BD%,RDPN2$)
1130 CALL IBRD(BD%,RDCOM$)
1140 CALL IBRD(BD%,RDVAL$)
1150 IF RDPN2$ = STRING$(1,48) GOTO 1170 ELSE
1160 GOTO 1190
1170 PRINT "RMIN =" RDPN1$ RDPN2$ RDCOM$ RDVAL$
1180 GOTO 1200
1190 PRINT "RMIN" RDPN1$ RDPN2$ " =" RDVAL$
1200 END
```

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