HOMANN–BELL CR1200B

Key Locations

User
indicator
display
Off/On
key

USER

ON USER

PRGM ALPHA

set key

set ha't **run**

function key overlay

man

Yellow
key

edit

back arrow key

edit key

CR1200B

R/S key

R/S

1

INSTRUCTION MANUAL

HIGH-VOLTAGE CONNECTION   MAIN POWER ON/OFF

1.5 A fuse (slow blow)

CR1200B

A/C POWER CORD

HP-82160A

SAFETY INTERLOCK CONNECTION

HP-41 CX

DOOR INTERLOCK

OVEN
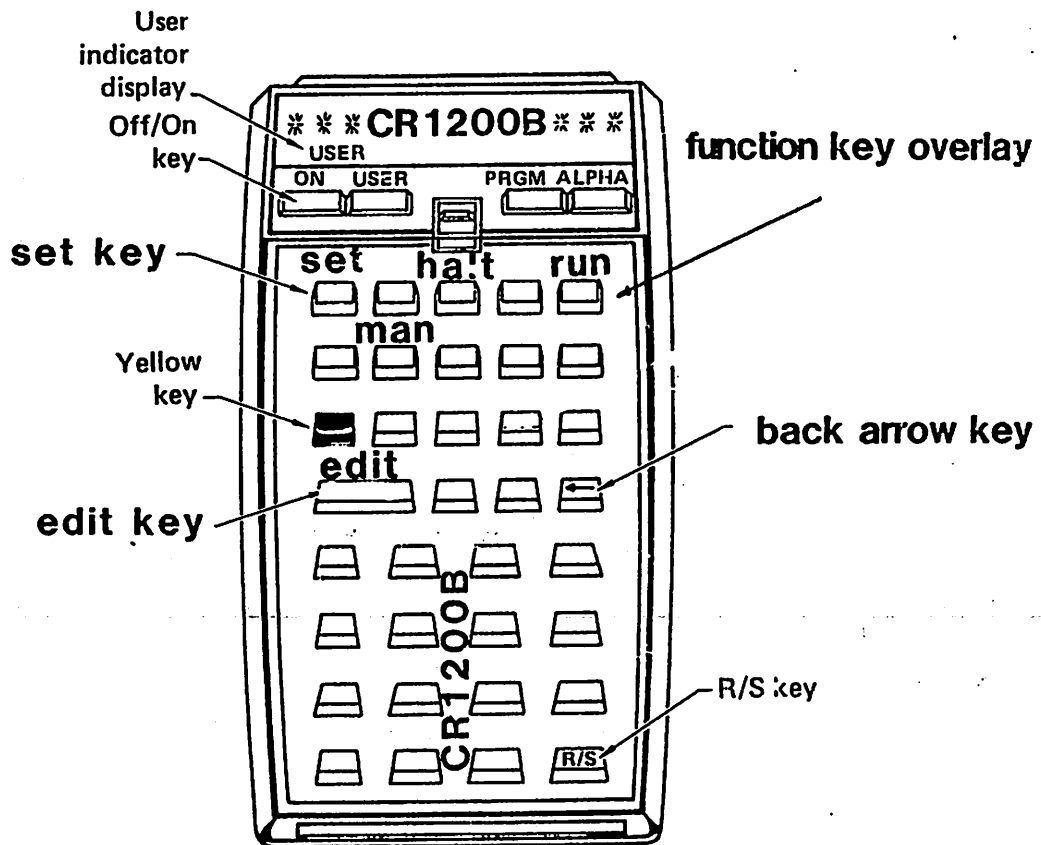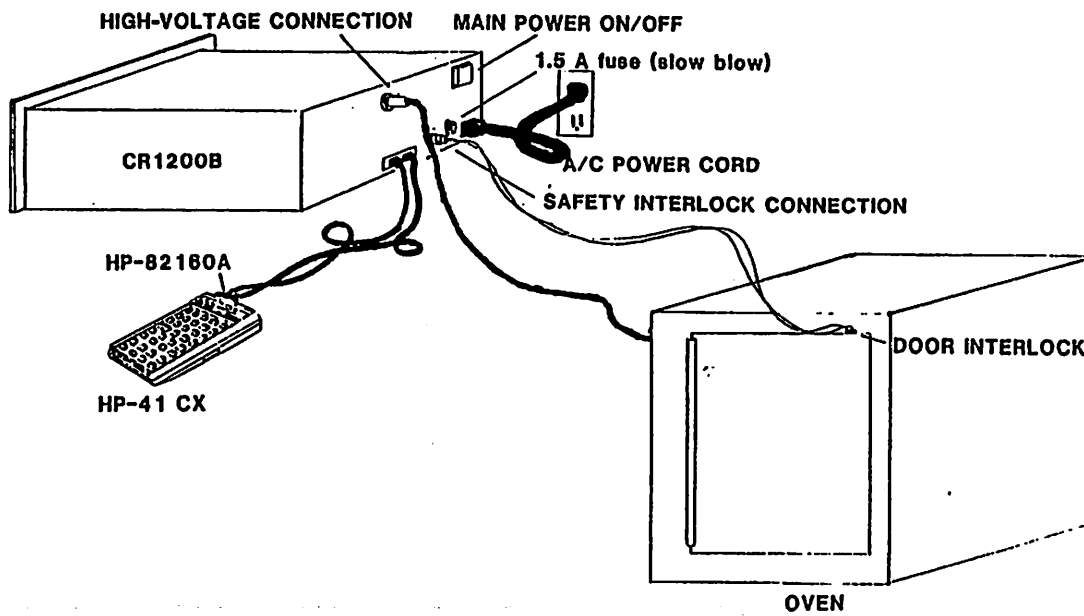
CR1200B CONNECTIONS

-Signal Generator

The Homann-Bell CR1200B Programmable Power Supply provides Voltage and Frequency control capabilities to your electrochemical track etch processing system. The CR1200B is controlled by the Hewlett-Packard HP-41CX Handheld Computer. You connect the CR1200B to your HP-41CX using the Hewlett-Packard Interface Loop (HP-IL).

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INSTALLATION

POWER

The CR1200B is powered by standard 120 VAC line voltage (or optional 220 VAC). To connect the CR1200B to a power outlet, plug one end of the power cord into the receptacle on the rear panel of the CR1200B and plug the other end into an appropriate outlet. The CR1200B is protected from power overload by a 1.5 Ampere, 250 volt SLO-BLO fuse. This fuse is located on the rear panel of the CR1200B.

HP-IL INTERFACE CONNECTIONS

To connect the CR1200B to the HP-41CX, first turn off the HP-41CX. Insert the HP-82183A Extended I/O Module into port #1 of the HP-41CX (port numbers are indicated on the bottom of the HP-41CX). Push in the module until it snaps into place. Insert the HP-82160A HP-IL Module into port #2. The module's switch should face down, and the switch placed in the ENABLE position (pushed away from cable end). Now, insert the two HP-IL cables (connected to the HP-IL module) into the connectors located in the rear of the CR1200B. The HP-IL connectors are designed to ensure proper orientation.

HIGH VOLTAGE CONNECTIONS

Power is supplied to the etch chamber(s) by the SHV connector located in the rear of the CR1200B. The maximum load that can be powered by the CR1200B is 1200 picofarads. This is the equivalent of 100 CR-39 films (1.10 x 0.60 x 0.025 inch thick) processed in a Homann-Type Etch Chamber. This maximum load is at 3500 Volts and 2500 Hertz. More cells may be added when the voltage and/or frequency are at lower values.

SAFETY INTERLOCK CONNECTIONS

The CR1200B is provided with an interlock loop for interfacing with external interlocks. The external interlock is connected to the CR1200B via the BNC connector located in the rear of the CR1200B. Power is supplied to an etch chamber(s) only when the interlock loop circuit is complete. A standard microswitch can be attached to the BNC connector to effect a safety interlock, e.g., with the microswitch located on the access door of the enclosure containing the etch chamber(s).

The electrical specifications for the safety interlock are:

OPEN-CONTACT VOLTAGE: 1.2 V nominal

CLOSED-CONTACT CURRENT: 5 mA nominal

CLOSED-CONTACT RESISTANCE: < 100 ohm

SAFETY PRECAUTIONS

This power supply is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS are present.

Inspect your high-voltage cables for possible wear, cracks or breaks before each use.

For optimum safety, all bare high-voltage connections (e.g., connectors at individual etch chambers) should be contained inside an enclosure to preclude accidental contact. The access door to this enclosure should be interlocked and the interlock connected to the CR1200B Safety Interlock Loop.

FRONT PANEL INDICATORS

As soon as the control software (magnetic cards) is loaded into the HP-41CX memory (see the section titled "LOADING THE SOFTWARE"), the CR1200B is connected to the HP-41CX via the interface loop, and is switched on via the main-power switch located in the rear of the CR1200B, you can begin using its capabilities.

The front panel on the CR1200B contains several indicators that allow you to monitor the unit's operation.

MAIN POWER	This light is on whenever the CR1200B is in its operating power state. This light will remain off for about 5 seconds after power-on.
VOLTAGE	This light is on whenever power is supplied to the external device, e.g., etch chamber connected via the banana jacks. The VOLTAGE light is also enabled when the CR1200B is in a programmed IDLE mode (0 volts during a pre etch cycle).
INTERLOCK	This light is on whenever the interlock loop is complete.
FAULT	This light is on whenever an overload occurs. The FAULT light will momentarily pulse during the SELF TEST at the beginning of each etch session and prior to each individual etch cycle.

CR1200B CONTROL FUNCTION KEYS

The CR1200B is controlled using the function keys designated on the function key overlay provided with your CR1200B. When the HP-41CX is in "USER" mode, the indicated functions are enabled. The "yellow key" must be pushed prior to pushing the desired function key, e.g., "yellow key" followed by the "run" key will start an etch cycle. This was done to prevent accidental pushing of any of the function keys.

The software provided with your CR1200B must be loaded prior to using your unit for the first time. Once the software has been loaded, it remains in the HP-41CX memory until the batteries are depleted or the user resets the memory. The expected lifetime of alkaline batteries is approximately 100 hours of CR1200B use. We strongly recommend that a rechargeable NiCd battery pack and charger be used . If you use NiCd batteries, it is recommended that the charger remain connected to insure uninterrupted control of the CR1200B.

The following function keys are indicated on the function key overlay for the HP-41CX. These function keys are only operational when the HP-41CX is in "USER" mode. During an etch cycle, the "USER" mode is automatically disabled to prevent inadvertent pushing of the function keys, e.g., accidentally re-starting the entire etch cycle by pushing the "run" key.

o set

Use this key for the initial setup of your etch cycles. Upon pushing the "set" key, the previous etch cycles are erased and new etch cycle parameters are prompted for. Once an etch scenario has been input, it remains in the memory even when the HP-41CX is turned off. Cycles can be changed by completely re-entering them via the "set" key, or individual parameters can be changed using the "edit" function (see following function description).

o edit

Use this key whenever you wish to review the etch cycles currently residing in the HP-41CX memory. In addition, this key can be used to edit the current etch cycles. Upon pushing the "edit" key, the HP-41CX will display the cycle number, cycle time, voltage , and frequency upon sequential pushing of the R/S key. If you wish to change a displayed parameter, e.g., the current voltage is 2200 volts and you want to change to 2500 volts, merely enter the new value and push R/S. The HP-41CX will prompt you with the new input for confirmation. If the new value is correct, push R/S for verification.

o run

This key is used to start the etch session. Upon pushing the "run" key, the HP41 will display "WORKING". During this time, the HP41 is ramping up the high voltage in 10 % increments and testing the etch cell for possible malfunction, e.g., leaking O-ring. After approximately one minute, the HP41 will continuously cycle through the following displays:

TIME IS ##:##   CURRENT TIME

CYCLE-# ##:##   CYCLE NUMBER AND TOTAL TIME REMAINING FOR ALL CYCLES

ENDS AT ##:##   TIME LAST CYCLE ENDS

TIME IS ##:##   CURRENT TIME

V #### HZ   CURRENT VOLTAGE AND FREQUENCY

NOTE: The HP-41CX internal clock must be set (refer to the HP-41CX owner's manual).If not, the CR1200B will still operate.However, the "time-of-completion" will not be correct.

o halt

Use this key to stop an etch session which is currently in progress. Since the "USER" mode is automatically disabled during an etch cycle, you must return the HP-41CX to "USER" mode prior to pushing the "halt" key. To toggle the "USER" mode on and off, push the "USER" key located adjacent to the HP-41CX "on" switch at the upper left of the HP-41CX.

o man

This is the manual-operation key. If you desire to continuously operate the CR1200B at a particular voltage and frequency, push this key. After entering the desired voltage and frequency, the CR1200B will output the desired parameters, display the output parameters, and automatically turn the HP-41CX off. The CR1200B will continue to output the previously input etch parameters until the HP-41CX is turned back on via the "ON" switch.

OPERATING THE CR1200B

1. Turn the HP-41CX on.

2. If the CR1200B control software (magnetic cards) has not been loaded, see the section titled "LOADING THE SOFTWARE".

3. Set the HP-41CX to"USER"mode (if already in "USER" mode, the display will indicate"USER").

4. Set your desired etch cycle parameters by pushing the"set" key (yellow key followed by the key under the "set"label). You will be prompted for the following input:

a)   T:1 ? HH.MMSS   Enter the total etch time for cycle number 1, in hours, minutes and seconds, and push R/S. For example, an etch time of one hour ,thirty minutes , and fifteen seconds would be entered as 1.3015

b)   TIME= __:__:__   This is a check of the time you have just input. If the time is correct, push R/S for confirmation. If you desire a different time, enter the new time and push R/S. You will again be prompted for input verification as described above.

c)   E-VOLTS ?   Enter the desired voltage and push R/S. If you desire an idle cycle, enter 0 volts.

d)   E=____VOLTS   This is a check of the voltage you have just input. If the voltage is correct, push R/S for confirmation. If you desire a different voltage, enter the new voltage and push R/S. You will again be prompted for input verification as described above.

e)   FREQ.-HZ ?   Enter the desired frequency, and push R/S.

f)   F = _____.__ HZ

This is a check of the frequency you have just input. If the frequency is correct, push R/S. If you desire a different frequency, enter the value and push R/S. You will again be prompted for verification as described above. NOTE: Due to selection resolution, the displayed value may differ slightly from the actual entered value, e.g., 120 HZ will be input to the CR1200B as 119.9 Hz.

g)   T:2 ? HH.MMSS

If you desire a second program cycle, enter the parameters as described in sections a) through g). If you do not desire another cycle, push R/S.

EXAMPLES

EXAMPLE 1. Using the "set" function to setup an etch session. You wish to program the HP-41CX with the following etch session:

CYCLE 1: 5 hours and 15 minutes at 3000 volts and 60 Hz
CYCLE 2: Idle for 20 minutes (no power to the CR1200B)
CYCLE 3: 38 minutes at 2700 volts and 2000 Hz
CYCLE 4: Not used in this example
CYCLE 5: Not used in this example

1. Turn the HP-41CX on.

2. If the CR1200B control software (magnetic cards) has not been loaded, see the section titled "LOADING THE SOFTWARE".

3. Set the HP-41CX to USER mode (if already in "USER" mode, the display will indicate" USER").

4. Set your desired etch cycle parameters by pushing the"set" key (yellow key followed by the key under the "set"label). You will be prompted for the following input:

HP-41CX DISPLAY	KEYBOARD INPUT
a) T:1 ? HH.MMSS	Enter 5.15 and push R/S.
b) TIME= 05:15:00	Time input is correct. Therefore, push R/S.
c) E-VOLTS ?	Enter 3000, and push R/S.
d) E=3000 VOLTS	Voltage input is correct. Therefore, push R/S.
e) FREQ.-HZ ?	Enter 60 and push R/S.
f) F = 60.0 HZ	Frequency input is correct. Therefore, push R/S.
g) T:2 ? HH.MMSS	Enter 0.20 and push R/S.
h) TIME= 00:20:00	Time input is correct. Therefore, push R/S.

	HP-41CX DISPLAY	KEYBOARD INPUT
i)	E-VOLTS ?	Enter 0 (for idle cycle), and push R/S.
j)	E=0 VOLTS	Voltage input is correct. Therefore, push R/S.
k)	T:3 ? HH.MMSS	Enter 0.38 and push R/S.
l)	TIME= 00:38:00	Time input is correct. Therefore, push R/S.
m)	E-VOLTS ?	Enter 2700 and push R/S.
n)	E=2700 VOLTS	Voltage input is correct. Therefore, push R/S.
o)	FREQ.-HZ	Enter 2000 and push R/S.
p)	F = 2000.0 HZ	Frequency input is correct. Therefore, push R/S.
q)	T:4 ? HH.MMSS	This completes the three cycles required of this particular etch scenario. Therefore, push R/S, without any data entry.
r)	READY	Data entry is complete. You are now ready to start the etch session by pushing the "run" key.

EXAMPLE 2. Using the "edit" function to edit the etch parameters in EXAMPLE 1., above. You wish to change the CYCLE 3 etch time from 38 minutes to 25 minutes, and the voltage from 2700 volts to 3500 volts.

1. Turn the HP-41CX on.

2. If the CR1200B control software (magnetic cards) has not been loaded, see the section titled "LOADING THE SOFTWARE".

3. Set the HP-41CX to USER mode (if already in "USER" mode, the display will indicate" USER").

4. Edit the desired etch cycle parameters by pushing the"edit" key (yellow key followed by the key under the "edit"label). You will be prompted as follows:

	HP-41CX DISPLAY	KEYBOARD INPUT
a)	CYCLE 1	Push R/S
b)	TIME= 05:15:00	Time input is correct. Therefore, push R/S.
c)	E=3000 VOLTS	Voltage input is correct. Therefore, push R/S.
d)	F = 60.0 HZ	Frequency input is correct. Therefore, push R/S. After a few seconds, you will be prompted with:
e)	CYCLE 2	Push R/S
f)	TIME= 00:20:00	Time input is correct. Therefore, push R/S.
g)	E=0 VOLTS	Voltage input is correct. Therefore, push R/S.

HP-41CX DISPLAY	KEYBOARD INPUT
h) CYCLE 3	Push R/S
i) TIME= 00:38:00	We wish to change this time to 25 minutes. Therefore, enter 0.25 and push R/S. After a few seconds, you will be prompted as follows:
j) TIME= 00:25:00	New time input is correct. Therefore, push R/S.
k) E=2700 VOLTS	We wish to change this voltage to 3500 volts. Therefore, enter 3500 and push R/S. In a few seconds, you will be prompted as follows:
l) E=3500 VOLTS	New voltage input is correct. Therefore, push R/S.
m) F = 2000.0 HZ	Frequency input is correct. Therefore, push R/S.
n) COMPLETE	This completes the edit session.

NOTE: If you need to change the total number of etch cycles, e.g., 3 cycles to 2 cycles, the "set" function must be used. The "edit" function is only for confirming currently loaded etch cycles and editing parameters when the total number of cycles remains unchanged (as in example 2; the total number of cycles remained at 3).

LOADING THE SOFTWARE

BATTERY POWER

The batteries in your HP-41CX supply power to the HP 82104A
Card Reader. An automatic power checking system has been built
into the card reader to prevent it from operating when battery
power is low. If the "LOW BAT" display appears while you are
operating the card reader, remove the card from the card reader
and recharge the NiCd batteries in the HP-41CX (or replace the
batteries if you are using size N alkaline batteries).

READING THE MAGNETIC CARDS

The CR1200B control software is contained on the 10 magnetic
cards supplied with your unit. To load the software, follow
the following steps.

1. Turn the HP-41CX off.

2. Attach the HP-82104A Card Reader to the HP-41CX. Port #4
   must be empty (protective port cover removed), as the Card
   Reader connects to this port.

3. Turn the HP-41CX on.

4. Insert Track #0 of the first program card (marked "0") into
   the card reader slot on the right side of the card reader.
   After the Track #0 is read, the number "0" will be in the
   display.
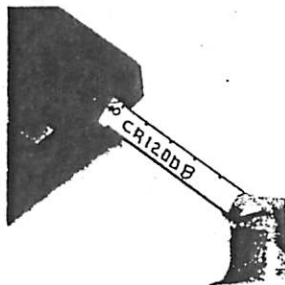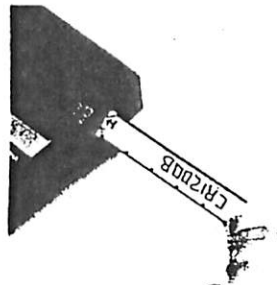
INSERTING TRACK #0   INSERTING TRACK #1

MAGNETIC CARD (ONE OF TEN)

5. Turn the magnetic card around and insert Track #1.

NOTE: If the HP-41CX display indicates "NO ROOM" (unlikely), you will need to clear the HP-41CX memory and start over at step #4. To clear the memory, turn the HP-41CX off. While pushing the back-arrow key down (key located directly above the number "9" key), turn the HP-41CX on and then release the back-arrow key. You might have to try this several times. Upon successfully clearing the memory, the display will indicate "MEMORY LOST".Return to step #4.

6. The HP-41CX will prompt you for the remaining tracks with the following prompt.

                    RDY kk OF nn

        Where: kk is the lowest-numbered track not yet read
               nn is the last track of the CR1200B software

For example, after Track 1 is read, the HP-41CX display will indicate:
                    RDY 02 OF 18

This means that the Card Reader is ready for Track #2, and the last track is Track #18.

7. Insert the remaining cards until all of the tracks have been read (total of 19 tracks; 0-18). TRACK 0 MUST BE LOADED FIRST. However, after track 0 has been read,the remaining cards may be inserted in any order you wish. The HP-41CX knows which tracks have been read and prompts you for the lowest-numbered track not yet read. Regardless of the order the remaining cards are read, the control software is placed in the proper order in the HP-41CX memory. After the last track is read (Track #18), the HP-41CX will display "WORKING", followed in a few seconds by "0".

8. The CR1200B control software is now loaded into the HP-41CX memory. Once the software has been loaded, it remains in the HP-41CX memory until the batteries are depleted or the user resets the memory. The expected lifetime of alkaline batteries is approximately 100 hours of CR1200B use. If you prefer, NiCd batteries can be used . If you use NiCd batteries, it is recommended that the charger remain connected as the lifetime of NiCd batteries is less than that of alkaline batteries.

NOTE: Should a reading error occur, e.g.,"CHECKSUM ERR", or "MALFUNCTION" , try reading the card again. Unless the magnetic card has been subjected to severe punishment, the card will correctly read on the second or third try.

TROUBLE SHOOTING

1. HP41CX does not respond to key commands, e.g., "set","edit", etc.

    a) HP41CX is not in" USER" mode
    b) CR1200B software is not loaded
    c) Batteries are completely discharged

2. HP41CX display indicates "NO HPIL"

    a) 82160A HPIL interface module is not inserted into the HP41CX port.
    b) 82160A HPIL interface module switch is in the "disable" position. Switch must be in "enable" position (move switch towards cable end of the 82160A module).

3. HP41CX display indicates "POWER FAULT" upon initiating the "run", "halt", or "man" command.

    a) CR1200B main power is OFF.
    b) 82160A HPIL cables are not connected to the CR1200B.
    c) CR1200B fuse is blown. Replace with a 1.5 A 250 volt SLO-BLO fuse. In the event of an etch cell short circuit,this fuse will prevent damage to the cell or CR1200B.

4. HP41CX display and keys are locked out, i.e., HP41CX does not respond to commands and will not turn off.There are some unlikely situations were the HP41CX will get "confused" and generate this lock-out situation, e.g., disconnecting the HP41CX from the CR1200B before turning the HP41CX off.

    a) Let the HP41CX rest for a few minutes. In most cases, the HP41CX will correct this problem by itself (internal time-out sequence).

5. System continuously creates FAULT conditions, and you are convinced that the etch chamber(s) is not leaking.

    a)The high voltage cable(s) is breaking down. The cables used in your system must be rated for AC high voltage. To check the CR1200B, remove the high voltage cable at the SHV connector located at the rear of the CR1200B, and confirm the CR1200B operates without generated a FAULT condition. If the CR1200B operates without the cable/etch chamber present, the fault is due to the cable and/or etch chamber. Repeat the test with only the cable connected (no etch chamber(s)). If the FAULT condition occurs, the problem is the cable.

SPECIFICATIONS

INPUT: 105-125 VAC, 60 Hz,   1 A RMS
           (OR OPTIONAL 210-250 VAC, 50 Hz ,0.5 A RMS)

OUTPUT: VOLTAGE   (RMS):   0 to 3500 volts
             SELECTION RESOLUTION: 0.025%
             ABSOLUTE ACCURACY:
                     0-2000 Hz   less than 2 %
                     above 2000 Hz less than 5 %

           FREQUENCY: 50 to 2500 Hz
             SELECTION RESOLUTION: 3% at 2500 Hz
             ABSOLUTE ACCURACY: +/- 0.05%

           LOAD: 1200 pF maximum capacitive load

           WAVEFORM - Sine wave. Less than 10% total
                      harmonic destortion

TEMPERATURE LIMITS: Operating: 0 to 40 deg. C.

REQUIRED EQUIPMENT

           CR1200B
           CONTROL SOFTWARE
           HP-41CX
           CARD READER
           HP-IL INTERFACE MODULE
           EXTENDED I/O MODULE
           RECHARGABLE BATTERIES/RECHARGER

Limited Warranty:

HOMANN-BELL warrants this product to be free from defects in
materials and construction for a period of 90 days from the
date of purchase. HOMANN-BELL will repair or replace, at our
option, any unit returned to our Factory Service Department.
This warranty does not apply if the unit has been subject to
misuse, fire, accident, or modification

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