

**OWNERS MANUAL**  
**SCANNER1**  
**COMPUSCAN<sup>™</sup> CP-2100**  
**by Bearcat<sup>®</sup>**

---

**A Scanning Receiver System designed to  
be driven by an  
IBM Personal Computer  
under PC DOS**



**Electra Company**  
**Division of Masco Corporation of Indiana**  
**300 East County Line Road**  
**Cumberland, IN 46229**

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This manual describes the installation and operation of the CompuScan CP-2100 in conjunction with the IBM Personal Computer.

## LIST OF MATERIALS

All materials required to implement the CP-2100 system are contained in two boxes. The larger box labelled CompuScan CP-2100 contains six items shown in Figure 1, below:

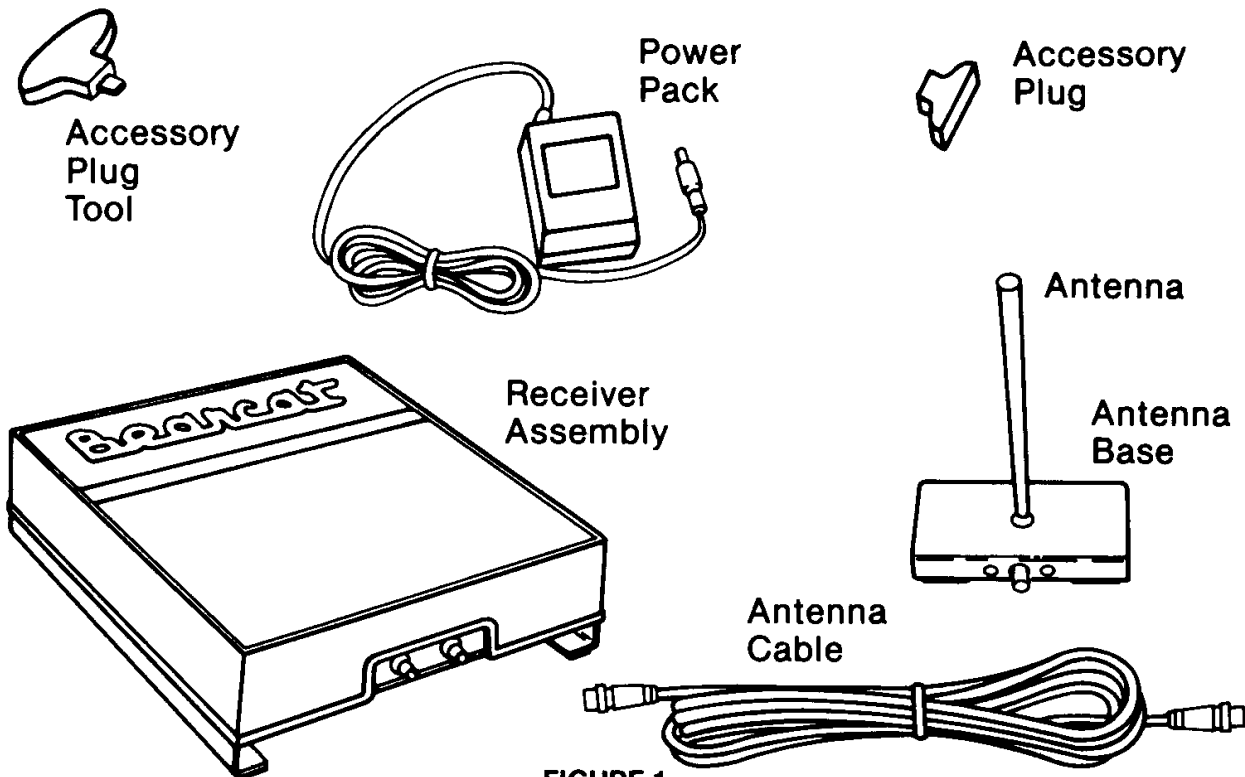


FIGURE 1

The smaller box labelled CP 2106 contains the items as shown in Figure 2, below:

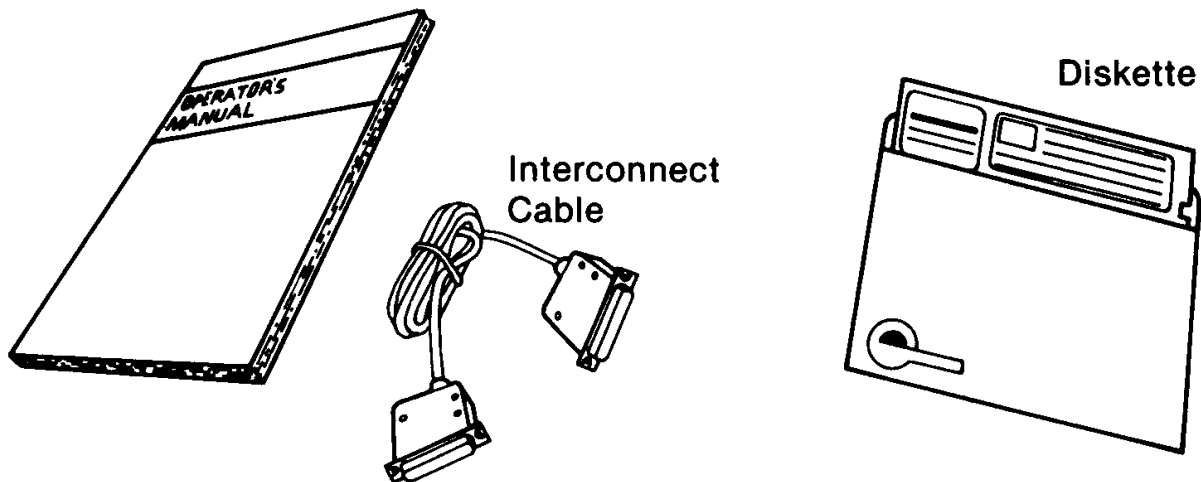


FIGURE 2

It is necessary to have both of these boxes in order to proceed from this point. Both the CompuScan and the CP 2106 may be purchased from a nearby Bearcat(R) CompuScan dealer. If any of the equipment is missing from the containers, return the unused container to the place of purchase, and request a substitute.

## SYSTEM REQUIREMENTS

The CP-2100 and the CP 2106 adaptor kit together require only a source of 115 VAC, 60 Hz, and a fully functional IBM Personal Computer, with a single disk drive, 128K of RAM (user) memory, the PC DOS operating system, and an Asynchronous Communications Card. A Color Adapter Card may optionally be used; 40 column color is supported, so that an ordinary television may be used.

All other software, and hardware are provided.

## SYSTEM SPECIFICATIONS

|                              |  | <b>Extended Range</b> |
|------------------------------|--|-----------------------|
| <b>Frequency Coverage:</b>   | 30- 50 MHz Low Band                                      | 29- 54 MHz            |
|                              | 118-136 MHz Aircraft (AM)                                |                       |
|                              | 144-148 MHz 2-Meter Amateur                              | 136-149 MHz           |
|                              | 148-174 MHz High Band                                    |                       |
|                              | 421-450 MHz 70-CM. Amateur                               |                       |
|                              | 450-470 MHz UHF Band                                     |                       |
|                              | 470-512 MHz UUHF-T Band                                  |                       |
| <b>RF Sensitivity:</b>       | 30- 50 MHz 0.4 uV  |                       |
|                              | 118-136 MHz 1.0 uV *(AM)                                 |                       |
|                              | 144-148 MHz 0.4 uV                                       |                       |
|                              | 148-174 MHz 0.4 uV                                       | Sensitivity may       |
|                              | 421-450 MHz 0.8 uV                                       | be slightly degraded  |
|                              | 450-470 MHz 0.8 uV                                       | in Extended Range     |
|                              | 470-512 MHz 0.8 uV( $\pm$ 3 KHz deviation                | 12 dB                 |
|                              | SINAD)   |                       |
|                              | *1.0 uV for 10 dB SINAD, 60% MOD.                        |                       |
| <b>Squelch Sensitivity:</b>  | Equal or better than specified under RF Sensitivity.     |                       |
| <b>IF Selectivity:</b>       | -60 dB @ $\pm$ 25 KHz                                    |                       |
| <b>Audio Output:</b>         | 1.0 Watt RMS, 10% THD (max.) into internal speaker       |                       |
|                              | 2 Watts RMS, 10% THD (max.) into 8 ohms external speaker |                       |
| <b>Front Panel Controls:</b> | Volume (on/off)  |                       |
|                              | Squelch (Auto Squelch)                                   |                       |
| <b>Base (bottom)</b>         | External Power   |                       |
| <b>Connectors:</b>           | External Antenna   |                       |
|                              | RS-232C (DCE) Interface (25 pin)                         |                       |
|                              | Accessory (24 pin)                                       |                       |
| <b>Size:</b>                 | 9-1/2" W x 2-13/16" H x 10-3/16" D                       |                       |

\*Specifications are typical and subject to change without notice

|                                  |  |
|----------------------------------|--|
| <b>Weight:</b>                   | 2 lbs. 10 ozs.   |
| <b>Cabinet:</b>                  | Texturized Polypropylene with anodized aluminum base   |
| <b>Power:</b>                    | DC 11.5-18.0 volts, 800 mA. max.<br>AC adaptor model AD203: 105-130 VAC 16W. max.  |
| <b>Auxiliary Outputs:</b>        | Four outputs are provided for user control on the accessory connector.   |
| <b>Output No.1</b>               | (Relay isolated-pins 7 and 20)<br>Normally open relay will close when tuned to a channel having AUX 1 programmed, and when a signal is present on that channel.<br><b>RELAY CONTACT RATING</b><br>Power-10VA<br>Current-To 1 amp<br>Voltage--150VDC, 250 VAC |
| <b>Output No.2</b>               | (Pin 21) provides 200 mA. current sink capacity (to ground-pin 17) Normally open output (open collector) is on (low) when tuned to a channel having AUX 1 programmed and when a signal is present on that channel.   |
| <b>Output No.3</b>               | (Pin 22) provides 200 mA. current sink capacity (to ground-pin 17) Output is on (low) when on a channel with AUX.3 programmed  |
| <b>Output No.4</b>               | (Pin 24) provides 200 mA. current sink capacity (to ground-pin 17) Output is on (low) when on a channel with AUX.4 programmed  |
| <b>Scan Speed:</b>               | 12 channels per second nominal during any bank, 1 second to change banks, 1 second additional at bank change when priority is programmed   |
| <b>Channel Capacity:</b>         | 200 (10 banks, 20 channels each)   |
| <b>Memo Capacity:</b>            | 4 lines, 30 characters each for each of the 200 channels   |
| <b>Priority:</b>                 | 3 selectable channels  |
| <b>Direct Channel Selection:</b> | Manual Mode  |
| <b>Look Ahead Frequency:</b>     | Scan Mode. Look ahead frequency processing (patent pending) for faster scan  |
| <b>Delay:</b>                    | Independently (on/off) for each channel. Two second nominal delay following loss of signal in scan.  |
| <b>Lockout:</b>                  | Independently programmable (on/off) for each channel   |
| <b>Search:</b>                   | Search within any band.  |
| <b>Manual Search:</b>            | Step or slew receive frequency.  |

**Search Direction:** Up/down in frequency.  
**Hold/Halt:** Scan and Search Modes.  
**Continue:** Scan and Search Modes.

## COMMUNICATIONS

|               | Used with the<br>IBM PC | CP-2100 options provided   |
|---------------|-------------------------|----------------------------|
| <b>Baud</b>   | 2400                    | 100-9600 (see Section 8)   |
| <b>Parity</b> | Off                     | Odd or Off (see Section 8) |
| <b>Signal</b> | RS-232C                 | RS-232C                    |
| <b>Level</b>  | -3 to +12 volts         | + 8 volts<br>-5 volts      |

|                             | <b>Pins</b> | <b>Signal</b> | <b>Pins</b> | <b>Signal</b> |
|-----------------------------|-------------|---------------|-------------|---------------|
| <b>RS-232<br/>Connector</b> | 1,7         | Ground        | 1,7         | Ground        |
|                             | 2           | TD (AA)       | 2           | TD (AA)       |
|                             | 3           | RD (BB)       | 3           | RD (BB)       |
|                             | 4           | RTS           | 4           | RTS           |
|                             | 5           | CTS           | 5           | CTS           |
|                             | 20          | DTR           | 20          | DTR           |

## UNDERWRITERS LABORATORY

The AC adaptor is tested and listed by U.L. The CP-2100 receiver assembly is designed for commercial or home use.

## FEDERAL COMMUNICATIONS COMMISSIONS

The CP-2100 complies with all applicable FCC regulations and is certified by them to that effect. The following is included to comply with those regulations.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television equipment, which can be determined by turning the equipment ON and OFF, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

“How to Identify and Resolve Radio-TV Interference Problems”

This booklet is available from the U.S. Government Printing Office, Washington, OC20402 Stock No. 004-000-00345-4.

## HARDWARE

To begin with, turn OFF the IBM PC, and store any disks and/or other items that are not related to the CompuScan System.

## LOCAL OR REMOTE SPEAKER OPTION

The CompuScan receiver is equipped with an internal speaker and volume and squelch controls which render it ready for use. There is a choice, however, in that these may be disabled in favor of using external speaker and external volume and squelch controls. Use of external speaker and controls makes it possible to store the receiver in an "out of sight" location if the user is short of space or simply chooses to have only speaker and controls visible. Hook-up for the external speaker is covered in Section 8. For now, it is assumed that the internal speaker systems will be used.

## PREPARING THE CompuScan RECEIVER

Take the CompuScan Receiver Assembly from its wrapping and place it upside down on a work space.

## INTERCONNECTIONS

Install the system interconnect cable. This cable connects to the jack on the IBM Asynchronous Card's RS-232 port. The connectors are arranged so that they mate in only one way. The switches must be pushed fully in one direction or the other; if this is not done, the switches will not make good contact, and the CP-2100 will NOT function. Rock the switches until a solid full contact is felt.

Now

If your CP-2100 does NOT have a red power-ON light between the volume and squelch controls on the front of the unit:

Press rocker (DIP) switches labelled 2 and 4 (two and four) down so that the labelled end of the switch is flush with the switch housing.

OR

If your CP-2100 has a red power-ON light:

Press rocker (DIP) switches labelled 1 and 3 (one and three) down so that the labelled end of the switch is flush with the switch housing.

Make sure that the CompuScan accessory connector is securely in place because the connector provides jumpers to needed to make the internal speaker and controls effective. No accessory plug means no audio out of the Receiver. Connect one end of the coaxial cable to the BNC jack on the underside of the CompuScan.

Finally, connect the power plug to the round receptacle on the CompuScan but do not as yet connect the AC adaptor to a wall receptacle.

Place the CompuScan Receiver Assembly right side up near to the IBM PC so that the controls are handy and route the cables in the most convenient manner. Screw the telescoping antenna into its base and connect the other end of the coaxial cable to the BNC receptacle on the antenna base.

### ANTENNA LOCATION

Take care in choosing a location for the antenna. Even though the IBM PC's housing has been treated to limit transmission of spurious radio signals and FCC requirements are satisfied in this regard, the CompuScan, being a very sensitive receiver, will detect even the smallest amount of radiation emitted by the IBM PC. To minimize this possibility, place the antenna as far from the IBM PC as is convenient. It is wise in general to locate the antenna away from electrical equipment of any sort.

### POWER ON

Connect the CompuScan AC adaptor to a wall socket. Turn the volume control to about mid-range. Adjust the squelch control until the receiver becomes "UNMUTED" (speaker produces rushing noise.) Now readjust the volume for a comfortable listening level and then readjust squelch counterclockwise until the rushing noise just stops. Alternately, the CompuScan Autosquelch feature can be used. Simply rotate the squelch control fully counterclockwise until it "clicks" into the Autosquelch position. Autosquelch provides a good compromise setting for receiver scan sensitivity and immunity to spurious signals. For absolute maximum sensitivity set squelch manually as described earlier. At this point, the radio is ready to operate. It is best NOT to touch the controls on the CompuScan until specifically recommended by this manual. Be sure NOT to interrupt AC power to the CompuScan by either unplugging the CompuScan AC adaptor, or turning the volume control to the OFF position, as this will cause its microprocessor to reinitialize, losing all prior setup commands, and requiring you to repeat them.

Before scanning, it must be mentioned that during the operation of the SCAN program, there may be pauses of up to several seconds for no apparent reason. This is caused by IBM's BASICA language reallocating its RAM memory (called garbage collection) and in no way will harm the general scanning process.

### PREPARING A WORKING DISKETTE

The diskette included in CP 2106 is intended to be a "master" diskette, and a copy of it needs to be made before proceeding. The copy of the diskette, with several programs on it, will be the "working" diskette.

First, format a diskette for PC DOS. The diskette needs to have PC DOS on it (it cannot be a "data" or "slave" diskette), and must also have the PC DOS "BASICA.COM" on it. Please refer to the DOS manual supplied with the IBM PC for answers to questions on how to do this. Without these programs on the diskette, the program will not function correctly. Copy the programs from the CompuScan onto the working diskette by typing the following (assuming the working disk is in Drive A, and the CompuScan Master diskette is in Drive B:

```
A>[COPY B:*. * A:]
```

The following files will be copied to the diskette in Drive A, although not necessarily in this order:

```
AUTOEXEC.BAT
```

SCANNER1.BAS  
CHAN.DAT  
PRIOR.DAT  
COUNT.DAT  
SEARCH.DAT  
SSTORE.DAT  
BANKS.DAT  
MEMO.DAT

The following programs should also be on the diskette:

COMMAND.COM  
BASICA.COM

After verifying that the files are correct, place the MASTER diskette in a safe storage place. The scanning program is now ready to begin.

## HOW TO BEGIN

If the preparations in Section 2 have been made, CompuScan is now ready to begin.

To start, place the working diskette into Drive A, turn power on to any monitor hooked up to the IBM PC, then the IBM PC. If the IBM PC and monitor are already powered up, type:

[CTRL-ALT-DEL]

simultaneously.

If the IBM PC is NOT already powered ON, insert the previously mentioned WORKING diskette, turn ON the power, and the SCAN program should automatically begin to load.

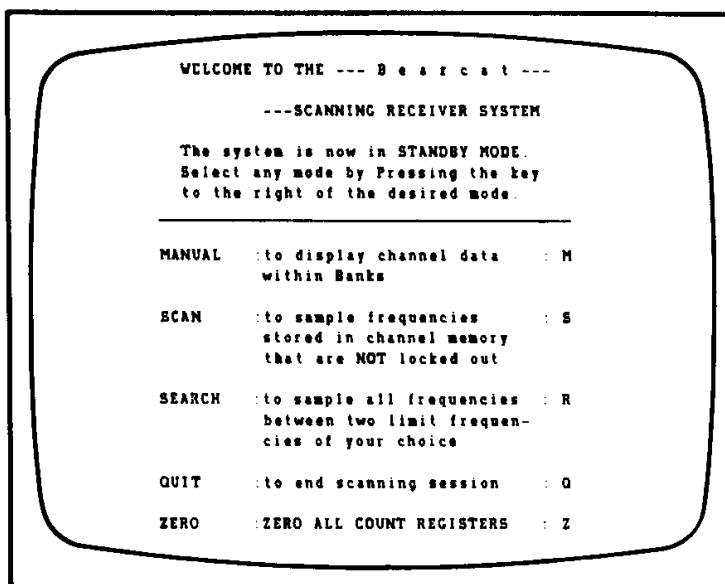


FIGURE 3

**STANDBY MODE**

CompuScan first loads channel data from diskette into a memory array for faster access later. This takes about 1-1/2 minutes. With NO action from the user, the system then displays the main selection screen, and enters STANDBY mode.

STANDBY Mode affords selection of five modes, and a means to exit the system. The selections, MANUAL, SCAN, SEARCH and QUIT modes are described in the following sections.

The fifth mode, ZERO, is selectable at this point. CompuScan automatically counts how many times a signal was present on a frequency during Scan Mode, and displays a running total on the Channel Data screen. By selecting ZERO from Standby Mode, you may zero out all counts for all channels. If, however, you wish to zero out only certain channel counts, you should do so from the Channel Data screen as will be described later. ZERO from STANDBY zeros out all channel counts.

**MANUAL MODE**

**A Note to the user:** You may use either capital, or lower case letters. CompuScan recognizes both forms, and gives you the option of whichever is the most convenient for you. Also, there is no need to press "RET" unless the system asks you to do so.

While in STANDBY Mode, select MANUAL by pressing [M]. The screen will fill with data. CompuScan provides 200 memory channels into which necessary and useful information can be stored. These channels are arranged in ten banks of 20 channels. The user may choose any bank to display, but CompuScan displays them as follows: (1) Bank 1, if the user has NOT yet viewed any other bank; (2) the first selected bank for Scan Mode; (3) the current bank being scanned if [M] is pressed from the Channel Data screen. Data for 20 channels completely fills the screen. Any other bank may be selected with a key stroke, as will be described later.

**GENERAL SCANNER OPERATION**

Before channel data is entered, a few words on the scanning operation might be helpful.

CompuScan will sequence through all or any combinations of frequencies loaded into channel memory. The sequence will always be ascending numerical order of channels. One complete pass through all selected banks and channels is referred to as Scan Sequence. The user controls which channels will be included in the scan sequence by selecting any combination of banks upon entering Scan Mode and by use of the LOCKOUT feature provided in Manual Mode. Both of these procedures will be described in detail later. For now it is important for the new user to give some thought to how the considerable amount of information that the CompuScan affords should be organized for best results. The most convenient procedure for most users is simply to load radio stations of the like character into the same bank, i.e., emergency related stations- Bank 1; city services- Bank 2; aircraft-

Bank-3; etc. Whatever arrangement is chosen, it is now time to start loading channel memory.

**INSPECT CHANNEL MEMORY**

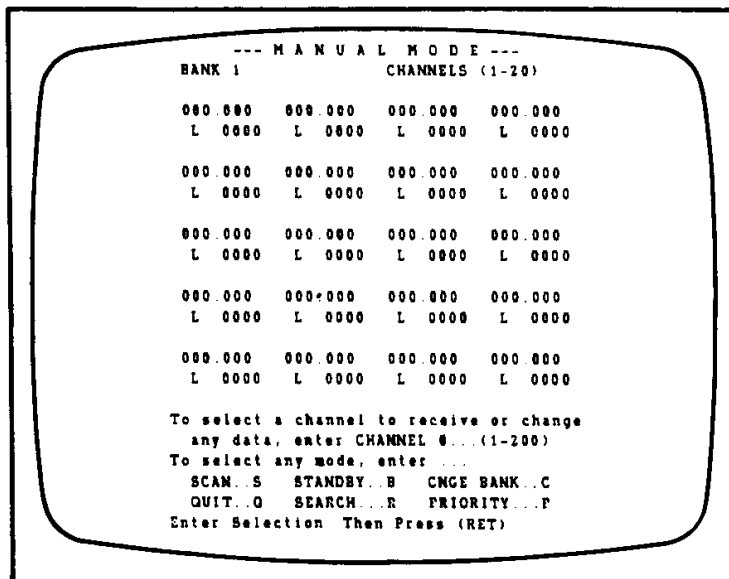
Referring to the Manual Mode screen (reached by pressing [M] from STANDBY Mode), five rows and four columns of data can be seen. Each consists of frequencies printed above symbols (Figure 4). All frequencies begin as 000.0000 for the first time the system is turned ON. Because so much is being displayed, the user is expected to remember that memory channel data blocks are numbered from left to right, top to bottom. For instance, count the blocks in the top row (1 thru 4) the second row (5 thru 8) and the bottom row (17 thru 20). This process is the same for each bank.

Information required immediately for scanning is presented in each channel data block as shown below.

460.1250    Frequency in MHz.  
1LD 0101    Priority, Lockout Flag, Delay Flag, Auxiliary bits  
            ┌── Bit 1  
            ├── Bit 2  
            ├── Bit 3  
            └── Bit 4

**LOADING CHANNEL MEMORY**

At this point the receiver should be muted by action of CompuScan, not by operation of the squelch control. The system is waiting for a command from the list provided at the bottom of the screen. To select Channel 1 for entering scan information, enter [1] and press [enter]



**FIGURE 4**

The screen will now change to the Channel Data screen and present all previously entered data for memory Channel 1, a sample of which is shown in Figure 5. When you select a channel with a previously programmed frequency, the signal on that frequency will be heard.

To load Channel 1 with a frequency (experiment with the NOAA weather frequency) press [1] to select Item Number 1-Frequency; following the instructions at the bottom of the screen, enter [165.55] and press [RET]. The frequency will automatically change to 162.55, Count will change to zero, and you will hear the weather broadcast.

Note: The frequencies chosen must be entered within certain Band Limits; if others are chosen, CompuScan will show that an error has been made, and the data will have to be re-entered. The frequency ranges are:

|      |             |
|------|-------------|
| Low  | 29- 54      |
| Air  | 118-135.995 |
| High | 136-174     |
| UHF  | 421-512     |

## LOCKOUT

The LOCKOUT feature simply provides means to skip a channel in a Scan sequence. If Lockout is programmed, the channel will NOT be included in the Scan. This is helpful when a station is needed only at certain times, or when a specific scanning need is best satisfied by scanning only a small group of stations. To program Lockout into Channel 1, press [2]. Note that each time Item Number 2 is pressed, the legend next to LOCKOUT switches between YES and NO. This is called toggling. When the legend reads YES proceed to the next step. Because the weather channel is always active, it is loaded into memory for easy access but

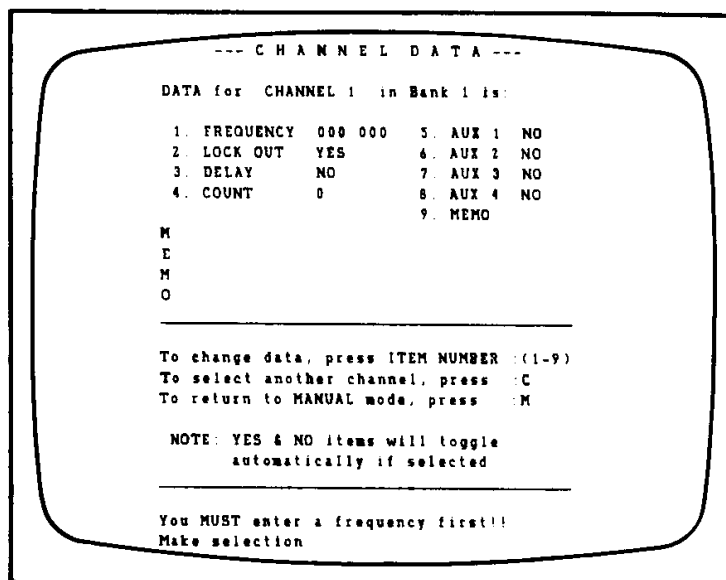


FIGURE 5

Locked Out of the Scan sequence. If it were NOT Locked Out, CompuScan would broadcast the weather message endlessly.

## DELAY

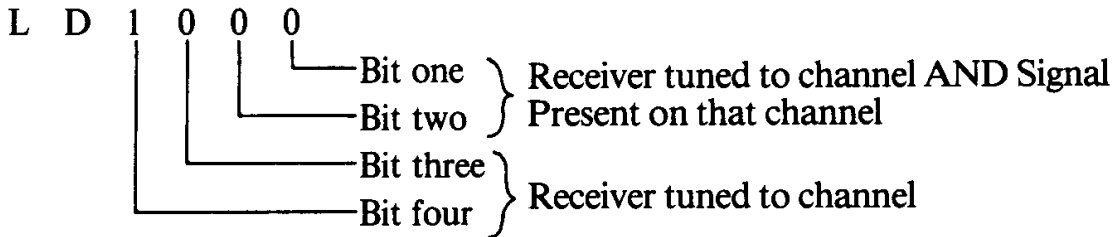
The DELAY feature, when programmed, causes the receiver to remain tuned to a given channel in Scan Mode about two seconds following loss of signal on that channel. If the delay is NOT selected, CompuScan will immediately move to the next channel in the scan sequence when a signal is lost. Delay is useful when the nature of broadcasts on a given channel is one transmission followed by a response (second transmission) on the same frequency. By remaining on the same frequency, the response is likely to be heard. Of course, delay has NO application to the weather channel, so press [3] until NO appears next to delay.

## COUNT

As mentioned earlier, CompuScan keeps a count of how many times a frequency was found to have a signal present during a Scan sequence. To Zero out this count, press [4]. The system asks for a Y(es) or N(o) answer. Press [Y] to zero the count, or press 'N' to do nothing.

## AUXILIARY BITS

Auxiliary bits refer to special control signals that will be present at the accessory jack on the bottom of the CompuScan receiver assembly depending on the status of the receiver. When an auxiliary bit is programmed for the "1" state, the corresponding output at the accessory jack will be true when the receiver status is as shown below. When an auxiliary bit is programmed to the "0" state, the corresponding output at the accessory jack will never be true.



Bit 1: Auxiliary output number one is true when the receiver is tuned to a channel for which auxiliary bit one is programmed (1), and a radio signal is present on that frequency. one is suitable for activating a tape recorder. It includes relay contacts capable of carrying tape recorder motor current but can be used for any purpose that is desired to occur when the channel(s) for which it is programmed have a signal present.

Bit 2: Bit two functions the same as bit one except the electronic nature of the signal is different. This signal, when true, sinks 250 mA maximum for controlling external devices, such as lights, or alarms.

Bits 3 and 4: These two control signals are true when the receiver is tuned to a channel in which they are programmed regardless of whether a signal is present.

They are effective in setting the environment in which the radio will operate when tuned to this channel. For instance, antennas can be selected with these outputs. These also sink 200 mA when true. Again, for our initial programming of weather into Channel 1, these auxiliary bits have little meaning so operate them for practice by pressing Item Numbers 5 thru 8 and leave them in any state. The only programming that is required for the scanning process is frequency, and lockout. All other controls are useful for more advanced scanner operations.

## MEMO

The MEMO feature enables information about a channel found active during Scan sequence to be displayed. The memo may be used to describe anything of importance to the user regarding the source of the broadcast, i.e., names, telephone numbers, codes, required procedures, etc. The memo is programmed by pressing Item Number "9" in Channel Data.

CompuScan responds by presenting the currently stored memo and text explaining the programming process. To change any line, press the line number to be changed, enter desired information, and press [RET]. Once the system receives a return, the line will immediately change to the new information. The other lines of the memo may be entered in the same way. When finished, press [E] to exit editing, and Channel Data will once again be displayed.

**IMPORTANT:** Memo size is 4 lines, 30 characters maximum per line.

You may at this time select other channels for programming, following the procedures outlined above, or return to Manual Mode by pressing [M].

**REMEMBER,** press [RET] only when CompuScan asks.

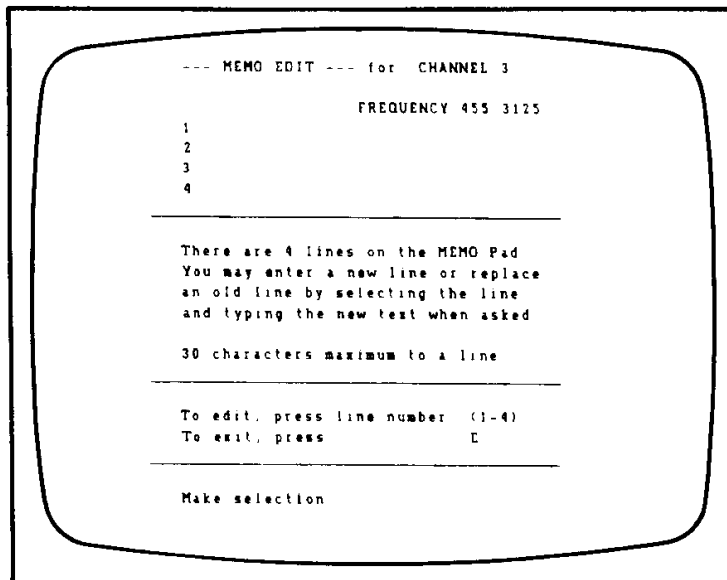


FIGURE 6

## SELECTING BANKS

Not more than a few channels need to be programmed for the scanner to become useful. Channels may be loaded a few at a time. However, to continue in a bank other than Bank 1, return to Manual Mode (press [M]). Then press [C][RET][X][RET] where X is the number of the bank to be viewed or changed. Then by repeating the procedures already described, as many channels as the user needs may be quickly loaded in the CompuScan channel memory.

## QUIT

To end a scanning session without worry of leaving files open, or destroying records, simply press [Q] from Standby or Manual Mode. Follow instructions to return to either of these two Modes.

## PRIORITY

The last feature involving programming is PRIORITY. Priority operation refers to causing CompuScan to continue monitoring up to three channels during scan or search modes, even if they are NOT included in the scan sequence, or if there is a signal present on any channel. For instance, the user maybe required to monitor one particular frequency at all times but monitoring weather occasionally, or scanning other frequencies on a non-interference basis would be helpful. The Priority feature makes this multipurpose scanning possible.

CompuScan Priority provides for selection of any 3 channels out of the entire channel memory for priority monitoring. Each channel selected for priority scan is called a Priority channel. CompuScan will sample priority channels at approximately 2 second intervals in Scan and Search Modes. If PRIORITY is selected, the priority channels are inserted into the Scan sequence. If Priority is selected and the user selects Search Mode, Priority channels are sampled during the Search process.

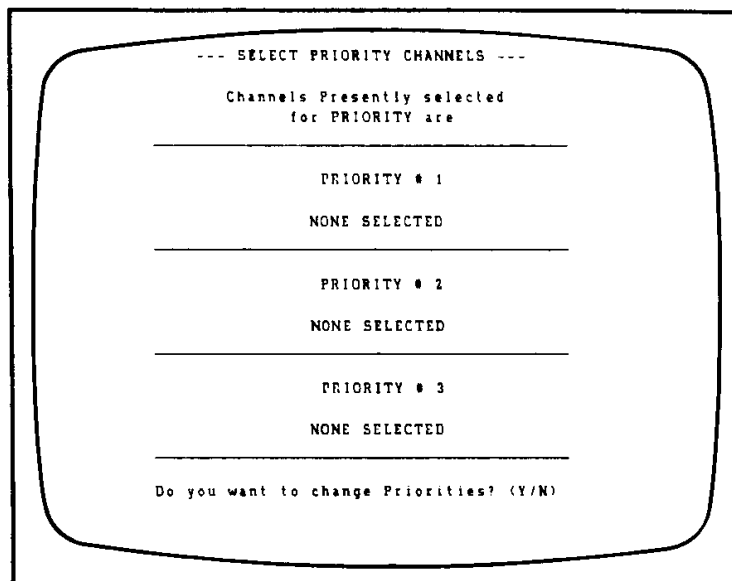


FIGURE 7

By entering Priority Selection Mode, the user automatically enables Priority sampling. If however, this is NOT desired, the option to disable priority is offered. If priority has been disabled, the user must return to the Priority selection Mode to re-start Priority Sampling.

If a signal becomes present on any channel during Scan or Search Modes, Priority sampling continues, so that if a signal also becomes present on a Priority channel, CompuScan will discontinue monitoring of the non-priority channel, and broadcast the Priority signal. Priority channels are sampled in sequence of priority so that Priority one takes precedence over Priority two, etc. If a signal is on any priority channel, it will NOT be interrupted.

Priority is easy to program. Press [P][RET] from Manual Mode. Present priority channels and instructions on how to change them will be displayed (Figure 7). Refer to the "Cook Book" instructions in the back of this manual for a complete description of options in programming Priority.

If help or assistance is needed, Section 5 contains summaries of programming commands, and specific examples.

## SCAN MODE

SCAN mode is the “business” mode of CompuScan. For those who are operating the system for the first time, these few words before entering SCAN mode may prevent “mental freeze-up” when the action begins.

## SCAN, BANK SELECT

Although Scan Mode may be entered from Manual Mode, the normal procedure is to press [S] from STANDBY. CompuScan responds by presenting text describing the current arrangement of channels, and banks, displaying the current list of banks that will be included in the Scan sequence, and asking, “Do you wish to change banks?” Press [N] for NO if the current list is satisfactory, or “Y” to change the banks. Again, toggling is put to use. If 1 is in the list, and you press [1][RET], the 1 in the list will disappear. If 1 is NOT on the list, press [1][RET] to add Bank 1 to the list. You may select as many, or all of the banks in this manner. When you have your choice of banks for SCAN, press [E][RET] to exit editing. CompuScan will now move to SCAN mode, if [Y] is pressed.

## SCAN

Scan speed is an important parameter of a scanning receiver system; the faster the scan rate, the higher the sampling rate on each channel, and the more intelligible the result. In order to produce a scan speed limited only by the receiver system (the fastest speed), CompuScan performs one complete pass to find the selected banks, and “NOT-locked-out” channels within those banks. Data for the scan is arranged in a way that minimizes time lost during the scan. The time required to do this depends, of course, on the number of channels that will be included in the scan, but typically runs about 15 seconds. During this time, CompuScan displays a heading which helps the user understand what is happening during the very dynamic SCAN Mode. The header simply identifies channel numbers along a line, as shown:

```
:1           :5           :10          :15
```

The colons are pointers, or index points for the status line which will appear below it when scanning starts. The number to the right of the colon identifies the channel number to associate with the symbol that will appear directly below the colon.

When scanning starts, a row of “L’s” and “\*’s” appears as shown:

```
:1           :5           :10          :15  
L * * * L * * L L *
```

As may be expected, the \* represents that a channel has been sampled; the L represents that the channel was skipped because it was locked out. Where the scan line is at any time, is exactly where the scanner is in the Scan sequence. For instance, in the above diagram, Channel 10 has just been sampled.

Note that, if in a bank, the last several (highest numbered) channels are all locked out, the Status Line will NOT display the last of the locked out channels, but will instead, skip them and go to the next bank in the scan sequence. This simply helps speed the scan.



- R To select SEARCH mode  
Pressing [R] at any time, will cause CompuScan to go to the Search Set Up screen.

## SCAN-SIGNAL PRESENT

IF, while scanning, CompuScan determines that a radio signal is present, the screen changes to display the channel number, the radio frequency, and most importantly, the memo programmed for the active channel (Figure 9).

The auxiliary bits, if programmed, produce signals at the accessory jack, and the same list of keyboard options is presented. Of course, the receiver will become UNMUTED, so that the station will be heard. When the radio transmission ends, CompuScan will automatically resume scanning.

## SEARCH MODE

The SEARCH function is a process for tuning the receiver across a band of frequencies, the same way one would dial a manually tuned receiver. The difference is, that CompuScan does it automatically while also providing manual controls.

## SEARCH MODE SET UP

The Search Mode option is provided from most CompuScan screens, but would normally be entered by pressing [R] while in Standby Mode. Given the R command, the screen displays all of the search parameters stored from the previous search operation (Figure 10). If desired, the user may resume searching from the exact point that the previous operation was ended by simply pressing [G] for go; but we will instead demonstrate the complete setup process. Let's assume it is desired to search (tune) across the often active frequency range of 460.0 MHz to 461.0 MHz. Notice from the list of band limits given on the screen that these two

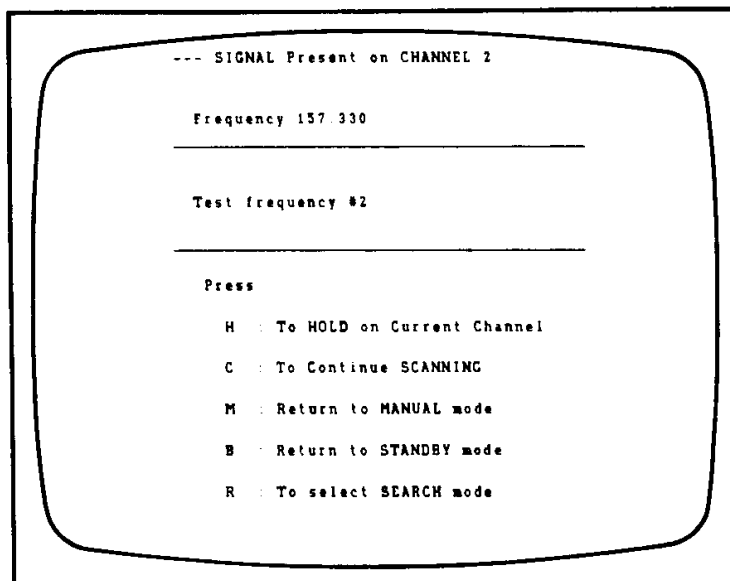


FIGURE 9

frequencies lie within the UHF range, so they are valid upper and lower limit frequencies for CompuScan. If an out-of-band frequency or limit frequencies that are NOT in the same band are entered, an error message will be shown when G is pressed and the user will be prompted to enter another frequency.

Press [U] for Upper. Enter [461][RET] to load the upper limit frequency.

Press [L] for Lower. Enter [460][RET] to load the lower limit frequency.

Notice that 460.000 and 461.000 are now shown as the limit frequencies, and are displayed in yellow on color monitors.

Nothing further is required to start a search operation but two additional options are provided. If it is desired to tune in descending order of frequencies (highest to lowest), press [D] until DOWN is next to "Present search direction is". The D key operates as a toggle switch changing the direction of search each time it is pressed.

The second option allows entering a Start Frequency which must be within the two limit frequencies. If it is NOT set to the lower limit already, CompuScan will change it to the lower limit when the G is pressed, and searching will begin in the direction specified. So it is NOT necessary to load a Start Frequency except to satisfy the user's needs.

## SEARCH

Having loaded two valid frequencies (460.000 and 461.000), the system is ready to Search.

Press [G] and go and watch the screen change to track the Search operation. Unless there was an error in entering limit frequencies, these frequencies are displayed. The frequency to which the receiver is presently tuned is shown between the upper and lower frequencies. Of course, the current frequency is changing in the selected direction (up or down) as the receiver tunes across the range. When

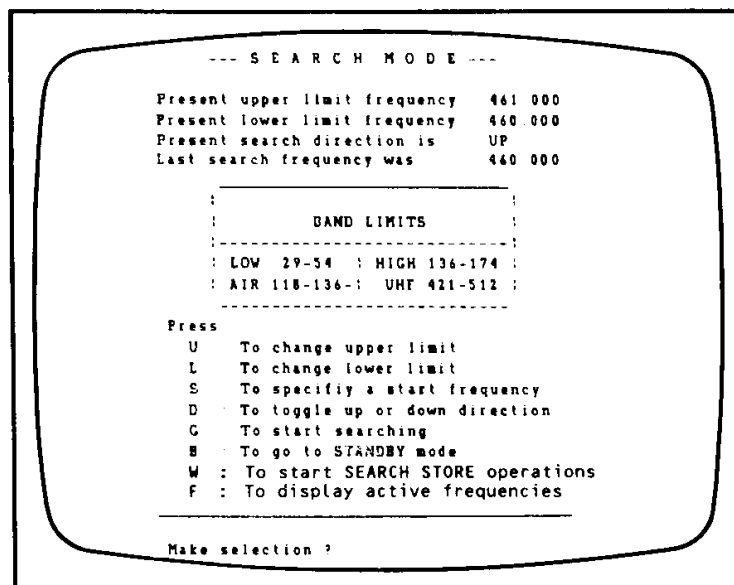


FIGURE 10

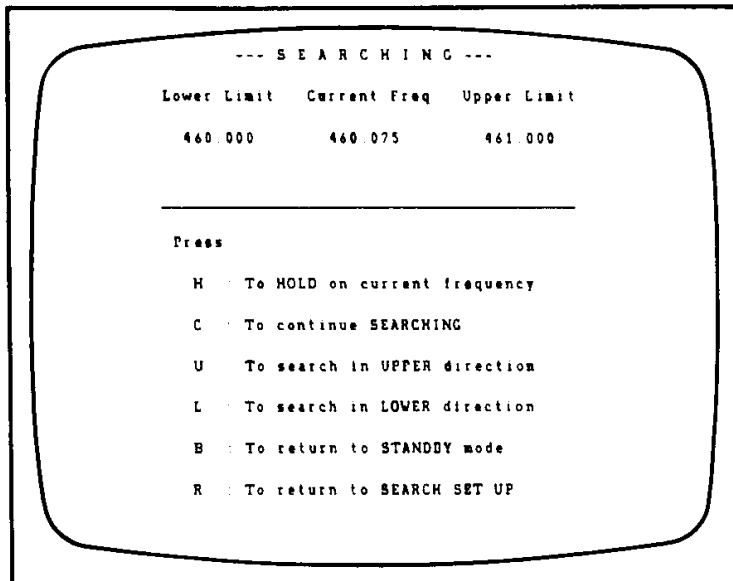
the limit frequency is reached, CompuScan starts over from the opposite limit.

The search process can be changed while in progress by simple keyboard inputs. For instance, the direction of search can be changed by pressing [U] or [L]; U for Up, L for Lower. To stop searching and remain tuned to the present frequency, press [H] for Hold. CompuScan will present a screen indicating HOLD mode and offering the same key options being described here. In Hold Mode, however, Pressing U or L causes the receiver to step up or down from the current frequency one step at a time. By this process, the user may manually tune the receiver within the specified search limits.

At any time you may press [B] to return to Standby Mode. It is also possible to return to Search Set Up Mode to change the Upper and Lower frequency limits in preparation for a new search operation in a different frequency range. To do so, simply press [R].

### **SEARCH STORE**

Search Store is a one-time program that allows a number of frequencies to be scanned between two limits. A count of the number of times that a frequency was found to have a signal present on it will be counted, and that information can be stored at the user's option. Press [W] to activate this feature.



**FIGURE 11**

## 5 EXAMPLES AND SUMMARY OF COMMANDS

This section provides “cook book” style summary instructions for operation of the CompuScan-IBM PC System. It is assumed that electrical and software preparations have been made according to sections presented earlier. Be sure that CompuScan is receiving wall power before beginning these procedures. For detailed description of operating procedures, refer to the appropriate parts in Sections 3 and 4 of this manual. The following notations are used to describe control procedures:

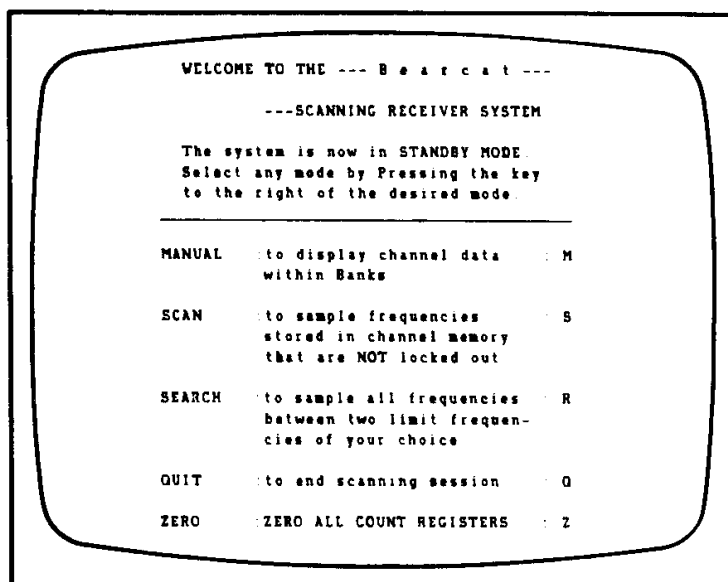
|       |   |
|-------|---|
| [X]   | Indicates a key stroke by the user  |
| [RET] | Return key stroke   |
| Press | Indicates a one-key action  |
| Enter | Indicates one or more keys are to be typed on the keyboard and always followed by a [RET] |

### POWER ON

Turn ON the Receiver, with the volume control mid-range

### SYSTEM STARTUP

1. Remove any diskettes from the IBM PC's disk drives
2. Insert the CompuScan diskette into Drive A.
3. Turn ON the IBM PC, and its monitor, if necessary
4. Press “M” to select Manual Mode
5. Press “S” to select Scan Mode
6. Press “R” to select Search Mode
7. Press “Q” to Quit
8. Press “Z” to Zero ALL counts



**DISPLAY MEMORY CHANNEL DATA**

Standard option procedure is to enter Manual Mode from Standby Mode but Manual Mode key option is provided in Scan Mode as well.

[M] Select Manual Mode and display channel memory for Bank 1

Optional:

[C][RET][X][RET]

where X is a different Bank to be changed. Skip this if Bank 1 is to monitored exclusively.

**EDIT CHANNEL DATA AND TUNE RECEIVER**

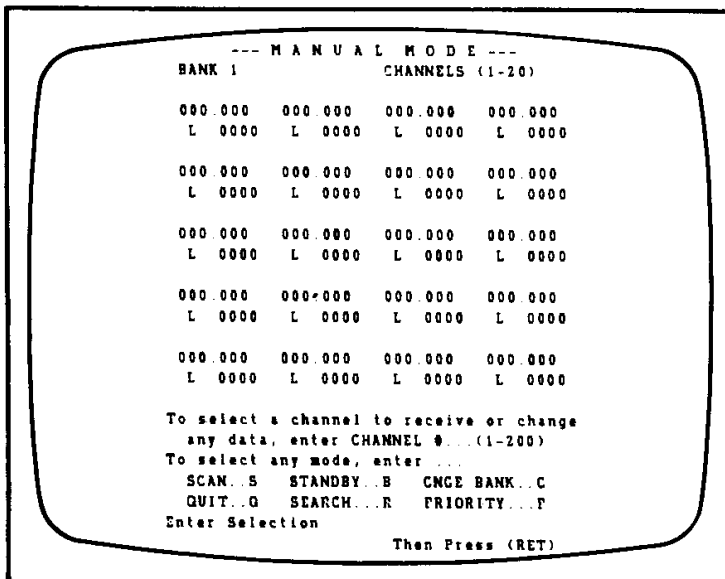
To tune receiver to a selected channel within the Bank being displayed now, and to display all programmed data for that channel:

[X][RET]

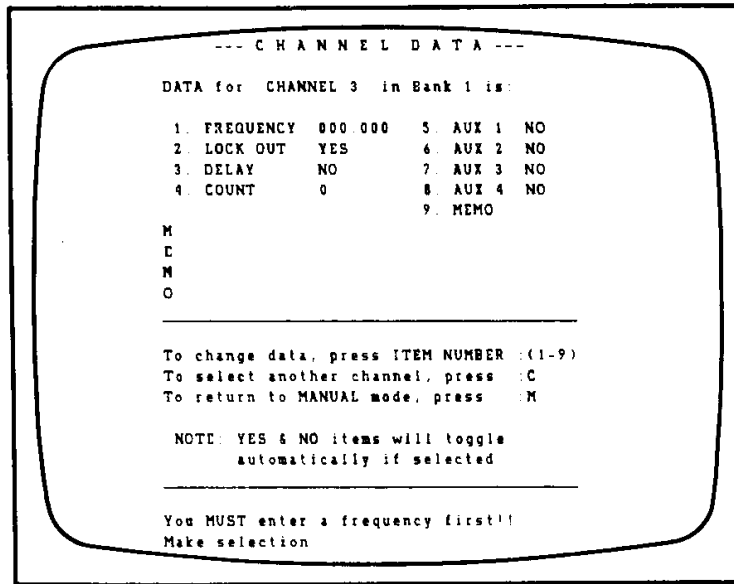
where X is the channel to be displayed.

Receiver audio will be present if radio transmission occurs on the frequency programmed into channel X.

DISPLAY



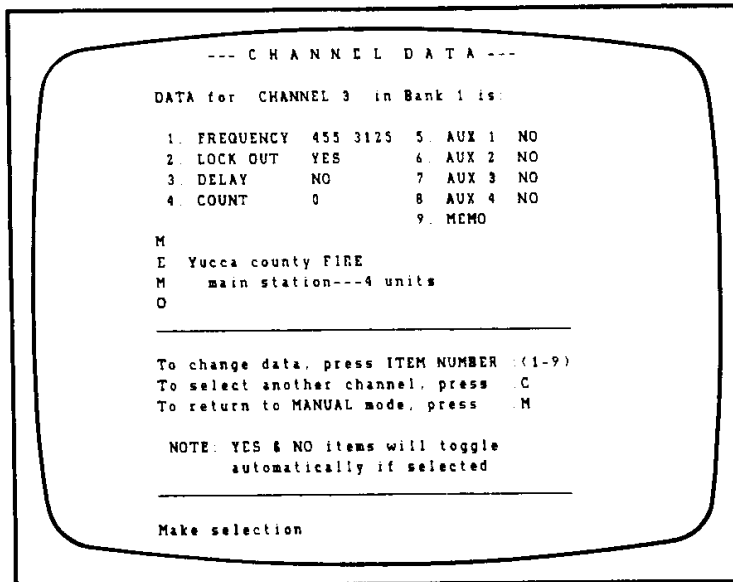
# 5 EXAMPLES AND SUMMARY OF COMMANDS



## CHANGE FREQUENCY

[1][XXX.XXXX][RET]

where XXX.XXXX is the desired frequency



**Note:** Frequencies to be loaded must fall within one of the following ranges (in MHz):

|      |             |
|------|-------------|
| Low  | 29-54       |
| Air  | 118-135.995 |
| High | 136-174     |
| UHF  | 421-512     |

For Low Band frequencies, if numbers to the right of the decimal point are to be entered, the decimal point is required; otherwise, in the other ranges, the decimal point is optional.

### **CHANGE LOCKOUT STATUS**

[2]

toggles legend next to LOCKOUT to either NO or YES

### **CHANGE DELAY STATUS**

[3]

toggles legend next to DELAY to either NO or YES

### **ZERO COUNT STATUS**

[4]

asks for [Y] to zero the count, or [N] to do nothing

### **CHANGE AUXILIARY BIT STATUS**

[X]

where X is 5, 6, 7, or 8 for AUX BITS 1 thru 4 respectively. These are toggle keys.

### **CHANGE MEMO STATUS**

[9]

select Memo Edit screen

[X][information for the line][RET]

where X is the line number to be edited

[E]

to exit edit mode, and return to Channel Data

Maximum of 30 characters per line.

### **INSPECT AND/OR CHANGE CHANNELS PROGRAMMED FOR PRIORITY**

If not in Manual Mode, follow instructions to return to Manual mode prior to proceeding.

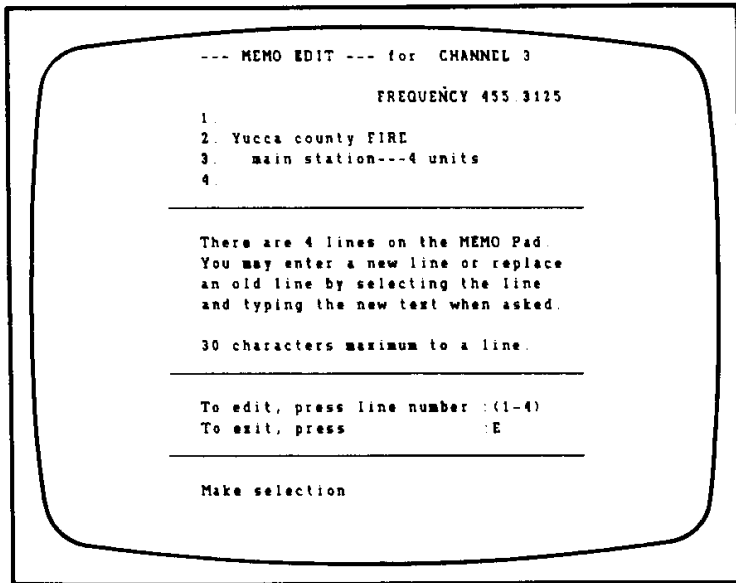
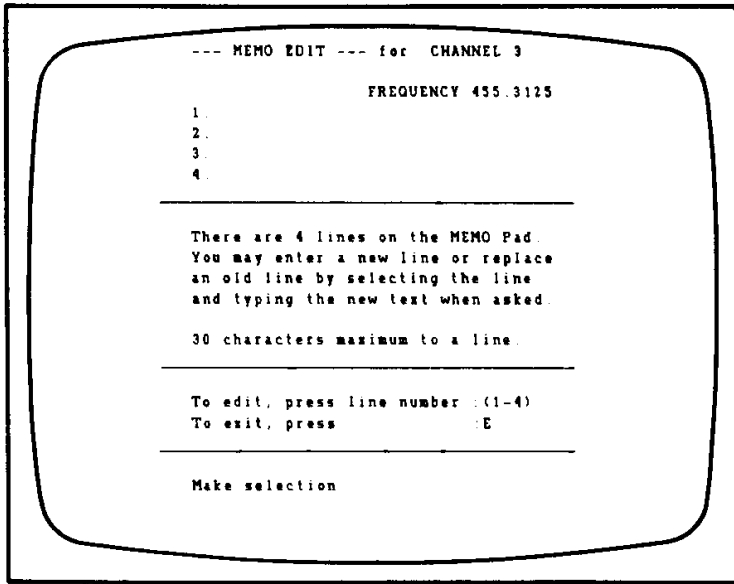
[P][RET]

to select Priority screen and enable Priority sampling when Priority channels have been selected

“Do you want to change Priorities? (Y/N)”

[Y]

# 5 EXAMPLES AND SUMMARY OF COMMANDS



to change Priority selections

“Press PRIORITY #(1-3) or E to end?”

[X]

where X is the Priority Number

“Enter CHANNEL #(1-200), 0 to Deselect, E to end (RET)”

[XXX][RET]

where XXX is the channel selected for that Priority number

or

[0][RET]

to change priority for that level

or

[E][RET]

to end Priority selection

“Do you want to change Priorities (Y/N)”

[N]

“DISABLE Priority Sampling? (Y/N)”

[Y]

To disable priority sampling and return to Standby Mode. Select [P] from Manual Mode to re-enable Priority sampling, when desired.

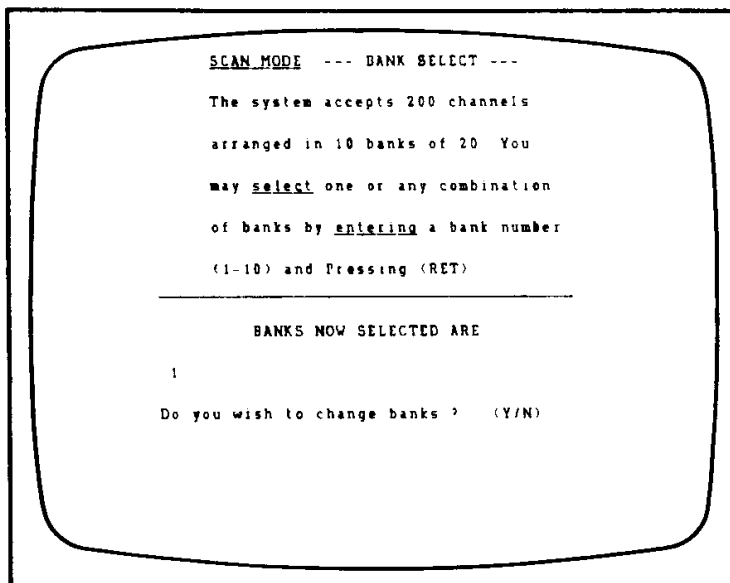
or

[N]

To return to Standby mode.

## SCAN MODE

From STANDBY or MANUAL Modes.



## 5 EXAMPLES AND SUMMARY OF COMMANDS

[S]

To select Scan Mode

“Do you wish to change banks (Y/N)”

[Y][X][RET][E]

To change banks, where X is the bank to change. Banks toggle if a bank is present and you enter the same bank number, it will be deleted from the list. Press “E” to end editing.

or

[N]

To leave the list as it is, and continue.

[G]

To go scanning.

[B]

To return to Standby Mode.

[M]

To return to Manual Mode.

When in Scan Mode the following options are present:

[H]

To hold on a given channel. The Memo is brought in from the disk and the holding screen is presented.

[C]

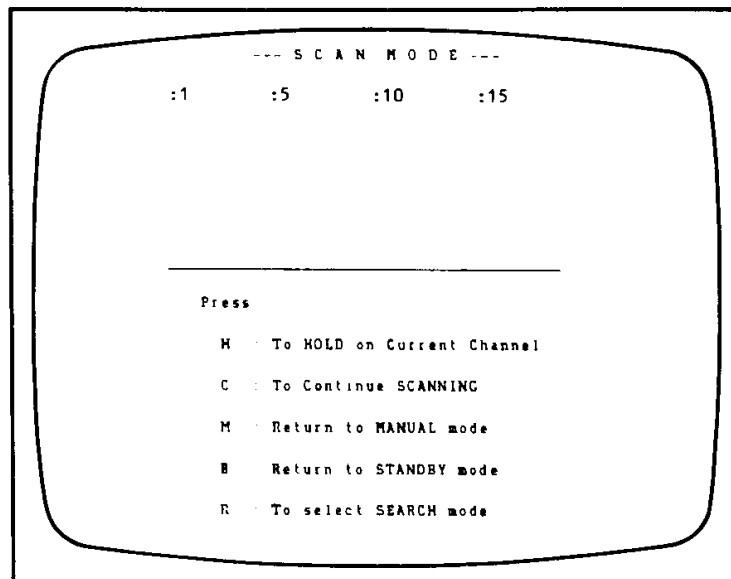
To Continue when a signal is present, or to continue from Hold.

[M]

To return to Manual Mode

[B]

To return to Standby Mode



[R]

To select Search Mode Set Up

When a signal is present during Scan sequencing, the Signal Present Screen appears, and the Memo is brought in from diskette.

The keyboard options are the same in Holding and Signal Present screens. Priority may appear in red if active channel is a Priority Channel.

## SEARCH MODE

From STANDBY, MANUAL, and SCAN Modes

[R]

To select Search Set Up.

[G]

To start searching with present parameters (Go).

[U][XXX.XXXX][RET]

To change Upper Limit frequency where XXX.XXXX is the new frequency.

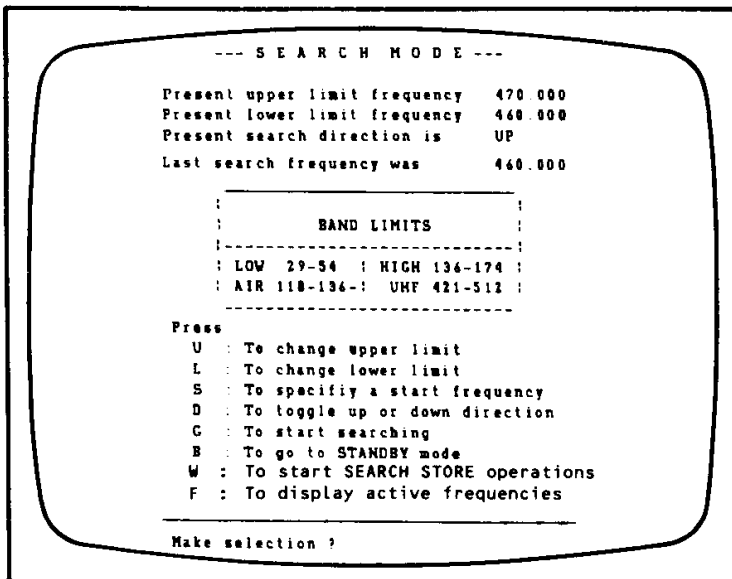
[L][XXX.XXXX][RET]

To change Lower Limit frequency where XXX.XXXX is the new frequency.

The Upper and Lower frequencies must be within the same band, which are shown in the Search Set Up screen.

Optional:

[S][XXX.XXXX][RET]



## 5 EXAMPLES AND SUMMARY OF COMMANDS

To select a starting frequency where XXX.XXXX is the new starting frequency. The frequency must be within the Upper and Lower limits selected.

[D]

To select the direction of search, Up or Down. This is a toggle switch.

[G]

Go. Start searching

or

[B]

To return to STANDBY Mode, and quit Search Mode.

[B][Q]

To return to STANDBY Mode, and exit the system by QUITTING.

The following keyboard options are present during SEARCH mode:

[H]

To Hold on a given frequency.

[C]

To Continue searching when a signal is present, or to continue from HOLD.

[U]

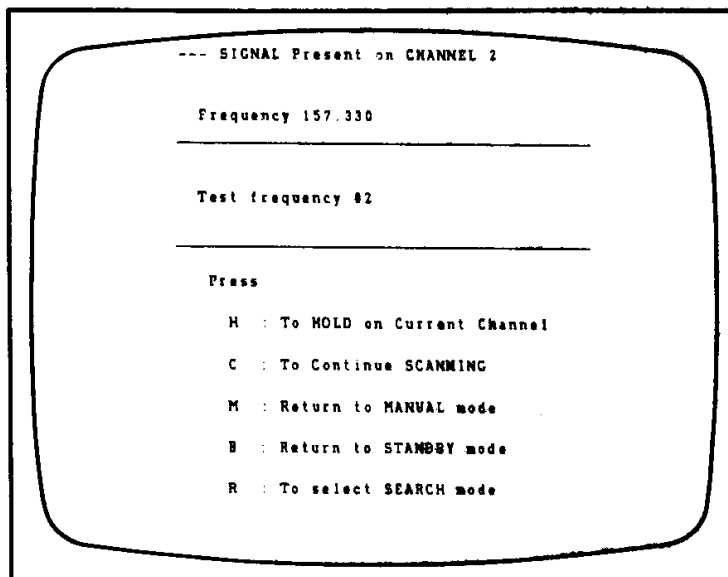
To change searching to Upper direction.

[L]

To change searching to Lower direction.

During HOLD, if U or L are pressed, the frequency will step up or down, one channel at a time.

[B]



To return to Standby Mode.

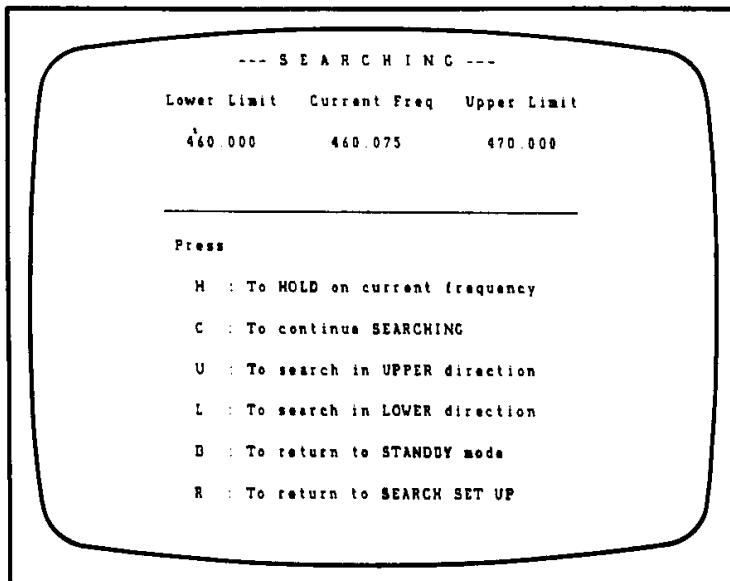
[R]

To return to Search Set Up.

[W]

To select SEARCH STORE Mode.

It may be good practice to press [H] when a signal becomes present to allow manual tuning of the signal for best reception, and time to record the exact frequency of the broadcast.



**The complete program listings in BASICA are available from the ELECTRA COMPANY.**

The name of the IBM BASICA program file, is SCANNER1.BAS

There are several data files that are called by the SCANNER1 program, they are:

|            |                                   |
|------------|-----------------------------------|
| CHAN.DAT   | Channel information               |
| PRIOR.DAT  | Priority channel information      |
| SEARCH.DAT | Search frequencies                |
| MEMO.DAT   | Memo information for all channels |
| BANK.DAT   | Current selected banks            |
| COUNT.DAT  | Channel Count information         |
| SSTORE.DAT | Search Store information          |

## HOST COMPUTER

Note: The following information should be used by those wishing to customize their system, with CompuScan's optional features.

### Control of Hardware Devices:

The following is a checklist of how the user's interface should be configured:

RS-232C ranges from +12 to +3 and -3 to -12 volts. This is standard for the CP-2100

Additional signal lines used by the host system are:

Standard 3 wire system— RD pin 3, TD pin 2, ground pin 1.

Standard 5 wire system— In addition to the standard 3-wire system, RTS pin 4, and CTS, pin 5 are used.

Others — Data Terminal Ready (DTR) are used by some systems, and are strapped high or low by jumper JW7.

Ground on pin 1 must always be used, the ground on pin 7 may also be used in addition to pin 1.

## CONNECTOR OUTPUTS

The 24 pin accessory connector provides outputs for use of external volume and squelch controls, speaker, and 4 auxiliary outputs. Shown below are the pin-outs for this connector (Figure 12).

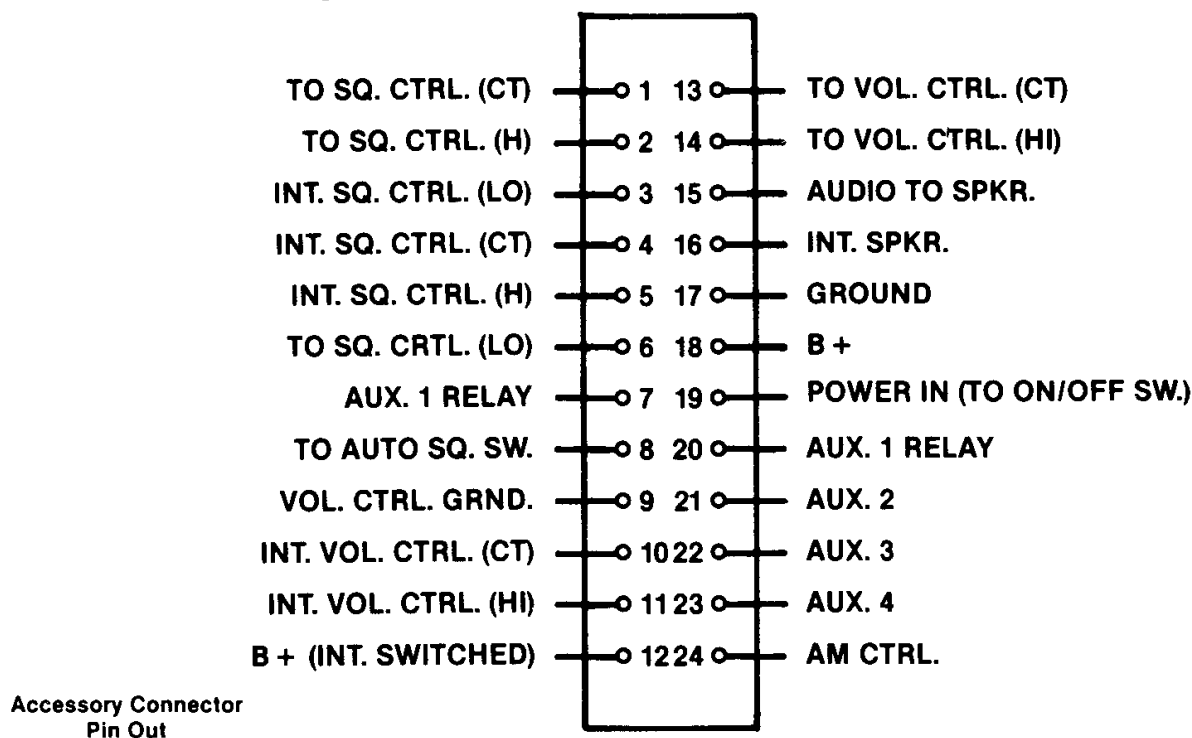


FIGURE 12

## ACCESSORY PLUG

The accessory connector plug is provided with jumpers for use of the internal volume and squelch controls, and internal speaker as shown below. As mentioned previously, this plug must be connected for CompuScan operation (Figure 13).

## EXTERNAL (REMOTE) CONTROLS

Shown below is the accessory plug wiring for external volume, squelch, and speaker (Figure 14).

The accessory connector plug jumper wires may be removed and replaced using the T-handle wire insertion tool supplied. This tool may also be used to insert new wires in the accessory plug for external controls or speaker. Wire used for this plug, should be 22 AWG insulated wire. The insulation displacement contacts do NOT require that the wire be stripped, prior to insertion.

## VOLUME CONTROL

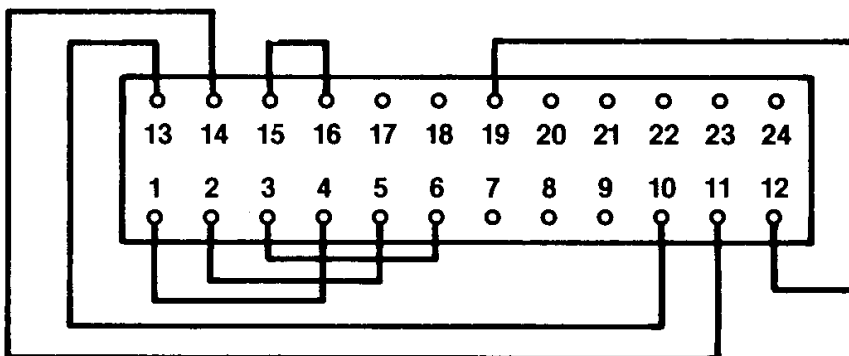
In the accessory connector pin-out figure, 3 connections for a volume control are found on pins, 9, 13, and 14. For use of the internal volume control, pins 13 and 14 must be jumpered to pins 10 and 11 respectively, as shown in Figure 13. Pins 13 and 14 are NOT connected for internal control, and external volume control (100K-linear) may be connected to pins 9, 13, and 14 as shown in Figure 14.

## ON/OFF SWITCH

Power is supplied through pin 19. This may come from the internal ON/OFF switch by connecting pin 12 to pin 19, as shown in Figure 13, or by an external switch between pins 18 and 19, as shown in Figure 14.

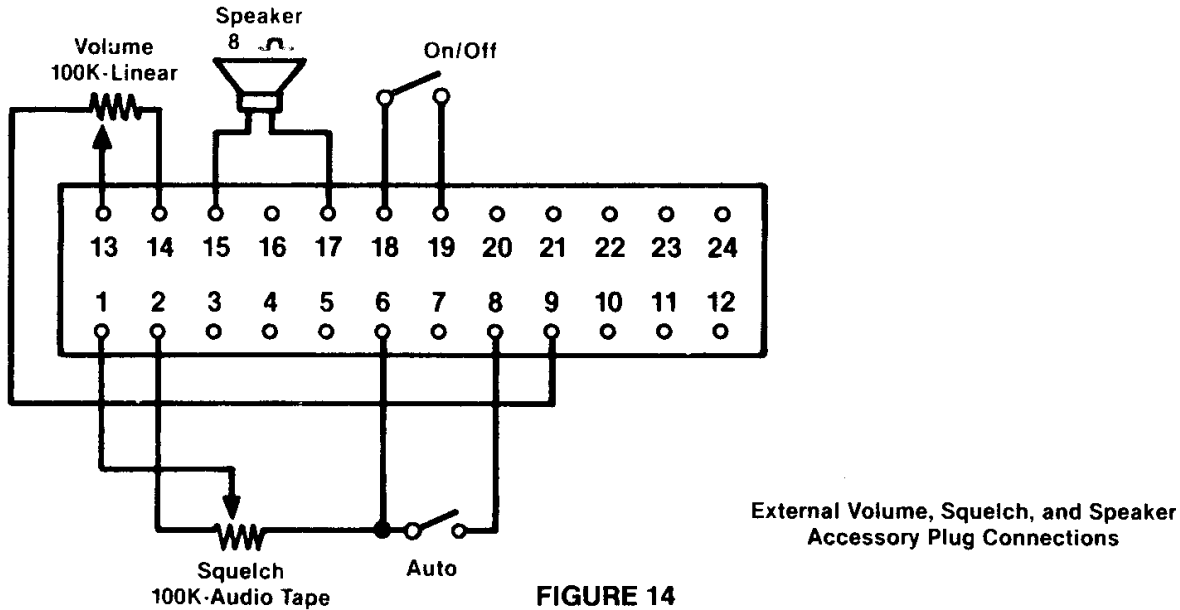
## SQUELCH CONTROL

The internal squelch control may be used by connecting pins 1, 2, 3 to pins 4, 5, and 6 respectively, as shown in Figure 13. When an external squelch control is desired, see Figure 14.



Accessory Plug Connections  
for Internal Volume, Squelch, and Speaker

FIGURE 13



## SPEAKER

The internal speaker is connected when accessory pins 15 and 16 are connected as shown in Figure 13. An external 8 ohm speaker may be connected between pins 15 and 17, as shown in Figure 14.

Internal speaker is limited to 1 watt maximum. An external 8 ohm speaker may be driven at full audio power, 2 watts. Both the internal and external speakers may be used simultaneously, however, the audio power from the internal speaker will be about one half that of the external speaker.

## AUXILIARY

Auxiliary outputs are provided:

- AUX 1—pins 7 and 20  
(RELAY ISOLATED)
- AUX 2—pin 21
- AUX 3—pin 22
- AUX 4—pin 23

See Section 3, AUXILIARY BITS for further information.

**BAUD SETTING**

Multiple baud settings are provided as follows:

For units having a red power-ON indicator light on the front of the CP-2100 refer to page 8.

For units NOT having a red power-ON indicator light on the front of the CP-2100:

| <b>BAUD</b> | <b>2</b> | <b>3</b> | <b>4</b> |
|-------------|----------|----------|----------|
| 110         | IN       | IN       | IN       |
| 150         | IN       | IN       | OUT      |
| 300         | IN       | OUT      | IN       |
| 600         | IN       | OUT      | OUT      |
| 1200        | OUT      | IN       | IN       |
| 2400        | OUT      | IN       | OUT      |
| 4800        | OUT      | OUT      | IN       |
| 9600        | OUT      | OUT      | OUT      |

**Note:** "IN" means switch pressed down.

**PARITY**

Parity is either odd or none, with switch 1 "IN", parity is OFF.

| <b>Problem</b>  | <b>Solution</b>  |
|---|--|
| <b>No response,<br/>Unit appears dead</b>                 | <ul style="list-style-type: none"> <li>–Check power to <b>IBM PC, and CP-2100</b></li> <li>–Accessory connector <b>NOT</b> plugged in on CP-2100</li> <li>–RS-232 cable <b>NOT</b> plugged in tightly</li> <li>–Baud rate switches set incorrectly</li> <li>–Antenna <b>NOT</b> plugged in</li> <li>–Instructions <b>NOT</b> followed</li> <li>–Disk drive door <b>NOT</b> shut</li> <li>–Wrong CompuScan disk used</li> <li>–CompuScan <b>MASTER</b> disk being used</li> <li>–Accessories plugged to accessory connectors <b>NOT</b> working</li> <li>–Asynchronous Card is <b>NOT</b> IBM's, and requires wiring changes in the RS-232 Cable</li> </ul> |
| <b>“Drive not ready error”</b>                            | <ul style="list-style-type: none"> <li>–<b>MASTER</b> diskette being used (a working copy must be made)</li> </ul>   |
| <b>A(bort) R(etry)<br/>C(ontinue)</b>                     | <ul style="list-style-type: none"> <li>–Diskette <b>NOT</b> correctly formatted</li> </ul>   |
| <b>or<br/>“Disk Full”</b>                                 | <ul style="list-style-type: none"> <li>–Disk drive door <b>NOT</b> closed</li> <li>–PC DOS absent from diskette</li> <li>–Working disk <b>NOT</b> made correctly</li> <li>–Disk is full</li> <li>–Operating systems versions have been mixed (see DOS manual)</li> </ul>   |
| <b>“(Error) line ?????”<br/>“Ok”</b>                      | <ul style="list-style-type: none"> <li>–Restart computer by typing <b>CONTROL-ALT-DEL</b> simultaneously</li> </ul>  |
| <b>Long Hesitation</b>                                    | <ul style="list-style-type: none"> <li>–Normal, occurs for up to 15 seconds at random, <b>NO</b> corrective action is necessary.</li> </ul>  |
| <b>No Audio</b>   | <ul style="list-style-type: none"> <li>–Check power to CP-2100</li> <li>–Check volume and squelch settings</li> <li>–Check accessory connector is properly mated, and external speaker, if used</li> </ul>   |
| <b>Does not receive a<br/>known active signal</b>         | <ul style="list-style-type: none"> <li>–Check power to CP-2100</li> <li>–Check antenna connection</li> <li>–Check accessories connector, volume and squelch settings</li> <li>–If no problems are found, shut <b>OFF</b> all equipment, restart as described in this manual</li> </ul>   |
| <b>System stops cold<br/>for more than 15<br/>seconds</b> | <ul style="list-style-type: none"> <li>–Static electricity has “locked up” the IBM PC. Use a grounded receptacle, and minimize static electricity.</li> </ul>  |

