RADIO COMMUNICATIONS TEST SET 2955A

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PREFACE

AMENDMENT STATUS

Each page bears the date of its original issue or the date and number of the latest amendment. Any changes subsequent to the latest amendment are included on Manual Change sheets coded C1, C2 etc.

WARNINGS AND CAUTIONS

See the Operating Manual.

Chapter 1
PROGRAMMING

COMMANDS

These take the form of a two–letter command code which may be followed by numeric data. Delimiters are required to separate multiple data and multiple commands and to terminate the last command in a string.

The command codes perform different types of function as follows:–

(a) Key functions as marked on the 2955's front panel. See Table 2–1. For the numeric, minus sign and decimal point keys, the appropriate number or sign is used.

(b) Soft key functions as shown on menus. See Table 2–2.

(c) Non–keyboard functions which are associated with settings. See Table 2–3.

(d) Non–keyboard functions which are associated with readings. See Table 2–4.

SYNTAX

Conventions

The following are used in this manual:–

Notation	Explanation	Example
AAAAAAAA	Items which are entered as a string.	WR
<AAAAAA>	ASCII keyboard function which is to be entered as a single key stroke.	<LF>
<aaaaaa>	Information as described which is to be entered as a string.	<data>
[ ]	Entry of the enclosed item is optional.	[<data>]
...	The previous item(s) can be repeated as necessary.	<data> <delimiter> ...

Delimiters

There are two types of delimiter as follows:-

(a) Low priority. <,> or <;> or <SPACE>. These are used to separate fields within a statement. These can be omitted when ambiguity does not arise. <SPACE> is ignored by the system and is used for intelligibility only.

(b) High priority. <LF> (linefeed), <ETX> (end of text) or <ETB> (end of text block). These are used to separate adjacent statements and to terminate the last statement. The GPIB bus EOI line can be used with the last character.

COMMAND FORMAT

Commands take the following form:-

<command code> [<data>][<command code>][<delimiter>] ... <delimiter>

where <command code> is 2-letter code as given in the Tables 2-1 to 2-4

and <data> is an integer (NR1 format) or a fixed decimal point number (NR2 format). Exponential formats are not allowed.

Where there is more than one item of data, delimiters have to be used.

A typical command string (where the data items are separated by commas, the commands are delimited by semicolons and the string is terminated by <LF>) is as follows:-

String	Meaning
PO40,3;PO41,5;<LF>	Poke the value 3 to memory location 40 and the value 5 to memory location 41.

Notes...

(1) Certain commands cause the instrument to output more data than it can store in its output buffer (e.g. SV, RD39). The result is that the data is held off from entering the buffer and hence the instrument stops. To prevent locking up the instrument, a 2 second timeout takes effect. If data output has not been started or is read out slower than 1 character per 2 seconds, then a buffer overflow error is raised and the instrument aborts the command.

(2) The input buffer length is 128 characters. If the buffer overflows, then the GPIB is held off until further space is available. If however, the buffer does not contain a command delimiter then the data is lost and an error is raised. This is because command interpretation, and hence buffer unloading, does not occur until a command string delimiter is received.

(3) If a syntax error is detected, then that command and all subsequent commands up to the next command separator are aborted and an error is raised.

(4) When the GPIB SDC (selected device clear) is used, it is recommended that a 0.5 second wait period follows while reinitialization of the instrument occurs. This avoids corruption or loss of GPIB commands.

DATA OUTPUT

Every request for data causes a response from the instrument. This takes the following form:-

<data> [<data type>] <delimiter>

where <data> contains the reading

and <data type> is an ASCII string when the data requires qualifying (e.g. MHz, dBm).

The data may be a numerical or alpha string. There is no fixed format except that numerical data conforms to NR1 or NR2 data types (i.e. non-exponential).

All readings are terminated with <CR> <LF>. This enables minimum interaction between a controller and a printer. The bus EOI is sent when the output buffer is empty.

If no data is available, the default response is NULL.

Blank page.

Chapter 2
COMMAND CODES

Command codes are listed below in four tables as follows:-

Table	Type of command code
2-1	Keyboard-equivalent. Also, see Fig. 2-1.
2-2	Soft key functions.
2-3	Non-keyboard settings.
2-4	Non-keyboard readings.

TABLE 2-1 KEYBOARD-EQUIVALENT COMMAND CODES

Command code	Data	Key	Function
TX		TX TEST	TRANSMITTER TEST mode.
RX		RX TEST	RECEIVER TEST mode.
DX		DUPLEX TEST	DUPLEX test mode.
TN		TONES	TONES mode.
TM	0 or 1	TX MON	TRANSMITTER MONITOR mode disabled or enabled.
BC		SCOPE/BAR	BAR charts selected. Disabled in DUPLEX test mode.
SC		SCOPE/BAR	SCOPE selected. Disabled in DUPLEX test mode.
HD	0 or 1	HOLD DISPLAY	Hold display on or off.
HP		HELP	Help menu.
AG		AF GEN	AF generator.
RT		RX=TX FREQ	Set RF generator to transmitter frequency.
RG		RF GEN	RF generator.
SM		SET MOD	Set modulation.
MD	0 or 1	MOD ON/OFF	2955A modulation switch off or on.
NF	0 or 1	ON OFF	ON OFF switch off or on.
SN	0, 1, 2 or 3	SINAD S/N and DIST'N	Off, default (SINAD or S/N), non-default (S/N or SINAD) or distortion.
AC		AC/DC	AC coupling.
DC		AC/DC	DC coupling.
FR	<value>	FREQ	Frequency.
LV	<value>	LEVEL	Level.
DI		Δ INCR	Increment/decrement.
ST	01 to 26	STORE	Store settings.
RC	00 to 26	RECALL	Recall settings.
MZ		MHz/V	MHz.
KZ		kHz/mV	kHz.
HZ		Hz/μV	Hz.
VL		MHz/V	V.
MV		kHz/mV	mV.
UV		Hz/μV	μV.
DB		dB	dB selected.
BU		dB	dB relative to 1 μV selected.
DM		dBm	dB relative to 1 mW.
FM		FM	Frequency modulation.
AM		AM%	Amplitude modulation.
PM		ΦM RAD	Phase modulation.

TABLE 2-1 KEYBOARD-EQUIVALENT COMMAND CODES (contd.)

Command code	Data	Key	Function
DE		DELETE	Delete previous character.
FI	0 or 3	BAND PASS	BP filter 300 Hz to 3.4 kHz or external.
FI	1 or 2	LOW PASS	LP filter 15/50 kHz or 300 Hz.
FU		FREQ↑	Frequency increment.
FD		FREQ↓	Frequency decrement.
LU		LEVEL↑	Level increment.
LD		LEVEL↓	Level decrement.
SW		SINGLE	Scope single sweep and arm.
RP		REP	Scope repetitive sweep.
VD			Scope vertical scale increment.
VU			Scope vertical scale decrement.
TD			Scope horizontal timebase increment.
TU			Scope horizontal timebase decrement.
IP	0, 1 or 2	SELECT	Input socket BNC, N or one-port duplex.
XA		TX TEST	Soft key A.
XB		RX TEST	Soft key B.
XC		DUPLEX TEST	Soft key C.
XD		TONES	Soft key D.
XE		TX MON	Soft key E.
XF		SCOPE/BAR	Soft key F.
XG		HOLD	Soft key G.
XH		HELP	Soft key H.

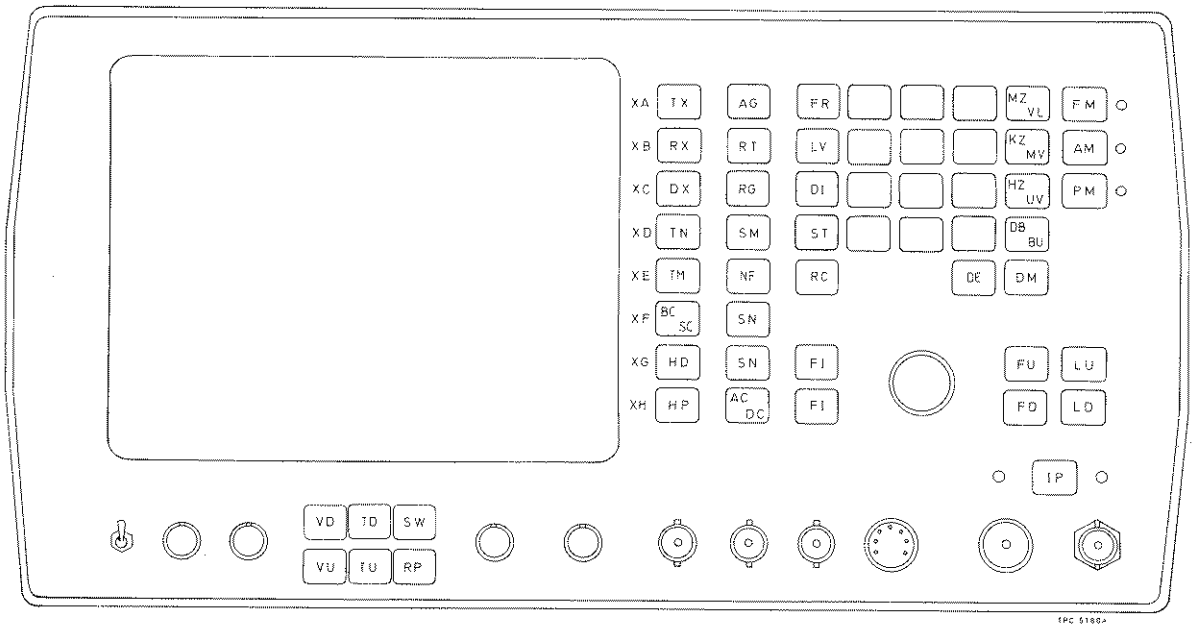


Fig. 2-1 Keyboard-equivalent command codes

TABLE 2-2 COMMAND CODES FOR SOFT KEY FUNCTIONS

Command code	Data	Function
CM	0 or 1	Normal 2955A operation or emulation of 2955.
SS		Send tones.
CT		Stop tones (clear DTMF send data buffer).
CD		Clear DTMF receive data buffer.
LS		Load DTMF send data buffer.
OD		Output DTMF data directly.
RI		Set POCSAG RIC.
PA	1, 2, 3 or 4	Set POCSAG address.
PS	1, 2, 3 or 4	Set POCSAG message.
PP	1 to 32	Set POCSAG error.
PT	1 to 32	Clear POCSAG error.
PD		Set instrument into potential difference mode.
EM		Set instrument into EMF mode.
SE		Store/poke enable.
SD		Store/poke disable.
PR		Select peak envelope power for Directional Power Head.
CR		Select CW power for Directional Power Head.
IF	0 or 1	Transmitter monitor mode IF filter 12 kHz or 180 kHz.
IM	0 or 1	Transmitter monitor mode RF image upper or lower.
LL	0 or 1	Lock modulation or AF levels together disable or enable.
WS	0, 1, 2 or 3	Wave shape sine, square, triangle or saw tooth.

TABLE 2-3 COMMAND CODES FOR NON-KEYBOARD SETTINGS

Command code	Data	Function
EV		Enable VARIABLE control.
DV		Disable VARIABLE control.
SQ	0, 1 or 2	
WR	0 to 39, 0 to 31, <string>	Write <string> starting at given column and given row. Followed by delimiter <EOI> <ETX> or <LF>. Note that <CR> has the effect of <CR><LF>. See under 'Creating a screen display' later in this chapter.

TABLE 2-3 COMMAND CODES FOR NON-KEYBOARD SETTINGS (contd.)

Command code	Data	Function
DS ES CS RS		Disable screen output. Enable screen output. Clear screen. Restore screen.
PG		Purge output buffer. Clears data available flag but SRQ remains raised.
PO	<m>, <n>	Poke byte <n> into memory location <m>. Note that this includes a 10 ms delay for EEPROMs. This should not be used except under the supervision of a Marconi Instruments representative. Data cannot be poked to the display since it is not memory mapped. For this, use WR.
DU	<m>, <n1>, <n2> ...	Poke bytes <n1>, <n2> etc (up to a terminator) into memory locations starting at <m>. Maximum of 64 bytes. Note that this includes a 10 ms delay for EEPROMs.
TF		Record sequential tone frequencies.
TE		Record sequential tone numbers and errors.
LF		Send <EOI> with <LF>. This is the default condition and suits most controllers. However, care should be taken when there are multiple readings in the output buffer as data could be lost.
EX		Send <EOI><ETX> when the output buffer is empty. <LF> is sent embedded between readings.
ET		Enable Directional Power Head if fitted.
DT		Disable Directional Power Head.
SP		Suppress GPIB annunciators. This is cleared by RS.
BX	<n>, <m>	Put up soft key boxes which are used to arrow the mode keys where <n> is the box pattern and <m> is the length of box. See under 'Creating a screen display' later in this Chapter.
BP or PB		Sound a tone in the loudspeaker. Note that the loudness is determined by the VOLUME control setting.

TABLE 2-4 COMMAND CODES FOR NON-KEYBOARD READINGS

Command code	Data	Function
SV		When next addressed to talk, sends a data string which, when sent back to the instrument, restores current settings. See Note (1) under 'Command format'.
PE	<m>	When next addressed to talk, sends data at memory location <m>. This should not be used except under the supervision of a Marconi Instruments representative.
RD	<n>	When next addressed to talk, sends reading or setting as specified in <n>. Measurement readings are as follows:-
	1	RF counter frequency.
	2	RF power.
	3	Modulation frequency.
	4	Modulation level.
	5	AF counter frequency.
	6	AF level.
	7	Receiver distortion, SINAD, S/N.
	8	Transmitter distortion.
	9	Modulation peak, positive deviation.
	10	Modulation trough, negative deviation.
	11	RF forward power.
	12	RF reflected power.
	13	VSWR; return loss.
	14	Sequential tone 1.
	15	Sequential tone 2.
	16	Sequential tone 3.
	17	Sequential tone 4.
	18	Sequential tone 5.
	19	Sequential tone 6.
	20	Sequential tone 7.
	21	Sequential tone 8.
	22	Sequential tone 9.
	23	Sequential tone 10.
	24	Sequential tone 11.
	25	Sequential tone page number.
	104	AF level in dBV or dBr.
	105	Modulation level in dB.
	109	DTMF received tones.

TABLE 2-4 COMMAND CODES FOR NON-KEYBOARD READINGS (contd.)

Command code	Data	Function
		Input settings are as follows:-
	26	Sequential tone standard.
	27	RF generator frequency.
	28	RF generator level.
	29	AF generator frequency.
	30	AF generator level.
	31	Modulation frequency.
	32	Modulation level.
	33	RF frequency increment.
	34	RF level increment.
	35	AF frequency increment.
	36	AF level increment.
	37	Mod frequency increment.
	38	Mod level increment.
	39	Whole page readings and settings (TRANSMITTER TEST,RECEIVER TEST and DUPLEX tests only). See Note (1) under 'Command format' above.
	100	AF generator 2 frequency.
	101	AF generator 2 level.
	102	Modulation 2 frequency.
	103	Modulation 2 level.
	106	Default modulation level.
	107	Sequential tones duration in ms.
	108	POCSAG RIC.
ER		When next addressed to talk, sends the code for the last error detected.
VN		When next addressed to talk, sends the software version number.
SK		When next addressed to talk, sends an ASCII character corresponding to the last key pressed as shown in Fig. 2-2.

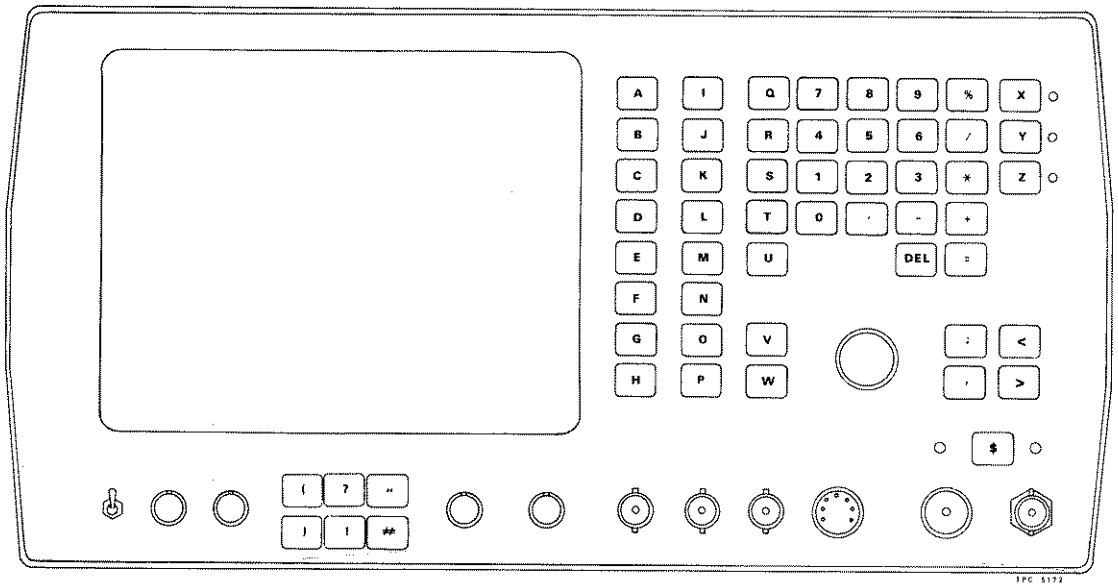


Fig. 2–2 ASCII characters sent when the SK command code is used

Chapter 3
WRITING A PROGRAM

OPERATING EXAMPLE

The following is a sample of GPIB input:-

Input	Explanation
RX;RG;FR123.5MZ;DI100KZ;LV-30DM; SM;FR1KZ;LV50AM;MD1;AC;SN2<LF>	In RECEIVER TEST mode, set the RF generator to 123.5 MHz (with the increment/decrement step set to 100 kHz) at a level of -30 dBm modulated by 1.0 kHz AM at 50%, preparatory to measuring the signal to noise ratio.

This input breaks down into the following:-

Command	Key equivalent
RX	RX TEST.
RG	RF GEN.
FR123.5MZ	FREQ 123.5 MHz.
DI100KZ	Δ INCR 100 kHz.
LV-30DM	LEVEL -30 dBm.
SM	SET MOD.
FR1KZ	FREQ 1 kHz.
LV50AM	LEVEL 50% AM.
MD1	Modulation ON.
AC	AC coupled.
SN2	S/N.

When ready, the level and distortion results can be selected for reading by sending RD6<LF>RD7<LF>.

DEVICE TRIGGERING

The GPIB trigger system can be used to start the transmission of a tone burst (which has been previously set up) while the instrument is in the receiver test mode. Typical trigger commands include SDT (Selective Device Trigger) and GET (Group Execute Trigger).

SERVICE REQUESTS AND STATUS BYTE

When it is enabled as a talker, the 2955A can send SRQ (Service ReQuest) to indicate to the controller that data is ready or to warn of an error condition. In response to a serial poll after asserting SRQ, the 2955A provides a status byte whose bits are as follows:-

Byte	Function
1xxxxxxx	Data ready.
x1xxxxxx	Service request.
xx1xxxxx	Error bit has occurred.
xxx1xxxx	Error bit 4 - Numerical entry.
xxxx1xxx	Error bit 3 - Data error.
xxxxx1xx	Error bit 2 - Abnormal operation.
xxxxxx1x	Error bit 1 - Syntax error.
xxxxxxx1	Error bit 0 - Input/output buffer overflow.

Notes...

(1) Data ready and error bits are cleared the next time the instrument is addressed to talk.

(2) The service request bit is cleared after a serial poll.

CREATING A SCREEN DISPLAY

A GPIB controller can be used to be create your own form of screen display. The 2955A is programmed with a number of specialized screen commands and it has a comprehensive character set stored in memory.

Screen commands

The operations involved in creating a display are as follows:-

(a) Clear the current display.

(b) Show the user-defined display with the selected measurements appearing when and where required.

(c) Return to the measurement mode.

The following commands are used for these purposes:-

Command	Function
CS (Clear Screen)	Clear the screen but allow measurement results to be shown.
DS (Disable Screen output)	Stop measurements from being shown on the screen.
ES (Enable Screen output)	Enable measurement results to be written on the screen.
HD0 (Hold Display)	Halt instrument operation.
RS (Restore Screen)	Return the display to the measurement mode.

The above commands can be used to operate the instrument in two modes – one in which the instrument is halted and one in which the instrument is still running.

When the instrument is halted, keyboard GPIB commands are ignored. Readings are those which were held at the time of HD.

When the instrument is running, keyboard GPIB commands are responded to. New readings are valid and readable.

WRite command

This is used to write characters on the screen display. The command code WR is followed by the start location and then the characters which are to be written.

The start address takes the form <c>,<r> where <c> is the column number and and <r> is the row number as shown on the worksheet which is given in Fig. 3-1. This can be copied and used for plotting.

Anything immediately following WR<c>,<r> is treated as a literal until a delimiter is seen. Thus, for multiple WR statements, end each with <LF> or other terminator

e.g. "WR20,15,A";CHR$(10)"WR20,16,b";CHR$(10)

not "WR20,15,a,WR,20,16,b";CHR$(10).

Character set

The complete set of characters for the instrument is shown in Table 3-1 and Fig. 3-2. These characters are used with the WR command to write onto the screen. With the principal exception of the alphanumerics A to Z and 0 to 9, the characters are not standard ASCII. Because of this, when a lower case letter is sent (in standard ASCII) from the controller, it is interpreted by the 2955A as a reverse video upper-case letter.

The characters shown blank are either unallocated or are machine functions (e.g. 32 is a space). Code 10 is not available for reverse video '7' so code 19 is used instead.

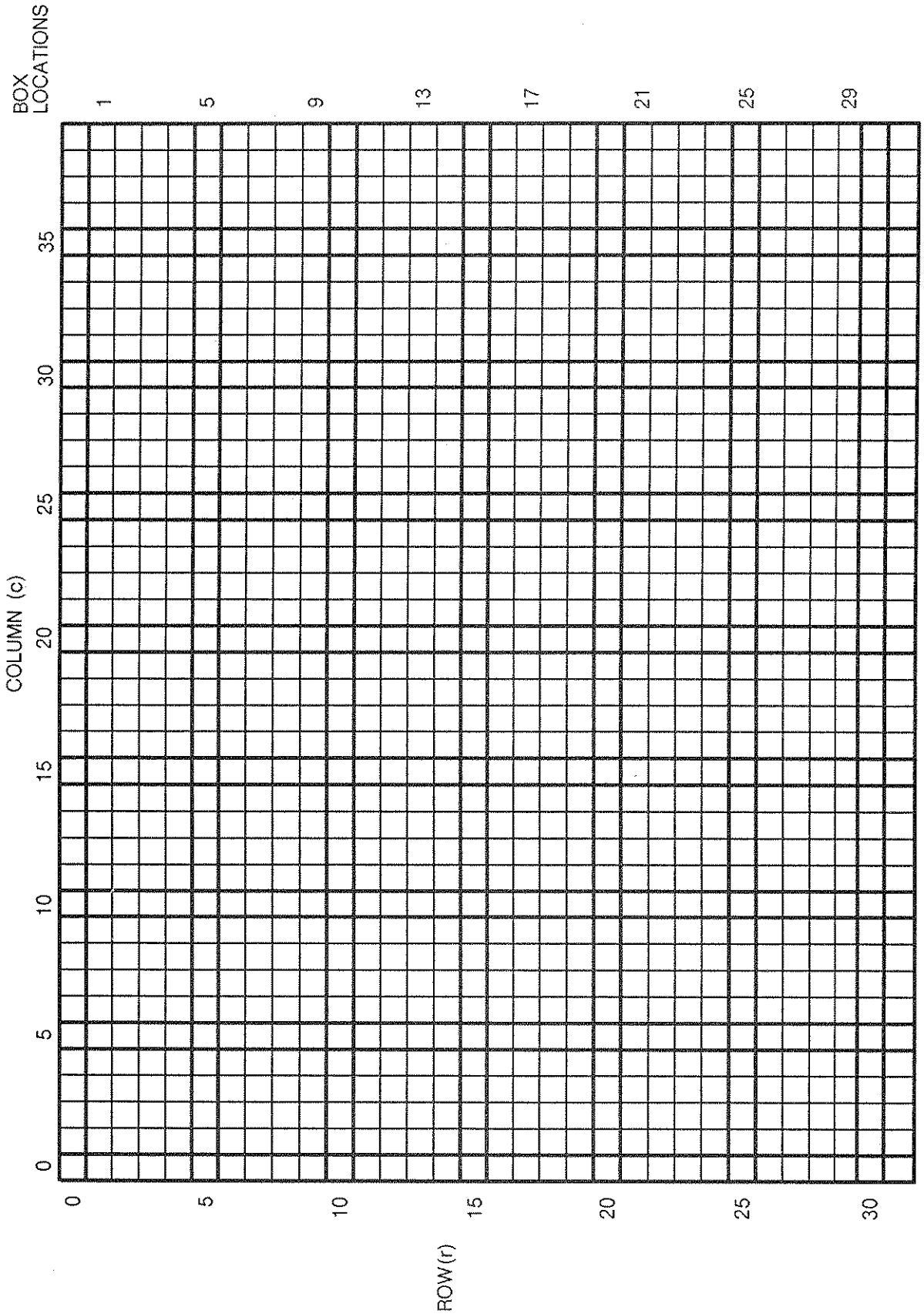


Fig. 3–1 Screen address worksheet

TABLE 3-1 CHARACTER CODES

Code dec	Code hex	Character	Code dec	Code hex	Character
0	0	– (Reverse video)	*46	2E	.
1	1	. (Reverse video)	*47	2F	/
2	2	0 (Reverse video)	*48	30	0
3	3	<ETX>	to	to	to
4	4	1	57	39	9
to	to	to	*58	3A	:
9	9	6 (Reverse video)	59	3B	(Reverse video top)
*10	A	<LF>	60	3C	(Box symbol)
11	B	8 (Reverse video)	61	3D	'
12	C	9 (Reverse video)	62	3E	(Box symbol)
13	D	<CR>	63	3F	(Box symbol)
14	E	(Pointer symbol)	64	40	(Box symbol)
15	F	* (Reverse video)	*65	41	A
16	10	Ω (Reverse video)	to	to	to
17	11	# (Reverse video)	90	5A	Z
18	12	*	91	5B	(Box symbols)
19	13	7 (Reverse video)	92	5C	(Box symbol)
20	14	$	93	5D	>
21	15	#	94	5E	(Box symbol)
22	16	(Bell symbol)	95	5F	(Box symbol)
*23	17	<ETB>	96	60	(Pointer symbol)
24	18	?	97	61	A
25	19	@	to	to	to
26	1A	(Copyright symbol)	122	7A	Z (Reverse video)
27	1B	(Graphics symbol)	123	7B	(Graticule symbol)
28	1C	<	124	7C	(Graticule symbol)
29	1D	[	125	7D	/ (Reverse video)
30	1E	]	126	7E	↓
31	1F	<SPACE> (Reverse video)	127	7F	↑
*32	20	<SPACE>	128	80	(Unused)
33	21	s	129	81	
34	22	z	to	to	
35	23	_ (Underline)	191	BF	(Scope graticule symbols)
36	24	μ	192	C0	(Flashing graphics symbol)
*37	25	%	193	C1	A
38	26	Ω	to	to	to
39	27	m	218	DA	Z (Flashing)
40	28	d	219	DB	
41	29	k	to	to	
42	2A	Φ	223	DF	(Flashing graphics symbols)
*43	2B	+	224	E0	
*44	2C	,	to	to	
*45	2D	–	255	FF	(Dim bar chart symbols)

*As ASCII

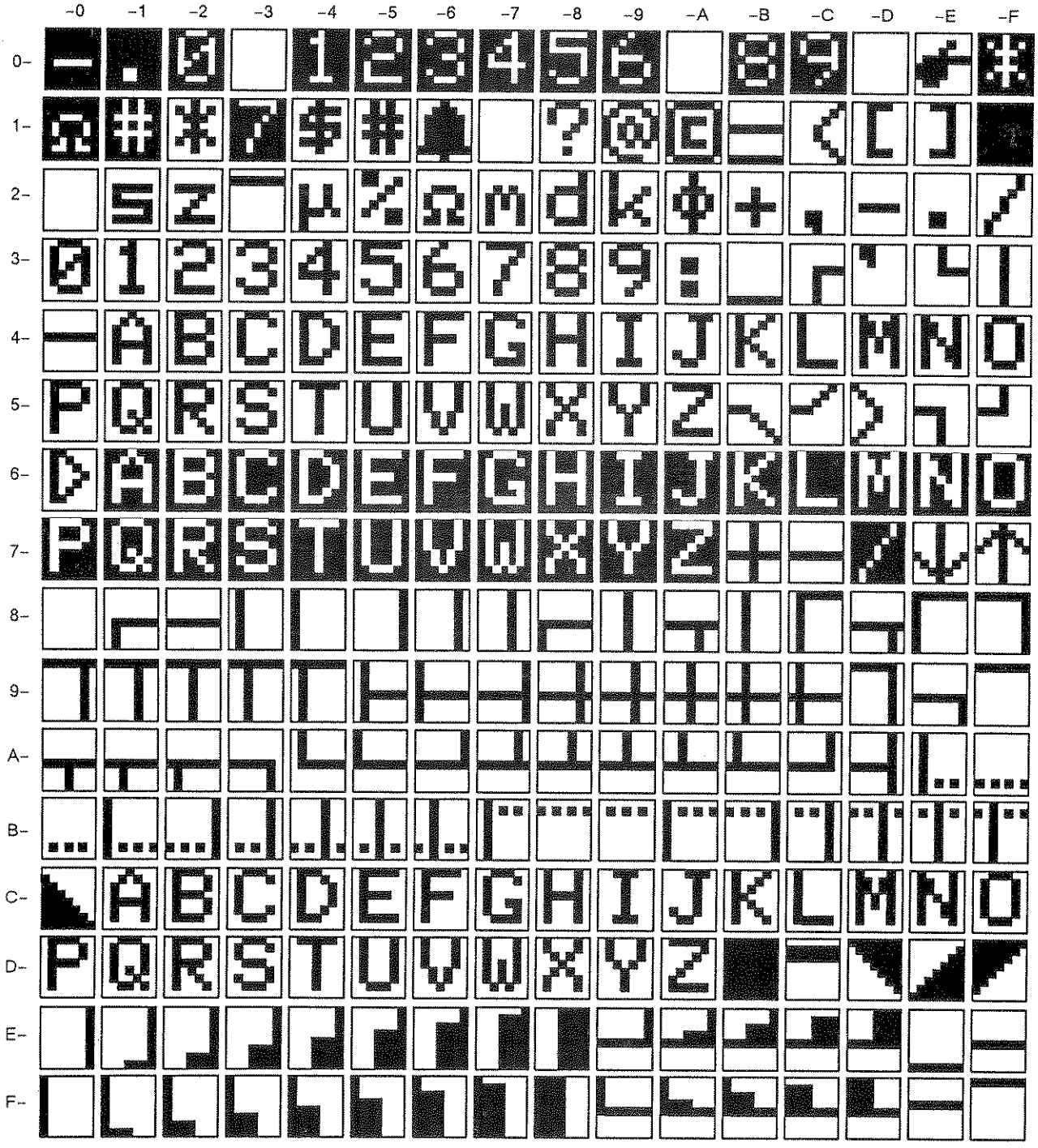


Fig. 3–2 Character set

Reverse video characters

Many of the reverse video characters, by their structure, have an open top. For characters which have a bar at the top (i.e. E, F, T and Z), this is particularly noticeable. A more pleasing appearance can be given to such a character by writing a reverse video top character (ASCII 59) directly above it (e.g"WR10,15e:" for a reversed video E is improved by adding "WR10,14";CHR$(59)).

BoX command

This is used to write characters within arrowed boxes alongside the MODE keys. The command code BX is followed by the box positions and length <n>,<m>. A WR command is then entered for the characters. The maximum number of characters is 31. Reverse video characters cannot be used in boxes.

The box positions code <n> is the decimal equivalent of the 8-digit binary number indicating by 1 or 0 which of the eight fixed positions have a box or no box. The eight bits (reading left to right) are for the boxes which are in rows 29, 25, 17, 13, 9, 5 and 1 respectively.

The length code <m> is $\geq$2 more (to cover the right-hand 2 rows for the point of the arrow) than the maximum number of characters (e.g. to write SELECT alongside the SCOPE/BAR key, use BX32,8;WR32,21;SELECT<LF>). When boxes of different lengths are required, sequential BX commands have to be sent.

To clear the screen prior to the boxes being displayed, add 64 to <m>.

Since CONTINUE and RETURN are commonly used for menu displays, the facility exists to call up these labels directly by adding fixed values to <m>. The positions for these are fixed – CONTINUE alongside the SCOPE/BAR key and RETURN alongside the HOLD DISPLAY key). This replaces a WR command.

To call up the CONTINUE label, add 32 to <m>. Ensure that there is sufficient room for the word in the box (i.e. 32 + $\geq$8 + 2 = $\geq$42), otherwise CONTINUE cannot be included. Thus, to display CONTINUE in a box of length 8 alongside the SCOPE/BAR key, the command is BX32,42<LF>.

To call up the RETURN label, add 128 to <m>. Ensure that there is sufficient room for the word in the box (i.e. 128 + $\geq$6 + 2= $\geq$136), otherwise RETURN cannot be included. Thus, to display RETURN in a box of length 6 alongside the HOLD DISPLAY key, the command is BX64,136<LF>.

Graticule characters

Some caution is required in the use of characters 128 to 191 since these are used to form the oscilloscope graticule. When the instrument recognises a graticule character, it also switches on the oscilloscope trace for the duration of that character. This may cause strange affects when these characters are used to form a user-defined display. Because of the method of triggering, no trace is observed as long as these characters are not used in a vertical sequence (as the screen is scanned from top to bottom). This means that, for instance, horizontal lines of these characters may be drawn as long as they are staggered (i.e. chequerboard or alternate lines).

To detect the presence, or otherwise, of the trace in a user-defined display, check for any movement in the display while adjusting the oscilloscope POSITION controls.

User-defined display examples

To write a reverse video A at the centre of the screen at column 20, row 15, use"WR20,15,";CHR$(97) or"WR20,15a". To write SELECT in the box alongside the SCOPE/BAR key, use BX32,8;WR32,21;SELECT<LF>. See Fig. 3-3.

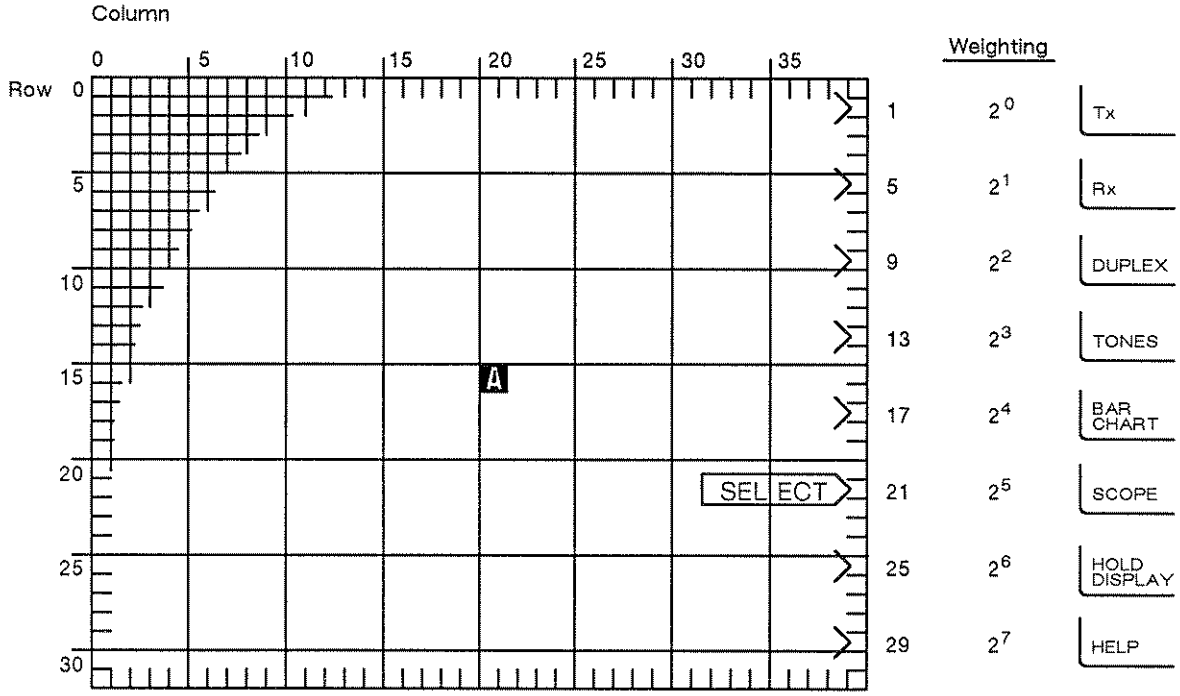
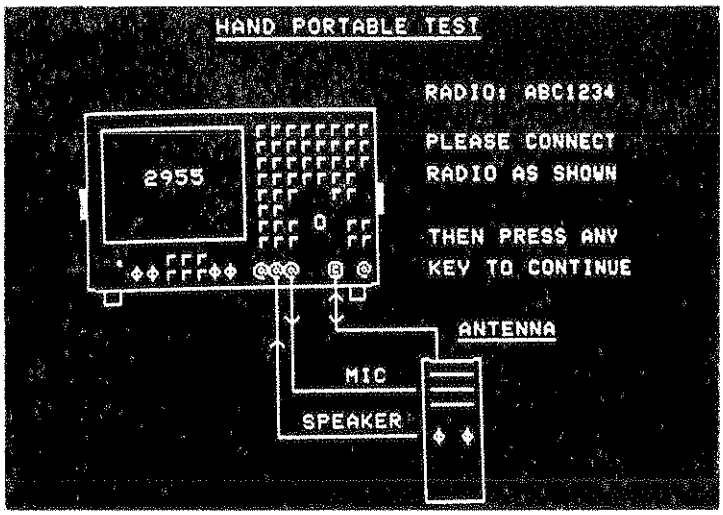


Fig. 3-3 Screen addressing example

A typical application of a user-created display is shown in Fig. 3-4 which features an interconnection diagram. The accompanying program was written using an HP 9816 Personal Computer.




```
1000 Start:          DIM A$[100]
1010                 Addr=706
1020                 REMOTE Addr
1030                 RESTORE Radio
1040                 GOSUB Displaypage
1050                 STOP
1060 Radio:          DATA 11,0,HAND PORTABLE TEST
1070                 DATA 11,1,##################
1080                 DATA 0,4,"                              RADIO: ABC1234"
1090                 DATA 0,5,"  <@@@@@@@@@@@@@@@@@@^"
1100                 DATA 0,6,"  ?<@@@@@@@@^<<<<<<<<?"
1110                 DATA 0,7,"  ??         ?<<<<<<<<?   PLEASE CONNECT"
1120                 DATA 0,8,"  ??         ?<<<<<<<<?"
1130                 DATA 0,9,"  ??  2955   ?<<<<<<< ?   RADIO AS SHOWN"
1140                 DATA 0,10,"  ½?         ?<<<  << Ò"
1150                 DATA 0,11,"  ½?         ?<<      Ò"
1160                 DATA 0,12,"  ??         ?<<< O <<?"
1170                 DATA 0,13,"  ?>@@@@@@@@_<<<   <<?   THEN PRESS ANY"
1180                 DATA 0,14,"  ?    <<<           ?"
1190                 DATA 0,15,"  ?  **<<<**    ?   KEY TO CONTINUE"
1200                 DATA 0,16,"  >  ¦¦¦¦¦¦¦¦¦{{¦¦{  _"
1210                 DATA 0,17,"   >_          }}  >_"
1220                 DATA 0,18,"               }~  ~"
1230                 DATA 0,19,"               }}  >@@@@@@^ ANTENNA"
1240                 DATA 0,20,"               }          } ########"
1250                 DATA 0,21,"               }}         <'¦¦^"
1260                 DATA 0,22,"               }}   MIC  ?@@@?"
1270                 DATA 0,23,"               }>@@@@@@@@@?@@@?"
1280                 DATA 0,24,"               }          ?@@@?"
1290                 DATA 0,25,"               } SPEAKER ?   ?"
1300                 DATA 0,26,"               >@@@@@@@@@?* *?"
1310                 DATA 0,27,"                          ?   ?"
1320                 DATA 0,28,"                          ?   ?"
1330                 DATA 0,29,"                          ?   ?"
1340                 DATA 0,30,"                          >@@@_"
1350                 DATA -10,0,0
1360                 !
1370                 !
1380                 !
1390 Displaypage:    OUTPUT Addr USING "K";"HD1ESCS"              ! CLEAR SCREEN
1400                 READ X,Y,A$
1410                 IF X<0 THEN RETURN                           ! PAGE COMPLETE?
1420                 OUTPUT Addr USING "K";"WR";X;",";Y;",";A$
1430                 GOTO 1400
1440                 !
1450                 !
1460                 !
1470                 END
```

Fig. 3–4 Display example

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