CHARACTER DISPLAY TERMINAL

MODEL VG-920

INSTRUCTION MANUAL

Contents

1. OUTLINE OF FUNCTIONS

1.1 General

Character display equipment VG-920 consists of display unit DP-920 and keyboard unit KB-920. This is a conversational-mode equipment with the DEC VT220 function that enables data of up to 80 or 132 characters x 24 lines to be displayed on the non-glare 12" CRT.

The logic configuration centering around micro CPU allows this equipment to provide a variety of functions and high flexibility in operation. It employs the angle alignment feature for the screen and the low-profile keyboard so as to have high operation-ability. As the result, it is said to be a high-performance and easy-to-use equipment that can meet a wide range of applications.

(Note that the specifications of external appearance and functions may be changed without any prior notice.)

1.2 Basic Specifications of Display Unit DP-920

1) Display

   (1) CRT: 12 inch nonglare screen
                                           (Green, Amber and White)

   (2) Active display size: Horizontal 210mm (8¼ inches)
                                             Vertical 140mm (5½ inches)

   (3) Screen capacity: 1920 characters (80 columns x 24 lines)
                                             3168 characters (132 columns x 24 lines)

   (4) Character format: 7 x 10 dot matrix (For single-height and single-width characters)
                                             10 x 10 dot matrix cell (for 80 columns)
                                             10 x 9 dot matrix cell (for 132 columns)

   (5) Display system: Raster scan

   (6) Refresh rate: 50 frame/sec. or 60 frame/sec.

   (7) Cursor type: Blinking block/block/blinking underline/underline non-display (Selected in the Set Up mode)

   (8) Character set: ASCII, UK national, Special graphic, Auxiliary, Down-Line loadable (each 94 characters)

   (9) Code: ANSI, ASCII

2) Operating mode

   (1) Set Up mode

      Sets the operation conditions with the keyboard. (Selected by the Set Up key)

   (2) Online mode

      Sends/receives data to/from the host computer. (Selected in the Set Up mode)

   (3) Local mode

      Inhibits data from being transmitted to the host computer and stores the data received data buffer. (Selected in the Set Up mode)

3) Control mode

   (1) VT200 7-bit control mode

      Supports the 7-bit control characters and the DEC Multi-national characters.

   (2) VT200 8-bit control mode

      Supports the 8-bit control characters and the DEC Multi-national characters.

   (3) VT100 mode

      This is the control mode compatible with the DEC VT100 terminal.

(4) VT52 mode

This is the control mode compatible with the DEC VT52 terminal.

4) Data transmitting/receiving (Line interface) function

    (1) Communication mode: Asynchronous mode

    (2) Transfer rate: 75/110/150/300/600/1200/2400//4800/9600/19200 bps selected in the Set Up mode

    (3) Data format: 1 start-stop bit, 7 or 8 data bits, 0 or 1 parity bit, and 1 or 2 stop bits, selected in the Set Up mode.

    (4) Interface: EIA RS232C/RS423 or 20-mA current loop

5) Print (Printer interface) function

    (1) Print mode: Normal print/Auto print/Controller mode

    (2) Serial interface

        (i) Transfer rate: 75/110/150/300/600/1200/2400/4800/9600/19200 bps selected in the Set Up mode

        (ii) Data format: 1 start-stop bit, 7 or 8 data bits, 0 or 1 parity bit, and 1 or 2 stop bit, selected in the Set Up mode

        (iii) Interface: EIA RS232C/RS423

    (3) Parallel interface (Option)

The handshake system (conforming to CENTRONIX, 36-pin connector) using 8-bit parallel data at the TTL level and acknowledge and busy signals is employed.

6) Audible alarm

    (1) Kay click: This operates when the effective key on the keyboard unit is pressed.

    (2) Bell: This operates if keyed-in data cause the cursor to move to to the right margin in case of a RAM error during self-diagnosis, a reception of a BEL code, or a keyboard operational erros.

7) Power supply: AC90 to 132V/AC180 to 264V (Selectable with the changeover switch), 50/60Hz, 38W (including the keyboard unit)

8) Ambient temperature and humidity, dimensions, weight, and storage conditions

    (1) Ambient temperature: 0 to 40°C

    (2) Ambient humidity: 35 to 80% RH (No dew condensation shall be permitted.)

    (3) Dimensions: 343 mm(H) x 353 mm(W) x 324 mm(D)

(4) Weight: About 10 kg

(5) Storage conditions: <Temperature> –10 to 50°C
<Humidity> 10 to 90% RH (No dew condensation shall
be permitted.)

1.3 Basic Specifications of Keyboard Unit KB-920

1) Key arrangement

(1) Keytop arrangement: The keytop consists of the main keypad, editing keypad,
auxiliary keypad, and Top-Row function key portions.

(2) Keytop inclination: Step sculpture

(3) Key movement: 4 ± 0.5mm

(4) Key row offset: 9.5–4.75–9.5mm

2) Data output function

(1) Structure and output: Low-profile type, capacitive keyboard with serial encoded
outputs

(2) Roll over: N-key roll over

(3) Repeat function: Automatic repeat (when pressing a key for more than 0.5
second)

3) Ambient temperature and humidity, dimensions, weight, and storage conditions

(1) Ambient temperature: 0 to 40°C

(2) Ambient humidity: 35 to 80% RH

(3) Dimensions: 30 mm(H) x 532 mm(W) x 197 mm(D)

(4) Weight: About 2.5 kg

(5) Storage conditions: <Temperature> –10 to 50°C
<Humidity> 10 to 90% RH

1.4 Accessories

1) Function and operating manual 1

2) Line-interface connector . . . . 1 pair

3) Power supply cord 1

4) Fuse (1 A) for high voltage (The set is set at 200V ~ 240V)
or (2 A) for low voltage (The set is set at 100V ~ 120V) 1

5) Standard shipment specifications

VG-920 is so set as to be powered by the AC power supply of your country at the shipment.

$$\boxed{\text{CAUTION}}$$

When powering it with other power supply, be sure to use it after replacing the fuse provided as an accessory and setting the AC voltage changeover switch.

2. INSTRUCTIONS FOR HANDLING

2.1 Installation

For VG-920, display unit DP-920 and keyboard unit KB-920 are independently packaged in two corrugated cardboard boxes.

See Figure 2-1-1 and 2-1-2 for unpacking these units.

For installing VG-920, be sure to meet the power supply and environmental conditions specified in Section 1.2 "Basic Specifications of Display Unit DP-920" and the environmental conditions Specified in Section 1.3 "Basic Specifications of Keyboard Unit KB-920, and take care the following points:

1) Do not install this equpment in the place with the direct sun light.

2) Do not operate this equipment when enclosed with a cover or cloth. This prevents the heat radiation effect thus may cause a failure.

3) Keep moisture, dust, oil, and smoke away from this equipment as far as possible.

4) Keep any magnetism generating article (such as a transformer) as far as possible.
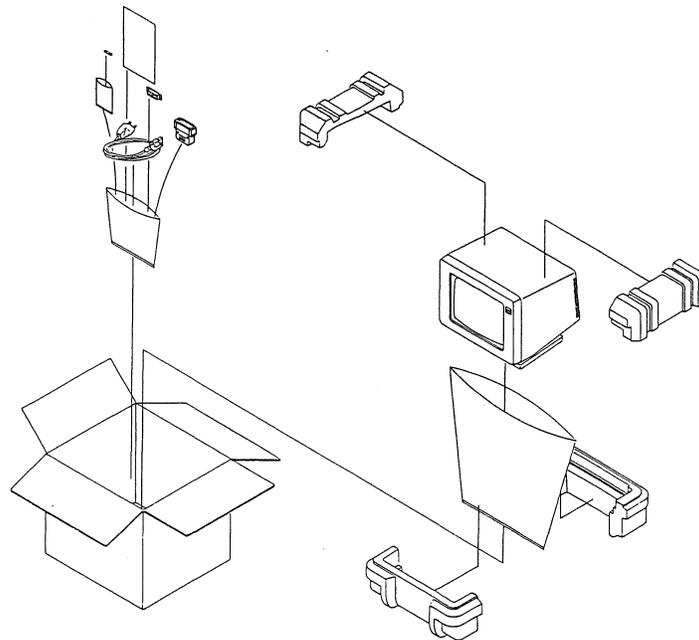
Fig. 2-1-1   Display Unit unpacking
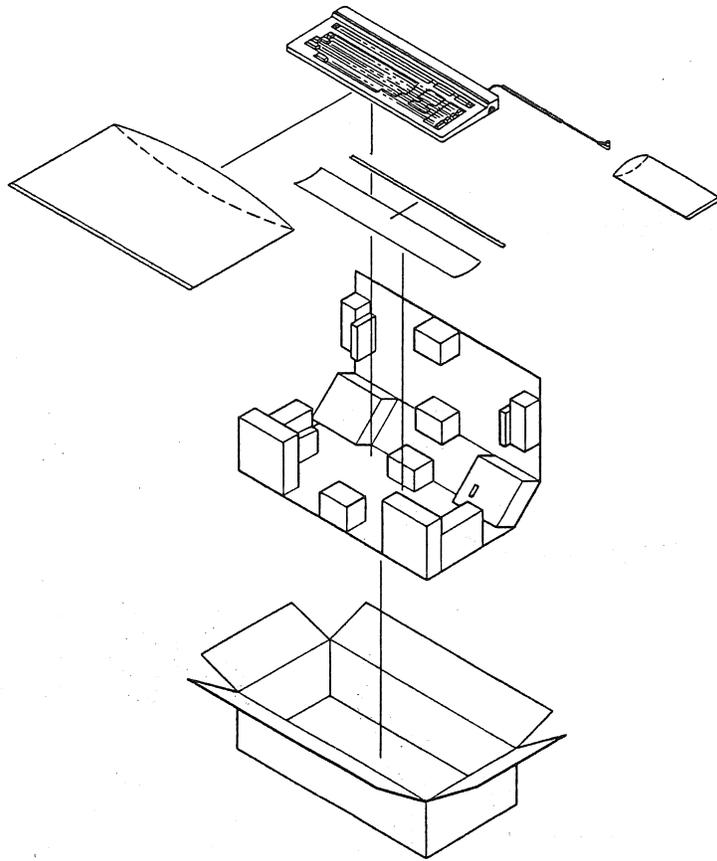
Figure 2-1-2   Key Board unpacking
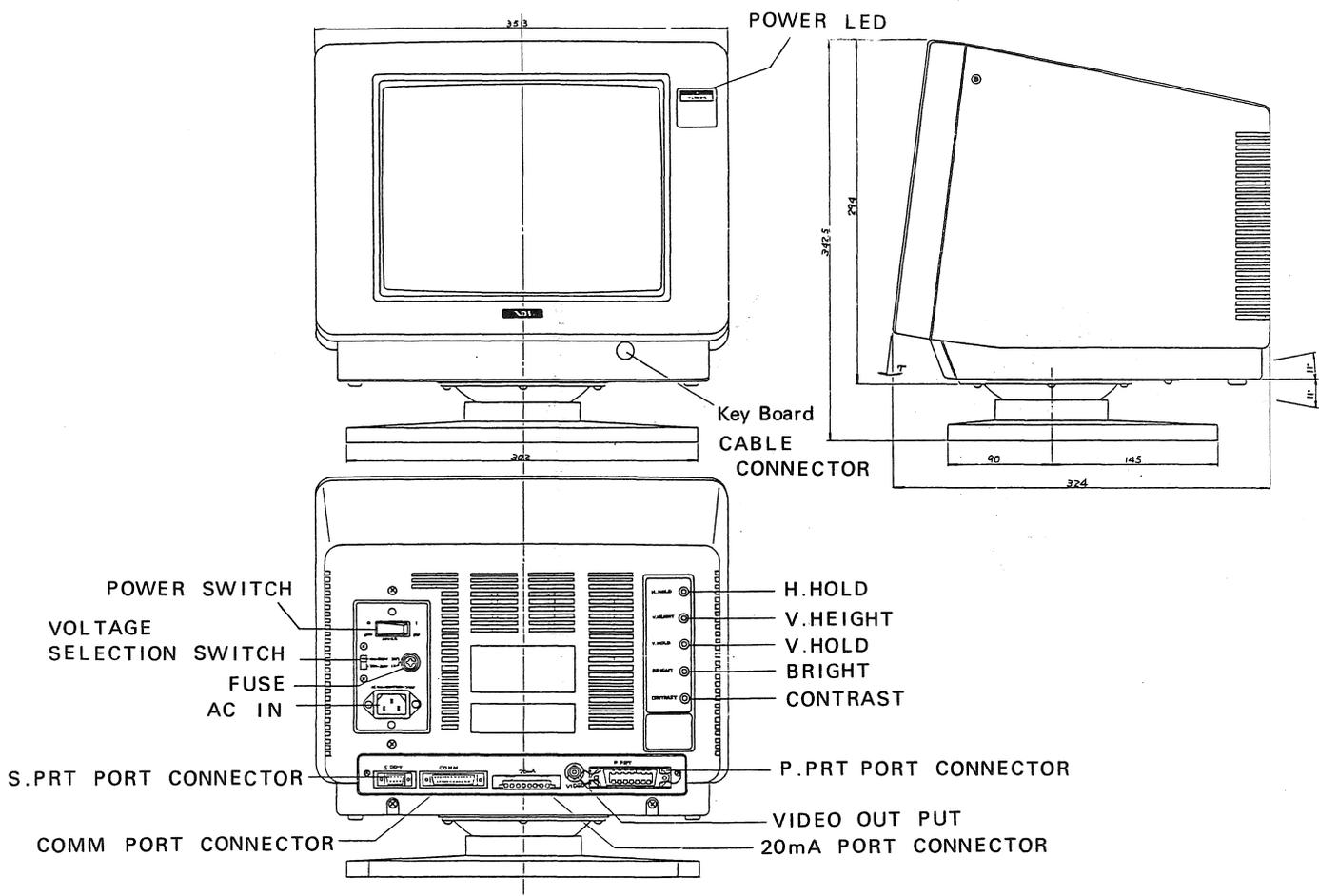
Figure 2-2-1 CONNECTORS and CONTROLS / Display Unit Dimensions
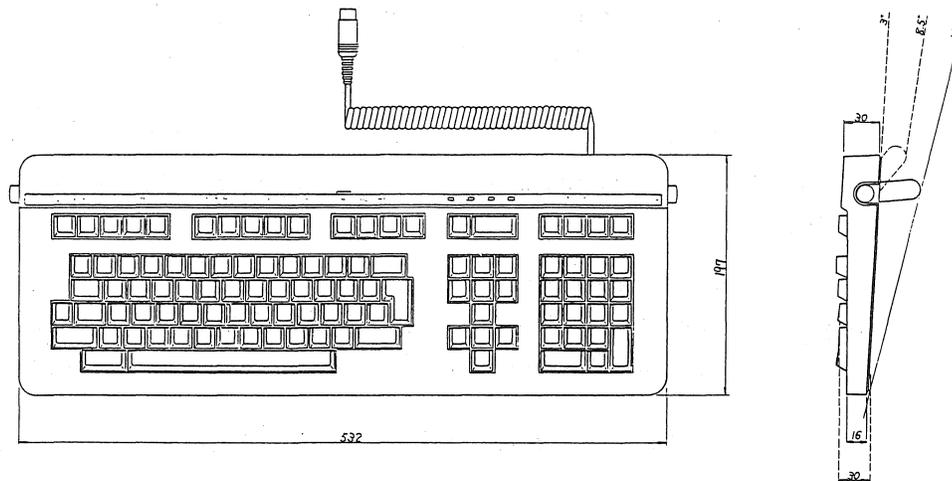
Figure 2-2-2   Key Board Dimensions

2.3 Connections

1) Connecting the keyboard unit (KB-920) and the display unit (DP-920).

Connect the DIN connector provided for the keyboard unit with the keyboard connector terminal on the lower right side of the front panel of display unit. Make sure to have the curved arrow pointing up when connecting the DIN connector.

Be sure to turn OFF the POWER switch when plugging the keyboard connector in and out.

2) Connecting the power supply cord

Be sure to check that the AC voltage changeover switch is set to the voltage value to be supplied when connecting the power supply cord. (See Fig. 2-2-1.)

When the set point is different, change the voltage to the appropriate value according to the following procedures:

```
┌─────────────┐
│  CAUTION    │
└─────────────┘
```

VG-920 may fail if operated with the wrong AC voltage.

(1) Set the AC voltage changeover switch to the voltage value to be supplied when the power cord is disconnected.

(2) Replace the fuse according to the voltage value to be supplied.
Setting the AC voltage to AC 100V: 2A/250V fuse (Pre-set to the unit at factory as a standard equipment)
Setting the AC voltage to AC 200V: 1A/250V fuse (Attached as an accessory)

(3) Connect the power supply cord with the equipment and plug the cord into the AC plug receptacle.

3) Connecting the line-interface connector
This equipment is provided with two kinds of line interface; the COMM port conforming to the EIA RS232C/RS423 standard and the 20-mA port for the 20-mA current loop interface.
See Section 3.5-1) "Line interface," for connecting these line-interface ports with the host computer.
At this time, note the following points:

(1) When connecting the 25-P connector with the COMM port, be sure to tighten two screws on the connector cover to lock the connector plug onto the equipment.

(2) When connecting the Mate-N-Loc connector with the 20-mA port, fix the connector to the equipment with the left and right lock mechanisms.

(3) Be sure to turn OFF the power supply switch when plugging the line-interface connector in and out.

4) Connecting the printer-interface connector
Either the S.PRT port (standard port) conforming to the EIA RS232C/RS423 standard or the P/PRT port (option) for the TTL-level (conforming to CENTRONIX) parallel data can be selected. See Section 3.5-2) "Printer interface" for connecting one of these ports with the printer.
At this time, note the following points:

(1) When connecting the 9-pin D connector with the S.PRT port, be sure to tighten two screws on the connecter cover to lock the connector plug onto the equipment.

(2) When connecting the connector with the P.PRT port (option), lock the connector plug onto the equipment with two spring locks of the connector receptacle.

(3) Be sure to turn OFF the POWER switch when plugging the printer interface connector in and out.

2.4 Angle Alignment

1) Angle alignment for display unit DP-920
The tilt swivel feature enables up/down and right/left angle alignments on the CRT. (See Section 2.2-1 "Display Unit Dimensions.")

2) Angle alignment for keyboard unit KB-920

The inclination angle of the keyboard unit can be switched in 3 steps by operating the angle alignment Foots on both left and right sides of this unit. (See Section 2.2-2 "Keyboard Dimensions.")

The Foot comes out by pressing the button.

2.5 Operation Test

Perform the initial operation test when the connection is completed.

Also for checking the operation of each function, see Sections 3 "OPERATION," 4 "CONTROL CODES," and 5 "PROGRAMING."

1) When the POWER switch is turned ON, the POWER LED (red) on the front panel lights up.

2) When the CRT warms up, the diagnostic message is displayed.

If an error is detected by self-diagnosis while the power is on, the error message is displayed. If not detected, the VG-920 OK message is displayed and VG-920 starts operating.

3) See Section 3 "OPERATION" and Section 4 "PROGRAMMING" for checking the operation conditions.

Next connect this equipment with the external unit, then perform the online operation test according to the following procedures.

And check that the online operation function is normal:

1) Turn OFF the POWER switch.

2) Connect the cable with the equipment.

3) Turn ON the POWER switch.

4) Select each operation condition corresponding to the external unit in the Set Up mode.

5) Execute the sending/receiving test according to the user test program.

2.6 Notes

1) Do not turn ON the POWER switch immediately after turning it OFF. Be sure to have a 1 minute pause before turning the POWER switch back ON.

2) The equipment may not function normally (for example, key-in operation becomes impossible) due to the spark phenomenon generated on the CRT, excessive noise in the power supply line, or immediate disconnection of power supply line. In this case, turn OFF the POWER switch once before operating the equipment.

3) Do not use any solvent such as thinner, benzine, or gasoline to clean up the exterior of the equipment. It may damage the plastic parts.

Clean it up with the cloth soaked in a small amount of furniture or house cleaner.

4) Annual interior cleaning and inspection are very effective for preventing a failure.

5) Notes for removing the logic board and rear cover.

   (1)   The logic board can be dismounted according to the following procedures:
- Pull out the keyboard connector.
- Remove two screws marked with A. (See Fig. 2-5-1.)
- Remove two connectors from the logic board.

   (2)   The rear cover can be separated from the front according to the following procedure:
- Remove 8 screws marked with B. (See Fig. 2-5-1.)

6) To avoid the influence from external noises; keep the equipment away from the noise source and keep the power supply cord away from other signal cables as far as possible.
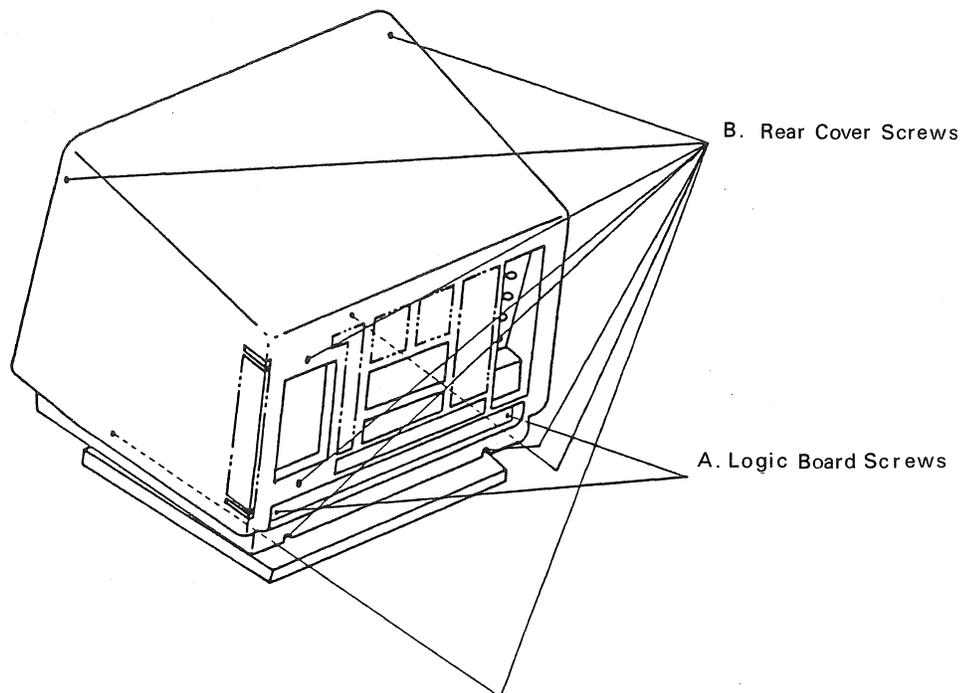
Fig. 2-5-1

3. OPERATION

3.1 General

This section explains about the keyboard, the Set Up mode, print function, interface, and self-diagnosis.

3.2 Keyboard Unit

1) Configuration

Fig. 3-2-1 shows the key arrangement of the keyboard unit.
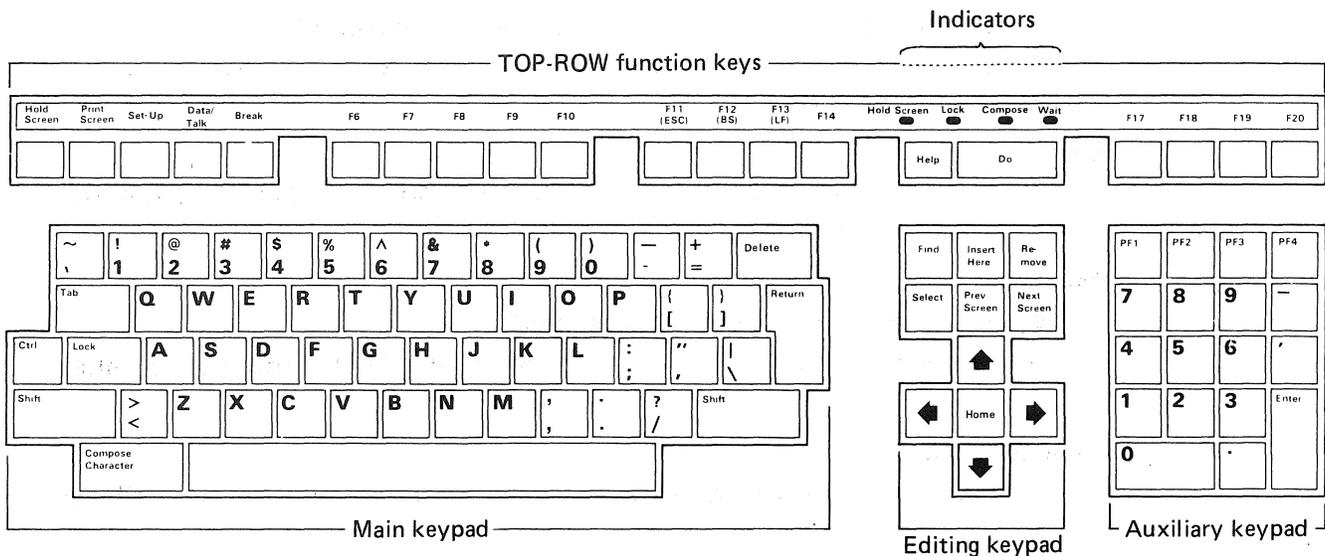
Fig. 3-2-1 Key Arrangement

Keyboard unit KB-920 consists of the following blocks:
- Main keypad
- Editing keypad
- Auxiliary keypad
- Top-Row function keys
- Indicators
- Audible indicator

(1) Main keypad

The main keypad consists of the standard typewriter keys and the following function keys:

TAB:

When pressed, the horizontal tab code is transmitted.

Ctrl:

When another key is pressed while this is held down, the control code is transmitted.

Lock:

The key-in operation performed after this key is pressed causes the Shift-Lock or Caps-Lock code to be transmitted. (Caps Lock or Shift Lock can be selected from the Keyboard Set Up screen.)

Shift:

When another key is pressed while this key is held down, a capital letter or a symbol described on the upper part of keytop is transmitted.

In addition, it can be used with a function key to specify the control function defined for this equipment.

Return:

When pressed, the return code or the return/new-line code is transmitted. (selected from the General Set Up screen)

Delete:

When pressed, the DEL code is transmitted.

When pressed while the Ctrl key is held down, the CAN (Cancel) code is transmitted.

Compose Character:

This key, when pressed, generates characters which not exist on the main keypad.

For details, see Section 3.2-2) "Compose function."

(2) Editing keypad

The editing keypad is used for cursor control and screen editing. 4 arrow keys and a Home key are used to control the cursor position corresponding to the indication on their keytops. Each of 6 edit keys is used to transmit the control code sequence corresponding to the edit function specified by the key. For more details, see Section 5.1-(2) "Editing keypad."

(3) Auxiliary keypad

The auxiliary keypad consists of number keys, 4 function keys, and an ENTER key. When the ENTER key is pressed, the return code or the return/new-line code is transmitted. (selected from the General Set Up screen)

For more details, see Section 5.1-(3) "Auxiliary keypad."

(4) Top-Row function keys

The keys other than the following keys can be defined as the function keys by user's application program.

Hold Screen:

When pressed, the display screen is locked and the data inputted after this key cannot be displayed on the screen.

When it is pressed again, the above lock condition is cancelled and the data inputted after this key are displayed on the screen. (The input of this key is invalid when the NO XOFF mode is selected from the Communication Set Up menu.)

Print Screen:

When pressed, the data displayed on the screen are outputted to the printer. When pressed while the Ctrl key is held down, the Auto Print mode can be set and reset. (The input of these keys is invalid when the Controller mode is selected from the Printer Set Up screen.)

Set Up:

When pressed, the Set Up mode is specified for the equipment. When it is pressed again, this mode is cancelled.

Data/Talk:

This key is valid only when the EIA Modem Control mode is specified.

Break:

When pressed, the break signal is outputted to the host computer. (This is valid when the break operation is selected from the Keyboard Set Up screen.) When pressed while the Shift key is held down, the host computer line is disconnected.

When pressed while the Ctrl key is held down, the answer-back message is transmitted to the host computer.

F11 (ESC):

When pressed, the ESC code is generated if the VT100 or VT52 mode is selected in the General Set Up screen. In the VT200 mode, this key is defined as a as a function key by user's application program.

F12 (BS):

When pressed, the BS code is generated if the VT100 or VT52 mode is selected from the General Set Up screen. In the VT200 mode, this key is defined as a function key by user's application program.

F13 (LF):

When pressed, the LF code is generated if the VT100 or VT52 mode is selected from the General Set Up screen. In the VT200 mode, this key is defined as a function key by user's application program.

Table 3-2-1 shows examples of general uses of KB-920 function keys.

Table 3-2-1 Uses of Function Keys

Key names	Uses
F6 F7 F8 F9 F10 F11 (ESC) F12 (BS) F13 (LF) F14 Help Do F17 F18 F19 F20	User defined function keys
← → ↑ ↓ Home	Cursor position define keys
Find Insert Here Remove Select Prov. Screen Next Screen	Screen editing keys
PF1 PF2 PF3 PF4	User defined function keys

(5) Indicator

The keyboard unit indicates the operation conditions of the equipment with 4 LEDs described below:

Hold Screen Indicator:

This LED lights up when the display screen is locked by the Hold Screen key.

Lock Indicator:

This LED lights up when the keyboard unit is capital characters.

Compose Indicator:

This LED lights up when the equipment performs the compose sequence function.

Wait Indicator:

This LED lights up when data are inhibitted from being inputted from the keyboard unit. This Wait status is released by executing Clear Comm on the Set Up Directory screen.

(6) Audible Indicator

The keyboard unit generates the following kinds of bell sound which can be selected in the Set Up mode:

Key click:

The key click sound is generated at every key input movement from the keyboard unit under the conditions other than the followings:

- The Shift or Ctrl key is inputted.
  The reason is that either of the above keys alone does not generate any character code.

- The Wait indicator lights up
  The data keyed in from the keyboard is erased.

- The key click sound is inhibited from being generated on the Keyboard Set Up screen.

Bell (Margin bell, warning bell)

The bell sound is generated.

- A RAM error is generated when:
- The BEL code is received. (This is effective only when Warning Bell is selected from the Keyboard Set Up screen.)
- A Keyboard operation error such as a Compose error is generated. (This is effective only when Warning Bell is selected from the Keyboard Set Up screen.)
- The cursor reaches the right margin by inputting data from the keyboard. (This is effective only when Warning Bell is selected from the Keyboard Set Up screen.)

2) Compose sequence function

The Compose sequence function is provided to generate the characters not existing on the main keypad. There are the following 2 methods for the Compose sequence function, 3-stroke sequence and 2-stroke sequence:

(1) 3-stroke sequence

The 3-stroke sequence operates with the keyboard in any type. Input the COMPOSE CHARACTER key first and then input 2 characters to operate this sequence.
Table 3-2-2 shows this sequence.

(2) 2-stroke sequence

The 2-stroke sequence operates with any keyboard other than the North American Keyboard. The input of the COMPOSE CHARACTER key is not required to operate this sequence.

The 2-stroke sequence operates faster than the 3-stroke sequence but it is limited to generate the characters only preceded by the diacritical marks such as Grave accent, Acute accent, Circumflex accent, Tilde mark, Diaeresis mark (Umlaut), and Ring mark. Characters corresponding to the diacritical marks are shown below:

Diacritical Mark	Corresponding characters
Diaresis (Umlaut) mark	Double quote "
Accute accent	Apostrophe '
Grave accent	Single quote `
Circumflex accent	Circumflex character ˆ
Tilde mark	Tilde character ~
Ring mark	Asterisk * or degree °

Table 3-2-2 shows this sequence.

Depending on the keyboard unit, the Compose sequence character can be generated according to the different procedures as described below:

- The Compose sequence character can be generated by inputting the corresponding key if there is a necessary character on the main keypad.
- The Compose sequence character can be generated in the 3-stroke sequence.
- The Compose sequence character can be generated in the 2-stroke sequence if there is a necessary diacritical mark on the main keypad.

(3) Generation of a Compose character in the 3-stroke sequence

The Compose characters are generated according to the following procedures:

- Retrieve the necessary Compose characters from Table 3-2-2.
- Input the COMPOSE CHARACTER key from the keyboard unit. (The Compose indicator on the keyboard unit lights up to set the equipment to the Compose mode.)
- Input 2 sequence characters.

Example: Generation of é (e acute)
After inputting the COMPOSE CHARACTER key, input characters e and '(Apostrophe) or '(Apostrophe) and e in this order.

Upon normal completion of the 3-stroke sequence, the Compose indicator puts out and a compose character is generated.

If an error is generated during the operation, the 3-stroke sequence is suspended and the bell is generated when Warning Bell is selected from the Keyboard Set Up screen.

Note: If the function key is inputted during the 3-stroke sequence, the sequence operation is suspended without generating the bell.

(4) Generation of a Compose character in the 2-stroke sequence

A compose character is generated according to the following procedures:

Note: The 2-stroke sequence operates with the keyboard in any type other than the North American Keyboard.

- Retrieve a necessary Compose character from Table 3-2-2 and check whether the character can be generated in the 2-stroke sequence.
- Input the diacritical mark. (The Compose indicator on the keyboard unit lights up to set the equipment to the Compose mode.)
- Input the second character.

Example: Generation of è (e grave) with Danish Keyboard Input ` (Grave accent) and e in this order.

Upon normal completion of the 2-stroke sequence, the Compose indicator on the keyboard unit puts out and the Compose character is generated.

If an error is generated during the operation, the 2-stroke sequence is suspended and a bell is generated when Warning Bell is selected from the Keyboard Set Up screen.

Note: If a function key is inputted during the 2-stroke sequence, the sequence operation is suspended without generating the bell.

(5) Suspension and Restart of the Compose sequence

If the COMPOSE CHARACTER key or the Diacritical Mark is carelessly inputted to set the equipment to the Compose mode, the Compose mode can be cancelled by inputting the DELETE key. The data inputted during the cancelled Compose sequence is ignored. If the COMPOSE CHARACTER key is inputted during the Compose sequence, the 3-stroke sequence is newly started and the data inputted during the Compose sequence immediately before this key is inputted is ignored.

Fig. 3-2-2 Compose Code Sequence

Note: During the 3-stroke sequence, the characters can be inputted in any order unless there is any special indication.
During the 2-stroke sequence, the characters must be inputted according to the order described in this table.

Compose character	3-stroke sequence	2-stroke sequence
" (quotation mark)	" (sp)	. . (sp)
# (number sign)	+ +	, (sp)
' (apostrophe)	' (sp)	
@ (commercial at)	aa or AA	
[(opening bracket)	((	
\ (backslash)	/ / or /<	
] (closing bracket)	))	
^ (circumflex)	^ (sp)	^ (sp)
` (single quote)	` (sp)	` (sp)
{ (opening brace)	(—	
l (vertical line)	/ ^	
} (closing brace)	) —	
~ (tilde)	~ (sp)	~ (sp)
¡ (inverted!)	! !	
c (cent sign)	c /, C /, c C	
£ (pound sign)	l —, L —, l = , or L =	
¥ (yen sign)	y —, Y —, y =, or Y =	
§ (section sign)	so, SO, S!, s! , sO, or SO	
¤ (currency sign)	xo, XO, xO, or XO	
© (copyright sign)	co, CO, cO, or CO	
a (feminine ordinal indicator)	a- or A-	
« (angle quotation mark left)	((	
° (degree sign)	O ^ , (SP)*, or (SP) °	
± (plus/minus sign)	+ ⊤	
2 (superscript 2)	2 ^	
3 (superscript 3)	3 ^	
µ (micro sign)	/u or /U (Do not change the character order.)	
¶ (paragraph sign)	p! or P!	
· (middle dot)	. ^	
1 (superscript 1)	1 ^	
o (masculine ordinal indicator)	o — or O —	
» (angle quotation mark right)	))	
¼ (fraction one-quarter)	14 (Do not change the character order.)	
½ (fraction one-half)	12 (Do not change the character order.)	
¿ (inverted?)	? ?	
À (A grave)	A `	` A
Á (A acute)	A '	' A
Â (A circumflex)	A ^	^ A

Compose character	3-stroke sequence	2-stroke sequence
Ã (A tilde)	A ~	~ A
Ä (A umlaut)	A″ or A¨	¨ A
Å (A ring)	A* or A°	
AE (AE ligature)	AE (Do not change the character order.)	
ç (C cedilla)	c ,	
È (E grave)	E `	` E
É (E acute)	E ´	´ E
Ê (E circumflex)	E ^	^ E
Ë (E umlaut)	E″ or E¨	¨ E
Ì (I grave)	I `	` I
Í (I acute)	I ´	´ I
Î (I circumflex)	I ^	^ I
Ï (I umlaut)	I″ or I¨	¨ I
Ñ (N tilde)	N ~	~ N
Ò (O grave)	O `	` O
Ó (O acute)	O ´	´ O
Ô (O circumflex)	O ^	^ O
Õ (O tilde)	O ~	~ O
Ö (O umlaut)	O″ or o¨	¨ O
OE (O E ligature)	OE (Do not change the character order.)	
Ù (U grave)	U `	` U
Ú (U acute)	U ´	´ U
Û (U circumflex)	U ^	^ U
Ü (U umlaut)	U″ or U¨	¨ U
Ÿ (Y umlaut)	Y″ or Y¨	¨ Y
β (German small sharps)	s s	` a
à (a grave)	a `	` a
á (a acute)	a ´	´ a
â (a circumflex)	a ^	^ a
a (a tilde)	a ~	~ a
ä (a umlaut)	a″ or a¨	
à (a ring)	a* or a°	
ae (a e ligature)	ae (Do not change the character order.)	
ç (c cedilla	c ,	
è (e grave)	e `	` e
é (e acute)	e ´	´ e
ê (e circumflex)	e ^	^ e
ë (e umlaut)	e″ or e¨	¨ e
ì (i grave)	i `	` i
í (i acute)	i ´	´ i
î (i circumflex)	i ^	^ i
ï (i umlaut)	i″ or i¨	¨ i
ñ (n tilde)	n ~	~ n
ò (o grave)	o `	` o
ó (o acute)	o ´	´ o
ô (o circumflex)	o ^	^ o

õ (o tilde)	o ~	~ o
ö (o umlaut)	o'' or o¨	¨ o
œ (o e ligature)	œ (Do not change the character order.)	
ø (o slash)	o /	
ù (u grave)	u `	` u
ú (u acute)	u ´	´ u
û (u circumflex)	u ^	^ u
ü (u umlaut)	u'' or u¨	¨ u
ÿ (y umlaut)	y'' or y¨	¨ y

3.3 Set Up Mode

VG-920 stores the control parameters required for operation in the nonvolatile RAM (NVR) and preserves them even when power is off.

There are 2 kinds of control parameters; those selected by the operator and default parameters provided at shipment.

The control parameter is changed in the Set Up mode. The control parameters are classified into 7 categories and displayed on the following menues:

- Set Up Directory screen
- Display Set Up screen
- General Set Up screen
- Communications Set Up screen
- Printer Set Up screen
- Keyboard Set Up screen
- Tab Set Up screen

All the parameters on each Set Up screen can be changed by inputting data from keyboard unit. However, some parameters can be changed by the command inputted from the host computer.

The Set Up mode is started by inputting the Set Up key and the Set Up Directory screen is displayed on the screen. However, multiple Set Up screens cannot be displayed simultaneously.

Control can be transferred from each Set Up screen to another Set Up screen. When the Set Up key is inputted again, the Set Up mode can be cancelled.

1) Outline of Set Up screens

Each Set Up screen is displayed on the lower part of the CRT screen. (Data displayed before this menu temporarily disappear from the screen.) If the XOFF operation is selected from the Communication Set Up Screen, the data received from the host computer are not lost.

Each Set Up screen consists of the following items:

- Screen title
- Terminal ID
- Status line
- Field

(1) Screen title

The screen title is displayed corresponding to each of 7 categories into which the control parameters are classified. There are 7 screen titles as shown below:

- Set Up Directory
- Display Set Up
- General Set Up

- Communication Set Up
- Printer Set Up
- Keyboard Set Up
- Tab Set Up

(2) Terminal ID

The equipment type is displayed as the terminal ID.

VG-920 is displayed as the terminal ID for this equipment.

(3) Status line

The status line is the lowermost line of each Set Up screen. In this line, the status information on the MODEM, printer, or equipment in the Insert/Replace mode is displayed. The status line is exclusively used to display a message so that the displayed message cannot be changed by the operations at the keyboard. Table 3-3-1 shows the messages to be displayed on the status line.

Table 3-3-1 Status Line Messages

Items	Messages	Contents
Insert/Replace:	Insert Mode	Indicates that the equipment is set to the Insert mode. When display data are newly generated, the characters displayed between the cursor and the last character of the line are shifted to the right and the new data are displayed at the cursor position.
	Replace Mode	Indicates that the equipment is set to the Replace mode. When new display data are generated, the characters displayed at the cursor position are replaced with new data.
Printer:	Ready	Indicates that the serial interface printer is ready.
	Not Ready	Indicates that the serial interface printer is not ready.
	None	Indicates that the serial interface printer is not connected with this equipment.
	Auto Print	Indicates that the equipment is set to the Auto Print mode.
	Controller	Indicates that the equipment is set to the Printer Controller mode.
Parallel Printer		Indicates that the equipment selects the parallel printer.
Modem:	DSR, Data DSR, Talk	Indicates that the DSR is turned ON.
	No. DSR, Data No. DSR, Talk	Indicates that the MODEM is not operational.
	DSR, Connected	Indicates that the MODEM is operational.

(4) Field

In the Field, the control parameters currently specified for the equipment corresponding to each Set Up screen are displayed. The Field can be divided into the following 3 sections:

- Command

   When the field cursor is moved to the command section and the Enter key is inputted, the equipment operates according to the displayed command. For example, when the field cursor is moved to "To Directory" and the Enter key is inputted, the screen moves to the Set Up Directory screen.

- Parameter

   The parameter values currently specified for the equipment are displayed. In this section, 2 or more parameter values are defined. When the field cursor is moved to the parameter section and the Enter key is inputted, the parameter value indicated by the cursor is updated endlessly. For example, when the field cursor is moved to the Keyclick parameter and the Enter key is inputted while "Keyclick" is displayed, the display is changed to "No Keyclick."

- Text

   Data can be set in the text section by directly inputting a message from the keyboard unit according to the following procedures:

   1. Use an arrow key or arrow keys to move the field cursor to the text section.

   2. Input the Enter key to set the text input area in the position of status line that is the lowermost line of the CRT screen and at this time, the status line temporarily disappears.

   3. Input the necessary text.

   4. Input the Enter key.

   If inputting a wrong key during creation of a text, input the Delete key to delete only the last character.

   In addition, in order to suspend creating the text and leave the original set point as it is, input arrow keys to move the cursor.

(5) Set Up mode Control

VG-920 controls the Set Up mode with the field cursor.

The field cursor is displayed brightly and it moves over the field by inputting the arrow keys from the keyboard unit. Table 3-3-2 describes the methods for starting and ending the Set Up mode, moving the field cursor, and changing the control parameter.

Table 3-3-2 Set Up Mode Control

Operation keys	Functions
Set Up	Starts and ends the Set Up mode alternately every time the Set Up key is pressed.
Arrow Key	Moves the field cursor to the arrow direction.
Enter	Starts the item indicated by the field cursor. Executes the command according to the data indicated by the field cursor in the command section. Updates the displayed parameter value at every input of the Enter key if the field cursor is located in the parameter section.

2) Set Up screen

Table 3-3-3 lists up the items to be displayed in the Set Up screen field.

Table 3-3-3   Field Display Item List

Set Up Directory	Display Set Up	General Set Up
Display Set Up	To Next Set Up	To Next Set Up
General Set Up	To Directory	To Directory
Communications Set Up	80/132 Columns	Terminal Mode
Printer Set Up	Control Representation Mode	ASCII/U.K.
Keyboard Set Up	Auto Wrap	UDK Lock
Tab Set Up	Smooth/Jump Scroll	User Features Lock
On-Line/Local	Light/Dark Screen	Keypad Mode
Clear Display	Cursor	Cursor Key Mode
Clear Communications	Cursor Style	New Line
Recall Saved Parameters		
Save Parameters		
Set Up Language		
Keyboard Language		
Factory Defaults		
Exit Set Up		

Communications Set Up	Printer Set Up	Keyboard Set Up
To Next Set Up	To Next Set Up	To Next Set Up
To Directory	To Directory	To Directory
Transmit Speed	Parallel/Serial	Typewriter/D.P.
Receive Speed	Transmit/Receive Speed	Caps/Shift-Lock
XOFF	Print Mode	Auto Repeat
Data-Bits/Parity	Data-Bits/Parity	Keyclick
Stop Bits	Stop Bits	Margin Bell
Local Echo	Print Page/Region	Warning Bell
Host Port Selection	Printed Data Type	Break
Disconnect	Print Terminator	Auto-Answerback
Transmit Rate Limit		Answerback Message
		Conceal Answerback

Tab Set Up
To Next Set Up
To Directory
Clear All Tabs
Set 8 Column Tabs
Tab Fields and Ruler

(1) Set Up Directory screen

The Set Up Directory screen is displayed immediately after the Set Up mode is started by inputting the Set Up key.

In this screen, the item to be required prior to proceeding to other Set Up screen or operation of this equipment is selected.

```
Set-Up Directory                                          VG-920 1.1
 Display  General  Comm  Printer  Keyboard  Tab

 On LIne  Clear Display  Clear Comm  Reset Terminal  Recall  Save

 Set-Up English  North American Keyboard  Default  Exit
------------------------------------------------------------------------
  Replace Mode          Printer:None
```
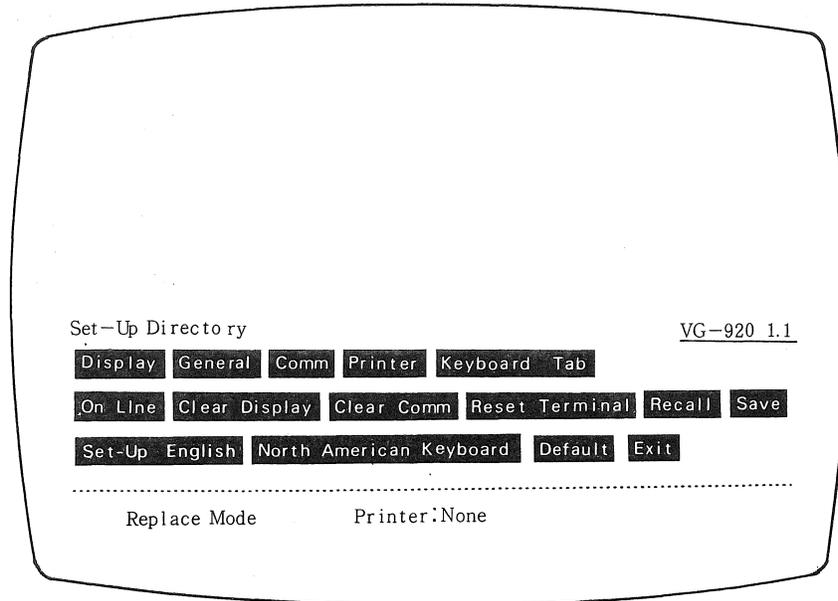
Field (Field kind)	Setting	Contents
Display Set Up (command)	Display	Proceed to the Display Set Up screen.
General Set Up (command)	General	Proceed to the General Set Up screen.
Communication Set Up (command)	Communication	Proceed to the Communication Set Up screen.
Printer Set Up (command)	Printer	Proceed to the Printer Set Up screen.
Keyboard Set Up (command)	Keyboard	Proceed to the Keyboard Set Up screen.
Tab Set Up (command)	Tab	Proceed to the Tab Set Up screen
On Line/Local (parameter)	On Line (Default)	Data can be sent/received to/from the host computer.
	Local	The data inputted from the keyboard is displayed on the screen but not sent to the host computer. The data received from the host computer is stored in the received data buffer in the equipment.

Field (Field kind)	Setting	Contents
Clear Dispaly (command)	Clear Display	Clears the screen after completion of the Set Up mode.
Clear Communication (command)	Clear Comm.	Holds the print operation and resets the Print Controller mode. Invalidates the control command sequence. Clears all the sent/received data buffers. Resets the XOFF code reception flag received from the host computer or the serial interface printer and sends the XON code to the host computer.
Reset Terminal (command)	Reset Terminal	Resets the equipment functions other than the screen display function, data transfer to/from the external equipment, and the user defined key functions, to the power-on status.
Recall Saved Parameters (command)	Recall	Reads the parameter set values from the non-volatile memory and replaces them with all the values set in the VG-920 Set Up screen field. After completion of the Set Up mode, the screen is cleared.
Save Parameters (command)	Save	Saves all the parameters set in the VG-920 Set Up screen field in the nonvolatile memory.
Set Up Language (parameter)	Set Up = English (Default)	Selects the language to be displayed on the Set Up screen.
	Set Up = Francais	
	Set Up = Deutsch	
Keyboard Language (parameter)	North American Keyboard (Default)	Selects the type of keyboard unit to operate.
	British Keyboard	
	Flemish Keyboard	
	Canadian (French) (Keyboard)	
	Danish Keyboard	
	Finnish Keyboard	
	German Keyboard	
	Dutch Keyboard	
	Italian Keyboard	
	Swiss (French) Keyboard	
	Swiss (German) Keyboard	
	Swedish Keyboard	
	Norwegian Keyboard	
	French/Belgian Keyboard	
	Spanish Keyboard	

Field (Field kind)	Setting	Contents
Factory Default (command)	Default	Replaces all the parameter values set in the VG-920 Set Up screen field with those set at shipment. After completion of the Set Up mode, the screen is cleared and the cursor is positioned in the first column on the first line.
Exit Set Up (command)	Exit	Cancels the Set Up mode and moves to the On Line mode or Local mode.

(2) Display Set Up screen

On the Display Set Up screen, the parameters concerning screen display are set.

```
Display Set-Up                                    VG-920 1.1
To Next Set-Up   To Directory   80 Columns   Interpret Controls

No Auto Wrap   Smooth Scroll   Light Text,Dark Screen

Blink Cursor   Block Cursor Style   50Hz
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    Replace Mode            Printer :None
```
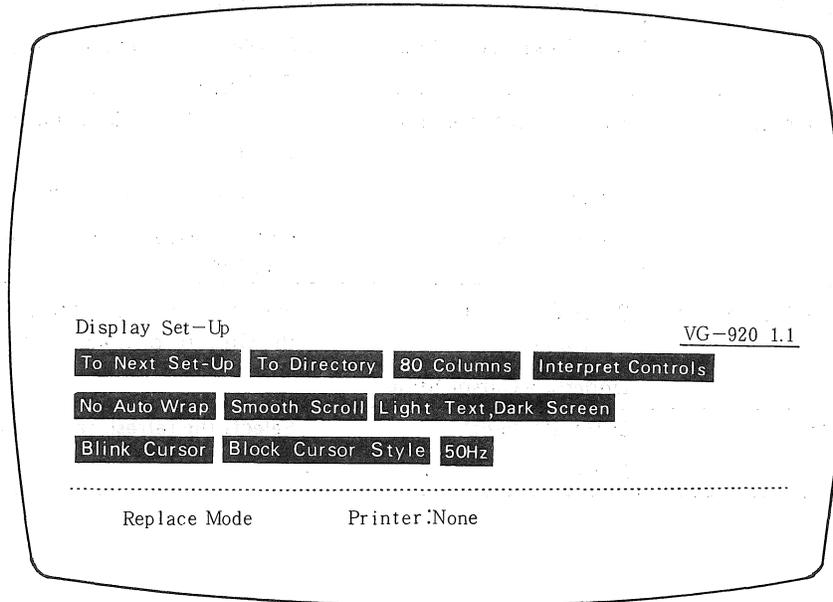
Table 3-3-3   Field Display Item List

Fields (Field kinds)	Parameter settings	Contents
To Next Set Up (command)	To Next Set Up	Switches the Display Set Up screen to the General Set Up screen.
To Directory (command)	To Directory	Switches the Display Set Up screen to the Set Up Directory screen.
80/132 Columns (parameter)	80 Columns (Default) 132 Columns	Selects the number of characters in a line. When the number is switched, at the same time, the menu is switched and the On-Line or Local parameter disappears.
Control Representation Mode (parameter)	Interpret Controls (Default)	The control code executes individually defined operations and it is not displayed on the screen.
	Display Controls	The control code is displayed on the screen but it does not execute individually defined operations.
Auto Wrap (parameter)	No Auto Wrap (Default)	The received data exceeding the last column on the line are replaced on the last column and a new line is not started.
	Auto Wrap	The received data exceeding the last column on the line continues to be displayed starting at the first column on the next line after automatic new-line operation is performed.
Smooth/Jump Scroll (parameter)	Smooth Scroll (Default)	Specifies the Smooth Scroll operation.
	Jump Scroll	Specifies the Jump Scroll operation.

Fields (Field kinds)	Parameter settings	Contents
Light/Dard Screen (parameter)	Light Text, Dark Screen (Default)	Displays only the characters are displayed on the screen.
	Dark Text, Light Screen	Displays the background and characters inversely.
Cursor (parameter)	Blank Cursor (Default)	Displays the blink cursor in the On-Line or Local mode.
	No Cursor	Inhibits the cursor from being displayed.
	Static Cursor	Displays the static cursor in the On-Line or Local Mode.
Cursor Style (parameter)	Block Cursor Style (Default)	Selects the shape of the cursor displayed in the On-Line or Local mode.
	Underline Cursor Style	
50Hz/60Hz	50Hz (Default)	Selects the refresh rate on the display screen.
	60Hz	

(3) General Set Up screen

The parameters concerning the overall operation of the equipment are set on the General Set Up screen

```
General Set-Up                                    VG-920 1.1
  To Next Set-Up    To Directory  VT200 Mode,7-Bit Controls

  User Defined Keys Unlocked  User Features Unlocked

  Numeric Keypad   Normal Cursor Keys   No New  Line
.................................................................
      Replace Mode          Printer:None
```

Fields (Field kinds)	Parameter settings	Contents
To Next Set Up (command)	To Next Set Up	Switches the General Set Up screen to the Communication Set Up screen.
To Directory (command)	To Directory	Switches the General Set Up screen to the Set Up Directory screen.
Terminal Mode (parameters)	VT200 Mode, 7-Bit Controls (Default)	The equipment operates in the VT200 7-bit control mode.
	VT200 Mode, 8-Bit Controls	The equipment operates in the VT200 8-bit control mode.
	VT52 Mode	The equipment operates in the VT52 mode.
	VT100 Mode	The equipment operates in the VT100 mode.
ASCII/UK (parameters)	VT100 ASCII (Default)	"#" is displayed when the 35NEX code is received when VT100 ASCII is selected, while "L" is displayed when the 35HEX code is received when VT100 UK is selected. This field is effective and displayed only in the VT100 or VT52 mode.
	VT100 U.K.	
UDK Lock (parameters)	User Defined Keys Unlocked (Default)	Enables any user defined function key to be defined again.
	User Defined Keys Locked	Inhibits any user defined function key to be defined again.

Fields (Field kinds)	Parameter settings	Contents
User Features Lock (parameters)	User Features Unlocked (Default)	Allows or inhibits the host computer to change the following items: • Auto repeat, • Smooth/jump scroll,
	User Features Locked	• Light/Dark screen, • Tab stop, • Keyboard lock
Keypad Mode (parameters)	Numeric Keypad (Default)	Every key on the auxiliary keypad other than function keys PF1 through PF4 transmits the ASCII code corresponding to the key indication.
	Application Keypad	Every key on the auxiliary keypad other than function keys PF1 through PF4 transmits the ASCII code corresponding to the key indication.
Cursor Key Modes (parameters)	Normal Cursor Key (Default)	Each arrow key transmits the sequence code according to the ANSI cursor control sequence.
	Application Cursor Keys	Each arrow key transmits the control sequence specified by the application program.
New Line (parameters)	No New Line (Default)	The Enter key, setting the Numeric Keypad or the Return key, generates the carriage return (CR) code.
	New Line	The Enter key, setting the Numeric Keypad or the Return key generates the carriage return/line feed (CR/LF) code.

(4) Communication Set Up screen

On the Communication Set Up screen, the parameters concerning communication with the host computer are set.
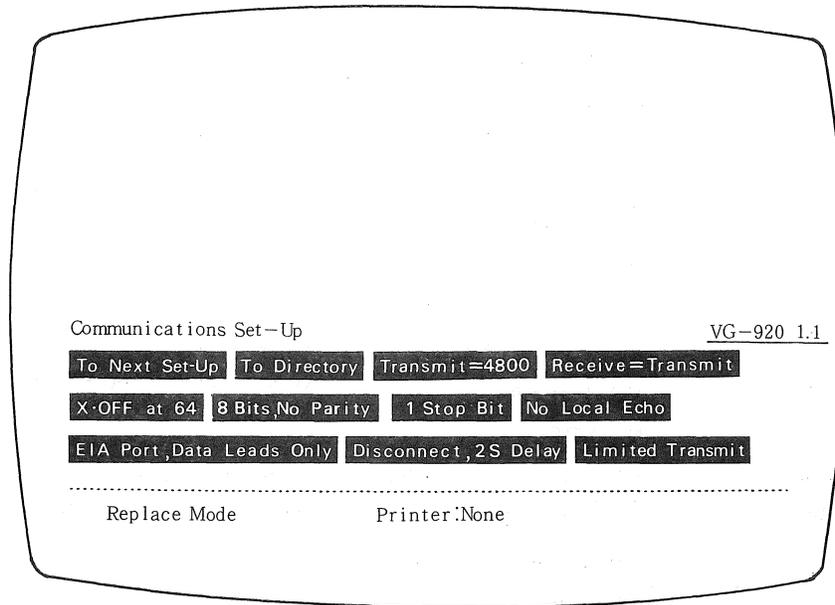
```
Communications Set-Up                                    VG-920  1.1
 To Next Set-Up   To Directory   Transmit=4800   Receive=Transmit

 X·OFF at 64   8 Bits No Parity    1 Stop Bit   No Local Echo

 EIA Port, Data Leads Only   Disconnect, 2S Delay   Limited Transmit
------------------------------------------------------------------
  Replace Mode                    Printer:None
```

Fields (Field kinds)	Parameter settings	Contents
To Next Set Up (command)	To Next Set Up	Switches the Communication Set Up screen to the Printer Set Up screen.
To Directory (command)	To Directory	Switches the Communication Set Up screen to the Set Up Directory screen.
Transmit Speed (parameters)	Transmit = 75	Selects the data transfer rate for sending data to the host computer.
	Transmit = 110	
	Transmit = 150	
	Transmit = 300	
	Transmit = 600	
	Transmit = 1200	
	Transmit = 2400	
	Transmit = 4800 (Default)	
	Transmit = 9600	
	Transmit = 19200	

Field (Field kind)	Setting	Contents
Receive Speed (parameters)	Receive = 75	Selects the data transfer rate for receiving data from the host computer.
	Receive = 110	
	Receive = 150	
	Receive = 300	
	Receive = 600	
	Receive = 1200	
	Receive = 2400	
	Receive = 4800	
	Receive = 9600	
	Receive = 19200	
	Receive = Transmit (Default)	
XOFF (parameters)	XOFF at 64 (Default)	Selects the timing for generating the XOFF code or inhibits the XOFF code from being generated.
	XOFF at 128	
	No. XOFF	
Data-Bits/Parity (parameters)	8 Bits, No. parity (Default)	Selects the bit structure for the data to be sent/received to/from the host computer.
	8 Bits, Even Parity	
	8 Bits, Odd Parity	
	7 Bits, No Parity	
	7 Bits, Even parity	
	7 Bits, Odd Parity	
	7 Bits, Mark Parity	
	7 Bits, Space Parity	
	7 Bits, Even Parity, No Check	
	7 Bits, Odd Parity, No Check	
	8 Bits, Even Parity, No Check	
	8 Bits, Odd Parity, No Check	
Stop Bits (parameters)	1 Stop Bit (Default)	Selects the number of stop bits for the data to be sent/received to/from the host computer.
	2 Stop Bits	
Local Echo (parameters)	No Local Echo (Default)	The key indicator inputted from the keyboard is sent to the host computer but it is not displayed on the screen.
	Local Echo	The key indicator inputted from the keyboard is sent to the host computer and at the same time, it is displayed on the screen.

Field (Field kind)	Setting	Contents
Host Port Selection (parameters)	EIA Pot, Data Lends Only (Default)	Selects the Comm port as a line interface with the host computer. This port is not controlled by the MODEM control signal. This interface operates with the sent data, received data, and signal ground signal.
	EIA Port, Modem Control	Selects the Comm port as a line interface with the host computer. This port is controlled by the MODEM control signal.
	20 mA Port	Selects the 20-mA port as a line interface with the host computer.
Disconnect (parameters)	Disconnect, 25 Delay (Default)	When parameter EIA Port, Modem control are selected, the communication line with the host computer is disconnected 2 seconds after the RLSD signal is turned OFF.
	Cisconnect, 60 ms Dalay	When parameter EIA port, MODEM control are selected, the communication line with the host computer is disconnected 60 ms after the RLSD signal is turned OFF.
Transfer Rate Limit (parameters)	Limited Transfer (Default)	Regardless of the data transfer rate (baud rate), sending data are limited to 150 to 180 characters per second.
	Unlimited Transfer	The number of characters for sending data is not limited.

(5) Printer Set Up screen
On the printer Set Up screen, the parameters concerning the printer are set.
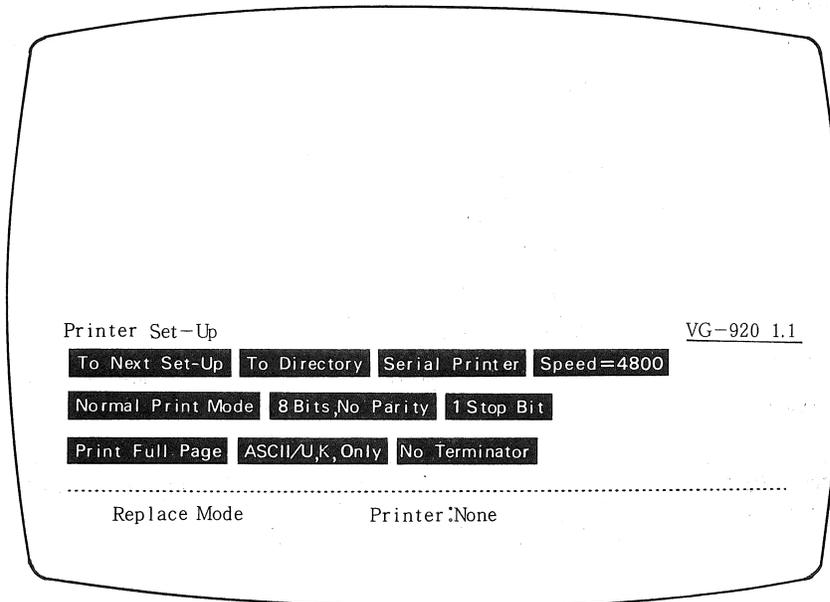
```
Printer Set-Up                                    VG-920 1.1
 To Next Set-Up   To Directory   Serial Printer  Speed=4800

 Normal Print Mode   8 Bits,No Parity   1 Stop Bit

 Print Full Page   ASCII/U,K,Only   No Terminator
.............................................................
    Replace Mode           Printer:None
```

Fields (Field kinds)	Parameter settings	Contents
To Next Set Up (command)	To Next Set Up	Switches the Printer Set Up screen to the Keyboard Set Up screen.
To Directory	To Directory	Switches the Printer Set Up screen to the Set Up Directory screen.
Parallel/Serial (parameters)	Serial Printer (Default)	Selects the printer interface type.
	Parallel Printer	
Send/Receive Speed (parameters)	Speed = 15	Selects the transfer rate for sending/receiving data to/from the serial interface printer.
	Speed = 110	
	Speed = 150	
	Speed = 300	
	Speed = 600	
	Speed = 1200	
	Speed = 2400	
	Speed = 4800 (Default)	
	Speed = 9600	
	Speed = 19200	
Print Mode (parameters)	Normal Print Mode (Default)	The print operation is started by inputting the key from the keyboard.
	Auto Print Mode	The character data on the line indicated by the cursor are sent to the printer by receiving the LF code, FF code, or VT code, or feeding the line automatically.
	Controller Mode	The data received from the host computer is not displayed on the screen but sent to the printer via VG-920.
Data-Bits/Parity (parameters)	7 Bits, No Parity	Selects the bit structure of the data to be sent/received to/from the serial interface printer.
	7 Bits, Mark Parity	
	7 Bits, Space Parity	
	7 Bits, Even Parity	
	7 Bits, Odd Parity	
	8 Bits, No Parity (Default)	
	8 Bits, Even Parity	
	8 Bits, Odd Parity	
Stop Bits (parameters)	1 Stop Bit (Default)	Selects the number of stop bits for the data to be sent/received to/from the serial interface printer.
	2 Stop Bits	
Print Page/Region (parameters)	Print Full Page (Default)	Selects the print range for page print operation.
	Print Scroll Region	

Field (Field kind)	Setting	Contents
Print Data Type (parameters)	ASCII/U.K. Only (Default)	Selects the print data type according to the character set of the printer which is to be connected. However, when the parallel printer is selected, the print data type is fixed to that of specified by parameter ASCII/UK only.
	ASCII/U.K., Line Drawing	
	All Characters	
Print Terminator (parameters)	No Terminator (Default)	Desides whether the FF code is sent as a terminator at completion of page print operation.
	Terminator = FF	

(6) Keyboard Set Up screen

On the Keyboard Set Up screen, the parameters concerning the keyboard unit are specified.
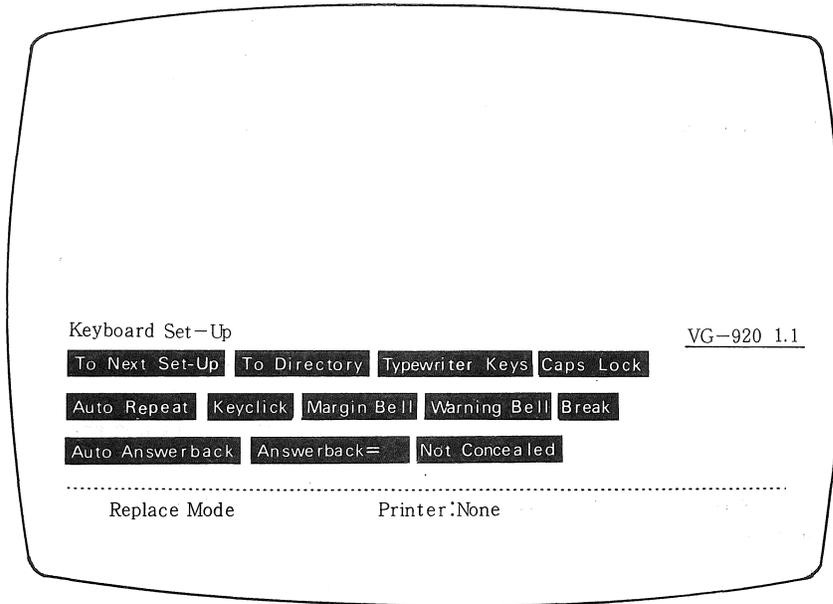
Keyboard Set—Up   VG—920 1.1
To Next Set-Up To Directory Typewriter Keys Caps Lock

Auto Repeat Keyclick Margin Bell Warning Bell Break

Auto Answerback Answerback= Not Concealed

Replace Mode   Printer:None

Fields (Field kinds)	parameter settings	Contents
To Next Set Up (command)	To Next Set Up	Switches the Keyboard Set Up screen to the Tab Set Up screen.
To Directory (command)	To Directory	Switches the Keyboard Set Up screen to the Set Up Directory screen.
Typewriter/D.P. (parameters)	Typewriter Keys (Default)	Generates the character indicated on the left-half keytop.
	Data Processing Keys	Generates the character indicated on the right-half keytop.

Field (Field kind)	Setting	Contents
Cap/Shift-Lock (parameters)	Caps Lock (Default)	Selects the function of the Lock key on the keyboard unit.
	Shift Lock	
Auto Repeat (parameters)	Auto Repeat (Default)	Desides whether to turn ON or OFF the automatic repeat function for the pressed key.
	No Auto Repeat	
Keyclick (parameters)	Keyclick (Default)	Desides whether to turn ON or OFF the click sound generation function of the keyboard.
	No keyclick	
Margin Bell (parameters)	Margin Bell (Default)	Selects whether to generate the bell sound when the cursor moves to the right margin in the On-Line or Local mode.
	No Margin Bell	
Warning Bell (parameters)	Warning Bell (Default)	Selects whether to generate the bell sound in case of an operational error or a reception of the BEL code.
	No Warning Bell	
Break (parameters)	Break (Default)	Desides whether to turn ON or OFF the Break key.
	No Break	
Auto Answerback (parameters)	Auto Answerback (Default)	Desides whether to automatically send the answer-back message to the host computer when the communication line with the host computer becomes operational.
	No Auto Answerback	
Answerback Message (text)	Answerback =	Enables the answerback message to be sent. The answerback message is sent to the host computer not only when the automatic answerback function is specified but also when the ENQ code is received or when the Break key is pressed while the Ctrl key is held down. When the Answerback Message field is started, "Enter Answerback =" is displayed on the status line and enables the message of up to 30 characters to be inputted.
Conceal Answerback (parameters)	Not Concealed (Default)	Select whether to display the answerback message specified for the equipment on the screen.
	Concealed	When "Concealed" is selected, the answer-back message is not displayed until it is specified again.

(7) Tab Set Up screen

On the Tab Set Up screen, the tab position is specified.
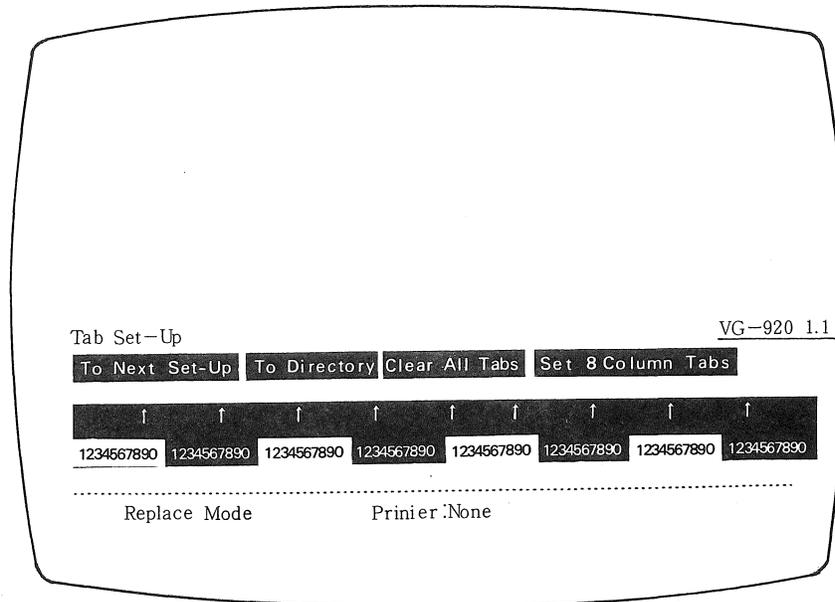
```
Tab Set—Up                                           VG—920 1.1
┌─────────────┐ ┌──────────────┐ ┌─────────────┐ ┌──────────────────┐
│To Next Set-Up│ │To Directory │ │Clear All Tabs│ │Set 8 Column Tabs│
└─────────────┘ └──────────────┘ └─────────────┘ └──────────────────┘

        ↑        ↑        ↑        ↑        ↑        ↑        ↑        ↑
    1234567890 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890

......................................................................
Replace  Mode                Prinier :None
```

Fields (Field kinds)	Parameter settings	Contents
To Next Set Up (command)	To Next Set Up	Switches the Tab Set Up screen to the Display Set Up screen.
To Directory (command)	To Directory	Switches the Tab Set Up screen to the Set Up Directory screen
Clear all Tabs (command)	Clear All Tabs	Clears all the already set tabs.
Sets 8 Column Tabs (command)	Set 8 Column Tabs	Sets tabs at interval of 8 columns starting at column 9.

Tab Field/Ruler

● The tab field/ruler is displayed in 80 or 132 columns according to the number of columns selected from the Display Set Up screen.

● Character "T" is displayed in every set tab position.

● The cursor in the tab field is controlled by the arrow keys.

● By moving the cursor to the specified column and inputting the Enter key, a tab can be set (displayed with "T") or cleared (displayed with a blank).

3.4 Print Function

VG-920 provided with the serial interface (standard feature) conforming to EIA RS232C/ RS423 and the 8-bit parallel interface (optional feature) conforming to CENTRONIX to get the hard copy of data in any of the following modes:

Print mode	Setting
Normal Print Mode	Selected from the Printer Set Up screen
Auto Print Mode	Selected from Printer Set Up screen
Printer Controller Mode	Selected from Printer Set Up screen
Local Controller Mode	Selected from the Set Up Directory screen and the Printer Set Up screen.

VG-920 selects one printer mode from these 4 modes for print operation. The selection items in the Printer Set Up screen can be switched from the host computer.

1) Normal Print Mode (Default)

In the Normal Print mode, all the print functions (such as the print screen) to be started by the keyboard unit can be operational.

2) Auto Print Mode

In the Auto Print mode, when the cursor moves to the next line with the LF, FF, or VT code or the Auto Wrap function, the display data of the previous line are printed out. When the Auto Print mode is started, "Auto Print" is displayed in the status line of the Printer Set Up screen. All the print functions to be started by the keyboard unit can also be operational.

3) Printer Controller Mode

In the Printer Controller mode, the printer is directly controlled by the host computer. The data received from the host computer are not displayed on the screen but directly transferred to the printer. When the Printer controller mode is started, "Controller" is displayed in the status line of the Printer Set Up screen.

The Printer Controller Mode can be selected from the Printer Set Up screen. In the Printer Controller mode, the print functions to be started by the keyboard and commands are not operational.

4) Local Controller Mode

The Local Controller mode is started when "Local" and "Controller Mode" are selected from the Set Up Directory screen and the Printer Set Up screen, respectively.

In the Local Controller mode, the data inputted from the keyboard unit is sent to the printer.

3.5 Interface

1) Line interface

The Comm port or 20-mA port is employed to send/receive data to/from the host computer. VG-920 operates in the full-duplex mode of start-stop asynchronous system. Any of 10 transfer rates provided independently for sending and receiving data can be selected from the Communication Set Up screen. VG-920 is connected with the host computer directly or via the MODEM or acoustic coupler.

(1) Comm port

This port is connected with the host computer by the 25-pin Subminiature D type connector. (EIA RS232C/RS423) Table 3-5-1 shows the signal pin configuration. (No signal is connected with the pin whose No. is not listed.)

Table 3-5-1 Comm Port Signal Pin Configuration

Pin Nos.	Signal names	Mnemonics	Contents	Signal directions
2	Transmit Data	TXD	Sends the character code. If there is no sent data, this signal is set to the mark status (at the Low level). In the MODEM Control mode, data can be sent when signals RTS, CTS, DSR, and DTR are turned ON.	O⟶
3	Received Data	RXD	Receives the character code. If there is no receive data, this signal is set to the mark status (at the Low level). In the MODEM control mode, the received data is ignored when the RLSD signal is turned OFF.	O⟵
4	Request to Send	RTS	When this signal is turned ON (set at the High level), the MODEM becomes ready for sending data.	O⟶
5	Clear to Send	CTS	When this signal is turned ON (set at the High level), it indicates that the MODEM is ready for sending data.	O⟵
6	Data set ready	DSR	When this signal is turned ON, it indicates that the MODEM is operational.	O⟵
7	Signal ground	SGND	This is used as a signal ground terminal.	O⟷
8	Receive Line Signal Detector (Carrier detect)	RLSD (CD)	When this signal is turned ON (set at the High level), it indicates that the received signal is suited for the specified MODEM range.	O⟵

Pin Nos.	Signal names	Mnemonics	Contents	Signal directions
12	Speed indicator	SPDI	When this signal is turned ON (set at the High level), 1200 bps is specified as the VG-920 data transfer rate for both sending and receiving data regardless of the rates specified in the Communication Set Up screen.	○←—
20	Data terminal ready	DTR	When this signal is turned ON (set at the High level), it indicates that the VG-920 becomes available for sending and receiving data.	○—→
23	Speed Select	SPDS	When this signal is turned ON (set at the High level) it indicates that the data receiving rate of VG-920 is specified within the range of 1200 to 19200 bps.	○—→

(2)   20-mA port

This port is connected with the host computer by the 8-pin Mate-N-Loc connector (20-mA current loop). Table 3-5-2 shows the signal pin configuration. (No signal is connected with the pin whose No. is not listed.)

Table 3-5-2   20-mA Port Signal Pin Configuration

Pin Nos.	Signal names	Contents
1	–12 V	–12 V
2	Transmit —	Sending data (—)
3	Receive —	Receiving data (—)
5	Transmit +	Sending data (+)
7	Receive +	Receiving data (+)
8	Ground	Signal ground terminal

Note: Neither current source nor current limit resistor is built into the 20-mA port. The connection shall be made as to flow the current from the + terminal to the — terminal. If there is neither sending nor receiving data (Idle status), the send and receive data lines are set to the mark status.

(3) Character structure

A character consists of 1 start-stop synchronous start bit, 7 or 8 data bits, 0 or 1 parity bit, and 1 or 2 stop bits. This character structure conforms to the ANSI X3.15 standard. (The number of bits is selected from the Communication Set Up screen.) Fig. 3-5-1 shows the character structure.
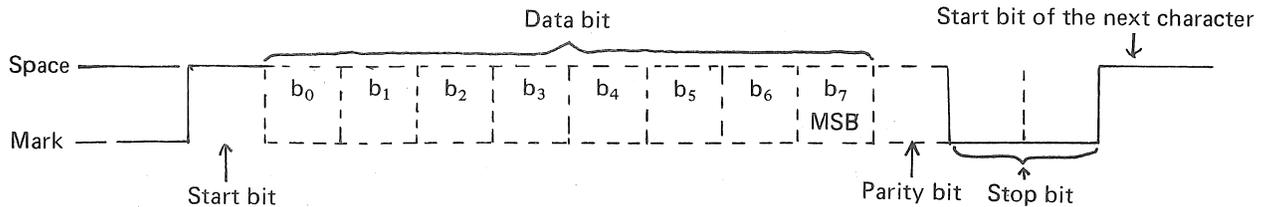
Fig. 3-5-1

(4) Data flow control

The character data received from the host computer are stored in the received data buffer and processed in the received character sequence.

The received data buffer has the capacity of 256 bytes. If "XOFF at 64" or "XOFF at 128" is selected from the Communication Set Up screen, the XOFF code is sent to the host computer as a request to stop data transfer when 64 or 128 bytes of received data are stored in the received data buffer. If the host computer does not suspend but continues sending data, VG-920 sends the second XOFF code to the host computer when 220 bytes of received data are stored in the buffer. If the received data buffer is filled up with data when receiving them, VG-920 sends the XOFF code to the host computer.

When the number of unprocessed characters stored in the received data buffer becomes 32 or less, VG-920 sends the XOFF code to the host computer as a request to restart data transfer.

Note: If "No XOFF" is selected from the Communication Set Up screen, VG-920 inhibits sending the XOFF code and operating the Hold Screen key of the keyboard unit. At this time, the received data that overflow the received data buffer are erased.

When the XON/XOFF operation is possible VG-920's receiving the XOFF code from the host computer stops sending data other than the XON and XOFF codes. When the keyboard data buffer overflows, the keyboard unit is locked and the Wait indicator lights up. VG-920 restarts sending data when receiving the XON code from the host computer.

(i) XON code generation conditions

If the XON/XOFF operation is selected from the Communication Set Up screen, the XON code is sent to the host computer under any of the following conditions:

the XON code is sent to the host computer under any of the following conditions:

- The number of unprocessed data stored in the received data buffer becomes 32 or less after the XOFF code is sent to the host computer as a data flow control signal.

- The Clear Comm function is completely executed.

- The Recall/Default function is completely executed.

- The self-diagnostic function is completely executed.

(ii) XOFF code generation conditions
If the XON/XOFF operation is selected from the Communication Set Up screen, the XOFF code is sent to the host computer under any of the following conditions:

- The number of unprocessed characters in the received data buffer reaches 64 or 128 (selected from the Communication Set Up screen) after the XON code is sent.

- The number of unprocessed characters in the received data buffer reaches 220 after the XON code is sent.

- Data are received when the received data buffer is filled up with them.

(5) Received data buffer overflow
The host computer does not respond to the XOFF code but continues sending data after the received data buffer is filled up with received data, overflow is generated and the data received after the overflow is lost.
If overflow is generated, reverse question mark "?" is displayed on the VG-920 screen.

(6) Connection/disconnection of communication line
Upon completion of connection with the host computer via the MODEM, VG-920 executes the following operations:

- Cancels the lock status of keyboard.

- Holds and clears sending data.

- Clears all the message buffers such as the keyboard buffer.

- Clears the received data buffer.

- Resets the sending/receiving condition of XOFF code.

The communication line is disconnected under any of the following conditions:

- The Break key is pressed while the Shift key is held down.

- "Recall" or "Default" is started in the Set Up Directory screen.

- The DSR signal is turned OFF.

- The RLSD signal is turned OFF for a longer time than the time specified in the Communication Set Up screen.

- The RLSD signal is turned OFF more than 30 seconds after the DSR signal is turned ON.

- The self-diagnostic sequence is received from the host computer.

- The interface port is switched between the EIA interface port and the 20-mA interface port.

In general, the communication line is disconnected by pressing the Break key while holding down the Shift key after completion of communication.

2) Printer interface

The hard copy can be provided by the external printer with the S.PRT or P.PRT (option) port. The S.PRT port (standard feature) is the serial printer interface conforming to the EIA RS232C/RS423 standard that operates in the full duplex mode of start-stop synchronous system. 10 transfer rates are selective in the Printer Set Up screen.

The P.PRT port (optional feature) is the parallel printer interface conforming to CENTRONIX that employs the handshake system using 8-bit parallel data at the TTL level and the acknowledge and busy signals. The printer interface port can be selected from the Printer Set Up screen. Both of these ports cannot operate at the same time.

VG-920 is directly connected with the external printer.

(1) S.PRT port

This port can be connected with the external printer by the 9-pin Subminiature D-type connector. (EIA RS232C/RS423)

Table 3-5-3 shows the signal pin configuration. (No signal is connected with the pin whose No. is not listed.)

Table 3-5-3 S. PRT Port Signal Pin Configuration

Pin Nos.	Signal names	Mnemonics	Contents	Signal directions
1	Protective ground	PGND	Protective ground terminal	○←→
2	Transmit	TXD	Send the character code. If there is no sending data, this signal is set to the mark status (at the Low level).	○→
3	Received data	RXD	Receives the character code. The characters other than the XON and XOFF codes are ignored. If there is no receiving data, this signal is set to the mark status (at low level).	○←
4	Request to Send	RTS	This signal is turned ON (set at the High level) when VG-920 is powered ON.	○→

Pin Nos.	Signal names	Mnemonics	Contents	Signal directions
5	Data terminal ready	DTR	This signal is turned ON (set at the High level) when VG-920 is powered ON.	○—→
6	Data set ready	DSR	Inputs the DTR signal from the external printer. When this signal is turned ON (set at the High level), it indicates that the external printer is operational.	○←—
7	Signal ground	SGND	Signal ground terminal	○←→

Each character to be sent and received by the S.PRT port consists of 1 start-stop synchronous system start bit, 7 or 8 data bits, 0 or 1 parity bit, and 1 or 2 stop bits. The character structure conforms to the ANSI X3.15. (The number of bits can be selected from the Printer Set Up screen.) This structure is independent of the character structure for the line interface.

Fig. 3-5-2 shows the character structure.
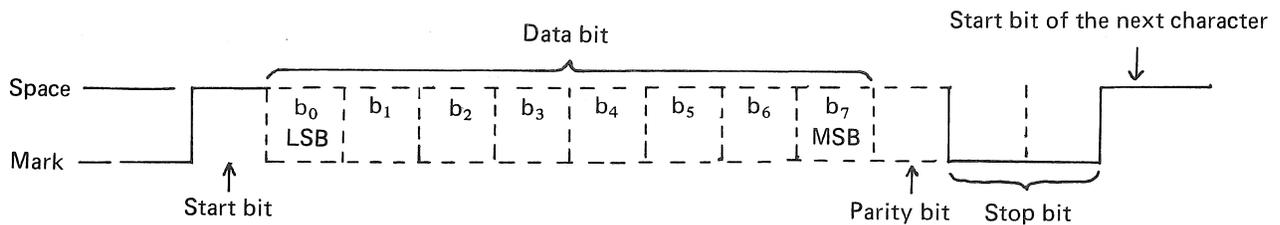
Fig. 3-5-2

VG-920 send neither XON nor XOFF code to the S.PRT port. In addition, the data received from the external printer other than the XON and XOFF codes is ignored. When VG-920 receives the XOFF code from the external printer, it stops sending print data until receiving the XON code from the external printer or executing the Clear Column function. When the DSR signal of S.PRT port is turned OFF, the operation for sending print data to S.PRT is cancelled. In the Controller mode, the received data are not sent to the S.PRT port but displayed on the screen.

(2) P.PRT port (optional)

This port is connected with the external printer by the 36-pin amphenol connector. (TTL level)

Table 3-5-4 shows the signal pin configuration. (No signal is connected with the pin whose No. is not listed.)

Table 3-5-4 P. PRT Port Signal Pin Configuration

Pin Nos.	Signal names	Mnemonics	Contents	Signal directions
1	Printer strobe	$\overline{\text{PRSTB}}$	This is the strobe signal (Negative logic) for sending 8-bit data.	○→
2	Data bit 0	PD0	8 data bit signals. Each of the these signals is set at the High level when data is set to "1."	○→
3	Data bit 1	PD1		
4	Data bit 2	PD2		
5	Data bit 3	PD3		
6	Data bit 4	PD4		
7	Data bit 5	PD5		
8	Data bit 6	PD6		
9	Data bit 7	PD7		
10	Acknowledge	$\overline{\text{ACK}}$	This is generated when the printer completes inputting the character codes (Negative logic). This is the data request signal from the printer.	○←
11	Printer busy	BUSY	This signal indicates whether the printer is busy. Data are not sent to the printer when this signal is "High." (Negative logic)	○←
17	Protective ground	PGND	Protective ground terminal	○↔
19 ～ 30	Signal ground	SGND	Signal ground terminal	○↔

During the print operation performed by the P.PRT port, only data can be sent so that data flow cannot be controlled by the XON and XOFF codes. Data are sent to the external printer with the handshake system using signals $\overline{\text{PRSTB}}$, $\overline{\text{ACK}}$, and BUSY.

Fig. 3-5-3 shows the timing chart.
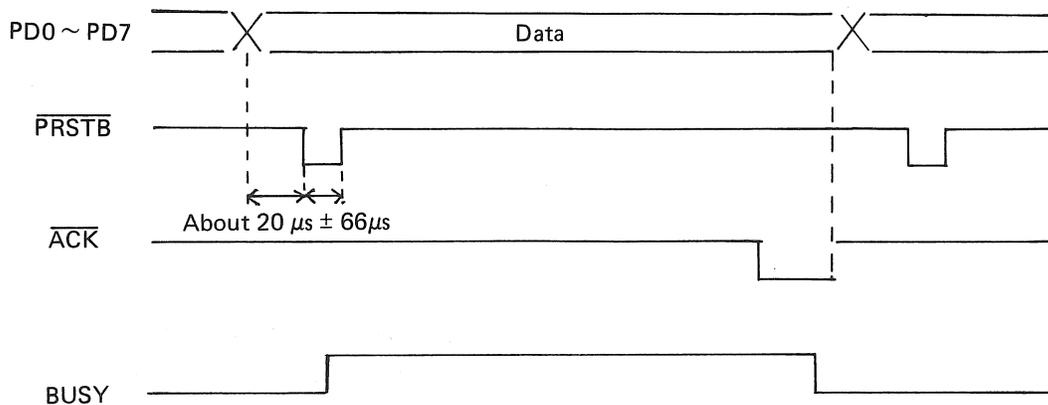
Fig. 3-5-3

3.6 CRT Monitor

The non-glare 12" CRT (medium resolution, color: green/white/amber) is employed to display 80 characters x 24 lines or 132 characters x 24 lines in the luster scanning method.
This section mainly explains the method for operating the knobs (See Fig. 2-2-1.) to adjust the operation of CRT monitor.

1) Adjustment knobs

The knobs vertically arranged on the right side of the back panel of display unit shown in Fig. 2-2-1 are the user-control knobs and control knobs for servicemen.

(1) User control knob

H. HOLD: Horizontally synchronous adjustment to prevent the picture from distorting slantly to the right or left.

V. HOLD: Vertically synchronous adjustment to prevent the picture from vertically distorting.

BRIGHT: Adjustment of total brightness of the picture.

CONTRAST: Adjustment of total brightness of the displayed characters.

(2) Control knobs for servicemen (Do not operate these knobs as far as possible.)

V. HEIGHT: Vertical adjustment of amplitude.

Other than the above, there are the following adjustment knobs in the monitor board:

FOCUS: Adjustment of the focus of picture.

H. WIDTH: Horizontal adjustment of amplitude.

V. LIN: Adjustment of vertical linearity.

SUB BRIGHT: Adjustment of total brightness of the picture.

3.7 Self-diagnostic Function at Power On (AUTO DIAG)

Self-diagnosis is started when this equipment is powered ON. The internal memory and the keyboard are sequentially tested. If an error is detected, the test is terminated and the error message is displayed. If the equipment is normal after completion of all the tests, the following message is displayed on the screen center:

```
VG-920 OK
```

After completion of self-diagnosis, VG-920 starts operating according to the values set in the NVR. The message displayed on the screen is erased when data are inputted from the keyboard or the line interface. Data are displayed on the screen starting with the home position.

4. CONTROL CODE

4.1 Code Used

VG-920 operates with the 7-bit or 8-bit code conforming to the ANSI/ISO standard. Fig. 4-1-1 shows the 7-bit code table if the ASCII character set is chosen and Fig. 4-1-2 shows the 8-bit code table if the ASCII character set and the auxiliary characters are chosen.

ROW	BITS b4 b3 b2 b1	0	1	2	3	4	5	6	7
0	0 0 0 0	NUL (0/0/0)	DLE (20/16/10)	SP (40/32/20)	0 (60/48/30)	@ (100/64/40)	P (120/80/50)	` (140/96/60)	p (160/112/70)
1	0 0 0 1	SOH (1/1/1)	DC1 (XON) (21/17/11)	! (41/33/21)	1 (61/49/31)	A (101/65/41)	Q (121/81/51)	a (141/97/61)	q (161/113/71)
2	0 0 1 0	STX (2/2/2)	DC2 (22/18/12)	" (42/34/22)	2 (62/50/32)	B (102/66/42)	R (122/82/52)	b (142/98/62)	r (162/114/72)
3	0 0 1 1	ETX (3/3/3)	DC3 (XOFF) (23/19/13)	# (43/35/23)	3 (63/51/33)	C (103/67/43)	S (123/83/53)	c (143/99/63)	s (163/115/73)
4	0 1 0 0	EOT (4/4/4)	DC4 (24/20/14)	$ (44/36/24)	4 (64/52/34)	D (104/68/44)	T (124/84/54)	d (144/100/64)	t (164/116/74)
5	0 1 0 1	ENQ (5/5/5)	NAK (25/21/15)	% (45/37/25)	5 (65/53/35)	E (105/69/45)	U (125/85/55)	e (145/101/65)	u (165/117/75)
6	0 1 1 0	ACK (6/6/6)	SYN (26/22/16)	& (46/38/26)	6 (66/54/36)	F (106/70/46)	V (126/86/56)	f (146/102/66)	v (166/118/76)
7	0 1 1 1	BEL (7/7/7)	ETB (27/23/17)	' (47/39/27)	7 (67/55/37)	G (107/71/47)	W (127/87/57)	g (147/103/67)	w (167/119/77)
8	1 0 0 0	BS (10/8/8)	CAN (30/24/18)	((50/40/28)	8 (70/56/38)	H (110/72/48)	X (130/88/58)	h (150/104/68)	x (170/120/78)
9	1 0 0 1	HT (11/9/9)	EM (31/25/19)	) (51/41/29)	9 (71/57/39)	I (111/73/49)	Y (131/89/59)	i (151/105/69)	y (171/121/79)
10	1 0 1 0	LF (12/10/A)	SUB (32/26/1A)	* (52/42/2A)	: (72/58/3A)	J (112/74/4A)	Z (132/90/5A)	j (152/106/6A)	z (172/122/7A)
11	1 0 1 1	VT (13/11/B)	ESC (33/27/1B)	+ (53/43/2B)	; (73/59/3B)	K (113/75/4B)	[(133/91/5B)	k (153/107/6B)	{ (173/123/7B)
12	1 1 0 0	FF (14/12/C)	FS (34/28/1C)	, (54/44/2C)	< (74/60/3C)	L (114/76/4C)	\ (134/92/5C)	l (154/108/6C)	| (174/124/7C)
13	1 1 0 1	CR (15/13/D)	GS (35/29/1D)	- (55/45/2D)	= (75/61/3D)	M (115/77/4D)	] (135/93/5D)	m (155/109/6D)	} (175/125/7D)
14	1 1 1 0	SO (16/14/E)	RS (36/30/1E)	. (56/46/2E)	> (76/62/3E)	N (116/78/4E)	^ (136/94/5E)	n (156/110/6E)	~ (176/126/7E)
15	1 1 1 1	SI (17/15/F)	US (37/31/1F)	/ (57/47/2F)	? (77/63/3F)	O (117/79/4F)	_ (137/95/5F)	o (157/111/6F)	DEL (177/127/7F)

Control codes ← → ASCII character set

(Each cell: octal / decimal / hexadecimal)

Fig. 4-1-1 7-bit Code Table

Fig. 4-1-2 8-bit Code Table

Approximate character layout (Column across the top, Row down the side). Left to right the zones are: C0 codes (columns 0–1), GL codes / ASCII character set (columns 2–7), C1 codes (columns 8–9), and GR codes / Auxiliary character set (columns 10–15).

Row	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	NUL	DLE	SP	0	@	P	`	p		DCS		°	À		à	
1	SOH	DC1 (XON)	!	1	A	Q	a	q		PU1	¡	±	Á	Ñ	á	ñ
2	STX	DC2	"	2	B	R	b	r		PU2	¢	²	Â	Ò	â	ò
3	ETX	DC3 (XOFF)	#	3	C	S	c	s		STS	£	³	Ã	Ó	ã	ó
4	EOT	DC4	$	4	D	T	d	t	IND	CCH		´	Ä	Ô	ä	ô
5	ENQ	NAK	%	5	E	U	e	u	NEL	MW	¥	µ	Å	Õ	å	õ
6	ACK	SYN	&	6	F	V	f	v	SSA	SPA		¶	Æ	Ö	æ	ö
7	BEL	ETB	'	7	G	W	g	w	ESA	EPA	§	·	Ç		ç	
8	BS	CAN	(	8	H	X	h	x	HTS		¤		È	Ø	è	ø
9	HT	EM	)	9	I	Y	i	y	HTJ		©	¹	É	Ù	é	ù
10	LF	SUB	*	:	J	Z	j	z	VTS		ª	º	Ê	Ú	ê	ú
11	VT	ESC	+	;	K	[	k	{	PLD	CSI	«	»	Ë	Û	ë	û
12	FF	FS	,	<	L	\	l	|	PLU	ST		¼	Ì	Ü	ì	ü
13	CR	GS	-	=	M	]	m	}	RI	OSC		½	Í	Ý	í	ÿ
14	SO	RS	.	>	N	^	n	~	SS2	PM			Î		î	
15	SI	US	/	?	O	_	o	DEL	SS3	APC	¿		Ï	ß	ï	

|———— C0 CODES ————|———— GL CODES ————|———— C1 CODES ————|———— GR CODES ————|

(ASCII character set)   (Auxiliary character set)

The 7-bit code table consists of 128 character codes (8 columns x 16 rows), and the high-order 3 bits of each 7-bit code corresponds to the Column value and the low-order 4 bits corresponds to the Row value. In columns 2 through 7, the later-described character sets (See Section 4.2.) can be defined. No control code can be changed. The 8-bit control code table consists of 256 character codes (16 columns x 16 rows), and the high-order 4 bits of each 8-bit code corresponds to the Column value and the low-order 4 bits corresponds to the Row value. The code of columns 0 through 7 is identical to the 7-bit code table except 1 MSB bit is added. Therefore, each code in the 7-bit code table can express b8 as 0. In the GL code in columns 2 through 7 and the GR code in columns 10 through 15, the later-described character sets can be defined (See Section 4.5). Neither the C0 code in columns 0 through 1 nor the C1 code in columns 8 through 9 can be changed.

Each code can be described by the Column/Row value according to the code table as shown below:

	Example	1/11	2/3	3/6
		ESC	L	6

In the above example, characters "ESC," "#," and "6" correspond to Column 1/Row 11, Column 2/Row 3, and Column 3/Row 6, respectively.

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4.2 Character Sets

VG-920 is provided with the following 5 kinds of character set:

1. ASCII character set
2. UK National character set
3. Special graphic character set
4. Auxiliary character set
5. Down Line Loadable character set

Character sets 1 through 4 are the system-provided character sets defined in the EP ROM and character set 5 is the character set to be defined by the user in RAM. At shipment, the ASCII character set and the auxiliary character set are set as the default options. These two character sets are called the Multi-national character set as a generic name.

1) ASCII character set

Fig. 4-2-1 shows the ASCII character set. At consignment, the GL code is defined as the ASCII character set.

2) UK National character set

Fig. 4-2-3 shows the UK National character set. This is the same as the ASCII character set except that character "#" (2/3) in the ASCII character set is changed to character "£" (2/3).

3) Special graphic character set

Fig. 4-2-4 shows the special graphic character set.

A part of the ASCII character set is replaced with special symbols and line segments.

4) Auxiliary character set

Fig. 4-2-2 shows the auxiliary character set. At shipment, the GR code is defined as the auxiliary character set.

Fig. 4-2-1   ASCII Character Set

ROW	BITS (b4 b3 b2 b1)	0	1	2	3	4	5	6	7
0	0 0 0 0	NUL	DLE	SP	0	@	P	`	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	#	3	C	S	c	s
4	0 1 0 0	EOT	DC4	$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	;	K	[	k	{
12	1 1 0 0	FF	FS	,	<	L	\	l	|
13	1 1 0 1	CR	GS	-	=	M	]	m	}
14	1 1 1 0	SO	RS	.	>	N	^	n	~
15	1 1 1 1	SI	US	/	?	O	_	o	DEL

Fig. 4-2-2   Auxiliary Character Set

ROW	BITS (b4 b3 b2 b1)	8	9	10	11	12	13	14	15
0	0 0 0 0		DCS		°	À		ð	a
1	0 0 0 1		PU1	¡	±	Á	Ñ	Ñ	ñ
2	0 0 1 0		PU2	¢	²	Â	Ò	Â	ò
3	0 0 1 1		STS	£	³	Ã	Ó	ã	ó
4	0 1 0 0	IND	CCH			Ä	Ô	ä	ô
5	0 1 0 1	NEL	MW	¥	μ	Å	Õ	å	õ
6	0 1 1 0	SSA	SPA	¶	¶	Æ	Ö	æ	ö
7	0 1 1 1	ESA	EPA	§	·	Ç	Œ	ç	œ
8	1 0 0 0	HTS		¤		È	Ø	è	ø
9	1 0 0 1	HTJ		©	¹	É	Ù	é	ù
10	1 0 1 0	VTS		ª	º	Ê	Ú	ê	ú
11	1 0 1 1	PLD	CSI	«	»	Ë	Û	ë	û
12	1 1 0 0	PLU	ST		¼	Ì	Ü	ì	ü
13	1 1 0 1	RI	OSC		½	Í	Ý	í	ÿ
14	1 1 1 0	SS2	PM			Î	Þ	î	þ
15	1 1 1 1	SS3	APC		¿	Ï	ß	ï	

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ROW	BITS	0	1	2	3	4	5	6	7
0	0 0 0 0	NUL	DLE	SP	0	@	P	`	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	£	3	C	S	c	s
4	0 1 0 0	EOT	DC4	$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	;	K	[	k	{
12	1 1 0 0	FF	FS	,	<	L	\	l	|
13	1 1 0 1	CR	GS	-	=	M	]	m	}
14	1 1 1 0	SO	RS	.	>	N	^	n	~
15	1 1 1 1	SI	US	/	?	O	_	o	DEL

Fig. 4-2-3   UK National Character Set

ROW	BITS	0	1	2	3	4	5	6	7
0	0 0 0 0	NUL	DLE	SP	0	@	P	♦	SCAN 3
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	—	SCAN 5
2	0 0 1 0	STX	DC2	"	2	B	R	—	SCAN 7
3	0 0 1 1	ETX	DC3 (XOFF)	#	3	C	S	—	SCAN 9
4	0 1 0 0	EOT	DC4	$	4	D	T	—	├
5	0 1 0 1	ENQ	NAK	%	5	E	U	—	┤
6	0 1 1 0	ACK	SYN	&	6	F	V	°	┴
7	0 1 1 1	BEL	ETB	'	7	G	W	±	┬
8	1 0 0 0	BS	CAN	(	8	H	X	—	│
9	1 0 0 1	HT	EM	)	9	I	Y	—	≤
10	1 0 1 0	LF	SUB	*	:	J	Z	⌡	≥
11	1 0 1 1	VT	ESC	+	;	K	[	⌐	π
12	1 1 0 0	FF	FS	,	<	L	\	⌈	≠
13	1 1 0 1	CR	GS	-	=	M	]	⌊	£
14	1 1 1 0	SO	RS	.	>	N	^	†	.
15	1 1 1 1	SI	US	/	?	O	(BLANK)	—	DEL
							SCAN 1		

Fig. 4-2-4   Special Graphic Character Set

5) Down Line loadable character set

Up to 94 characters can be defined as the down line loadable character set by the user application program.

This is effective in the VT200 7-bit control mode of the VT200 8-bit control mode.

4.3 Control Functions

VG-920 controls the following operations by the single-character and multi-character control codes:

- Cursor movement
- Insertion and deletion of characters and lines
- Setting of the attributes for characters and lines
- Setting of character sets
- Setting of operation modes

The control characters in the C0 and C1 codes in the code table are used as single-character control codes. According to the introducer of each control code and the difference in the function, the multiple-character control codes are divided into 3 types; Escape Sequence, Control Sequence, and Device Control String.

1) C0 and C1 control characters

Tables 4-3-1 and 4-3-2 list up C0 and C1 control characters, respectively. The control characters not listed in these tables are ignored. Each C1 control character can be replaced with the character code in the 7-bit code table. (See Section 4.4)

Table 4-3-1 C0 Control Code List

Mnemonics	Names	Codes	Contents
NUL	Null	0/0	This is ignored when received.
ENQ	Enquiry	0/5	The answerback message is transmitted.
BEL	Bell	0/7	The bell sound is generated when "Warning Bell" is selected from the Keyboard Set Up menu.
BS	Backspace	0/8	The cursor is moved one column to the left. This is ignored when the cursor is positioned in the first column.
HT	Horizontal Tabulation	0/9	The cursor is moved to the column where the next tab is to be set. If there is no tab until the end of the line, the cursor is moved to the last column in the line. No line feed operation is performed.
LF	Line Feed	0/10	If "New Line" is selected from the General Set Up screen, the new-line (carriage-return/line feed) operation or the line-feed operation is performed.
VT	Vertical tabulation	0/11	The same operation as the one specified by the LF code is performed.
FF	Form Feed	0/12	The same operation as the one specified by the LF code is performed.

Mnemonics	Names	Codes	Contents
CR	Carriage Return	0/13	The cursor moves to the first column on the same line.
SO (LS 1)	Shift Out (Lock Shift 1)	0/14	The G1 character set is called at the GL code. The G1 character set is indicated during the later-described SCS sequence.
SI (LS 0)	Shift In (Lock Shift 0)	0/15	The G0 character set is called at the GL code. The G0 character set is indicated during the later-described SCS sequence.
DC 1	Device Control 1	1/1	This code operates as the XON code. In the XON/XOFF-operational status, the XOFF status is cleared by receiving the DC1 code and VG-920 becomes ready for sending data.
DC 3	Device Control 3	1/3	This operates as the XOFF code. In the XON/XOFF-operational status, VG-920 inhibits sending data.
CAN	Cancel	1/8	When this code is received during the Escape or Control Sequence, the sequence code is cancelled. When this code is received during the Device Control String, this sequence is terminated and the reverse question mark " " is displayed on the screen.
SUB	Substitute	1/10	When this code is received during the Escape or Control Sequence, the sequence code is cancelled and Reverse Question Mark " " is displayed on the screen. When this code is received during the Device Control String, the sequence is terminated and Reverse Question Mark " " is displayed.
ESC	Escape	1/11	This is the introducer for the Escape Sequence command.
DEL	Delete	7/15	This code is ignored when received.

Table 4-3-2   CI Control Code List

Mnemonics	Names	Codes	Equivalent 7-bit table code	Contents
IND	Index	8/4	1/11 4/4 ESC D	The cursor moves down by one line while positioned in the same column. If this code is received when the cursor is positioned on the lowermost line in the scroll area, the display in the scroll area is scrolled up one line.
NEL	Next Line	8/5	1/11 4/5 ESC E	The cursor moves to the first column on the next line. If this code is received when the cursor is positioned on the lowermost line, the cursor moves to the first column on the same line and the display in the scroll area is scrolled up one line.

Mnemonics	Names	Codes	Equivalent 7-bit table code	Contents
HTS	Horizontal Tab Set	8/8	1/11 4/8 ESC H	The tab is set on the column where the cursor is positioned.
RI	Reverse Index	8/13	1/11 4/13 ESC M	The cursor moves up one line while positioned in the same column. If this code is received when the cursor is positioned on the lowermost line, the display in the scroll area is scrolled down one line.
SS 2	Single Shift G2	8/14	1/11 4/14 ESC N	The G2 character set is temporarily called at the GL code. The G2 character set is indicated during the later-described SCS sequence.
SS 3	Single Shift G3	8/15	1/11 4/15 ESC O	The G3 character set is called at the GL code. The G3 character set is indicated during the later-described SCS sequence.
DCS	Device Control String	9/0	1/11 5/10 ESC P	This is the introducer for the Device Control String.
CSI	Control Sequence Introducer	9/11	1/11 5/11 ESC [	This is the introducer for the Control Sequence.
ST	String Terminator	9/12	1/11 5/12 ESC \	This is the terminator for the Device Control

2) Escape Sequence

The escape sequence consists of the ESC code (1/11) and more than one byte of character code.

```
Example:    1/11      2/3      3/6
            ESC        #        6      Data on the line where the cursor is
                                       positioned are displayed wider.
```

3) Control Sequence

The control sequence consists of the CSI code (9/11) and more than one byte of character code.

```
Example:    9/11     3/15      3/3      6/8
            CSI        ?        3        h
```

The display format is changed from 80 columns/line to 132 columns/line. The CSI code can be replaced with the character code in the 7-bit code table if this sequence is used in the 7-bit control mode. (See Section 4.4.)

The example is shown as follows:

```
Example:    9/11     3/15      3/3      6/8
            CSI        ?        3        h

            1/11     5/11      3/15     3/3      6/8
            ESC        [        ?        3        h
```

4) Device Control String

The Device Control String is the sequence command with the DCS code (9/0) as an introducer and the ST code (9/12) as a terminator and consists of a group of control codes.

This is used to set the code generated by each user-defined function key and the front for the Down Line Loadable character set.

Example:	9/0	3/0	3/11	3/1	7/12	9/12
	DCS	0	;					ST

THe values set for all the user-defined function keys are cleared.

If this string is used in the 7-bit control mode, the DCS and ST codes can be replaced with the character codes in the 7-bit code table. (See Section 4.4.)

The example is shown as follows:

Example:	9/0	3/0	3/11	3/1	7/12	9/12		
	DCS	0	;	'			ST		
	1/11	5/0	3/0	3/11	3/1	7/12	1/11	5/12
	ESC	P	0	;	'			ESC	\

4.4 Compatibility between 7-bit Control and 8-bit Control Codes

In order to control the C1 control code for communication of 7-bit data, the 8-bit control code can be replaced with the 7-bit equivalent sequence code by the ESC code and the single character GL code. The relationship between the 8-bit control code and the equivalent 7-bit sequence code is shown as follows:

$$\text{8-bit control code} = \text{ESC} + (\text{8-bit control code}_{10} - 64_{10})$$

or

$$\text{8-bit control code} = \text{ESC} + (\text{8-bit control code}_{16} - 40_{16})$$

According to the above expression, the CSI and SS3 codes can be indicated as the following 7-bit sequence codes:

9/11 (155_{10})	1/11	5/11
CSI	ESC	[
8/15 ($8F_{16}$)	1/11	4/15
SS3	ESC	O

4.5 Display Control Mode

VG-920 employs the Display Control mode that inhibits the specific function of each control code from being executed and handles it as a display character or display characters.

This Display Control mode is convenient for debugging a program and started by selecting "Display Control" in the Control Representation Mode field of the Display Set Up menu.

Fig. 4-5-1 shows the front for the display-control-mode display characters.

Characters, C0, GL, C1, and GR are displayed in the VT200 mode, while characters C0 and GL are displayed in the VT100/VT52 mode. In general, the specific function of each control code is not executed in the Display Control mode. However, codes LF, FF, and VT execute the line-feed operation after they are displayed and codes XON (DC1) and XOFF (DC3) are displayed after controlling the data flow.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
0	N_U	D_L		0	@	P	`	p	8_0	9_0	A_0	°	À	D_0	à	F_0	0
1	S_H	D_1	!	1	A	Q	a	q	8_1	9_1	¡	±	Á	Ñ	á	ñ	1
2	S_X	D_2	"	2	B	R	b	r	8_2	9_2	¢	2	Â	Ò	â	ò	2
3	E_X	D_3	#	3	C	S	c	s	8_3	9_3	£	3	Ã	Ó	ã	ó	3
4	E_T	D_4	$	4	D	T	d	t	8_4	9_4	A_4	B_4	Ä	Ô	ä	ô	4
5	E_Q	N_K	%	5	E	U	e	u	8_5	9_5	¥	µ	Å	Õ	å	õ	5
6	A_K	S_Y	&	6	F	V	f	v	8_6	9_6	A_6	¶	Æ	Ö	æ	ö	6
7	B_L	E_B	'	7	G	W	g	w	8_7	9_7	§	·	Ç	Œ	ç	œ	7
8	B_S	C_N	(	8	H	X	h	x	8_8	9_8	¤	B_8	È	Ø	è	ø	8
9	H_T	E_M	)	9	I	Y	i	y	8_9	9_9	©	1	É	Ù	é	ù	9
10	L_F	Ç	*	:	J	Z	j	z	8_A	9_A	ª	º	Ê	Ú	ê	ú	10
11	V_T	E_C	+	;	K	[	k	{	8_B	9_B	«	»	Ë	Û	ë	û	11
12	F_F	F_S	,	<	L	\	l	|	8_C	9_C	A_C	¼	Ì	Ü	ì	ü	12
13	C_R	G_S	-	=	M	]	m	}	8_D	9_D	A_D	½	Í	Ÿ	í	ÿ	13
14	S_O	R_S	.	>	N	^	n	~	8_E	9_E	A_E	B_E	Î	D_E	î	F_E	14
15	S_I	U_S	/	?	O	_	o	D_T	8_F	9_F	A_F	¿	Ï	D_F	ï	□	15

CO CODES — GL CODES (ASCII character set) — C1 CODES — GR CODES (Auxiliary character set)

Fig. 4-5-1 Display Control Mode Display Font

5. PROGRAMMING

5.1 Transmit Function

1) Keyboard unit transmit codes

The codes generated by inputting with the keys on the keyboard unit are described below.
The codes generated vary depending on the keyboard selected from 15 types in the Set Up
Directory screen, the mode selected from the Keyboard Set Up screen, and the Terminal
Mode selected from the General Set Up screen.

The keys arranged on the keyboard are roughly divided into the following 4 portions as
shown in Fig. 5-1-1.
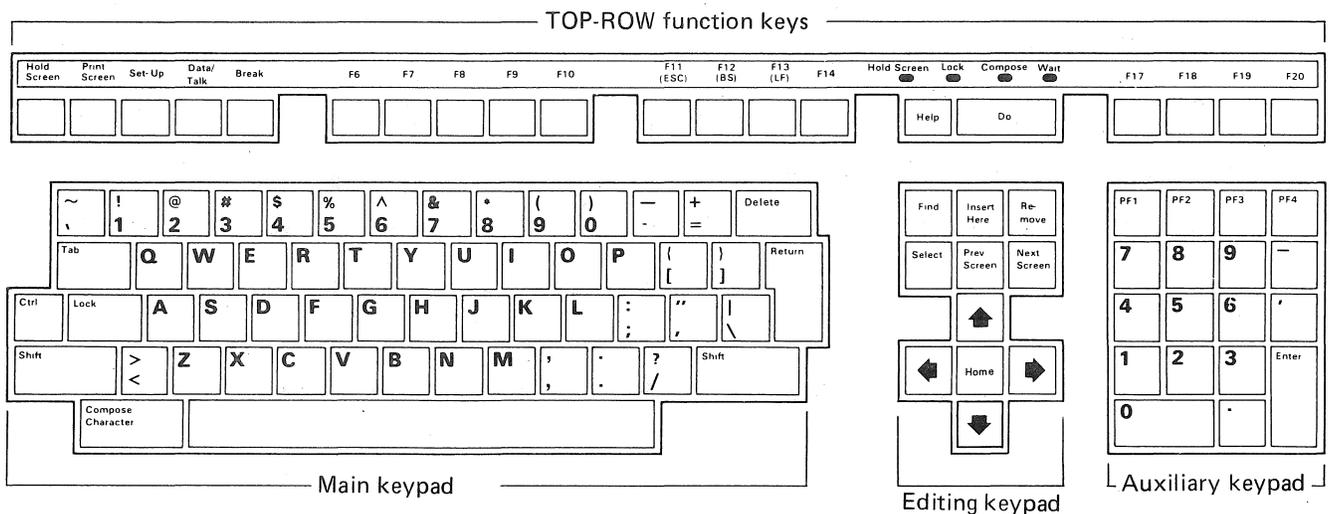
Fig. 5-1-1   Key Arrangement on Keyboard Unit (North American Keyboard)

(1) Main keypad

The main keypad consists of standard typewriter keys and function keys. An alpha-
betical character can be generated by inputting with a single key or multiple standard
typewriter keys.

The North American Keyboard cannot generate character codes in the auxiliary
character set because its standard typewriter keys represent only ASCII characters.

A keyboard other than the North American Keyboard can generate not only ASCII
characters, but also the characters in the auxiliary character set. But the arrangement
of standard typewriter keys varies depending on the keyboard type.

There are auxiliary characters that cannot be generated directly with the standard
typewriter keys. These characters can be generated using the Compose function.

All keyboard units other than the North American keyboard can generate different
characters by switching the Typewriter/Data Processing mode in the Keyboard Set Up
screen.

The characters generated in the Typewriter/D.P. mode are described in parallel on
each key top.

The character described on each right-half keytop is generated in the Data Processing Mode; the characters described on each left-half keytop are generated in the Typewriter mode.

At this time, the keyboard shift function enables either the character on the upper portion of a keytop or that on the lower portion of a keytop to be selected.

Fig. 5-1-2 shows examples of Data Processing Mode keys.
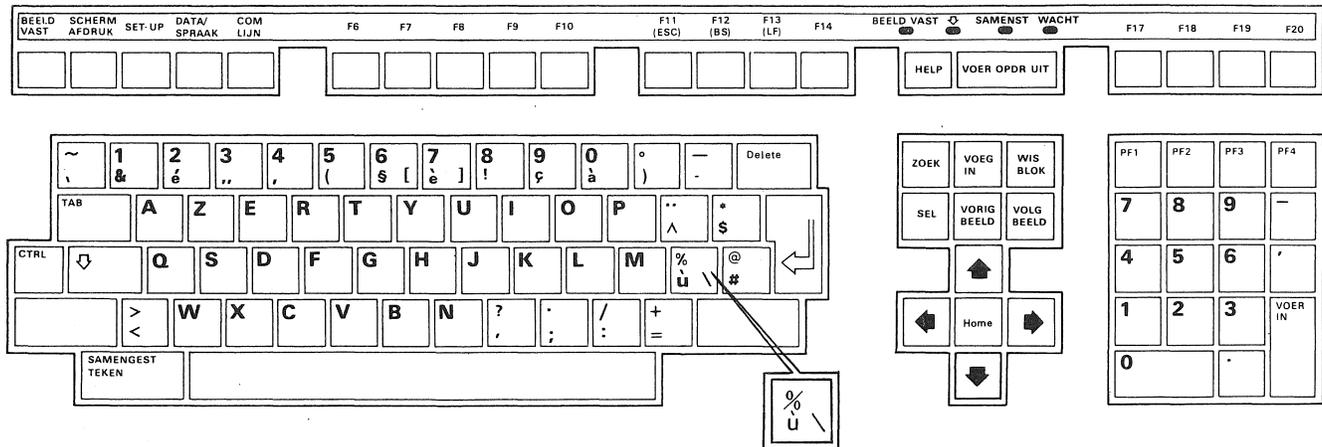
Fig. 5-1-2 Data Processing Mode Keys (French/Belgian keyboard)

Table 5-1-1 shows the transmit codes for the function keys.

Table 5-1-1 Function Key Transmit Codes

Key	Transmit code	Contents
Delete	7/15	Transmit the DEL character.
Tab	0/9	Transmit the HT character.
Return	0/13	Transmit the CR character when No New Line is selected from the General Set Up screen.
	0/13 0/10	Transmit the CR/LF character when New Line is selected from the General Set Up screen.
Ctrl	—	The transmit code cannot be generated by inputting with the CTRL key alone. A control code can be generated by inputting with a key while the CTRL key is held down.
Lock	—	The transmit code cannot be generated by inputting with the LOCK key alone. The LOCK key is used to set or reset the Caps Lock/Shift Lock state according to the parameter selected from the Keyboard Set Up screen.

Key	Transmit code	Contents
Shift	—	The Shift key itself does not cause a transmit code to be generated. By pressing a key while holding down this key, the alphabetical capital or the symbol code indicated on the upper portion of the keytop is transmitted.
Space Bar	2/10	Transmit the SP character.
Compose Character	—	A transmit code cannot be generated with the Compose Character key. This key is used to start the 3-stroke compose sequence.

(2) Editing keypad

The editing keypad consists of the editing keys and the cursor control keys.

The Normal or Application Cursor Keys mode can be selected by setting the control sequence (DECCKM) from the host computer and the parameter in the Cursor Key Mode field of General Set Up screen.

Tables 5-1-2 and 5-1-3 show the transmit codes for the editing keys and those for the cursor control keys, respectively.

Table 5-1-2 Transmit Codes for Editing Keys

Key	Transmit code in the VT200 mode	Transmit code in the VT100/VT52 mode
Find	9/11 3/1 7/14 CSI 1 ~	—
Insert Here	9/11 3/2 7/14 CSI 2 ~	—
Remove	9/11 3/3 7/14 CSI 3 ~	—
Select	9/11 3/4 7/14 CSI 4 ~	—
Prev Screen	9/11 3/5 7/14 CSI 5 ~	—
Next Screen	9/11 3/6 7/14 CSI 6 ~	—

Note: A transmit code cannot be generated with the editing keys in the VT100/VT52 mode.

Table 5-1-3 Transmit Codes for Cursor Control Keys

| Key | VT200/100 mode (Compatible with ANSI) | | VT52 mode | |
	Normal Cursor Keys mode	Application Cursor Keys mode	Normal Cursor Keys mode	Application Cursor Keys mode
↑	9/11 4/1 CSI A	8/15 4/1 SS3 A	1/11 4/1 ESC A	1/11 4/1 ESC A
↓	9/11 4/2 CSI B	8/15 4/2 SS3 B	1/11 4/2 ESC B	1/11 4/2 ESC B
⇒	9/11 4/3 CSI C	8/15 4/3 SS3 C	1/11 4/3 ESC C	1/11 4/3 ESC C
⇐	9/11 4/4 CSI D	8/15 4/4 SS3 D	1/11 4/4 ESC D	1/11 4/4 ESC D
Home	9/11 4/8 CSI H	9/11 4/8 CSI H	1/11 4/8 ESC H	1/11 4/8 ESC H

(3) Auxiliary Keypad

The codes to be generated using the keys on the auxiliary keypad can be switched by setting the ANSI (VT200, VT100)/VT52 mode and selecting the Numeric/Application Keypad.

Either Numeric or Application keypad can be selected by the control sequence (DECKPAM/DECPNM) from the host computer and the parameter set in the Keypad Mode field of General Set Up screen.

Table 5-1-4 shows the transmit codes for the Auxiliary Keypad.

Table 5-1-4 Auxiliary Keypad Transmit Codes

| Key | VT200, VT100 mode (compatible with ANSI) | | VT52 mode | |
	Numeric Keypad mode	Application Keypad mode	Numeric Keypad mode	Application Keypad mode
0	3/0 0	8/15 7/0 SS3 p	3/0 0	1/11 3/15 7/0 ESC ? p
1	3/1 1	8/15 7/1 SS3 q	3/1 1	1/11 3/15 7/1 ESC ? q
2	3/2 2	8/15 7/2 SS3 r	3/2 2	1/11 3/15 7/2 ESC ? r
3	3/3 3	8/15 7/3 SS3 s	3/3 3	1/11 3/15 7/3 ESC ? s
4	3/4 4	8/15 7/4 SS3 t	3/4 4	1/11 3/15 7/4 ESC ? t
5	3/15 5	8/15 7/5 SS3 u	3/5 5	1/11 3/15 7/5 ESC ? u

Key				
6	3/6 6	8/15 7/6 SS3 v	3/6 6	1/11 3/15 7/6 ESC ? v
7	3/7 7	8/15 7/7 SS3 w	3/7 7	1/11 3/15 7/7 ESC ? w
8	3/8 8	8/15 7/8 SS3 x	3/8 8	1/11 3/15 7/8 ESC ? x
9	3/9 9	8/15 7/9 SS3 y	3/9 9	1/11 3/15 7/9 ESC ? y
–	2/13 – (minus)	8/15 6/13 SS3 m	2/13 –	1/11 3/15 6/13 ESC ? m
,	2/12 , (comma)	8/15 6/12 SS3 l	2/12 ,	1/11 3/15 6/12 ESC ? l
.	2/14 . (period)	8/15 6/14 SS3 n	2/14 .	1/11 3/15 6/14 ESC ? n
Enter (Note)	0/13 or 0/13 0/10 CR CR LF	8/15 4/13 SS3 M	0/13 or 0/13 0/10 CR CR LF	1/11 3/15 4/13 ESC ? M
PF1	8/15 5/0 SS3 P	8/15 5/0 SS3 P	1/11 5/0 ESC P	1/11 5/0 ESC P
PF2	8/15 5/1 SS3 Q	8/15 5/1 SS3 Q	1/11 5/1 ESC Q	1/11 5/1 ESC Q
PF3	8/15 5/2 SS3 R	8/15 5/2 SS3 R	1/11 5/2 ESC R	1/11 5/2 ESC R
PF4	8/15 5/3 SS3 S	8/15 5/3 SS3 S	1/11 5/3 ESC S	1/11 5/3 ESC S

Note: In the Numeric Keypad mode, the Enter and Return keys cause the same code to be transmitted. By inputting the Enter key, the CR code is transmitted when No New Line is set by the New Line function; the CR/LF code is transmitted when New Line is set by the New Line function.

(4) Top-Row function keys

20 function keys F1 through F20 are provided.

Function keys F1 through F5 are the local function keys: Hold Screen, Print Screen, Set Up, Data/Talk, and Break.

These keys do not cause a transmit code to be generated. Table 5-1-5 shows the transmit code of the Top-Row function key. The transmit codes generated with function keys F6 through F20 can be defined by the command sequence for the user-defined function keys. The code defined by pressing a function key while holding down the Shift key can be transmitted.

Table 5-1-5 shows the transmit codes for Top-Row Function Keys.

Table 5-1-5 Transmit Codes for Top-Row Function Keys

Key	Key name	VT200 mode				VT100/VT52 mode
F1	Hold Screen	— .				—
F2	Print Screen	—				—
F3	Set Up	—				—
F4	Data/Talk	—				—
F5	Break	—				—
F6	F6	9/11 CSI	3/1 1	3/7 7	7/14 ~	—
F7	F7	9/11 CSI	3/1 1	3/8 8	7/14 ~	—
F8	F8	9/11 CSI	3/1 1	3/9 9	7/14 ~	—
F9	F9	9/11 CSI	3/2 2	3/0 0	7/14 ~	—
F10	F10	9/11 CSI	3/2 2	3/1 1	7/14 ~	—
F11	F11 (ESC)	9/11 CSI	3/2 2	3/3 3	7/14 ~	1/11 ESC
F12	F12 (BS)	9/11 CSI	3/2 2	3/4 4	7/14 ~	0/8 BS
F13	F13 (LF)	9/11 CSI	3/2 2	3/5 5	7/14 ~	0/10 LF
F14	F14	9/11 CSI	3/2 2	3/6 6	7/14 ~	—
F15	Help	9/11 CSI	3/2 2	3/8 8	7/14 ~	—
F16	Do	9/11 CSI	3/2 2	3/9 9	7/14 ~	—
F17	F17	9/11 CSI	3/3 3	3/1 1	7/14 ~	—
F18	F18	9/11 CSI	3/3 3	3/2 2	7/14 ~	—
F19	F19	9/11 CSI	3/3 3	3/3 3	7/14 ~	—
F20	F20	9/11 CSI	3/3 3	3/4 4	7/14 ~	—

(5) Transmit control codes

Table 5-1-6 shows the control codes generated by pressing keys while holding down the CTRL key.

Any key combination is common to all the keyboard types.

However, an 8-bit control code cannot be generated.

Table 5-1-6 Generation of 7-bit Control Code

Send code	Mnemonic	Key to be pressed simultaneously	Function key with the same function
0/0	NUL	Z or space key	
0/1	SOH	A	
0/2	STX	B	
0/3	ETX	C	
0/4	EOT	D	
0/5	ENQ	E	
0/6	ACK	F	
0/7	BEL	G	
0/8	BS	H	F12 (BS) Note 1
0/9	HT	I	Tab
0/10	LF	J	F13 (LF) Note 1
0/11	VT	K	
0/12	FF	L	
0/13	CR	M	Return
0/14	SO	N	
0/15	SI	O	
1/0	DLE	P	
1/1	DC1	Q Note 2	
1/2	DC2	R	
1/3	DC3	S Note 2	
1/4	DC4	T	
1/5	NAK	U	
1/6	SYN	V	
1/7	ETB	W	
1/8	CAN	X	
1/9	EM	Y	
1/10	SUB	Z	
1/11	ESC	3 or [	F11 (ESC) Note 1
1/12	FS	4 or \	
1/13	GS	5 or]	
1/14	RS	6 or ~	
1/15	US	7 or ?	
7/15	DEL	8	Delete

Note 1: Function keys F11, F12, and F13 are effective only when the equipment operates in the VT100 or VT52 mode.

Note 2: This key is effective only when the XON/XOFF operation is inhibited. If the XON/OFF operation is permitted, "Hold Screen" can be set or cancelled by pressing the S or Q key while holding down the CTRL key.

2) Keyboard unit automatic repeat function

The automatic repeat function is selected by the parameter set in the Auto Repeat field of the Keyboard Set Up screen and the control sequence (DECARM) from the host computer. In the Auto Repeat mode, the automatic repeat operation is started if the key is held down for about 0.5 second.

In order to perform the automatic repeat operation constantly, the automatic repeat rate varies interlocking with the rate for transmitting data to the host computer.

Table 5-1-7 shows the automatic repeat rate.

Table 5-1-7 Automatic Repeat Rate

Data transmission rate to the host computer	Main keypad	Cursor control keys, Auxiliary keypad	Top Row function keys, Editing keys
19,200 bps ~ 2,400 bps	30 keys/sec	30 keys/sec	30 keys/sec
1,200 bps	30 keys/sec	30 keys/sec	24 keys/sec
600 bps	30 keys/sec	20 keys/sec	12 keys/sec
300 bps	30 keys/sec	12 keys/sec	12 keys/sec
150 bps ~ 75 bps	6 keys/sec	6 keys/sec	6 keys/sec

The keys not subject to the automatic repeat function are listed as follows:

Hold Screen, Print Screen, Set Up, Data/Talk, Break, Compose Character, Shift, Return, Lock, Ctrl

3) Keyboard lock function

The keyboard is locked by the control sequence (KAM) from the host computer or when the keyboard buffer is filled with data; inputting with any key other than Hold Screen, Print Screen, Set Up, Data/Talk, and Break is then inhibited. At this time, the Wait indicator lights up.

The locked keyboard unit is released if:

- The keyboard buffer becomes available again when the keyboard is not locked by the control sequence from the host computer.
- The keyboard is reset by the control sequence (KAM) from the host computer when the keyboard is not filled with data.
- The DECSTR or RIS control sequence is received from the host computer.

- Clear Communication, Reset Terminal, Recall, or Default is executed in the Set Up Directory screen.

  (The keyboard lock is cancelled during the Set Up mode. The keyboard is locked again when the Set Up mode is cancelled if any of the above commands are not executed during the Set Up mode.)

- Self-diagnosis is executed at power on or when the DECTST control sequence command is executed.

  (In this case, the Wait indicator does not light up.)

5.2 Reception Function

VG-920 operates when receiving control characters C0 and C1, and sequence codes Escape Sequences, Control Sequences, and Device Control Strings.

The commands for Escape Sequences, Control Sequences, and Device Control Strings are detailed as follows:

The commands are roughly divided into the following by their functions:

- (1) Control mode set commands
- (2) Character set set commands
- (3) Terminal mode set commands
- (4) Cursor control commands
- (5) Attribute set commands
- (6) Screen edit commands
- (7) Delete commands
- (8) Scroll control commands
- (9) Printer control commands
- (10) User-defined key control commands
- (11) Terminal report control commands
- (12) Terminal reset commands
- (13) Commands for test and adjustment
- (14) VT52 mode control commands

1) Control mode set commands

VG-920 can operate in any of 4 control modes, VT200 7-bit control, VT200 8-bit control, VT100, and VT52. These control modes are selected by the Set Up mode or the control mode set commands described as follows:

(1) Setting of compatibility level (DECSCL)

Command sequence	9/11	3/6	3/1	2/2	7/0
	CSI	6	1	"	P

Set the equipment to the VT100 mode (Level 1 compatible). The 8th bit of data received is regarded as 0.

As the character sets, the ASCII character set, UK National character set, and special graphic character set are effective.

| Command sequence | 9/11 | 3/6 | 3/2 | 2/2 | 7/0 |
| | CSI | 6 | 2 | " | P |

| | 9/11 | 3/6 | 3/2 | 3/11 | 3/0 | 2/2 | 7/0 |
| | CSI | 6 | 3 | ; | 0 | " | P |

| | 9/11 | 3/6 | 3/2 | 3/11 | 3/2 | 2/2 | 7/0 |
| | CSI | 6 | 2 | ; | 2 | " | P |

Set the equipment to the VT200 8-bit control mode (Level 2 compatible). The UK National character set cannot be used.

| Command sequence | 9/11 | 3/6 | 3/2 | 3/11 | 3/1 | 2/2 | 7/0 |
| | CSI | 6 | 2 | ; | 1 | " | P |

Set the equipment to the VT200 7-bit control mode (Level 2 compatible). The 8th bit of data received is valid.
However, the UK National character set cannot be used.

(2) ANSI/VT52 mode (DECANM)

| Command sequence | 9/11 | 3/15 | 3/2 | 6/12 |
| | CSI | ? | 2 | l |

Set the equipment to VT52 mode.

(3) Control of C1 control code (S7C1T, S8C1T)

| Sequence (S7C1T) | 1/11 | 2/0 | 4/7 |
| | ESC | SP | F |

The C1 control is converted into the C0 control code and transmitted.

| Sequence (S8C1T) | 1/11 | 2/0 | 4/6 |
| | ESC | SP | G |

The C1 control code is transmitted without being converted into the C0 control code.

2) Character sets set command
At shipment, the ASCII character set and the auxiliary character set are set in GL and GR, respectively.
The following 5 character sets (See section 4.2.) are provided:
- ASCII character set
- UK National character set
- Special graphic character set
- Auxiliary character set
- Down Line Loadable character set

These character sets are indicated at G0 through G3 by the character set selection command (SCS) and called in GL and GR by the Lock Shift and Single Shift functions.

(1) Character set indication command (SCS)

Sequence	1/11 ESC	2/8 (	4/2 B	Indicate the ASCII character set at G0. (Default)
	1/11 ESC	2/9)	4/2 B	Indicate the ASCII character set at G1.
	1/11 ESC	2/10 *	4/2 B	Indicate the ASCII character set at G2. (Valid only in the VT mode)
	1/11 ESC	2/11 +	4/2 B	Indicate the ASCII character set at G3. (Valid in the VT200 mode)
	1/11 ESC	2/8 (	3/12 <	Indicate the auxiliary character set at G0. (Valid only in the VT200 mode)
	1/11 ESC	2/9)	3/12 <	Indicate the auxiliary character est at G1. (Valid only in the VT200 mode)
	1/11 ESC	2/10 *	3/12 <	Indicate the auxiliary character set at G2. (Valid only in the VT200 mode)
	1/11 ESC	2/11 +	3/12 <	Indicate the auxiliary character set at G3. (Valid only in the VT200 mode)
	1/11 ESC	2/8 (	4/1 A	Indicate the UK National character set at G0. (Valid only in the VT100/VT52 mode)
	1/11 ESC	2/9)	4/1 A	Indicate the UK National character set at G1. (Valid only in the VT100/VT52 mode)
	1/11 ESC	2/8 (	3/0 0	Indicate the special graphic character set at G0.
	1/11 ESC	2/9)	3/0 0	Indicate the special graphic character set at G1.
	1/11 ESC	2/10 *	3/0 0	Indicate the special graphic character set at G2. (Valid only in the VT200 mode)
	1/11 ESC	2/11 +	3/0 0	Indicate the special graphic character set at G3. (Valid only in the VT200 mode)
	1/11 ESC	2/8 (	.... Dscs	Indicate the Down Line Loadable character set at G0. (Valid only in the VT200 mode)
	1/11 ESC	2/9)	.... Dscs	Indicate the Down Line Loadable character set at G1. (Valid only in the VT200 mode)
	1/11 ESC	2/10 *	.... Dscs	Indicate the Down Line Loadable character set at G2. (Valid only in the VT200 mode)
	1/11 ESC	2/11 +	.... Dscs	Indicate the Down Line Loadable character set at G3. (Valid only in the VT200 mode)

(2) Locking Shift and Single Shift commands

Mnemonic	Name	Code		Function
LS0	Lock Shift G0	0/15 SI		Call G0 in GL. (Initialization)
LS1	Lock Shift G1	0/14 SO		Call G1 in GL.
LS1R	Lock Shift G1, Right	1/11 ESC	7/14 ~	Call G1 in GR. (Valid only in the VT200 mode)
LS2	Lock Shift G2	1/11 ESC	6/14 n	Call G2 in GR. (Valid only in the VT200 mode)
LS2R	Lock Shift G2, Right	1/11 ESC	7/13 }	Call G2 in GR. (Initialization, valid only in the VT200 mode)
LS3	Lock Shift G3	1/11 ESC	6/15 o	Call G3 in GL. (Valid only in the VT200 mode)
LS3R	Lock Shift G3, Right	1/11 ESC	7/12 l	Call G3 in GR. (Valid only in the VT200 mode)
SS2	Single Shift G2	8/14 SS2		Call G2 in GL. This call is valid only for the first character displayed after calling. (Valid only in the VT200 mode)
		1/11 ESC	4/14 N	
SS3	Single Shift G3	8/15 SS3		Call G3 in GL. This call is valid only for the first character displayed after calling. (Valid only in the VT200 mode)
		1/11 ESC	4/15 O	

(3) Down Line Loadable character set

In the VT200 mode, up to 94 characters with the user-defined font can be set. This character set is called the Dynamically Redefinable Character Set (DRCS) and is defined by the DECDLD Device Control String.

This character set is not stored in the nonvolatile RAM (NVR) and is therefore erased when the power switch is turned OFF.

The Down Line Loadable character set is set according to the following procedures:

(i) Define the character front on a matrix of 7 x 10 pixels. DRCS consists of a matrix of 8 x 10 pixels, but the matrix displayed on the screen is limited to 7 x 10 pixels.

As an example, setting the font for character "A" is described below:
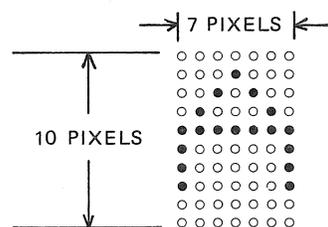
(ii)   Divide the font defined in (i) into upper 6 pixels and lower 4 pixels, and also divide it vertically into columns 1 through 15. Each of these columns divided into 6 or 4 pixels is called a "sixel."
b0 in each sixel is LSB.
At setting columns 9 through 15, b4 and b5 are ignored.

```
     1 2 3 4 5 6 7
 b0 | o o o o o o o      ↑
 b1 | o o o ● o o o      |
 b2 | o o ● o ● o o      UPPER
 b3 | o ● o o o ● o      COLUMNS
 b4 | ● o o o o o ●      |
 b5 | ● ● ● ● ● ● ●      ↓
 b0 | ● o o o o o ●      ↑
 b1 | ● o o o o o ●      LOWER
 b2 | o o o o o o o      COLUMNS
 b3 | o o o o o o o      ↓
     9 101112131415
```
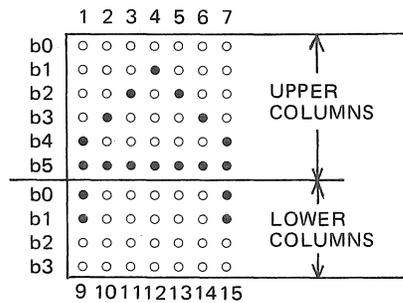
(iii) Express the contents of each sixel in binary.
The pixel to be displayed on the screen is represented by "1" while the pixel not to be displayed on the screen is represented by "0".

(iv)   Convert the binary value obtained in (iii) into an octonary value.

(v)   Add offset value 77_8 to the octonary value obtained in (iv).

(vi)   Obtain the ASCII character corresponding to the octonary value obtained in (v) in reference to Fig. 4-2-1.
Procedures (iii) through (vi) are shown in the figure below.

$157_8 = 0$

$147_8 = g$

$143_8 = c$

$100010_2 = 42_8; 42_8 + 77_8 = 141_8 = a$

$100100_2 = 44_8; 44_8 + 77_8 = 143_8 = c$

$101000_2 = 50_8; 50_8 + 77_8 = 147_8 = g$

$110000_2 = 60_8; 60_8 + 77_8 = 157_8 = o$

$$102_8 = B$$
$$77_8 = ?$$
$$77_8 = ?$$
$$77_8 = ?$$
$$77_8 = ?$$
$$0000_2 = 0_8 ; 0_8 + 77_8 = 77_8 = ?$$
$$0011_2 = 3_8 ; 3_8 + 77_8 = 102_8 = B$$
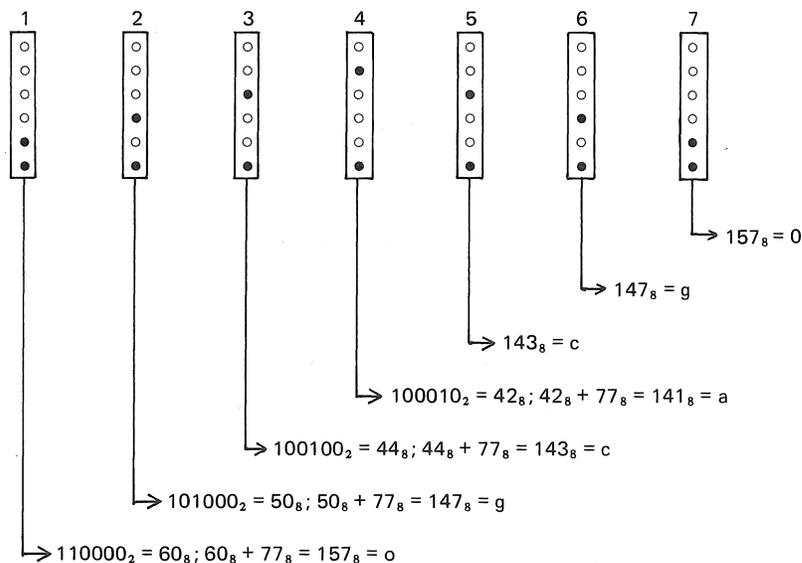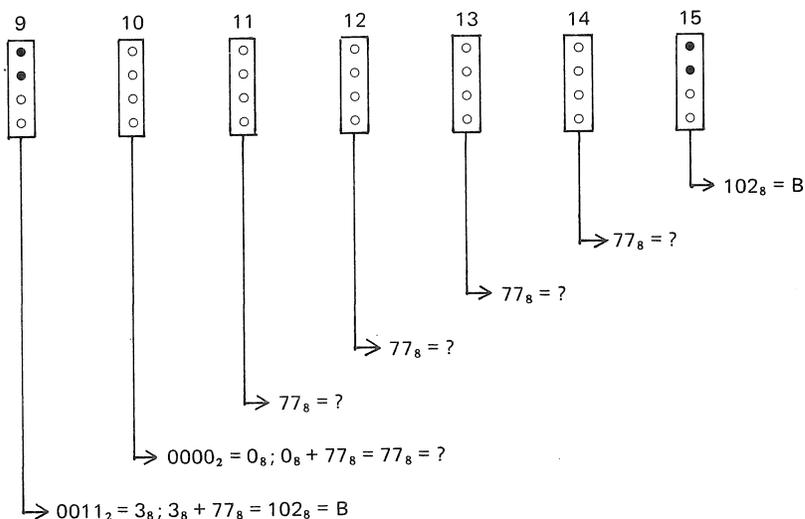
(vii) Down Line Loadable character set set command (DECDLD)

The Down Line Loadable character set is set by the Device Control String command shown below:

Sequence
| 9/0 | 3/11 | 3/11 | 3/11 | 3/11 | 7/11 |

DCS Pfn ; Pcn ; Pe ; Pcms ; Pw ; Pt { Dscs

| 3/11 | 3/11 | 3/11 | 9/12 |

Sxbp1 ; Sxbp2 ; ..... ; Sxbp94 ST

DCS .... Device Control String introducer
This is expressed as ESC P (1/11 5/0) in the 7-bit control characters.

Pfn .... Font No. parameter
Indicate the DRCS font buffer number. 0 or 1 is specified. VG-920 is provided with only one DRCS font buffer so that it performs the same operation whichever numbers are specified.

Pcn .... Character number parameter
Specify the character start number for the font to be defined in DRCS. 1 or 94 is specified in the case of 2/1 or 1/14, respectively.

Pe .... Erase parameter
Specify the character font to be erased prior to defining the font in DRCS.

0 : Erase the entire contents of the font buffer specified in Pfn. (Default)

1 : Erase only the character font area to be redefined.

2 : Erase the entire contents of the font buffer.

Pcms .... Matrix size parameter for the character font.
   Specify the size of character font.
            0 : 7 x 10 (Default)
            2 : 7 x 10
            3 : 7 x 10
            4 : 7 x 10
Pw .... Column parameter
   Specify the character width.
            0 : 80 columns (Default)
            1 : 80 columns
            2 : 80 columns
Pt .... Text/fall-cell font parameter
   Specify whether the font to be set is the text font or the full-cell font.
   The full-cell font is specified in the pixel font but it cannot be speci-
   fied in VG-920.
            0 : Text (Default)
            1 : Text
{ .... Indicate the completion of specifying parameters and that this
   sequence is the RECDLD command.

Dscs .... Specify the character set name. This is used with the character
   set selection command (SCS).
   Note: Dscs is a string of up to 3 characters in the IIF format. I and F
           are specified by codes ranging from 2/0 to 2/15 and from 3/0
           to 7/14, respectively.
Sxbpl .... Sixel bit pattern
   The sixel bit patterns determined in procedures (i) through (vi) are
   specified for columns 1 through 15 in this order.
   The format in which "A" is specified is shown below.

; .... Indicate the partition between sixel bit patterns.
ST .... String terminator
   This is the terminator code for this Device Control String command
   (DECDLD). This is expressed as ESC (1/11 5/12) in the 7-bit control
   characters.

(viii) Erasing the Down Line Loadable character set

The Down Line Loadable character set is erased when:
- The self-diagnostic test is executed at power on.
- Recall or Default is executed on the Set Up Directory screen.
- The RIS command (ESC C) is executed.

3) Terminal mode set commands

The terminal operation mode is set by the set/reset Control Sequence shown below. Most of the items to be set for this operation mode can be set in the Set Up mode. Also, some items can be set under the lock condition by the User Features Lock function in the General Set Up screen. The command sequence format is shown below.

ANSI mode set command

9/11		3/11		3/11	6/8
CSI	PS	;	....	; PS	h

ANSI mode reset command

9/11		3/11		3/11	6/12
CSI	PS	;	....	; PS	l

DEC Private mode set command

9/11	3/15	3/11		3/11	6/8
CSI	? PS	;	....	; PS	h

DEC Private mode reset command

9/11	3/15	3/11		3/11	6/12
CSI	?	;	....	; PS	l

Ps is the parameter specifying the operation mode to be set.

(1) Keyboard operation set command (KAM)

Set sequence

9/11	3/2	6/8
CSI	2	h

The keyboard is locked and the keyed-in data cannot be sent to the host computer. The wait indicator lights up and the key-in operation does not cause clicking sound.

Reset sequence

9/11	3/2	6/12
CSI	2	l

If the keyboard is not locked by the XOFF function, the keyboard is released from the lock condition.

(2) Insert/replace mode set command (IRM)

Set sequence

9/11	3/4	6/8
CSI	4	h

The equipment is set in the insert mode. When new data to be displayed is generated, the data displayed from the cursor position to the line end is shifted 1 column to the right and the new data is displayed in the cursor position. The display data exceeding the last column is erased.

Reset sequence

9/11	3/4	6/12
CSI	4	l

The equipment is set in the replace mode. When new data to be displayed is generated, the data displayed in the cursor position is replaced with the new data and erased.

(3)　Transmit/Receive mode set command (SRM)

Set sequence

9/11	3/1	3/2	6/8
CSI	1	2	h

The local echo operation is inhibited. The keyed-in data is transmitted to the host computer but it is not displayed on the screen.

Reset sequence

9/11	3/1	3/2	6/12
CSI	1	2	l

The local echo operation is specified. The keyed-in data is transmitted to the host computer and at the same time, it is automatically displayed on the screen.

(4)　Line Feed/New Line operation set command (LNM)

Set sequence

9/11	3/2	3/0	6/8
CSI	2	0	h

The LF, FF, or VT code received from the host computer moves the cursor to the first column on the next line.
Pushing the Return key causes the CR and LF codes to be sent to the host computer. The Enter key has the same function as the Return key in the Numeric Keypad mode.

Reset sequence

9/11	3/2	3/0	6/12
CSI	3	0	l

The LF, FF, or VT code received from the host computer moves the cursor to the same column on the next line.
Pushing the Return key causes the CR code to be transmitted to the host computer. The Enter key has the same function as the Return key in the Numeric Keypad mode.

(5)　Cursor key operation set command (DECCKM)

Set sequence

9/11	3/15	3/1	6/8
CSI	?	1	h

Set the arrow-key generation code to the Application Cursor Keys mode.

Reset sequence

9/11	3/15	3/1	6/12
CSI	?	1	l

Set the arrow-key generation code to the Normal Cursor Keys mode.

(6) Display column number selection command (DECCOLM)

When this command is received, the display screen is cleared and the cursor is set in the first column on the first line. Also, the scroll range is set on the screen for lines 1 through 24.

Set sequence

	9/11	3/15	3/3	6/8
	CSI	?	3	h

132 columns/line is specified for the screen.

Reset sequence

	9/11	3/15	3/3	6/12
	CSI	?	3	l

80 columns/line is specified for the screen.

(7) Scroll operation set command (DECSCLM)

Set sequence

	9/11	3/15	3/4	6/8
	CSI	?	4	h

Specify smooth scroll operation.

Reset sequence

	9/11	3/15	3/4	6/12
	CSI	?	4	l

Specify jump scroll operation.

(8) Display screen selection command (DECSCNM)

Set sequence

	9/11	3/15	3/5	6/8
	CSI	?	5	h

Set the display screen to reverse display.

Reset sequence

	9/11	3/15	3/5	6/12
	CSI	?	5	l

Set the display screen to normal display.

(9) Origin set command (DECOM)

Set sequence

	9/11	3/15	3/6	6/8
	CSI	?	6	h

Set the home position in the first column on the scroll area start line.
The scroll area start line is processed as line 1.
The cursor moves only within the scroll area.
This mode is invalid for the screen erase command (ED) operation.

Reset sequence

	9/11	3/15	3/6	6/12
	CSI	?	6	l

Set the home position in the first column on the first line. Regardless of the specified scroll area, line numbers 1 through 24 are set.
The cursor-up operation enables the cursor to be moved outside the scroll area.

(10) Automatic line feed operation set command (DECAWN)

Set sequence
9/11	3/15	3/6	6/8
CSI	?	7	h

Set the equipment in the automatic line feed (Auto Wrap) mode.

Data received exceeding the last column on the line are displayed starting on the first column of the next line.

If the cursor is positioned on the bottom line of the scroll area, the display screen in the scroll area is scrolled up.

The line feed operation cannot be performed with the TAB code.

Reset sequence
9/11	3/15	3/7	6/12
CSI	?	7	l

The automatic line feed (Auto Wrap) mode is reset.

Data received exceeding the last column on the line are replaced on the last column so that the line feed operation is not performed.

(11) Keyboard repeat operation set command (DECARM)

Set sequence
9/11	3/15	3/8	6/8
CSI	?	8	h

Set the keyboard unit in the automatic repeat mode.

Pressing a key other than one of the following keys for more than 0.5 second causes the automatic repeat function to operate:

Hold Screen, Print Screen, Set Up, Data/Talk, Break, Return, Compose Character, Lock, Shift, Ctrl

Reset sequence
9/11	3/15	3/8	6/12
CSI	?	8	l

The automatic repeat function of keyboard unit is inhibited.

(12) Print Form Feed function selection command (DECPFF)

Set sequence
9/11	3/15	3/1	3/8	6/8
CSI	?	1	8	h

Transmit the Form Feed (FF) code to the printer as a terminator at completion of print operation.

Reset sequence
9/11	3/15	3/1	3/8	6/12
CSI	?	1	8	l

The function to transmit the terminator (FF code) upon completion of the print operation is inhibited.

(13) Print area set command (DECPEX)

Set sequence
9/11	3/15	3/1	3/9	6/8
CSI	?	1	9	h

During the print screen operation, all data displayed on the screen is sent to the printer.

Reset sequence

9/11	3/15	3/1	3/9	6/12
CSI	?	1	9	l

During the print screen operation, all data displayed in the scroll area is sent to the printer.

(14)   Cursor display control command (DECTCEM)

Set sequence

9/11	3/15	3/2	3/5	6/8
CSI	?	2	5	h

In the On Line/Local mode, the cursor blinks.

Reset sequence

9/11	3/15	3/2	3/5	6/12
CSI	?	2	5	l

In the On Line/Local mode, the cursor display is inhibited.

(15)   Auxiliary keypad control command (DECLPAM/DECKPNM)

Set sequence (DECKPNM)

1/11	3/13
ESC	=

Set the Application Keypad mode for the auxiliary keypad.

Reset sequence (DECKPNM)

1/11	3/14
ESC	>

Set the Numeric Keypad mode for the auxiliary keypad.
When VG-920 is powered on or reset, it is set to the Numeric Keypad mode.

4)   Cursor control commands

The cursor indicates the position where the data to be received next is displayed, except when it is positioned at the last column. The cursor can be moved by controling.

- Relative movement based on the present cursor position
- Direct specification of line No. and column No. on the screen
- Movement with the TAB code or Line Feed control code

The cursor commands are shown below:

Note: Pn is the control parameter expressed in an ASCII Numeric code.
When this parameter is either not specified or 0 is specified, VG-920 regards this parameter value as 1.

(1)   Cursor up control command (CUU)

Sequence

9/11		4/1
CSI	Pn	A

The cursor moves upward in the same column by the number of lines specified by Pn.
When the cursor moves up to the top line on the screen, or the scroll start line, it stops.

(2) Cursor down control command (CUD)

Sequence

	9/11		4/2
	CSI	Pn	B

The cursor moves downward in the same column by the number of lines specified by Pn.
When the cursor moves down to the bottom line on the screen, or the bottom line in the scroll area, it stops.

(3) Cursor forward control command (CUF)

Sequence

	9/11		4/3
	CSI	Pn	C

The cursor moves to the right by the number of columns specified by Pn.
When the cursor moves to the last column, it stops.

(4) Cursor backward control command (CUB)

Sequence

	9/11		4/4
	CSI	Pn	D

The cursor moves Pn columns to the left.
When it moves to the 1st column, it stops.

(5) Cursor position control command (CUP, HVP)

Sequence (CUP)

	9/11		3/11		4/8
	CSI	P1	;	Pc	H

The cursor moves to the position, line Pl/ column Pc.
The line and column numbers vary depending on those set by the Origin set command (DECOM).

Sequence (HVP)

	9/11		3/11		6/6
	CSI	P1	;	Pc	f

This command operates in the same manner as the CUP command. However, it is recommended you use the CUP command.

(6) Index mode command (IND)

Sequence

	1/11	4/4		8/4
	ESC	D	or	IND

The cursor moves down 1 line in the same column.
If this command is received when the cursor is positioned on the bottom line in the scroll area, the scroll-area screen is scrolled down 1 line.

(7) Reverse Index mode command (RI)

Sequence

	1/11	4/13		8/13
	ESC	M	or	RI

The cursor moves up 1 line in the same column. If this command is received when the cursor is positioned on the top line in the scroll area, the scroll-area display screen is scrolled down 1 line.

(8) Next Line mode command (NEL)

Sequence
    1/11   4/5   8/5
    ESC   E   or   NEL

The cursor moves to the first column on the next line.
If this code is received when the cursor is positioned on the bottom line in the scroll area, the cursor moves to the first column on the same line and the scroll-area display screen is scrolled up 1 line.

(9) Save Cursor command (DECSC)

Sequence
    1/11   3/7
    ESC   7

The following contents area saved in the internal memory of VG-920:
- Cursor position
- Character attributes (Punctuation character, underline, blink, reverse display, and non-eliminable character)
- Automatic line feed operation
- Origin mode
- Character set

(10) Restore Cursor command (DECRC)

Sequence
    1/11   3/8
    ESC   8

VG-920 is reset according to the contents saved by the Save Cursor command (DECSC). When this command is executed and the contents have not been saved, the following conditions are specified:
- The cursor is moved to the home position.
- The origin mode is reset.
- All the character attributes are turned OFF.
- The default character set is specified.

(11) Horizontal tab set command (HTS)

Sequence
    1/11   4/8   8/8
    ESC   H   or   HTS

Set the tab in the present cursor position (column).
When VG-920 receives the HT (019) code, the cursor moves to the position where the tab is set after the present column position.
If the tab is not set by the line end, the cursor moves to the last column.

(12) Tab clear command (TBC)

Sequence

	9/11	1/7		9/11	3/0	6/7
	CSI	g	or	CSI	0	g

Clear the tab set in the present cursor position (column).

Sequence

	9/11	3/3	6/7
	CSI	3	g

Clear all the tabs set.

5) Attribute set commands

Specify the attributes of display character (such as punctuation characters and underline, blink, and reverse display), the non-eliminable characters, and the character size on the line.

(1) Character attribute specification command (SGR)

Sequence

	9/11		3/11				6/13
	CSI	Ps	;	Ps	...	Ps	m

Specify the attributres of the characters to be displayed on the screen. Ps indicates the attribute parameter and one or more parameters can be specified. When multiple parameters are specified, they are delimited by one or more character codes (3/11).

Ps.

3/0
0 . . . . Resets all the attributes.

3/1
1 . . . . Specifies the punctuation character to be displayed.

3/4
4 . . . . Specifies the underline to be displayed.

3/5
5 . . . . Specifies blink display.

3/7
7 . . . . Specifies reverse display.

3/2 3/2
2   2 . . . . Resets the punctuation character specified.

3/2 3/4
2   4 . . . . Resets the underline specified.

3/2 3/5
2   5 . . . . Resets blink display specified.

3/2 3/7
2   7 . . . . Resets reverse display specified.

(2) Non-eliminable character specification command (DECSCA)

Sequence

9/11		2/2	7/1
CSI	Ps	''	q

Specify the non-eliminable attribute of the character to be displayed on the screen.

The elimination commands (DECSEL/DECSED) described later cause the elimination function to be executed.

This command operates only in the VT200 mode and does not affect the character attribute specification command described before.

Ps indicates the control parameter. The contents of this parameter are shown below.

Ps

3/0
0 . . . . The characters to be displayed after this command are eliminated by the later-described elimination command (DECSEL/DECSED). (Default)

3/1
1 . . . . The characters to be displayed after this command are not eliminated by the DECSEL/DECSED command. (Attribute On)

3/2
2 . . . . The characters to be displayed after this command are eliminated by the DECSEL/DECSED command.

(3) Character size specification command (DECDHL, DECSWL, DECDWL)

Set the line on which the cursor is presently displayed as the top- or bottom-half of the double-height double-width character line, the single-height double-width character line, or the single-height character line.

When the line character size is altered, the cursor is positioned in the column prior to the alteration. However, the cursor positioned in the right-half portion of the single-width character line is set in the last column, if the line character size is altered to the double-width character line. And, the characters displayed on the right-half portion of the single-width character line are deleted.

If the screen is shifted by the scroll operation, the line character size specified is also shifted. Therefore, the display character size does not vary.

If the command is executed to eliminate all the characters displayed on 1 line, the line is set as the single-width character line.

Sequence (DECDWL)

1/11	2/3	3/3
ESC	#	3

The line on which the cursor is displayed is set on the to-half portion of the double-height double-width character line.

Sequence (DECDWL)	1/11	2/3	3/4
	ESC	#	4

The line on which the cursor is displayed is set on the bottom-half portion of the double-height double-width character line.

Sequence (DECSWL)	1/11	2/3	3/5
	ESC	#	5

The line on which the cursor is displayed is set as the single-height single-width character line. Under the initial condition, all the lines on the screen are set as the single-height single-width character lines.

Sequence (DECDWL)	1/11	2/3	3/6
	ESC	#	6

The line on which the cursor is displayed is set as the single-height double-width character line.

6) Screen edit commands

Insert or delete the characters or line starting with the cursor position.

The cursor position does not change after completion of these commands.

Note: Pn is the control parameter expressed in an ASCII Numeric code.

If this parameter is not specified or 0 is specified, VG-920 regards the parameter value as 1.

(1) Insert line command (IL)

Sequence	9/11		4/12
	CSI	Pn	L

Insert a Pn number of space lines with the single-height and single-width character size after the line on which the cursor is displayed. Data displayed on the lines from the line on which the cursor is positioned to the lowermost line in the scroll area are scrolled down while the space lines are added to the cursor position, and the cursor moves to the first column on the same line. Screen data overflowing from the scroll area by the scroll-down operation are erased.

This command is invalid if the cursor is positioned outside of the scroll area.

(2) Delete line command (DL)

Sequence	9/11		4/13
	CSI	Pn	M

Delete a Pn number of display lines after the line on which the cursor is positioned. Data displayed on lines from the line on which the cursor is positioned to the last line in the scroll area are scrolled up to the cursor-displayed line, while the space lines with the single-height single-width character size are added to the bottom line in the scroll area.

This command is invalid if the cursor is positioned outside the scroll area.

(3) Insert character command (ICH)

Sequence
9/11   4/0
CSI   Pn   @

Insert a Pn number of space characters after the cursor position. The cursor does not move. The characters displayed on the columns between the cursor position and the last column on the line are shifted to the right by adding the space characters to the cursor position. The characters shifted beyond the last column are erased.

This command is valid only in the VT200 mode.

(4) Delete character command (DCH)

Sequence
9/11   5/0
CSI   Pnq   P

Delete a Pn number of characters after the cursor Position. Data displayed on the columns between the cursor position and the last column are shifted to the left by adding a space character to the last column.

Characters shifted beyond the cursor position are erased.

7) Elimination commands

Control elimination of characters, lines, and screen.

All the attributes of the characters eliminated by the elimination command are reset by the character attribute specification command (SGR) already described.

(1) Character elimination command (ECH)

Sequence
9/11   5/8
CSI   Pn   X

Eliminate a Pn number of characters displayed after the cursor position.

If Pn is set to 0, 1 character on the cursor position is eliminated.

This command is valid only in the VT200 mode.

(2) Line elimination command (EL)

Sequence
9/11   4/11   9/11   3/0   4/11
CSI   K   or   CSI   O   K

Eliminate the characters displayed on the columns from the cursor position to the last column on the line.

The character size does not change.

Sequence
9/11   3/1   4/11
CSI   I   K

Eliminate the characters displayed on the columns from the first column to the cursor position on the line where the cursor is positioned. The character size does change.

Sequence	9/11 CSI	3/2 2	4/11 K

Eliminate all the characters displayed on the line where the cursor is positioned.

(3) Screen elimination command (ED)

Sequence	9/11 CSI	4/10 J	or	9/11 CSI	3/0 O	4/10 J

Regardless of the scroll area specified, eliminate all the characters displayed on the columns from the cursor position to the last column on the screen.
If an entire line of characters is eliminated, the line is specified as the single-height single-width character line.

Sequence	9/11 CSI	3/1 1	4/10 J

Eliminate all the characters displayed on the columns from the first column on the screen (the first column on the first line) to the cursor position.
If an entire line of characters is eliminated, the line is set as the single-height single-width character line.

Sequence	9/11 CSI	3/2 2	4/10 J

Eliminate the characters on an entire screen. All the lines on the screen are set as single-height single-width character lines.
The cursor position doesnot change.

(4) Line selective elimination command (DECSEL)
This command is valid only in the VT200 mode.

Sequence	9/11 CSI	3/15 ?	4/11 K	or	9/11 CSI	3/15 ?	3/0 0	4/11 K

Eliminate the elimination specification characters among the characters displayed on the columns between the cursor position and the last column on the line.
The elimination specification characters are specified by the non-eliminable character specification command (DECSCA) already described.
The attributes and line character size of the elimination characters specified by the attribute set command are not eliminated but are preserved as they are.

Sequence	9/11 CSI	3/15 ?	3/1 1	4/11 K

Eliminate the elimination specification characters among the characters displayed on the columns from the first column to the cursor position.
The elimination specification characters are specified by the non-eliminable character specification command (DECSCA) already described.

The attributes and line character size of the elimination characters specified by the attribute set command described before are not eliminated but are preserved as they are.

Sequence	9/11	3/15	3/2	4/11
	CSI	?	2	K

Eliminate the elimination specification characters among all the characters displayed on the line where the cursor is positioned.

The elimination specification characters are specified by the non-eliminable character specification command (DECSCA) already described.

The attributes and line character size of the elimination characters specified by the attribute set command are not eliminated but are preserved as they are.

(5) Screen selective elimination command (DECSED)

This is valid only in the VT200 mode.

Sequence	9/11	3/15	4/10	or	9/11	3/15	3/0	4/10
	CSI	?	J		CSI	?	0	J

Regardless of the scroll area specified, eliminate the elimination specification characters among all the characters displayed on the columns from the cursor position to the last column on the screen.

The elimination specification characters are specified by the non-eliminable character specification command (DECSCA) already described.

The attributes and line character size of the elimination characters specified by the attribute set command already described are not eliminated but are preserved as they are.

Sequence	9/11	3/15	3/1	4/10
	CSI	?	1	J

Eliminate the elimination specification characters among all the characters displayed on the columns from the first column on the screen (the first column on the first line) to the cursor position.

The elimination specification characters are specified by the non-eliminable character specification command (DECSCA) described before.

The attributes and line character size of the elimination characters specified by the attribute set command already described are not eliminated but are preserved as they are.

Sequence	9/11	3/15	3/2	4/10
	CSI	?	2	J

Eliminate the elimination specification characters among all the characters displayed on the screen.

The elimination specification characters are specified by the non-eliminable character specification command (DECSCA) already described.

The attributes and line character size of the elimination characters specified by the attribute set command already described are not eliminated but are preserved as they are.

8) Scroll control commands

When the received data causes a new screen to be generated, the screen previously displayed is erased by the scroll operation in the scroll area.

An area of more than 2 lines can be set as the scroll area.

This can be set by specifying the start line number and end line number with the scroll area set command (DECCSTBM) described below. A line number ranging from 1 through 24 can be specified.

(1) Scroll area set command (DECSTBM)

Sequence	9/11		3/11		7/2
	CSI	Pt	;	Pb	r

Specify the start line number and end line number of the scroll area.

    Pt : Scroll start line number (1 through 23)

    Pb : Scroll end line number (2 through 24)

When Pt is not specified, 1 is specified as the start line number.

When Pb is not specified, 24 is specified as the end line number.

When VG-920 is powered on or reset, the scroll area is set over the entire screen from lines 1 through 24.

9) Printer control commands

Set the print operation mode.

Prior to setting the print operation mode, the printer condition needs to be checked by the print status report command (DSR) described later.

(1) Auto Print mode set command

Sequence	9/11	3/15	3/5	6/9
	CSI	?	5	i

VG-920 is set to the Auto Print mode. If the Line Feed, Vertical Tabulation, or Automatic Line Feed operation causes the cursor-displayed line to vary, the data displayed on 1 line are printed out.

Sequence	9/11	3/15	3/4	6/9
	CSI	?	4	i

The Auto Print mode is reset.

(2) Printer Controller mode set command

Sequence	9/11	3/5	6/9
	CSI	5	i

VG-920 is set to the Printer Controller mode.

The received data are not displayed on the screen but are output to the printer. (NUL, XON, and XOFF codes and CSI5i and CSI4i code sequences are not output.)

VG-920 does not require the additional printer control code.

The printer Controller mode is set and takes priority over the Auto Print mode. (When VG-920 is set to the Auto Print mode, it can be set to the Printer Controller mode.)

Data keyed-in from the keyboard unit are sent to the host computer.

Sequence
9/11	3/4	6/9
CSI	4	i

The Printer Controller mode is reset.

(3) Cursor line print command

Sequence
9/11	3/15	3/1	6/9
CSI	?	1	i

Data displayed on one line where the cursor is positioned are printed out. The cursor position does not change.

(4) Screen print command

Sequence
9/11	6/9		9/11	3/0	6/9
CSI	i	or	CSI	0	i

According to the print area set command (DECPEX) already described data displayed on the entire screen or in the scroll area are printed out.

In addition, according to the Print Form Feed set command (DECPFF), the terminator (FF code) required at completion of the print operation can be generated.

10) User-defined key control command (DECUDK)

Among the Top-Row function keys, 15 function keys F6 through F14, Help, Do, and F17 through F20 can be defined by the user.

In the VT200 mode, these keys are defined by the user-defined key control command (DECUDK) and keying-in any of these keys while holding down the Shift key causes the defined code to be generated.

Up to 256 bytes of characters can be defined for 115 function keys. If 256 bytes of characters are specified for the 15 keys, no character can be specified for function keys other than these keys.

Moreover, the defined characters are erased when VG-920 is powered OFF. Therefore, the characters need to be defined again when VG-920 is powered ON.

Sequence
9/0	3/11	7/12	2/15	3/11	2/15	3/11		2/15	9/12
DSC	Pc ;	Pl l	kyl /	St1 ;	ky2 /	st2 ;	.....	kyn /stn	ST

DCS . . . . . . Device Control String introducer

This is expressed as ESC P (1/11 5/0) in the 7-bit control characters.

Pc . . . . Clear parameter

Prior to setting a key, this parameter specifies the key to clear the contents previously defined.

    Not specified . . . . Clear the definitions of all the keys.

    0 . . . . Clear the definitions of all the keys.

    1 . . . . Clear the definition of the key to be set.

Pl . . . . Lock parameter

Re-definition of the key already set is specified as follows by this parameter.

    Not specified . . . . Re-definition of the key is inhibited.

    0 . . . . Re-definition of the key is inhibited.

    1 . . . . Re-definition of the key is possible.

| . . . . Final character

Indicates that this command sequence is the DECUDK command.

Kyn . . . . . . Key number

Specifies the key to be defined. The keys to be defined and the Kyn values corresponding to these keys are shown below.

Key	Kyn value
F6	17
F7	18
F8	19
F9	20
F10	21
F11	23
F12	24
F13	25
F14	26
HELP	28
DO	29
F17	31
F18	32
F19	33
F20	34

/ . . . . Indicates the delimiter between the key number and the key-string parameter.

Stn . . . . Key-string parameter

Defines the key generated contents.

ST . . . . String Terminator

This is the terminator code for this user-defined key control command (DECUDK).

This is expressed as ESC \ (1/11 5/12) in the 7-bit control characters.

DECUDK use examples

(i) Clear the contents of all the keys set.

9/0	3/0	3/11	3/1	7/12	9/12
DCS	0	;	1	|	ST

(ii) Inhibit re-definition of the keys.

9/0	3/1	3/11	3/0	7/12	9/12
DCS	1	;	0	|	ST

(iii) Define the code generated by the key.
Provided that the code generated by the F20 key is defined as "PRINT."

P = 50 hex
R = 52 hex
I = 49 hex
N = 4E hex
T = 54 hex

9/0	3/1	3/11	3/1	7/12	3/3	3/4	2/15	3/5	3/0	3/5	3/2	3/4	3/9
DCS	1	;	1	|	3	4	/	5	0	5	2	4	9

3/4	4/5	3/5	3/4	9/12
4	E	5	4	ST

11) Terminal report control commands
At the request of the host computer, VG-920 answers the terminal status.

(1) Device attribute (DA)

Request command (Primary Device Attribute Request)

9/11	6/3		9/11	3/0	6/3
CSI	C	or	CSI	0	C

Answer command

9/11	3/15	3/6	3/2	3/11	3/1	3/11	3/2	3/11	3/6	3/11	3/7	3/11	3/8	6/3
CSI	?	6	2	;	1	;	2	;	6	;	7	;	8	C

Request command (Secondary Device Attribute Request)

9/11	3/14	6/3		9/11	3/14	3/0	6/3
CSI	>	C	or	CSI	>	0	C

Answer command

9/11	3/14	3/1	3/11	3/1	3/0	6/3
CSI	>	1	;	1	0	C

(2)   Device Status (DSR)

Request command (Status request)

9/11	3/5	6/14
CSI	5	n

Answer command

9/11	3/0	6/14	
CSI	0	n	When the terminal is normal

9/11	3/3	6/14	
CSI	3	n	When the terminal is abnormal:

Request command (Cursor Position Request)

9/11	3/6	6/14
CSI	6	n

Answer command

9/11		3/11			5/2
CSI	Pv	;	Ph		R

Pv . . . . . Line number (1 through 24)

Ph . . . . . Column number (1 through 132)

Request command (Printer Status Request)

9/11	3/15	3/1	3/5	6/14
CSI	?	1	5	n

Answer command

9/11	3/15	3/1	3/3	6/14	
CSI	?	1	3	n	Printer not connected

9/11	3/15	3/1	3/0	6/14	
CSI	?	1	0	n	Printer ready

9/11	3/15	3/1	3/1	6/14	
CSI	?	1	1	n	Printer not ready

Request command (User-defined Key Status Request)

9/11	3/15	3/2	3/5	6/14
CSI	?	2	5	n

Answer command

9/11	3/15	3/2	3/0	6/14	
CSI	?	2	0	n	Re-definition inhibition status

9/11	3/15	3/2	3/1	6/14	
CSI	?	2	1	n	Re-definition possible status

(3) Identification (DECID)

Request command

1/11	5/10
ESC	Z

Answer command

9/11	3/15	3/6	3/2	3/11	3/1	3/11	3/2	3/11	3/6	3/11	3/7	3/11	3/8	6/3
CSI	?	6	2	;	1	;	2	;	6	;	7	;	8	C

12) Terminal Reset Commands
Reset the operation mode of the terminal.

(1) Soft Terminal Reset

9/11	2/1	7/0
CSI	!	P

Table 5-2-1 shows the terminal status after the terminal is reset. The data saved by the Save Cursor command (DECSC) are reset as shown in Table 5-2-1.
This command is valid only in the VT200 mode.
The same operation can be performed by executing Reset Terminal in the Set Up mode.

Table 5-2-1 Soft Terminal Reset Operation

Item	Contents
Text cursor	on
Insert/replace mode	Replace mode
Origin mode	Reset
Auto Wrap	off
Keyboard Action	Unlock
Auxiliary Keypad	Numeric Keypad mode
Editing Keypad	Normal Cursor keys mode
Scroll start line number	1
Scroll end line number	24
Character set	Default
G0 G1	
G2 G3	
GL GR	
Attributes of characters displayed	Reset
Non-eliminable character	Reset

(2) Hard Terminal Reset (RIS)

```
1/11   6/3
ESC    C
```

Initialize the reset terminal to the status at power-on.

13) Alignment command (DECALN)

The original pattern used for screen alignment is built into the terminal.

The DECANL sequence causes H to be displayed on the entire screen.

```
1/11   2/3   3/8
ESC    #     8
```

14) VT52 mode control commands

In the VT52 mode, the VT52 Escape Sequence command and control character C0 are executed.

Table 5-2-2 shows the VT52 Escape Sequence command.

Table 5-2-2   VT52 Escape Sequence Command

Sequence		Function
ESC	A	Cursor up
"	B	Cursor down
"	C	Cursor right
"	D	Cursor left
"	F	The graphic mode is set.
"	G	The graphic mode is reset.
"	H	Cursor home
"	I	Reverse Line Feed
"	J	Eliminate the characters up to the last column on the screen.
"	K	Eliminate the characters up to the last column on the line.
"	Y	Cursor addressing
	Line Column	
ESC	Z	Identification request.
"	=	The Alternate Keypad mode is set.
"	>	The Alternate Keypad mode is reset.
"	<	The VT100 mode is set.
"	∧	The Auto Print mode is set.
"	—	The Auto Print mode is reset.
"	W	The Printer Controller mode is set.
"	X	The printer controller mode is reset.
"	]	Print screen
"	V	Print Cursor Line

6. ATTACHED DIAGRAM

The key arrangement diagram for each keyboard unit-type to be specified on the Set Up Directory screen is shown below.
There are the following 15 keyboard unit types:

North American Keyboard
British Keyboard
Flemish Keyboard
Canadian (French) Keyboard
Danish Keyboard
Finnish Keyboard
French/Belgian Keyboard
German Keyboard
Dutch Keyboard
Italian Keyboard
Norwegian Keyboard
Spanish Keyboard
Swedish Keyboard
Swiss (French) Keyboard
Swiss (German) Keyboard
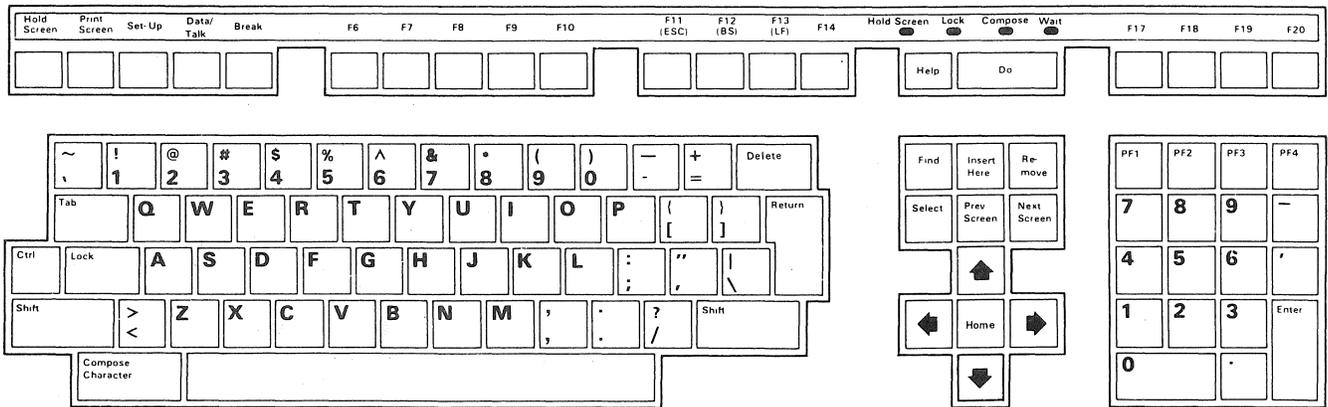
Figure 6 – 1   North American keyboard
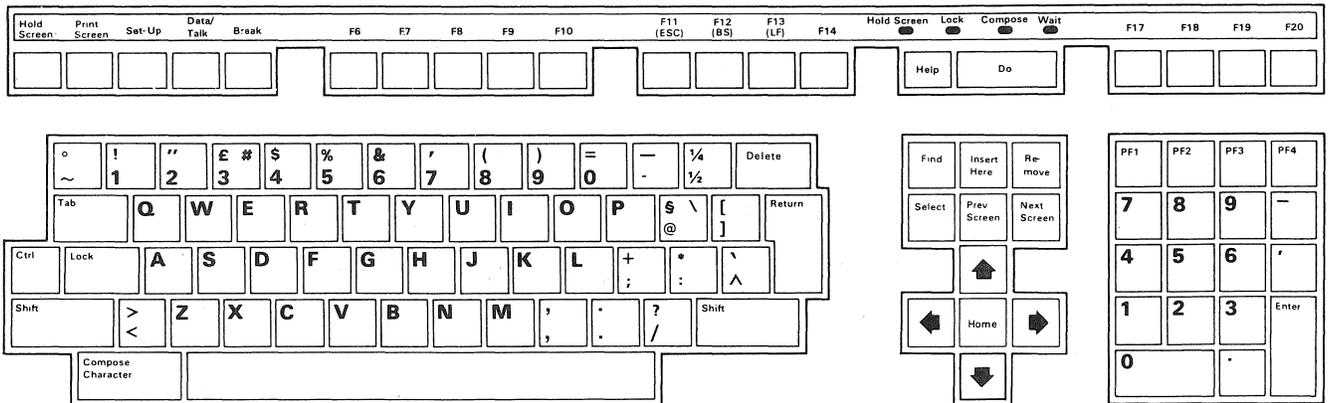
Figure 6 – 2   British keyboard
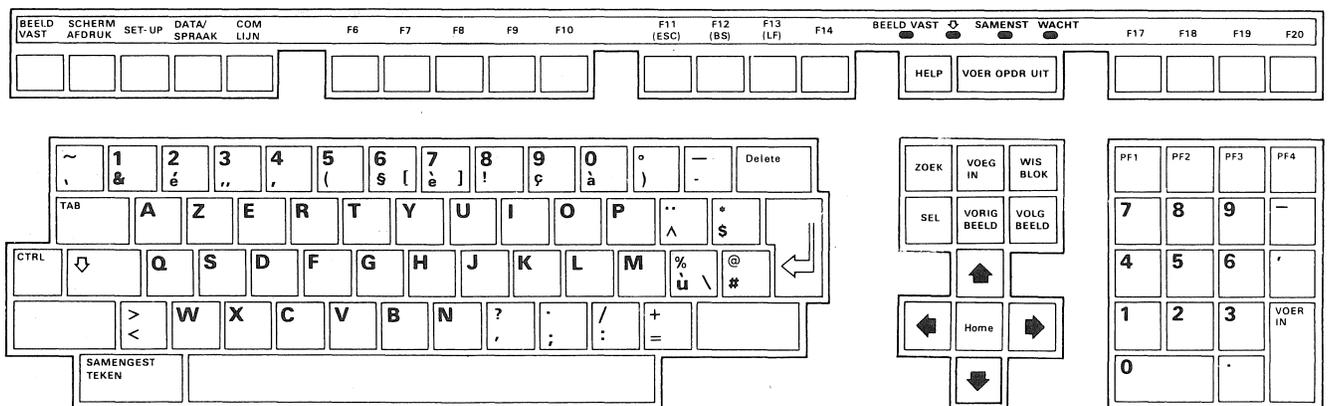
Figure 6 – 3   Flemish keyboard
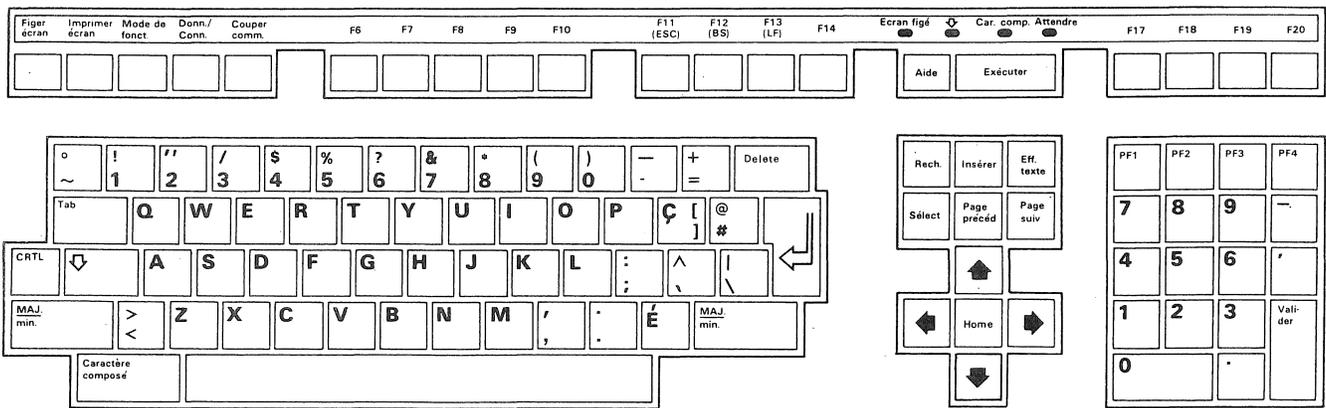
Figure 6 – 4   Canadian (French) keyboard
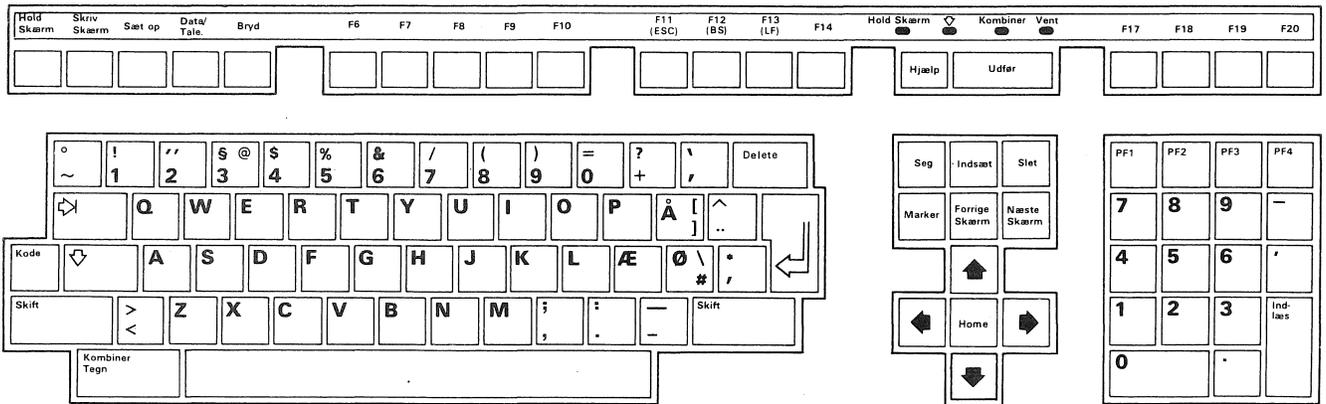
Figure 6 – 5   Danish keyboard
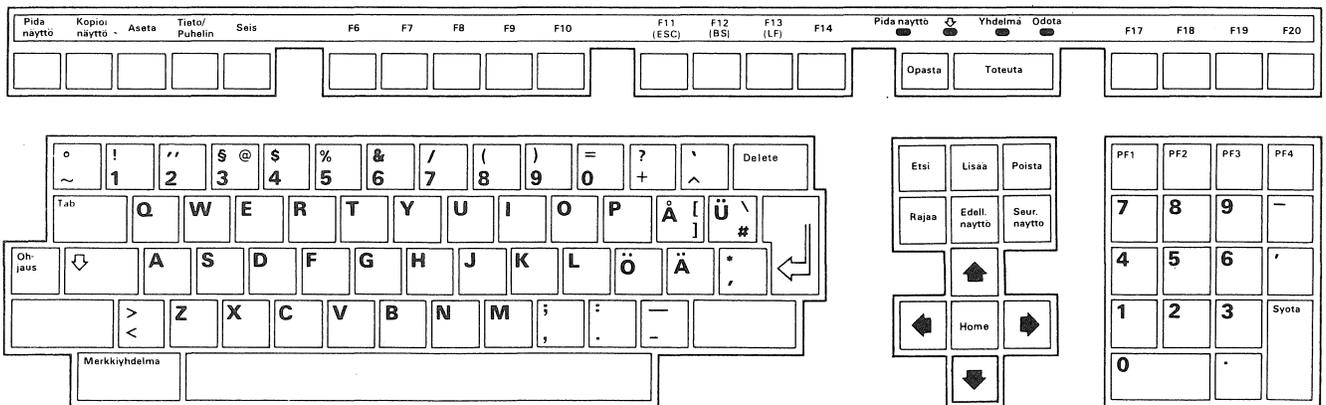
Figure 6 – 6   Finnish keyboard
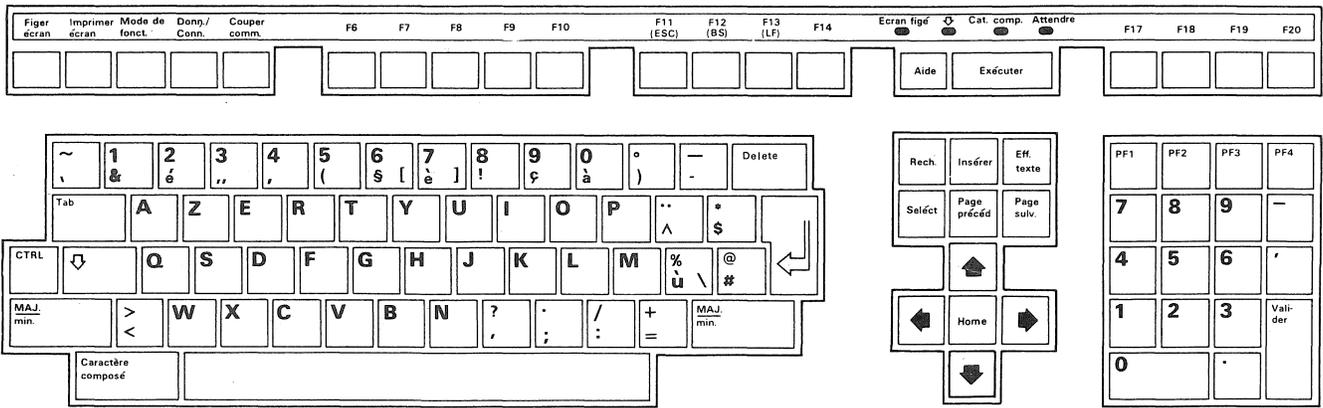
Figure 6 — 7   French/Belgian keyboard
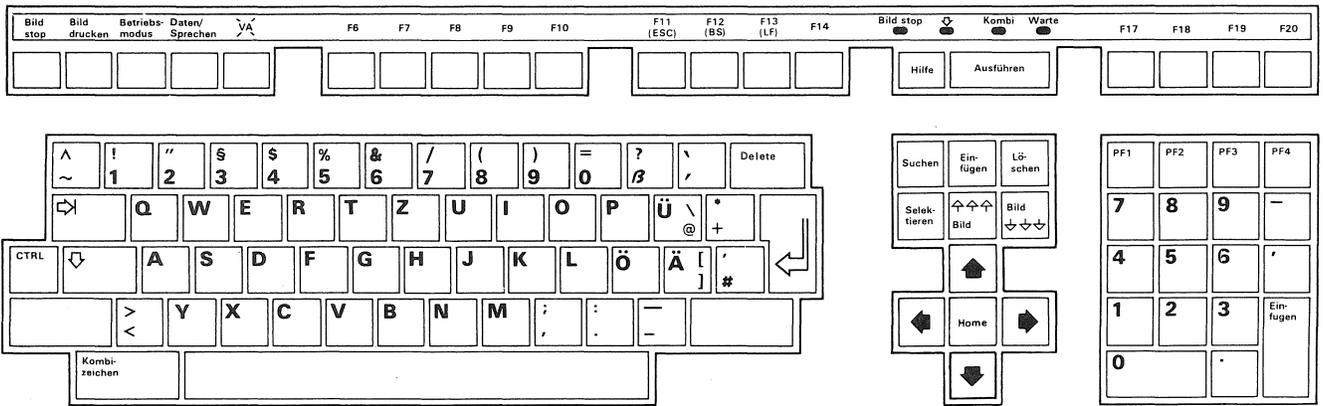
Figure 6 — 8   German keyboard
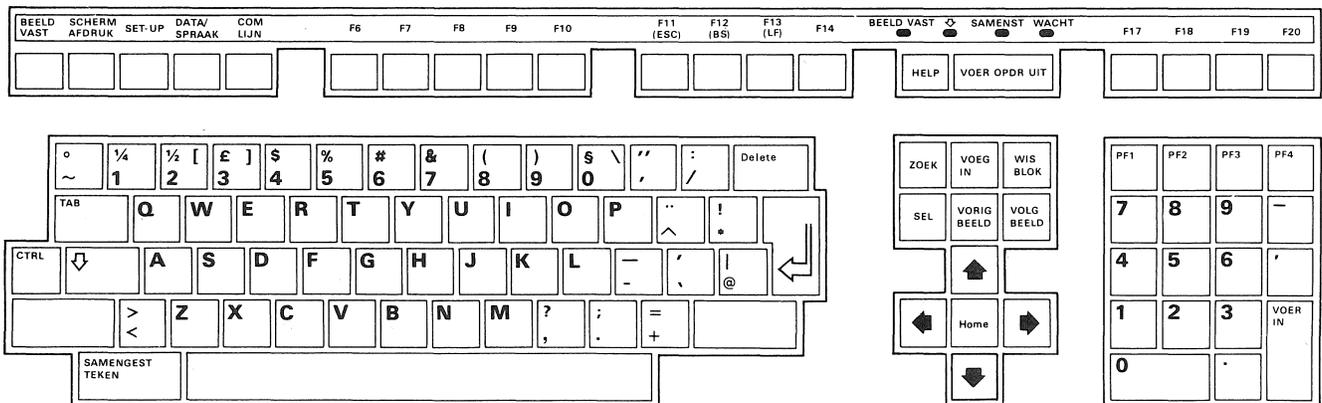
Figure 6 — 9   Dutch keyboard
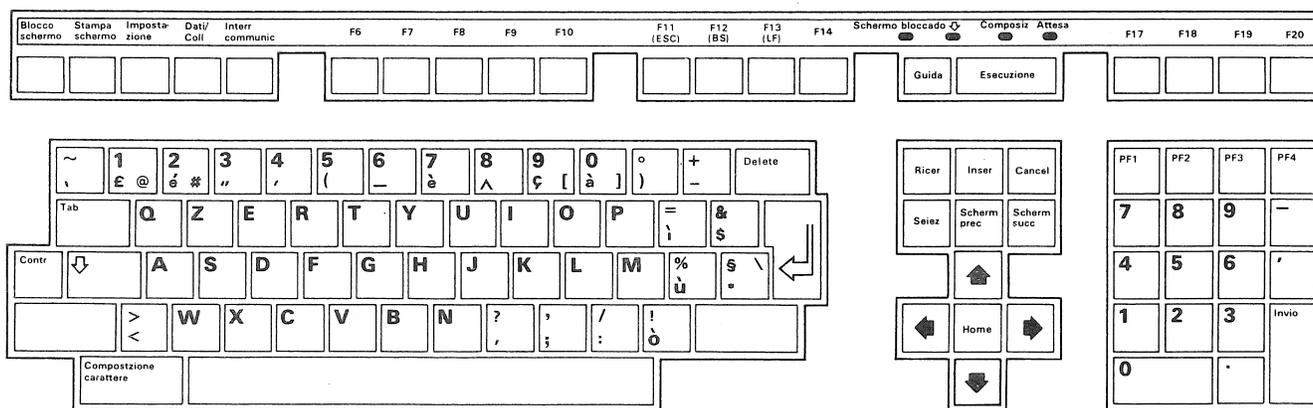
Figure 6 − 10   Italian keyboard
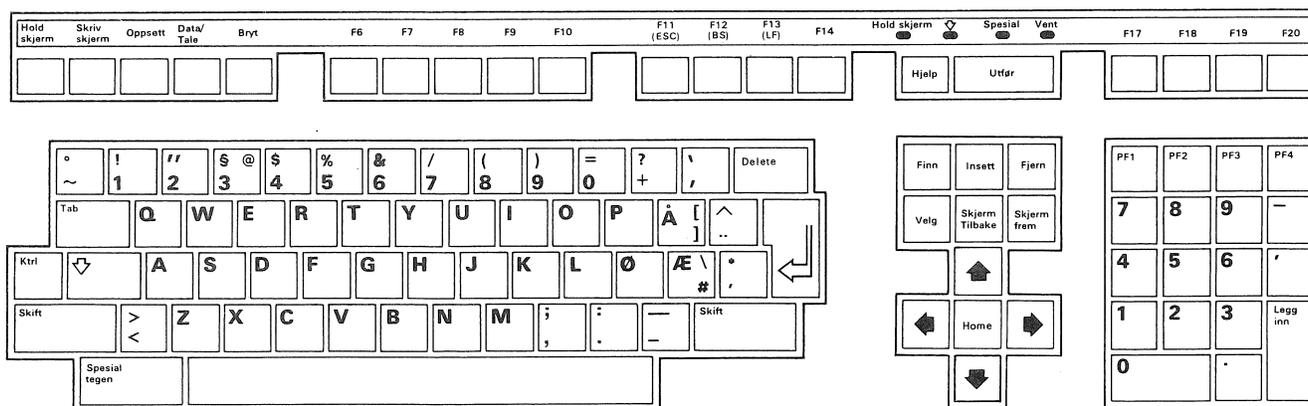
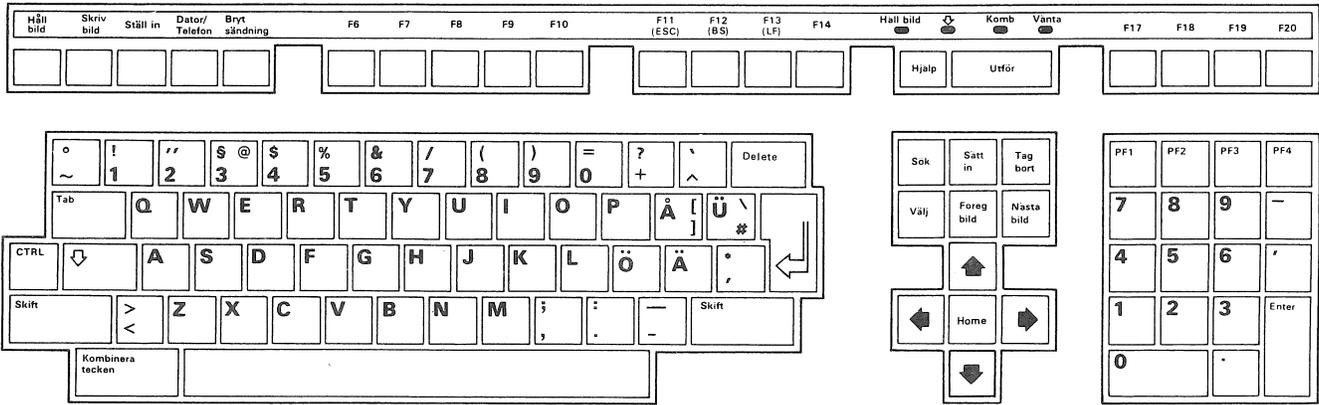Figure 6 − 11   Norwegian keyboard
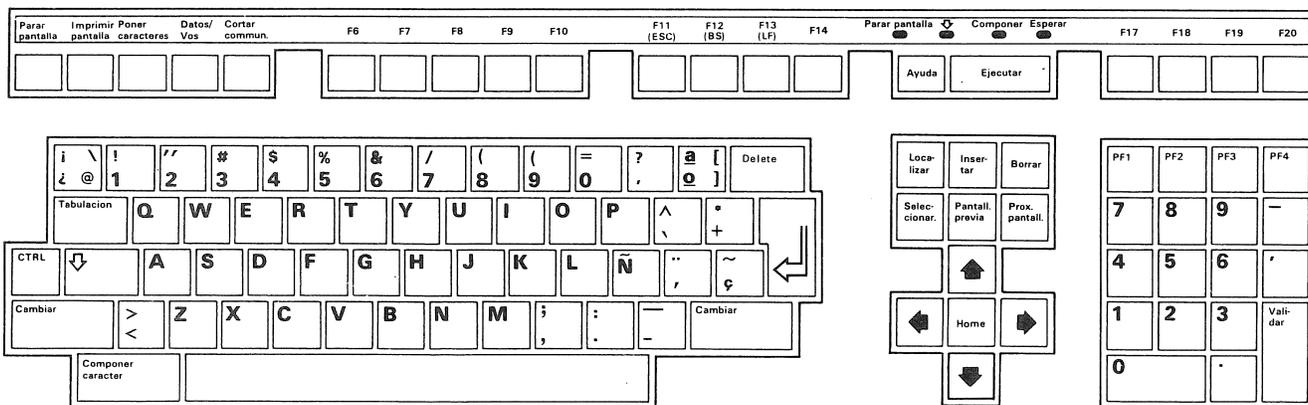
Figure 6 − 12   Spanish keyboard

Figure 6 – 13   Swedish keyboard
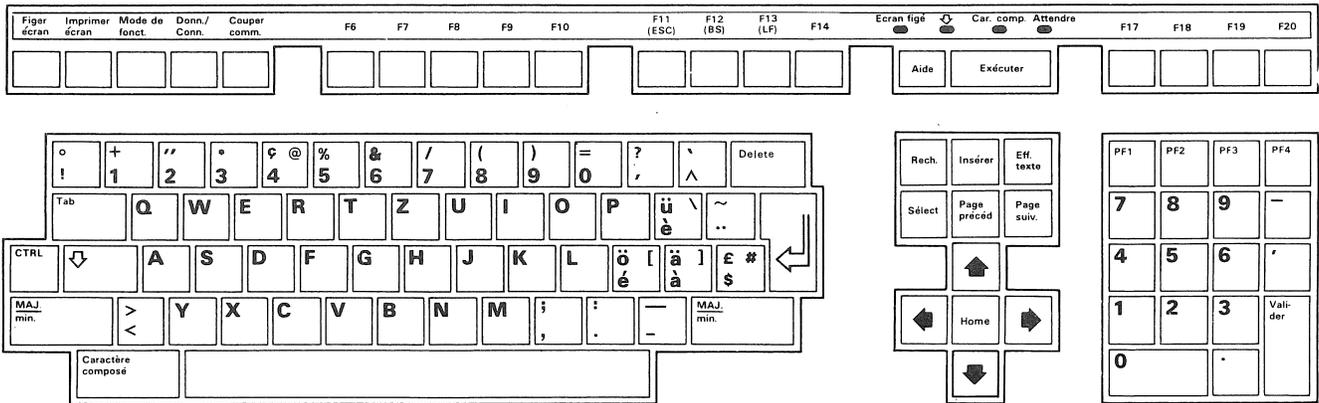
Figure 6 – 14   Swiss (French) keyboard
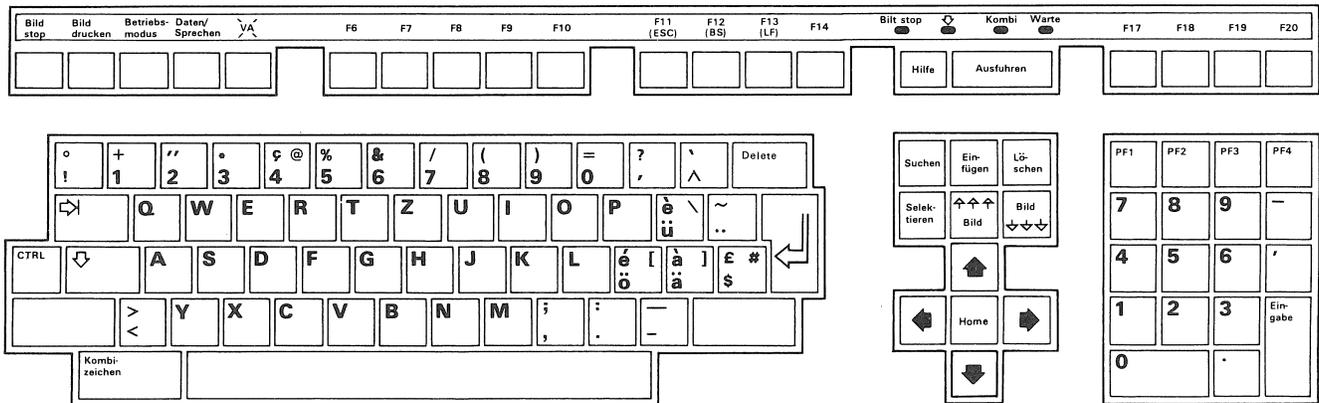
Figure 6 – 15   Swiss (German) keyboard

VDS