5-6 MAIN- AND SUB-CHANNEL SIGNALS OF FM STEREO (VP-8193A / 8194A only)

5-6-1 General

At the FM stereo modulation time, modulation status is shown in the ***MODULATION*** block and a modulation ratio is shown in the ***MODULATION*** readout with a 75 kHz FM deviation assumed as 100 %.

The setting range and resolution of a modulation ratio are shown in Table 5-10 below.

Table 5-10 Setting range and resolution of an FM stereo modulation ratio

Setting range (%)	Resolution (%)
0.0 to 127	1

■ NOTE

- The maximum allowable modulation ratio is the deviation amount equal to 50 % of an RF frequency. When an RF frequency is 100 kHz, for example, the maximum allowable deviation is 50 kHz, which is equal to a deviation ratio of 66 %.
- The maximum allowable modulation ratio for guaranteed performance is the deviation amount equal to 25% of an RF frequency.
- The ***MODULATION*** readout normally shows either AM degree or FM deviation. To switch between AM degree and FM deviation, press the AM key or FM key.
- When pre-emphasis is ON, the ***MODULATION*** readout does not show an actual deviation amount.

For main- and sub-channel signal modulation of FM stereo, the instrument supports the modulation modes as listed in Table 5-11. To specify a mode, press either one of the ***MODULATION*** block keys (L=R, L, R, and L=−R).

Table 5-11 Modulation modes (FM stereo)

Modulation signal source	Modulation mode	Remark
Internal signal or external signal (one signal)	L=R	Main-channel component only
	L	L-channel signal only
	R	R-channel signal only
	L=−R	Sub-channel component only

The basic operations related to FM stereo modulation are described in the following paragraphs.

5-6-2 Turning main- / sub-channel signals ON or OFF

5-6-3 Selecting a modulation signal

5-6-4 Direct setting with the data keys

5-6-5 Modification with the ***MODIFY*** knob

5-6-6 GP-IB program code

5-6-2 Turning main- / sub-channel signals ON or OFF

1 Press the FM-SIG [O] key.

Pressing this key switches FM between ON and OFF. The key light is lit in the ON case, and it is lit off in the OFF case.

■ NOTE

Even after main- / sub-channel signals are turned OFF, the ***MODULATION*** readout still shows an FM ratio.

2 Press either one of the ***MODULATION*** block keys (L=R [O], L [O], R [O], and L=−R [O]) to select a desired modulation mode.

The key light corresponding to the selected modulation mode is lit.

5-6-3 Selecting a modulation signal

A modulation signal can be selected among the following three:

- The internal sine wave of 400 Hz or 1 kHz (INT)
- An externally supplied signal of 20 Hz to 15 kHz (EXT)
- The optional DDS sine wave (DDS)

Select a desired signal using the ***FM SOURCE*** key in the ***MODULATION*** block.

Every press toggles a signal among INT, EXT, and DDS. When your model is VP-8192A or the DDS option is not installed in the model VP-8193A / 8194A, an FM signal is toggled between INT and EXT. The selected signal can be identified from the ***INT***, ***EXT***, and ***DDS*** lights.

Once INT is selected, press the ***INT*** key to switch a frequency between 400 Hz and 1 kHz. The key light is lit when 1 kHz is selected. It is lit off when 400 Hz is selected.

■ NOTE

The instrument automatically recognizes the DDS option. When the DDS option is not installed, the instrument does not perform any DDS-related control.

5-6-4 Direct setting with the data keys

Ex. Setting an FM ratio to 85 %

1 Press the FM [O] key.

2 Enter an FM ratio with the data keys.

[8] [5]

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

3 Press the ENTER [O] key.

5-6-5 Modification with the *MODIFY* knob

Ex. Modifying the FM ratio from 85 % to 105 %

1 Press the FM [O] key.

2 Specify a digit to be modified with the ΔF OFF [⇦] or ΔdB OFF [⇨] key.

The currently specified digit blinks.

Press the ΔF OFF [⇦] key two times.

■ NOTE

If there is no operation for five seconds, the digit will stop blinking.

3 When the digit stops blinking, modify the value with the *MODIFY* knob.

Turn the knob clockwise by two steps.

■ NOTE

The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the FM ratio, while turning it counterclockwise decreases the FM ratio. Carry and borrow are available.

5-6-6 GP-IB program code

As for main- and sub-channel signals of FM stereo, GP-IB control is available for selection of a modulation mode and setting of an FM ratio. Table 5-12 contains the program codes used for this purpose.

Table 5-12 GP-IB program codes related to main- / sub-channel signals

Header code	Data code	Unit code	Description
MS	1		Sets a modulation mode to FM MONO.
	2		Sets a modulation mode to FM stereo L=R.
	3		Sets a modulation mode to FM stereo L
	4		Sets a modulation mode to FM stereo R
	5		Sets a modulation mode to FM stereo L=−R
	ON		Turns FM modulation ON. (Same feature as *FM-SIG* key)
	OF		Turns FM modulation OFF. (Same feature as *FM-SIG* key)
FM			Selects frequency modulation
	ON		FM-related settings are reset. (Note)
	OF		FM-related settings are all turned OFF. (Note)
	TO		Sets an frequency modulation signal to INT
	XD		Sets an frequency modulation signal to EXT
	TD		Sets an frequency modulation signal to DDS (Option, for VP-8193A / 8194A only)
	0.0 to 100	(KZ)	Specifies an FM deviation
	0.0 to 127	(PC)	Specifies a frequency modulation ratio
TO	1		Sets the frequency of the internal RC oscillator to 1 kHz
	4		Sets the frequency of the internal RC oscillator to 400 Hz

Note: Using the FM OF command turns OFF all FM-related settings given below.

- Frequency modulation (Setting condition of the *FM-SIG* key)
- Pilot signal
- Pre-emphasis
- RDS signal
- SK signal
- BK signal
- DK signal

Using the FM ON command returns the FM-related settings to the state immediately before using the FM OF command.

Note that there is no panel key corresponding to the FM ON/OF commands.

5-7 PILOT SIGNAL (VP-8193A / 8194A only)

5-7-1 General

As for pilot signals, the ON / OFF status of a pilot signal is shown in the ***MODULATION*** block and a pilot signal level ratio is shown in the ***MODULATION*** readout.

A pilot signal level ratio represents a level ratio when a 75 kHz deviation is assumed as 100 %.

The setting range and resolution of an FM stereo pilot signal level ratio are shown in Table 5-13 below.

Table 5-13 Setting range and resolution of an FM stereo pilot signal level ratio

Setting range (%)	Resolution (%)
0 to 15.0	0.1

The basic operations related to a pilot signal are described in the following paragraphs.

5-7-2 Turning a pilot signal ON or OFF

5-7-3 Direct setting with the data keys

5-7-4 Modification with the ***MODIFY*** knob

5-7-5 GP-IB program code

5-7-2 Turning a pilot signal ON or OFF

1 Press the PILOT [O] key.

Pressing this key switches a pilot signal between ON and OFF. The key light is lit in the ON case, and it is lit off in the OFF case.

■ NOTE
When the modulation mode is MONO, the ***PILOT*** key may not be turned ON.

5-7-3 Direct setting with the data keys

Ex. Setting a pilot signal level ratio to 9.5 %

1 Press the PILOT LVL [O] key.

2 Enter a pilot signal level ratio with the data keys.

[9] [.] [5]

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

3 Press the ENTER key.

■ NOTE

Once a pilot signal level ratio is specified, the display unit is changed into % and the *PILOT* key light is lit in the *MODULATION* block.

5-7-4 Modification with the *MODIFY* knob

Modifying the pilot signal level ratio from 9.5 % to 13.5 %

1 Press the PILOT LVL key.

2 Specify a digit to be modified with the ΔF OFF or ΔdB OFF key.

The currently specified digit blinks.

Press the ΔF OFF key two times.

■ NOTE

If there is no operation for five seconds, the digit will stop blinking.

3 When the digit stops blinking, modify the value with the *MODIFY* knob.

Turn the knob clockwise by four steps.

■ NOTE

The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the pilot signal level ratio, while turning it counterclockwise decreases the pilot signal level ratio. Carry and borrow are available.

5-7-5 GP-IB program code

As for pilot signals, GP-IB control is available for turning ON/OFF of signals, and direct setting of a level ratio with the data keys. Table 5-14 contains the program codes used for this purpose.

Table 5-14 GP-IB program codes related to pilot signals

Header code	Data code	Unit code	Description
PL	ON		Turns a pilot signal ON
	OF		Turns a pilot signal OFF
	0.0 to 15.0		Sets a pilot signal level to 0.0% to 15.0 %.

5-8 PRE-EMPHASIS (VP-8193A / 8194A only)

5-8-1 General

In the FM stereo modes, signals can be provided with the pre-emphasis feature as follows.

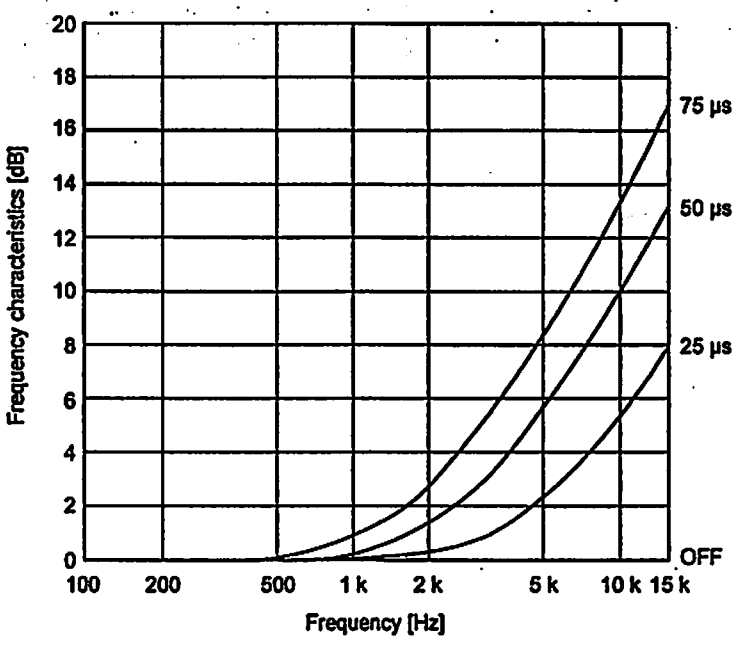


Figure 5-2 Pre-emphasis feature

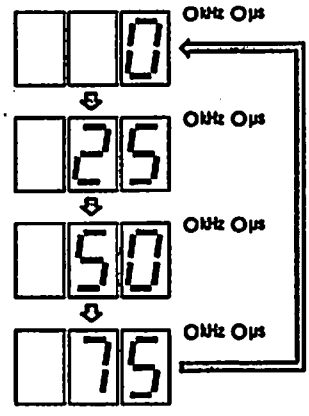
The basic operations related to the pre-emphasis feature are described in the following paragraphs.

5-8-2 Selecting a time constant
5-8-3 GP-IB program code

5-8-2 Selecting a time constant

A time constant of the pre-emphasis feature can be selected among 0 µs (OFF), 25 µs, 50 µs, and 75 µs.

Press the PRE-EMPH key once to show the current time constant in the ***MODULATION*** readout. Every press of the key causes a time constant to be changed as shown right. The key light is lit off when a time constant is 0 µs (OFF), and it is lit when a time constant other than 0 is selected.



■ NOTE

- If there is no operation during five seconds, the time constant display disappears.
- Pre-emphasis is only effective for frequency modulation.
- When the ***FM-SIG*** key is turned OFF, the pre-emphasis cannot be turned ON.
- When a time constant is already set, turning the ***FM-SIG*** key ON automatically turns the pre-emphasis ON.

5-8-3 GP-IB program code

As for pre-emphasis, GP-IB control is available for selection of a time constant. Table 5-15 contains the program codes used for this purpose.

Table 5-15 GP-IB program codes related to pre-emphasis

Header code	Data code	Unit code	Description
PR	0		Turns pre-emphasis OFF
	1		Sets a time constant to 25 µs
	2		Sets a time constant to 50 µs
	3		Sets a time constant to 75 µs

5-9 SCA SIGNAL (VP-8193A / 8194A only)

When an SCA signal is required to generate a composite stereo signal, apply a 0.56-V [P-P] signal to the ***SCA INPUT*** connector on the rear side of the instrument. Then the SCA component equal to the deviation of 7.5 kHz can be obtained.

■ NOTE

When a signal is applied to the ***SCA INPUT*** connector, an RF output signal is modulated regardless of the modulation mode of the instrument. For this reason, apply a signal to the ***SCA INPUT*** connector only when an SCA signal is required.

Note that the instrument is not provided with the indication of SCA signals. Thus the input level should always keep 0.56 V [P-P].

5-10 COMPOSITE SIGNAL OUTPUT LEVEL (VP-8193A / 8194A only)

The instrument is equipped with the ***COMPOSITE*** connector on the rear panel to obtain a composite stereo signal. When an FM monophonic deviation is 100 kHz, the output level is approx. 5 V [P-P] (at 600 Ω termination).

This connector is helpful when the instrument is used only as a stereo modulator.

5-11 RDS SIGNAL (VP-8194A only)

5-11-1 General

The instrument can download desired pattern data from a computer for output. It can download up to 16 pattern data and assign pattern numbers 0 to 15 to them for management.

Besides, the instrument can output the NULL pattern data and Sc pattern data. The NULL pattern data consists of all 0 data, while the Sc pattern data consists of sub carrier signals only. You do not need to download them because they are already installed in the instrument.

The status of an RDS signal is shown in the ***ARI / RDS*** block and ***ARI / RDS*** readout. The ***ARI / RDS*** block contains RDS signal ON / OFF status, while the ***ARI / RDS*** readout contains an RDS signal level, sub-carrier phase of an RDS signal, and an RDS signal pattern.

The range and resolution of an RDS signal level are shown in Table 5-16 below.

Table 5-16 RDS signal level range and resolution

RDS signal level (%)	Resolution (%)
0.0 to 10	0.1

■ NOTE

- The ***ARI / RDS*** readout normally shows either RDS signal level or ARI SK signal level. To switch between RDS level and SK level, press the RDS LVL key or SK LVL key.
- RDS signals are available only in the FM stereo mode. Before turning an RDS signal ON, be sure to set FM to the stereo mode.

The basic operations related to an RDS signal are described in the following paragraphs.

5-11-2 Turning an RDS signal ON or OFF
5-11-3 Direct setting of a signal level with the data keys
5-11-4 Modification of a signal level with the ***MODIFY*** knob
5-11-5 Direct setting of pattern data with the data keys
5-11-6 Modification of pattern data with the ***MODIFY*** knob
5-11-7 Selecting a sub-carrier phase
5-11-8 GP-IB program code

5-11-2 Turning an RDS signal ON or OFF

1 Press the RDS PHASE key.

Pressing this key switches an RDS signal between ON and OFF. The key light is lit in the ON case, and it is lit off in the OFF case.

■ NOTE

- Even after an RDS signal is turned OFF, the ***ARI / RDS*** readout still shows an RDS signal level.
- RDS signals are available only in the FM stereo mode. Before turning an RDS signal ON, be sure to set FM to the stereo mode.

5-11-3 Direct setting of a signal level with the data keys

Ex. Setting an RDS signal level to 5.3 %

1 Press the RDS LVL [0] key.

2 Enter an RDS signal level with the data keys.

[5] [.] [3]

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

3 Press the ENTER [0] key.

■ NOTE

When an RDS signal level is specified with The data keys or GP-IB code and RS-232-C codes, the RDS signal operation is automatically turned ON.

5-11-4 Modification of a signal level with the *MODIFY* knob

Ex. Modifying the RDS signal level from 5.3 % to 5.0 %

1 Press the RDS LVL [0] key.

2 Specify a digit to be modified with the ΔF OFF [⇦] or ΔdB OFF [⇨] key.

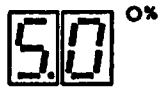
The currently specified digit blinks.

Press the ΔF OFF [⇦] key one time.

■ NOTE

If there is no operation for five seconds, the digit will stop blinking.

3 When the digit stops blinking, modify the value with the *MODIFY* knob.



Turn the knob counterclockwise by three steps.

> ■ NOTE
>
> The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the signal level, while turning it counterclockwise decreases the signal level. Carry and borrow are available.

5-11-5 Direct setting of pattern data with the data keys

Ex. Selecting the pattern data 3

1 Press the PAT CODE key.

2 Enter a pattern data number with the data key.

[3]

> ■ NOTE
>
> If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

3 Press the ENTER key.

Table 5-17 shows the relationship among pattern data numbers, key inputs, and display contents of the *ARI / RDS* readout.

Table 5-17 Relationship among pattern data numbers, key inputs, and displays

Number	Key input	Display	Number	Key input	Display
Pattern 0	0	0	Pattern 9	9	9
Pattern 1	1	1	Pattern 10	1 0	A
Pattern 2	2	2	Pattern 11	1 1	b
Pattern 3	3	3	Pattern 12	1 2	C
Pattern 4	4	4	Pattern 13	1 3	d
Pattern 5	5	5	Pattern 14	1 4	E
Pattern 6	6	6	Pattern 15	1 5	F
Pattern 7	7	7	Null	−	-
Pattern 8	8	8	Sc	·	.

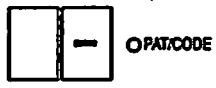
5-11-6 Modification of pattern data with the *MODIFY* knob

Ex. Changing from the pattern data 3 to Null

1 Press the PAT CODE key.

3 Modify the value with the *MODIFY* knob.

Turn the knob counterclockwise by five steps.



■ NOTE

The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the pattern data number, while turning it counterclockwise decreases the pattern data number. Turning the knob clockwise at the Sc position ([•] displayed) causes the pattern data 0 to be selected. Turning the knob counterclockwise at the pattern data 0 causes the pattern data Sc to be selected.

5-11-7 Selecting a sub-carrier phase

For RDS signals, a sub-carrier phase can be set to either 0° or 90°.

Ex. Setting a sub-carrier phase of an RDS signal to 90°

1 Press the SHIFT key.

2 Press the RDS PHASE key.

3 Enter a sub-carrier phase with the data keys.

9 0

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

4 Press the ENTER key.

■ NOTE

- When an ARI signal is turned ON, the sub-carrier phase of an RDS signal is fixed to 90°.
- When a sub-carrier phase may be entered (as described in the above procedure 3), turning the *MODIFY* knob toggles a sub-carrier phase between 0° and 90°.

5-11-8 GP-IB program code

In the RDS signal operation, GP-IB control is available for RDS signal ON / OFF, and selection of a signal level, pattern data, and sub-carrier phase. Table 5-18 contains the program codes used for this purpose.

Table 5-18 GP-IB program codes related to RDS signals

Header code	Data code	Unit code	Description
RD	ON		Turns an RDS signal ON
	OF		Turns an RDS signal OFF
	0.0 to 10	PC	Specifies an RDS signal level
	NULL		Selects the pattern data Null
	SC		Selects the pattern data Sc
	0 to F		Selects a registered pattern data (among the pattern 0 to 15)
	P0		Sets a sub-carrier phase to 0°.
	P9		Sets a sub-carrier phase to 90°

Note: Unit codes for RDS level setting cannot be omitted.

5-12 ARI SIGNAL (VP-8194A only)

5-12-1 General

The status of ARI signals is shown in the ***ARI / RDS*** block and ***ARI / RDS*** readout. The ***ARI / RDS*** block contains SK, BK, and DK signals ON / OFF status, while the ARI/RDS readout contains an SK signal level, BK signal code data, and AM degrees of a BK signal and DK signal.

The range and resolution of each setting value are shown in Table 5-19 below.

Table 5-19 Setting range and resolution

Item	Setting range (%)	Resolution (%)
SK signal level	0.0 to 10	0.1
AM degree of a BK signal	0 to 80	1
AM degree of a DK signal	0 to 40	1

■ NOTE

- The ***ARI / RDS*** readout normally shows either RDS signal level or ARI SK signal level. To switch between RDS level and SK level, press the RDS LVL key or SK LVL key.
- ARI signals are available only in the FM stereo mode. Before turning an ARI signal ON, be sure to set FM to the stereo mode.

The basic operations related to ARI signals are described in the following paragraphs.

5-12-2 Turning an SK signal ON or OFF
5-12-3 Direct setting of an SK signal level with the data keys
5-12-4 Modification of an SK signal level with the ***MODIFY*** knob
5-12-5 Turning a BK signal ON or OFF
5-12-6 Direct setting of the AM degree of a BK signal with the data keys
5-12-7 Modification of the AM degree of a BK signal with the ***MODIFY*** knob
5-12-8 Selecting a BK signal code data
5-12-9 Modification of a BK signal code data with the ***MODIFY*** knob
5-12-10 Turning a DK signal ON or OFF
5-12-11 Direct setting of the AM degree of a DK signal with the data keys
5-12-12 Modification of the AM degree of a DK signal with the ***MODIFY*** knob
5-12-13 GP-IB program code

5-12-2 Turning an SK signal ON or OFF

1 Press the SK [O] key.

Pressing this key switches an SK signal between ON and OFF. The key light is lit in the ON case, and it is lit off in the OFF case.

■ NOTE

- Even after an SK signal is turned OFF, the *ARI / RDS* readout still shows an SK signal level.
- SK signals are available only in the FM stereo mode. Before turning an SK signal ON, be sure to set FM to the stereo mode.

5-12-3 Direct setting of an SK signal level with the data keys

Ex. Setting an SK signal level to 5.3 %

1 Press the SK LVL [O] key.

2 Enter an SK signal level with the data keys.

[5] [·] [3]

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

3 Press the ENTER [O] key.

■ NOTE

When an SK signal level is specified with The data keys or GP-IB code and RS-232-C codes, the SK signal operation is automatically turned ON.

5-12-4 Modification of an SK signal level with the *MODIFY* knob

Ex. Modifying the SK signal level from 5.3 % to 5.0 %

1 Press the SK LVL [O] key.

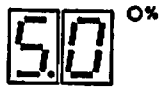
2 Specify a digit to be modified with the ΔF OFF ⇦ or ΔdB OFF ⇨ key.

The currently specified digit blinks.

Press the ΔF OFF ⇦ key one time.

> ■ NOTE
> If there is no operation for five seconds, the digit will stop blinking.

3 When the digit stops blinking, modify the value with the *MODIFY* knob.



Turn the knob counterclockwise by three steps.

> ■ NOTE
> The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the signal level, while turning it counterclockwise decreases the signal level. Carry and borrow are available.

5-12-5 Turning a BK signal ON or OFF

1 Press the BK AM-B ○ key.

Pressing this key switches a BK signal between ON and OFF. The key light is lit in the ON case, and it is lit off in the OFF case.

> ■ NOTE
> - Even after a BK signal is turned OFF, the *ARI / RDS* readout still shows a BK signal level.
> - BK signals are available only in the FM stereo mode. Before turning a BK signal ON, be sure to set FM to the stereo mode.

5-12-6 Direct setting of the AM degree of a BK signal with the data keys

Ex. Setting the AM degree of an BK signal to 60 %

1 Press the SHIFT ○ key.

2 Press the BK AM-B ○ key.

3 Enter an AM degree with the data keys.

6 0

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

4 Press the ENTER key.

■ NOTE

When an AM degree of a BK signal is set with The data keys or GP-IB code and RS-232-C codes, the BK signal operation is automatically turned ON.

5-12-7 Modification of the AM degree of a BK signal with the *MODIFY* knob

Ex. Modifying the AM degree from 60 % to 55 %

1 Press the SHIFT key.

2 Press the BK AM-B key.

3 Specify a digit to be modified with the ΔF OFF or ΔdB OFF key.

The currently specified digit blinks.

Press the ΔF OFF key one time.

■ NOTE

If there is no operation for five seconds, the digit will stop blinking.

4 Modify the value with the *MODIFY* knob.

Turn the knob counterclockwise by five steps.

■ NOTE

The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the AM degree, while turning it counterclockwise decreases the AM degree. Carry and borrow are available.

5-12-8 Selecting a BK signal code data

例 Ex. Selecting the code data E

1 Press the SHIFT [O] key.

2 Press the PAT CODE [ ] key.

3 Enter a code data number with the data key.

[1] [4]

> ■ NOTE
>
> If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

4 Press the ENTER [O] key.

Table 5-20 shows the relationship among code data, key inputs, and display contents of the *ARI / RDS* readout.

Table 5-20 Relationship among code data, key inputs, and displays

Number	Key input	Display	Number	Key input	Display
Code A	[1] [0]	A	Code D	[1] [3]	d
Code B	[1] [1]	b	Code E	[1] [4]	E
Code C	[1] [2]	C	Code F	[1] [5]	F

5-12-9 Modification of a BK signal code data with the *MODIFY* knob

Ex. Changing from the code data E to A

1 Press the SHIFT [O] key.

2 Press the PAT CODE [ ] key.

3 Modify the value with the *MODIFY* knob.

Turn the knob clockwise by two steps.

■ NOTE

The *MODIFY* knob can be turned endlessly. Turning the knob clockwise moves code data upward in Table 5-20, while turning it counterclockwise moves code data downward. Thus turning the knob clockwise at the code F position causes the Code A to be selected, and turning it counterclockwise at the code A position causes the code F to be selected.

5-12-10 Turning a DK signal ON or OFF

1 Press the DK AM-D key.

Pressing this key switches FM between ON and OFF. The key light is lit in the ON case, and it is lit off in the OFF case.

■ NOTE

- Even after a DK signal is turned OFF, the *ARI / RDS* readout still shows a DK signal level.
- DK signals are available only in the FM stereo mode. Before turning a DK signal ON, be sure to set FM to the stereo mode.

5-12-11 Direct setting of the AM degree of a DK signal with the data keys

Ex. Setting the AM degree of a DK signal to 30 %

1 Press the SHIFT key.

2 Press the DK AM-D key.

3 Enter an AM degree with the data keys.

3 0

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

4 Press the ENTER key.

■ NOTE

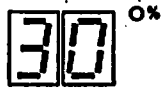
When an AM degree of a DK signal is set with The data keys or GP-IB code and RS-232-C codes, the DK signal operation is automatically turned ON.

5-12-12 Modification of the AM degree of a DK signal with the *MODIFY* knob

Ex. Modifying the AM degree from 30 % to 25 %

1 Press the SHIFT [O] key.

2 Press the DK AM-D [O] key.



3 Specify a digit to be modified with the ΔF OFF [⇦] or ΔdB OFF [⇨] key.

The currently specified digit blinks.

Press the ΔF OFF [⇦] key one time.

> ■ NOTE
> If there is no operation for five seconds, the digit will stop blinking.

4 Modify the value with the *MODIFY* knob.

Turn the knob counterclockwise by five steps.

> ■ NOTE
> The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the AM degree, while turning it counterclockwise decreases the AM degree. Carry and borrow are available.

5-12-13 GP-IB program code

In the ARI signal operation, GP-IB control is available for SK signal ON/OFF, selection of an SK signal level, BK signal ON/OFF, selection of the AM degree and code data of a BK signal, DK signal ON/OFF, and selection of the AM degree of a DK signal. Table 5-21 contains the program codes used for this purpose.

Table 5-21 GP-IB program codes related to ARI signals

Header code	Data code	Unit code	Description
SK	ON		Turns ARI SK signal ON
	OF		Turns ARI SK signal OFF
	0.0 to 10	(PC)	Specifies an ARI SK signal level
BK	ON		Turns ARI BK signal ON
	OF		Turns ARI BK signal OFF
	0.0 to 80	(PC)	Specifies the AM degree of an ARI BK signal
	A to F		Specifies the code data of an ARI BK signal
DK	ON		Turns ARI DK signal ON
	OF		Turns ARI DK signal OFF
	0.0 to 40	(PC)	Specifies the AM degree of an ARI DK signal

5-13 DDS FREQUENCY (option, VP-8193A / 8194A only)

5-13-1 General

The DDS frequency is indicated in the *FREQUENCY* readout in the range of 0.020 kHz to 20.000 kHz. The decimal point represents the position of the kHz unit. The resolution is 1 Hz.

> ■ NOTE
> The DDS feature is optional for the models VP-8193A/8194A only. To implement this feature, the optional accessory VQ-081G is required. For details, contact our local representative or service station.

The basic operations related to DDS frequency are explained in the following paragraphs.

5-13-2 Direct setting with the data keys

5-13-3 Modification with the *MODIFY* knob

5-13-4 Specifying a variable step amount of the DDS frequency

5-13-5 Changing the DDS frequency at a variable step amount

5-13-6 Canceling the step DDS frequency

5-13-7 GP-IB program code

5-13-2 Direct setting with the data keys

Ex. Setting the DDS frequency to 12.345 kHz

1 Press the DDS [O] key.

2 Enter a DDS frequency with the data keys.

[1] [2] [.] [3] [4] [5]

> ■ NOTE
> If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

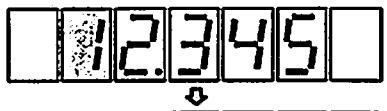
3 Press the ENTER [O] key.

5-13-3 Modification with the *MODIFY* knob

Ex. Modifying the frequency from 12.345 kHz to 12.400 kHz

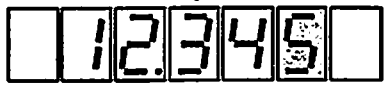
1 Press the DDS [O] key.

2 Specify a digit to be modified with the ΔF OFF [⇦] or ΔdB OFF [⇨] key.



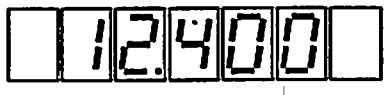
The currently specified digit blinks.

Press the ΔF OFF [⇦] key two times.



> ■ NOTE
> If there is no operation for five seconds, the digit will stop blinking.

3 When the digit stops blinking, modify the value with the *MODIFY* knob.



Turn the knob clockwise by fifty-five steps.

> ■ NOTE
> The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the frequency, while turning it counterclockwise decreases the frequency. Carry and borrow are available.

5-13-4 Specifying a variable step amount of the DDS frequency

The DDS frequency can be varied at a certain step amount.

> ■ NOTE
> The step DDS frequency can be set in the range of −10 kHz to 10 kHz.

Ex. Setting a variable step amount to 1.1 kHz

1 Press the SHIFT [O] key.

2 Press the DDS-STEP [3] key.

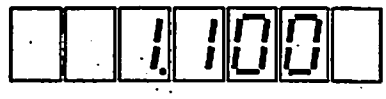
3 Enter a variable step amount with the data keys.

[1] [.] [1]

■ NOTE

If a wrong value is entered, confirm the entered value once, and then repeat the setting operation from the procedure 1.

4 Press the ENTER [0] key.



The set value is displayed for about 10 seconds.

Ex. Verifying the variable step amount

1 Press the SHIFT [0] key.

2 Press the DDS-STEP [3] key.

The set value is displayed for about 10 seconds.

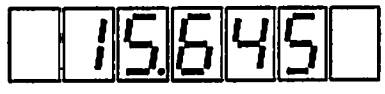
5-13-5 Changing the DDS frequency at a variable step amount

Ex. Increasing the frequency from 12.345 kHz five times, and then decrease it twice at a 1.1 kHz step amount

1 Press the DDS [0] key.

2 Turn the *MODIFY* knob clockwise by five steps.

3 Turn the *MODIFY* knob counterclockwise by two steps.



■ NOTE

- The *MODIFY* knob can be turned endlessly. Turning the knob clockwise increases the frequency, while turning it counterclockwise decreases the frequency. Carry and borrow are available.
- When the variable step operation is enabled, the *MODIFY* knob works as a variable step knob. Thus it cannot be used for normal frequency modification operation.

5-13-6 Canceling the step DDS frequency

1 Press the SHIFT [0] key.

2 Press the DDS-STEP [3] key.

3 Press the I/O MODE 0 key.

4 Press the ENTER O key.

■ NOTE

Once the variable step operation is disabled, the *MODIFY* knob can be used for normal frequency modification operation.

5-13-7 GP-IB program code

In the DDS frequency operation, GP-IB control is available for direct setting of a frequency with numeric values. Table 5-22 contains the program codes used for this purpose.

Table 5-22 GP-IB program codes related to DDS frequency

Header code	Data code	Unit code	Description
DF	0.020 to 20.000	(KZ)	Specifies a DDS frequency

* The unit code enclosed with the parentheses may be omitted.

5-14 ASSORTED PRESET MEMORY

5-14-1 General

The assorted preset memory function can be used to store up to 100 sets of parameters as described before, and to recall a desired set of parameters as necessary.

The 100 sets of preset memories are managed with the memory address of 00 to 99. A memory address is indicated in the *MEMORY ADDRESS* readout.

Table 5-23 lists the setting items that may be stored in one set.

Table 5-23 Setting items that may be stored in the preset memory

Item	Setting
RF frequency	
Frequency	0.100 0 MHz to 140.000 0 MHz 162.000 0 MHz to 163.000 0 MHz (option)
Relative frequency	−99.999 9 MHz to 99.999 9 MHz
Variable step	−99.999 9 MHz to 99.999 9 MHz
Output level	
Level	−20.0 dBμV [emf] to 126.0 dBμV [emf]
Relative level	0 dB to ±146 dB
Output	ON / OFF
Variable step	0 dB to ±146 dB
Amplitude modulation (AM)	
Modulation	ON / OFF
Modulation signal	INT 400 Hz / INT 1 kHz / INT DDS* / EXT (* option, for VP-8193A / 94A only)
Modulation degree	0 % to 100 %
Frequency modulation (FM)	
Modulation	ON / OFF
Modulation signal	INT 400 Hz / INT 1 kHz / INT DDS* / EXT (* option, for VP-8193A / 94A only)
Frequency deviation	0.0 kHz to 100 kHz
Main- / Sub-channel signal (VP-8193A / 94A only)	
Modulation	ON / OFF
Modulation mode	MONO / L=R / L / R / L=−R
Modulation ratio	0 % to 127 %
Pre-emphasis (VP-8193A / 94A only)	25 μs / 50 μs / 75 μs / OFF
DDS frequency (option, VP-8193A / 94A only)	
Frequency	0.020 kHz to 20.000 kHz
Variable step	−10 kHz to 10 kHz
Pilot signal (VP-8193A / 94A only)	
Signal	ON / OFF
Level ratio	0.0 % to 15 % (FM stereo)
Selection state of setting item	AMPTD / FREQ / FM / AM PILOT LVL / DDS (for VP-8193A / 94A only) RDS LVL / SK LVL (for VP-8194Aonly)

(Continued to the next page)

Table 5-23 Setting items that may be stored in the preset memory (Cont'd)

Item	Setting
External control output	
Port 1	0 to 255
Port 2	0 to 255
Reverse frequency of relay drive output	−140 to 140
RDS signal (VP-8194A only)	
Signal	ON / OFF
Level	0.0 % to 10 %
Pattern data	0 to 15 (0_H to F_H) / Null / Sc
Sub carrier phase	0° / 90°
ARI signal (VP-8194A only)	
SK signal	ON / OFF
SK signal level	0.0 % to 10 %
BK signal	ON / OFF
BK signal AM degree	0 % to 80 %
BK signal code data	A to F
DK signal	ON / OFF
DK signal AM degree	0 % to 40 %

The basic operations related to the assorted preset memories are described in the following paragraphs.

5-14-2 Storing operation

5-14-3 Direct recalling operation

5-14-4 Sequential recalling operation

5-14-5 Grouped sequential recalling operation

5-14-6 GP-IB program code

5-14-2 Storing operation

Ex. Storing the current settings in the preset memory with the memory address 12

1 Press the SHIFT [O] key.

2 Press the STO [RCL] key.

3 Enter a memory address with the data keys.

[1] [2]

4 Press the ENTER [O] key.

5-14-3 Direct recalling operation

Ex. Recalling the memory with the memory address 12

1 Press the STO RCL key.

2 Enter a memory address with the data keys.

1 2

■ NOTE

Alternatively, the preset memories with the memory addresses 00 to 09 can be recalled with the procedure as described in the paragraph "Ex. Recalling the memory with the memory address 1."

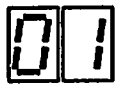
Ex. Recalling the memory with the memory address 1

1 Press the STO RCL key.

2 Enter a memory address with the data keys.

1

3 Press the ENTER O key.



5-14-4 Sequential recalling operation

The memories between a desired start address and end address can be sequentially recalled with a single key operation.

Setting a start address to 12, and end address to 34

1 Press the SHIFT O key.

2 Press the STO RCL key.

3 Press the PORT 2 . key.

4 Enter a two-digit start address with the data keys.

1 2

5 Press the PORT 2 . key.

6 Enter a two-digit end address with the data keys.

3 4

7 Press the ENTER O key. 

■ NOTE

- It is assumed that the smaller one of the two entered addresses is a start address and the bigger one is an end address. Thus setting two addresses as follows causes the preset memories to be sequentially recalled from the address 12 to the address 34.

SHIFT O STO RCL . 3 4 . 1 2 ENTER O

- When a start or end address is specified, it is shown with the dot [•] mark added to its end. 
- If a start and end addresses are set to the same numeric value, both addresses are cancelled.

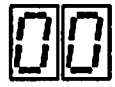
Ex. Canceling a start or end address

1 Press the SHIFT O key.

2 Press the STO RCL key.

3 Press the PORT 2 . key.

4 Press the PORT 2 . key.

5 Press the ENTER O key. 

Ex. Recalling addresses sequentially (start address 12, end address 34)

1 Press the AUTO/MANU ⇧ key. 

The address after the current address is recalled.

■ NOTE

If the currently displayed address is the end address, the start address is recalled.

2 Press the COPY ⇩ key. 

The address before the current address is recalled.

■ NOTE
If the currently displayed address is the start address, the end address is recalled.

3 Press the LIST CLR key.

The start address is recalled.

■ NOTE
If the LIST CLR key is pressed when the start and end addresses are cancelled, the address 00 is recalled.

5-14-5 Grouped sequential recalling operation

Preset memories can be divided into up to ten groups. Then you may specify a desired one group to perform sequential recalling.

Ex. Defining Group 5 with a start address set to 12 and an end address set to 34

1 Press the SHIFT O key.

2 Press the STO RCL key.

3 Press the PORT 2 . key.

4 Enter a two-digit start address with the data keys.

1 2

5 Press the PORT 2 . key.

6 Enter a two-digit end address with the data keys.

3 4

7 Press the PORT 2 . key.

8 Enter a group number with the data keys.

5

9 Press the ENTER O key.

■ NOTE
More than one group can share same addresses.

Ex. Defining three groups sharing same addresses

1 Press the SHIFT [O] key.

2 Press the STO [RCL] key.

3 Press the PORT 2 [.] key.

4 Enter a two-digit start address with the data keys.

[0] [0]

5 Press the PORT 2 [.] key.

6 Enter a two-digit end address with the data keys.

[2] [0]

7 Press the PORT 2 [.] key.

8 Enter a group number with the data keys.

[1]

9 Press the ENTER [O] key.

10 Press the SHIFT [O] key.

11 Press the STO [RCL] key.

12 Press the PORT 2 [.] key.

13 Enter a two-digit start address with the data keys.

[1] [0]

14 Press the PORT 2 [.] key.

15 Enter a two-digit end address with the data keys.

[3] [0]

16 Press the PORT 2 [.] key.

17 Enter a group number with the data keys.

[2]

18 Press the ENTER [O] key.

19 Press the SHIFT [O] key.

20 Press the STO [RCL] key.

21 Press the PORT 2 [.] key.

22 Enter a two-digit start address with the data keys.

[2] [0]

23 Press the PORT 2 [.] key.

24 Enter a two-digit end address with the data keys.

[4] [0]

25 Press the PORT 2 [.] key.

26 Enter a group number with the data keys.

[3]

27 Press the ENTER [O] key.

Ex. Specifying Group 1

1 Press the STO [RCL] key.

2 Press the PORT 2 [.] key.

3 Enter a group number with the data keys.

[1]

4 Press the ENTER [O] key.

Ex. Canceling sequentially recalling within a group

1 Press the SHIFT [O] key.

2 Press the STO [RCL] key.

3 Press the PORT 2 [.] key.

4 Press the PORT 2 [.] key.

5 Press the ENTER O key.

■ NOTE

When a start and end addresses are set to the same numeric value, both addresses are cancelled.

5-14-6 GP-IB program code

As for the preset memories, GP-IB control is available for storing operation and direct recalling operation. Table 5-24 lists the program codes used for this purpose.

Table 5-24 GP-IB program codes related to the preset memories

Header code	Data code	Unit code	Description
RC	00 to 99		Recalls the preset memories with the addresses ranging from 00 to 99
ST	00 to 99		Stores settings in the preset memories with the addresses ranging from 00 to 99.

5-15 AUTO SEQUENCE OF THE ASSORTED PRESET MEMORIES —

5-15-1 General

The auto sequence operation allows the assorted preset memories to be sequentially recalled at a desired time interval.

The basic operations related to the auto sequence operation are described in the following paragraphs.

5-15-2 Specifying an interval time
5-15-3 Specifying an auto sequence mode
5-15-4 Enabling and disabling the auto sequence operation
5-15-5 GP-IB program code

5-15-2 Specifying an interval time

In the auto sequence operation, an interval time means the time period after a certain memory is recalled until the next memory is recalled. An interval time may be varied with memory addresses.

An interval time in seconds appears in the ***MODULATION*** readout only when it is specified or verified. The setting range and resolution are shown in Table 5-25.

Table 5-25 Setting range and resolution of an interval time

Setting range (s)	Resolution (s)
0.10 to 9.99	0.01
10.0 to 60.0	0.1

Ex. Setting an interval time for a memory address to one second

(Current FM deviation)

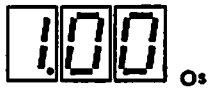
1 Press the SHIFT [0] key.

2 Press the INTVL [1] key.

3 Enter an interval time with the data keys.

[1]

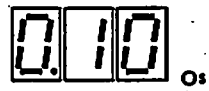
4 Press the ENTER [0] key.



Ex. Setting an interval time for the memory addresses 3 to 9 to two seconds

1 Press the SHIFT (0) key.

2 Press the INTVL (1) key.



3 Enter an interval time with the data keys.

(2) (–)

4 Enter a memory address with the data keys.

(3) (–) (9)

5 Press the ENTER (0) key.

Ex. Setting an interval time for all memory addresses (start to end addresses) to three seconds

1 Press the SHIFT (0) key.

2 Press the INTVL (1) key.

3 Enter an interval time with the data keys.

(3) (–) (–)

4 Press the ENTER (0) key.

Ex. Verifying the interval time for the currently displayed memory address

1 Press the SHIFT (0) key.

2 Press the INTVL (1) key.

■ NOTE

Press The data keys while the *s* light is lit. Once the *s* light is turned off, an interval time may not be specified.

5-15-3 Specifying an auto sequence mode

There are four modes available for the auto sequence operation.

- Repeat up: Performs the auto sequence operation repeatedly in the direction from a start address to an end address.
- Single up: Performs the auto sequence operation once in the direction from a start address to an end address.
- Repeat down: Performs the auto sequence operation repeatedly in the direction from an end address to a start address.
- Single down: Performs the auto sequence operation once in the direction from an end address to a start address.

■ NOTE

An auto sequence mode appears with other I/O modes in the ***FREQUENCY*** readout only when it is specified or verified.

Ex. Verifying the auto sequence mode

1 Press the SHIFT [O] key.

2 Press the I/O MODE [0] key.

An auto sequence mode is indicated in the AS digit of the ***FREQUENCY*** readout.

The correspondence between the numeric values in the AS digit and auto sequence modes is shown in Table 5-26.

Table 5-26 Correspondence between AS numeric values and auto sequence modes

AS	Mode
0	Repeat up
1	Single up
2	Repeat down
3	Single down

Ex. Setting an auto sequence mode to Repeat down (AS: 2)

1 Press the SHIFT [0] key.

2 Press the I/O MODE [0] key.

3 Specify the AS digit with the ΔF OFF [⇦] or ΔdB OFF [⇨] key.

The currently specified digit blinks.

4 Enter a mode number (0 to 3) with the data keys.

PORT 1 [2]

5 Press the ENTER [0] key.

5-15-4 Enabling and disabling the auto sequence operation

1 Press the SHIFT [0] key.

2 Press the AUTO/MANU [⇧] key.

Repeating the above key operation causes the auto sequence operation to be enabled or disabled. The *AUTO* light in the *MEMORY ADDRESS* readout is lit when the auto sequence operation is enabled, and it is lit off when the auto sequence operation is disabled.

■ NOTE

When the auto sequence operation is in progress, pressing the SHIFT [0] key causes the auto sequence to be paused.

5-15-5 GP-IB program code

In the auto sequence operation, GP-IB control is available for setting of an interval time and mode selection. Table 5-27 lists the program codes used for this purpose.

Table 5-27 GP-IB program codes related to the auto sequence operation

Header code	Data code	Unit code	Description
NT	t		Specifies an interval time for the currently displayed address to t (s).
	t−a1−a2		Specifies an interval time for the addresses a1 to a2 to t (s).
	t−−		Specifies an interval time for the start to stop addresses to t (s).
	t (interval time): 0.10 to 60.0 a1, a2 (address): 00 to 99 (a1<a2)		
AS	0		Sets the operation mode to Repeat up.
	1		Sets the operation mode to Single up.
	2		Sets the operation mode to Repeat down.
	3		Sets the operation mode to Single down.

CHAPTER VI GP-IB INTERFACE

6-1 GENERAL

The GP-IB interface allows this series of signal generators to execute the following functions:

(1) Remote control of the instrument's settings by program codes that are sent from the controller (listener)
(2) Function for sending the instrument's settings to the controller (talker).
(3) Memory sync and memory copy functions (talk only / listen only).

6-2 GP-IB INTERFACE FUNCTION

Table 6-1 shows the instrument's interface functions.

Table 6-1 Code assignment of command information

Function	Code	Description
Source handshake	SH1	Complete capability
Acceptor handshake	AH1	Complete capability
Talker	T7	Basic talker, talker release by MLA, and talk only
Listener	L3	Basic listener, listener release by MTA, and listen only
Service request	SR0	No capability
Remote / local	RL1	Complete capability
Parallel poll	PP0	No capability
Device clear	DC1	Complete capability
Device trigger	DT0	No capability
Controller	C0	No capability

6-3 GP-IB CONNECTOR

Figure 6-1 shows the pin assignment of the *GP-IB* connector of the instrument.

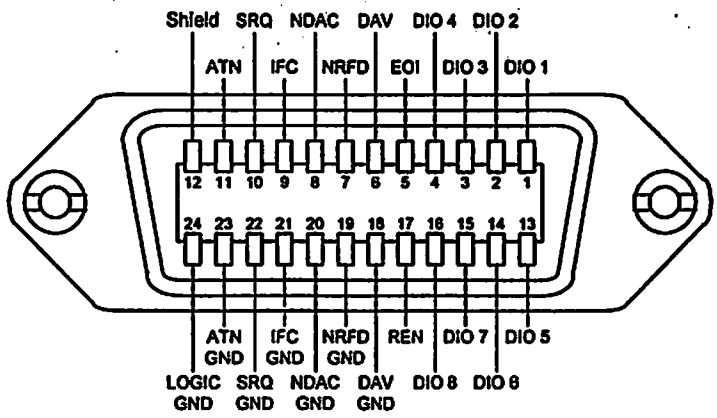


Figure 6-1 GP-IB pin assignment

6-4 GP-IB ADDRESS SETTING

A GP-IB device address is set with panel keys. The GP-IB address appears in the ***FREQUENCY*** readout with the parameters for other I/O modes only during setting and verifying operation.

Ex. Verifying the GP-IB address setting

1 Press the SHIFT [O] key.

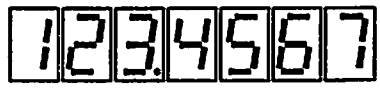
2 Press the I/O MODE [0] key.

The Digits A1 and A2 in the ***FREQUENCY*** readout display the GP-IB device address as a decimal number of 0 to 30.

■ NOTE

After pressing the I/O MODE [0] key, operating any key and knob other than mentioned under turns the I/O mode light of the ***FREQUENCY*** readout off; i.e. the generator returns to the normal setting state.

Ex. Setting the GB-IB address to 15



1 Press the SHIFT [O] key.

2 Press the I/O MODE [0] key.

3 Specify the A1 digit with the ΔF OFF [⇦] ΔdB OFF [⇨] keys.

The currently specified digit is displayed blinking.

4 Enter an address with ***DATA*** keys.

[1] [5]

5 Press the ENTER [O] key.

6 Press the ***POWER*** switch.

Turn the power off.

7 Press the ***POWER*** switch.

Again turn the power on.

■ NOTE

Turning the ***POWER*** switch off and then on completes the setting procedure. Note that if this step is omitted, the generator will maintain the previous setting.

6-5 DEVICE CLEAR

The DCL or SDC command clears the signal generator to the initial conditions shown in Table 6-2.

Table 6-2 Initial conditions

Item	Setting
Output level	−20.0 dBμV [emf]
Effective digit of the ***AMPLITUDE*** readout	The first digit (The lowest digit)
RF frequency	140.000 0 MHz
Effective digit of the ***FREQUENCY*** readout	The first digit (The lowest digit)
Status of the ***FUNCTION*** block	***RF FREQ*** key light is lit
Contents of the ***MODULATION*** readout	AM degree
Frequency modulation	OFF
Modulation signal	INT
Deviation	0.0 kHz
Amplitude modulation	OFF
Modulation signal	INT
Modulation degree	0 %
Internal modulation frequency	1 kHz
Main- and sub-channel modulation signal (VP-8193A / 94A only)	
Modulation level ratio	0 %
Modulation mode	MONO
PILOT signal (VP-8193A / 94A only)	OFF
Pilot level	0 %
Pre-emphasis (VP-8193A / 94A only)	OFF
RDS signal (VP-8194A only)	OFF
Level ratio	0 %
Selection of the pattern	Null
Sub carrier phase	0°
ARI SK signal (VP-8194A only)	OFF
Level ratio	0 %
ARI DK signal (VP-8194A only)	OFF
AM degree	0 %
ARI BK signal (VP-8194A only)	OFF
AM degree	0 %
Code selection	A
DDS frequency (option, VP-8193A / 94A only)	
Frequency	20 kHz
I/O mode	
Operation mode for auto sequence	0 (Repeat up)
External control output signal Port 1	0
Port 2	0
Memory address	00
Reverse frequency of a relay drive output	30 MHz

6-6 FUNCTIONS REMOTELY UNCONTROLLABLE

Most of the instrument functions executed through panel operation can be remotely controlled via the GP-IB. The following functions, however, cannot be remotely controlled.

- The ***MODIFY*** knob operation
- The relative value display of RF frequency and output level
- Sequential memory recall (AUTO/MANU [⇧] , COPY [⇩] , and LIST [CLR] keys operation)
- Memory grouping
- Group specification for sequential memory recall
- Starting and ending of memory auto sequence
- Setup of the I/O mode (except the operation mode for auto sequence)

6-7 REMOTE / LOCAL FUNCTION

The remote / local function is controlled with the system controller and the O REMOTE / ● LOCAL [O] key of the signal generator.

The instrument is always in either of the three modes; local, remote, and remote with lockout. Each mode is described in the following paragraph.

6-7-1 Local mode

The instrument enters the local monde when:

- the ***POWER*** switch is turned on,
- the O REMOTE / ● LOCAL [O] key is pressed to turn the key light off,
- the GTL command is received, or
- the REN line becomes false in the remote mode.

■ NOTE

When the mode is switched from remote to local, the setup condition in the remote mode remains effective in the local mode.

6-7-2 Remote mode

The generator enters the remote mode if it receives the MLA command with the REN line true.

■ NOTE

- In the remote mode, the ***POWER*** switch and 

key are only effective.
- When the mode is switched from local to remote, the setup condition in the local mode remains effective in the remote mode.

6-7-3 Remote mode with lockout

In this mode, the 

key cannot be used to switch to the local mode.

To set the generator in the local mode, 1) issue the GTL address command, 2) make the REN line false, or 3) turn the power off and then on again.

6-8 RESPONSE TO COMMANDS

Table 6-3 shows the types of commands and the generator's response to each command.

Table 6-3 Response to commands

Type	Name	Description	Response
Universal command	DCL	Clears all devices.	O
	SPE	Enables serial polling.	×
	SPD	Clears serial polling.	×
	PPU	Clears parallel polling.	×
	LLO	Sets all devices in the local lockout mode to disable manual operation.	O
Address command	UNL	Releases the specified listener.	O
	UNT	Releases the specified talker,	O
	SDC	Clears the specified device.	O
	GTL	Sets the specified device in the local mode.	O
	PPC	Enables parallel polling line assignment to the specified listener during parallel polling.	×
	GET	Issues a trigger to the specified device.	×
	TCT	Transfers bus control to the talker-specified controller when the system has two or more controllers.	×

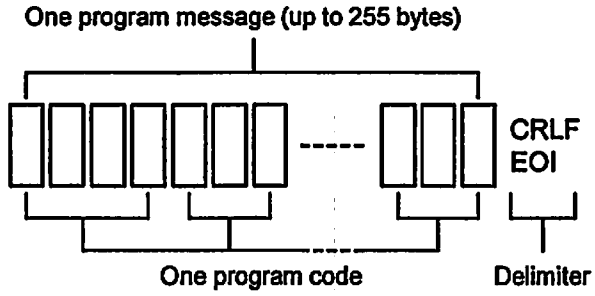
6-9 PROGRAM CODE INPUT FORMAT

This paragraph describes the input format for GP-IB program codes.

6-9-1 Input program message format

To set the generator in a desired state through the GP-IB interface, several program codes must be sent from the controller to the generator.

The instrument can receive a program message of up to 255 bytes of program codes in 7-bit ASCII code. The program message format is as follows.



6-9-2 Delimiter for a program message

Either one of the following delimiters must be used for a program message.

- CRLF (0D+0A in hexadecimal notation)
- LF (0A in hexadecimal notation)
- EOI (GP-IB uniline message)

6-9-3 Delimiter for a program code

No delimiter is required between program codes, but a comma (,) or space (␣) can be inserted. Given below are examples.

Ex. When no delimiter is inserted between program codes

FR100AP20FM2.5CRLF

RF frequency Output level FM deviation Delimiter

Setup value: RF frequency.... 100 MHz
Output level..... −20 dBμV
FM deviation .... 2.5 kHz

Ex. When a comma is inserted between program codes

FR100,AP20,FM2.5CRLF

RF frequency Output level FM deviation Delimiter

Ex. When a space is inserted between program codes

FR100 AP20 FM2.5CRLF

RF frequency· Output level FM deviation Delimiter

6-9-4 Program code input format

A GP-IB program code consists of a header code, data code, and unit code.

Most header codes consist of two English upper cases. A data code is generally a numeric value.

A unit code consists of one or two English upper cases, but many of the program codes require no unit code.

For detailed description of the program codes for setting parameters. The GP-IB program codes are given in a list at the end of this manual.

6-10 PROGRAM CODE OUTPUT FORMAT

The generator has the basic talker function for sending data out. The contents of data for output depend on the talker mode in which the generator is set. The talker mode and data to be sent out are given below.

Table 6-4 The talker mode and data to be sent out

Talker mode	: Data to be sent out
0	Setup state of the generator
1	Data applied to port 2 of the EXT CONTROL I/O interface. (Data read function)

■ NOTE

The talker mode is selected with the program code having the header code "TM," and the data code "0 and 1."

6-10-1 Talker mode 0 (TM0)

When assigned a talker with the talker mode 0 selected, the generator sends out its setup state. The output format in this talker mode is as follows:

[VP-8192A]

FRddddddddd_APddddd_AMdddd_AMdd_AMdd_FMddd_FMdd_FMddd_TOd_MS1_
<1> <2> <3> <4> <5> <6> <7> <8> <9><10>

MSdd_DRdddd_ASd_NTdddd_P1ddd_P2dddCRLF
<11> <16> <17> <18> <19> <20> <32>

ddd…: Data code (including a unit code)
_: Space

[VP-8193A]

FRddddddddd_APddddd_AMdddd_AMdd_AMdd_FMddd_FMdd_FMddd_TOd_MSd_
<1> <2> <3> <4> <5> <6> <7> <8> <9><10>

MSdd_PLdddd_PLdd_PRd_DFddddddd_DRdddd_ASd_NTdddd_P1ddd_P2dddCRLF
<11> <12> <13> <14> <15> <16> <17> <18> <19> <20> <32>

[VP-8194A]

FRddddddddd_APddddd_AMdddd_AMdd_AMdd_FMddd_FMdd_FMddd_TOd_MSd_
<1> <2> <3> <4> <5> <6> <7> <8> <9><10>

MSdd_PLdddd_PLdd_PRd_DFddddddd_DRdddd_ASd_NTdddd_P1ddd_P2ddd_
<11> <12> <13> <14> <15> <16> <17> <18> <19> <20>

RDdddPC_RDdd_RDdddd_RDdd_SKddd_SKdd_DKdd_DKdd_BKdd_BKdd_BKdCRLF
<21> <22> <23> <24> <25> <26> <27> <28> <29> <30> <31><32>

The program code <1> to <25> are described below.

Table 6-5 Program codes

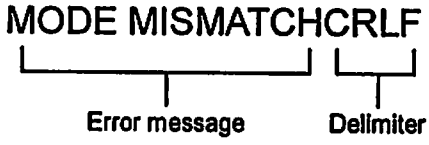
	Program code	Data code	Description
<1>	FRddddddddd	0.100 0 to 140.000 00	RF frequency setup value
<2>	APdddddd	−20.0 to 126.0	Output level setup value
<3>	AMdddd	0.0 to 100	AM degree setup value
<4>	AMdd	ON / OF	Turns AM modulation on and off
<5>	AMdd	TO / XD / TD	AM modulation signal (INT / EXT / DDS)
<6>	FMddd	0.0 to 100	FM deviation setup value
<7>	FMdd	TO / XD / TD	FM modulation signal (INT / EXT / DDS)
<8>	FMddd	0.0 to 127	Setup value of an FM modulation ratio
<9>	TOd	1 / 4	Setting condition of the internal modulation signal oscillator
<10>	MSd	1 to 5	Selection of an FM modulation mode
<11>	MSdd	ON / OF	Turns FM modulation on and off
<12>	PLdddd	0 to 15.0	Setup value of PILOT level ratio
<13>	PLdd	ON / OF	Turns the PILOT signal on and off
<14>	PRd	0 to 3	Pre-emphasis setup value
<15>	DFddddddd	0.020 to 20.000	DDS frequency setup value
<16>	DRdddd	0 to 140 / −0 to −140	Setup value of the reverse frequency for the relay drive output
<17>	ASd	0 to 3	Setup value of the operation mode for memory auto sequence
<18>	NTdddd	0.0 to 60.0	Interval time setup value
<19>	P1ddd	0 to 255	Setup value of the external control output signal for port 1
<20>	P2ddd	0 to 255	Setup value of the external control output Signal for port 2
<21>	RDdddPC	0 to 10	Setup value of the RDS signal level
<22>	RDdd	ON / OF	Turns the RDS signal on and off
<23>	RDdddd	0 to F / NULL / SC	Setup value of the RDS pattern code
<24>	RDdd	P0 / P9	Setup value of the RDS sub carrier phase
<25>	SKddd	0 to 10	Setup value of the ARI_SK signal level
<26>	SKdd	ON / OF	Turns the ARI_SK signal on and off
<27>	DKdd	0 to 40	Setup value of the ARI_DK modulation ratio
<28>	DKdd	ON / OF	Turns the ARI_DK signal on and off
<29>	BKdd	0 to 80	Setup value of the ARI_BK modulation ratio
<30>	BKdd	ON / OF	Turns the ARI_BK signal on and off
<31>	BKd	A to F	Setup value of the ARI_BK signal code
<32>	CRLF		Delimiter (EOI message generated simultaneously with LF)

6-10-2 Talker mode 1 (TM1)

When assigned a talker with the talker mode 1 selected, the generator sends out the 8-bit input data of port2 of the EXT CONTROL I/O interface in decimal notation. This is called the data read function (→ "8-10 DATA READ"). The output format is as follows:

dddCRLF ddd: 0 to 255
CRLF: Delimiter (EOI message generated simultaneously with LF)

If the data read mode is not selected for the I/O mode of port 2 of the EXT CONTROL I/O interface, however, the generator sends out the following message.



6-11 MEMORY SYNC AND MEMORY COPY FUNCTIONS

The GP-IB interface allows the instrument to the memory sync function that simultaneously recalls assorted preset memory data of multiple instruments. It also allows the instrument to have the memory copy function that transfers preset memory data mutually between the same models.

Memory sync function

Use the GP-IB interface to connect a master set of the instrument to one or more slave sets. When the master set starts the recalling operation of assorted preset memory data, it sends out the program code for recalling the memory data to the slave set (s). Consequently the same memory address will be recalled on the slave set (s) as well. Note that a slave set may not be necessarily the same model as the master set, provided that the slave mode is available for the memory sync function.

Memory copy function

Use the GP-IB interface to connect a master set to one or more slave set (s). Starting the memory copy operation on the master set allows all or part of the preset memory data of the master set to be transferred to the slave set (s). Note that the master set and slave set (s) in this operation must be the same model.

6-11-1 Master / slave mode readout

The selected master or slave mode is display in the ***FREQUENCY*** readout with other I/O mode parameters only during the setup and verification operations.

The TL digit in the ***FREQUENCY*** readout indicates whether the master or slave mode is currently selected for the memory sync or memory copy operations,

The TL numeric values and modes are shown in Table 6-6.

Table 6-6 The TL numeric values and modes

TL	Mode
0	Releases the master / slave mode.
1	Slave mode for memory sync.
2	Master mode for memory sync.
3	Slave mode for memory copy.
4	Master mode for memory copy.

■ NOTE

The master / slave mode corresponds to the talk only / listen only function of the GP-IB. Therefore the master / slave mode must be released when the GP-IB control with addressing (normal GP-IB control) is required.

Ex. Verifying the master / slave mode

1 Press the SHIFT [O] key.

2 Press the I/O MODE [0] key.

A current master or slave mode is indicated as a decimal number of 0 to 4 in The TL digit of the ***FREQUENCY*** readout.

■ NOTE

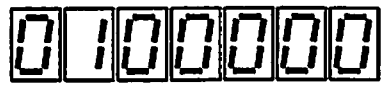
After pressing the I/O MODE [0] key, operating any key and knob other than mentioned under turns the ***I/O*** light off; i.e. the generator returns to the normal setting state.

6-11-2 Setting the master / slave mode

Ex. Selecting the master mode for memory sync

1 Press the SHIFT [O] key.

2 Press the I/O MODE [0] key.



3 Specify the TL digit with the ΔF OFF [⇦] ΔdB OFF [⇨] keys.

The currently specified digit is displayed blinking.

4 Enter a numeric value for a master mode with the data keys.

[2]

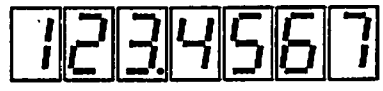
5 Press the ENTER [O] key.

6 Press the ***POWER*** switch.

Turn the power off.

7 Press the ***POWER*** switch.

Again turn the power on.



■ NOTE

Turning the ***POWER*** switch off and then on completes the setting procedure. Note that if this step is omitted, the generator will maintain the previous setting.

6-11-3 Memory sync operation

Recalling the memory data of the master set causes the memory data of the slave set to be recalled at the same time. The direct recalling, sequential recalling, and auto sequence operation can be synthesized.

6-11-4 Memory copy operation

To enable the memory copy function, specify the range of the memory addresses to be copied and start the copy operation.

Specifying a memory address range

- Specify a pair of start and end address on the master set to start the copy operation. Then only the contents of the assorted preset memory between the start and end addresses are copied.
- Canceling the start and end address allows the entire contents of the assorted preset memory to be copied.
- See the paragraph "5-14-4 Sequential recall" for specifying and canceling the start and end address.

Starting the copy operation

1 Press the SHIFT [O] key of the master set.

2 Press the COPY [⇩] key of the master Set.

The memory copy function starts.

> ■ NOTE
>
> During the copy operation, the SHIFT [O] key is turned on and every panel operation is disabled. upon completion of the copy operation, the key is turned off and panel operation is enabled.

6-12 PANEL DISPLAY OFF FUNCTION

The instrument has a function that turns off the display LED of the panel in a remote state. In a remote state, only the key light of the ○ REMOTE ● LOCAL [O] key is lit.

6-12-1 Setting the panel display off function

The setting is executed by sending out the program codes, header code "PI" and data code "1" in the GP-IB control operation.

6-12-2 Resetting the panel display off function

The panel display Off function is reset when;

- the program code "PI0" is received.
- a local state is resumed. (Refer to Chapter 6-7 for a local state.)
- the initial state is resumed by receiving DCL or SDC.

■ NOTE

In AM or FM external modulating operation, the ***HI*** or ***LO*** light in the ***AF EXT*** block may be turned on according to the input level In this case, the light is not turned off even by the panel display off function.

6-13 VP-8174A COMPATIBLE COMMANDS FUNCTION (VP-8193A only)—

The model VP-8193A can be controlled compatibly with VP-8174A, a similar model provided by us, in the compatible mode. Note that the FM and AM mixed modulation function is not available in the compatible mode.

For detailed description of commands for the compatible mode, see " Appendix 2: VP-8174A compatible command list" at the end of this manual.

6-13-1 Verifying the compatible mode setting state

A setting state of the compatible mode is indicated in the SP digit of the ***FREQUENCY*** readout.

Table 6-7 shows the relationship between SP numeric values and modes.

Table 6-7 SP numeric values and modes

SP	Mode
0	VP-8193A normal mode
1	VP-8174A compatible mode

■ NOTE

- The compatible mode is available only when the remote control via GP-IB and RS-232-C is enabled. In the manual mode, the compatible mode works same as the normal mode.
- In the compatible mode, the instrument can provide only single modulation. Thus if the instrument provides mixed modulation in the manual mode, it enters the single modulation mode when a modulation degree is specified with the command.

Ex. Verifying the compatible mode setting state

1 Press the SHIFT [0] key.

2 Press the I/O MODE [0] key.

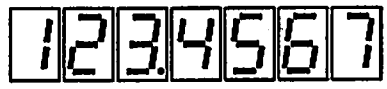
A current compatible mode is indicated as a decimal number of 0 or 1 in the SP digit of the ***FREQUENCY*** readout.

■ NOTE

After pressing the I/O MODE [0] key, operating any key other than the data keys and ⊿F OFF [⇦] and ⊿dB OFF [⇨] keys in the ***MODIFY*** block turns the ***I/O*** light off and returns the instrument to the normal setting condition.

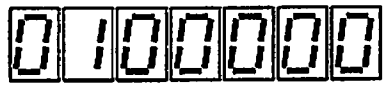
6-13-2 Setting the compatible mode

Ex. Setting VP-8193A to the compatible mode

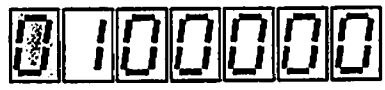


1 Press the SHIFT [0] key.

2 Press the I/O MODE [0] key.



3 Specify the SP digit with the ΔF OFF [⇦] or ΔdB OFF [⇨] key.



The currently specified digit blinks.

4 Enter a numeric value for the compatible mode.

[1]

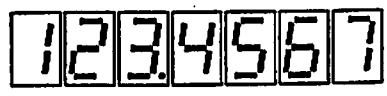
5 Press the ENTER [0] key.

6 Press the ***POWER*** switch.

The power is turned off.

7 Press the ***POWER*** switch.

The power is turned on again.



■ NOTE

Turning the ***POWER*** switch off and then on completes the setting procedure. Note that if this step is omitted, the generator will maintain the previous setting.

CHAPTER VII RS-232-C INTERFACE

7-1 GENERAL

The instrument provides an RS-232-C interface on the rear panel. The RS-232-C interface makes the following functions effective.

(1) Remote control for RF frequency, output level, and modulation settings by program codes that are sent from the host.

(2) Sending and receiving of RDS data by the attached pattern software. (Only for VP-8194A)

■ NOTE

Even if RS-232-C remotely controls the instrument, O REMOTE / ● LOCAL [O] key does not go on.

7-2 INTERFACE SPECIFICATIONS

Table 7-1 shows the fixed RS-232-C interface conditions of the instrument.

Table 7-1 RS-232-C interface specifications

Item	Description
Communication system	Asynchronous system
Transmission rate	38 400 bps
Stop bit	1 bit
Character length	8 bits
Parity	EVEN
Control line specification	DTE specification *1
Flow control	Software flow control (Xon: 11_H / Xoff: 13_H)

*1: Use a cross cable to connect with a computer having DTE specifications.

7-3 RS-232-C CONNECTOR

The RS-232-C interface connector of the instrument is 9-pin D-sub plug.

Figure 7-1 shows the pin assignment of the *RS-232-C* connector of the instrument.

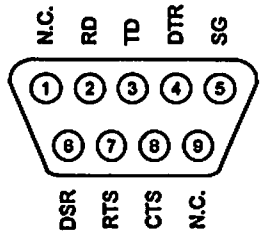


Figure 7-1 RS-232-C pin assignment

Table 7-2 lists signal functions.

Table 7-2 RS-232-C pin connection

Pin No.	Signal	Description
1	N.C.	Not connected
2	RD	Received data
3	TD	Transmitted data
4	DTR	Internal connection with No. 6 terminal
5	SG	Ground for signal
6	DSR	Internal connection with No. 4 terminal
7	RTS	Internal connection with No. 8 terminal
8	CTS	Internal connection with No. 7 terminal
9	N.C.	Not connected