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FM/AM SIGNAL GENERATOR

MODEL:GSG-120/122

82SG-12200Mc

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SAFETY PRECAUTIONS

This instruments has been designed and tested to ensure reasonable personal protection and protection of the surrounding area against damage, and has been supplied a safe condition.

The following precautions must be observed by the user to ensure safe operation and to retain the instrument in a safe condition.

1. Avoid abnormal stresses in transport or storage.

2. REMOVED OF COVERS

This instrument contains no operator serviceable parts, screw removal by qualified persons only. If any adjustment, maintenance or repair under voltage in inevitable, it shall only be carried out by a skilled person who is aware of the hazard involved. For further replacement, please contact your nearest agent or our company.

3. FUSE REPLACEMENT

If the fuse blows, the unit will not operation. The fuse should not normally open unless a problem has developed in the unit. Try to determine and correct the cause of the blown fuse, then replace only with a fuse of the correct rating and type. A change in line voltage may also require a corresponding change of fuse value. Install the correct fuse value as listed:

1A fuse for 100V, 120V Line Voltage
0.5A fuse for 220V, 240V Line Voltage

4. OPERATING VOLTAGE

The primary winding of the power transformer is tapped to permit operation from 100, 120, 220 or 240VAC 50/60Hz line voltage. Depending on the country of destination, to prevent damage to the instrument, make sure to reconfirm the suitable voltage before connecting main supply.

5. PROTECTIVE EARTH

Use only a polarized 3-wire ac outlet. This assures that the instrument chassis, case, and ground terminal are connected to a good earth ground and reduces danger from electrical shock.

6. PROTECTIVE CIRCUIT

Avoid to apply an external voltage to the output connector, DC or AC voltage exceeding 3V may cause the damage of output circuit.

7. ENVIRONMENT

Operating temperature range of this instrument is 0°C~40°C. Avoid the direct rays and do not operate in high humidity, dirty, strong magnetic field.

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1. GENERAL

1-1 INTRODUCTION

This is a FM/AM standard signal generator which provides CW, AM and FM signals in frequency ranges from 100 KHz to 110 MHz, the calibrated output levels from −19 dB to 99 dB at open end in 1 dB steps. This instrument performance for labratory use, convenience for production lines and compactness for service use. The principal features cover of almost all applications in any type of receiver manufacturing and manintenance industries. The carries frequency, output level and modulation functions can also be freely combined. From 10 points in oneblock to 100 continuous points in 10 blocks, and 4 independent output level points can be stored in memory and recalled. The three functions can be remotely controlled with a simple external fixture.

1-2 CARRIER FREQUENCY

The carrier frequency is always locked to the internal reference crystal oscillator and is settable with resolutions of 100 Hz in 100 KHz~30 MHz range and 1 KHz in 30~110 MHz range. A 6-digits LED display of the carrier frequency in MHz is provided. Continuous variation is possible using the rotary knob with cursor indication. A frequency difference display (△F) and +/− function are also provided for checking the selectivity.

1-3 OUTPUT LEVEL

An endless rotary switch permits increment and decrement by 10 dB or 1 dB step for level from −19 dB to 99 dB e.m.f (open circuit voltages in terms of dB above 1 microvolt). A 2-digits LED display of the output level is provided. Additionally provided four preset keys are used on occasion to recall four optionally predetermined output levels in the range from 0 dB to 99 dB.

1-4 MODULATION

Amplitude modulation and frequency modulation are both derived from the internal 400Hz and 1KHz oscillator but 3KHz only for GSG120. External frequency from 20Hz to 10KHz for AM, 20Hz to 100KHz for FM (50Hz to 15KHz for GSG122 FM stereo modulation). AM depth and FM deviation are variable up to 60% and 100KHz respectively (GSG122 stereo modulation the deviation of audio and pilot signals are variable up to 90% and 15%), all are indicated on the 3-digits display provided on the front panel.

1-5 MEMORY

This signal generator features a versatile preset capability for carrier frequency, output level, modulation level and functions etc. The data of carrier frequency, output level, modulation (FM/AM) and functions are assorted together and can be stored in memory (up to 100 points) and recalled when necessary. As the memory device (RAM) is battery backed-up, the stored data are retained while turning off the instrument.

1-6 REMOTE CONTROL

The function includes recall stored of frequency, output level and modulation. Increment and decrement step keys of frequency, output level and modulation of/off etc.

2. SPECIFICATIONS

2-1 Carrier Frequency

Range:	100 KHz-110 MHz
Resolution:	100 Hz (100 KHz-34.9999 MHz)
	1KHz (35 MHz-110 MHz)
Display:	6-digits 0.5" LED display
Accuracy:	Within +/− (5×10^{-5} + 1 count)

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2-2 Output Level

Range:	−19 to 99 dBu (0.11 uV-89 mVrms) open circuit
Resolution:	1dB
Display:	2-digits 0.5" display
Memory:	Four mutually independent points (A/B/C/D), with STROE/RECALL key
Attenuator Accuracy:	+/− 1.5 dB (99 dBu to 20 dBu) +/− 2 dB (20 dBu to −10 dBu) +/−3 dB (−10 dBu to −19 dBu)
Flatness:	+/−1.5 dB
Output Impedance:	50 ohms (VSWR: Not greater than 1.2)
Spurious:	−30 dB or less (2nd harmonics)
Residual:	Demodulation frequency range: 50 Hz - 15 KHz
Modulation:	FM component: Lower than 200 Hz (75 KHz deviation) post - detection AM component: Not greater than 0.13% (S/N: Less than 47 dB with 30% depth)
Modulation:	FM or AM with internal or external modulating signal (No compund FM/AM modulation)

2-3 Frequency Modulation

Deviation:	0-99.5 KHz (1 MHz-110 MHz) Carrier frequency x 10% (below 1 MHz)
Resolution:	0.5 KHz
Display:	3-digits 0.5" LED display
Accuracy:	+/− 10% of maximum frequency deviation
Internal Modulation Frequency	400 Hz/1 KHz/3 KHz, +/− 3%
External Modulation:	Flatness: 20 Hz-100 KHz +/− 1dB (with reference to 1 KHz) Input impedance: Approx. 10kΩ (unbalanced) Input voltage: Approx. 3Vp-p, +/− 2% of set zone
Distortion:	Carrier frequency: 10.7 MHz/65-110 MHz Demodulation range: 50 Hz-15 KHz (post-detection with 50us deemphasis). Modulation frequency: 1 KHz Less than 0.05% at 75 KHz deviation Less than 0.1% at other frequencies

2-4 Stereo Modulation (GSG-122 only)

Range	0-90% (audio) 0-15% (pilot)
Display	3 digits
Resolution	0.5% (audio) 1% (pilot)
Separation	more than 55dB (at 1KHz)
pilot Frequency	19KHz +/− 2Hz
External Range	50Hz-15KHz +/− 1dB

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2-5 Amplitude Modulation

Depth:	0-60%
Resolution:	0.5%
Display:	3-digits 0.5" LED display
Accuracy:	+/−5% (for 0 to 60% modulation)
Internal Modulation Frequency:	400Hz/1KHz/3KHz, +/−3% (3KHz GSG120 only)
External Modulation:	Frequency range: 20Hz-10KHz, +/−1.5dB (with reference to 1KHz) Input impedance: Approx. 10 KΩ (unbalanced) Input voltage: Approx. 3 Vp-p, +/−2% of set zone
Distortion:	Carrier frequency: 200KHz-30MHz Demodulation range: 50Hz-15KHz Modulation frequency: 1KHz Less than 0.5% with 30% modulation Less than 1.5% with other carrier frequencies

2-6 Setting Functions

(1) Numeric keys and rotary knobs Carrier frequency, output level, modulation and memory
(2) Step keys Carrier frequency and output level
(3) Preset keys Frequency modulation: 3.5KHz/22.5KHz/75KHz
Amplitude modulation: 30%

2-7 Memory performance

(1) 100 points (carrier frequency, output level, modulation level, function, etc.)
(2) 10 blocks x 10, or 100 continous points
(3) Four mutually-independent output points
(4) Memory contents can be transferred

2-8 Remote Control

(1) Recall or stored of frequency, output level and modulation
(2) Output level control in 1dB steps
(3) Modulation ON - OFF
(4) Increment or decrement step keys of frequency and output level.

2-9 Power Requirements

Line voltage: 100V, 120V, 220V, 240V +/−10% (selectable by voltage selector plug)
Line frequency: 50Hz/60Hz
Power dissipation: Approx. 30 VA

2-10 Mechanical Specifications

Dimensions of main frame: 430W x 110H x 260D (mm) (16.93W x 4.33H x 10.24D inch)
Maximum dimensions: 435W x 121H x 306D (mm) (17.13W x 4.76H x 12.05D inch)
Weight: Approx. 6.5kg

2-11 Operation environment

To satisfy specifications: 18 to 28°C, 85% RH
Maximum Operating range: 0 to 40°C, 90% RH

2-12 Accessoies

Output cable GTL-110..1 Fuse 1A for 100V, 120V...2
or 0.5A for 220V, 240V
Power cable.....1
Operation manual.....1

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3. FRONT AND REAR PANEL CONTROL

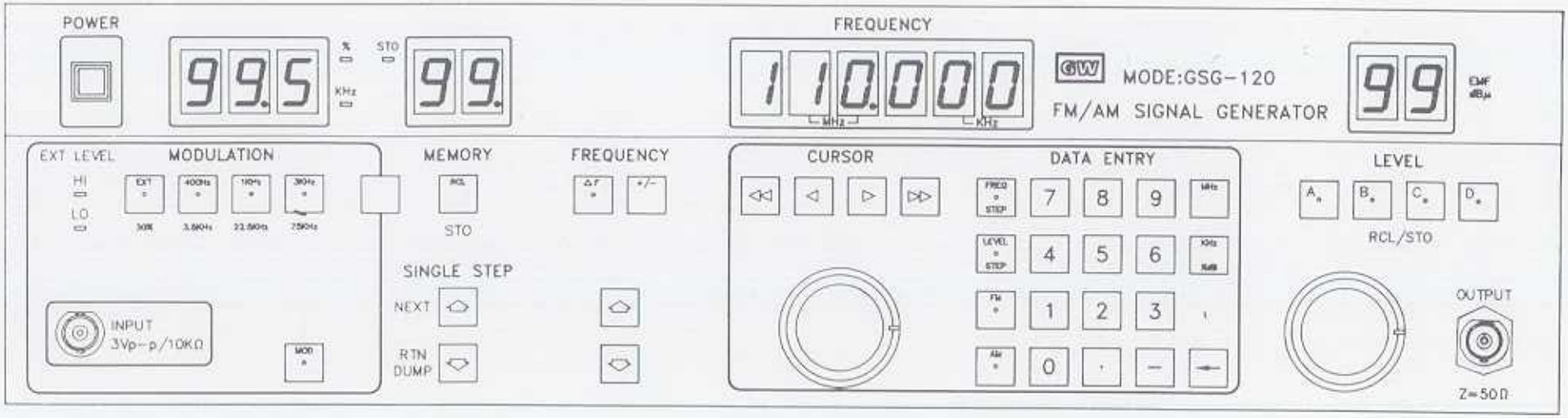


FIG. 3-1 GSG-120 FRONT PANEL

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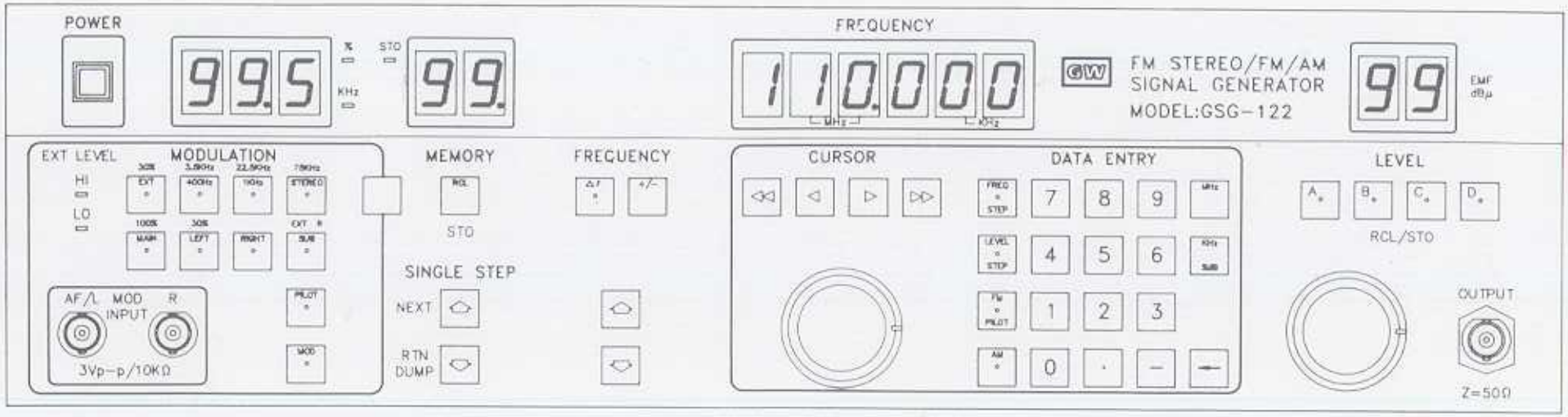


FIG. 3-2 GSG-122 FRONT PANEL

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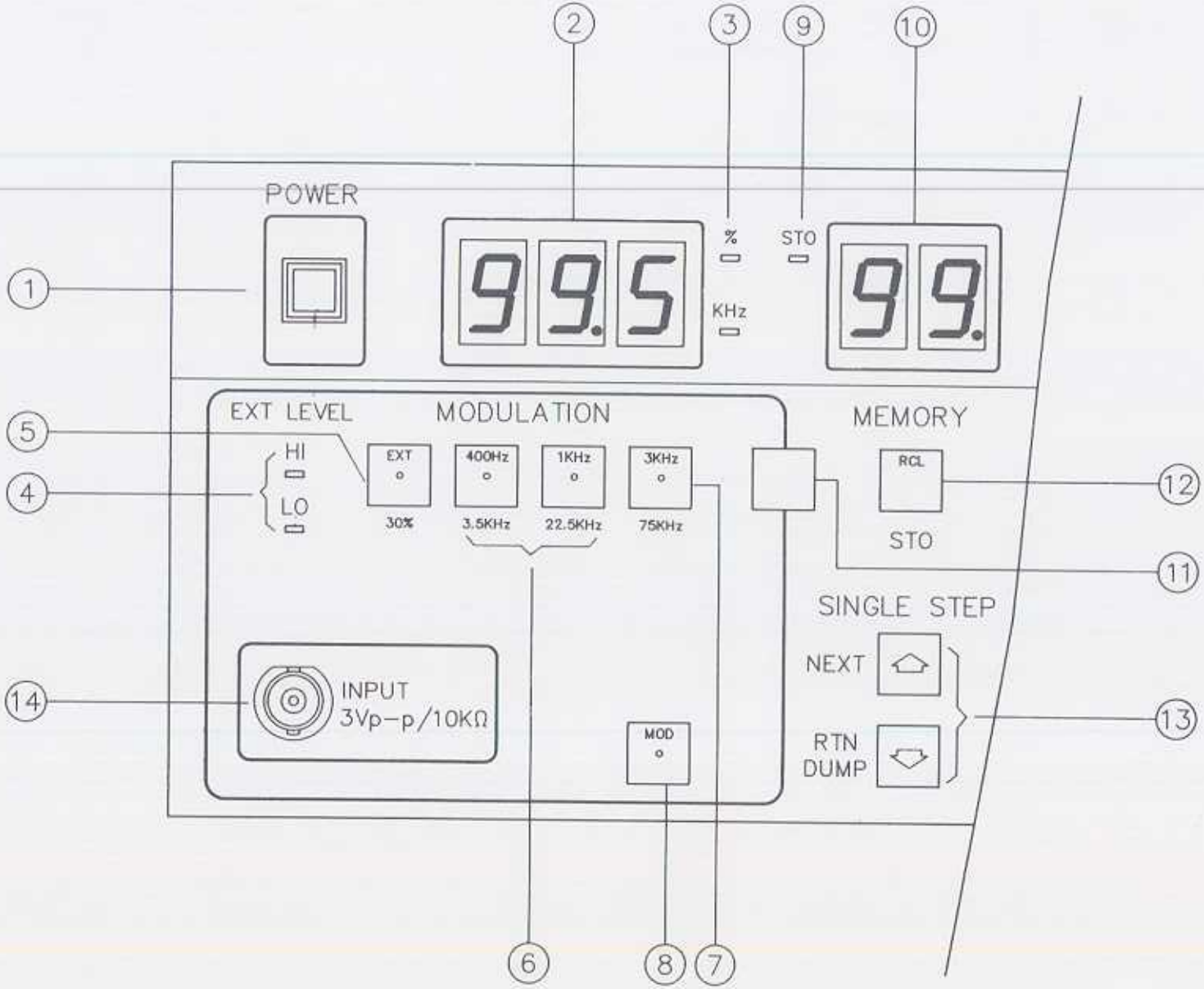


FIG. 3-3 GSG-120

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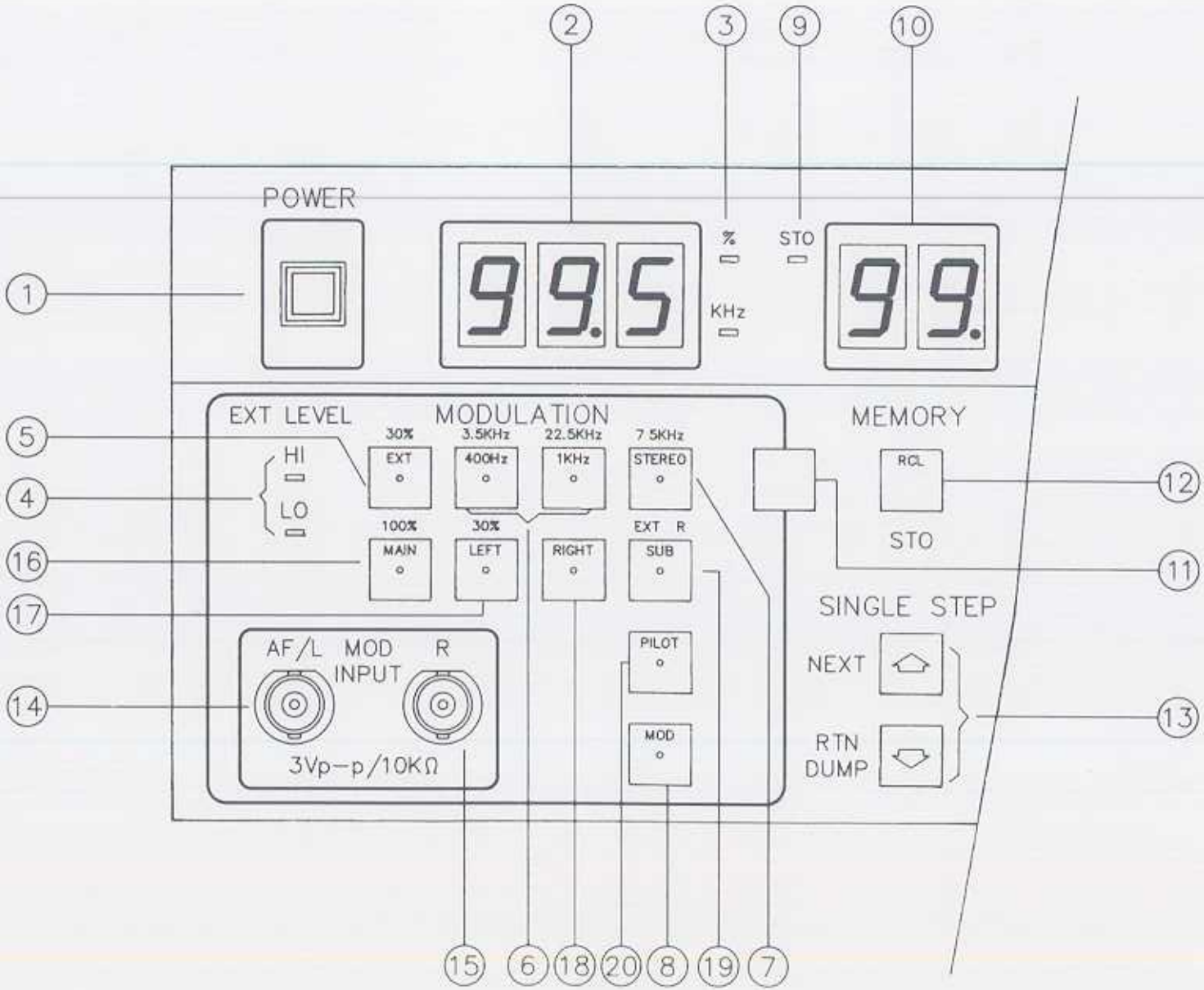


FIG. 3-4 GSG-122

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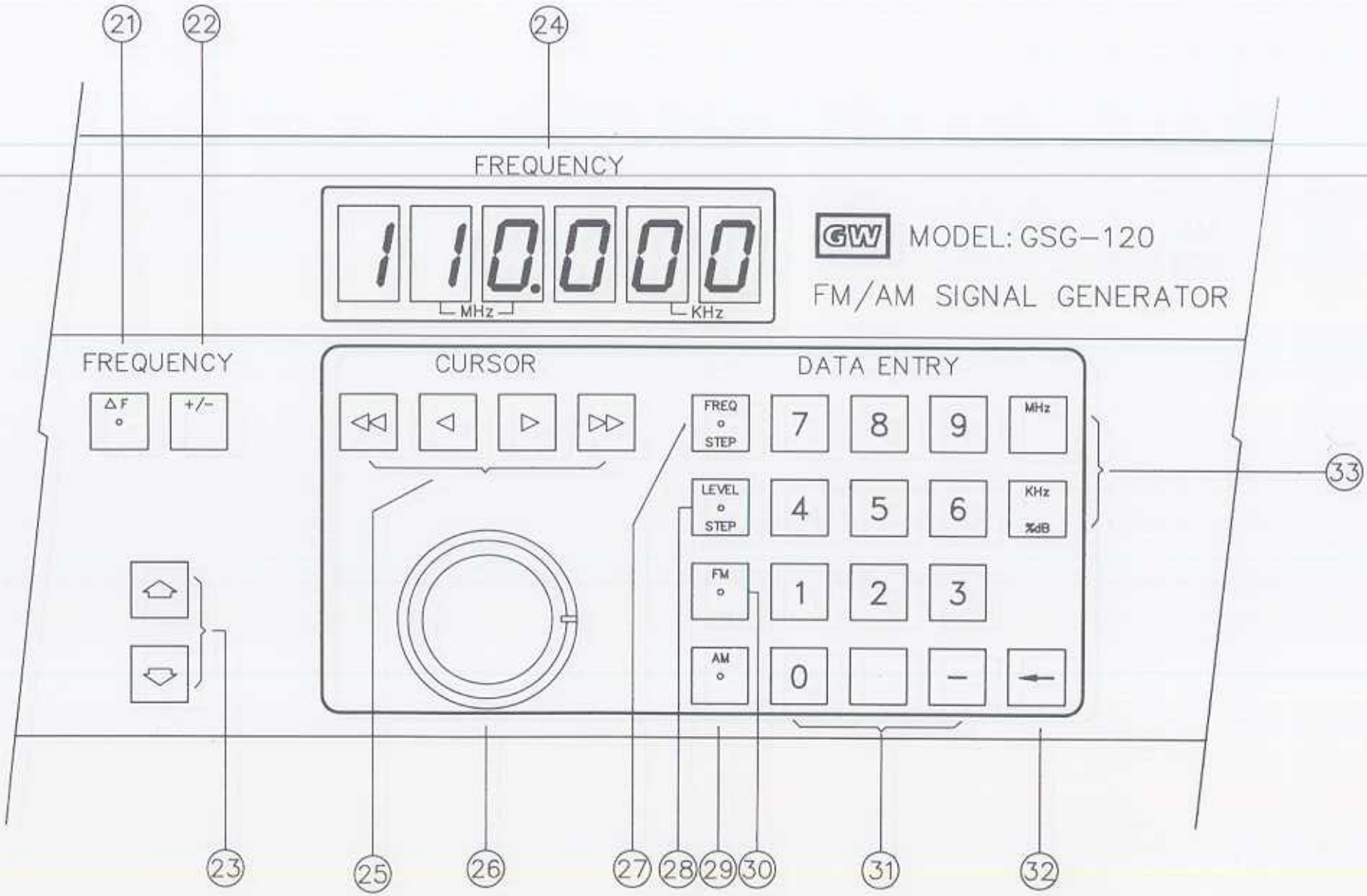


FIG. 3-5 GSG-120

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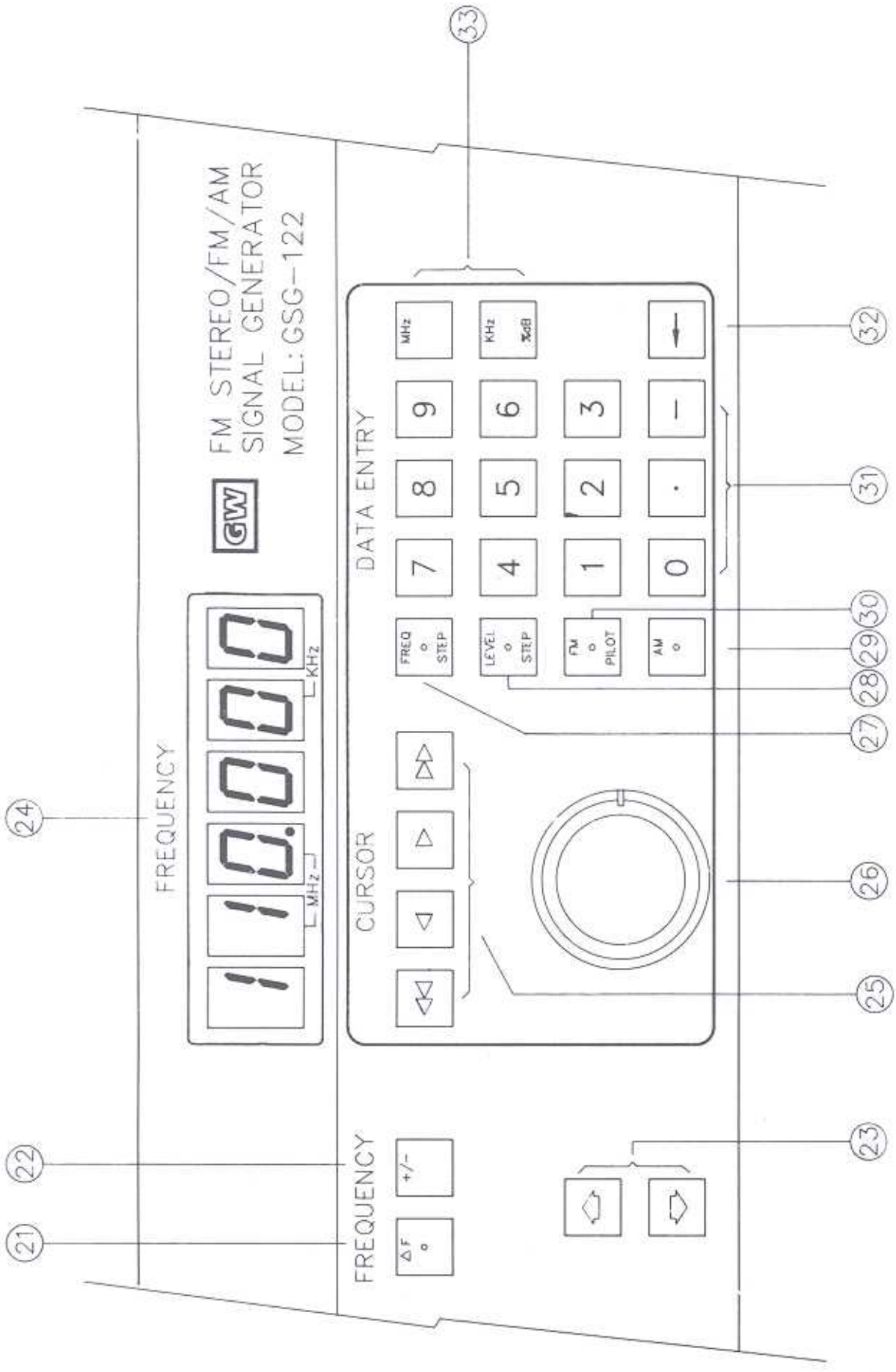


FIG. 3-6 GSG-122

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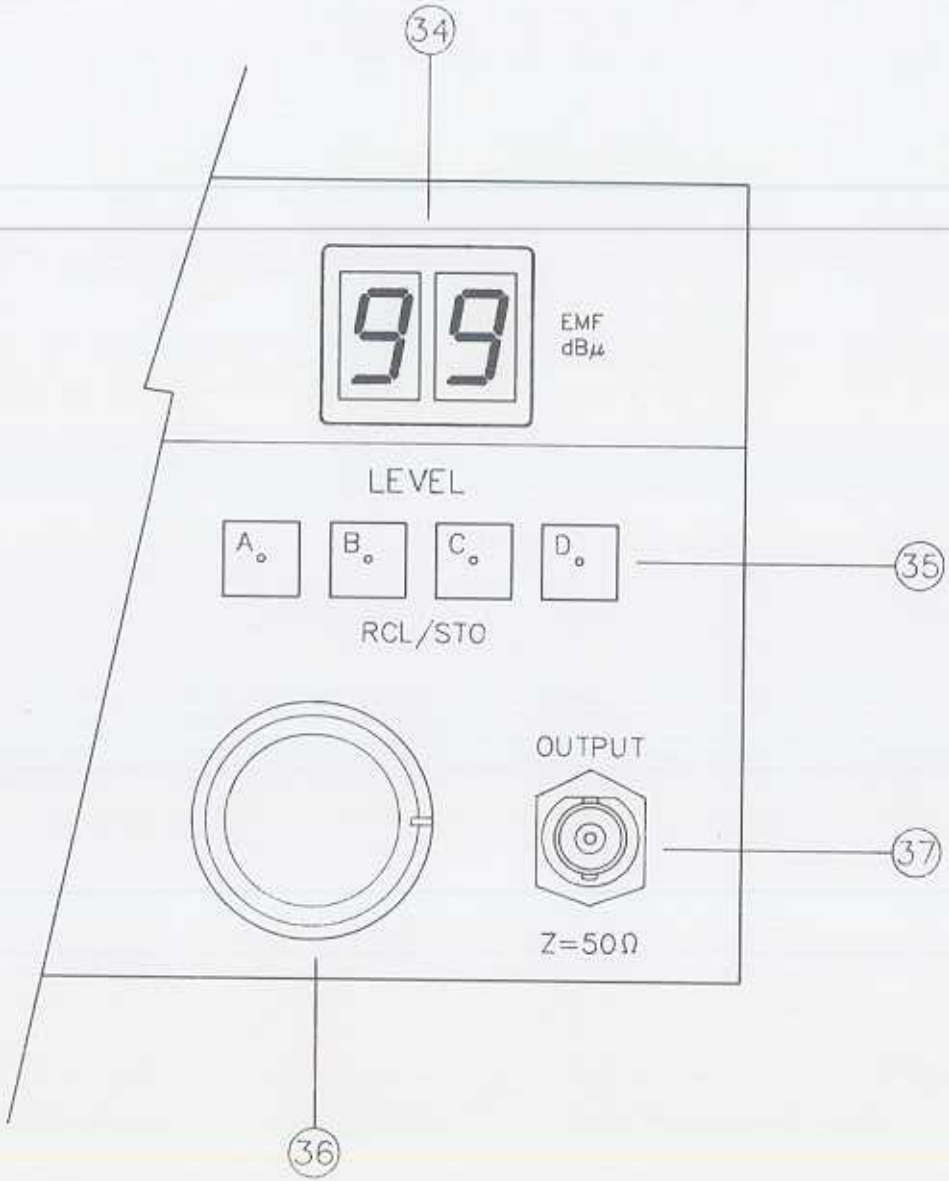
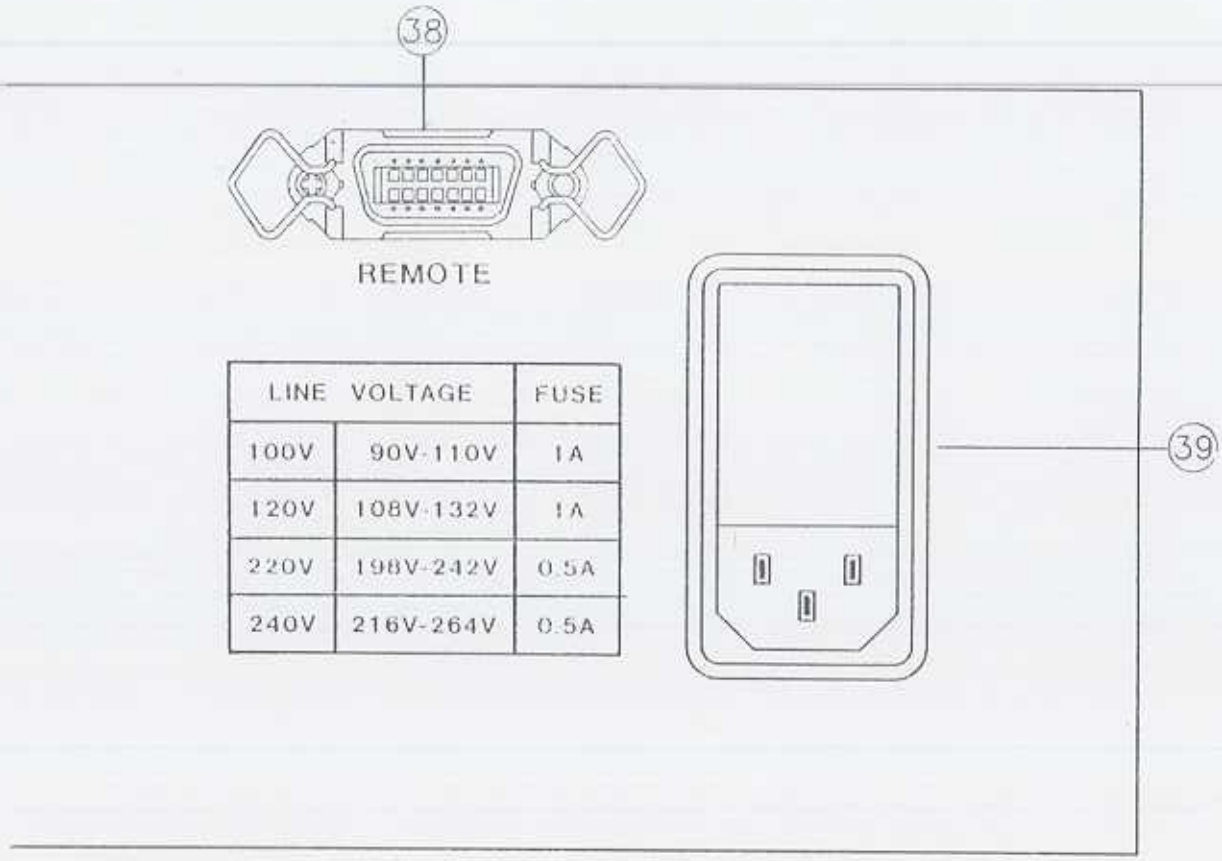


FIG. 3-7 GSG-120/122

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LINE VOLTAGE		FUSE
100V	90V-110V	1A
120V	108V-132V	1A
220V	198V-242V	0.5A
240V	216V-264V	0.5A

FIG. 3-8 REAR PANEL

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3-1 FRONT PANEL

(1) Power switch: Turns power ON and OFF

(2) Modulation indicator: 3-digits display indicates FM or AM modulation degree.

(3) Modulation unit: Indicates AM depth % or FM peak deviation in KHz

(4) EXT input level indicator: Indicates the EXT input level. Normally both high and low indicators are extinguised when unit is set in INT modulation.

(5) EXT Key: GSG120: To make EXT modulation ON and OFF. The indica-tor is light when the EXT modulation is selected.
GSG122: Indicate both right and left signal are external and equ-al to the input applied from LEFT terminal.In the meantime the Right input is ineffective.

(6) 400Hz, 1KHz, Key: Selects 400Hz and 1KHz internal modulation signal rate.

(7) 3KHz Key: GSG120: Selects 3KHz internal modulation signal rate.

STEREO key: GSG122: Selects stereo modulations

(8) MOD. ON/OFF: Turns modulation ON and OFF. When LED indicator is light, the modulation is ON.

(9) STO indicator: When store function is operated the LED is light.

(10) Address display: Indicates current address, are arranged in a matrix with a line-column display 00~99.

(11) Brown Key: This Brown Key makes more functions combined with another Keys.

(12) Recall Key: Data will be output from selected address.

(13) Single step ⌓ ⌔ Key: Use to increase or decrease address by column one step.

(14) EXT modulation input connector: GSG120: For AM or FM external modulation signal input.
AF/L modulation input connector: GSG122: For AM, FM or stereo L external modulation signal input.

(15)-(20) GSG 122 only:

(15) EXT R input connector: For stereo right external modulation signal input.

(16) MAIN: The internal right and left signal are in-phase in this mode.

(17) LEFT Key: Only left signal is delivered to modulate.

(18) RIGHT Key: Only right signal is delivered to modulate.

(19) SUB Key: The internal right and left signal are out of phase for 180°.

(20) PILOT Key: Select pilot signal to deliver.

(21) △F Key: Sets to indicate the step of +/− frequency difference, when the lamp lights. To clear the frequency difference function, repress the △F Key and LED extinguished.

(22) +/− Key In selectivity characteristic tests, Setting with one touch switches from + FREQ. Setting to − FREQ.

(23) ⌓ ⌔ Key Set the frequency after pressing BROWN [ ] Key and frequency step key to make increment or decrement to step units

(24) Frequency display: Indicates the carrier frequency or frequency difference.

(25) ◁◁ ▷▷ Key: Shifts the cursor to modulation, memory or frequency display.
◁ ▷ Shifts the cursor to right or left in the blocks.

(26) Rotary Knob: An endless rotary switch with twenty-four detents per revolution to increase or decrease the selected digit by units.

(27) FREQ Key: Used with the numeric keys to set frequencies.

(28) LEVEL Key: Used with the numeric keys to set output level.

(29) AM Key: Used with the numeric keys to set AM depth.

(30) FM Key: Used with the numeric keys to set FM deviation.

PILOT Key: Used with the brown and numeric keys to set pilot signal level (GSG-122 only).

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31 NUMERIC Key: Used to set the data.

32 ← Key: The back space key, used to make data entry revision If a numerical setting error has been made, press [←] Key to clear from last input number one by one.

33 MHz, KHz, %, dB Key: Used to input data units.

34 LEVEL display: Indicates the carrier frequency output levels.

35 A, B, C, D Key: Used to store and recall 4 independent output levels.

36 ROTARY Knob: An endless rotary switch with twenty-four detents per revolution to increase or decrease the output levels.

37 OUTPUT connector: 50Ω BNC receptacle for output signal.

3-2 REAR PANEL

38 REMOTE control connector: This connector for external remote control of front panel operations. It enables the control of all front panel operations.

39 LINE VOLTAGE selector: Set arrow to the proper AC line voltage value.

FUSE holder: If any line voltage changes the fuse should be according to the rated value as below.

100V, 120V 1A

220V, 240V 0.5A

AC connector: For AC power plug.

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4 OPERATION

4-1 Frequency control

(1) Direct entry mode

(a) Press the [FREQ] Key, the LED on [FREQ] Key illuminates.

(b) Input the desired values by using the numeric Key. If a numerical setting error has been made, press the [FREQ] Key again and re-enter the input with the numeric Keys or press the [←] Key to clear from the last input number one by one.

(c) When input is completed using the numeric Keys, pressing the [MHz] or [KHz] Keys will display the correct value on the frequency display.

* Set the number, then press the [FREQ] Key before operating as (c), display will return to its previous value.

Example: Setting the frequency to 15.6789 MHz

Key operation	Frequency display	Remarks
[FREQ]	x x x.x x x	Previous display
[1]	1	
[5]	1 5	
[.]	1 5.	
[6]	1 5. 6	
[7]	1 5. 6 7	
[8]	1 5. 6 7 8	
[9]	1 5. 6 7 8 9	
[MHz]	1 5. 6 7 8. 9	

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Example: An error was made while inputting 10.7 MHz (Using again make input)

Key operation	Frequency display	Remarks
FREQ	x x x.x x x	Previous display
1	1	
0	10	
.	10.	
6	10.6	
MHz	10.6000	
FREQ	10.6000	
1	1	
0	10	
.	10.	
7	10.7	
MHz	10.7000	

Example: An error was made while setting 10.7 MHz (Using ← Key)

Key operation	Frequency display	Remarks
FREQ	x x x.x x x	Previous display
1	1	
0	10	
.	10.	
6	10.6	
←	10.	
7	10.7	
MHz	10.7000	

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(2) Using the rotary knob (FIG. 3-3 ⑲)
(a) Shift the cursor to the frequency display by using [▷▷] Key.
(b) Shift the cursor to the digit you desire by using [◁] or [▷] Key.
(c) Make increment or decrement to step units by rotary knob.

Example: Changing frequency from 106 MHz to 107 MHz

Key operation	Frequency display	Remarks
	1* 0 6. 0 0 0	"*" shows the
[▷] Press twice	1 0 6* 0 0 0	cursor position
Rotate the rotary knob Clockwise 1 step.	1 0 7* 0 0 0	

Example: Changing frequency from 107.2 MHz to 107 MHz

Key operation	Frequency display	Remarks
	1 0 7. 2 0 0*	"*" shows the
[◁] Press twice	1 0 7. 2* 0 0	cursor position
Rotate the rotary knob counterclockwise 2 steps.	1 0 7. 0* 0 0	

(3) Setting the frequency steps
(a) Press the BROWN [ ] Key
(b) Press ther STEP [FREQ] Key
(c) Enter the numeric Keys and [MHz] or [KHz] unit for desired step value (0.1~34.9999 MHz range, 100 Hz minimum/35~110 MHz range, 1 KHz minimum).
(d) Using [◇] and [◇] keys can increase or decrease the frequency.

Example: Setting the 5 KHz step by using the frequency [◇] [◇] keys

Key operation	Frequency display	Remarks
	3 0. 0 0 0. 0	Previous display
[ ] BROWN KEY	3 0. 0 0 0. 0	
[FREQ] Step	3 0. 0 0 0. 0	
[5]	5	
[KHz]	3 0. 0 0 0. 0	
[◇] Press once	2 9. 9 9 5. 0	

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The frequency continous shift in 5 KHz steps, when repeat operates the ◁ or ▷ Keys are pressed continuously.

(4) Setting frequency difference by using the △F and +/− Keys

This function is extremely useful in measuring the frequency difference and bandwidth of receivers.

(a) Press BROWN [ ] Key
(b) Press STEP [FREQ] Key
(c) Press the [△F] Key, Then the frequency display is off with [△F] Key LED is on.
(d) Set the frequency to desired value using the [◁] [▷] Key or Rotate the rotary knob.
(e) Press the [△F] Key, the varied carrier frequency becomes to be new carrier frequency.

Example: With a center frequency of 27 MHz, [△F] is varied in 100 KHz step using the [◁] [▷] Keys.

Key operation	Frequency display	Remark
[ ] BROWN KEY	27.000	
[FREQ] step	27.000	
[1]	1	
[0]	10	
[0]	100	
[KHz]	27.000	
[△F]	0.0	
[◁]	−100.0	
[←]	0.0	The carrior frequency returns to center when the [←] Key is pressed
[▷]	100.0	
[△F]	27.100	

Example: With a center frequency of 98 MHz, △F is varied in 6 MHz using the rotary knob

Key operation	Frequency display	Remarks
	98.000*	"*" shows the cursor position
[△F]	0*	
[◁] Press 3 times	*0	
Rotate the rotary knob clockwise 6 steps	6*000	
[△F]	104*00	

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Example: With a center frequency of 98 MHz, △F is 6 MHz using the [+/−] Key.

Key operation	Frequency display	Remarks
[FREQ]	98.000	
[△F]	0	
[6]	6	
[MHz]	6.000	
[+/−]	−6.000	
[△F]	92.000	

4-2 Output level control

(1) Direct entry mode

(a) Press the [LEVEL] Key, lighting on [LEVEL] Key LED.

(b) Input the desired values by using the numberic Key. If a numerical setting error has been made, press the [LEVEL] Key again and re-enter the input with the numeric Keys or press the [←] Key to clear from the last input number one by one.

(c) When input is completed using the numberic Keys, pressing the [dB] Key will display the correct value on the LEVEL display.

* Set the number, then press the [LEVEL] Key before operating as (c), display will return to its previous value.

Example: Setting the output level to 85dB

Key operation	Level display	Remarks
[LEVEL]	xx	previous display
[8]	8	
[5]	85	
[dB]	85	

Example: Setting the output level to −15dB

Key operation	Level display	Remarks
[LEVEL]	85	[LEVEL] Not necessary to press this key for continuous setting.
[−]	−	
[1]	−1	
[5]	−15	
[dB]	−15	

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Example: An error was made while setting 60 dB (Using [←] Key)

Key operation	Level Display
[LEVEL]	-15
[6]	6
[1]	61
[←]	6
[0]	60
[dB]	60

(2) Using the rotary knob (FIG. 3-4 (29))
The output level increases when the rotary knob is turned clockwise and decreases when the rotary knob is turned counterclockwise.

(3) Setting the output level steps
(a) Press the BROWN [ ] Key
(b) Press the STEP [LEVEL] Key
(c) Enter the numeric Keys and [dB] unit for desired step value (1 dB minimum).

Example: Setting 5 dB step using the LEVEL rotary knob

Key operation	Level display	Remarks
[ ] BROWN KEY	60	previous display
[LEVEL] STEP	60	
[5]	5	
[dB]	60	
Rotate the rotary knob clockwise 1 step	65	

The output level continuously shifts by 5 dB steps, when repeat turning the rotary knob clockwise or counterclockwise.

(4) Store the independent 4 output level
(a) Enter the numeric Keys and [dB] unit for desired dB value.
(b) Press the BROWN [ ] Key
(c) Press the one of [A] ~ [D] Keys

* The four keys [A] ~ [D] can store output level without using the main memory and can be recalled again by pressing the one of [A] ~ [D] Keys.

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Example: Setting the output level A to 48 dB, B to 56 dB, C to 64 dB, and D to 72 dB

Key operation	Level display	Remarks
LEVEL	x x	Previous display
4	4	
8	4 8	
dB	4 8	
BROWN Key	4 8	
A	4 8	
5	5	
6	5 6	
dB	5 6	
BROWN Key	5 6	
B	5 6	
6	6	
4	6 4	
dB	6 4	
BROWN Key	6 4	
C	6 4	
7	7	
2	7 2	
dB	7 2	
BROWN Key	7 2	
D	7 2	
A	4 8	
B	5 6	
C	6 4	
D	7 2	

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4-3 Modulation control

(1) Direct entry mode

(a) Press the [FM] or [AM] Key, lighting on [FM] or [AM] and MODULATION ON/OFF Keys LED.

(b) Input the desired values by using the numeric Key. When input is completed, pressed the [KHz] Key for FM modulation or [%] Key for AM modulation.

(c) Any desired values can be input by using the numeric Keys, the maximums are 99.5 KHz for FM modulation and 60% for AM modulation. The minimum setting step is 0.5.

Example: Setting 30 KHz FM deviation

Key operation	Modulation display	Remarks
[FM]	x.x	previous value □KHz LED lighting
[3]	3	
[0]	30	
[KHz]	30.0	

Example: Setting 30% AM depth

Key operation	Modulation display	Remarks
[AM]	x.x	previous value □% LED lighting
[3]	3	
[0]	30	
[%]	30.0	

(2) Using the rotary knob

(a) Press the [FM] or [AM] Key, lighting on [FM] or [AM] and MODULATION ON/OFF Keys LED.

(b) Shift the cursor to modulation display by using [◁◁] Key.

(c) Shift the cursor to the digit you desire by using [◁], [▷] Key.

(d) The modulation value increases when the rotary knob is turned clockwise and decreases when the rotary knob is turned counter-clockwise.

Example: Changing FM deviation from 30 KHz to 40 KHz

Key operation	Modulation display	Remarks
[FM]	30.0	current display "*" shows the cursor position
[◁◁]	30.0*	
[◁] Press twice	*30.0	
Rotate the rotary knob 1 step clockwise	40.0	

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Example: Changing AM depth from 30% to 25%

Key operation	Modulation display	Remarks
[AM]	30.0	current display
Rotate the rotary knob 1 step counter clockwise	25.0	
[▷] Press once	25.0	
Rotate the rotary knob 5 steps clockwise.	25.0	

(3) Setting the modulation source
(a) Press the modulation source selection Keys 400 Hz, 1 KHz or 3 KHz.
(b) Press the modulation ON/OFF Key.

Example: Setting FM internal modulation of 1 KHz for 45 KHz deviation.

Key operation	Modulation display	Remarks
[1 KHz]		1 KHz LED lights
[FM]	xxx	previous value [ ] KHz LED lights
[4]	4	
[5]	45	
[KHz]	45.0	
[0] Modulation ON/OFF Key LED lights	45.0	

Example: Setting modulation off

Key operation	Modulation display	Remarks
	45.0	current display
[0] Modulation ON/OFF Key LED goes out	0.0	

(4) Setting with the BROWN [ ] Key.
(a) Set the AM depth to 30%, using the BROWN [ ] Key and [30%] Keys.
(b) Set the FM diviation to 3.5 KHz, using the BROWN [ ] and [3.5 KHz] Keys.
(c) Set the FM diviation to 22.5 KHz, using the BROWN [ ] and [22.5 KHz] Keys.
(d) Set the FM diviation to 75 KHz, using the BROWN [ ] and [75 KHz] Keys.

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4-4 Stereo function control (GSG-122 only)

(1) stereo function

(a) Set [STEREO] Key ON.

(b) Select one of [MAIN] [LEFT] [RIGHT] and [SUB] mode.

(c) Set [PILOT] Key ON/OFF to select pilot signal deliverd or not.

(2) FM deviation with pilot ON

(a) Set [STEREO] Key ON.

(b) Set [PILOT] Key ON.

(c) Press [FM/PILOT] Key.

(d) Enter the numeric keys and % unit for desired percent value.

Example: Setting deviation 50% with pilot ON.

Key Operation	Modulation display	Remarks
[STEREO]	* X X X	Previous display (PILOT OFF)
[PILOT(ON)]	** X X X	PILOT ON
[FM/PILOT]	X X X	
[5]	5	
[0]	5 0	
[%]	5 0. 0	include pilot signal

NOTE: * The unit of stereo modulation is percent (%).

** skip if [PILOT] Key is ON originally.

(3) FM deviation with pilot OFF

(a) Set [STEREO] key ON.

(b) Set [PILOT] key OFF.

(c) Press [FM/PILOT] key.

(d) Enter the numeric keys and % unit for desired precent value.

Example: Setting FM deviation 80% with pilot OFF

Key Operation	Modulation display	Remarks
[STEREO]	X X X	Previous display (PILOT ON)
[PILOT(OFF)]	** X X X	PILOT OFF
[FM/PILOT]	X X X	
[8]	8	
[0]	8 0	
[%]	8 0. 0	exclude pilot signal

NOTE: ** skip if [PILOT] key is OFF originally.

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(4)Pilot level control

(a) Press the BROWN ☐ key.

(b) Press FM/PILOT Key (Fig3-6).

(c) Enter the numeric keys and % unit for desired percent value.

Example: Setting pilot signal to 15%

Key Operation	Modulation display	Remarks
☐ BROWN Key	90.0	previously assumed value (pilot ON)
FM/PILOT	10	previously assumed pilot value
1	1	
5	15	
%	95.0	

(5) Deviation setting

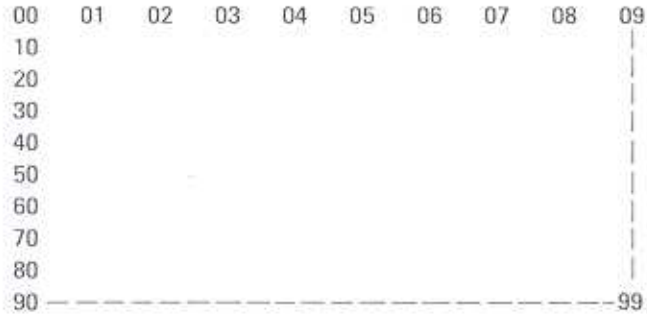
(a) Set stereo modulation deviation to 100%, using BROWN ☐ key and 100% key.

(b) Set stereo modulation deviation to 30%, using BROWN ☐ key and 30% key.

4-5 Using the memory

(1) Memory recall

The memory is arranged in a matrix. It is arranged in 10 lines horizontally and 10 columns vertically for total of 100 points.



(a) Press the RCL and numeric Keys for call out the lines.

(b) Press the ◇ Key for call out the columns.

(c) Press the RCL and • Keys to turn off the memory display for direct calling of memory address.

Example: Recalling memory address 2, 0

Key operation	Memory display	Remarks
RCL	xx	Current display
2	20	

Example: Recalling memory address 3, 5

Key operation	Memory display	Remarks
RCL	xx	
3	3	
◇ Press the single step key 5 times.	35	

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Example: Direct recalling of memory address [6] [8]

Key operation	Memory display	Remarks
[RCL]	x x	previous display display goes out
[·]		
[6]	6	
[8]	6 8	

(2) Memory Storage

If you want to change the data everytime, it can be output directly as needed by storing the memory. The basic store operation is performed by setting the carrier frequency, output level, modulation control, etc.

(a) Press the numeric Keys and unit Key for desired value
(b) Press the BROWN [ ] Key.
(c) Press the [STO] Key.
(d) Press the single step [<>] Key.

* The memory display can also be turned off by using the [RCL] and [·] Keys for direct calling of memory address.

Example: Storing the carrier frequency of 92 MHz, output level of 72 dB, and internal modulation of 1 KHz 50% in memory address [2], [0]

Key operation	Frequency display	Remarks
[FREQ]	x x x. x x x	previous display
[9]	9	
[2]	9 2	
[MHz]	9 2. 0 0 0	

The carrier frequency can also be set by using the Rotary knob and frequency [<>] [<>] Keys.

Key operation	Level display	Remarks
[LEVEL]	x x	previous display
[7]	7	
[2]	7 2	
[dB]	7 2	

The output level can also be set by using the level rotary knob and independent 4 - point memory [A] ~ [D] Keys.

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		Modulation display	
AM	Key LED lights	x.x.x	previous display
1 KHz	1 KHz LED lights	x.x.x	□% LED lights
5		5	
0		50	
%		50.0	
	BROWN KEY		
STO			□STO LED lights

	Memory display
2	20

The carrier frequency, output Level and modulation stored in memory address [2] [0].

Example: Using [ ] BROWN, [STO] and [·] Keys, for storing in memory address [2], [5].

(a) Set the carrier frequency, output level, modulation, etc.
(b) Turn off the memory display by using the [ ] BROWN, [STO] and [·] Keys
(c) Using the numeric Keys, input the memory address and store the data.

Key operation		Memory display	Remarks
[ ]	BROWN KEY	xx	previous address
STO		xx	□STO LED lights
·			display off
2		2	
5		25	

The data of item (a) above is stored in memory address [2], [5]

If need to store data in memory address [2] [6]

(a) Press [<>] NEXT Key to shift address by one
(b) Set the carrier frequency, output level, modulation, etc.
(c) Press the BROWN [ ], [STO] and [<>] NEXT keys to store
(d) You may press SINGLE STEP [<>] Key to check the store data of memory address [2] [6]

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Key operation	Memory display	Remarks
[ ] BROWN KEY	|2|6|	previous address
[STO]	|2|6|	□STO LED lights
[⇳] NEXT	|2|7|	□STO LED goes out
[⇳] SINGLE STEP	|2|6|	

(3) Using the memory address of other function

Example: Ring changing the memory address from [3] [0] → [3] [3]

Key operation	Memory display	Remarks
[RCL]	|x|x|	previous address
[3]	|3|0|	
[⇳] Press Key 3 times	|3|3|	
[ ] BROWN KEY	|3|3|	
[STO]	|3|3|	□STO LED lights
[⇳] RETURN	|3|3|	□STO LED goes out
[⇳] SINGLE STEP	|3|0|	
[⇳]	|3|1|	
[⇳]	|3|2|	
[⇳]	|3|3|	
[⇳]	|3|0|	

Example: Release the [⇳] RTN Key

Key operation	Memory display	Remarks
[RCL]	|3|0|	
[•]	| | |	
[3]	|3| |	

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[9]	39	
[ ] BROWN Key	39	
[STO]	39	□STO LED lights
[◇] RTN	39	□STO LED goes out

(4) Using the memory Recall for more than 10 continuous steps Normally, the memory steps which can be recalled are the 10 steps 00~09, 10~19,.....90~99.
It is also possible to increase in 10 step units, with the memory display showing column number 9 the next 10 steps can be continuously recalled by using the [ ] BROWN, STO and [◇] NEXT Keys.

Example: To continuously recall memory address [3] [0] ~ [4] [9]

Key operation	Memory display	Remarks
[RCL]	39	previous display
[ ] BROWN KEY	39	
[STO]	39	□STO LED lights
[◇] NEXT	40	□STO LED goes out
[RCL]	40	
[◇] SINGLE STEP	41	
⋮	⋮	
[◇]	49	
[◇]	30	

Example: To continuously recall memory address [3] [0] ~ [4] [2]

Key operation	Memory display	Remarks
[RCL]	39	previous display
[ ] BROWN KEY	39	
[STO]	39	□STO LED lights
[◇] NEXT	40	□STO LED goes out
[RCL]	40	
[◇]	41	

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◇		4 2	
	BROWN KEY	4 2	
STO		4 2	☐STO LED lights
◇	RTN	4 2	☐STO LED goes out
◇	SINGLE STEP	3 0	
◇		4 2	
◇		3 0	

Example: Release the continuously recall operation, reset
3 0 ~ 4 9 continuity back to 3 0 ~ 3 9
4 0 ~ 4 9 operation

Key operation		Memory display	Remarks
RCL		3 0	
.			
3		3	
9		3 9	
	BROWN KEY	3 9	
STO		3 9	☐STO LED lights
◇	RTN	3 9	☐STO LED goes out

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5. REMOTE CONTROL

The set GRC-1201 is combined with GSG-120/122 to provide remote control. By connecting the cable with the slot on the rear panel of GSG-120/122, user can excute normal control function such as modulation, memory address recall, moving cursor and output level by GRC-1201.

5-1 Connecting terminal

The connector pin connections locking from the rear panel are as shown in Fig. 5-1.

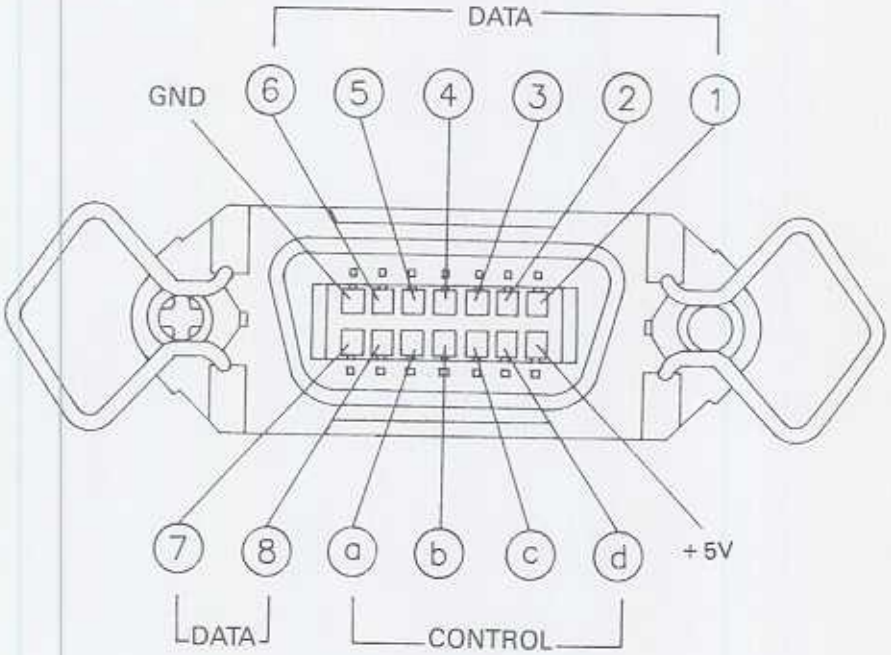


Fig. 5-1

Pin 1: data 1 (bidirectional)
Pin 2: data 2 (bidirectional)
Pin 3: data 3 (bidirectional)
Pin 4: data 4 (bidirectional)
Pin 5: data 5 (bidirectional)
Pin 6: data 6 (bidirectional)
Pin 7: GND
Pin 8: +V (5V)
Pin 9: control d
Pin 10: control c (display & busy)
Pin 11: control b (read request)
Pin 12: control a (data stroble)
Pin 13: data 8 (bidirectional)
Pin 14: data 7 (bidirectional)

*DATA 7 & DATA 8: always HIGH.

5-2 Code chart for the panel keys

All panel keys are coded. By setting the key code data shown below and sending request to read, the effect is the same as pressing one of the panel keys.

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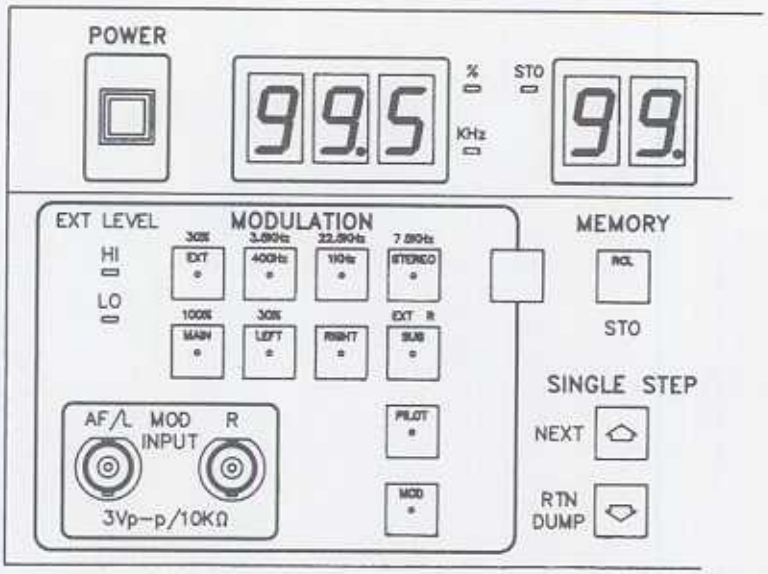


Fig. 5-2

KEY NAME		KEY CODE INPUT PIN NO.					
		6	5	4	3	2	1
		MSB <-- KEY CODE --> LSB					
MEMORY	RCL/STO	0	0	0	1	0	0
MEMORY	▼ / RTN	0	0	0	1	1	1
MEMORY	▲ / NEXT	0	0	0	1	1	0
BROWN	KEY	0	1	1	0	1	1
MODULATION	EXT	0	0	1	0	0	1
MODULATION	400Hz	0	0	1	0	1	1
MODULATION	1KHz	0	0	1	1	0	0
MODULATION	3KHz	1	0	1	0	1	0
STEREO		1	0	1	0	1	0
STEREO	MAIN	0	1	1	1	0	0
STEREO	LEFT	0	1	1	1	0	1
STEREO	RIGHT	0	1	1	1	1	0
STEREO	SUB	0	1	1	1	1	1
MODULATION	ON	0	0	1	1	1	1
PILOT	ON	0	0	1	1	1	0

Table 5-1

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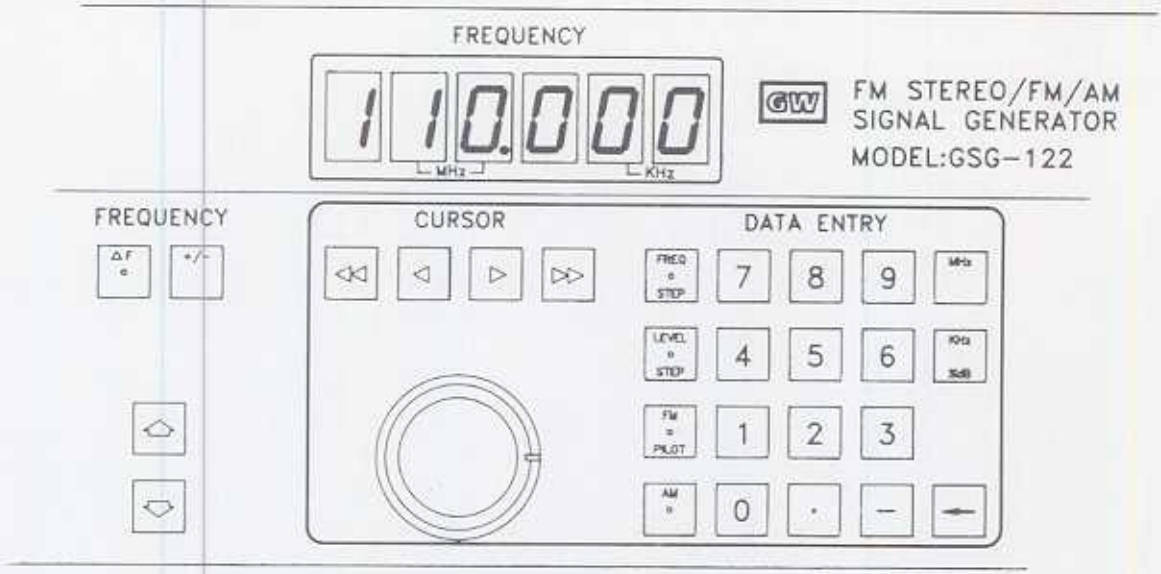


Fig. 5-3

DATA ENTRY	FREQ / STEP FREQ	0	1	0	0	1	0
DATA ENTRY	AMP / STEP AMP	0	1	0	0	1	1
DATA ENTRY	FM	0	1	0	1	0	0
DATA ENTRY	AM	0	1	0	1	0	1
DATA ENTRY	0	1	1	0	0	0	0
DATA ENTRY	1	1	1	0	0	0	1
DATA ENTRY	2	1	1	0	0	1	0
DATA ENTRY	3	1	1	0	0	1	1
DATA ENTRY	4	1	1	0	1	0	0
DATA ENTRY	5	1	1	0	1	0	1
DATA ENTRY	6	1	1	0	1	1	0
DATA ENTRY	7	1	1	0	1	1	1
DATA ENTRY	8	1	1	1	0	0	0
DATA ENTRY	9	1	1	1	0	0	1
DATA ENTRY	.	1	0	1	1	1	0
DATA ENTRY	–	1	0	1	1	0	1
DATA ENTRY	←	0	0	1	0	0	0
DATA ENTRY	MHz	0	1	0	1	1	0
DATA ENTRY	KHz, %, dB	1	0	0	1	0	1
DATA ENTRY	◀◀	0	1	0	1	1	1
DATA ENTRY	◀	1	1	1	1	0	0
DATA ENTRY	▶	1	1	1	1	1	0
DATA ENTRY	▶▶	0	1	1	0	0	0
DATA ENTRY	ROTARY KNOB UP	0	0	0	0	0	0
DATA ENTRY	ROTARY KNOB DOWN	0	0	0	0	0	1

Table 5-2

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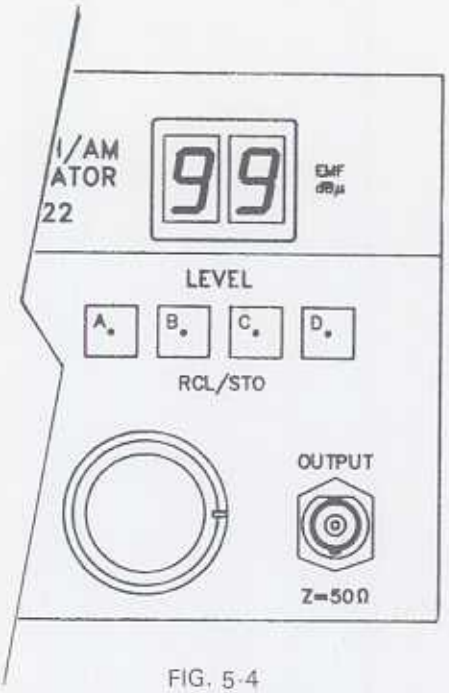


FIG. 5-4

FREQUENCY	▲ FREQ	1	1	1	1	0	1
FREQUENCY	+ / −	1	0	1	0	0	1
FREQUENCY	▲	0	1	1	0	0	1
FREQUENCY	▼	0	1	1	0	1	0
AMPLITUDE	RCL A / STO A	1	0	0	0	0	1
AMPLITUDE	RCL B / STO B	1	0	0	0	1	0
AMPLITUDE	RCL C / STO C	1	0	0	0	1	1
AMPLITUDE	RCL D / STO D	1	0	0	1	0	0
AMPLITUDE	ROTARY KNOB UP	1	0	0	1	1	0
AMPLITUDE	ROTARY KNOB DOWN	1	0	0	1	1	1

Table 5-3

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