

SMATV MANUAL

QPSK to QAM TRANSMODULATOR



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1. Safety Instructions

WARNING

To prevent fire or electric shock, Do not expose this appliance to rain or moisture.

CAUTION

To prevent electric shock, match wide blade of plug to wide slot, fully insert.

- **Read Instructions** - All the safety and operating instructions should be read before the product is operated.
- **Retain Instructions** - The safety and operating instructions should be retained for future reference.
- **Heed Warnings** - All warning on the product in the operating instructions should be adhered to.
- **Follow Instructions** - All operating and use instructions should be followed.
- **Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- **Attachments** - Do not use attachments not recommended by the product manufacturer as they may cause hazards.
- **Water and Moisture** - Do not use this product near water – for example, near bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.
- **Accessories** - Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
- A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.
- **Ventilation** - Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
- **Power Sources** - This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other source, refer to the operating instructions.



Portable cart warning



CAUTION :

TO REDUCE THE RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALIFIED SERVICE PERSONNEL



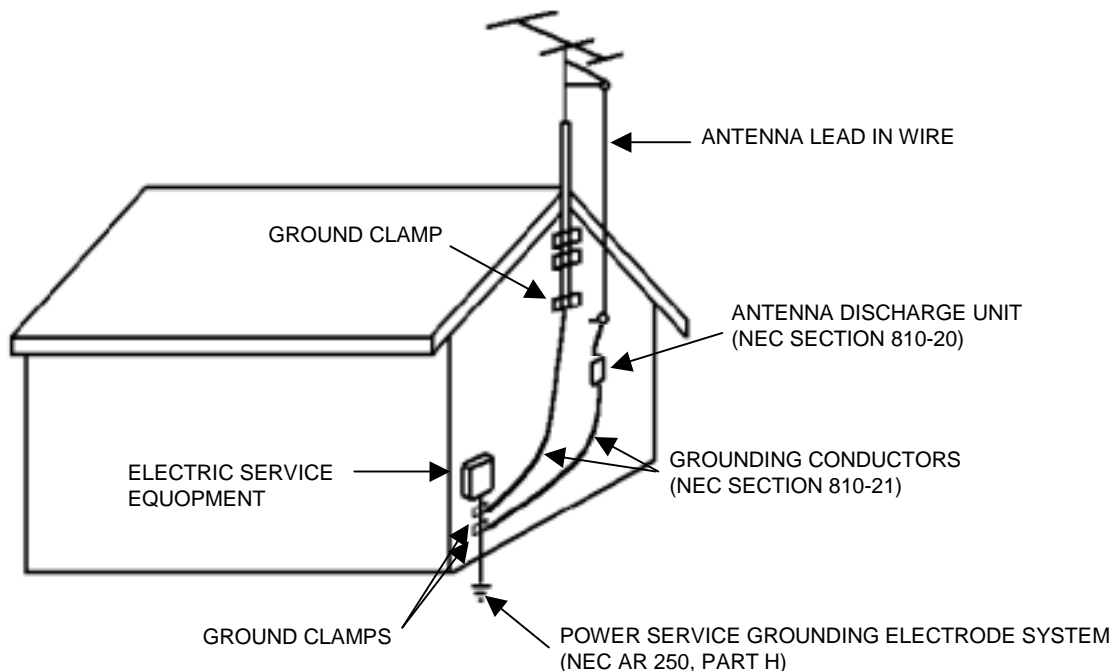
The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within a equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instruction in the literature accompanying the appliance.

1. Safety Instructions

- **Grounding or Polarization** - This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
- **Alternate Warnings** - This product is equipped with a three-wire grounding-type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.
- **Power-Cord Protection** - Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
- **Productive Attachment Plug** - The product is equipped with an attachment plug having overload protection. This is a safety feature. See Instruction Manual for replacement or resetting of protective device. If replacement of the plug is required, be sure the service technician has used a replacement plug specified by the manufacturer that has the same overload protection as the original plug.
- **Outdoor Antenna Grounding** - If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.



Example of Antenna grounding as per National Electric Code, ANSI/NFPA 70
(NEC – National Electrical Code)

Note to CATV System Installer

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

1. Safety Instructions

- **Lightning** - For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.
- **Power Lines** - An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.
- **Overloading** - Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.
- **Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
- **Servicing** - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
- **Damage Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions.
 - a) When the power-supply cord or plug is damaged.
 - b) If liquid has been spilled, or objects have fallen into the product.
 - c) If the product has been exposed to rain or water.
 - d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
 - e) If the product has been dropped or damaged in any way, and
 - f) When the product exhibits a distinct change in performance - this indicates a need for service
- **Replacement Parts** - When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.
- **Safety Check** - Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
- **Wall or Ceiling Mounting** - The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
- **Heat** - The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

Instructions on Protection from ESD

The set is fitted with components sensitive to electrostatic. These can be irreparably damaged or their service life impaired by the effect of an electric field or electrostatic discharge. It is imperative that the following protective measures be observed for modules at risk from electrostatic discharge.

- Before you commence work on one of the modules at risk, form an equipotential bond between yourself and the surrounding environment. It is imperative that the base unit be earthed via the earth terminal during this process.

1. Safety Instructions

FCC NOTICE

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES.
OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED,
INCLUDING INTERFERENCE THAT MAY CAUSE UNDERSIRED OPERATION.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures :

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE : The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

2. Specifications

1. IF Input

Receiving Frequency Range	950MHz ~2150MHz
Input Level	-65dBm ~ -25dBm
Capture Range	+/- 5MHz
Step Frequency	125KHZ
Input Connector	"F" Female
Output Connector	"F" Female
Input Impedance	75 Ohm
Loop-through Losses	< 2dB typ
LNB Power	0/13V/18V, 22KHz on/off (400mA typ)
IF Frequency	Zero IF
IF Bandwidth	36MHz

2. QPSK Demodulator

Symbol Rate	2 to 45Ms/s
FEC Convolutional Code	Viterbi 1/2, 2/3, 3/4, 5/6, 7/8
FEC Block Code	Reed Solomon (204, 188)
Roll-off	35%
Deinterleaving	DVB ETS300421
Descrambling	DVB TES300421

3. QAM Modulator

Modulation Format	16, 32, 64, 128, 256 QAM
Maximum Symbol Rate	7.0 MBaud
Roll-off	15% (12%, 18% Programmable)
FEC Block Code	Reed Solomon (204, 188)
Scrambling	DVB ETS300429
Interleaving	DVB ETS300429
Bandwidth	8MHz
Spectrum Inversion	Programmable

2. Specifications

4. RF Output

Frequency range	47MHz to 862MHz Programmable
Output Level	70dBuV to 85dBuV typ
Adjustable Output Level	20dB typ
Output Loop Losses	< 2.0 dB typ
Return Losses	> 12dB typ
Connector type	"F" Female
Output Impedance	75 Ohm
C/N	> 46dB typ
Ouput Spurious Level	< -55dB typ

5. Power Supply Unit

Main AC Voltage	120V, 60Hz
Output DC Voltage & Currents	3.3V (0.6A per 6 sets) 5V (3.8A per 6 sets) 8V (1.2A per 6 sets) 12V (0A per 6sets) 22V (0.4A per 6 sets) 30V (40mA per 6 sets)

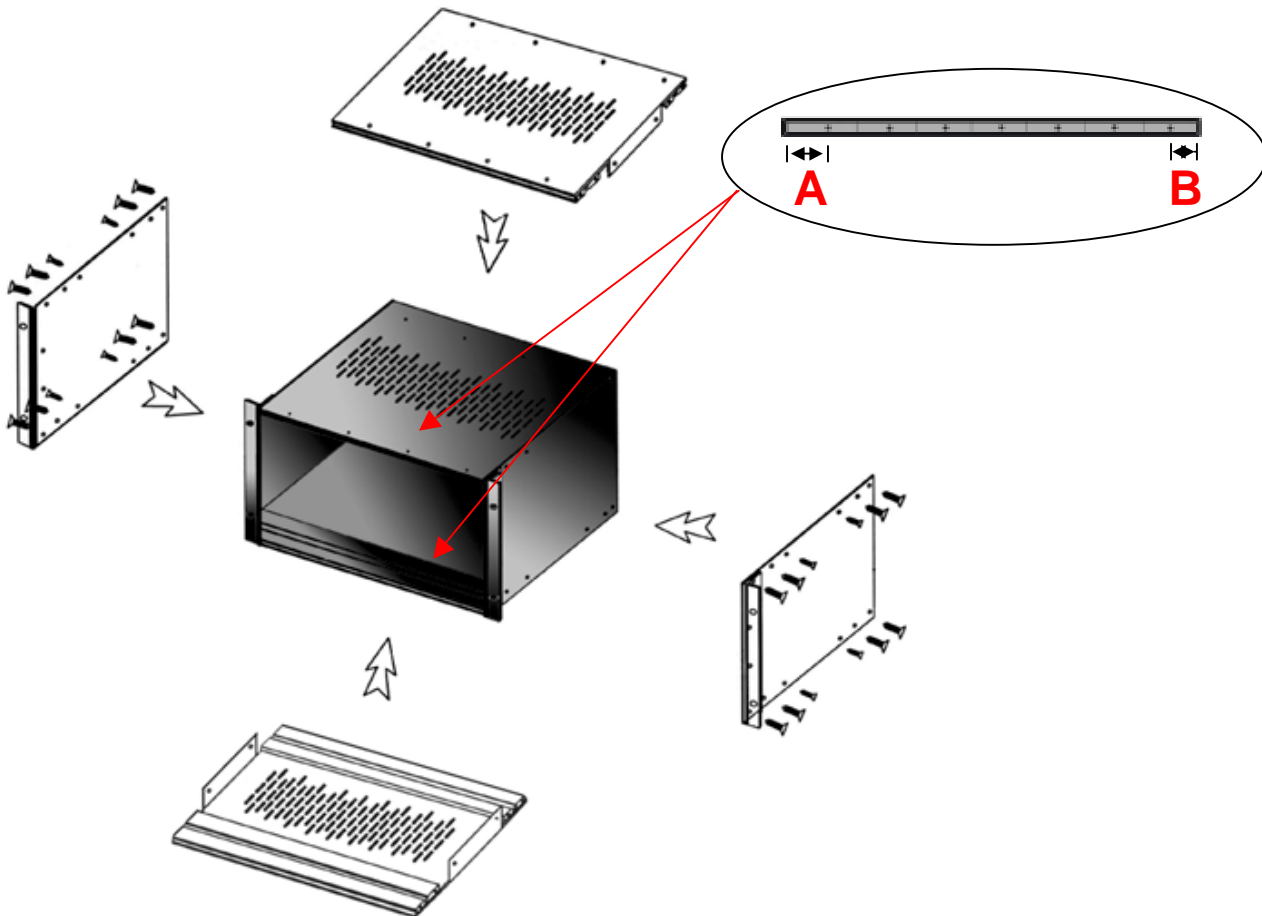
6. Dimension

W x H x D	17" x 8.7" x 10"
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3. Assembling Instructions

1. Assemble the each board by screwing as following pictures.

Note : The section “A” is wider than the section “B” because the Power Supply Board is larger than a Transmodulator module.



Reference : Depending on the frame location of the rack, you can use two methods.

- Rack Mount [Picture 1] – It is useful if you want to screw the rack of the unit to other equipment.
- Wall Mount [Picture 2] – It is useful if you want to screw the rack of the unit to the wall.



[Picture 1- Rack Mount]



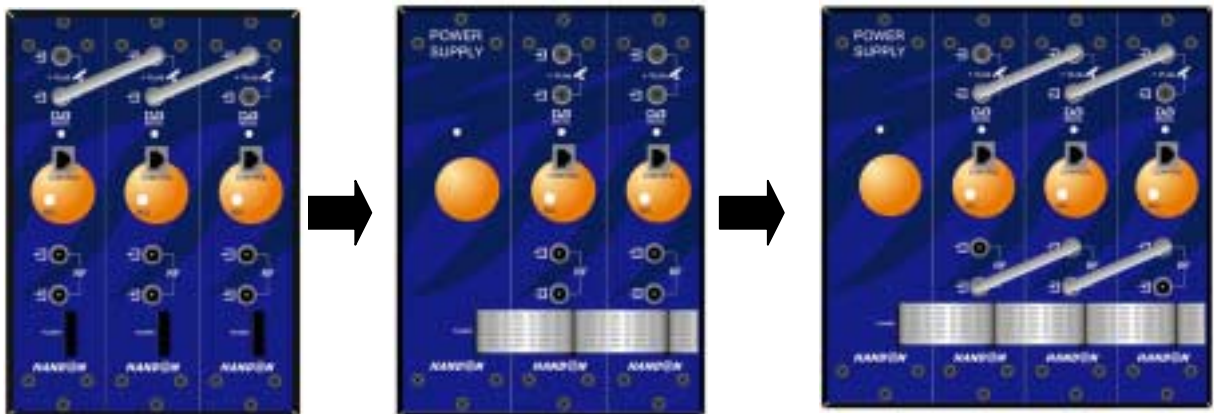
[Picture 2- Wall Mount]

3. Assembling Instructions

2. Assemble the Power Supply Board first and then the Transmodulator modules from the left side of the rack one by one with screws.



3. Connect the LNB Out to LNB In socket with loop through cable.
Connect the Power socket with the Power Connection cable.
Connect the RF In to RF Out socket with loop through cable.



3. Assembling Instructions

4. Connect the LNB In socket of the first unit to LNB and the RF out socket to the Digital Cable Set-top-box.

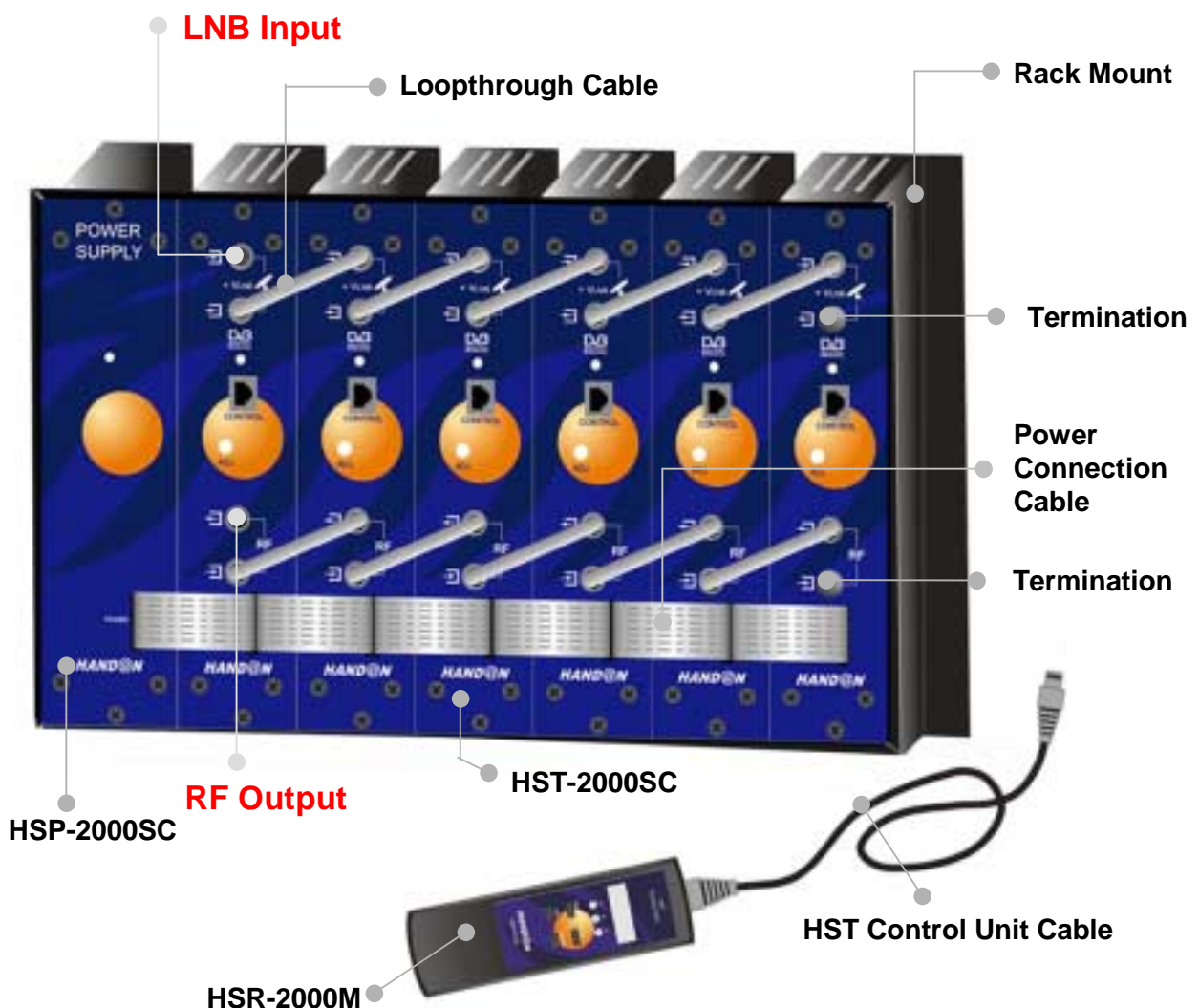


Note > You must always power on after all connections and installations are completed.

4. Descriptions

1. Overview of System compositions

- **HSP-2000SC** : Power Supply Unit
- **HST-2000SC** : Transmodulator
- **HSR-2000M** : HST Control Unit
- **Rack mount**
- **Accessories** : Loopthrough Cable, HST Control Unit Cable, Power Connection Cable, Termination



4. Descriptions

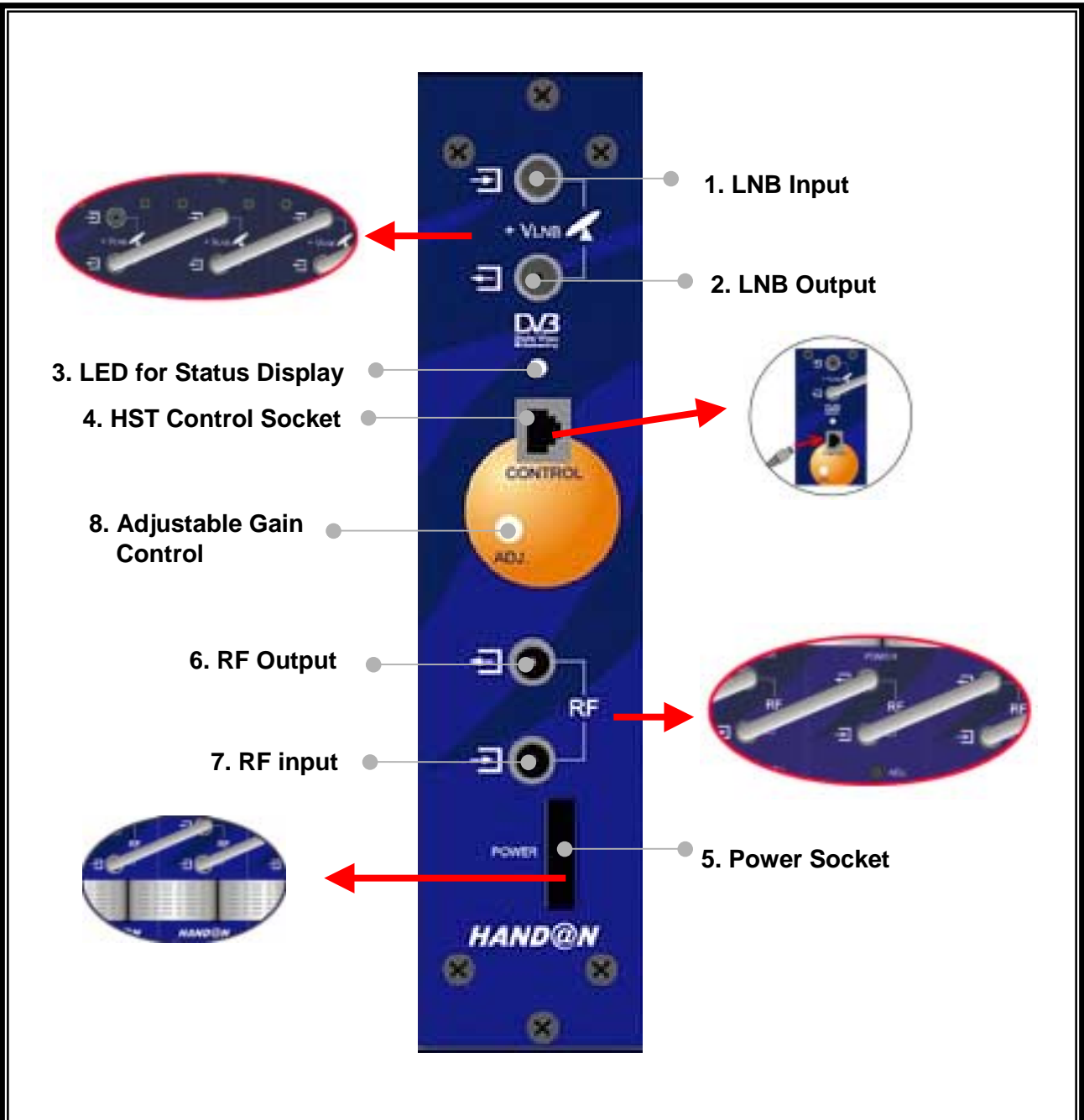
2. HST-K2001Q Front View (Transmodulator)

The **HST-2000SC** receives the data from each transponder of a satellite and performs the QPSK demodulation of the input channel containing MPEC Transport Stream.

After that, it performs the QAM modulation of MPEC Transport Stream with the data entered through the **HSR-2000M** and then complete the output to the RF frequency.

It is available to select the Input frequency and the output channel using the **HSR-2000M**.

The descriptions of the each on the **HST-2000M** front are as follows.



4. Descriptions

- 1. LNB Input** : It is used for receiving the data from each TP of a satellite or from a previous unit.
- 2. LNB Output** : It enables to supply the input signal to the next **HST-2000SC**, so it is used for loop through.
- 3. LED for Status Display** : The color of LED is changed as follows.
 - Power On : Orange
 - QPSK Lock : Red
 - QAM Lock : Green
- 4. HST Control Socket** : It should be connected to the **HSR-2000M**.
- 5. Power Socket** : It enables to supply the power to the **HST-2000SC** and should be connected to the Power Supply Unit(**HSP-2000SC**).
- 6. RF Input** : It is used to receive the data from the next **HST-2000SC**.
- 7. RF Output** : It has the functionality to combine the channels before amplification and should be connected to the RF Input of the previous **HST-2000SC** module.
- 8. Adjustable Gain Control(ADJ.)** : It is set to Max. at initial situation.
 - You could reset the data but it is recommended to remain the initial status.

4. Descriptions

3. HSP-K2002P View (Power Supply Unit)

The **HSP-2000SC** is used to supply the input power with the **HST-2000SC**.

Because a **HSP-2000SC** could control just 6 **HST-2000SC**, if you want to use **HST-2000SC** more than 6 unit, you need more **HSP-2000SC** power supply unit.

You could see the LED of **HSR-2000M** power on just when the **HSP-2000SC** has input power.

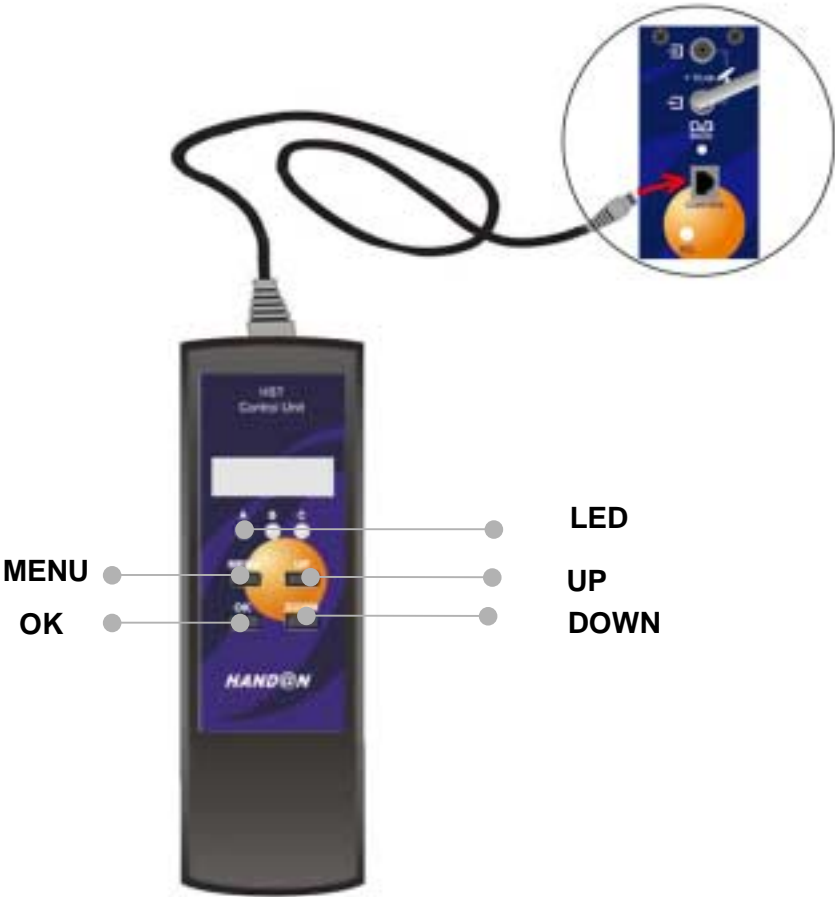


- **Power on LED** : The color of LED is **Green** when it has the input power.
- **Power Socket** : It should be connected to the **HSR-2000M**.

4. Descriptions

4. HSR-2000Q View (HST Control Unit)

You could perform all programming with the below four buttons of the **HSR-2000M**.
It is available just when the **HST-K2001Q** has input power and is connected to the **HSR-2000M**.
Because the **HST-2000SC** could control only one TP, you should set the **HST-2000SC** according to the number of TP which you would use.



- **MENU** : It is used to set the **HST-2000M** initially and to go to the previous menu.
If you want to set the **HST-2000M**, press the **MENU** once.
- **OK** : It is used to go to the next menu.
- **UP** : It is used to go up the data while setting.
- **DOWN** : It is used to go down the data while setting.
- **LED** : You could find the **LED** status to change while setting.

	A	B	C
1) Correct Functioning	: <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) QPSK Demodulator Locking	: <input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>
3) QAM Modulator Locking	: <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Installation

1. Before the Installation

1-1. Preparatory Tasks

The LNB should be ready for being able to receive the signal from a satellite. Then you should connect the LNBs input socket to the unit to receive the input frequency.

If you want to use several the **HST-2000SC**, you should connect the one LNBs output to the next LNBs input with loop through cable.

You should connect between the RF input and RF output same as the above with loop through cable.

Note > You must always power on after all connections and installations are completed.

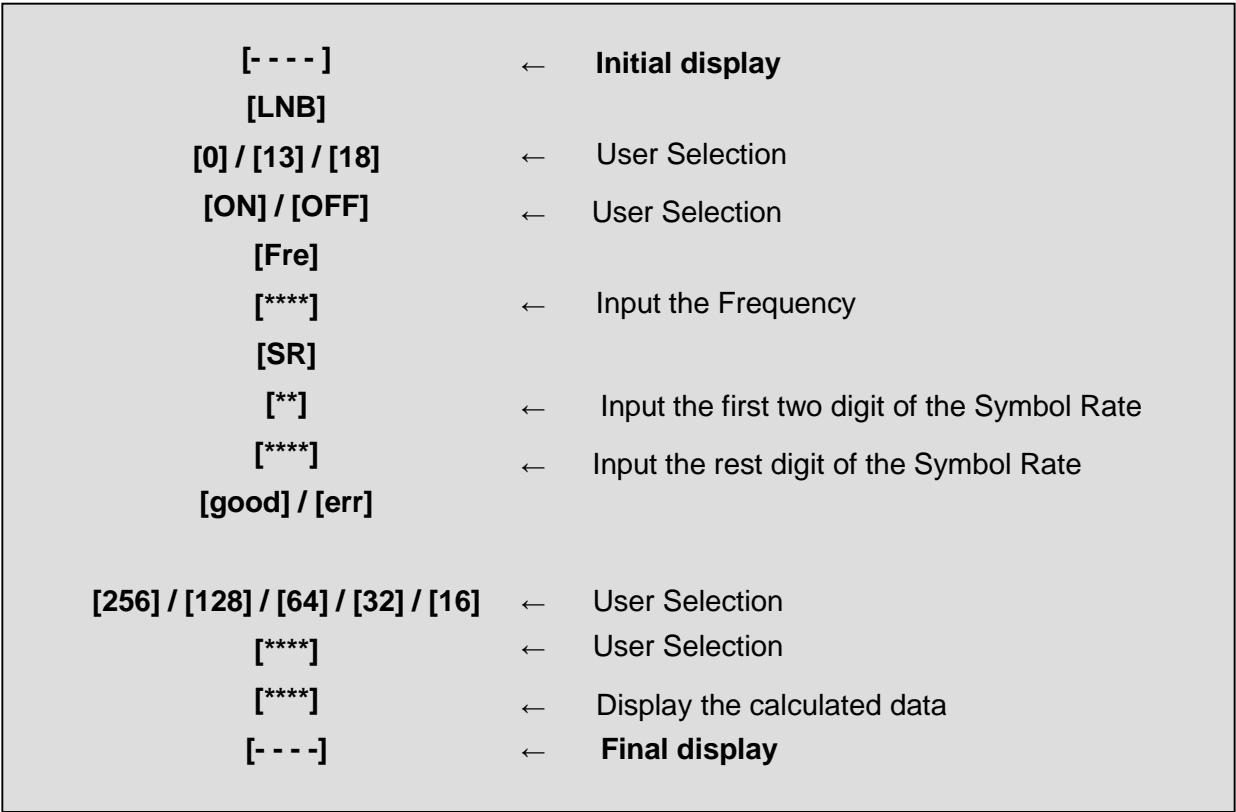
1-2. The Installation Procedure

You can find the [- - -] display when the **HSR-2000M** is connected to the **HST-2000SC** initially.

The unit will return to the initial stage after it past one minute without any operation while you are installing.

2. Installation

2-1. Installation Flow Chart



5. Installation

2-2. Variety of LNB polarity control menu : 0/13V/18V and 0/22KHz tone

- You can find the [LNB] display on the **HSR-2000M** when you press the **OK** key initially.
- Press the **OK** key again to display the polarity control then select the one out of [0], [13V], [18V] using the **UP/Down** keys.
- Press the **OK** key to confirm the previous selection and go to the next selection of the 0/22KHz tone.
- Select the [On] or [Off] using the **UP/Down** keys.

2-3. IF Frequency Input menu

- Press the **OK** key to set the input frequency data when [Fre] is displayed on the **HSR-2000M**.
- Press the **Up** or **Down** key till you can reach the input frequency values which you want to fix then release the **Up** or **Down** key.
- Press the **OK** key to go to the symbol rate menu using the **UP/ Down** keys. The available range is between 2 and 32.00Mbaud.

In case you want to set the 24.800MBaud, you should first set the [24] and press the **OK** key and then set the [800] using the **Up/Down** keys.

If the input value coincide with the Input signal, the [good] is displayed on the display window of the **HSR-2000M** after waiting for 2 or 3 seconds.

If it doesn't coincide with, the [Err] is displayed.

2-4. Modulation format (256, 128, 64, 32, 16)

- Press the **OK** key to select the modulation format when the [good] is displayed.
- Select the one out of 256, 128, 64, 32 and 16 using the **Up/Down** keys.

5. Installation

2-5. RF output menu

- Press the **OK** key to go to the output channel menu.

You could choose the range between 52 and 858M using the Up/Down keys.

It goes up or down 8M step at one time.

- Press the **OK** key then the information of the QAM symbol rate is displayed.

This data is calculated according to the value of modulation format automatically and is useful for you to know.

By pressing the **OK** key, you confirms to complete all procedure to install on the **HST-2000M** module and at the same time all information which you set is saved.

Then it shows the [- - -] on the display window of the **HSR-2000M**.

3. Adjusting the RF Output Signal Level

You should control the signal transmitted through the final module.

It is recommended that you should use the amplified signal from pre-amplifier.

6. Channel & Frequency Table

No.	CH	Freq.	Cen-Fre	No.	CH	Freq.	Cen-Fre	No.	CH	Freq.	Cen-Fre	No.	CH	Freq.	Cen-Fre
1	2	55.25	57	62	W+21	421.25	423	123	W+82	787.25	789	184	72	819.25	821
2	3	61.25	63	63	W+22	427.25	429	124	W+83	793.25	795	185	73	825.25	827
3	4	67.25	69	64	W+23	433.25	435	125	W+84	799.25	801	186	74	831.25	833
4	A-8	HRC,IRC		65	W+24	439.25	441	126	14	471.25	473	187	75	837.25	839
5	5	77.25	79	66	W+25	445.25	447	127	15	477.25	479	188	76	843.25	845
6	6	83.25	85	67	W+26	451.25	453	128	16	483.25	485	189	77	849.25	851
7	A-5	91.25	93	68	W+27	457.25	459	129	17	489.25	491	190	78	855.25	857
8	A-4	97.25	99	69	W+28	463.25	465	130	18	495.25	497				
9	A-3	103.25	105	70	W+29	469.25	471	131	19	501.25	503				
10	A-2	109.25	111	71	W+30	475.25	477	132	20	507.25	509				
11	A-1	115.25	117	72	W+31	481.25	483	133	21	513.25	515				
12	A	121.25	123	73	W+32	487.25	489	134	22	519.25	521				
13	B	127.25	129	74	W+33	493.25	495	135	23	525.25	527				
14	C	133.25	135	75	W+34	499.25	501	136	24	531.25	533				
15	D	139.25	141	76	W+35	505.25	507	137	25	537.25	539				
16	E	145.25	147	77	W+36	511.25	513	138	26	543.25	545				
17	F	151.25	153	78	W+37	517.25	519	139	27	549.25	551				
18	G	157.25	159	79	W+38	523.25	525	140	28	555.25	557				
19	H	163.25	165	80	W+39	529.25	531	141	29	561.25	563				
20	I	169.25	171	81	W+40	535.25	537	142	30	567.25	569				
21	7	175.25	177	82	W+41	541.25	543	143	31	573.25	575				
22	8	181.25	183	83	W+42	547.25	549	144	32	579.25	581				
23	9	187.25	189	84	W+43	553.25	555	145	33	585.25	587				
24	10	193.25	195	85	W+44	559.25	561	146	34	591.25	593				
25	11	199.25	201	86	W+45	565.25	567	147	35	597.25	599				
26	12	205.25	207	87	W+46	571.25	573	148	36	603.25	605				
27	13	211.25	213	88	W+47	577.25	579	149	37	609.25	611				
28	J	217.25	219	89	W+48	583.25	585	150	38	615.25	617				
29	K	223.25	225	90	W+49	589.25	591	151	39	621.25	623				
30	L	229.25	231	91	W+50	595.25	597	152	40	627.25	629				
31	M	235.25	237	92	W+51	601.25	603	153	41	633.25	635				
32	N	241.25	243	93	W+52	607.25	609	154	42	639.25	641				
33	O	247.25	249	94	W+53	613.25	615	155	43	645.25	647				
34	P	253.25	255	95	W+54	619.25	621	156	44	651.25	653				
35	Q	259.25	261	96	W+55	625.25	627	157	45	657.25	659				
36	R	265.25	267	97	W+56	631.25	633	158	46	663.25	665				
37	S	271.25	273	98	W+57	637.25	639	159	47	669.25	671				
38	T	277.25	279	99	W+58	643.25	645	160	48	675.25	677				
39	U	283.25	285	100	W+59	649.25	651	161	49	681.25	683				
40	V	289.25	291	101	W+60	655.25	657	162	50	687.25	689				
41	W	295.25	297	102	W+61	661.25	663	163	51	693.25	695				
42	W+1	301.25	303	103	W+62	667.25	669	164	52	699.25	701				
43	W+2	307.25	309	104	W+63	673.25	675	165	53	705.25	707				
44	W+3	313.25	315	105	W+64	679.25	681	166	54	711.25	713				
45	W+4	319.25	321	106	W+65	685.25	687	167	55	717.25	719				
46	W+5	325.25	327	107	W+66	691.25	693	168	56	723.25	725				
47	W+6	331.25	333	108	W+67	697.25	699	169	57	729.25	731				
48	W+7	337.25	339	109	W+68	703.25	705	170	58	735.25	737				
49	W+8	343.25	345	110	W+69	709.25	711	171	59	741.25	743				
50	W+9	349.25	351	111	W+70	715.25	717	172	60	747.25	749				
51	W+10	355.25	357	112	W+71	721.25	723	173	61	753.25	755				
52	W+11	361.25	363	113	W+72	727.25	729	174	62	759.25	761				
53	W+12	367.25	369	114	W+73	733.25	735	175	63	765.25	767				
54	W+13	373.25	375	115	W+74	739.25	741	176	64	771.25	773				
55	W+14	379.25	381	116	W+75	745.25	747	177	65	777.25	779				
56	W+15	385.25	387	117	W+76	751.25	753	178	66	783.25	785				
57	W+16	391.25	393	118	W+77	757.25	759	179	67	789.25	791				
58	W+17	397.25	399	119	W+78	763.25	765	180	68	795.25	797				
59	W+18	403.25	405	120	W+79	769.25	771	181	69	801.25	803				
60	W+19	409.25	411	121	W+80	775.25	777	182	70	807.25	809				
61	W+20	415.25	417	122	W+81	781.25	783	183	71	813.25	815				