HOLLAND
ELECTRONICS LLC

NE1100 CATV Optical Receiver

Operation Manual V1.1

Contents

1.0 Preface

This manual covers the functions, characteristics, installation, operation, warnings, and maintenance procedures of the NE1100 outdoor optical receiver.

The NE1100 CATV optical receiver can be used in an optical CATV system including AM Supertrunking , Headend-to-Hub; and Hub-to-Node. It can also be used with an existing main trunk amplifier, extended amplifier and other equipment, and on the optical backbone, optical trunk, optical transmission line and wireline area network systems of a CATV network. Two-way broadband transmission service is available if a NE1200 uplink optical transmitter and a NE1210 uplink optical receiver are also installed.

2.0 Specifications

Optical Parameters

Wavelength:	1310 +/- 20nm, or 1550 +/- 20nm
Input power :	-3dBm to +2dBm
Detector:	InGaAs PIN
Connector type:	FC/APC; SC/APC

RF Parameters

Output level:	(@NTSC 79 Channel Loading)
A Port:	37 dBmV/Channel (Min.)
B Port :	27 dBmV/Channel (Min.)
Frequency Response	45-750/860 MHZ
Flatness:	″ +/- 1.0 dB (Receiver only)
Gain Control:	AGC/MGC
Gain Control Range:	≥10dB
Input Impedance:	75
Return Loss:	>16dB
Connector Type:	F Type

User Interface

LED Indicator:	DC Power ON
	Optical Present ON
	RF Carrier Present ON
	AGC ON
	RPT ON
	RPT ALARM

Monitor Point

Output Level:	-20dB down
Accuracy:	+/- 1.5 dB
Connector:	F Type

A/B Switch Standard
Tilt Adjustment: 0~3db (Standard)
Control: Auto Enable
A/B Switch Enable
AGC/MGC Select
AGC/MGC Level Adjust

Power
40~150VAC, 50/60 Hz
AC Power Consumption: 30W (Max.)

Environmental
Operating Temperature: -40 C~+60 C
Storage Temperature: -40 C~+70 C
Relative Humidity: 100% Max.

Physical
Dimensions: 11” W x 5.5” H x 8.3” D
Weight: Approx. 6.5Kg

Optional Accessories

Option 01: Return Path Transmitter (NE 1200)

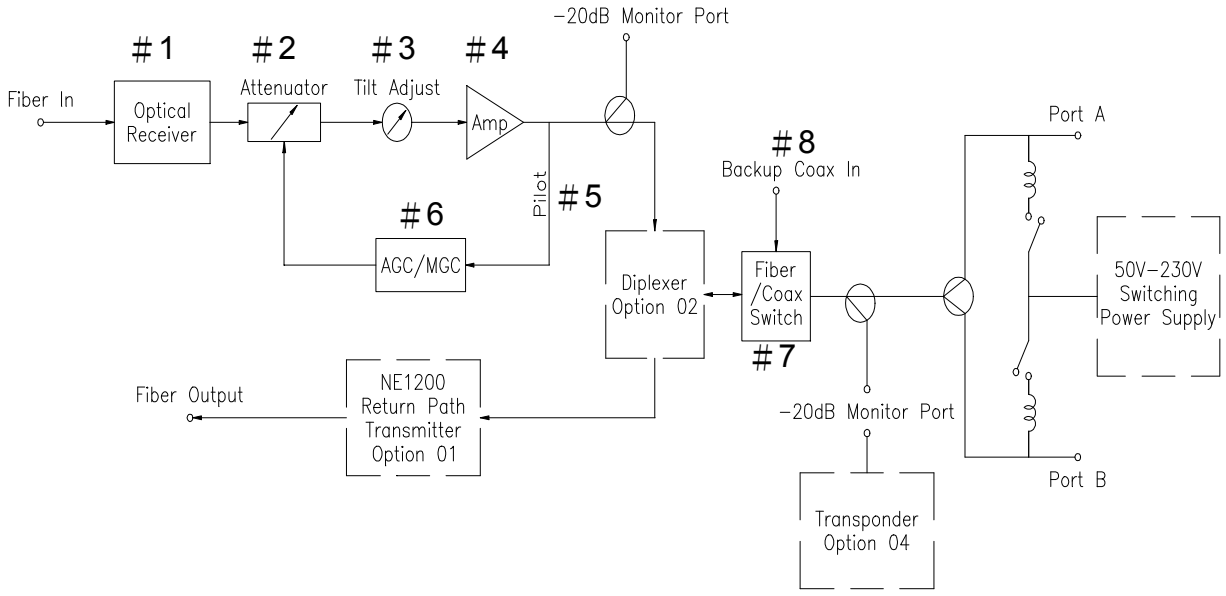
Option 02: Diplex Filter
*Return-path band of 5-30 MHz
(Adjustable upon request)
*Forward path band of 45-750 MHz

Option 04: Network Management System Transponder (NE1310)

3.0 Principals of Operation

The NE1100 series optical receiver converts an optical input signal into an RF output signal. The block diagram in figure 1 highlights the functions of the receiver.

Figure 1. NE1100 Functional Block Diagram



The Optical Receiver **(1)** detects the input optical signal, converts it into an RF signal, and also converts it into voltage signal via the front end amplifier. By using the Equalizer **(2)** and Tilt Adjustment **(3)**, the dB level can be set according to the practical needs of the Amplifier **(4)**, which sends the RF signal to the Pilot-Tone Power Detector **(5)** which detects the guided signal strength used for feedback control of the AGC automatic and MGC manual gain control circuits **(6).**

The amplified RF signal is sent to the Diplexer (option 02) and to the Fiber/Coax Switch **(7).** From there the RF signal is sent to the RF Output Ports A & B. The Backup Coax In port **(8)** serves as an auxiliary RF input to keep the system functioning in case the optical input signal to the receiver is lost. The RF output level of the receiver can be measured at the –20dB Monitor Port. The signal strength should be –20dB (+/-1 dB) down from the output signal at port A.

A Transponder (option 04) can be installed at the 14-pin Status Monitor Port (see fig. 3) to transmit the receiver's status information to the network status monitor.

A Return Path Transmitter (option 01) can be installed to return an optical signal to the headend , including the monitor signal , which is sent via a repeater.

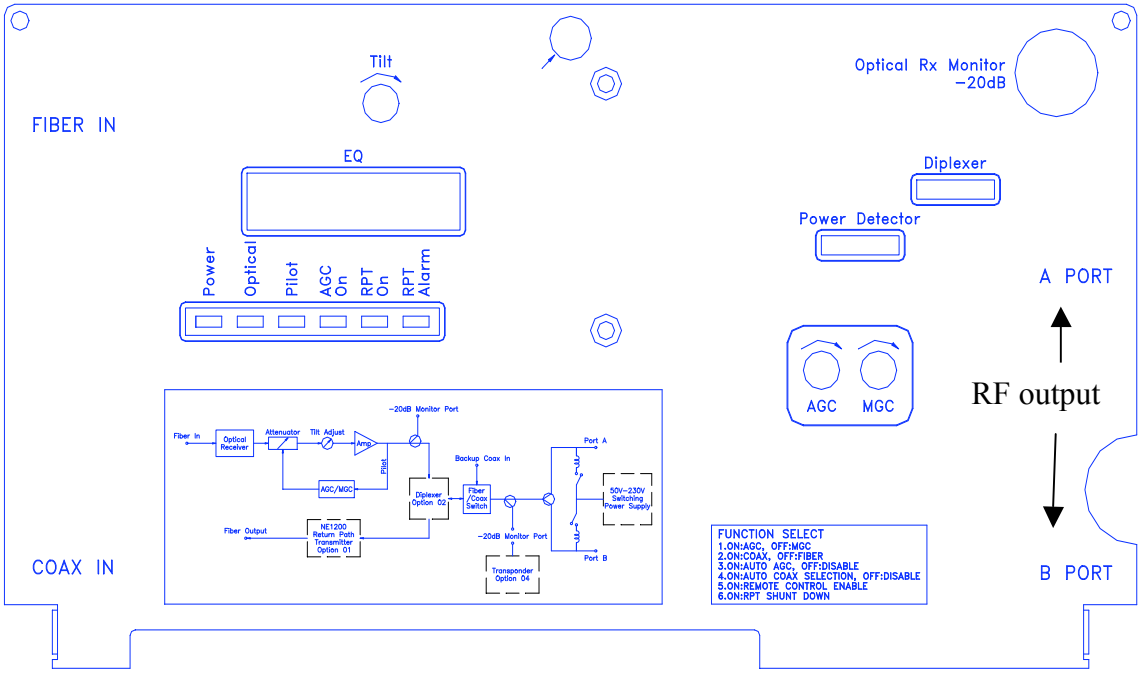


Figure 2. NE1100 Top Panel

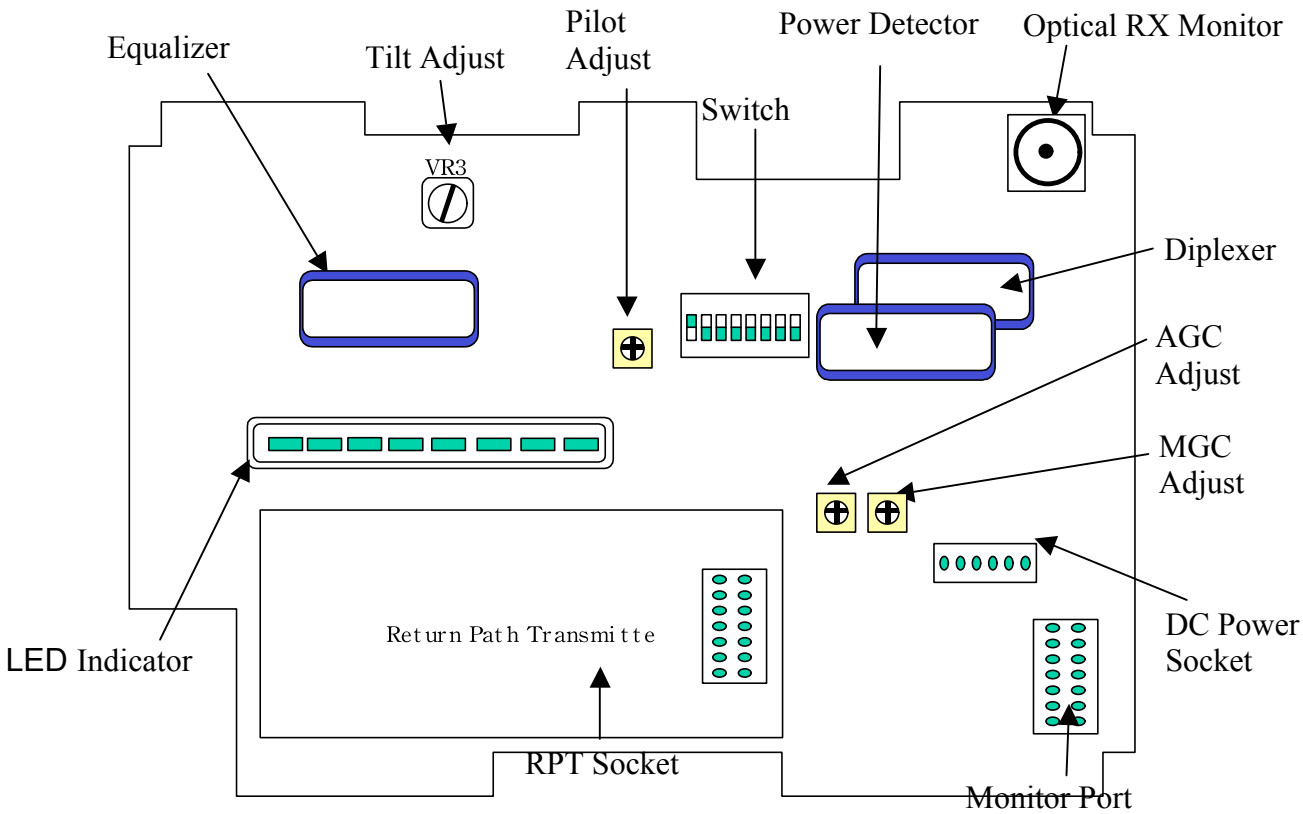


Figure 3. Illustration of motherboard features

4.0 Receiver Controls, Settings, and Status

4.1 Definitions - Refer to figures 2 & 3 to locate the following features of the receiver.

OPT RX Monitor F-type connector .Used to monitor the optical receiver's RF output signal strength. The signal strength equals the port A output level minus 20dB.

Power Detector A plug in module used to detect the pilot tone signal. The standard pilot tone signal is 10.7 MHz +/- 50 kHZ. Optional modules are available for use with different pilot tone frequencies.

EQ-Plug-in Equalizer The effective frequency range of tilt adjustment is 54MHz~750/860MHz.

TILT Adjust- (VR3) The effective frequency range of tilt adjustment is 54MHz~750/860MHz. It can be continuously adjusted for positive tilt with a 0~3dB range.

Pilot adjust – (VR6) The default values are preset for the optical receiver to work properly in the AGC mode. ***Do not alter the factory setting.***

MGC Adjust - (VR4) The level of the RF output signal can be properly maintained by a manual gain control circuit. (MGC). The controlled gain range is 10dB. VR4 adjusts the reference level of the MGC.

AGC Adjust – (VR5) The level of the RF output signal can be properly controlled via the automatic gain control circuit (AGC). The controlled gain's range is 10dB. VR5 adjusts the reference level of the AGC.

RPT Socket An 14-pin connector used to install the (optional) Return Path Transmitter module.

DC Power Socket A flat 6-pin header-type connector used to connect the DC output of the switching power supply to the motherboard of the optical receiver.
(+5V/+12V/GND/GND/NC/+24V).

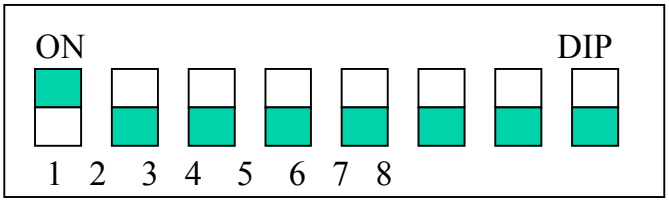
Return Path Transmitter (optional)

Diplex filter (optional) A filter which separates the reverse RF signal and forward RF signal

4.2 LED Status Indicators

Order	1	2	3	4	5	6	7	8
Default value	ON	ON	ON	ON	OFF	OFF	OFF	OFF
Color	Red	Green	Green	Yellow	Green	Red	Green	Green
Light ON	Power On	Optical power between -3dBm +2dBm	Pilot signal	AGC mode	Forward transmitter power on	Forward transmitter out of order	No function	No function
Light OFF	Power Off	Optical power either under or over limit	No pilot signal	MGC mode	Forward transmitter power off	Forward transmitter in order	No function	No function

4.3 Dip Switches



Dip Switch ON and OFF functions

Order	1	2	3	4	5	6	7	8
Default Value	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ON position	AGC (Appendix A)	Coaxial cable input signal (Appendix B)	Auto AGC function (Appendix A)	Auto Coax function (Appendix B)	Remote Enable ON	No function	No function	No function
OFF position	MGC	Optical cable input signal	No Auto AGC function	No Auto Coax function	Remote Enable OFF	No function	No function	No function

Detailed Description of DIP Switch functions

Dip Switch pin # 1: AGC or MGC select.

ON = AGC. (The default setting is ON.)

OFF = MGC.

Dip Switch pin # 2: Input signal select

ON = The receiver's input signal is RF from the backup coax cable input.

OFF = The receiver input signal is optical from the fiber cable input.

(The default value =OFF.)

Dip Switch pin # 3 : Auto AGC switching

ON = Enables the gain control mode to automatically switch between AGC and MGC

OFF = Allows only the gain control mode selected by dip switch # 1.

(The default value is OFF.)

Dip Switch pin # 4: Auto Coax input signal switching .

ON = Enables the receiver to automatically switch to RF input mode if the optical input signal is interrupted (see pg.11 Appendix B)

OFF = Prevents the receiver from switching to RF input mode if the optical input signal is interrupted.

Dip Switch pin # 5: Remote/Local control mode select.

ON = Remote control mode. Allows the receiver to be remotely controlled.

OFF = Local control mode. (The default value is OFF.)

Appendix A

Relationship between dip switch # 1 and # 3:

1. When dip switch # 1 is ON, the receiver will automatically detect the pilot tone and implement AGC automatic gain control.
2. If the dip switches # 1 and # 3 are **both** ON (AGC Mode), if no pilot tone is detected, it will force the gain control mode to change to from AGC to MGC.
3. AUTO AGC ONLY: Setting dip switch # 3 to OFF and DIP switch # 1 to ON will prevent the receiver from switching to the MGC mode. The receiver must not be allowed to switch to MGC mode unless the MCG output level has been adjusted to be equal to the AGC output level. Otherwise, the network signal level will be affected when the receiver switches from AGC to MGC mode*. Note: The MGC level was preset at the factory and must not be readjusted.*

Appendix B

Relationship between dip switches # 2 and # 4

1. By setting dip switch # 2 to OFF (= optical input signal mode), and dip switch # 4 to ON (= auto Coax function), if at any time the receiver cannot detect an optical input signal it will automatically switch from the optical input signal mode to the RF input signal mode.
2. To prevent the receiver from automatically switching from optical input mode to RF input mode, set both dip switches # 4 and # 2 to OFF. The receiver will stay in the optical input signal mode even if no optical input signal is detected.

4.4 Status Monitor Port

This is a 14-pin connector used for monitoring the working status of the receiver. It is also used to install the Network Management System Transponder (option 04) for remote system monitoring. Below is a diagram of the pin numbering followed by the definitions and functions of each test point.

1	2
3	4
5	6
7	8
9	10
11	12
13	14

Pin	Definition and function
1	DC power supply state . Normal = +4v.
2	Optical input signal power level. The measured DC voltage value less 2V is equal to the optical input power value in mW. (Please refer to Table 2)
3	Pilot signal power checking(from the optical input signal).
4	AGC/MGC attenuated voltage .
5	Forward optical transmitter module output optical power check.
6	Forward optical transmitter module adjust power check.
7	Forward optical transmitter module offset current check.
8	GND
9	AGC/MGC gain control mode setting status.
10	Optical /RF input switching status.
11	Not Used
12	Not Used
13	Not Used
14	GND

Table 2 Status Monitor Test Points

Optical receiving power		Testing point voltage
dBm	mW	V
-4	0.40	2.40
-3	0.50	2.50
-2	0.63	2.63
-1	0.79	2.79
0	1.00	3.00
1	1.26	3.26
2	1.58	3.58
3	2.00	4.00

Table 3 Optical Receiving Power vs. Test Point Voltage

5.0 Pre - Installation Steps

5.1 Small Parts Checklist

Locate the following items included with the NE1100:

1) Fuses (2) - located in bottom of receiver housing
2) #3 std. screws (4)
3) Pin-to f-type connectors (3)
4) 75Ω terminators (3)

5.2 Opening the Receiver Housing

Loosen the 6 captive screws as shown in Figure 4. Open the receiver housing.

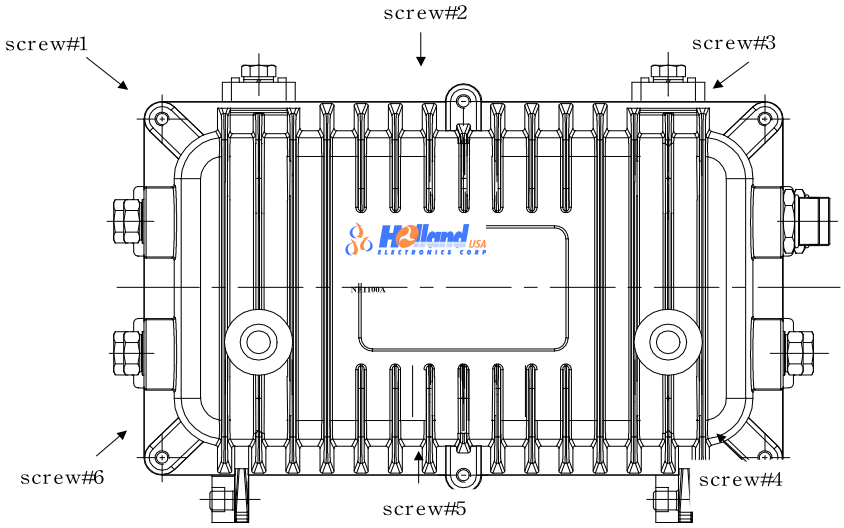


Figure 4. Location of receiver housing captive screws

5.3 Removing the Receiver Chassis from the Housing

1. Loosen the 3 captive screws securing the motherboard chassis at points a, b, & c (see fig. 5)
2. Remove the 2 front panel screws at points d & e (see fig. 5). Open the hinged front panel covering the motherboard. Unplug the 6-wire power supply harness at connector J2. Carefully lift the receiver chassis out of the receiver body using the attached handles. Don't pull or drag the optical fiber.

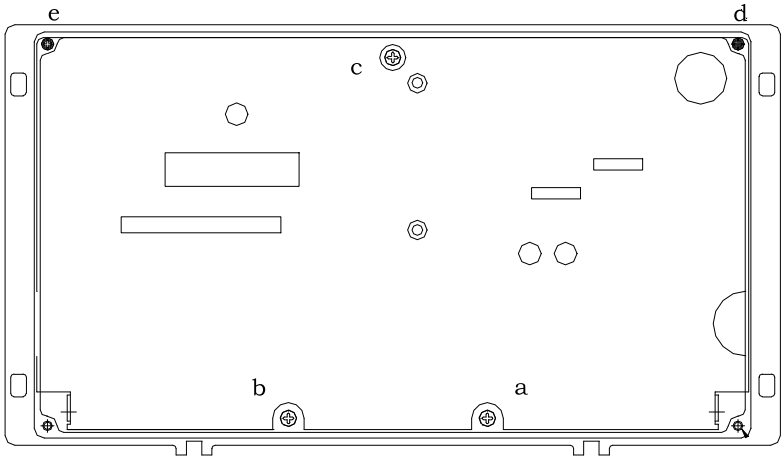


Fig.5 Top Panel and Screw Locations

5.4 Power Supply Connection

The following precautions must be observed with regards to the available AC voltage source:

1) Disconnect or turn off the AC voltage source before starting the installation procedure.

2) The NE1100 outdoor optical receiver is designed outdoor installation:

   a) The NE1100 receiver is designed for connection to the AC voltage source present on the CATV coaxial cable line. This AC voltage is between 40V and 160V AC (RMS).

5.5 Port Designations

Designating the AC Input Port

A Coaxial cable supplying the AC voltage source can be connected through port A, port B or port C (refer to Figure 6). It is necessary to designate an AC input port before beginning the installation procedure.

Locating the Optical Fiber Connector

The optical fiber input is located at port D (refer to figure 6). Use only types FC/APC or SC/APC optical fiber connectors with the NE1100 receiver.

Designating the RF Output Cable Connection Port

The receiver has (2) RF output ports A and B. It can be configured for either single or double outputs. The factory outputs are calibrated as follows: port A output is 36dBmV and port B output is 27dBmV (in European Standard PAL system) while in North America NTSC system (77 channels), port A output is 35dBmV, port B output is 26dBmV. It is recommended to use port A as the main output.

The RF output cable can be connected to port A or simultaneously to ports A and B (refer to Figure 6). It is necessary to decide from which port to output the RF signal before beginning the installation procedure.

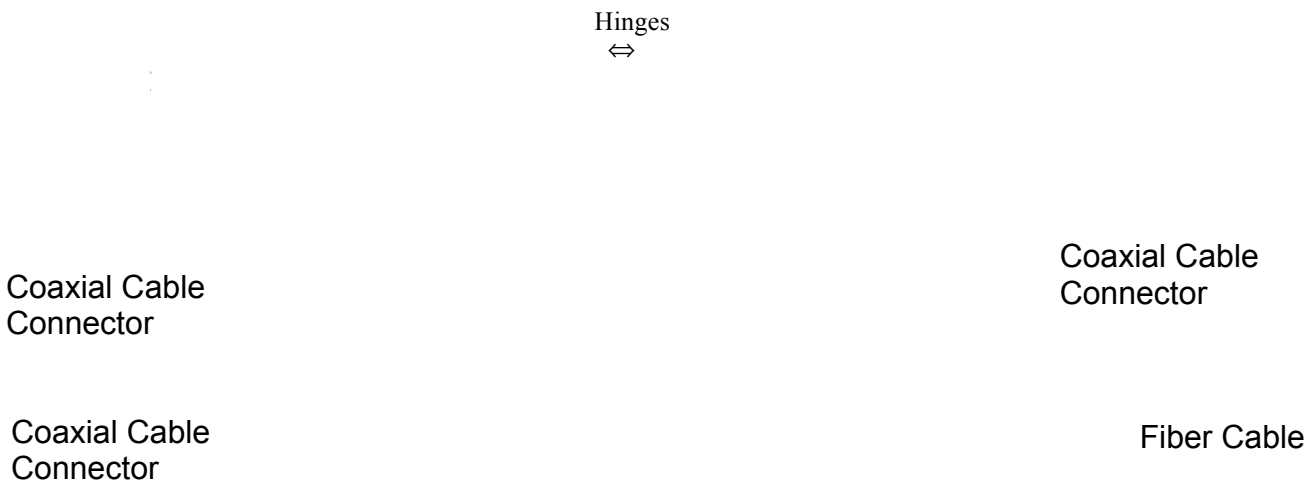


Fig. 6 illustration of fuse locations and I/O ports

5.6 Fuse Installation

1) . The receiver is shipped from the factory with (2) 250V / 10A fuses. They are stored in the fuse holders which are located in the bottom of the receiver housing underneath the receiver chassis. Lift up on the clips to remove the fuse and its holder from the storage locations.

2) Fuse socket locations (Refer to fig. 6)

a) If the AC input voltage is connected to port A, install one 10A fuse at fuse location #1 (See fig. 6) adjacent to port A.

b) If the AC input voltage is connected to port B, install one 10A fuse at fuse location # 2 (See fig. 6) adjacent to port B.

c)) If the AC input voltage is connected to port C, install one 10A fuse at fuse holder # 3 (See fig. 6) adjacent to port C.

3) Depending on which port is dedicated to the AC input voltage (fused), connect the gray and red wire harness from the receiver's DC power supply to the J2 connector on one of the two I/O circuit boards located in the bottom of the receiver housing.

4) Be sure that the fuse is installed only at the AC input voltage port. For example, if the AC input voltage is at port C, install a 10a fuse at location # 3 only (see fig. 6).

5) Do not install fuses at the RF output ports (fuse locations #1 & #2) unless it is also necessary to supply output voltage to power a next-stage amplifier

5.7 Pin-to-F Type Connector Installation

Caution: Make sure that there is no AC voltage present on the CATV coaxial cable line.

As shown in fig. 6, install the (3) included pin-to-f type connectors at the RF output cable ports and the AC input voltage coaxial cable port. Any unused ports must be sealed with a threaded weatherproof plug. Be sure to tighten all of the connectors and plugs completely to achieve a weather tight seal.

To install the pin-to f-type connectors:

1. Remove the waterproof plugs from the ports.
2. Loosen the set screws for the (3) pin connectors at CON2 and CON3 (a &b) located on the (2) I/O PCB's.
3. Thread the connectors into the receiver housing. It may be necessary to trim the ends of the pins if they protrude from the PCB connectors so as not to cause a short circuit.
4. Tighten the pin-to f-type connectors and the set screws completely
5. Connect the RF output coaxial cable to the RF output port.
6. Do not connect the AC input voltage until after the installation is completed.

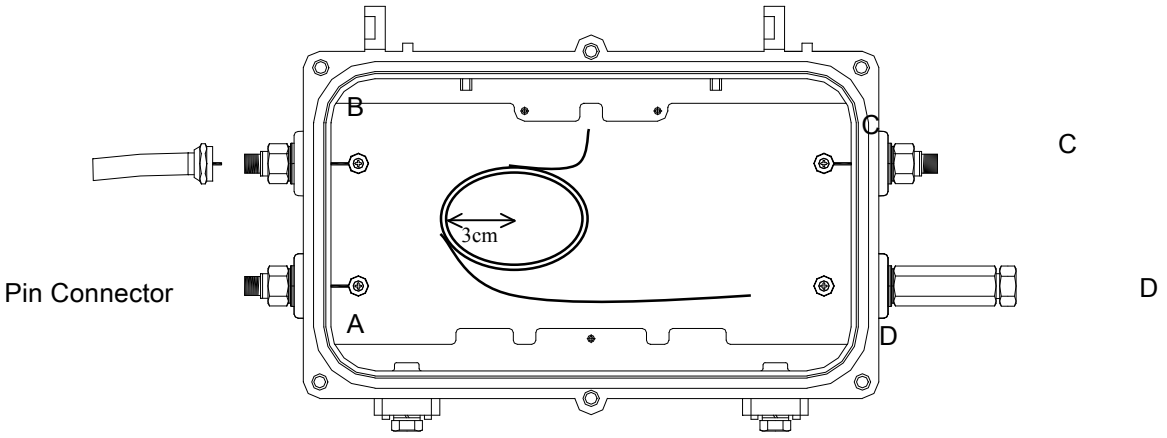


Figure 7. Fiber Cable Installation

5.8 Optical Fiber Input Cable Connection

The standard fiber connector is FC/APC, however FC/APC or SC/APC can be used according to the system configuration. Confirm which type of fiber connector is used in the system.

A dust cover should be installed whenever there is no optical fiber cable installed to protect the receiver's fiber cable input port.

The NE1100 optical receiver uses a dedicated pigtail cable (a "jumper cable" or length of optical cable included) used to connect to the fiber cable's connection box and optical transceiver node.

1. Remove the weather tight plug from port D.
2. Bring the fiber cable into optical receiver housing at port D, using a threaded waterproof sleeve fitting (see fig. 7).
3. Carefully rest the receiver chassis (with the top panel open) sideways atop the receiver housing. Bring the fiber cable up through the bottom of the receiver chassis through the cutout corner of the PCB.
4. Position the receiver chassis into the receiver housing, using the guide slots near the hinges to position the chassis. Be careful not to pinch or kink the fiber optic cable. Tighten the 3 screws at points a, b, & c (see fig.5).
5. Reconnect the 6-conductor wiring harness from the DC power supply to connector J2 on the receiver PCB.
6. Completely tighten the weatherproof sleeve fitting against the receiver housing at port D.

   Also tighten the weatherproof nut on the fiber cable.

7. Before connecting the optical fiber input cable, clean the fiber cable end using the procedure on pg. 22.
8. Plug the fiber cable connector into the fiber adapter (see fig. 8).
9. Secure the fiber optic input cable to the inside of the top panel, using the clip on the lower right corner of the panel. Caution: The pigtail cable should remain in a coil wound around the fastening clips on the inside of the top panel. The radius of the optical fiber winding must be ≥30 mm, and must be totally flat so that when the top panel is closed, the optical fiber does not press against any part of the PCB or chassis .

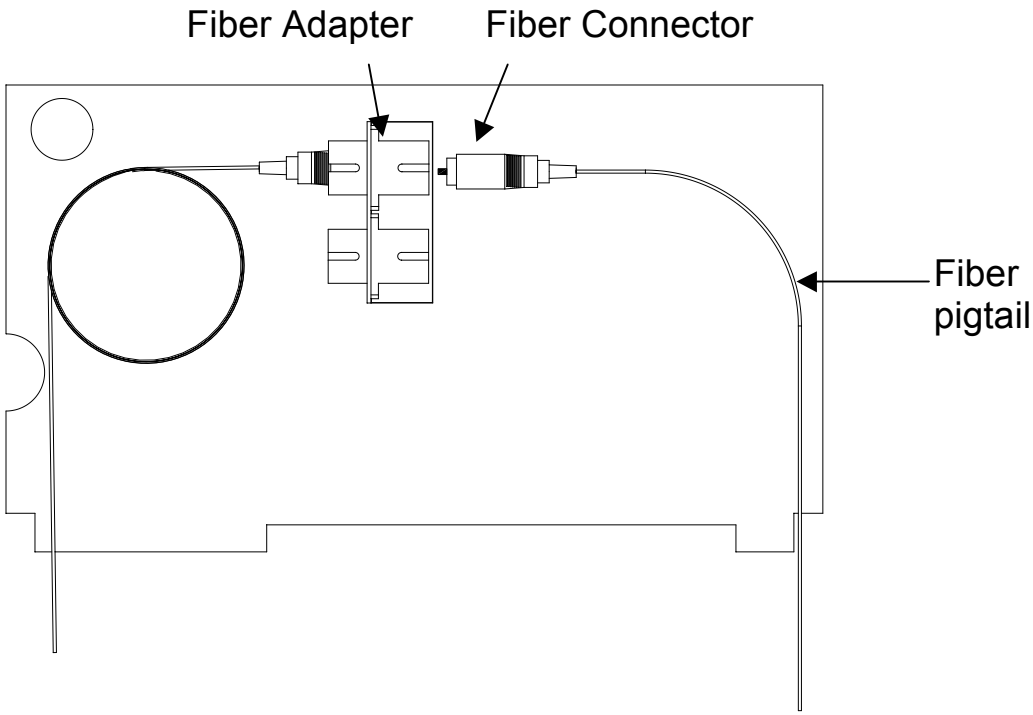


Figure 8. Illustration of fiber connector installation

10. Carefully close the top panel and fasten it to the receiver chassis with (2) screws at the upper corners.

6.0 Mounting the Receiver

NE1100 may be mounted by suspending the receiver housing from the cable strand or by attaching it to the wall. Before mounting, temporarily close the outer housing, taking care to push both wiring harnesses to either side of the power supply so that they are not caught between the power supply and top panel. Tighten at least one of the captive screws to hold the housing closed during the mounting procedure.

6.1 Strand Mounting

Use the 2 clamps on the top of the receiver housing to hang the receiver from the cable strand. (See fig.9). Tighten the clamp bolts securely to lock the receiver to the cable strand.

6.2 Wall Mounting

1) There are (10) threaded mounting holes in the back of the receiver housing. Refer to fig.11 for the hole pattern and spacing.

2) Drill the holes in the wall. Use a minimum of 6 screws to attach the receiver to the wall (see fig. 10).

6.3 Grounding/Lightning Strike Protection

The receiver must be properly grounded to prevent damage from lightning. Use any of the receiver housing screws to attach a wire from earth ground.

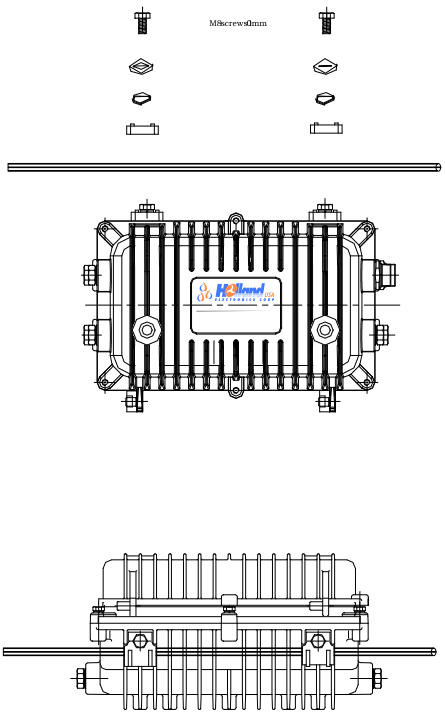


Figure 9. Illustration of cable- mounted practical installation

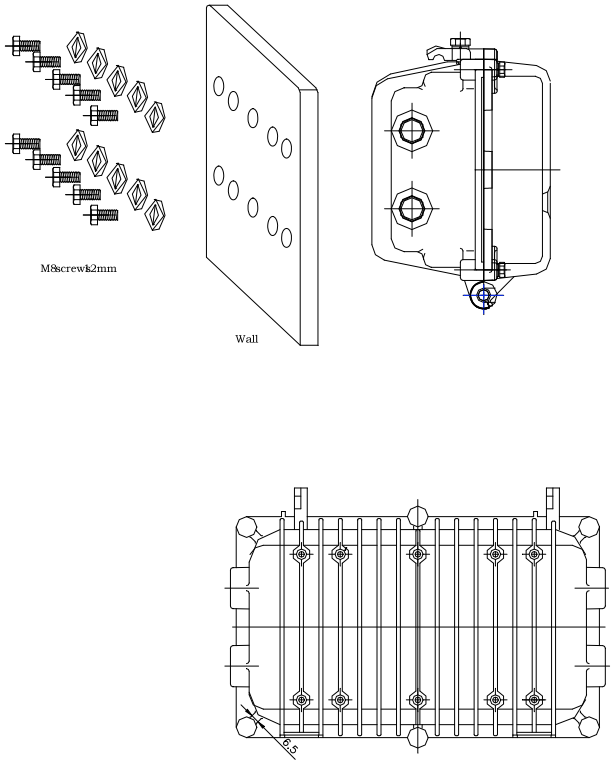


Figure 10. Illustration of wall-mounted practical installation

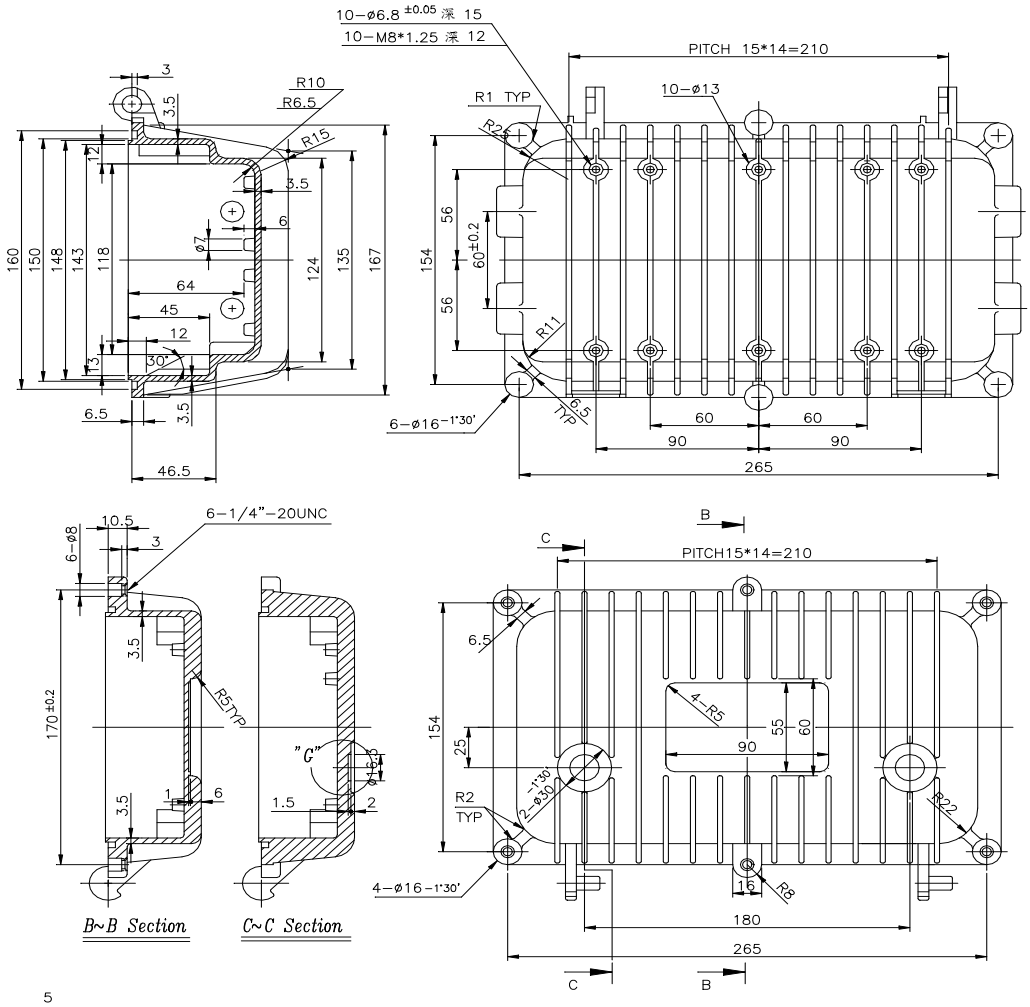


Fig. 11 Physical Dimensions of the NE1100 Optical Receiver

7.0 Warnings - Cleaning the Optical Fiber Cable Ends

1) ***Caution: Do not look directly at the end of the fiber optic cable when disconnected.*** Doing so may cause serious eye injuries from the laser energy**.**

2) Do not scratch the optical fiber cable end. Wipe the surface with alcohol using a dust-free cloth. Next, wipe it with a dry dust free cloth, and then quickly wave the fiber end back and forth in the air. ***Do not blow air onto the fiber to dry it. Doing so may cause dust to permanently scratch the fiber cable end.***

8.0 Operating Procedures

The normal operating procedures and for the NE1100 outdoor optical receiver are as the follows:

1) Connect the AC input voltage cable and apply the AC input voltage.

The red **POWER** LED Indicates that the AC power is on.

2) Check Optical input power status

The green **OPTICAL** LED indicates sufficient optical input power of at least -3dBm (the minimum input threshold level required for the receiver to work properly).

3) Check Pilot Signal status

The green **PILOT** LED Indicates that the pilot signal input power is present at or above the minimum threshold level required for the receiver to work properly.

4) Check AGC – (automatic gain control) mode

The yellow **AGC ON** LED indicates that the gain control mode is properly set to AGC.

a) The gain control mode (AGC or MGC) can be selected using position #1 of the 8-pin piano key switch (see sect. 4.3 and appendixes A&B).

b) The gain control circuit of the receiver is preset to the optimum state at the factory. Only a skilled RF technician trained in the use of a spectrum analyzer and field strength signal meter should attempt to adjust the gain of AGC/MGC.

5) Check RPT ON

The green **RPT ON** LED indicates that the **optional** RPT (return path transmitter) module is installed and working properly

6) Check RPT Alarm

The green **RPT Alarm** LED indicates a malfunction in the **optional** RPT module.

9.0 Closing the Outer Cover.

The receiver housing must be kept airtight to prevent moisture in the air from affecting the performance and the life of the optical receiver.

Before closing the outer cover verify the following:

1. Verify that the receiver chassis is securely fastened to the receiver housing with the (3) captive screws (see fig. 5).
2. Verify that the top panel is fastened shut with (2) screws (see fig. 5).
3. Make sure there is no dust or debris on the gasket seal. Clean the gasket surface if necessary. After each cleaning or after several years of use, an application of silicon grease to the gasket seal is recommended to keep the seal airtight.
4. While closing the receiver housing, make sure that the wiring harnesses from either side of the DC power supply are folded into the openings on both sides of the DC power supply. Do not allow the wiring to be caught between the power supply and the horizontal edge of the receiver housing. Make sure that neither the power supply wiring or optical fiber cable are caught between the upper and lower halves of the receiver housing.
5. Make sure that the (4) waterproof connectors and/or and plugs are tightly installed at all 4 ports A, B, C, & D.
6. Completely tighten the (6) captive screws attaching the upper and lower halves of the weatherproof receiver housing.

10.0 Maintenance and Trouble-shooting

Only the following basic maintenance and trouble-shooting methods should be attempted. A factory authorized service technician or repair facility must perform any other service or repairs.

Any repair attempts by unauthorized personnel will cancel the warranty (see full warranty statement for details).

Problem	Possible trouble-shooting method
AC power indicator LED is off.	1. Check for AC input voltage. 2. Check the 10A AC input fuse and replace if necessary.
Poor optical input signal	1. Check the optical fiber surface. 2. Verify that the correct optical fiber connector type (FC/AP or SC/APC-type) is being used. 3. Clean the optical fiber surface, then reconnect and retest. 4. Observe if the **Optical** LED Indicator is on, or use an optical power level meter to measure for the correct optical input power level. a) The normal optical input power level range is between -3.0dBm and +2.0dBm. b) An optical attenuator may be added if the optical input power level is too high. c) Recheck the system configuration if the optical input power level is too low.
Output RF signal is low	1. Confirm that optical signal input is normal 2. Confirm that AGC/MGC mode setting is correct 3. Test the output power at the F-type –20dB RF test point. 4. Adjust AGC/MGC setting (Note: see Sect. 7 step 4b) 5. Confirm that the optical transmitter is working properly. 6. Contact a factory authorized service facility for further assistance.

Appendix 1

dBm –to- mW Conversion Table

dBm	mW	dBm	mW
-10	0.100	0.5	1.122
-9.5	0.112	1	1.259
-9	0.126	1.5	1.413
-8.5	0.141	2	1.585
-8	0.158	2.5	1.778
-7.5	0.178	3	1.995
-7	0.200	3.5	2.239
-6.5	0.224	4	2.512
-6	0.251	4.5	2.818
-5.5	0.282	5	3.162
-5	0.316	5.5	3.548
-4.5	0.355	6	3.981
-4	0.398	6.5	4.467
-3.5	0.457	7	5.012
-3	0.501	7.5	5.623
-2.5	0.562	8	6.310
-2	0.631	8.5	7.079
-1.5	0.708	9	7.943
-1	0.794	9.5	8.913
-0.5	0.891	10	10.000
0	1.000	10.5	11.220
		11	12.589
		11.5	14.125
		12	15.849

Appendix 2

Optical Input Power to- Voltage Measurment Conversion Table

Optical Input Power (dB)	Optical Input Power (mW)	OPT. PWR. TP(V)
5	3.14	3.15
4.5	2.85	2.8
4	2.52	2.5
3.5	2.14	2.2
3	2.1	1.9
2.5	1.9	1.8
2	1.65	1.5
1.5	1.5	1.3
1	1.3	1.2
0.5	1.1	1.1
0	1.0	1.0
-0.5	0.94	0.9
-1	0.84	0.8
-1.5	0.75	0.7
-2	0.67	0.6
-2.5	0.59	0.57
-3	0.52	0.5
-3.5	0.46	0.45
-4	0.41	0.4
-4.5	0.37	0.35
-5	0.32	0.3
-5.5	0.3	0.28
-6	0.26	0.25

WARRANTY

HOLLAND ELECTRONICS LLC
LIMITED WARRANTY

Holland ELECTRONICS LLC, warrants that the product enclosed with this Limited Warranty Statement will conform to the manufacturer's specifications and be free of defects in workmanship and material for a period of one year (1) from the date of original purchase.

WARRANTY PROCEDURE:
If the product appears to be defective, contact Holland Electronics LLC at (805) 339-9060. Holland Electronics will analyze the problem and offer solutions to prevent removing the unit from service. If the unit is to be returned for evaluation, you will be issued a Return Material Authorization (RMA) number.

Holland Electronics LLC will, at its option, repair or replace the defective unit, under warranty, without charge for parts or labor. This repair will be subject to charges if signs of tampering or misuses are detected. Incoming shipping costs will be the customer's responsibility. Returns will not be accepted without an RMA number.

The warranty and remedy provided above are exclusive and in lieu of all other express warranties and unless stated herein, any statements or representations made by any other person or firm are void. The duration of any implied warranties of merchantability or fitness for a particular purpose on this product shall be limited to the duration of the express warranty set fourth above. Except as provided in this written warranty, Holland Electronics LLC shall not be liable for any loss, inconvenience, or damage, including direct, special, incidental, or consequential damages, resulting from the use or inability to use this product, whether resulting from breach of warranty or any other legal theory.

Some states do not allow limitations on how long an implied warranty lasts and some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

To arrange for Warranty Service: Call Holland Electronics LLC (805) 339-9060