

# INSTRUCTION MANUAL FL-2010



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INSTRUCTION

MANUAL

FE-2010



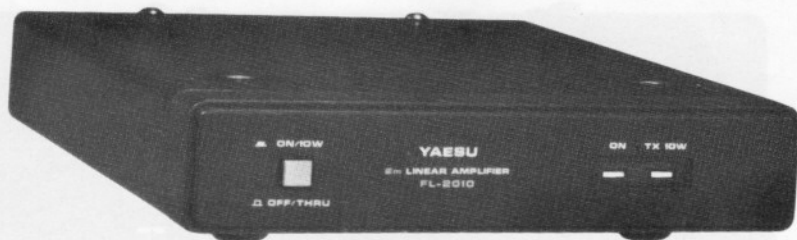
## ACCESSORIES

Connection Cable A	(T9101270)	1
Connection Cable B	(T9100910)	1
DC Power Cord	(T9002805)	1
Spare Fuse 5A	(Q0000005)	1



# FL-2010

## 2 METER LINEAR AMPLIFIER



The FL-2010 is a compact 2 meter linear amplifier, designed to match the FT-290R and FT-208R/NC-8, providing an output of 10 watts through the 144 – 148 MHz range.

The FL-2010 can be mounted with the MMB-11 mounting bracket, allowing you to use the FT-290R as a mobile unit. For base station operation, you can place the FT-290R on top of the FL-2010.

### SPECIFICATIONS

Frequency coverage:	144.0 – 148.0 MHz
Modes of operation:	SSB, CW, FM
Power output:	10 watts (at DC 13.8V; Drive power 2.5 watts)
Maximum drive power:	3 watts
Input impedance:	50 ohms
Output impedance:	50 ohms
Spurious radiation:	Better than 60 dB
Power requirements:	13.8V DC, negative ground (12.4V – 15.2V)
Power consumption:	3A (at 10W RF)
Case size:	150(W) x 30(H) x 170(D) mm
Weight:	0.7 kg (approximately)

Note: The above specifications were measured with the FT-290R.

Specifications subject to change without notice or obligation.

# FRONT PANEL SWITCH AND INDICATORS



## 1. POWER switch

This switch activates the FL-2010. When pushed, a 2.5 watt RF signal from the transceiver is amplified to 10 watts. When this switch is in the off position, the RF output from the transceiver is fed through relays to the ANT jack.

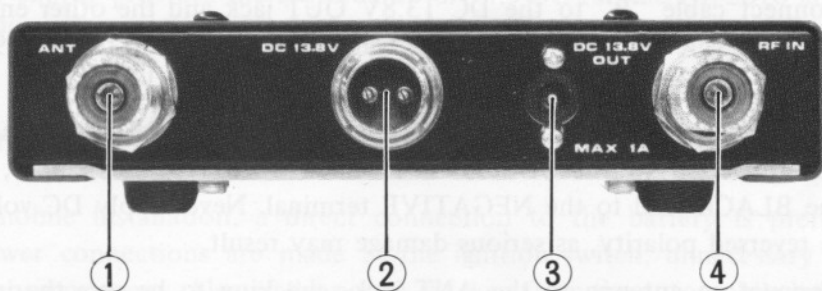
## 2. ON indicator

This indicator illuminates when the POWER switch is pushed on.

## 3. TX 10W indicator

This indicator illuminates when the transmitter is activated with the POWER switch in the on position. If an antenna with an impedance of other than 50 ohms is connected to the ANT jack, the LED will not be illuminated, as the final transistor protection circuit will be activated.

## REAR PANEL CONNECTIONS



### 1. ANT jack

This jack accommodates the PL-259 plug of your antenna feeder. The nominal output impedance is 50 ohms.

### 2. DC 13.8V

This is the power jack of the FL-2010. Connect the supplied DC cable to this jack.

### 3. DC 13.8V OUT

This jack provides a DC output of 13.8 volts for a transceiver. When the FT-290R is used with the FL-2010, connect the DC plug from the transceiver to this jack.

### 4. RF IN

This is the RF input jack of the FL-2010. Connect the transceiver output to this jack.

## INSTALLATION

1. Connect the transceiver ANT jack to the FL-2010 RF IN jack, using the supplied cable "A".
2. Connect cable "B" to the DC 13.8V OUT jack and the other end to the FT-290R DC jack. If you use a transceiver other than the FT-290R, be sure the maximum current drain from this jack is 1 amp.
3. Connect the DC cable to the DC 13.8V jack. The RED lead should be connected to the POSITIVE terminal of the power supply, and the BLACK lead to the NEGATIVE terminal. Never apply DC voltage in reversed polarity, as serious damage may result.
4. Connect an antenna to the ANT jack, checking to be sure the impedance is 50 ohms. A high-SWR antenna connection will activate the built-in final protection circuit.

**Note:** The FL-2010 may not be used with transceivers other than the FT-290R when operating on the SSB mode, because the change-over relay is controlled by a DC voltage fed through the ANT jack to the FL-2010 RF IN jack. During transmission, the DC voltage is fed through the RF line from the FT-290R to the FL-2010 RF input, so as to activate the change-over relay.

On the FM mode, a built-in carrier controlled stand-by circuit allows activation of the relays.

### WARNING

NEVER APPLY AC POWER TO THE REAR PANEL POWER JACK OF THE LINEAR AMPLIFIER. NEVER CONNECT A DC POWER SOURCE GREATER THAN 15 VOLTS TO THE REAR PANEL POWER JACK. ALWAYS REPLACE FUSES WITH A FUSE OF THE PROPER RATING. FAILURE TO OBSERVE THESE SIMPLE PRECAUTIONS WILL VOID ALL WARRANTIES ON THIS EQUIPMENT.

**Note:** When using a DC cable supply with the mobile bracket MMB-11 and the FL-2010 and the FT-290R, replace the 3 amp fuse with a fuse of 5 amps.



## BASE INSTALLATION

A power supply capable of supplying greater than 5 amps at 13.8 volts DC is required for operation from the AC main. The Yaesu FP-80A AC power supply provides the required 13.8 volts DC for the FL-2010 and the FT-290R combination. For further details, see your Yaesu dealer.

## MOBILE INSTALLATION

For mobile installation, a direct connection to the battery is preferred. If power connections are made at the ignition switch, unnecessary noise pick-up may occur. Also, if the power is taken from the automobile lighting, cigarette lighter or other circuits, the circuit line may suffer from unnecessary voltage drops, and as a result, the proper power rating will not be obtained.

The power connection procedure is detailed below. Once the power connections are made, but before the power cord is connected to the transceiver, you should check the battery charging voltage with the engine running fast enough for the car ammeter to show a charge. If the voltage exceeds 15 volts, the car voltage regulator must be adjusted to limit the maximum voltage to less than 15 volts. Also, when making power supply connections, you must be absolutely certain that the proper supply polarity is observed.



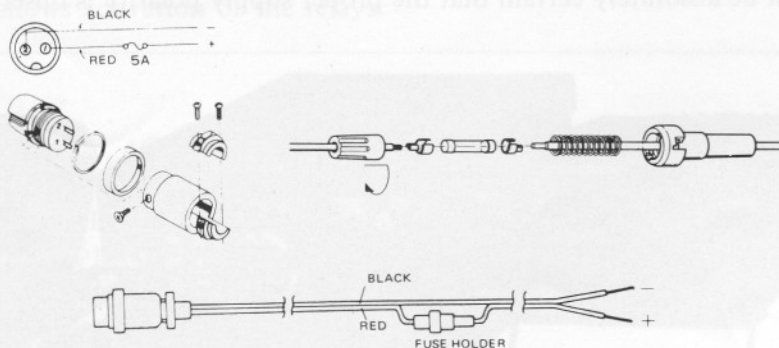
FP-80A/FT-290R/FL-2010/YM-47

## ANTENNA CONSIDERATION

The FL-2010 is designed for operation using an antenna presenting a 50 ohm resistive load. The automatic final transistor protector circuitry will cut off the linear amplifier to protect the transistor when a high antenna SWR is encountered. The SWR on the antenna should, if possible, be kept below 1:1.5 at all times, to secure full output from the linear amplifier.

In most cases, coverage is a function of antenna height. The antenna for base station operation should be located as high and in the clear as possible. Vertical polarization is standard for FM communications in most areas, so be sure your antenna is oriented appropriately. Popular antennas for base station use include the 5/8 wavelength vertical or one of the many stacked dipole arrays. For accessing repeaters a long distance away, a Yagi or other high gain directional array may be required.

For mobile applications, the most popular antennas are the 1/4 wavelength vertical and 5/8 wavelength vertical, which has approximately 3 dB gain over the 1/4 wavelength vertical.

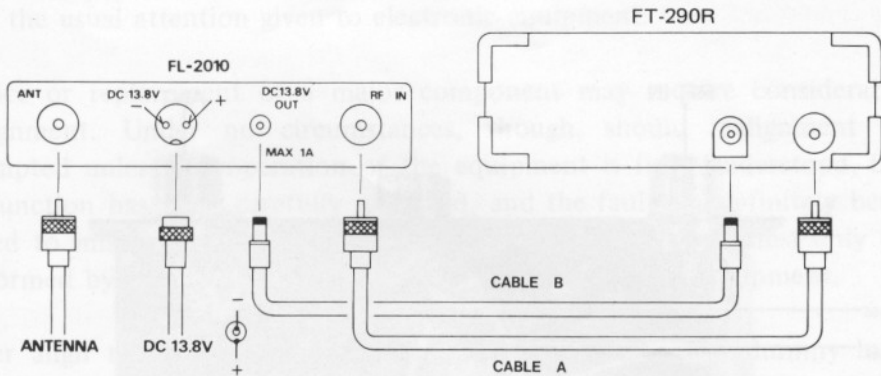


Power cord connections

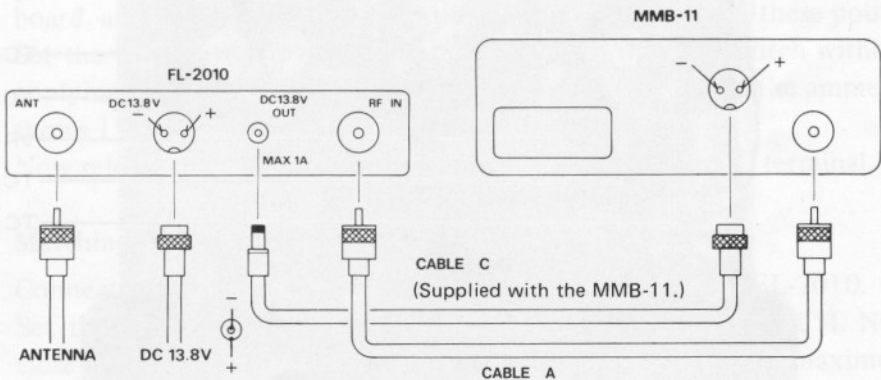


# MAINTENANCE INTERCONNECTIONS

This equipment has been carefully checked and tested at the factory prior to shipment. If the instrument is not checked, it should not require other than the usual attention given to electronic equipment.



FL-2010/FT-290R



FL-2010/MMB-11/FT-290R



## MAINTENANCE AND ALIGNMENT

This equipment has been carefully aligned and tested at the factory, prior to shipment. If the instrument is not abused, it should not require other than the usual attention given to electronic equipment.

Service or replacement of a major component may require considerable realignment. Under no circumstances, though, should realignment be attempted unless the operation of the equipment is fully understood, the malfunction has been carefully analyzed, and the fault has definitely been traced to misalignment rather than part failure. Service work must only be performed by experienced personnel using the proper test equipment.

Never align this linear amplifier without having a 50 ohm dummy load connected to the antenna jack, unless otherwise noted.

### A. Base Current Adjustment

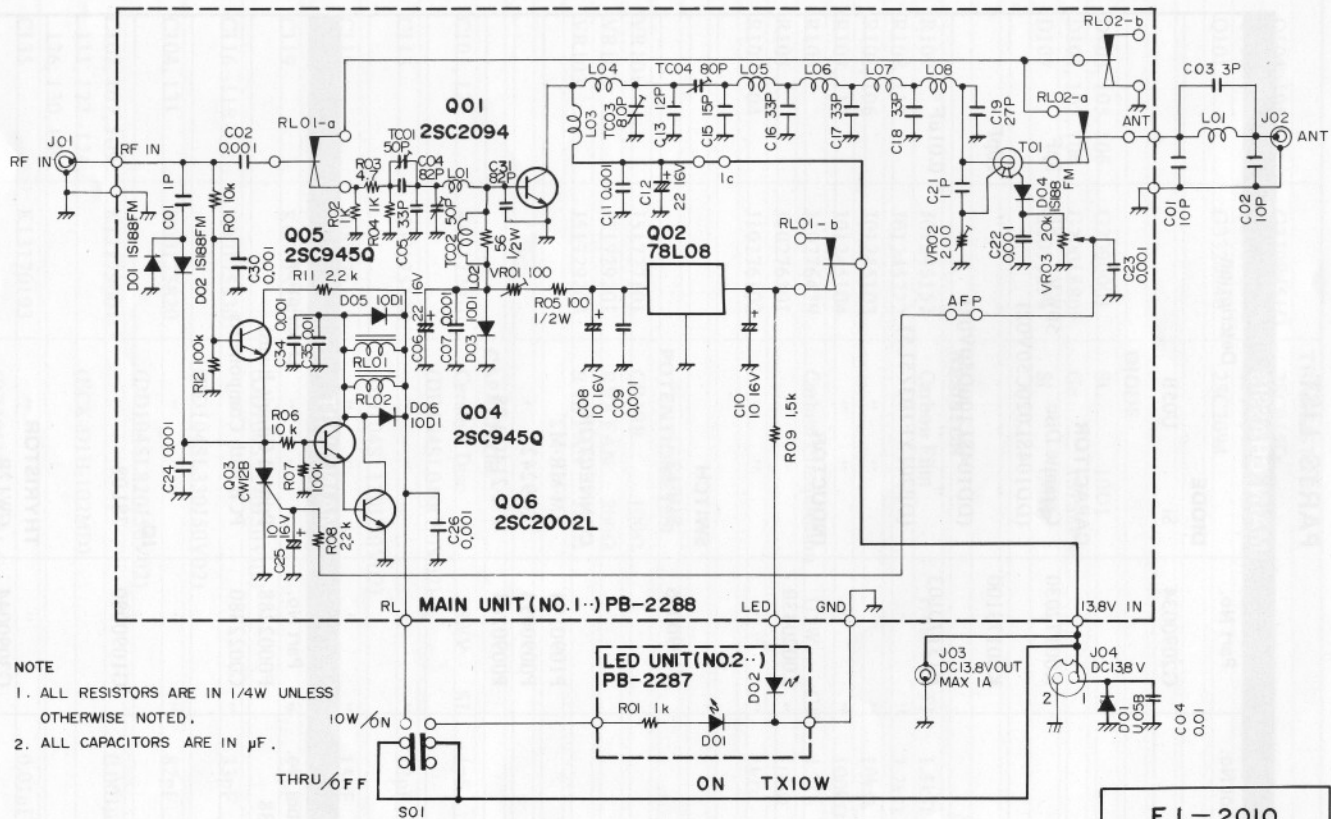
1. Disconnect the wire connected to the IC terminal on the printed circuit board, and install a 250mA full scale DC ammeter between these points.
2. Set the transceiver to the SSB mode, and close the PTT switch without applying a tone to the microphone. Adjust  $VR_{101}$  so that the ammeter shows 150mA.
3. Now release the PTT switch and connect the wire to the IC terminal.

### B. Matching Networks Alignment

1. Connect a dummy load/wattmeter to the ANT jack of the FL-2010.
2. Set the transceiver to 145.00 MHz, and the mode switch to FM. Now close the PTT switch and adjust  $TC_{101}$  through  $TC_{104}$  for a maximum RF reading on the wattmeter.

### C. AFP Alignment

1. Disconnect the wire connected to the AFP terminal, and connect the + lead of a DC voltmeter to the AFP terminal. Connect the - lead to ground.
2. Preset VR<sub>103</sub> fully clockwise.
3. Set the transceiver to 145 MHz and the mode switch to FM. Now close the PTT switch and adjust VR<sub>102</sub> for minimum deflection on the voltmeter.
4. Connect the wire to the AFP terminal, as it was connected prior to Step 1, and set VR<sub>103</sub> fully counterclockwise.
5. Now remove the dummy load, and close the PTT switch. Adjust VR<sub>103</sub> to the point where the TX indicator just turns off. This alignment should be performed within 10 seconds, as alignment without a dummy load for longer than 10 seconds will cause damage to the final transistor.
6. If a 110 ohm dummy load is used (three parallel-connected 330 ohm, 5W resistors), connect it to the ANT jack. Now close the PTT switch so that the AFP circuit remains off. If the AFP circuit is activated, adjust VR<sub>103</sub> so that the AFP circuit remains off.



**FL-2010**  
**CIRCUIT DIAGRAM**

## PARTS LIST

MAIN CHASSIS					
Symbol No.	Part No.	Description			
<b>DIODE</b>					
D1	G2090034	Si	U05B		
<b>CAPACITOR</b>					
C3	K00172030	Ceramic Disc	50WV	SL	3pF
		(DD104SL020C50V02)			
C1, 2	K00173100	" "	" "	" "	10pF
		(DD104SL100D50V02)			
C4	K13170103	" "	" "	" "	0.01 $\mu$ F
		(DB201YF103Z5L5)			
<b>INDUCTOR</b>					
L1	L0020430				
<b>SWITCH</b>					
S1	N4090046	SUF12			
<b>CONNECTOR</b>					
J1, 2	P1090194	FM-MR-M2'			
J3	P0090093	XG9242			
J4	P0090244	FM-214(2)-2S			
<b>MAIN UNIT</b>					
Symbol No.	Part No.	Description			
PB-2288	F0002288	Printed Circuit Board			
	C0022880	PCB with Components			
<b>IC</b>					
Q102	G1090080	78L08			
<b>THYRISTOR</b>					
Q103	G3090044	CW12B			



		<b>TRANSISTOR</b>			
Q104, 105	G3309451Q	2SC945Q			
Q106	G3320020L	2SC2002L			
Q101	G3320940	2SC2094			
		<b>DIODE</b>			
D103, 105, 106	G2090001	Si	10D1		
D101, 102, 104	G2001880F	Ge	1S188FM		
D107	G2090034	Si	U05B		
		<b>RESISTOR</b>			
R109	J01245152	Carbon Film	1/4W	TJ	1.5k $\Omega$
R108, 111	J01245222	" "	"	"	2.2k $\Omega$
R101, 106	J01245103	" "	"	"	10k $\Omega$
R107, 112	J01245104	" "	"	"	100k $\Omega$
R103	J10276479	Carbon Composition	1/2W	GK	4.7 $\Omega$
R105	J10276101	" "	"	"	100 $\Omega$
R102, 104	J10276102	" "	"	"	1k $\Omega$
		<b>POTENTIOMETER</b>			
VR101	J51727101	CR19R	100 $\Omega$		
VR102	J51729201	RV8 FAN	200 $\Omega$		
VR103	J51729203	RV8 FAN	20k $\Omega$		
		<b>CAPACITOR</b>			
C101, 121	K00172010	Ceramic Disc	50WV	SL	1pF
		(DD104SL010C50V02)			
C113	K00175120	" "	"	"	12pF
		(DD104SL120U50V02)			
C115	K00175150	" "	"	"	15pF
		(DD104SL150J50V02)			
C119	K00175270	" "	"	"	27pF
		(DD104SL270J50V02)			
C116-118	K00175330	" "	"	"	33pF
		(DD104SL330J50V02)			
C104, 131	K00175820	" "	"	"	82pF
		(DD104SL820J50V02)			
C102, 107, 109, 111, 122-124, 126, 130, 134	K11179001	" "	"		0.001 $\mu$ F
		(ECK-D1H-102MD)			
C135	K13170103	" "	"		0.01 $\mu$ F
		(DB201YF103Z5L5)			
C108, 110, 125	K40129004	Electrolytic	16WV	RE	10 $\mu$ F
		(16RE10)			



**ACCESSORIES**

Symbol No.	Part No.	Description
	T9002805	DC POWER CABLE
	P1090019	(Power Plug FM-142P)
	Q2000001	(Fuse Holder SN-1101)
	T9101270	CONNECTION CABLE A
	P0090020	(Coaxial Plug MP-3)
	T9100910	CONNECTION CABLE B
	P1090140	(Plug PJ-2)
		SPARE FUSE
	Q0000005	5A



MEMO

