

INSTRUCTION MANUAL

ORDER NO.482

AFTERBURNER PLUS
base station, bilateral linear, 115VAC

PN 800106

General Description

The 482 Bilateral Linear is a compact, precision-built amplifier of advanced design. It utilizes an integrated circuit, two tubes, two transistors and nine diodes in a grounded-grid, tuned-plate circuit for amplification of AM, FM, CW, and SSB signals.

It will operate over a frequency range of 25-54 MHz. However, it is FCC Type Accepted under Parts 89, 91, and 93 for the frequency range of 25-40 MHz.

Operation of this equipment requires a FCC license. Failure to comply is punishable by penalties set forth in the Rules and Regulations of the FCC. A copy of these Rules is available from the U.S. Government Printing Office and should be in the possession of the operator.

The 482 Bilateral Linear Amplifier complies with FCC Regulation when shipped from the factory, and must be used with a transceiver which is FCC Type Accepted under Parts 89, 91, and 93 for the system to be valid.

Special features of the amplifier include the automatic, antenna change-over relay which operates without special external connections. This makes it perfect for operation with low power transceivers not having external amplifier control circuits. Amplification of the received signal is done by an integrated circuit amplifier. Tune and load, variable plate capacitors offer impedance matching for maximum output to varying antenna loads in the 40-70 ohm range.

The 482 will suppress most radiation that may cause television interference. The TVI problem has been given full consideration in design and layout of the chassis. There are, however, some types of TVI that cannot be prevented within the amplifier. This is particularly true in weak signal areas. In such cases, a good, commercial, low pass filter is recommended.

Mechanical Specifications

Height	4-1/8" (10.5 cm)
Width	7-1/8" (18.1 cm)
Depth	10-3/8" (26.4 cm)
Net weight	11 lbs. (5.0 kg)
Shipping weight	12 lbs. (5.4 kg)
Construction	lightweight aluminum chassis with rugged steel case

Electrical Specifications

Primary power	115VAC, 60 cycle, 3 amp
Frequency coverage	25-40 MHz
Types of emission	AM, FM, CW, SSB, DSB
Power output (slightly less at 50 MHz) ..	80 watts carrier CW/FM 60 watts AM/100% modulation 100 watts SSB/DSB (amateur service)
Receive amplifier	20 dB gain
Power required to key	1 watt

Max. drive (unmodulated carrier and FM).	15 watts
(amplitude modulated carrier)	3.5 watts
(amplitude modulated peak)	14 watts PEP
Harmonic suppression	more than 60 dB
Input impedance (unbalanced).....	50 ohms nominal
	less than 2:1 VSWR 25-54 MHz
Output impedance (unbalanced)	50 ohms nominal
	adjustable 40-70 ohms nonreactive
Switching	automatic, by RF sensing network
Tube and semiconductor complement	2 tubes, 2 transistors,
	9 diodes, 1 integrated circuit
Cable connectors	input and output require
	MIL PL-259

Installation

Carefully remove the amplifier from the packing carton. Examine it closely for signs of shipping damage. Be sure the tubes are seated in their sockets. Check the plate caps on the tubes. Look for any signs of internal damage.

Before you "plug it in and turn it on," read the manual and then be sure you install the unit properly. Properly installed and used, it will give you years of good service.

() Remove the controls cover and install the two knobs from the parts pack. Put the small knob on the TUNE control and the large knob on the LOAD control. Replace the controls cover.

The location of the unit at your station is not critical, but it is important that there is enough air circulation for adequate cooling of the power tubes and power supply. Allow about 4" of clearance, as possible, and a minimum of at least 1" of clearance on all sides.

Should you have trouble with hum, a good earth ground to the chassis will help. For the sake of good operating practice, grounding the chassis, hum or not, should be done.

Most antennas in the 25-54 MHz range with an impedance of 40-70 ohms will work fine. The SWR should be no higher than 2:1.

() Plug the power cord into an ordinary 115VAC outlet. The fuse holder on the rear panel is supplied with a 3 amp, 3AG fuse. Do not use a fuse larger than that; a larger fuse will not protect the unit.

() Make or buy a piece of RG-58/U coax with a PL-259 connector on the linear end and the appropriate connector for your transceiver on the other end (usually also a PL-259) to connect your transceiver to the unit, and then hook it up. The transceiver jack on the unit is on the upper right of the rear panel.

() Your installation is now complete, but do not use the unit until you have followed the instructions under "Operation".

Front Panel Controls and Functions

ON-OFF switch	controls 120VAC power to amplifier
AM-FM & SSB switch	adjusts delay constant of automatic antenna relay
XMT-STAND BY switch	activates the automatic antenna relay circuit, also supplies power to the receive amplifier circuit
Receive Amplifier ON-OFF switch	activates the integrated circuit receive amplifier NOTE: Receive amplifier will only operate when the XMT-STAND BY switch is in the XMT position and the REC AMP switch in ON.
Red indicator light	shows when primary power is on
Output meter	visual indication of relative RF power output
Tune control	adjusts resonant frequency of amplifier
Load control	adjusts coupling of output circuit to antenna

Operation

This amplifier must be used with a transmitter or transceiver capable of at least one watt output.

NOTE: When the amplifier is to be used on business band, adjustments are required that can be made only by an FCC licensed technician.

The 482 Amplifier is factory adjusted for 25-32 MHz operation. Operation on 32-40 MHz requires a change in the number of turns in L1 (RF tank coil). A shorting tap is placed on the end of the coil, from the left-hand side as viewed from the front panel (see Figure 2) to the first turn, counting from the left side.

CAUTION

Before applying any RF power to the linear, pretune the tune control to the frequency at which you wish to operate.

Remove the controls cover for tuning and loading. Below is a pretuning example. If your desired operating frequency is 31 MHz, set the tune knob between 29 and 33 as shown.

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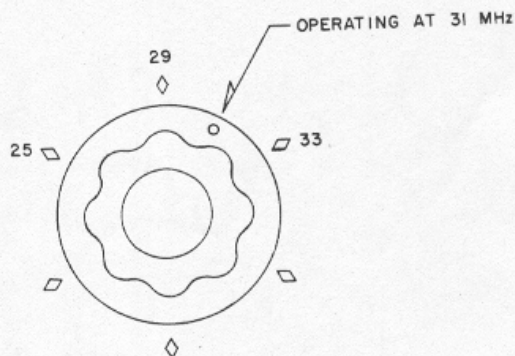


Figure 1

Tuning for AM Use: Place the function switch in the AM-FM position. Set the tune control before turning on any power! (See CAUTION above.) The load control should be positioned so that the capacitor is fully meshed. Put the XMT-STAND BY switch on STAND BY.

Turn the power ON-OFF switch ON. The red visual indicator light will come on.

After warm-up, put the XMT-STAND BY on XMT. This will energize the automatic antenna relay control circuitry and provide power for the receive amplifier.

Switch on the output power by keying the transceiver microphone, PTT button and quickly adjust the tune control for a maximum reading on the output meter. Remove drive power after adjustment.

CAUTION

Do not apply drive power for more than five seconds without adjusting the tune control or damage to the tubes can result.

Reapply drive power and advance the load control clockwise. Note the reading of the output meter. Adjust the load control for maximum output. Remove drive power. Repeat these two steps several times to maximize output.

To provide for the extra power contained in AM signal modulation it is necessary to "overcouple" the output circuit. This insures an undistorted output with a minimum of adjacent channel "bleeding" (spatter). This is done as follows:

Reapply drive power and advance the load control until the output meter reading drops perceptably (about 15 degrees more rotation). Readjust the tune control for maximum output. The output circuit is now "overcoupled".

If a relative power output indicator is available (SWR bridge on forward, etc.) the output signal can be quickly checked to insure upward modulation. If the meter does not "flick" upward on voice peaks, the load control is improperly set (or the exciter is not capable of 100 per cent modulation or may have "downward modulation"). This can also be seen on the output meter. The last adjustment should always be the tune control.

Your amplifier is now tuned and ready for operation.

Automatic antenna switching and amplifier operation are provided for by a special, input sensing circuit. Should you desire to hold the amplifier in a "ready" condition, but not use it until needed, simply place the XMT-STAND BY switch on STAND BY. The sensing circuit will be disabled and the antenna connected to the transceiver at all times.

IMPORTANT: With the XMT-STAND BY switch in the STAND BY position, the REC AMP switch should be in the OFF position to prevent the receive amplifier from loading the transceiver output.

Tuning for FM: The amplifier is tuned for FM in the same way it is for AM, except the load and tune controls are set for maximum output.

Tuning for SSB & DSB: Place the function switch on SSB. This connects a delay circuit to the automatic relay control and extends the "drop-out" approximately one second. This will prevent relay chattering and erratic operation.

If the transceiver is capable of carrier output equal to the peak power of voice SSB or DSB signal, simply adjust the tune and load controls for maximum deflection of the output meter while applying the carrier signal.

If the transceiver cannot supply a carrier equal to the peak power of the voice SSB or DSB signal, the tune and load controls must be set for maximum output while modulating. In this case, a modulation envelope indicator (monitor scope) is the most reliable method for adjustment of the amplifier.

Tuning for CW: Place the function switch in SSB, apply drive power, and adjust the tune and load controls for maximum output. The delay circuit for SSB prevents drop-out of the automatic antenna relay between characters.

Remove the knobs and replace the controls cover before putting the amplifier into Business Band service.

50-54 MHz Operation: For operation on the six-meter amateur band it is necessary to short out three turns of the pi-network output coil, L1 from its left hand side as viewed from the front panel. The 100 pF dipped silver mica capacitor across C17 load capacitor must be removed.

The low-pass filter on the output must be shorted out. This can be done by soldering a wire from the input to the output and removing the three dipped silver mica capacitors (180 pF and 240 pF) from the small circuit board connected to the output socket.

Set the TUNE control at what used to be the 29 MHz position (see Figure1).

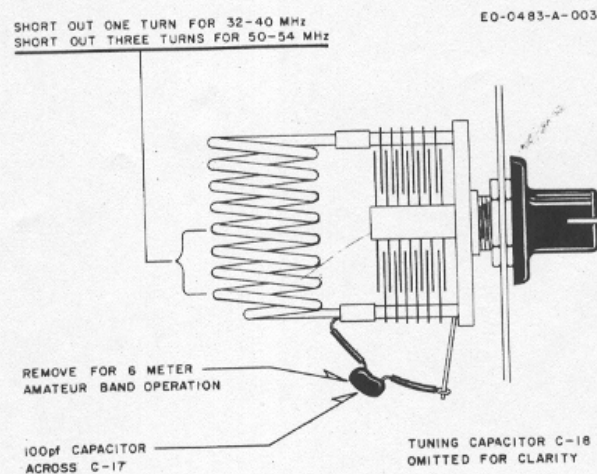


Figure 2

Theory of Operation

A portion of the incoming circuit is coupled to the base of Q1 sensing transistor. This causes Q1 to conduct and change the bias on Q2, relay transistor. Q2 conducts heavily and closes relay K1. Relay K1 connects the input signal to the cathodes of V1 and V2, applying plate voltage to V1 and V2, and connecting the output circuit to the antenna.

C18 is the pi-network tuning capacitor and sets the operating frequency of the amplifier. C17 is the pi-network loading capacitor and controls the coupling to the antenna. For SSB operation, C22 is added to the relay transistor circuit to extend the drop out time.

An integrated circuit amplifier increases the level of the incoming signals from the antenna before it is applied to the transceiver. Amplifier power is switched by the XMT-STAND BY switch and the REC AMP switch. With the XMT-STAND BY switch in the XMT position the receive amplifier can be switched ON or OFF as required. With the switch in the STAND BY position, the receive amplifier is disabled and the receive amplifier switch should be in the OFF position.

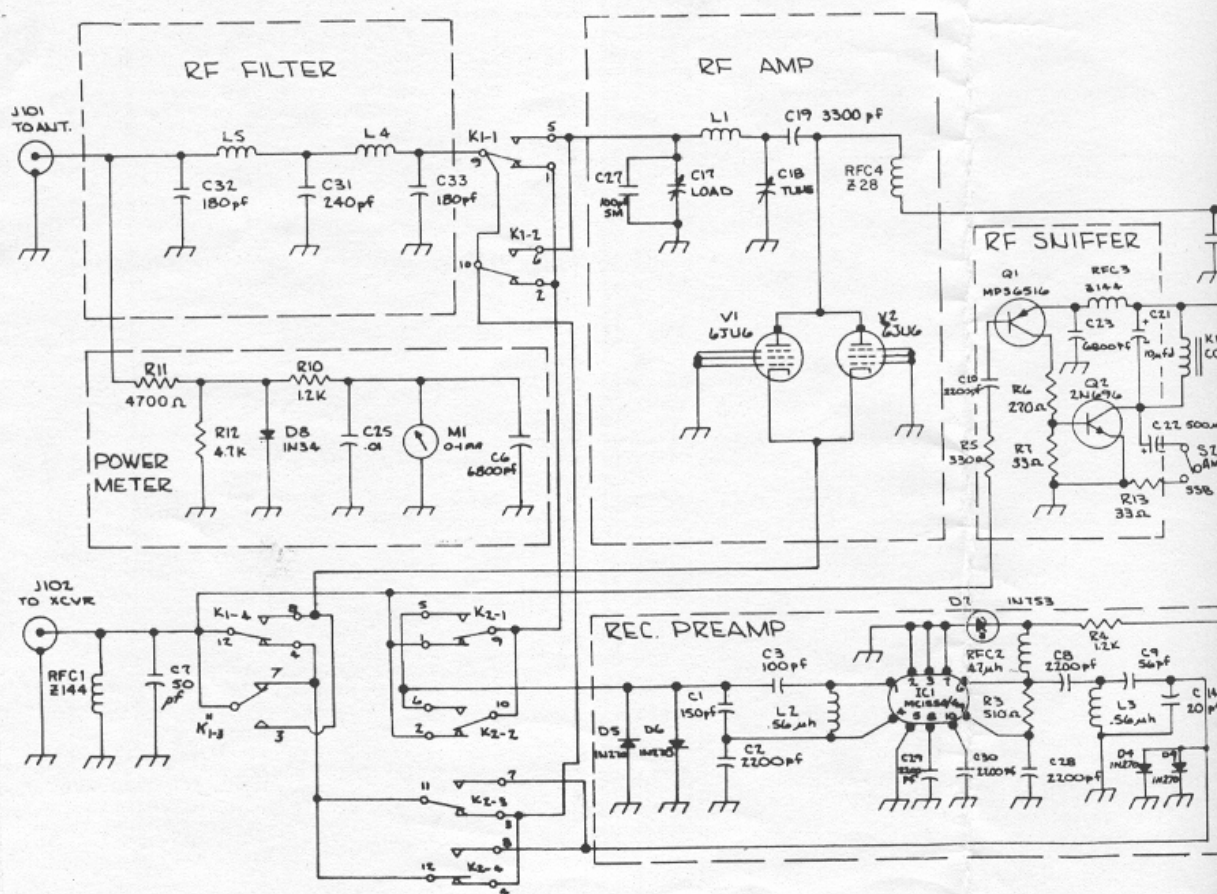
Component Parts List

Item No.	Description	Part No.
C1	150 pF, 1 kV, ceramic disc	727980
C2	.0022 uF, 1 kV, ceramic disc	721161
C3	100 pF, 1 kV, ceramic disc	721016
C4	.001 uF, 1 kV, ceramic disc	721158
C5	.001 uF, 1 kV, ceramic disc	721158
C6	.0068 uF, 1 kV, ceramic disc	721160
C7	50 pF, 1 kV, ceramic disc	725718
C8	.0022 uF, 1 kV, ceramic disc	721161
C9	56 pF, 1 kV, ceramic disc	725711
C10	40 uF, 450 WVDC, electrolytic	721156
C11	40 uF, 450 WVDC, electrolytic	721156
C12	(not assigned)	
C13	.001 uF, 1 kV, ceramic disc	721158
C14	20 pF, 1 kV, ceramic disc	725717
C15	.0068 uF, 1 kV, ceramic disc	721160
C16	.0068 uF, 1 kV, ceramic disc	721160
C17	10.5 - 313.9 pF, air variable	721123
C18	3.2 - 50 pF, air variable	721157
C19	.0033 uF, 3 kV, ceramic disc	721159
C20	.0023 uF, 1 kV, ceramic disc	721161
C21	10 uF, 25-35 WVDC, electrolytic	721121
C22	500 uF, 15 WVDC, electrolytic	721120
C23	.0068 uF, 1 kV, ceramic disc	721160
C24	.0068 uF, 1 kV, ceramic disc	721160
C25	.01 uF, 1 kV, ceramic disc	721178
C26	500 uF, 15 WVDC, electrolytic	721120
C27	100 pF, 5%, 500V, dipped silver mica	725748
C28	.0022 uF, 1 kV, ceramic disc	721161
C29	.0022 uF, 1 kV, ceramic disc	721161
C30	.0022 uF, 1 kV, ceramic disc	721161
C31	240 pF, 5%, 500V, dipped silver mica	720004
C32	180 pF, 5%, 500V, dipped silver mica	720013
C33	180 pF, 5%, 500V, dipped silver mica	720013

Item No.	Description	Part No.
D1	1N5054 silicon	765713
D2	1N5054 silicon	765713
D3	1N645 silicon	761113
D4	1N270 germanium	765722
D5	1N270 germanium	765722
D6	1N270 germanium	765722
D7	1N753 zener	765721
D8	1N34 germanium	765668
D9	1N270 germanium	765722
F1	3 amp, 3AG fuse	718055
IC1	(Motorola) MC1550G	765724
K1	4PDT, enclosed plug-in relay	730006
K2	4PDT, enclosed plug-in relay	730006
L1	tank coil	271490
L2	.56 uH coil	725679
L3	.56 uH coil	725679
L4	25-40 MHz, low-pass filter coil	720003
L5	25-40 MHz, low-pass filter coil	720003
M1	relative power meter	795680
N1	#53 lamp	715665
Q1	(Motorola) MPS6516	761115
Q2	2N696	761114
R1	270 k, 1 watt, 10%	721162
R2	270 k, 1 watt, 10%	721162
R3	510, 1/4 watt, 10%	725727
R4	1.2 k, 1/4 watt, 10%	725728
R5	330, 1/2 watt, 10%	721305
R6	270, 1/4 watt, 10%	721112
R7	33, 1/4 watt, 10%	721103
R8	2.2 k, 1/4 watt, 10%	721116
R9	1 ohm, 1/2 watt, 10%	720020
R10	1.2 k, 1/4 watt, 10%	725728
R11	4.7 k, 1/2 watt, 10%	725650
R12	4.7 k, 1 watt, 10%	721367
R13	33, 1/4 watt, 10%	721103
RFC1	(Ohmite) Z144	728025
RFC2	47 uH	725710
RFC3	(Ohmite) Z144	728025
RFC4	(Ohmite) Z28	721124
S1	SPST rocker switch -- power	701147
S2	SPST rocker switch -- AM-FM/SSB	701147
S3	SPST rocker switch -- XMT-STAND BY	701147
S4	SPST rocker switch -- REC AMP	701147

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Item No.	Description
T1	110V-800V power transformer
V1	(RCA) 6JU6
V2	(RCA) 6JU6



Description
10V-800V power transformer

Part No.
731164

RCA) 6JU6 matched pair
RCA) 6JU6

761166
761166

