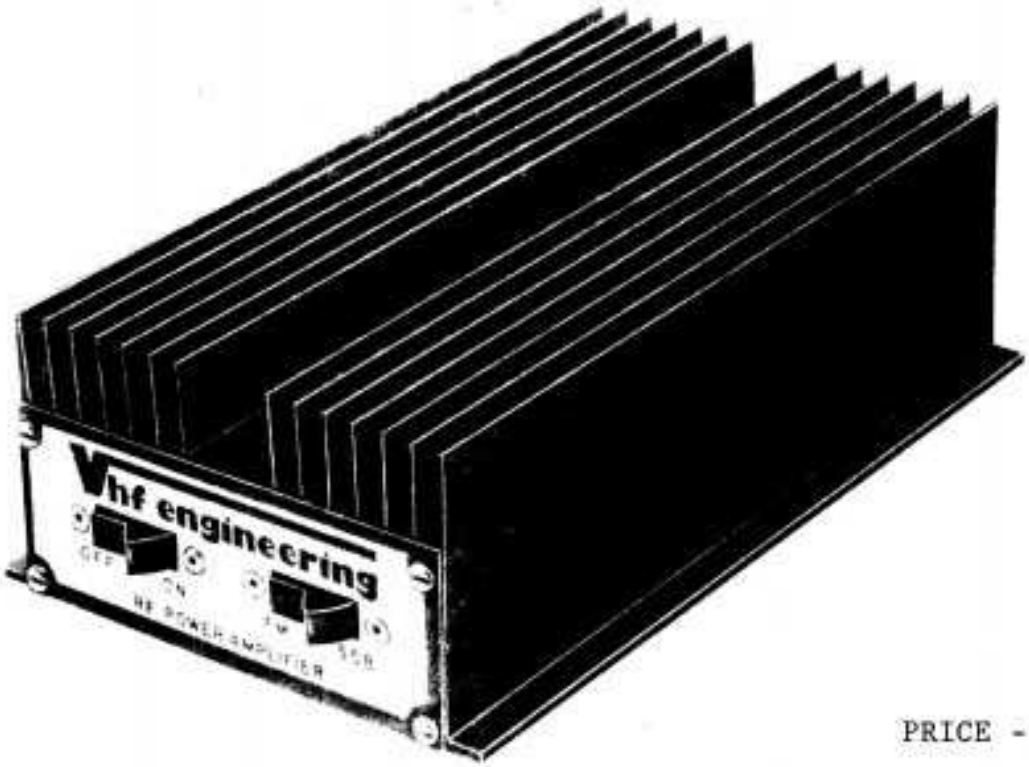
INSTRUCTION MANUAL

BLD 10/120 BLD 30/120

INSTRUCTION MANUAL

#5011225 REV.00



PRICE - $2.00

Vhf engineering
DIVISION OF BROWNIAN ELECTRONICS CORP.
320 WATER ST. BINGHAMTON, N.Y. 13901 / Phone 607-723-9574

SPECIFICATIONS	BLD 30/120	BLD 10/120
Frequency Range	217-225	217-225
Power Gain Class C Class AB	6 dB nominal 5-7 dB typical	11 dB nominal 11-12 dB typical
Class C (Nominal Values)		
120W rms output	30W rms input	10 rms input
130W rms output	40W rms input*	15 rms input*
80W rms output	20W rms input	5 rms input
Class AB (Nominal Values)		
120W PEP output (rated)	30W PEP input*	10W PEP input*
96W PEP output	24W PEP input	8W PEP input
60W PEP output	15W PEP input	5W PEP input
36W PEP output	9W PEP input	3W PEP input
*These powers are the maximum recommended input powers - do not exceed.		
DC Input Voltage	12-14 volts negative ground 15 volts maximum	Same as BLD 30/120
DC Input Current	18 amperes nominal	22 amperes nominal
Fuse Rating	20 amperes	20 amperes
Insertion Loss	Less than 1dB typical	Less than 1dB typical
Standby Current	Less than 10 MA	Less than 10 MA
Duty Cycle	50% (90% with fan) for a maximum keyed time less than 10 minutes (See Installation Section)	Same as BLD 30/120

LIMITED WARRANTY

The enclosed warranty card must be filled out and returned within 10 days of purchase.

Factory wired units are warranted for 90 days from purchase date. UHF Engineering's liability is limited to the repair, adjustment or replacement of units of the original consumer purchaser that are proven defective. R.F. power devices are warranted to be within 1db of specification. Units modified or operated in a manner not consistent with the instructions in the manual will not be covered by this warranty.

Defective units must be returned to the factory at the address below with a description of the difficulty and the date of purchase. UHF Engineering is not liable for any damage occurring in shipment, so the unit should be packed properly. The customer must pay all shipping costs. Further information may be obtained by calling UHF Engineering's Customer Service Department at (607) 722-9574 (collect calls will not be accepted) or writing

Customer Service Department
UHF Engineering
320 Water Street
Binghamton, New York 13901

The customer must pay all shipping costs.

No other warranties are expressed or implied. UHF Engineering is not responsible for damages which result as a consequence of or incident to using this unit.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

I. DESCRIPTION

The BLD 30/120 and BLD 10/120 are solid state VHF amplifiers designed for fixed or mobile operation. They are unique because they are operable in class C for FM or class AB for SSB or AM. The BLD 30/120 provides a nominal 120 watts RMS output power for an input power of 30 watts RMS, while the BLD 10/120 requires only 10 watts RMS. TR switching is done by RF sensing circuitry, eliminating external switching connections to the transceiver. Microstripline design eliminates tuning and permits operation over the entire band. Rugged balanced emitter RF power transistors insure long life and high SWR protection.

II. INSTALLATION

The BLD 10/120 and BLD 30/120 are high power VHF amplifiers requiring proper mounting and termination to assure maximum transistor life-times. The MRF 245 and the 2N6084 are extremely rugged devices; however, their lifetime is closely related to the operating tempera-ture. The cooler they are operated, the longer they will last. Lifetimes of properly cooled transistors can approach 100,000 hours.

For this reason, the duty cycle should be taken into consideration when mounting. The unit should be mounted with sufficient free air space above the heatsink fins to allow convection cooling. This should satisfy the cooling needs for short duty-cycle operation. For high duty-cycle operation (over 50% for maximum keyed time of 10 minutes) forced air cooling is necessary. Tests have shown a downward directed muffin fan of a capacity of 100 CFM or more placed directly on the heatsink fins midway between the ends of the amplifier will provide the required cooling to limit the temperature rise of the unit.

CAUTION

Heatsink temperatures of up to 100 degrees C can be reached during extended short duty cycle operation using only convection-cooling. Care must be taken to mount the amplifier in a location where acci-dental contact with personnel is not possible. Forced air cooling, however, has resulted in heatsink temperatures of 50 degrees Centigrade or less.

The DC current requirements of the amplifier make the use of #12 gauge or larger wire for supply connections a necessity. Connect the red wire to the positive terminal and the black wire to the negative terminal of the supply. For mobile use, the D.C. connections should be made directly to the 12V battery; connecting the power cables to the ignition switch or other wiring could cause serious damage. These units are for use only in negative ground systems.

VHF amplifiers are sensitive to impedance variations at the input and output terminations. To assure maximum power transfer and mini-mum power reflections, we recommend the use of good quality connectors

and 50 ohm coaxial cable. Lossy cable, when used with high power at 140-150MHz, can cause overheating of the coax. RG 58 A/U is usually sufficient for the input connections, while RG 8 A/U or better is recommended for the output transmission line. Length and poor solder connections can contribute to total power loss.

III. OPERATING INSTRUCTIONS

FM or CW OPERATION

1. MODE switch to FM.

2. On-off switch to ON.

When in this mode of operation the on-off switch will light when drive power is applied. The MODE switch will remain unlit. When on-off switch is off, the amplifier may be transmitted through. (any mode)

AM and SSB OPERATION

1. MODE switch to SSB.

2. On-off switch to ON.

Care must be taken to avoid over-driving the amplifier. Spurious outputs will be generated by driving the amplifier into a non-linear operating region. For this reason it is desirable to use a wattmeter between the amplifier and the antenna for adjustment purposes. While it is possible to adjust the drive to the amplifier experimentally by having another station check for splatter while adjusting the exciter drive and/or audio level controls, the following methods are preferred.

AM OPERATION

Connect a good quality wattmeter between the amplifier output and the antenna. Adjust the output level of the exciter so that the amplifier output is ½ of the "rated output" as given in the specifications. When the unit is 100% modulated, the PEP output power will be the rated power. If the drive to the amplifier is properly adjusted, the output power will fluctuate very little when the exciter is modulated. If the drive power is too high, the output power will fluctuate significantly when the exciter is modulated. If the AM carrier output of the exciter cannot be adjusted and the drive level appears to be too high (significant output power fluctuation during modulation), then the exciter microphone gain may be decreased to the point where the output power does not fluctuate. The positions of the microphone gain and output controls of the exciter should be marked for future reference.

SSB OPERATION

Connect a good quality wattmeter between the amplifier output and the antenna, or as an alternative, observe the output of the amplifier on

a field strength meter. Set the exciter gain to its minimum setting. While whistling into the microphone or speaking a loud constant sound into the microphone, increase the exciter microphone gain while observing the output indication on the wattmeter or field strength meter. The output will increase significantly as the gain is increased. At some point, the output will not increase or will begin to increase much more slowly. At this point (the clipping point), the amplifier will be operating in the non-linear region. The exciter gain should now be decreased slightly, by lowering the gain of the exciter so that the power reading is 10% lower than the clipping point. The position of the microphone gain control of the exciter should be marked for future reference.

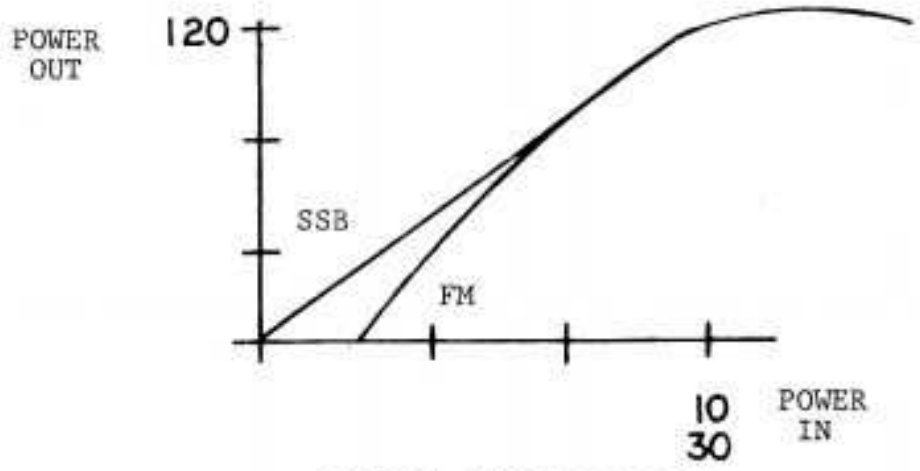
When the amplifier is in the "SSB" mode, the MODE switch will light when drive is applied. In this mode a built-in delay is provided to prevent the loss of words or syllables.

REPEATER OPERATION, RTTY OPERATION - Continuous duty operation is not recommended.

IV. THEORY OF OPERATION

The BLD 10/120 and the BLD 30/120 are wideband high-power VHF amplifiers. Solid state devices and microstripline construction assure high performance and reliability. The input and output impedances of each transistor are brought to an intermediate impedance level by microstripline transformers. These computer optimized, impedance matching networks minimize spurious parasitic oscillations and suppress carrier harmonics. Two of these networks are combined to form a two transistor unit having greater power handling capability than that attainable with a single device with the same gain. An additional stage of gain is provided in the BLD 10/120 to allow lower drive powers for the same output power capability as the BLD 30/120.

When the mode switch is in the FM position, the amplifier is not biased, i.e., class "C" operation. Class C operation requires a minimum threshold input drive power to obtain useful output power. In the SSB position, a DC bias is applied to the transistors allowing linear, class AB, RF power amplification.



TYPICAL POWER RESPONSE

In standby the output connector is connected to the input by a 50 ohm line, providing a low loss transmission of signals from the antenna to the receiver. If the RF drive is applied while the amplifier is in standby, the TR switching circuitry, which features RF detection and a high gain Darlington device, provides fast, sensitive activation of the relay. The relay, when activated, applies the drive to the input of the amplifier and connects the amplifier output to the output termination. After the relay is activated, positive feedback through R-6 will aid in holding the relay. This will result in hysteresis - the power level required for drop out of the relay will be lower than that required for its activation. In addition, for the SSB mode C-47 is switched across C-2 to provide a delay in the return to standby. This prevents chopping or losing parts of words.

If the power is disconnected or the unit is switched to the off position, one may receive and transmit through the amplifier.

V. TUNE UP PROCEDURES

The BLD 10/120 and BLD 30/120 are designed with broadband microstripline techniques. Consequently, the amplifiers need not be tuned by the customer.

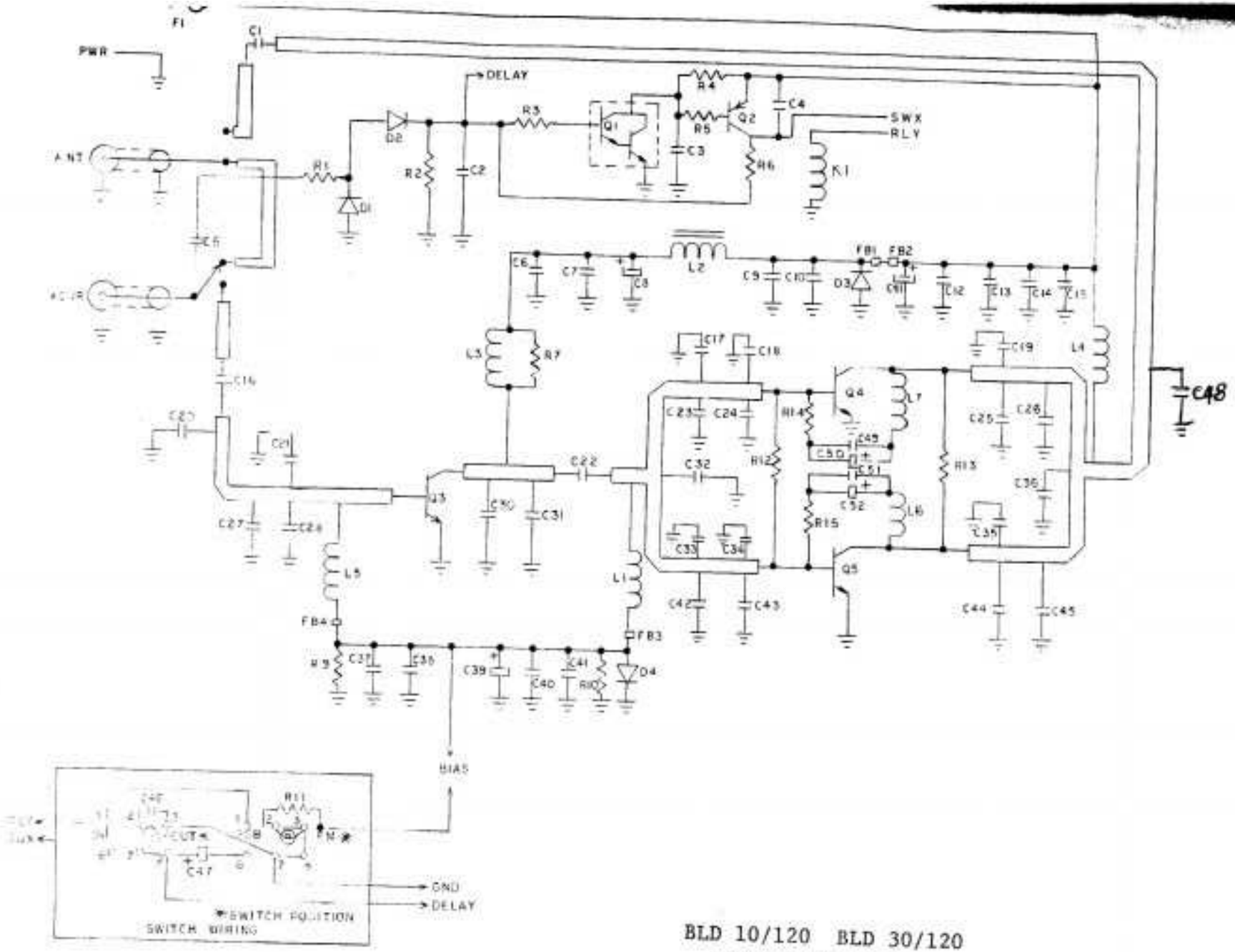
VI. SERVICING

For the first year, the unit will be covered by the limited warranty, unless modified or obviously misused. Check limited warranty for details. Units not covered by warranty may be returned to the factory for repair or alignment for a nominal charge, plus parts and shipping costs.

VII. CUSTOMER SERVICE

VHF Engineering's Customer Service department will assist customers with technical problems concerning all VHF Engineering units. If you have a query, please contact the Customer Service department at (607) 723-9574. Units having serious problems may be returned postpaid to the factory without authorization for evaluation and repair estimates with a note detailing the difficulty. Units qualifying for warranty service will be covered according to the warranties detailed in their manuals. For units not covered by a warranty, a nominal service fee plus parts and return postage will be charged. Units returned for service should be sent to:

Customer Service Department
VHF Engineering
320 Water Street
Binghamton, New York 13901



BLD 10/120 BLD 30/120
SCHEMATIC DIAGRAM

(5)

PARTS LIST

BLD 10/120 BLD 30/120

CAPACITORS

C1	220pf SM	(2010300)
C2	.022	(2010430)
C3	.001	(2010370)
C4	.001	(2010370)
C5	10pf	(2010070)
*C6	500pf UM	(2010320)
*C7	.022	(2010430)
*C8	1 MFD TAN	(2010460)
C9	.022	(2010430)
C10	500pf UM	(2010320)
C11	500pf UM	(2010320)
C12	100 MFD ELEC	(2010540)
C13	1 MFD TAN	(2010460)
C14	.022	(2010430)
C15	500pf UM	(2010320)
*C16	220pf SM	(2010300)
C17	68pf UM	(2010230)
C18	100pf UM	(2010240)
C19	100pf UM	(2010240)
*C20	15pf UM	(2010101)
*C21	100pf UM	(2010240)
C22	220pf SM	(2010300)
C23	47pf UM	(2010200)
C24	100pf UM	(2010240)
C25	100pf UM	(2010240)
C26	47pf UM	(2010200)
*C27	47pf UM	(2010200)
*C28	100pf UM	(2010240)
C30	68pf UM	(2010230)
C31	33pf UM	(2010170)
C32	68pf UM	(2010230)
C33	68pf UM	(2010230)
C34	100pf UM	(2010240)
C35	100pf UM	(2010240)
C36	22pf UM	(2010130)
C37	.022	(2010430)
C38	500pf UM	(2010320)
C39	100 MFD ELEC	(2010540)
C40	.022	(2010430)
C41	500pf UM	(2010320)
C42	47pf UM	(2010200)
C43	100pf UM	(2010240)
C44	100pf UM	(2010240)
C45	47pf UM	(2010200)
C46	.001	(2010370)
C47	4.7 MFD ELEC	(2010490)
C48	5pf UM	(2010051)
C49	.001	(2010370)
C50	1 MFD TAN	(2010460)
C51	.001	(2010370)
C52	1 MFD TAN	(2010460)

RESISTORS

R1	3.3K, 1W	(2020589)
R2	56K	(2020400)
R3	100K	(2020410)
R4	2.2K	(2020260)
R5	150	(2020130)
R6	1M	(2020470)
*R7	100, 1W	(2020110)
R9	4.7, 1W	(2020586)
R10	FACTORY SELECTED	
R11	47, 5W	(2020584)
R12	10, ½W	(2020040)
R13	10, 1W	(2020050)
R14	10, ½W	(2020040)
R15	10, ½W	(2020040)

SEMICONDUCTORS

D1	IN34	(1010010)
D2	IN34	(1010010)
D3	V350	(1010090)
D4	V350	(1010090)
Q1	MPS-A13	(1020186)
Q2	MJE-170	(1020187)
*Q3	2N6084	(1030090)
Q4	MRF245	(1030009)
Q5	MRF245	(1030009)

INDUCTORS

L1	.15 uH	(2040010)
*L2	VK-200-	(2040090)
*L3	5 turns #20 on R-7	
L4	5 turns #14	
*L5	.15 uH	(2040010)
L6	.15 uH	(2040010)
L7	.15 uH	(2040010)

MISCELLANEOUS

FB-1	Ferrite Slug	(2030120)
FB-2	Ferrite Slug	(2030120)
FB-3	Ferrite Bead	(3050220)
*FB-4	Ferrite Bead	(3050220)
K1	DPDT Relay	(3020030)

*Parts used only in the BLD 10/120