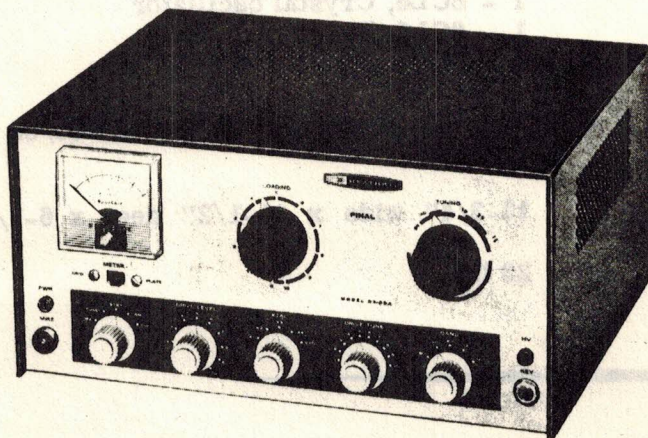


Assembly
and
Operation
of the



TRANSMITTER
MODEL DX-60B



HEATH COMPANY
BENTON HARBOR,
MICHIGAN 49022

*Don't release!
- my copy!*

CONDENSED
MANUAL

SPECIFICATIONS

Power Input.	90 watts CW and controlled-carrier phone.
Output Impedance.	50-75 Ω .
Output Coupling.	Pi network (coaxial).
Band Coverage.	80, 40, 20, 15, and 10 meters.
Front Panel Controls.	Meter switch Function switch Drive Level Crystal-VFO switch (4 crystal positions) Drive Tune Band switch Final Tuning Final Loading
Tube Complement.	1 - 12AX7, Speech amplifier 1 - 6DE7, Controlled-carrier modulator 1 - 6CL6, Crystal oscillator 1 - 6CL6, Driver 1 - 6146, Final amplifier
Power Requirements.	105-125 or 210-250 volts AC, 50/60 cps, 225 watts.
Cabinet Size.	13-3/4" wide x 11-1/2" deep x 6-1/2" high.
Net Weight.	23 lbs.

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obliga-

tion to incorporate new features in instruments previously sold.

HEATH COMPANY
BENTON HARBOR
MICHIGAN 48007

PARTS LIST

The numbers in parentheses in the Parts List are keyed to the numbers on the Parts Pictorial (fold-out from Page 9) to aid in parts identification.

To order a replacement part, refer to the Replacement Parts Price List and use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of the Manual. For pricing information, refer to the separate "Heath Parts Price List."

PART No.	PARTS Per Kit	DESCRIPTION
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RESISTORS

1/2 Watt

(1) 1-130	1	8.2 Ω (gray-red-gold)
1-41	1	10 Ω (brown-black-black)
1-45	1	220 Ω (red-red-brown)
1-79	2	820 Ω (gray-red-brown)
1-90	1	2000 Ω (red-black-red)
1-14	1	3300 Ω (orange-orange-red)
1-16	1	4700 Ω (yellow-violet-red)
1-69	1	18 K Ω (brown-gray-orange)
1-22	1	22 K Ω (red-red-orange)
1-24	2	33 K Ω (orange-orange-orange)
1-25	1	47 K Ω (yellow-violet-orange)
1-33	4	470 K Ω (yellow-violet-yellow)
1-35	2	1 megohm (brown-black-green)
1-37	1	2.2 megohm (red-red-green)
1-70	1	22 megohm (red-red-blue)

1 Watt

(2) 1-2-1	1	1000 Ω (brown-black-red)
1-24-1	1	4700 Ω (yellow-violet-red)

2 Watt

(3) 1-30-2	1	270 Ω (red-violet-brown)
1-15-2	1	1000 Ω (brown-black-red)
1-17-2	1	6800 Ω (blue-gray-red)
1-3-2	1	10 K Ω (brown-black-orange)
1-4-2	1	15 K Ω (brown-green-orange)
1-18-2	1	33 K Ω (orange-orange-orange)
1-10-2	1	47 K Ω (yellow-violet-orange)
1-24-2	2	100 K Ω (brown-black-yellow)

7 Watt

(4) 3-9-7	1	100 Ω wire-wound
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PART No.	PARTS Per Kit	DESCRIPTION
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CAPACITORS

Silver Mica

(5) 20-101	3	47 μmf
20-102	1	100 μmf
20-105	2	180 μmf

Molded Mica

(6) 20-64	1	120 μmf
20-48	1	.001 μfd , 2 KV

Disc

(7) 21-49	1	68 μmf , 4 KV
(8) 21-9	3	100 μmf
21-140	3	.001 μfd
21-71	1	.001 μfd 1.4 KV
21-57	14	.005 μfd
21-72	2	.005 μfd , 1.4 KV

Mylar*

(9) 27-115	2	.005 μfd
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Tubular

(10) 23-28	1	.1 μfd
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Electrolytic

(11) 25-16	1	20 μfd , 350 V
25-36	2	40 μfd , 450 V
(12) 25-206	1	20-20 μfd , 200 V
(13) 25-37	1	40-40 μfd , 450 V

Variable

(14) 26-64	1	1-section
26-102	1	2-section
26-101	1	3-section

CONTROLS-SWITCHES

(15) 11-20	1	25 K Ω control
10-58	1	100 K Ω twist-tab control
(16) 60-15	1	DPDT slide switch
(17) 63-290	1	1-wafer rotary switch
63-246	1	Ceramic rotary switch
(18) 63-244	1	2-wafer rotary switch

*DuPont Registered Trademark

PART No.	PARTS Per Kit	DESCRIPTION
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TRANSFORMER-COILS-CHOKES

54-179-24	1	Power transformer
40-644	1	Final amplifier coil
141-14	1	Coil and choke package consisting of:
(19)40-79	1	40 meter oscillator coil
(20)40-337	1	Driver plate coil
(21)40-347	2	.32 μ h low-pass filter coil
40-348	2	.44 μ h low-pass filter coil
40-349	1	.5 μ h low-pass filter coil
(22)45-3	1	1 mh RF choke
(23)45-4	1	1.1 mh RF choke
(24)45-19	1	Parasitic choke
(25)45-41	1	.425 mh RF choke

TUBES-LAMPS-DIODES

411-63	2	6CL6 tube
411-109	1	6DE7 tube
411-75	1	6146 tube
411-26	1	12AX7 tube
412-36	2	NE-2E neon lamp
413-11	1	Clear lens
413-10	1	Red lens
(26)57-27	5	Silicon diode

TERMINAL STRIPS-SOCKETS-PHONE JACK

(27)431-14	1	2-lug terminal strip (one lug ground)
(28)431-1	1	2-lug upright terminal strip
(29)431-10	3	3-lug terminal strip
(30)431-12	2	4-lug terminal strip
(31)431-40	1	4-lug terminal strip
(32)431-55	1	6-lug terminal strip
(33)431-45	1	6-lug terminal strip
(34)431-41	1	2-lug high voltage terminal strip
(35)431-43	1	3-lug high voltage terminal strip
431-42	2	5-lug high voltage terminal strip
(36)434-36	2	9-pin ceramic tube socket
434-43	2	9-pin molded tube socket
(37)434-39	2	Octal tube socket
(38)434-38	3	Crystal socket
(39)434-74	1	Crystal socket
(40)434-42	2	Phono socket
(41)436-4	1	Phone jack
(42)432-3	1	Microphone connector
(43)438-4	2	Phono plug

PART No.	PARTS Per Kit	DESCRIPTION
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WIRE-SLEEVING

89-1	1	Line cord
344-54	1	Yellow hookup wire
344-52	1	Red hookup wire
344-50	1	Black hookup wire
344-51	1	Brown hookup wire
344-6	1	Large red hookup wire
340-2	1	Small bare wire
340-3	1	Large bare wire
346-1	1	Sleeving
134-25	1	Wire harness

HARDWARE

(44)250-49	8	3-48 x 1/4" screw
(45)250-34	4	4-40 x 1/2" screw
(46)250-7	6	6-32 x 3/16" round head screw
(47)250-56	47	6-32 x 1/4" screw
(48)250-116	4	6-32 x 1/4" black screw
(49)250-89	6	6-32 x 3/8" screw
(50)250-8	26	#6 sheet metal screw
(51)250-152	1	10-24 x 3/4" screw
(52)251-1	10	6-32 spade bolt
(53)250-43	5	8-32 x 1/4" setscrew
(54)250-1193	2	8-32 x 3/8" setscrew
(55)252-1	8	3-48 nut
(56)252-15	4	4-40 nut
(57)252-3	55	6-32 nut
(58)252-4	4	8-32 nut
(59)252-30	1	10-24 nut
(60)252-31	1	10-24 wing nut
(61)252-7	7	Control nut
(62)252-22	4	6-32 speednut
(63)252-32	2	Push-on speednut
(64)254-7	13	#3 lockwasher
(65)254-1	78	#6 lockwasher
(66)254-2	4	#8 lockwasher
(67)254-3	2	#10 lockwasher
(68)254-5	1	Thin control lockwasher
(69)254-4	7	Control lockwasher
(70)253-9	4	#8 flat washer
(71)253-10	4	Control flat washer
(72)253-19	2	#10 flat washer
(73)259-6	5	#6 small solder lug
(74)259-1	2	#6 solder lug
(75)259-10	1	Control solder lug
(76)455-9	2	3/8" bushing
(77)456-7	2	1/4" shaft coupler

PART No.	PARTS Per Kit	DESCRIPTION
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METAL PARTS

90-358	1	Cabinet
200-425-1	1	Chassis
203-485	1	Front panel
205-259	1	Top plate
205-260	1	Bottom plate
(78) 206-271	1	Front shield
206-272	1	Rear shield
(79) 206-136	1	Oscillator shield
206-137	1	Driver shield
(80) 206-273	1	Center shield
206-274	1	Low-pass filter chassis

MISCELLANEOUS

453-66	1	5" shaft
453-102	1	7-7/8" shaft
462-122	5	Skirt knob
100-687	2	Knob with pointer assembly

PART No.	PARTS Per Kit	DESCRIPTION
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Miscellaneous (cont'd.)

(81) 73-4	4	5/16" grommet
(82) 73-1	1	3/8" grommet
(83) 261-9	4	Rubber foot
(84) 260-39	1	Anode clip (Appearance may vary)
206-3	1	2" tube shield
206-54	3	2-3/8" tube shield
(85) 65-9	1	Circuit breaker
(86) 75-24	1	Line cord strain relief
(87) 481-1	1	Capacitor mounting wafer
407-76	1	Meter
391-34	1	Blue and white label
	1	Manual (See front cover for part number.)
597-260	1	Parts Order Form
		Solder

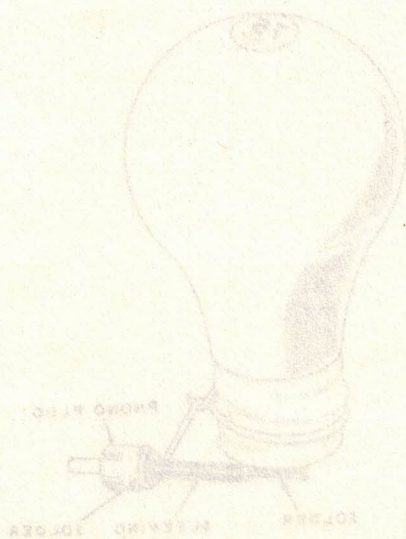


Figure 2

DESCRIPTION	PART NO.	DESCRIPTION	PART NO.
Microphone (see 15)	80-355	Control	80-355
1/2" x 1/2" x 1/2" (see 15)	80-356	Control	80-356
1/2" x 1/2" x 1/2" (see 15)	80-357	Control	80-357
1/2" x 1/2" x 1/2" (see 15)	80-358	Control	80-358
1/2" x 1/2" x 1/2" (see 15)	80-359	Control	80-359
1/2" x 1/2" x 1/2" (see 15)	80-360	Control	80-360
1/2" x 1/2" x 1/2" (see 15)	80-361	Control	80-361
1/2" x 1/2" x 1/2" (see 15)	80-362	Control	80-362
1/2" x 1/2" x 1/2" (see 15)	80-363	Control	80-363
1/2" x 1/2" x 1/2" (see 15)	80-364	Control	80-364
1/2" x 1/2" x 1/2" (see 15)	80-365	Control	80-365
1/2" x 1/2" x 1/2" (see 15)	80-366	Control	80-366
1/2" x 1/2" x 1/2" (see 15)	80-367	Control	80-367
1/2" x 1/2" x 1/2" (see 15)	80-368	Control	80-368
1/2" x 1/2" x 1/2" (see 15)	80-369	Control	80-369
1/2" x 1/2" x 1/2" (see 15)	80-370	Control	80-370
1/2" x 1/2" x 1/2" (see 15)	80-371	Control	80-371
1/2" x 1/2" x 1/2" (see 15)	80-372	Control	80-372
1/2" x 1/2" x 1/2" (see 15)	80-373	Control	80-373
1/2" x 1/2" x 1/2" (see 15)	80-374	Control	80-374
1/2" x 1/2" x 1/2" (see 15)	80-375	Control	80-375
1/2" x 1/2" x 1/2" (see 15)	80-376	Control	80-376
1/2" x 1/2" x 1/2" (see 15)	80-377	Control	80-377
1/2" x 1/2" x 1/2" (see 15)	80-378	Control	80-378
1/2" x 1/2" x 1/2" (see 15)	80-379	Control	80-379
1/2" x 1/2" x 1/2" (see 15)	80-380	Control	80-380
1/2" x 1/2" x 1/2" (see 15)	80-381	Control	80-381
1/2" x 1/2" x 1/2" (see 15)	80-382	Control	80-382
1/2" x 1/2" x 1/2" (see 15)	80-383	Control	80-383
1/2" x 1/2" x 1/2" (see 15)	80-384	Control	80-384
1/2" x 1/2" x 1/2" (see 15)	80-385	Control	80-385
1/2" x 1/2" x 1/2" (see 15)	80-386	Control	80-386
1/2" x 1/2" x 1/2" (see 15)	80-387	Control	80-387
1/2" x 1/2" x 1/2" (see 15)	80-388	Control	80-388
1/2" x 1/2" x 1/2" (see 15)	80-389	Control	80-389
1/2" x 1/2" x 1/2" (see 15)	80-390	Control	80-390
1/2" x 1/2" x 1/2" (see 15)	80-391	Control	80-391
1/2" x 1/2" x 1/2" (see 15)	80-392	Control	80-392
1/2" x 1/2" x 1/2" (see 15)	80-393	Control	80-393
1/2" x 1/2" x 1/2" (see 15)	80-394	Control	80-394
1/2" x 1/2" x 1/2" (see 15)	80-395	Control	80-395
1/2" x 1/2" x 1/2" (see 15)	80-396	Control	80-396
1/2" x 1/2" x 1/2" (see 15)	80-397	Control	80-397
1/2" x 1/2" x 1/2" (see 15)	80-398	Control	80-398
1/2" x 1/2" x 1/2" (see 15)	80-399	Control	80-399
1/2" x 1/2" x 1/2" (see 15)	80-400	Control	80-400

INITIAL TEST AND ADJUSTMENT

- () If an ohmmeter is available, measure the resistance from lug 1 of terminal strip G (+) to ground. The ohmmeter should "kick" down scale and then gradually rise to about 30 K Ω .
- () Attach a resistive type dummy load to the antenna connector on the low-pass filter. The Heathkit Cantenna Transmitter Dummy Load is such a type. If this type dummy load is not available, a dummy load constructed of a light bulb can be made as shown in Figure 2. The light bulb type dummy load may not work properly on all bands and therefore it is not recommended.
- () Select a crystal, preferably an 80 meter crystal, and install it in crystal socket X1 or X2 (depending upon the diameter of the crystal socket pins).

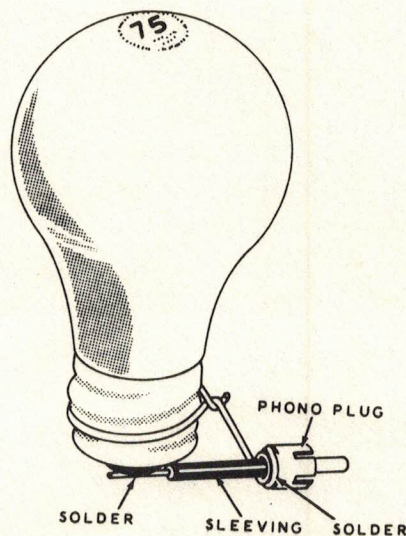


Figure 2

- () Place all controls except FINAL TUNING in their maximum counterclockwise position. (The FINAL TUNING control should be set to the panel marking for the band being used, on this case the 80 meter position.)

WARNING: HIGH VOLTAGES ARE PRESENT BOTH ABOVE AND BELOW THE CHASSIS. CARE SHOULD BE EXERCISED NOT TO TOUCH ANY HIGH VOLTAGE POINTS WITH YOUR HANDS. WELL INSULATED TOOLS SHOULD BE USED FOR ANY ADJUSTMENTS BEHIND THE FRONT PANEL. ALWAYS REMOVE THE LINE CORD PLUG WHEN SERVICING THIS TRANSMITTER.

WARNING: BE SURE ALL CONTROLS ARE SET AS LISTED PREVIOUSLY.

- () Plug the line cord into an AC outlet supplying the voltage for which the Transmitter was wired, 105-125 VAC or 210-250 VAC, 50/60 cps. CAUTION: Connecting the Transmitter to the wrong voltage could result in severe damage.
- () Turn the FUNCTION switch to the STANDBY (STBY) position. The clear neon lamp and all tube filaments should light. If any overheating, arcing, or smoke is noticed, immediately unplug the transmitter from the AC outlet and refer to the In Case Of Difficulty section on Page 40.
- () Turn the crystal switch to the X1 position. If an 80 meter crystal was installed in crystal socket X2, turn the crystal switch to the X2 position.
- () Turn the FUNCTION switch to TUNE.
- () Place the METER switch in the GRID position.

CAUTION: This transmitter produces more than sufficient grid drive on all bands. Be sure to reduce grid drive with the DRIVE LEVEL control when it exceeds 2.5 ma to prevent tube damage.

- () Advance the DRIVE LEVEL control to 1. Now, adjust the DRIVE TUNE control for maximum reading on the meter. (If the meter pointer goes off scale, readjust the DRIVE LEVEL control setting.) After peaking the DRIVE TUNE control, set the DRIVE LEVEL control for a reading of 2.5 milliamperes.

- () Return the Function switch to the STANDBY position.

WARNING: If you do not obtain a grid drive reading do not attempt to continue, since the final amplifier may be damaged. If at any point in the following steps the indicated results are not obtained, return the FUNCTION switch to STANDBY (STBY), and refer to the In Case Of Difficulty section on Page 40.

- () Place the METER switch in the PLATE position.
- () Turn the FUNCTION switch to the AM position and immediately adjust the FINAL TUNING control for a dip, or minimum plate current reading on the meter.
- () Turn the FUNCTION switch to CW.
- () Now advance the FINAL LOADING control approximately 1/8 turn. Readjust the FINAL TUNING control for a dip. Notice that the meter reading has increased slightly and possibly the dummy load will begin to glow.
- () Alternately advance the FINAL LOADING control in 1/8 turn steps, and each time readjust the FINAL TUNING control for a dip in the meter reading. Repeat this procedure until the meter reading, when at the minimum point of the dip, reaches 150 ma.
- () Place the METER switch in the GRID position and adjust the DRIVE LEVEL control for 2.5 ma. Return the METER switch to the PLATE position.
- () Place the FUNCTION switch in the STANDBY position.
- () Attach a crystal or other high impedance microphone to the MIKE jack. Turn the FUNCTION switch to the AM position and speak into the microphone. While speaking in a normal tone adjust the audio gain control (D), see Pictorial 14, until the meter peaks at approximately 75 ma. Now, return the FUNCTION switch to STANDBY.
- () Repeat the preceding steps with the BAND switch in the 40, 20, 15, and 10 meter positions. We suggest that you use 40 meter crystals for these bands. The MIKE gain need not be readjusted once it is set unless the microphone is replaced.

- () Set the BAND switch to 10 meters, the METER switch to the GRID position, and the XTAL switch to the position whose crystal socket should contain a 40 meter crystal that will multiply up to the center of the 10 meter band. Refer to Page 38 for crystal information.
- () Place the FUNCTION switch in the TUNE position and adjust DRIVE TUNE for maximum drive, setting the DRIVE LEVEL for normal 2.5 ma grid drive. Now, adjust 40-meter driver coil CA for maximum indication on the meter. Reduce the drive if excessive. See Pictorial 14 on Page 33.
- () Turn the transmitter off and remove the line cord plug from the AC outlet.

NEUTRALIZATION ADJUSTMENT

Neutralization is generally necessary to assure stable operation of the final amplifier. This is accomplished by carefully adjusting the neutralizing stub in the amplifier compartment until an RF indicator, coupled to the final plate tank circuit (with high voltage disconnected), reads minimum for resonant settings of both the DRIVE and FINAL tuning controls.

- () Refer to Pictorial 2 (fold-out from Page 17). Disconnect the large red wire, coming from breakout E, from lug 3 of terminal strip G. Position this wire so it does not touch the chassis or any other parts. (This removes B+ from the plate of the final amplifier.)
- () Plug the line cord into 117 V AC outlet.
- () Select a crystal frequency near the center of the 10 meter band.

- () Place the FUNCTION switch in the TUNE position and the METER switch in the GRID position.
- () Adjust the DRIVE LEVEL and DRIVE TUNE control for a normal operating level.
- () Loosely couple a grid dip meter to the 10 meter portion of the final tank coil, or connect the high impedance probe of a VTVM between the ANT connector and ground. Use a low AC range.
- () Set the FINAL LOADING control to zero and set the FINAL TUNING control for a maximum reading on the RF indicator.
- () Now, adjust the physical position of the neutralizing stub for a minimum reading on the RF indicator. Readjust the FINAL TUNING control for peak indication again, and also reposition the neutralizing stub for minimum RF indication. When the final amplifier has been neutralized, the FINAL TUNING capacitor can be rotated with very little variation in the RF indicator reading.

If an RF indicating device is not available a preset adjustment may be made as follows:

- () With the line cord unplugged from the AC outlet, adjust the neutralizing stub so that it is approximately 1/4" from the final amplifier tube.
- () Reconnect the large red wire to lug 3 of terminal strip G and solder.

If it becomes necessary to replace the final amplifier tube, be sure to recheck neutralization. If necessary to reneutralize, follow the neutralization procedure just completed.

OPERATION

NOTE: An Amateur Radio Operator and Station License is required to place this Transmitter on the air. Information regarding licensing and amateur frequency allocations may be obtained from publications of the Federal Communications Commission or the American Radio Relay League.

ANTENNAS

The pi network output circuit of the Transmitter will match pure resistive loads of 50 to 75 Ω .

The simplest type of antenna that falls into this impedance range is the "dipole," constructed so that its length is 1/2 wave at the frequency of operation. The 50 to 75 Ω impedance range also covers other antennas such as beams, verticals, and trapped antennas.

Much has been published on this subject of antennas and excellent articles can be found in the ARRL Handbook, Radio Handbook, and in most issues of CQ and QST magazines.

OPERATION WITH CRYSTALS

The Transmitter may be operated satisfactorily using the following crystals:

Band	Fundamental Crystals
80 meters	160 or 80 meter crystals
40 meters	80 or 40 meter crystals
20 meters	80 or 40 meter crystals
15 meters	40 meter crystals
10 meters	40 meter crystals

Crystal Information

Crystal sockets X2, X3,
and X4. Pin spacing .486".
Pin diameter .093".

Crystal socket X1. Pin spacing .486".
Pin diameter .050".

Novice operation imposes restrictions on operating frequencies as follows:

Band	Frequency
80 Meters	3700-3750 kHz
40 Meters	7100-7150 kHz
15 Meters	21,100-21,200 kHz
10 Meters	28,100-28,200 kHz

Novice power input is limited to 75 watts. In the operating instructions to follow, the final amplifier is loaded to 100 ma for Novice operation, which is within the present Novice power limitation.

CAUTION: Be sure to check the latest FCC regulations on frequency allocations and power input requirements. When ordering crystals be sure to stay well within amateur band edge limits and power input to avoid violations.

OPERATION WITH VFO

The accessory socket on the rear apron of the Transmitter makes available 6.3 V AC at 2 amperes, 300 V DC at 50 ma, and about -65 V DC key up for grid block keying of an external VFO.

Grid block keying of the VFO used is recommended to be compatible with the keying system used in the Transmitter. The Heathkit HG-10 VFO is designed to match the Transmitter. To use the HG-10 VFO, just plug its power cable into the accessory socket of the Transmitter and plug the RF cable into both units.

ACCESSORY SOCKET

See the Schematic and the lettering on the Transmitter rear apron for all filament, bias, relay, and B+ accessory connections.

OPERATING INSTRUCTIONS FOR CW OR AM

1. Plug the line cord into the AC outlet and check to be sure the antenna is connected.
2. Turn the FUNCTION switch to STBY.
3. Set the DRIVE LEVEL to about 2-1/2.
4. Select desired XTAL or VFO mode.
5. Select the desired BAND.
6. Set the FINAL TUNING capacitor in the desired band area as indicated on the front panel.
7. Set the FINAL LOADING control fully counterclockwise.
8. Set the METER switch to GRID position.
9. Turn the FUNCTION switch to TUNE.
10. Rotate the DRIVE TUNE control for maximum grid meter reading.
11. Set the DRIVE LEVEL to 2.5 ma of grid current.
12. Change METER switch to PLATE position.
13. Turn the FUNCTION switch to AM position.
14. Rotate the FINAL TUNING control to obtain a minimum plate current meter reading.
15. Turn the FUNCTION switch to CW.
16. While maintaining minimum plate current by tuning the FINAL TUNING control, increase the FINAL LOADING control in small steps in a clockwise direction until the Transmitter is loaded to 100 ma for Novice operation or 150 ma for regular operation.
17. Return the METER switch to GRID position.

18. Check and reset the grid drive to 2.5 ma if needed.
19. Return the FUNCTION switch to STBY.
20. Return the METER switch to PLATE position.

CW

1. Insert key plug in key jack.
2. When ready to transmit turn the FUNCTION switch to CW and proceed. (NOTE: In the key-up position on CW, the final plate current will be approximately 5 to 20 ma.)

AM

1. Remove key plug from key jack if in place.
2. Connect microphone.
3. When ready to transmit, turn the FUNCTION switch to AM and proceed.

OPERATING REMINDERS

- A. If frequency changes of more than a few kilocycles occur, the final amplifier and driver stages may require retuning.
- B. Operation of the Transmitter without a crystal, a proper antenna, or dummy load will result in component failure.
- C. Operation of the Transmitter with the final amplifier not tuned to resonance (minimum plate current) may ruin the final amplifier tube.
- D. Use caution and observe rules of safety in making all voltage and current measurements.
- E. Do not cover cabinet ventilation holes.

IN CASE OF DIFFICULTY

1. Recheck the wiring. Trace each lead in colored pencil on the Pictorial as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the constructor.
2. Check all solder connections carefully to make sure they are properly soldered. Be sure there are no solder bridges between two different foils. Usually a good solder connection is smooth and shiny. The wires are tightly soldered and cannot be pulled loose from the connection. It is interesting to note that about 90% of the kits that are returned to the Heath Company for repair, do not work properly due to poor solder connections. Reheat, and if necessary apply a little more solder, to all questionable connections.
3. Check to be sure that all tubes are in their proper locations. Make sure that all tubes light up properly.
4. Check the tubes with a tube tester or by substitution of tubes of the same types and known to be good.
5. Be sure the proper part is wired into the circuit in each position. Check the values of the resistors and capacitors. It is sometimes easy to misread the third color band on a resistor. For example, if a 22 K Ω (red-red-orange) resistor was installed instead of a 220 K Ω (red-red-yellow) resistor, the circuit would not operate properly.
6. Check for bits of solder, wire ends or other foreign matter which may be lodged in the wiring beneath the chassis.
7. If, after careful checks, the trouble is still not located and a voltmeter is available, check voltage readings against those found on the Schematic Diagram. NOTE: All voltage readings were taken with an 11 megohm input vacuum tube voltmeter. Voltages may vary $\pm 10\%$.
8. A review of the Circuit Description will prove helpful in indicating where to look for trouble.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual. Your Warranty is located inside the front cover.

TROUBLESHOOTING

Oscillator

To determine if the oscillator stage is operating, measure the voltage at pin 2 or pin 9 of tube V1. Key-down voltage should be -18 V DC; with the key up, the voltage should be -85 V DC. Also check other voltages around tube socket V1, and check wiring of the crystal sockets and CRYSTAL switch.

Driver

Driver voltage can be checked at pin 2 or pin 9 of V2. Key-down voltage should be -95 V DC, key-up voltage -85 V DC. If the oscillator bias was normal, but there is no driver bias with the key down, check the 40 meter coil. Try re-peaking this coil. If there is no bias on the driver stage with the key up or down, check the 1 mh RF choke, R6, and C1. Check all voltages around V2.

Final Amplifier

With the driver stage tuned for 2.5 ma drive, measure key-up and key-down voltage on V3.

If no operating bias is measured, check the rear wafer of the BAND switch, the 1.1 mh RFC, R11, R12, and R30. Check all voltages on V3.

If bias is normal (about -65 volts) but there is no dip in final plate current, check the front wafer of the BAND switch, and check for shorted plates in FINAL LOADING or TUNING capacitors. Remove the low-pass filter from the circuit by disconnecting it from the final amplifier tank coil, and check for a final plate current dip. If a dip is now obtainable, check assembly of the low-pass filter for possible wiring errors or shorts.

Audio Section

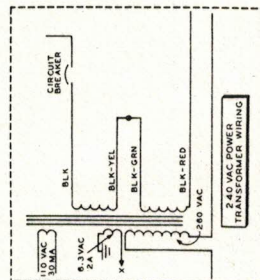
Carefully check the voltages on V4 and V5. Try a substitute microphone to further isolate

the problem. Be sure that the Audio Gain control is set properly. An audio oscillator and oscilloscope may be used for checking this stage.

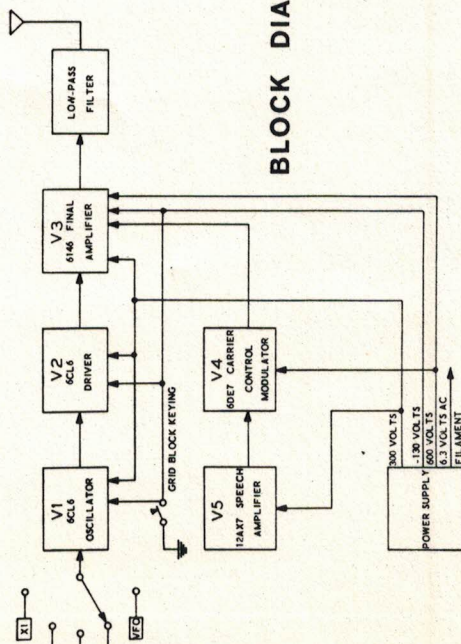
Power Supply

Voltage checks at various points in the power supply will localize the problem. If B+ voltage is low, check R35, the silicon diodes, C39, C40, and C41. If the -135 V DC bias is not present, check C37, C38, and the bias supply silicon diode D5. If the silicon diode is installed in reverse, +135 V DC would appear across C37 and C38.

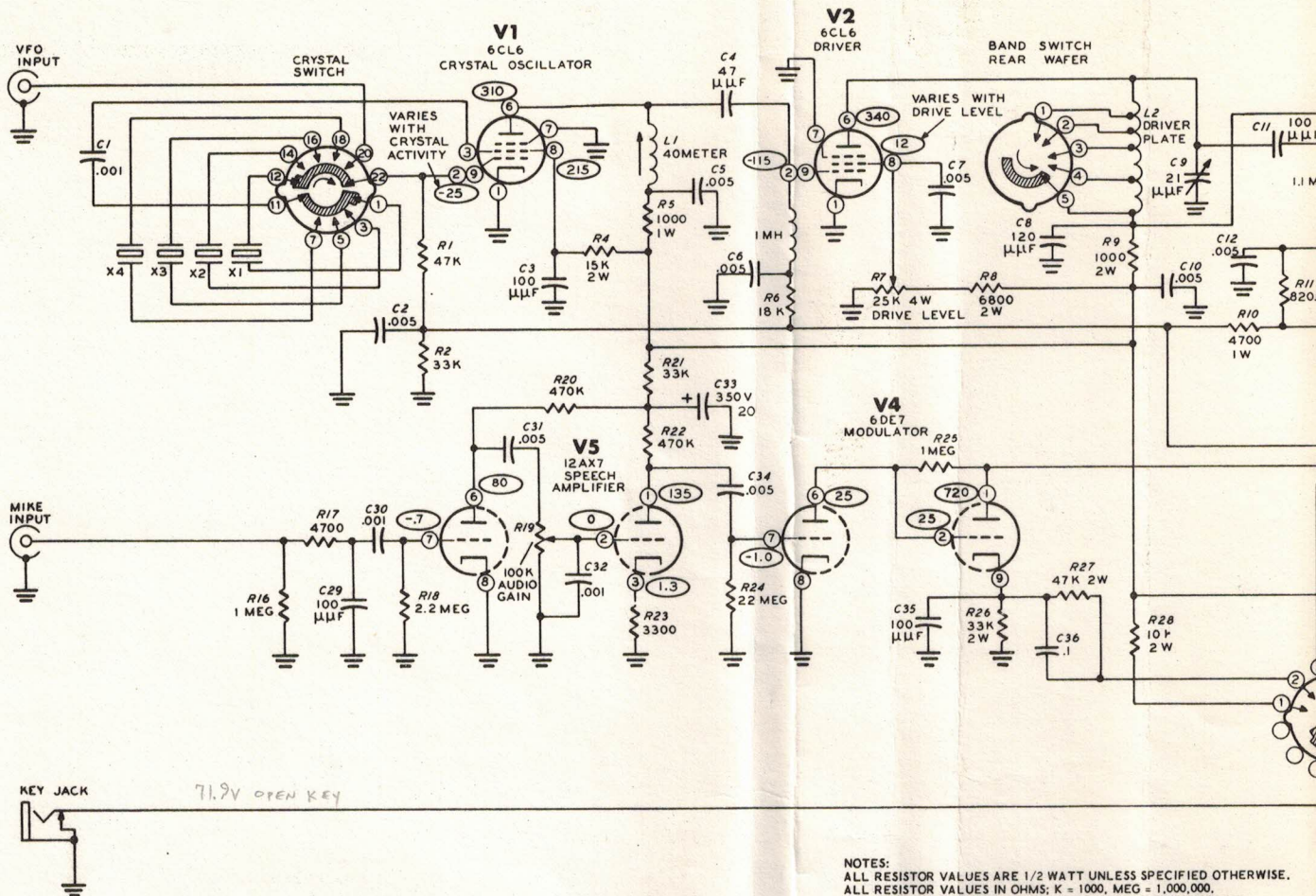
Part of 595-944-07



**Schematic of the HEATHKIT®
AMATEUR TRANSMITTER
Model DX-60B**

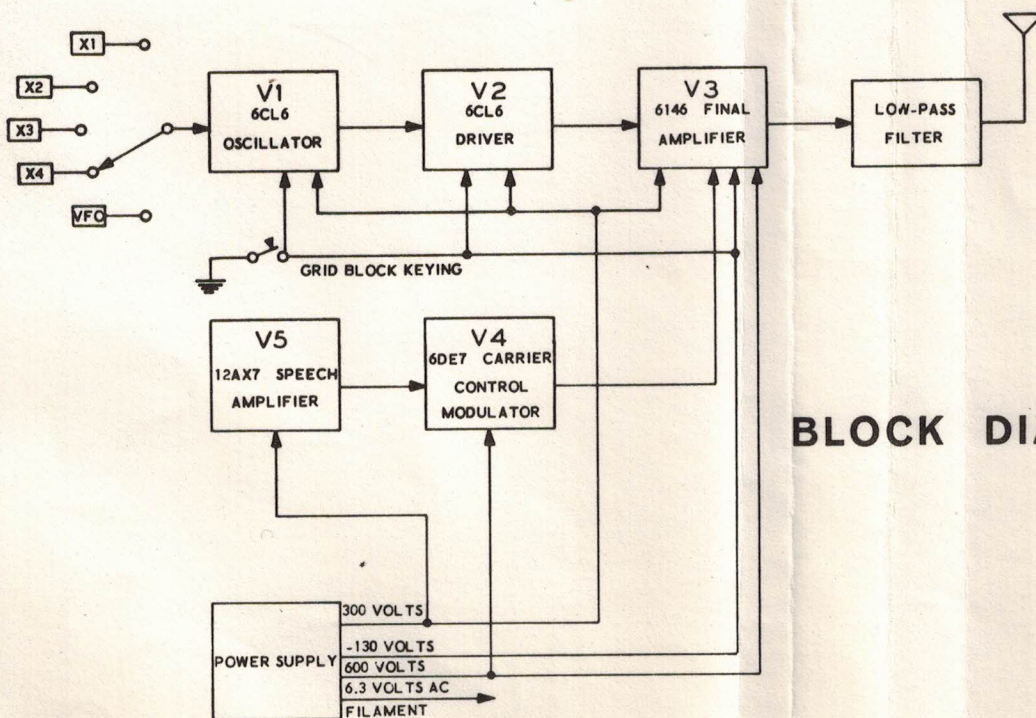


BLOCK DIAGRAM

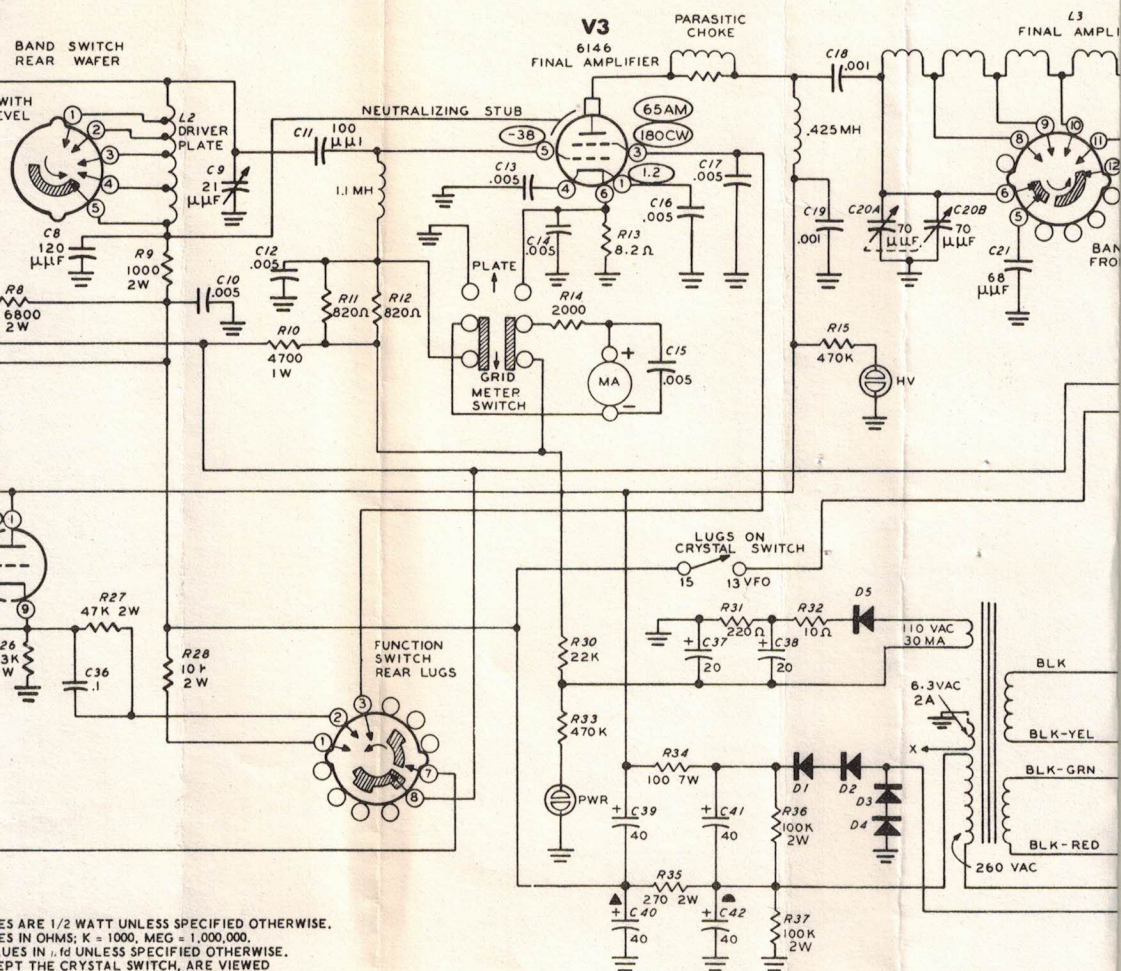


**Schematic of the HEATHKIT®
AMATEUR TRANSMITTER
Model DX - 60B**

NOTES:
ALL RESISTOR VALUES ARE 1/2 WATT UNLESS SPECIFIED OTHERWISE.
ALL RESISTOR VALUES IN OHMS; K = 1000, MEG = 1,000,000.
ALL CAPACITOR VALUES IN μ F UNLESS SPECIFIED OTHERWISE.
ALL SWITCHES, EXCEPT THE CRYSTAL SWITCH, ARE VIEWED FROM THE REAR. THE CRYSTAL SWITCH IS VIEWED FROM THE SHAFT END.
FUNCTION SWITCH SHOWN IN OFF POSITION.
BAND SWITCH SHOWN IN 80 METER POSITION.
Circles INDICATES VOLTAGE READINGS.
VOLTAGES TAKEN WITH FUNCTION SWITCH IN AM POSITION.
VOLTAGES TAKEN WITH AN 11 MEGOHM INPUT METER.
VOLTAGE READINGS ARE DC UNLESS SPECIFIED OTHERWISE.
VOLTAGES MAY VARY $\pm 10\%$.
VOLTAGES TAKEN WITH DUMMY LOAD CONNECTED.

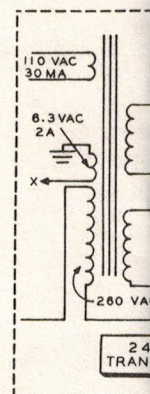
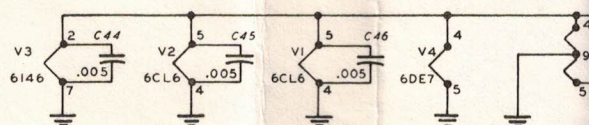


BLOCK DIAGRAM



RESISTORS ARE 1/2 WATT UNLESS SPECIFIED OTHERWISE.
RESISTORS IN OHMS; K = 1000, MEG = 1,000,000.
CAPACITORS IN μ F UNLESS SPECIFIED OTHERWISE.
EXCEPT THE CRYSTAL SWITCH, ARE VIEWED FROM THE
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SHOWN IN OFF POSITION.
IN 80 METER POSITION.
AGE READINGS.
WITH FUNCTION SWITCH IN AM POSITION.
WITH AN 11 MEGOHM INPUT METER.
ARE DC UNLESS SPECIFIED OTHERWISE.
VARIATION $\pm 10\%$.
WITH DUMMY LOAD CONNECTED.



DIAGRAM

