

Heathkit of the Month #131:
by Bob Eckweiler, AF6C



HOME, AUTO, BOAT.

Heathkit GD-39 / GD-49
The “Informer®” Ultrasonic Intrusion Alarm

Introduction:

Well, it's April again, and in celebration of April Fool's Day, it's time to present one of the more unusual Heathkit products. Our own club VP, Tim – N6GP, passed this kit on to me.

In 1969 Heathkit started a new line of “home protection” kits. A two-page layout in that year's main catalog (810-69 - pages 26 & 27)¹. announced the GD-77, GD-87 and GD-97. They are a “Receiver - Alarm”, a “Smoke - Heat Detector/Transmitter” and a “Utility Detector/Transmitter,” respectively. Three accessories were also offered; the GDA-97-1, -2 and -3. They are switches for windows, for doors and a 133° F heat sensor. The GD-77 sits beside your bed; A GD -87 is located wherever fire might likely occur, like the garage, kitchen and furnace room. A GD-97 is located wherever an on-off sensor, or multiple sensors are located. The GDA-97-1 and -2 are switches that can sense a window or door has opened. The GDA-97-3 detects high heat. While these sensors have to be wired to the GD-97, all three devices communicate over the house power lines.

Here is a link to the index of Heathkit of the Month (HotM) articles:

http://www.w6ze.org/Heathkit/Heathkit_Index.html

1. Notes begin on page 11



Figure 1: The Heathkit GD-39 book-like Intrusion Alarm. On the left is the unit; on the right is the book-like sleeve it slides into for concealment.

In 1973 Heathkit introduced a stand-alone ultrasonic intrusion alarm to its growing home protection kits. It is the GD-39 Intrusion alarm. (**Figure 1**). Measuring 10-1/8” high x 2-3/8” wide by about 7-1/2” deep in its book-like sleeve; it is the size of a typical hard-back book. On the book's spine a title is printed - “The Informer” and also “Heath”, as if that is the name of the author. Two round “decorative circles” on the spine house the sending and receiving ultrasonic transducers.

The GD-39 first appeared in the Spring 1973 catalog² (**Figure 2**). It initially sold for \$49.95.

2
EVENING
KIT

49⁹⁵
NO MONEY DOWN

Outdoor Alarm Bell. Heavy duty 6" bell has loud clear ring (83 dB at 10'). No mechanical clatter, no adjustments. Shock-proof die-cast housing with gray bonderized finish. Dust-proof, enclosed mechanism. Plugs into back of Intrusion Alarm. Measures 7" x 7" x 3 1/4". Universal mounting plate included.
Kit GDA-39-2, 5 lbs., available**26.95**

NEW Ultrasonic Intrusion Alarm

Disguised as your copy of "The Informer", the Heathkit Intrusion Alarm unobtrusively sits on a table or shelf. But behind the two decorative circles on the spine is a sophisticated solid-state ultrasonic transceiver. Flip the out-of-sight switch to activate the system, and the transmitter disperses a 41 kHz signal through the room. This signal bounces off walls and returns to the internal receiver where it is monitored for any change in amplitude. Any movement within the field of surveillance produces a change in the signal that is perceived by the receiver, which then triggers the lamp outlet, followed approximately 30 seconds later by the alarm outlet. This built-in delay time between light and alarm allows you to enter the room and deactivate the Intrusion Alarm without tripping the audible signal. A second hidden switch lets you set the lamp and alarm for automatic reset after the alarm has sounded for 25 seconds. Or this switch can be left in the normal position and the alarm will stay on until manually reset.

The Heathkit Intrusion Alarm also can do double duty as an automatic light switch in a dark hallway or sick room, or alert parents to night-walking children. Here is reliable home protection in an inconspicuous, easy-to-install package. Order one or more for your home. Note: As the GD-39 Ultrasonic Alarm operates in the same frequency range as Ultrasonic TV Remote Controls, interference between the two is possible.

Kit GD-39, 4 lbs., available**49.95**
GD-39 SPECIFICATIONS — Operating range: Varies with installation. Typical maximum range is 25 ft. Operating times: Turn-on delay: Approximately 10 sec. Alarm delay: 20 to 30 sec. (lamp-on time). Automatic reset delay: 20 to 30 sec. (alarm-on time). Ultrasonic frequency: Approximately 41 kHz. Power outlets: Two AC sockets: One for Lamp, one for Alarm. Power outlet current: Three amperes total for both. Power requirements: 110-130 or 220-250 VAC, 50/60 VAC, 50/60 Hz, 1 1/2" W. Dimensions: Chassis only, 2" W x 9 1/4" H x 7" D (approximately). In book-style cover, 2 3/4" W x 10 1/4" H x 7 1/2" D (approximately).

Figure 2: Introductory Ad for "The Informer" ultrasonic intrusion alarm. (Spring 1973 catalog #800-65 - page 12)

Two accessories were available: the GDA-39-2 Outdoor Bell (\$26.95), and the GDA-39-1 Indoor Buzzer Alarm, (\$9.95) not shown in ad. By the fall of 1980 the GD-39 price had risen to \$59.95.

The GD-49:

In the Christmas 1980 catalog (#851 - page 6), without any fanfare "The Informer" was shown with a new model number - GD-49, still \$59.95. Comparing manuals, there were three non-sig-

nificant changes: Different transistors were used in the circuit, which remained identical; different model transducers were used and the variable inductor came paired with one of the transducers in the set, instead of as a separate part. A list of changed parts is shown in **Table I**.

The GD-49 continued to sell. It appeared on page 17 of the Christmas 1987 catalog (#208) selling for \$79.95. The next catalog in the au-

TABLE I - PARTS CHANGES FROM GD-39 to GD-49						
GD-39			GD-49			Notes:
Part #	Desc.	Qty	Part #	Desc.	Qty	
417-118	2N3393	17	417-801	MPSA20	17	Both general purpose NPN transistors.
417-91	2N5232A	2	417-283	SM07275	2	Both low noise, high gain transistors
73-124	Grommet	2	73-180	Grommet	2	New Grommet to fit new transducers
202-604-2	Metal part	1	202-604-3	Metal part	1	Identical rear panels with differing silkscreen part #
202-603	Metal part	1	202-626	Metal part	1	New transducer mounting panel
40-1626	Inductor	1	Part of 100-1777 Ass'y		-	
85-1217-2	PC Board	1	85-1217-3	PC Board	1	Identical boards except for silkscreening
438-62	RCA plug	2	Not used		-	Only GD-39 transducers have RCA jacks.
595-1481	Manual	1	595-2451	Manual	1	GD-39: 595-1481-11; GD-49: 595-2451-01
473-11	Xdcr pair	1	-	-	-	Matched Transducers w/ RCA jack. (41.2 KHz)
-	-	-	100-1777	Xdcr set	1	Matched Transducers w/ solder terminals. One transducer marked (T) also matched to included inductor.

thor's collection, Spring of 1988. (#211) no longer listed the GD-49, and almost all the items in the security section of the catalog were being sold fully assembled.

switch and power cord exit are two AC sockets. The upper is marked **ALARM** and lower is marked **LAMP**. When motion is detected the LAMP socket becomes energized. Then, after

GD-39 / GD-49 Specifications:

Table II gives the specifications of the GD-39. The GD-49 is identical. While not mentioned in the specs, the plug power cord and sockets for both "Informer" models are three-wire³.

Features of the GD-39 / GD-49:

The GD-39 and GD-49 are identical in function and layout. Unless otherwise stated a reference to GD-39 is also true for the GD-49.

The rear panel of the GD-39 contains all the controls and connections. **Figure 3** is a drawing of the rear panel taken from the manual. At the top is the AC **POWER** switch. When turned to **ON** it delays listening for approximately 10 seconds to give the user time to leave the area of detection⁴. Below the POWER

SPECIFICATIONS GD-39 / GD/49	
Operating Range:	Varies with installation. Typical maximum range is 25 feet.
Operating Times:	
Turn-on Delay:	Approximately 10 seconds.
Alarm Delay:	20 to 30 seconds (lamp-on time).
Automatic Reset Delay:	20 to 30 seconds (alarm-on time).
Ultrasonic Frequency:	Approximately 41.2 kHz.
Power Outlets	Two AC sockets (lamp and alarm).
Power Outlet current	Three amps total for both sockets. (360 watts at 120 volts AC)
Power Requirements	110-130 or 220-260 VAC 50/60 Hz. 1-½ watts excluding socket draw.
Dimensions:	Chassis only, 2"W x 9-¼"H x 7" D. In book cover: 2-¾"W x 9-¼"H x 7½" D.
Net Weight:	Approximately 3 lbs. in book-style cover; approximately 2-¼ lbs. without cover.

TABLE II

approximately 30 seconds, the ALARM socket becomes energized. These sockets can supply up to 3 amperes (360 watts) combined. Larger loads need an external relay. Below the sockets is the **AUTO RESET - HOLD** switch. In the AUTO RESET position the GD-39 will reset after about 30 seconds. In the HOLD position the ALARM and LIGHT socket will remain energized until the GD-39 is manually reset by turning the POWER switch to **OFF** and then back to ON. Below the AUTO RESET - HOLD switch is the **SENSITIVITY** control. This can be adjusted to a particular room or area for positive detection without false triggering.

Assembling the GD-39:

Heathkits have always been fun to assemble. One could consider the assembly itself a hobby. However, unlike most hobbies, after a few days or weeks of enjoying the hobby, you end up with something practical that you can use for years. This kit is considered a two-evening kit; see the little owl caricature in FIGURE 2. One has to wonder if using an owl means these are going to be late evenings? This kit uses a circuit board, and except for the two transducers, two slide switches, two outlets, the SENSITIVITY control and the power cord with its strain relief, all the components mount on the printed circuit board.

Assembly progresses as follows: First, an unusual step. There are two

holes in the board that need to be threaded. That is accomplished by screwing a 6-32 3/8" self-tapping screw into the holes, one-at-a-time, and then discarding the screw. Machine screws will be put into these holes later to act as switches during checkout.

Second, the components are mounted on the board in groups, starting with components that mount close to the board (resistors and diodes). They are installed one quadrant at a time starting at the upper left of the board and going counter-clockwise. For each quadrant components are installed in groups, checked and soldered to the board. The amount of components installed in each group varies, but are usually eight or less. Once the smaller components are installed, the same routine is repeated to install the taller components (capacitors, transistors, the inductor, the power transformer and a few remaining diodes). Last, one or two jumpers are soldered in depending on whether the device is going to run off 120 or 240 volt power. The board is now complete except for the two relays which get installed later.

Next the chassis is assembled. First two rubber grommets that hold the transducers are installed on the transducer panel. Then that panel is joined with the control panel. Together, they make up the chassis.

The circuit board is mounted inside the chassis, and the components located on the

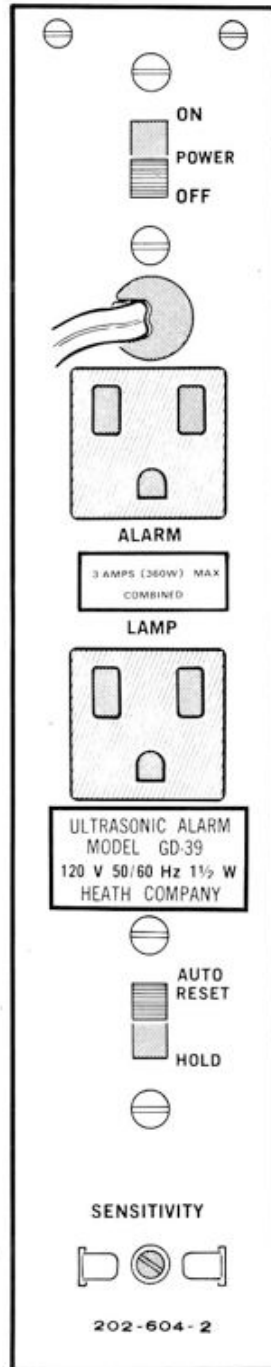


Figure 3: Rear panel of the GD-39, The GD-49 is identical except it is silkscreened GD-49 in the box. The function of each item is discussed in the text.

back panel are all mounted and wired to the circuit board.

On the GD-39, two short cables are made with a phono plug on one end. The non-plug ends are soldered to the circuit board. Then the transducers are mounted in their grommets and connected to the board via the plugs. On the GD-49 wire leads are soldered to the transducers; those leads are then soldered to the circuit board, and the transducer is mounted. Finally, the two relays are soldered to the board, and the line cord

with the strain-relief is installed and wired to the board and power switch.

Installation and Operation of the GD-39:

While the GD-39 was designed to operate stand-alone, it can be incorporated with the other Heath home protection devices. The GD-39 manual covers this in detail. This section is not in the GD-49 manual because the GD-77/87/97 were no longer in production.

Multiple GD-39s can also be hooked together to trigger one alarm. However, each unit will require

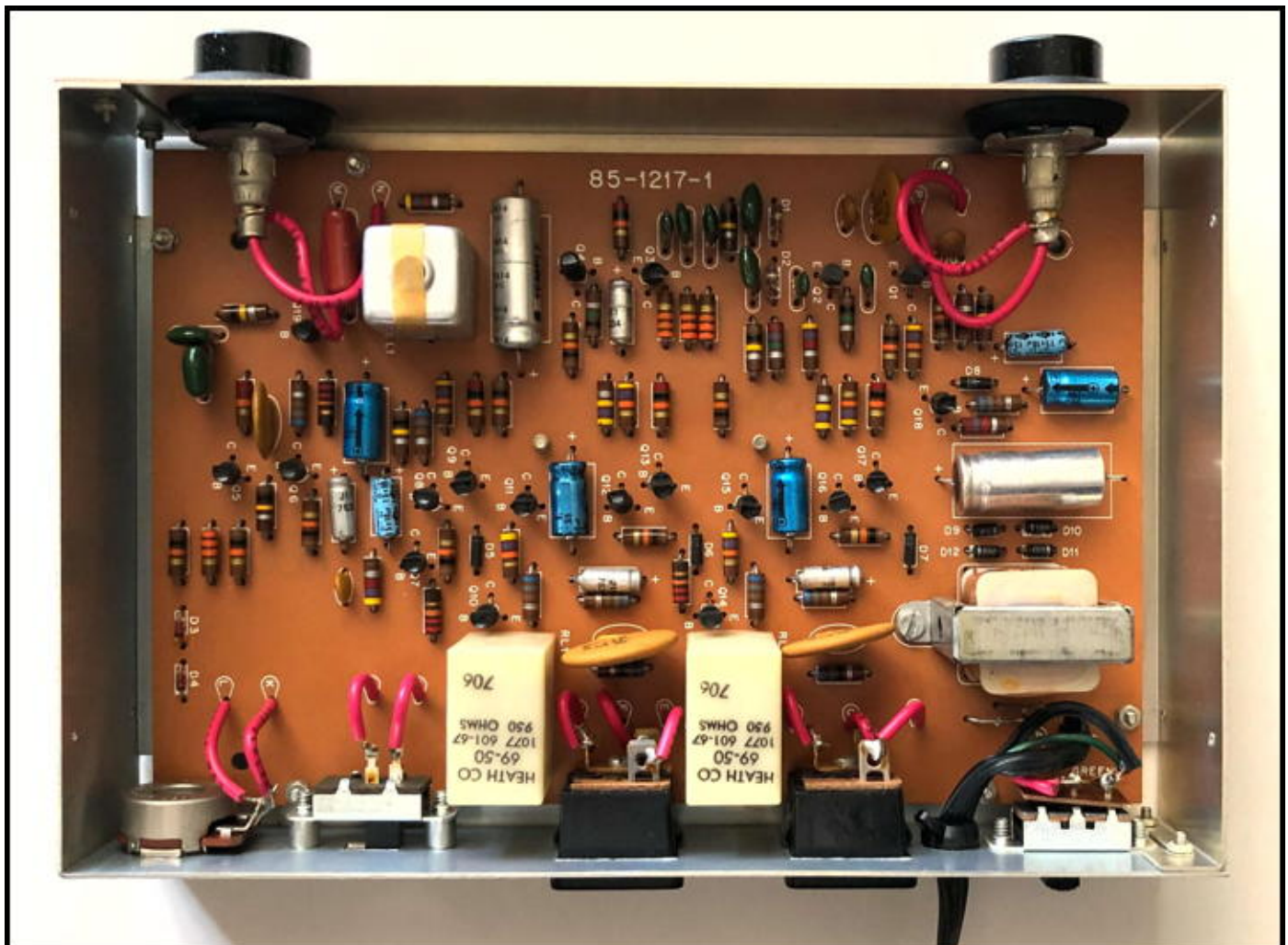


Figure 4: Component-side view of the circuit board installed in the chassis of the GD-39. The transducers are at the top. The one on the left is the transmitter with the receiver transducer on the right. Note the connection to the transducers uses phono plugs. The power transformer is in the lower right, and the two yellow objects (lower center) are the relays. The silver rectangular object near the upper left is the inductor. Tim - N6GP did the assembly back in the seventies. It is very well assembled.

an external relay to safely isolate the line hot lead, as some may be on different fused circuits. Failure to do so can create a fire hazard.⁵

When using a single GD-39, the unit should be strategically placed where an intruder would likely enter or pass. The GD-39 is then plugged into a wall outlet, and a lamp (or other device) is plugged into the LAMP socket. Whatever you decide to use as an alarm is then plugged into the ALARM socket. The lamp and alarm

must be the same voltage the power supply is wired for (either 120 or 240 VAC nominal power.) If you need to drive something requiring a non-compatible voltage, an external relay should be used. If you just want a light to come on when someone enters the room you don't need to plug anything into the ALARM socket.

Once set up, the power switch is turned to ON. The operator then has about 10 seconds to leave the area before the system becomes active.

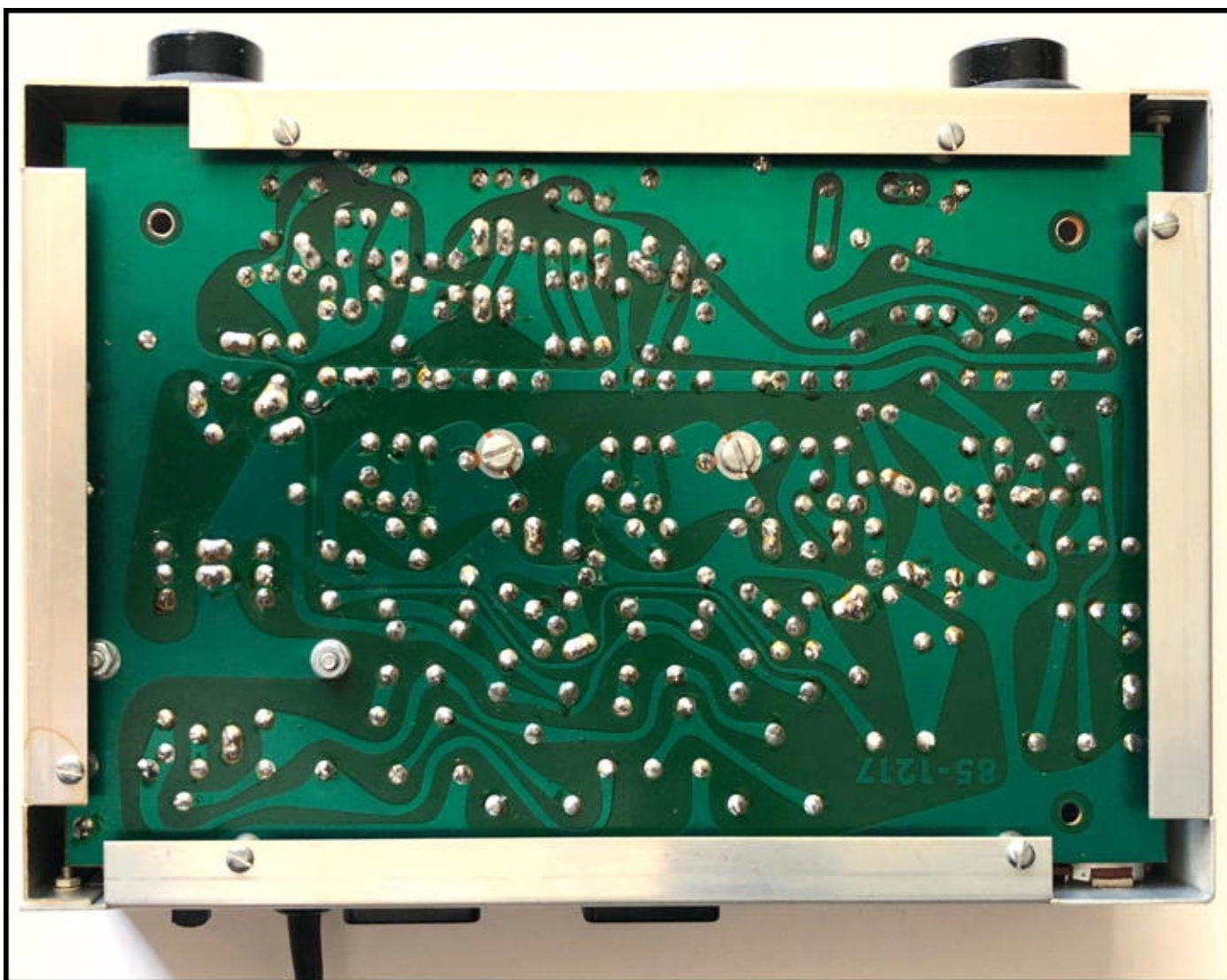


Figure 5: Foil-side view of the circuit board installed in the chassis of the GD-39. The two slotted screws near mid-center of the board can be tightened to shorten alarm and auto-reset times during checkout or troubleshooting. The screws are loosened for normal operation - or removed, fitted with a fiber washer and reinstalled. Nice soldering by N6GP.

Should anyone, family member or intruder, enter the room and be detected by the GD-39, the LIGHT socket will be activated. If a lamp is plugged in, it will activate, If an alarm or such is plugged into the ALARM socket it will activate in 20 -30 seconds. The ALARM socket will remain powered either continually until it is manually reset, or until an automatic reset occurs, depending on the position of the ALARM RESET - HOLD switch. The automatic reset will occur after about 30 seconds.

The schematic of the GD-39 is too large to include with the article. However, it may be downloaded from:
<https://www.w6ze.org/Heathkit/GD39/GD-39Sch.pdf>

more are the Schmitt triggers #1 through #3. Two are relay controls for the LAMP and ALARM sockets. And the remaining two are the power supply and transmitter.

The circuit uses 19 transistors. Q1 and Q2 are low noise transistors and are used in the initial stages of the receiver. The GD-39 uses the 2N5232A (417-91), and the GD-49 uses the SM07275 (417-283). The remaining transistors Q3 through Q19 are all the same general pur-

The GD-39: Circuit Description:

Figure 6 is a Block Diagram of the GD-39/49. There are 10 blocks: Three are the receiver with its low frequency amplifier and detector. Three

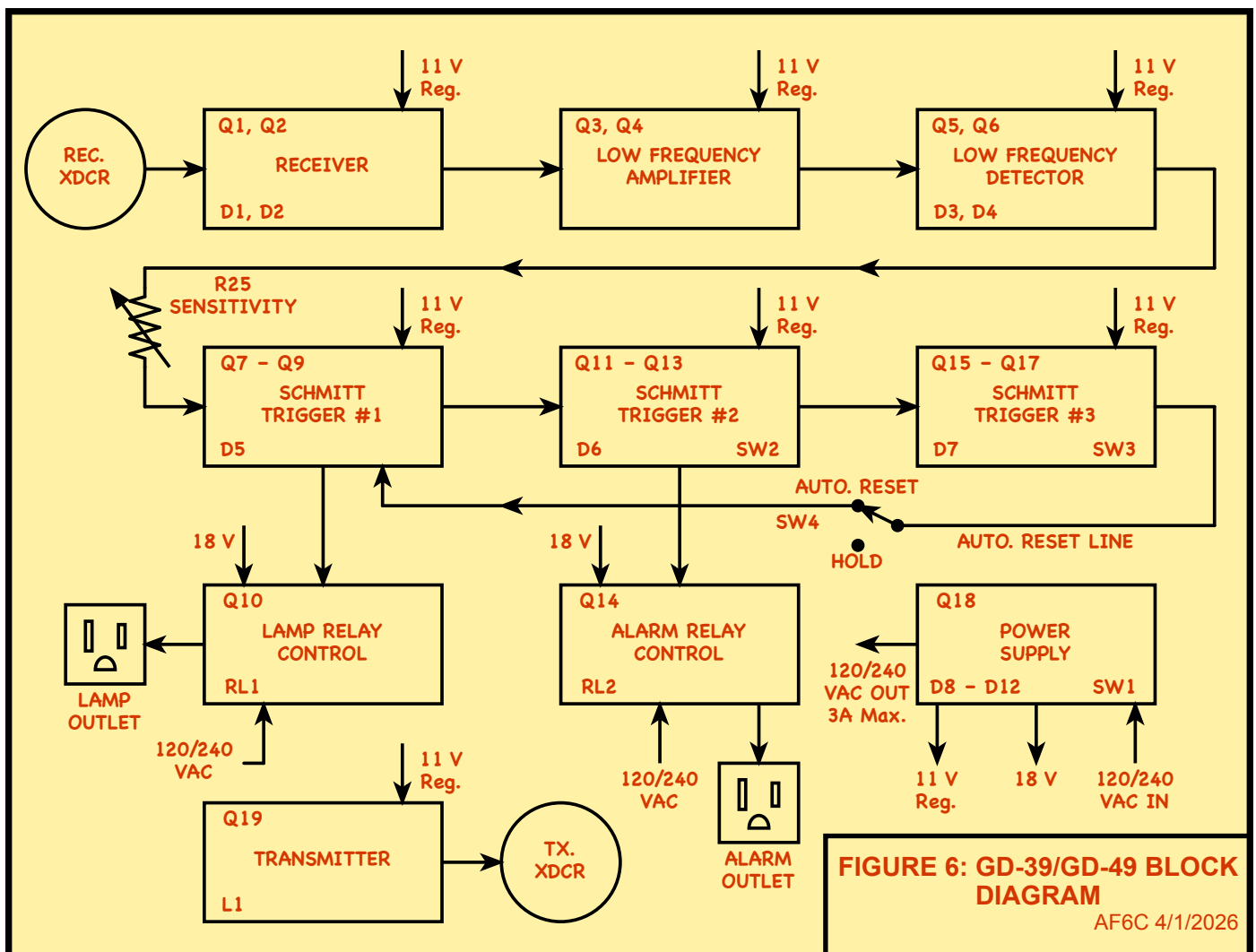


FIGURE 6: GD-39/GD-49 BLOCK DIAGRAM
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pose type. The GD-39 uses the 2N3393 (417-118), and the GD-49 uses the MPSA20 (417-801).

Receiver

The output from the ultrasonic transducer is coupled to the base of low-noise transistor Q1 through a low-pass filter composed of R3, in series with the impedance of the transducer, and C2. The collector is coupled through C4 to the base of Q2, another low-noise transistor, which further amplifies the 41 KHz signal. The signal is then fed to D1 and D2 that act as a voltage doubling detector. R9 forward biases the diodes by passing a 3.5 μ A current through them, increasing their sensitivity.

This detected signal follows the amplitude of the received 41 KHz signal.

When "The Informer" is initially turned on the emitter of Q1 is at 3.5 V due to the voltage divider of R5 and R6. Meanwhile the base is at just under 1 V since C1 is fully discharged. As C10 charges, the base voltage increases until Q1 starts to conduct and amplify the signal from the transducer. This instills a delay, giving the person turning the unit on time to leave the area without triggering an alarm.

Low Frequency Amplifier

The detected signal is filtered by a three-pole low-pass RC filter with a cutoff of just a couple of hundred hertz. Q3 is an emitter follower to present a high impedance to the output of the filter. The output of Q3 is then coupled to Q4 through C13 where it is further amplified. The amplified signal is coupled to the low frequency detector via C27.

Low Frequency Detector (LFD)

The sensitivity control, R25, controls the level

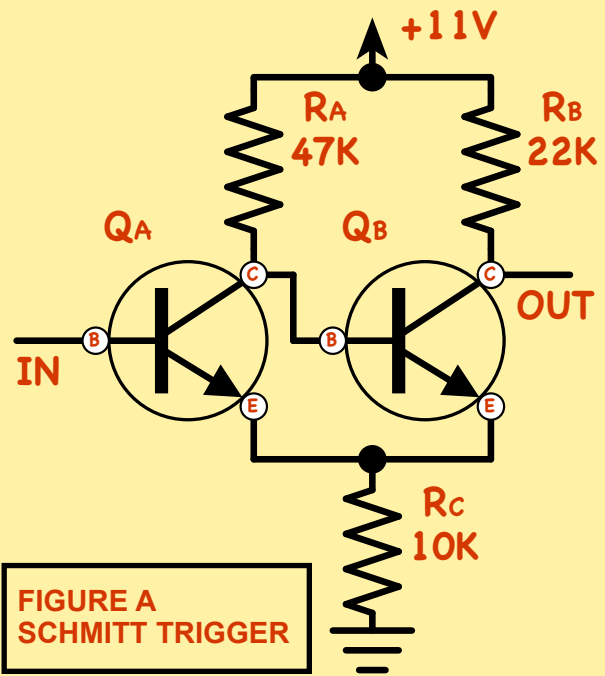
THE SCHMITT TRIGGER

Figure A shows the basic circuit of a Schmitt trigger. When power is first applied Q_B starts to conduct receiving base current through R_A. R_B and R_C make up a voltage divider, resulting in both emitters seeing around 3.4 volts, and the output is just a bit above 3.4 volts.

As the input voltage increases, nothing happens until the voltage reaches about 4.0 volts and Q_A begins to conduct, drawing base current away from Q_B, reducing the emitter voltage, which, in turn causes Q_A to turn on more. This positive feedback quickly causes Q_A to saturate and Q_B to turn off completely. Now the emitter voltage is determined by the voltage divider action of R_A and R_C, and the emitters see a voltage of around 1.9 volts. With Q_B cutoff the output voltage quickly rises to 11 volts.

Now, as the input voltage decreases, nothing happens until the voltage drops to about 2.5 volts and Q_A starts to turn off, turning on Q_B and increasing the emitter voltage. Again positive feedback will cause Q_A to turn off and Q_B to saturate very rapidly, returning the circuit to the initial power on state.

Thus the input has a 1.5-volt hysteresis effect turning on at 4.0 volts and off at 2.5 volts. The Schmitt trigger is very useful for contact debouncing and positive switching in noisy environments.



**FIGURE A
SCHMITT TRIGGER**

of the signal reaching the LFD and Q5. R23, D3 and D4 set a fixed bias level for Q5 that puts it barely into saturation. Any fluctuation on the base will un-saturate Q5 causing a pulse at its collector. This pulse is fed to Q6 which is across R31, the upper side of a voltage divider consisting of R31 and R32. This pulse is fed to Schmitt trigger #1. However, to prevent false actuation C19 is located across R32 and integrates the pulses preventing a single short pulse from triggering the alarm. A low-pass filter, comprised of R33 and C22, further prevents a false triggering.

Schmitt Trigger #1 & the Lamp Cntl. Relay

The basic operation of the Schmitt trigger is discussed in the sidebar. It is suggested the reader become familiar with it before continuing.

The normal input bias to the Schmitt trigger is set at about 3.4 volts in the LFD by R32 and R33. The LFD is incapable of sending a voltage low enough to reset the Schmitt trigger. When a pulse does make it through, the LFD, Schmitt #1 triggers. Q9 goes high and turns on Q10. Zener diode D5 acts as a level converter and also isolates R22 and Q10 from the R37 – R38 voltage divider. With Q10 on, relay RL1 actuates applying AC voltage to the LAMP socket. R42 and C24 protect Q10 from any voltage transients created when the relay coil turns off. Likewise R62 and C32 protect the relay contacts when they open under an inductive load. When Q10 turns on, its collector drops from a bit under 11 volts to almost zero volts. This signal is sent to Schmitt trigger #2.

Q7 is normally off. When turns on it shorts the base of Q8 to below the reset level and Schmitt trigger #1 resets. C23 prevents noise from re-

setting the alarm. Q7 is triggered by Schmitt trigger #3 and will be discussed there.

Schmitt Trigger #2 & the Alarm Cntl. Relay

The signal from Schmitt trigger #1 is connected to the base of Q11, which is normally on and holding C25 totally discharged. When Q11 turns off, C25 starts to charge through R45. When the charge reaches about 4 volts, which takes about 20 – 30 seconds, Schmitt trigger #2 triggers. As in the previous paragraph, Q14 turns on, the relay is activated powering the ALARM socket and a signal is sent to Schmitt trigger #3.

Schmitt Trigger #3 & Reset

Schmitt trigger #3 operates just as Schmitt #2 does, and is triggered after C27 charges to about 4 volts after another 20 – 30 second delay. The only difference is that there is no relay operated. Instead, depending on the setting of the AUTO RESET – HOLD, a signal is sent back to Q7, discussed earlier, resetting, Schmitt trigger #1, and cascading via Q11 and Q15 to reset Schmitt #2 and #3 respectively.

Power Supply

The transformer, T1, has a dual primary that can be wired for 120 or 240 VAC. This is the voltage that will appear at the LAMP and ALARM sockets when activated. SW1, in the primary controls the power. The 15 VAC secondary is rectified by D9 through D12, which make up a full-wave rectifier. Filtering is accomplished by C57, resulting in about 18 VDC which provides power for the relays. The 18 VDC is fed to the collector of Q18, The 18 VDC is further filtered by R61 and C29, through R59 to the base of Q18. The voltage at the base is held at 12 volts by zener diode D8. A nominal 11 regulated volts appears at the emitter of

Q18 and is further filtered by C28. This 11 volts is distributed to most of the blocks.

Transmitter

The transmitter is a single transistor (Q19) Colpitts oscillator using emitter feedback. The signal at the collector is stepped up by L1 and fed to the ultrasonic transducer through R22 which swamps out the varying impedance of the transducer around its resonant point. L1, C15 and C16 set the initial oscillator frequency to approximately that of the transducer. The transducer's influence then pulls the oscillator frequency towards its resonant frequency, stabilizing the frequency.

Personalized Timing:

The GD-39/49 comes with three preset times: The time to be clear of the device after turning it on; the time after the LIGHT socket is activated before the ALARM socket turns on; and the time after the ALARM socket is activated before reset occurs, assuming the AUTO RESET is on.

Turn-on Delay

The turn-on delay, initially 10 seconds, is governed by R1, R2, R4 and C1. None of the resistors should be changed. To change the turn-on time change C1. An approximate value is 1 μf per second of delay. Changing C1 to 30 μf will change the delay from 10 to 30 seconds.

Lamp-to-Alarm Delay

This delay is governed by R45 and C25. C25 should not be changed. A new R45 can be installed to change the delay time. R45 must be in the range of 10 K Ω to 2 M Ω , allowing a delay time from 0.5 seconds to 100 seconds. A formula is provided in the manual:

$$R = \frac{T}{50}$$

Where:

R = value of R45 (or R55) in Megohms

T = desired delay time in seconds

Alarm-to-Auto Reset Delay

Assuming AUTO DELAY is selected, this delay is governed by R55 and C27, and is initially 20-30 seconds. C27 must remain 50 μf and R55 is chosen as in the equation in the last paragraph.

Heathkit suggests you order the required parts for changing the timing from a local source.

Shortening Timing During Checkout:

When checking out your GD-39 or GD-49 it is possible to shorten the lamp-to-alarm and alarm-to-auto reset times to about 2-seconds by closing SW2 and SW3 respectively on the circuit board. These switches are closed by tightening the screws which shunt the timing resistor (R45 or R55) with a lower value resistor (R44 or R54). Be sure to loosen them when done.

The GD-39/GD-49 and Interference:

While in operation "The Informer" puts out a steady ultrasonic tone at about 41.2 kHz. Heath warns in the manual that it can cause interference with local TV remotes that also operate in the ultrasonic region.

WARNING: As television remote control devices and the Intruder Alarm operate on or near the same frequencies, false triggering of the remote control circuits may occur when the television set and the Intruder Alarm are both turned ON at the same time.

If your television set is equipped with a wireless remote control device, turn your television set OFF when the Intruder Alarm is turned ON. It is also IMPORTANT that you turn the television set off at its main power switch instead of using the remote control. Otherwise, the remote control circuits of the television set may be damaged.

Figure 7: The Heathkit GD-39 and GD49 manuals contain the following warning:

While one wouldn't be in the room watching TV with the intrusion alarm on, Heath included a warning in the manual (**Figure 7**).

The GD-39/GD-49 and Pets:

Many animals can hear sound up into the 40 - 50 KHz range. The Heath manual doesn't mention this. It only mentions: *"If a pet may be moving on the floor in the surveillance area, aim the unit higher to avoid tripping the alarm."*

None of the specifications give the decibel level of the transmitted sound. Some research on the web mentions that sometimes ultrasonic devices will attract a dog or cat, who are trying to find where the sound is emanating from. If you are using 'The Informer' or other ultrasonic device, just be aware that it might affect your pet.

General Comments:

In 2021 Chuck Penson – WA7ZZE published the third edition of his *Heathkit: A Guide to the Amateur Radio Products*, a significantly updated edition. The book sold out quickly, as had his two previous editions. Recently, Chuck announced that the third edition is again available by "Print-on-Demand" process from Lulu. The "tiny URL" link for more information and to order is: <https://tinyurl.com/7n7c787f>. I've ordered five or six "print-on-demand" books from Lulu and have always well been satisfied.

I recently acquired a Heath HG-10 VFO, I plan to use with a DX-40 I'm restoring (slowly). The band switch on the VFO is frozen solid on the 2-meter band. Unfortunately, that makes it very difficult to access the shaft coupling screws, and difficult to get heat onto the shaft to start to free it up. I have put it aside as my 'bench' is currently occupied by an H.J. Leak "Point One" TL/10 Hi-Fi tube amplifier from

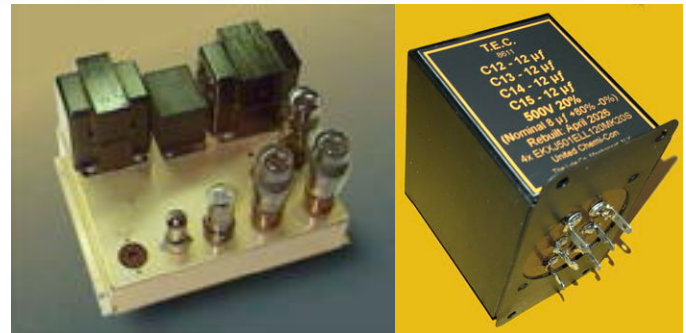


Figure 8: At left the H.J. Leak HiFi amplifier. Empty socket is the preamp input. At right is the rebuilt 4-section filter capacitor.

the fifties. I have rebuild the odd four-section filter capacitor (**Figure 8**), and am in the process of re-capping the unit. The Leak amplifier was made in Britain and uses an EF86, a 6SN7, a pair of KT-61 output tubes and a 5Z4 rectifier.

The next article will possibly be on the HR-10 Basic Amateur Band Receiver,

73, from AF6C



Notes:

1. The two-page ad may be found at: <https://www.w6ze.org/Heathkit/GD39/p26-p27.pdf>
2. Catalog #800-65 is available at the World Radio History site. Though it says 1972, it is actually the Spring 1973 catalog: <https://www.worldradiohistory.com/Archive-Catalogs/Heathkit-Catalogs/Heathkit-1972-800-65.pdf>
3. Neither the unit itself, the LAMP nor the ALARM sockets are fused.
4. This time may be changed by changing a capacitor (C1) inside the unit.
5. Failure to do this may connect two house circuit breakers in parallel, highly increasing the current needed to trip the circuit breakers in an overload condition.

Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.

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Thanks - AF6C