

The Use of Body Metal Detectors on Shabbat

By: Gershon & Moshe Nachshon

Overview

The use of body metal detectors has become widespread over recent years. Such scanners are used at the entrances to shopping malls, hospitals, the Western Wall and many other public places. However, passing through such a security detector on Shabbat presents several issues for those who observe halacha. This article discusses the main halachic difficulties with a body metal detector and how they may be overcome, such that this device may be used without desecrating the laws of Shabbat.

The contents of this article were originally presented by my son Moshe in the form of a Powerpoint presentation, as his Bar Mitzva *drasha* in Tevet 5765. It is with his permission and enthusiasm that I am expressing his presentation in the form of a written article for the current version of *Chiddushei Torah@NDS*.

Introduction

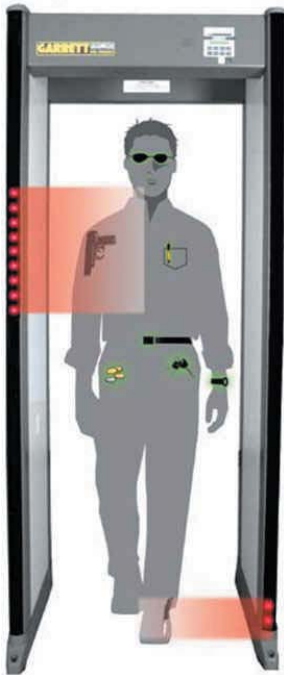
The use of modern electrical equipment on Shabbat presents a unique challenge to the observant Jew. Technological advancement has given society a wide range of electronic devices. However, in their original implementations, most of these violate several of the laws of Shabbat and are thus forbidden to be used on this day.

Amongst others, the Zomet Institute (Machon Zomet) in Alon Shvut, Gush Etzion, investigates the use of such devices on Shabbat from a halachic perspective and offers solutions for their use. The topic discussed in this article has been investigated by this institute, and a permissible solution has been found. In this article, we present the solution developed by Machon Zomet.¹

1. Much appreciation to Machon Zomet for its direction and help in understanding the principles & solution discussed in this article.

How Does a Body Metal Detector Work?

For the purpose of this discussion, we will describe the use of a walk-through type detector rather than a hand-held detector that is waved over the body. Walk-through detectors are the common type placed at the entrances of public buildings.



In principle, the body metal detector consists of 3 main parts:

1. **The magnetic field in the opening of the detector**

Almost all walk-through metal detectors are based on **pulse induction (PI)**. Typical PI systems use a single coil of wire on one side of the arch that acts as both transmitter and receiver. This technology sends powerful, short bursts (pulses) of current through the coil of wire. Each pulse generates a brief magnetic field. When the pulse ends, the magnetic field reverses polarity and collapses very suddenly, resulting in a sharp electrical spike. This spike lasts a few microseconds (millionths of a second) and causes

another current to run through the coil. This subsequent current is called the **reflected pulse** and lasts only about 30 microseconds. Another pulse is then sent and the process repeats.

The transmitter operates in a manner similar to an automobile ignition system. Each time a pulse of current is switched into the transmit coil it generates a magnetic field. As the current pulse shuts off, the magnetic field around the coil suddenly collapses. When this happens, a voltage spike of a high intensity and opposite polarity appears across the coil. This voltage spike is called a counter electromotive force, or counter EMF. In an automobile it is the high voltage that fires the spark plug.

Thus, each time the pulse of current is switched an electrical circuit is completed. When a metal object passes through the opening of the metal detector, it momentarily stores some of the energy of the reflected pulse and increases the time it takes for the pulse to decay to zero. It is this change in the decay rate of the pulse that is registered by the detector.

2. The alarm

When a change in the reflected pulse is detected, the detector causes an alarm to sound to warn the personnel manning the detector that a metal object has been passed through the detector.

3. The warning light

In addition to the alarm, a warning light is lit as an extra notification that an object containing metal has just passed through the scanner.

What Are the Problems of Using a Body Metal Detector on Shabbat?

A. Turning on a Light

Is turning on an incandescent light prohibited on Shabbat? This is one of the earliest issues regarding electricity to be found in halachic literature. The Talmud (Shabbat 41a-b) discusses heating a piece of metal in order to shape or harden it. It is understood that, by heating a piece of metal one transgresses the biblical prohibition of lighting a flame (מבעיר אש).

This ruling is codified by Maimonides² and is generally accepted by most halachic authorities. Thus, turning on an incandescent light bulb, which causes the filament to glow, is tantamount to “lighting a flame.” Fluorescent and neon lights work on a different principle. They electrically excite gases to emit light and are therefore analogous to electrical appliances. Electrical appliances are discussed below.

B. Sounding an Alarm

The prohibition of sounding an alarm is based on another discussion in the Talmud (Shabbat 17b):

אין נותנים חיטין לתוך הריחיים של מים אלא בכדי שיטחנו מבעוד יום. מאי טעמא, אמר רבה מפני שמשמעת קול.

“One may not put wheat kernels into a watermill *before* Shabbat unless the grinding can be completed before Shabbat. Raba explains that the prohibition is due to ‘creating a noise on Shabbat.’”

This principle is codified by Rema (Rav Moshe Isserles) in Shulchan Aruch (chapter 252, section 5) as follows:

יש אוסרים בריחים (בערב שבת), ובכל מקום שיש לחוש להשמעת קול.

“...and there are those authorities who prohibit (grinding grain) in a watermill (from before Shabbat), and *every case* where there is a chance of ‘creating a noise’ (on Shabbat).”

The *Mishna Berura* comments on this principle:

כל כיוצא בזה המשמיע קול, דאושא מלתא ואיכא זלותא לשבתא. (יש זלזול בכבוד השבת).

“...and anything like this that may cause a noise to be sounded manifests disregard (*zilzul*) for the Shabbat.”

2. Hilchot Shabbat 12:1.

C. Closing an Electrical Circuit

As mentioned, each cycle of Pulse Induction in the body scanner creates a pulse of current and a magnetic field. As the pulse ends, a sharp electrical spike occurs. This is comparable to using an electrical appliance that generates neither light nor heat but does create an electrical circuit which is prohibited on Shabbat.

Halakhic Approaches to the Problem of Closing an Electrical Circuit on Shabbat

As electrical appliances have become increasingly prevalent in our day-to-day lives, use of such appliances has been discussed at length by the rabbinic authorities.³ There are several approaches to this issue. Four of the main approaches regarding the nature of the prohibition of closing an electrical circuit are as follows:

I. The approach of Hazon Ish (Rabbi Avraham Yeshaya Karelitz 1878-1953): Electrical appliances may not be activated on Shabbat due to the prohibition of בונה—building.

Whilst devoting his entire life to Torah study, Hazon Ish also studied the sciences such as astronomy, anatomy, and mathematics. He moved to Israel in 1933, where he became the leading worldwide authority on all matters of halacha. Although principally an academic scholar, Hazon Ish applied himself to practical problems such as the use of milking machines on Shabbat and the cultivation of hydroponics during the sabbatical year, when it is forbidden to cultivate land in Eretz Yisrael.

Discussing electricity, Hazon Ish explains his understanding of the main prohibition for using electricity on Shabbat.⁴

חיבור חוט החשמל מעורר את כח החשמלי המוטבע בחוט עצמו... וחוששים בו משום בונה.

3. For a very helpful discussion of the use of electricity on Shabbat, see http://daat.co.il/daat/english/journal/broyde_1.htm.

4. Hazon Ish, Orach Chayim 50:9.

“Connecting a wire to an electrical circuit ‘awakens’ the electric potential in the wire and thus we are concerned with the prohibition of ‘building’ on Shabbat.”

II. The approach of Beit Yitzchak (Rav Yitzchak Shmelkis 1828–1906): Electrical appliances may not be activated on Shabbat due to the prohibition of מוליד—creating something new.

Rav Yitzchak Schmelkis was born in Lemberg (Lvov) and served as the head of the rabbinic court (*beit din*) in several eastern European Jewish communities. His last post was as head of the rabbinic court of his native Lemberg. Beit Yitzchak is Rav Schmelkis’s six volume collection of responsa. It is widely consulted in deciding modern halachic issues. In Beit Yitzchak, Rav Schmelkis writes:⁵

יש איסור של מוליד זרם הנלמד ממסכת ביצה כג. שדנה בסוגית “מוליד ריח”

“There is a prohibition relating to ‘creating a current’ based on the talmudic discussion in Tractate Beitza (23a) which addresses the issue of ‘creating a scent’ on Shabbat.”

The Talmud discusses whether it is permitted to “transfer” the scent of smoking herbs onto clothes or other such items on Shabbat. The opinion given by Rava is that this is forbidden because it “creates” a new smell in the clothes. Beit Yitzhak uses this principle (מוליד) to prohibit closing an electrical circuit, as it “creates” a new reality.

III. Electrical appliances may not be activated on Shabbat due to the prohibition of מכה בפטיש – completing an item.

Hazon Ish, among other authorities, offers another possible basis for prohibiting the closing of an electrical circuit (and thus for prohibiting use of electrical appliances) on Shabbat. These authorities argue that “...since the electrical appliance is useless before electricity is added to it, the introduction of electric

5. Beit Yitzhak 2:31.

current causes it to become a useful piece of equipment, and is thus prohibited because of *מכה בפטיש*.⁶

IV. The approach of Rav Shlomo Zalman Auerbach

Rav Shlomo Zalman Auerbach z"l takes issue with all of these approaches, finds good reason to disqualify them, and finds no valid reason for prohibiting turning electrical appliances on or off on Shabbat. Nevertheless, he does not permit such appliances to be used, for fear of people turning on incandescent lights (which, as discussed above, is biblically prohibited) and due to the fact that it has become the widely accepted practice NOT to use such electrical appliances on Shabbat. The fact that all observant Jews accept this tradition, is reason in itself to uphold the prohibition.⁷

Thus, according to Rav Auerbach, there is no firm halakhic basis for prohibiting the use of electrical appliances that do not generate heat or light. Nevertheless, he is inclined to base the rabbinic prohibition or understanding that it is not acceptable, on the Beit Yitzchak's principle of *מוליד*.

Halakhic Solutions

Turning on a Light and Sounding an Alarm

The simple solution employed to overcome prohibitions of turning on a light and sounding an alarm is to replace both the alarm and light with a dial. The dial is activated by the presence of metal moving through the scanner. The precise reason is discussed below.

Closing an Electrical Circuit

We have already cited the Talmudic discussion in Beitzah 23a concerning "creation of scent." Based on that discussion, Beit Yitzhak ruled that it is forbidden to close an electrical circuit on Shabbat because doing so "creates" a

6. Hazon Ish, Orach Chayim 50:9.

7. Minchat Shlomo 74:84.

new reality in the appliance. The Talmud goes onto discuss a related question. What happens if someone crushed the leaves of a herb in his fingers in order to release the scent—is this permitted or forbidden on Shabbat? The opinion is given that, since the scent is already inherent in the herb, one who crushes it between his fingers is merely releasing the scent that is already there. Thus, the person is just adding to the scent that already exists, whereas by transferring the scent to another item (see above) he is “creating” a new scent.

This principle is cited in the halachic literature by the Hayei Adam and Shulhan Aruch HaRav. These works explain that the Talmudic discussion cited shows that it is permitted to add to something that already exists on Shabbat. Rav Shlomo Zalman Auerbach z”l states that one can rely on these opinions.

Rav Auerbach’s approach can now be used to solve the issue of closing a circuit on Shabbat. Machon Zomet has created a body metal detector that *always* has a weak, complete electrical circuit in the walk-through opening of the scanner. When someone passes through the opening with metal on him, he increases the existing electrical current; he does not create a circuit.

Likewise, the dial showing the strength of the circuit is always active, since there is always a closed circuit present. When the person moves through the opening and adds to the current, the dial moves to register an increase. Again, the principle of adding to something that already exists applies, and there is no transgression involved.

Summary

The normal use of a body metal detector raises three issues with regard to Shabbat. These issues are activation of an incandescent light, activation of an audible alarm, and creation of an electrical circuit. As explained, both the incandescent light and the audible alarm can be replaced by a dial, thus resolving the first two issues. Various approaches to the last issue lie at the heart of our discussion. As shown, Rav Auerbach takes issue with all the approaches. However, based on the Beit Yitzchak, Rav Auerbach states that מוליך is probably the principle reason to forbid the creation of an electrical circuit on Shabbat. Thus, following Rav Auerbach’s approach, Machon Zomet

created a body scanner in which an electrical circuit is always present. Passing metal through the opening of this scanner only increases the existing current, and this is permissible based on the Talmudic discussion in Beitzah 23a, as cited above.

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