



MISSION BOOKLET

The Pocket Pager

Every alert in a pocket started as somebody's problem with being too far away to hear it.

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The Pocket Pager

Every alert in a pocket started as somebody's problem with being too far away to hear it.

A pager has to hold a signal, carry a tone, and get somebody's attention without a screen or a speaker doing the work alone. Five circuits build toward that: a relay that carries more than a transistor dares, a second relay that holds itself shut once triggered, a 555 tone that cuts through a pocket, a motor whose current depends on what it is asked to turn, and the same motor with one off-centre weight added — the difference between a curiosity and a signal.

Caught Red-Handed

BEFORE

A relay's contacts can carry more than a transistor ever will. Before this mission trusts one to switch a motor, it has to see what a relay can carry that a transistor can't.

AFTER

A cold fifteen-ohm lamp filament pulls near 0.6 A the instant it lights — six times what a 2N2222 will carry — while the relay's own contacts carry it without blinking, on the strength of an 18 mA coil.

HOW PEOPLE GOT THERE

1965 Milton Bradley shipped Operation in 1965: tweezers, a buzzer, a bulb behind the nose, and a board edge that judges a steady hand by the same forgiving-contact trick this chapter wires on purpose.

Milton Bradley Company, Operation (board game), first released 1965.

What Holds the Line

BEFORE

A relay that only rings while a finger holds a button is not an alarm. Something needs to catch the moment and keep it caught.

AFTER

The second relay's own contact feeds its own coil in parallel with the first relay's momentary push, so once it closes it holds itself shut — the buzzer keeps going long after the trigger is gone. Only the slide switch lets it go.

HOW PEOPLE GOT THERE

1852 Boston's 1852 fire-alarm telegraph was the first system built so a passer-by's momentary pull on a street box kept ringing after they let go — a relay holding its own line shut, same as this chapter's second relay.

William F. Channing and Moses G. Farmer, Boston Fire Alarm Telegraph, operational 1852.

A Tone That Carries

BEFORE

A pager has to cut through a pocket, a jacket, and a noisy room. That takes a tone somebody can pick out, not just a tone somebody can hear.

AFTER

A 555 astable's pitch sweeps roughly 690 Hz to 3 kHz across a ten-kilohm pot — the range that still reads as urgent once it's muffled, the same range a pager or a smoke alarm reaches for on purpose.

HOW PEOPLE GOT THERE

1949 Al Gross demonstrated a wireless pocket pager to New York's Jewish Hospital in 1949 — years before hospitals had paging systems to put it in, or anyone else had a use for one.

Al Gross, pocket pager demonstration, Jewish Hospital, New York, 1949.

What the Motor Pushes Back

BEFORE

The same motor on the same battery does not always draw the same current. What it drives changes what it takes.

AFTER

Bare-shaft, the motor settles near 4,100 rpm on 20 mA; loaded with a propeller it settles lower, near 2,900 rpm, but pulls 169 mA — a spinning motor is also a generator, and its load decides how much current the battery actually gives up.

HOW PEOPLE GOT THERE

1821 Faraday's 1821 demonstration got a wire to circle a magnet continuously on nothing but a current — the first time anyone had turned electricity into ongoing rotation instead of a single twitch.

Michael Faraday, electromagnetic rotation demonstration, Royal Institution, 1821.

The Shiver, Not the Spin

BEFORE

A motor that spins is a curiosity. A motor that shakes is a signal — the difference is one off-centre weight.

AFTER

An off-centre brass weight on the same bare shaft turns 4,100 rpm into 3.4 N pulling outward 68 times a second, on the same 20 mA a bare shaft already draws — the weight barely loads the motor at all, so nearly the whole thing goes into the shake.

HOW PEOPLE GOT THERE

1957 By the late 1950s, hospital paging systems carried pocket units built around exactly this trick: an unbalanced motor shaft, silent to the room and unmistakable to the pocket it rode in.

Multitone Electronics, hospital pocket paging systems, commercialised from the mid-to-late 1950s.

Colophon

Generated from the modules the bench runs on; every circuit in this booklet is the circuit the simulator solves, and every word beside it is the word the manual panel prints.

Built 2026-09-18 from commit c7af8b2.

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