LIGHTING

Whole passenger trains can be lit up using a supersonic generator at around 25 - 40 kHz. This can be fairly easily contructed using a 10 W audio power amplifier with the conventional negative feedback rephased to positive. Connected in parallel with the train motor power, with a blocking choke between the two, constant lighting can give a superb visual effect with artificial twilight on a layout. Switch off the generator — and the lights go out. Each train group of lights uses a 0.22 uF capacitor in series to block the otherwise additive lighting power from the DC motor voltage.

RADIO CONTROL AND CARRIER CONTROL

Coming back to the mystery of operating several trains simultaneously on one ribbon of track, and at different speeds and directions brings me to the surprising revelation that mighty General Electric was once (1963 — 64) in the model train electronic business with their "Astrac" carrier control system. "Astrac" used separate little frequency-gated SCR receivers in each of up to five locomotives. Twenty volts AC was on the track at all times, and depending which part of the AC cycle was switched on in each high frequency selective receiver, gave varying speed and direction, by either gating on only the negative or only the positive half cycles. An analog system if ever there was one! The control frequencies used were spaced 5 kHz apart around 250 kHz. December 1963 prices are shown in the advertisement reproduction in Fig. 5.

Much more recently a "Digitronic 1600" system appeared, also in the USA, using digital proportional control of up to 16 trains simultaneously, also from a continuous AC track voltage. The system is too costly for most individuals; but a few clubs would opt for it. Incidentally there are at least three large model railroad clubs with very large permanent layouts in the Toronto area alone. One of the several train hobby shops can always direct you to a club.

As a purely personal observation, I feel the next and imminent step in electronics with model railroads is radio control. At least one experimental, but practical circuit has already been published. Taken to the ultimate, needed are very low current motors powered by rechargeable Ni Cd batteries together with the radio receiver, variable speed and direction controls, and sound generator circuit plus amplifier. Of necessity the concept requires extreme miniaturization because for HO scale, (the most widely used size), the space available for everything is hardly more than 5 or 6 cubic inches. The entire receiver and motor drive circuit can easily be derived from model aircraft R. C. designs, particularly if the new Signetics NE544 motor/servo driver chip is employed. On-board sound — for example a diesel horn sound, can use a 556 IC in the self-oscillating mode generating two tones, each around 250 Hz, amplified by an LM380 audio chip.

Individual function control is practical using 555 tone generators in the transmitter with phase lock loop decoders in the receiver. The advantage of this type of control is that the modeller has become free of the power-to-the-rails restriction.

In summary, I hope this overview shows how another hobby can adapt techniques of electronics in order to add to the fun. Maybe I've tempted you to pop round to your nearest Model Railroad emporium. Take money!

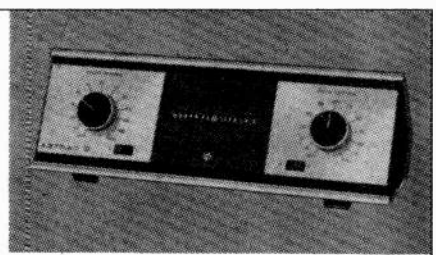
Peter J. Thorne has authored audio books for Philips Technical Library, and is also the author of "Practical Electronic Projects for Model Railroads", published by Kalmbach Publications, Milwaukee.

Fig. 5. Example of frequency multiplexed control system, available in the early '60s. Note the use of rubber rectifiers in the receiver. From an advertisement for General Electric.

Model No. K-2 (Channels 1 and 5)
Model No. K-4 (Channels 2 and 4)

DUAL CONTROL UNIT

Controls two trains on the same track both independently and simultaneously. Model K-2 pre-set for channels 1 and 5. Model K-4 pre-set for channels 2 and 4. Separate speed controls and separate forward/reverse switches provided for each train. All electronic control unit contains 4 transistors, 6 diodes, and printed circuit board. Indicator light tells when system is on. Heavy gauge all metal housing. Brushed aluminum finish. Not affected by track shorts. Complete with two pre-set micro-receivers, power cord, connecting wire, and installation instructions. 90 day warranty on all parts and labor. Sockets on back for future equipment.

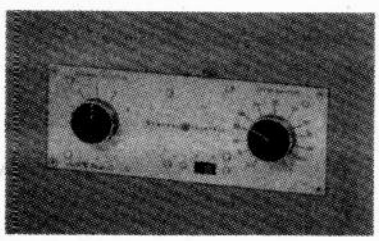


These Dual Control Units operate from 110-125 volts AC, 50-60 cycles, 11 watts.
Transmitter size: 12½" x 4½" x 3½".
Carton size: 14" x 8" x 4". Packed one set per carton (includes 2 Micro-Receivers).
Approx. Ship. Wt. 3 lbs. Retail price about $64.95.

Model No. K-5

5-CHANNEL CONTROL UNIT

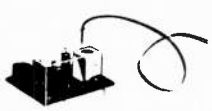
Completely assembled and ready to mount in your control panel. Controls one train at a time. Select any train on the track with the channel selector switch. All electronic, completely transistorized, with printed circuit board. Complete with mounting hardware, wire, hole template, power cord, and installation instructions. Warranty. Socket in back for future equipment. Operates from 110-125 volts AC, 50-60 cycles, 4 watts. Transmitter size 8½" x 3½" x 3".



Carton size: 10" x 5" x 5". Packed one per carton.
Approx. Ship. Wt. 2 lbs. Retail price about $34.95

Models K-10, 20, 30, 40, 50

MICRO-RECEIVERS



Encased in clear General Electric silicone rubber, G-E Micro-Receivers are shock-proof, moisture proof, and heat resistant. Not affected by track shorts. All electronic, no mechanical contacts. Uses two G-E Silicone Controlled Rectifiers. Adaptable to most gauges. Each receiver can handle up to 1.6 amperes, 15 amperes one cycle surge, and a 48 watt load at 30 volts. They operate from 6 to 30 volts AC, 25-60 cycles. Only three connections need be made to install the receivers. One wire to the motor, one wire to each pickup wheel. Rubber can be trimmed to custom fit your equipment. Two receivers can be paralleled for double heading. Complete instructions included. Warranty.

Receiver size: 1⅞" x 1⅛" x ¾".

Models and channels are as follows:

K-10	Channel 1	100KC
K-20	Channel 2	140KC
K-30	Channel 3	180KC
K-40	Channel 4	220KC
K-50	Channel 5	255KC

Carton size: 3" x 2" x 1½". Packed 5 per carton (K-10 thru K-50).
Approx. Ship. Wt. 1⅓ lbs. Retail price about $9.95 per receiver.
Also available in single units.