

DEVELOPMENT OF THE BACKSTOP

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Antenna Development
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Mr. Green is a graduate physicist of Yale University with a long record of achievement in the electronics industry. He is the engineer responsible for the development of the BACKSTOP, and has made many contributions to antenna research as a member of Channel Master's distinguished engineering staff.

FCC regulations permit stations on the same channel to operate as close as 170 miles apart. This, coupled with the increasing use of high power transmitters, creates the ever-growing problem of co-channel and adjacent channel interference in many areas of the country.

Yagis Unsatisfactory

Until now, the antenna that could best combat this problem has been the 10-element Yagi. However, the Yagi has two serious drawbacks. First, in most cases, even the high front-to-back ratio of the Yagi has not been sufficient to completely eliminate interference. Second, the Yagi is a narrow band antenna and could not receive all of the stations available in each area.

Does Merely Adding a Screen Help?

The front-to-back ratio of any antenna may be improved simply by the addition of a screen reflector. In fact, many dealers throughout the country have added chicken-wire screens to existing installations. By doing this they have actually improved the front-to-back ratio in many cases, but found, to their dismay, that the gain of the antenna was seriously reduced.

A well-designed television antenna has physical dimensions that result in a 300-ohm impedance. By adding a screen reflector the impedance is always reduced. This is especially true where the screen is placed very close to a driven element, such as in collinear types. Julius Green, designer of the BACKSTOP, realized that it was not possible to develop a simple modification kit that would operate effectively on existing antennas. He knew that he would have to re-design existing an-

tennas completely in order to achieve a high front-to-back ratio without impairing gain.

Basic Champion Design Used

Since front-to-back problems occur predominantly in fringe areas, requiring an extremely sensitive antenna, Mr. Green worked with the basic Champion design. By increasing the Champion's screen size, and adding carefully-designed and properly-spaced director and reflector elements, he was able to develop an antenna that eliminates rear interference. At the same time, he was successful in actually increasing the gain of the Champion antenna on all VHF channels.

Since the co-channel interference problem is more serious on the Low Band, and since the Champion already had excellent directivity on the High Band, Mr. Green deliberately designed this antenna with even higher front-to-back ratios on the Low Band. These ratios are considerably better than those of other screen-type antennas; even better than 10-element single-channel Yagis. The BACKSTOP ratios range from 9:1 to 20:1 (Relative Voltage).

Minimum front-to-back ratios are shown on the Channel Master tables. These ratios are based on the largest minor lobe. In actual practice, ratios would be even greater, since the BACKSTOP could be oriented so that the smaller lobe is in line with the unwanted (rear) station. This would substantially increase the front-to-back ratios over the figures shown, giving unparalleled reception in problem areas.

In designing the BACKSTOP, Channel Master has completely solved the problem of television reception interference in most areas where two or more stations are operating on the



same or adjacent channels.

The BACKSTOP provides excellent gain and directivity—on VHF and UHF—actually out-performing the Champion on all VHF channels, and eliminating "venue-blind" effects and "ghosting".

Use Shielded Lead for Best Results

In many areas the amount of signal picked up directly on the transmission line will be sufficient to cause interference. For that reason it is important that a shielded 300 ohm lead-in is used.

In some areas, even a BACKSTOP with a shielded lead may not be sufficient to screen out the stronger station completely. This is especially true when one station is much closer to the set than the other. In these areas the signal picked up directly by the set, as well as lead-in pickup, will be strong enough to cause interference even though the antenna's front-to-back ratio is sufficient to screen out the rear signal. In such cases the BACKSTOP will always provide clear reception of the station having the strongest signal.

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CHANNEL MASTER CORP.

The World's Largest Manufacturer of TV Antennas.

ELLENFIELD, N. Y.

The Real Meaning of Front-To-Back Ratios

The directivity of a television receiving antenna is its ability to receive or reject signals from different directions. This data is generally presented on a horizontal polar diagram which can be expressed either as a VOLTAGE or as a POWER ratio. The power ratio is the square of the voltage.

This means that if we have an antenna with a front-to-back ratio of 5:1 RELATIVE VOLTAGE (fig. 1), this same data could also be shown with a front-to-back ratio of 25:1 RELATIVE POWER (fig. 2).

When evaluating a horizontal polar diagram, it is always important to ask: "Is this presented in terms of RELATIVE VOLTAGE or RELATIVE POWER?"

Attempts are sometimes made to deliberately mislead the serviceman by presenting these figures in RELATIVE POWER. Let us see what the front-to-back ratios of Channel Master's BACKSTOP would look like if expressed in RELATIVE POWER:

Channel	Front-To-Back Relative VOLTAGE	Front-To-Back Relative POWER
2	9:1	81:1
3	10:1	100:1
4	11:1	121:1
5	20:1	400:1
6	18:1	324:1

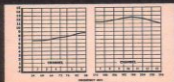
Both of these presentations are technically correct. But, showing horizontal polar patterns in RELATIVE POWER is very misleading, and presents a grossly exaggerated picture, because the signal picked up by the antenna is a voltage signal. For instance, on channel 5 the BACKSTOP has a 20:1 front-to-back ratio in relative voltage. This means that the antenna picks up 20 times more signal from the front than from the rear—NOT 400 times!

Channel Master polar patterns are always expressed in Relative Voltage.

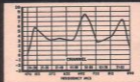
Gain — Another Vital Consideration

The problem of rear interference is encountered only in areas that are located approximately halfway between stations operating on the same channels. This places you in a fringe area—at least 75 to 100 miles from the closest station. The antenna, therefore, in order to be effective, must have—not only a high front-to-back ratio—but also very high gain. Merely adding a screen behind an existing antenna can have disastrous effects on the antenna's sensitivity. Channel Master engineers, therefore, re-designed the powerful Champion, actually developing an antenna that provides higher gain than the basic Champion design, and functions as a superb fringe-area antenna.

VHF Gain

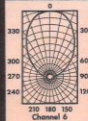
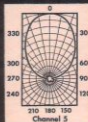
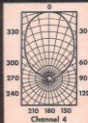
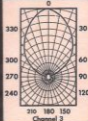
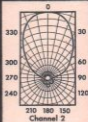


UHF Gain



Never before has there been an antenna with polar patterns like this!

(relative voltage)



CHANNEL MASTER'S VHF-UHF

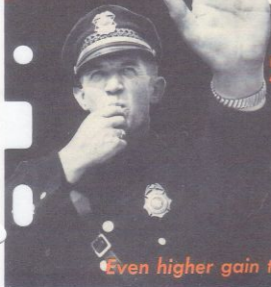
BACKSTOP

the ONE-WAY
CHAMPION antenna

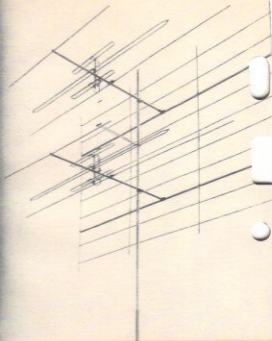
STOPS

co-channel and
adjacent-channel
interference
caused by rear
signal pick-up!

Even higher gain than the stacked Champion!



HERE'S THE ANTENNA YOU'VE LONG AWAITED --



the **BACKSTOP**
makes yesterday's *problem* areas
today's *opportunity* areas!

- Eliminates "venetian-blinds" and other interference effects caused by rear signal pick-up.
- Considerably greater front-to-back ratio than all other screen-type antennas; even greater than 10-element Yagis!
- All-aluminum construction, including brackets—factory preassembled.
- Incorporates basic high-gain Champion design, including the famous all-channel Tri-Pole.
- Free merchandising aids and newspaper mats.

Newly designed specifically for high gain and high front-to-back ratio —
not merely an old antenna with a screen added!



No more "venetian-blinds" or other interference effects!

Table of Front-To-Back Ratios
(relative voltage)

Channel	Front-To-Back Ratio
2	9:1
3	10:1
4	11:1
5	20:1
6	18:1