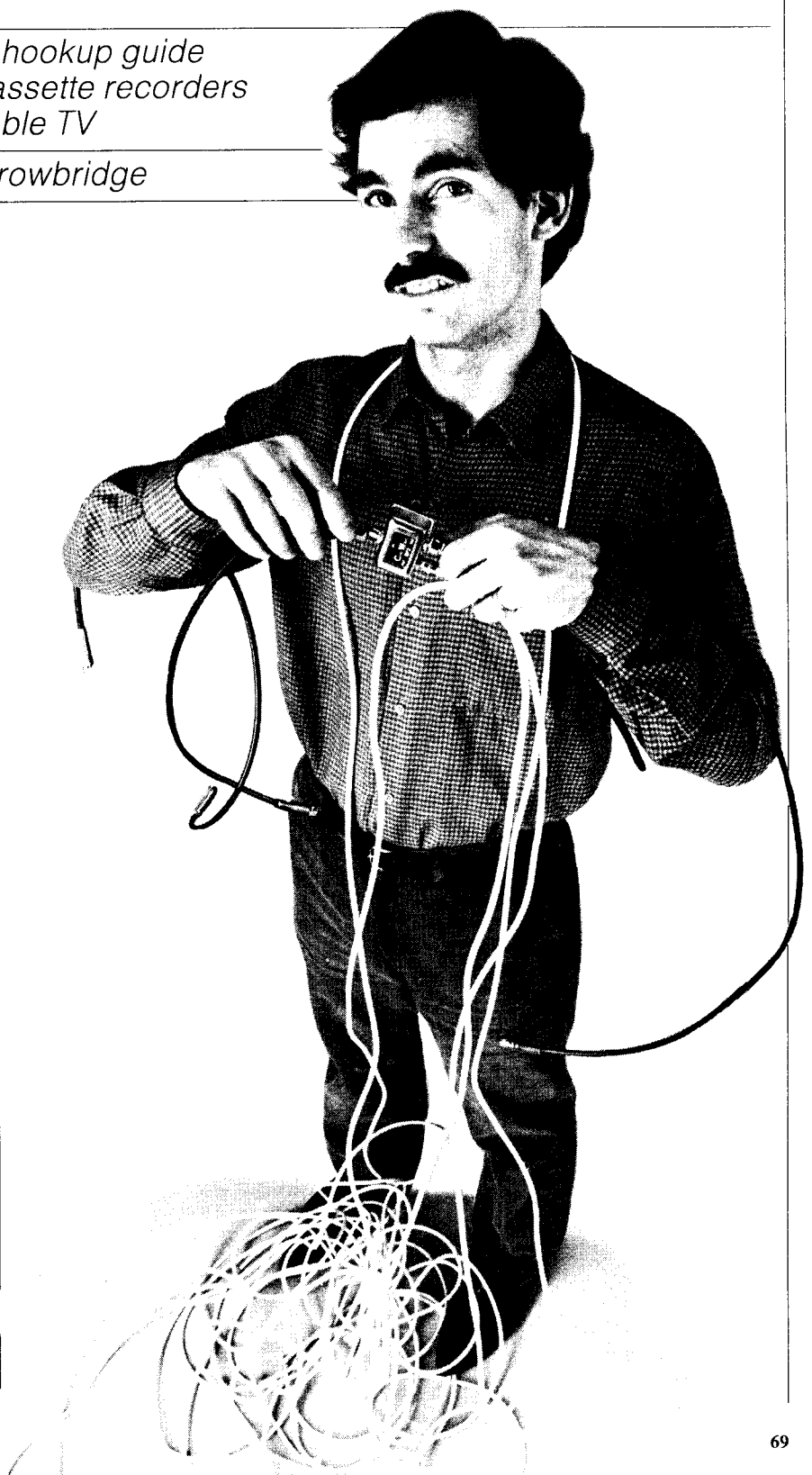
THE VIDEO CONNECTION

An equipment hookup guide for using video cassette recorders with cable TV

By Dave Trowbridge



CABLE television is becoming a major factor in the "video revolution." To a video recording enthusiast, it looks like a dream come true: a seemingly limitless video "library" at one's fingertips. As a result, video equipment manufacturers are scrambling to add cable-oriented features to their products. There are now cable-ready TV and VCR tuners that promise the ability to "browse" through 127 or more channels with a handheld remote control. Some video recorders can be programmed to automatically record up to eight "events" on different channels over a 21-day period, and all video recorders offer the option of recording one channel while watching a different one.

Unfortunately for many videophiles, much of the video gear now available is still not wholly compatible with most modern cable systems. Consequently, if you subscribe to cable and are planning to buy a new television receiver or a video recorder, you should consider your purchase carefully. Otherwise, you may find that your cable system offers more channels than your "cable-ready" set will tune; that it has "offset" channels that your PLL tuner ignores; or that some of the channels on it are scrambled, which can compromise or eliminate important features of your video system. You may even find that you cannot record the channels you pay extra for!

If you already own equipment that is limited by the design of your cable system, don't despair. The

CABLE CHANNEL CONVERSION CHART

VHF BANDS	Low-band (Standard)					Mid-band (Special)								
Numeric Designation	2	3	4	5	6	14	15	16	17	18	19	20	21	22
Appears on UHF Channel	42	43	44	46	47	54	55	56	57	58	59	60	61	62
Alphanumeric Designation	2	3	4	5	6	A	B	C	D	E	F	G	H	I

VHF BANDS	High-band (Standard)							Super-band (Special)																	
Numeric Designation	7	8	9	10	11	12	13	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Appears on UHF Channel	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
Alphanumeric Designation	7	8	9	10	11	12	13	J	K	L	M	N	O	P	Q	R	S	T	U	V	W

"block converter," a device that converts a whole "block" of vhf channels into uhf channels, may be all you need. On many cable systems (though not all) this versatile video accessory can restore remote channel control, multi-channel programmability, and watch/record versatility to your equipment—features eliminated entirely on many cable systems. It can even be used to deliver the output of a video component or r-f switcher to every television in your home over the existing cable wiring, without interfering with a TV set's remote control function.

Cables and Recording. Though there are many aspects of cable system design that can affect your television or video recorder, three in particular are most likely to limit the usefulness of your video system: the number of channels carried, the presence of "off-set" (off-frequency) channels, and the use of "programming security systems" to prevent unauthorized (free) reception of certain channels.

Although 60% of all cable systems still have twelve channels or fewer, a state-of-the-art system can transmit frequencies as high as 450 MHz, giving it a 66-channel capacity. A "dual-cable" system, one which runs two trunk lines to each neighborhood and two drops to each subscriber, can carry 132 channels. Extending a cable system's bandwidth beyond this point would be quite expensive, and would be liable to interference from broadcast uhf stations (470 MHz and higher), especially since most televisions have unshielded uhf tuners (not to mention the fact that there's not even enough programming available yet for the existing channels!).

Some of the problems encountered in cable use result from the frequencies allocated to cable and their relation to broadcast frequencies. For instance, the standard vhf channels (2 to 13) are the same on cable as they are over the air, unless the cable operator "offsets" them. Until recently, most televisions had unshielded tuner sections. Since there can be only one station broadcasting on a channel in a given area, there was nothing to shield against. On a cable system, however, the off-the-air channel 7, for example, can interfere with cable channel 7, causing "herringbone" or moire patterns in the picture. Some television sets, even "cable-ready" ones, still don't have shielded tuners, however, and are subject to this "co-channel interference."

Another related problem is caused by cable use of many of the same frequencies allocated to land mobile services, such as fire and police departments, and aeronautical radio. This is a source of intermittent "herringbone" on some cable channels, and sometimes you can even *hear* police calls on your TV set. This, too, can be due to a poorly shielded tuner, or, like co-channel interference, a result of deficiencies in the cable system itself (corroded connections, defective coaxial cables, etc.).

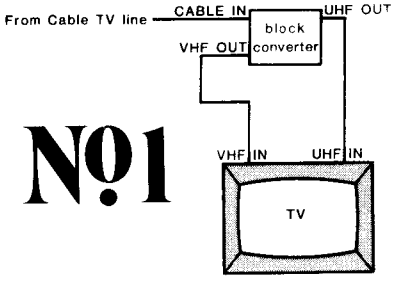
Until recently, all television receivers were equipped with 82-channel tuners capable of tuning the 12 standard vhf channels and 70 uhf channels (Congress mandated the inclusion of all uhf channels in 1964). Since cable television systems do not use the uhf band, once they began expanding beyond a 12-channel capacity some form of converter became necessary to enable their subscribers to tune in the additional channels.

Connection 1

At first the cable industry used a block converter to change the additional channels to uhf as shown in connection No. 1. The channel conversion chart at the top of this page shows where the special vhf channels end up on the uhf band on one block converter.

This is still a useful hookup in some cases, but a block converter has certain channel and performance limitations so the cable industry turned to set-top tuner-converters.

A settop converter selects channels one-by-one and converts them to a single vhf channel, usually channel 3 or 4. Since the converter only delivers one channel at a time, it eliminates the remote channel control feature of any television set connected to it because the television must be tuned only to the output channel of the converter. The cable industry has gradually introduced remote-control set-top converters. However, television receiver manufacturers have also been building so-called "cable-ready" tuners that can receive cable channels without the use of an external converter, thus retaining remote control.



No1

The first cable-ready sets had 91-channel tuners (12 standard vhf, 9 special vhf and 70 uhf). Later sets had a 105-channel capability (12 standard vhf, 23 special vhf, and 70

uhf), and now some televisions can tune as many as 142 channels. While certainly useful, the cable-ready feature is somewhat over-rated, for the use of offset channels and scrambling can often render such a tuner unusable.

As channels are added to a cable system, it becomes increasingly difficult to avoid intermodulation distortion from trunk amplifiers and other active components in the system. These distortion products can cause "herringbone" or moire patterns on the screen. In systems with fewer than 35 channels these effects can be greatly diminished by offsetting the frequencies of selected channels in a way that eliminates the worst intermodulations. In systems with more than 35 channels it is usually necessary to install an HRC (Harmonically Related Carrier) headend. In an HRC system all visual carriers are coherent (in phase) and are harmonics of a 6-MHz master oscillator. This means that any distortion generated in the system will fall "zero-beat" on a visual carrier. Thus, it will look like a harmonic of that carrier and will be ignored by the tuner circuitry. An HRC system offers a minimum 6-dB improvement in distortion levels, but all of its channels are 1.25 MHz lower than their "normal" frequencies, except for channels 4 and 5, which are 0.75 MHz higher. Some cable systems may use an IRC (Incrementally Related Carrier) system. This is similar to HRC but lacks the master oscillator and has fewer offset channels.

Offset channels are not a problem if you have a television receiver or video recorder with manual fine-tuning, but many of the latest advanced sets have PLL (phase-lock loop) tuners. Such a tuner generally has a "capture range" (the range within which it will look for a channel) of only ±125 kHz around the nominal frequency of a channel, *and no fine-tuning adjustment.* Therefore, it cannot tune-in an offset channel. However, some PLL tuners are now equipped with a variable-range aft (automatic fine tuning) circuit (usually a switch labelled AFT: NORM/CABLE) that can be set for a wider capture-range. Many do not, though, and cannot tune-in offset channels.

If you have a set with a PLL tuner that does not have a variable aft range, and your cable system is an IRC type, you will have to use the set-top converter supplied by the cable company whether or not your set is cable-ready, and you will lose the use of the remote channel control on your TV set (or VCR).

Connection 2

If your cable system is HRC or has only a few offset channels, you can connect a block converter as shown in connection No. 2 to maintain a measure of remote channel control.

On a HRC system, adjust the local oscillator of the block converter to bring the up-converted channels back to viewable frequencies on uhf, but channels 4 and 5 will have to be selected on the set-top converter because of their different offset.

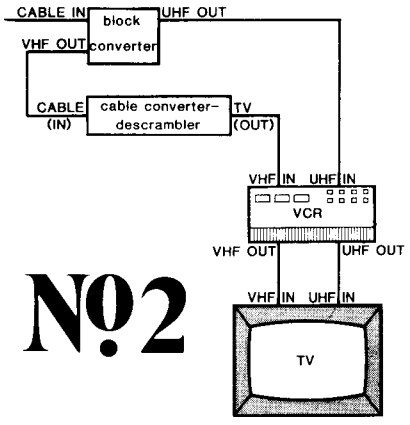
Programming Security. Many cable systems offer several levels of service, called tiers. Some may offer up to ten tiers, but two or three-tier systems are most common. A tier may consist of just one additional channel (such as a movie channel) or of several. Each tier that you add to your cable subscription costs additional money.

The first tier, usually called "basic," often consists of just the 12 standard vhf channels that any TV set can receive. Additional tiers may add services such as ESPN or CNN, the superstations like WTBS and WGN, or movie services such as HBO and Showtime, and may require the use of a set-top converter.

Since so many TV sets and video recorders now have cable-ready tuners (over half the televisions sold this year will), and because a block converter can make any set cable-ready, many cable operators protect their higher tiers with some sort of programming security to prevent free reception. There are many different security systems available. A cable operator will choose one based on three parameters: cost, security (how easy is it to "cheat"?), and transparency (how much does it affect the channel it protects?).

There are two basic types of programming security: trapping and scrambling. Trapping involves the use of a notch filter tuned to suppress a specific channel. If a subscriber decides to add a trapped channel to his service, the cable company sends an installer out to remove the trap, which must be reinstalled if the subscriber later cancels that channel. Traps are completely transparent, moderately secure, and best of all from a videophile's standpoint, have no effect on the operation of a video system.

If your equipment is cable-ready, then once the trap is removed, you get the channel. Unfortunately, traps are somewhat more expensive than the alternative (scrambling) due to the labor costs incurred every time a trap must be removed or reinstalled. To get around this problem, some companies have developed "addressable" traps that can be turned on and off at the headend.



A scrambling system electronically distorts a pay channel in the headend while a set-top converter-descrambler in the subscriber's home descrambles it for viewing. A cable-ready tuner cannot tune a scrambled channel, of course. The number of cable systems using a scrambling system is growing rapidly because the cost of the electronics needed has fallen drastically in the past few years.

Scrambling methods can be divided into three basic types: video inversion, line switching, and sync-pulse modification. In the first, the

video signal is inverted with respect to the sync pulse. Line switching is a rather esoteric system in which the headend actually scrambles the order of the scanning lines in each video field.

Sync-pulse modification is the most popular type of scrambling. There are four methods: the sync pulse may be inverted; it may be suppressed (reduced in level 6 dB or so); its width may be reduced to make it too "fast" for the receiver to detect; or pseudo-random sync pulses may be added. Some systems use a combination of these methods.

In almost all scrambling systems a decoding signal (called a "tag") is sent out by the headend to tell the converter-descrambler how to descramble the picture; and on most cable systems, the tag is amplitude-modulated onto the FM audio carrier of the scrambled channel. Since the limiter in an FM tuner strips the carrier of any AM, this tag cannot affect sound quality.

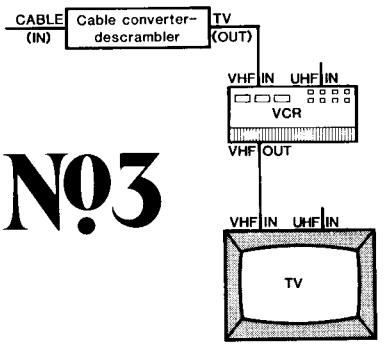
The transparency of these systems varies. One scrambling system uses an analog decoding signal on the audio carrier, and any number of problems in the cable system, from the headend to the line amplifiers, can induce unwanted AM onto that FM carrier. The decoder circuit interprets this as part of the decoding tag and generates a misshapen sync pulse that your television receiver or video recorder cannot lock to. Ironically, it is often older sets that are least affected by this problem, while newer sets are generally affected, especially those without manual vertical and horizontal-hold controls. There is very little you can do about this particular problem except wait for your cable operator to find the source of the unwanted AM. (If the problem affects only your VCR, so that you can watch movies but not record them, your request for service may be assigned a very low priority on the repair schedule.)

More modern scrambling systems use a digital tag on the audio carrier that cannot be influenced by extraneous AM. Not only is such a system more transparent, but a cable operator can assign a different digital code to any or all channels and control the availability of each channel in each home by means of a computer interfaced with the headend. Such a system, called "addressable," can even be combined with interactive circuitry to create a "pay-per-view" system, where the subscriber pays only for those programs he or she selects on the settop converter/descrambler. The "addressable" concept is so attractive to the cable industry that more and more operators are making every channel addressable (every channel scrambled).

To understand how the presence of even one scrambled channel eliminates several important features of your video system, let's look at three ways a VCR and a TV set can interface with a cable system with some (not all) scrambled channels.

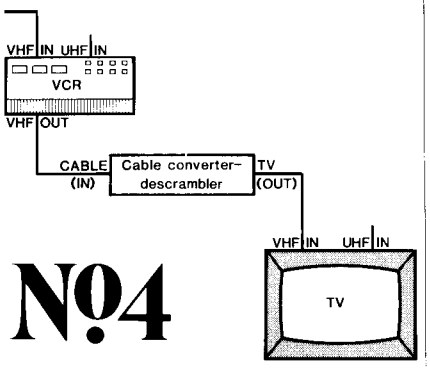
Connection 3

The television and the video recorder can receive only the channel selected on the converter/descrambler, whether they're cable-ready or not in connection No. 3. You can record any channel, scrambled or not, but you can't watch a different channel from the one you're recording. You can automatically record several events on a single channel, but you can't program your VCR to record different channels at different times unless someone is present to select the channels



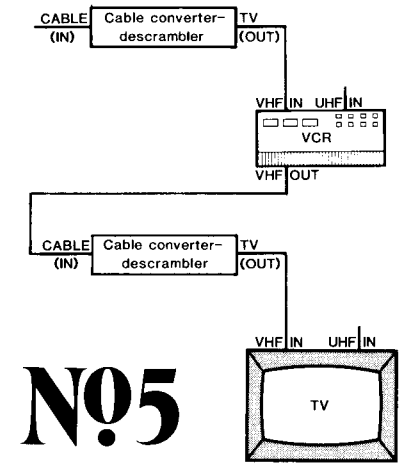
on the settop converter. If your television has a remote channel control, it won't work.

Connection 4



In connection No. 4, the video recorder can record any *non*-scrambled channel that it can tune-in, and it can program any combination of those channels. The television can tune in any channel, but its remote channel control still doesn't work. You can watch any channel while recording any non-scrambled channel, but you can't record the channels you're paying extra for. If your VCR is not cable-ready, this hookup is particularly limiting.

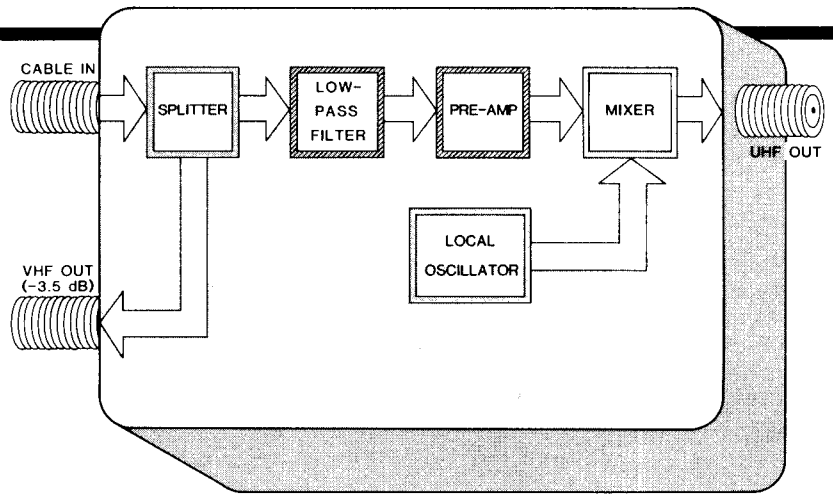
Connection 5



An additional converter/descrambler rented from the cable company and used as shown in connection No. 5 can give you full watch/record versatility *and* the ability to record scrambled channels. You still won't have full, multi-channel programmability (and you're paying $3 to $5 a month for the extra converter). But if you subscribe to a fully addressable system with every channel scrambled, this is the best you can do, although you'll still be doing without remote control.

The Block Converter. The three connections above have one thing in common: the uhf inputs of both the television and the video recorder are unused. On an 82-channel set this means that more than 85% of the tuner's channel capacity is left out. It is this fact that makes the block converter such a good accessory. Not only can it be used to make any 82-channel television set or VCR cable-ready by up-converting the cable frequencies to uhf, it can also give your video system access to both scrambled and nonscrambled channels at the same time, thus restoring a measure of multi-channel programmability, remote channel

How A Block Converter Works



A block converter "beats" an internally generated frequency against a "block" of incoming vhf channels in order to up-convert them to uhf channels. Circuits in solid outlines in the block diagram are found in all block converters; those in dotted outlines only in more advanced models.

As the signal enters the block converter it is split, and a portion is returned to the VHF OUT port so that standard vhf channels can be tuned in their normal positions (as in connection No. 1), or so that a converter/descrambler can be used to access scrambled channels (as in connection No. 2).

After the splitter, some block converters use a low-pass filter, generally at a frequency around 330 MHz. This helps prevent or limit intermodulation distortion caused by the presence of channels higher than the block converter can handle. (The second harmonic of the local oscillator beats against the higher channels, generating a frequency that interferes with the lower channels.)

After the filter, some block converters have a preamp to compensate for the loss caused in the mixer section. This is quite an important feature because the uhf output of a block converter, if it is converting many channels, cannot be amplified; there is no uhf amplifier that can handle twenty to thirty adjacent channels without incurring unacceptable intermodulation distortion in the picture.

The local oscillator generates the frequency to be beat against the incoming vhf channels. This frequency is generally between 540 and 590 MHz. For instance, if channel 2 (54 to 60 MHz) is beat against a 584-MHz oscillator, the result is uhf channel 42 (638 to 644 MHz). The lower the frequency, the more channels the block converter can up-convert before it runs into the limit imposed by the size of the uhf band. (You can't up-convert to a channel higher than 83.) However, intermodulation effects limit any block converter to about 36 channels no matter what oscillator frequency is chosen.

The local oscillator should be tuneable over a range of at least ±6 MHz in order to compensate for offset channels and to allow re-tuning to avoid co-channel interference on a specific channel from a local uhf station.

Finally, in the mixer section, the actual heterodyne conversion takes place. Its output is the UHF OUT port of the block converter. The outputs of a typical block converter are shown in the cable conversion chart.

Disadvantages. As useful as a block converter can be, it has several limitations that can prevent it from operating satisfactorily in some situations. First, it has a limited "dynamic range." Most block converters can accept signal input levels over a range of only about 10 to 15 dB. Less than the rated input range yields a noisy (grainy) picture and intermodulation distortion (herringbone); more generates even worse intermodulation.

Second, its uhf output, as mentioned above, cannot be amplified unless it is handling only one channel at a time. This, taken with the dynamic range limitation, means that a single block converter can rarely be used to supply an up-converted multi-channel signal to more than two VCRs or televisions simultaneously. Of course, you can use separate block converters for each set, but that runs into money!

Third, a block converter is not completely compatible with some PLL tuners. In the frequency allocations, there is a space between channels 4 and 5. This space is less than one channel (6 MHz) wide. When a block converter up-converts the low-vhf band it reproduces this spacing, but there is no corresponding space in the uhf band. This creates offset uhf channels that some PLL tuners cannot manage. The only (partial) solution is to tune the local oscillator of the block converter so that channels 5 and above are on-frequency, and use the set-top converter to tune channels 2, 3, and 4 (connection No. 2).

Last, but not least, the noise generated by the up-conversion process increases with the number of channels converted, due to unavoidable nonlinearities in the circuitry. If you are most concerned with the image quality of your recordings, it is best to sacrifice some convenience and up-convert only a single channel at a time (connection No. 6).

Selecting a Block Converter. Since a block converter can increase the versatility of your video system enormously, it's important to choose a good one. As discussed above, a block converter should have a preamp and a low-pass filter on the input especially if your cable system has more than 36 channels.

It should be temperature and voltage stabilized, a feature of extreme importance for programmed recordings. If the block converter drifts off frequency due to a voltage brown-out or a temperature change (many people turn their thermostats down when going out), your VCR, which you set to record two movies and an important football game, may end up recording only noise, or an entirely different channel!

A block converter should be FCC and UL approved. All converters require what is called Part 15 approval since they generate an r-f signal. Some cable operators will not let you use an unapproved block converter. ◇

control, as well as watch/record versatility.

There are many ways to connect a block converter to accomplish this. The best way for you will depend on the nature of your cable system, which of the features of your video system are most important, and what kind of tuner your television set or VCR recorder has. In the following hookups we'll consider two kinds of tuner: "direct-access" and "preset."

A "direct-access" tuner is one that can tune-in any channel in its range directly without presetting. The old-fashioned "two-knob" mechanical tuners and the latest electronic tuners with "calculator keyboard" or "ten key" controls are both direct access. A cable-ready direct-access tuner (105 or more channels) *cannot* tune uhf and special vhf cable channels at the same time, unfortunately. Such tuners have a switch on the control panel (generally labeled CATV/NORM) that defeats the cable-ready feature when uhf reception is desired. (Remember to use this switch when employing a block converter with this kind of tuner.) Almost all cable-ready televisions have direct-access tuners. A few of the most recent VCRs do, too, giving them greater programming versatility than VCRs with "preset" tuners.

A "preset" tuner is one that must be preset to the channels you want to receive. These generally have 12 or 14 tuning positions, each of which can be set to any channel within the tuner's capability. Channels not preset cannot be received without manually re-tuning the set. Unlike a direct-access tuner, a cable-ready preset tuner *can* receive uhf and special vhf cable channels at the same time. Up until very recently all programmable video recorders had preset tuners.

The most commonly used block converter installation however, was illustrated by connection No. 2. It is best for the following situations: (1) if you have a programmable video recorder, noncable-ready or direct-access cable-ready, and programmability is the most important feature to you; or (2) if you have a direct-access television (cable-ready or not) or a noncable-ready preset television, and you want the maximum number of channels available for remote control and maximum watch/record versatility.

When this hookup is used with a preset tuner, one of the tuner's positions should be set to the vhf output channel of the converter/descrambler so that you can watch or record the scrambled channel (s). The remaining positions should be tuned to the nonscrambled channels of your choice on their up-converted uhf equivalents. You'll have to make some choices here, since your cable system will likely have more nonscrambled channels than your preset tuner has tuning positions. Of course, any channel can be tuned-in by selecting it on the converter/descrambler.

As an example of what this hookup can do, assume you have a programmable VCR with a 14-position preset tuner and a remote-control TV with a direct-access tuner. With connection No. 2, you will be able to program any combination of 13 nonscrambled channels you've preset on the VCR's tuner *plus* one scrambled channel from the converter/descrambler. You cannot program two different scrambled channels. You can watch any nonscrambled channel or one of the scrambled channels while recording that same scrambled channel or one of the 13 preset channels, and you have all of the nonscrambled channels plus one scrambled channel at a time available for remote channel control.

Note that in this hookup, if your cable system has more channels than your block converter can handle, those channels beyond its range will count as scrambled, since the only way to tune them is through the converter/descrambler.

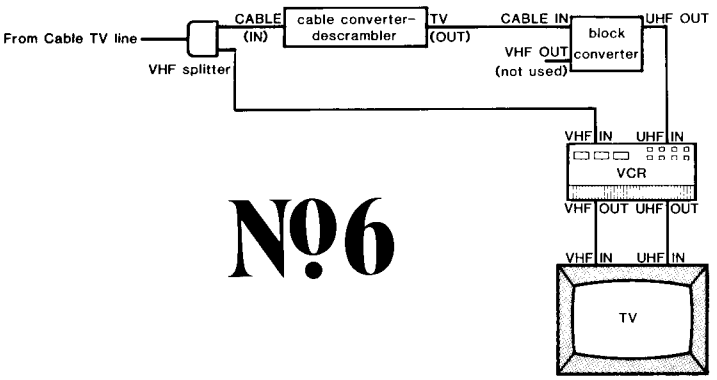
Some video recorders have a single, combined vhf and uhf input and output (Sanyo, Sears, and Toshiba, among them). If you have this kind of VCR you will have to use a vhf/uhf separator/joiner to combine the vhf and uhf lines before the video recorder. The use of this separator/joiner does not change the operation of the block converter installation in any way.

Connection 6

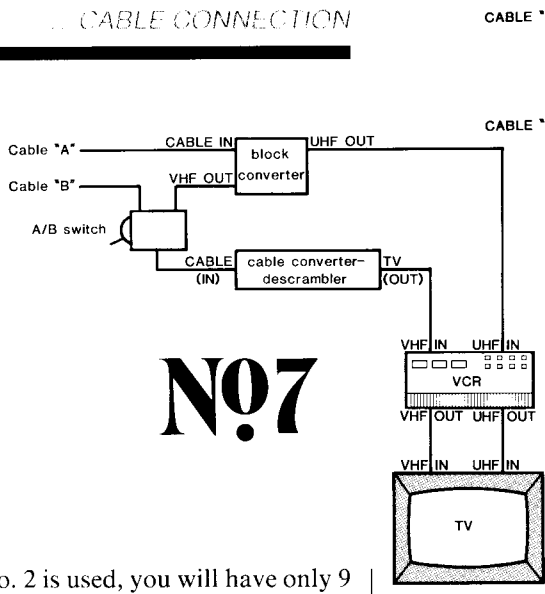
Use connection No. 6 in the following situations: (1) if you have a cable-ready preset VCR and programmability is the most important feature, (2) if you have a single-knob preset television and you want the maximum number of channels available for remote control or watch/record versatility or (3) if your cable system has only the 12 standard vhf channels plus the scrambled channel (s).

Since a cable-ready preset tuner can tune uhf and special vhf simultaneously, you can record any nonscrambled channel directly on vhf, and any scrambled channel up-converted to uhf after it has passed through both the descrambler and the block converter. A significant advantage of this installation is that you get cleaner recordings because the block converter is up-converting only one channel at a time and is less subject to intermodulation distortion.

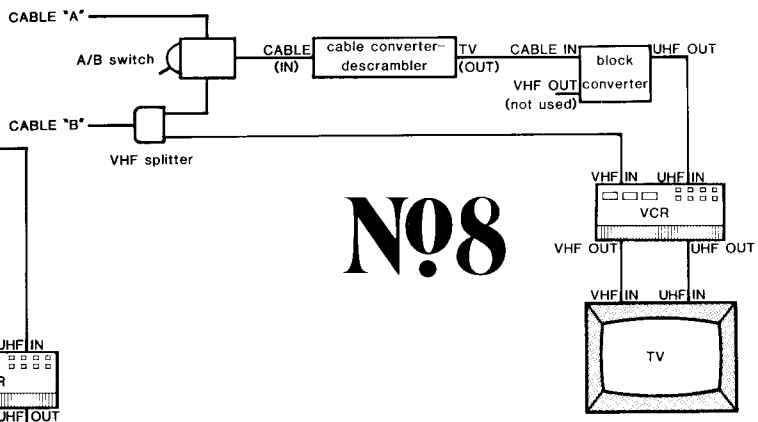
Connection No. 6 is used with a single-knob preset television when remote control is important because



No6



No7



No8

if No. 2 is used, you will have only 9 channels available for remote selection: 8 uhf plus one vhf (the vhf can't be re-tuned to uhf). With connection No. 6, you get 13 channels for remote control: 12 vhf plus one uhf. The watch/record versatility of the system is improved for the same reason.

Finally, if your cable system has only the 12 standard vhf channels plus the scrambled channel(s), it doesn't make sense to up-convert channels that your tuner can receive directly, so use connection No. 6.

Dual Cable Systems. A dual-cable system is no more than two single-cable systems combined into one, with an A/B switch to select which of the two will be accessed by the converter/descrambler. In the following hookups the A/B switch is shown separately for clarity. The hookups that follow are variants of Nos. 2 and 6, except that here we must consider the distribution of the channels on two cables. Some dual-cable systems put all the scrambled channels on one line and the rest on the other. Other systems may put the basic tier on one cable and all remaining tiers on the other. Space prohibits listing all the possible combinations, but here are two installations that will be useful with most dual-cable systems.

Connection 7

Connection No. 7 is a variation of No. 2. You can program or remotely control any combination of nonscrambled channels from Cable A plus any one channel (scrambled or not) from A or B and watch or record any channel. If A has no scrambled channels, the A/B switch is unnecessary.

Connection 8

Connection No. 8 is a variation of No. 6, and is likewise most useful with cable-ready preset tuners. With this installation you can tune-in any nonscrambled channel from Cable B plus any one channel (whether scrambled or not) from either Cable A or B. Since this hookup is usually used with preset tuners, the addition of another A/B switch wouldn't be of any help.

Double-Input TV. Some recent cable-ready televisions and component video tuners are equipped with a built-in A/B switch to allow accessing both scrambled and nonscrambled channels with your remote control. In this case, connection No. 9 can be used to hook the TV to a single-cable system with scrambled channels.

Connection 9

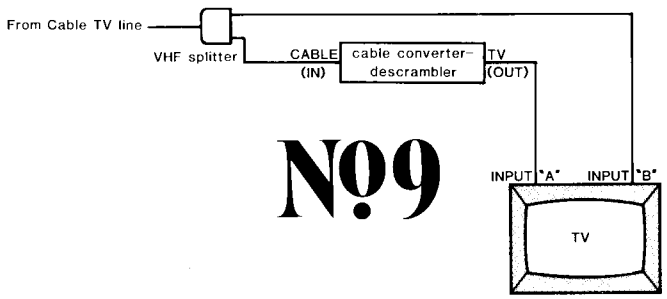
Note that a "double-input" television doesn't need a block converter. No VCR is yet equipped with this feature, though, so a block converter will still be necessary for programmability and full watch-record versatility. Now, however, you can hook up the block converter in the way that best suits your particular VCR without worrying about how the hookup will affect your TV.

Connection 10

Use connection No. 10 with a non-cable-ready VCR or any direct-access VCR, and a double input television. The block converter and descrambler are positioned as in connection No. 2 with respect to the VCR.

Connection 11

With a cable-ready preset VCR and a double-input TV, use connection No. 11. Here the block convert-



No9

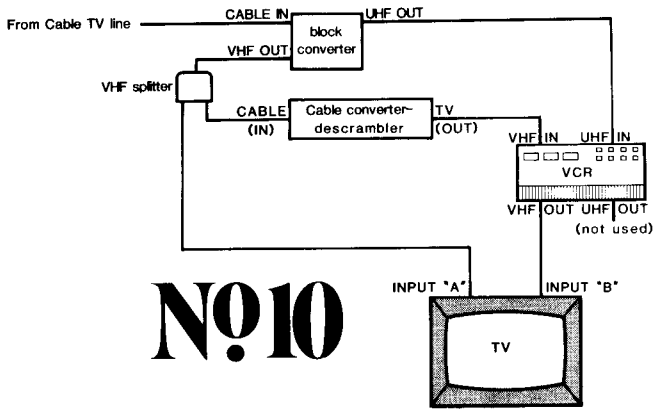
er and descrambler are positioned as in connection No. 6.

All double-input televisions and tuners are direct-access types, and both inputs on these sets are either cable-ready or not, depending on the setting of the "defeat" switch. An exception is a tuner made by the Proton Corp., which has one uhf/vhf and one cable-ready input, selectable by a front-panel switch.

There is one more hookup for a block converter that may well be the most useful one we have discussed. If you have several television receivers that are all connected to the cable system and you have access to the distribution splitter that feeds the signal to them, you can use a block converter to distribute the r-f output of any video component to every TV set or VCR in your home, using the existing cable wiring. This includes your video recorder or videodisc player, a home computer (which then becomes an electronic memo board that can be read from any TV), or a surveillance camera in a security system.

Connection 12

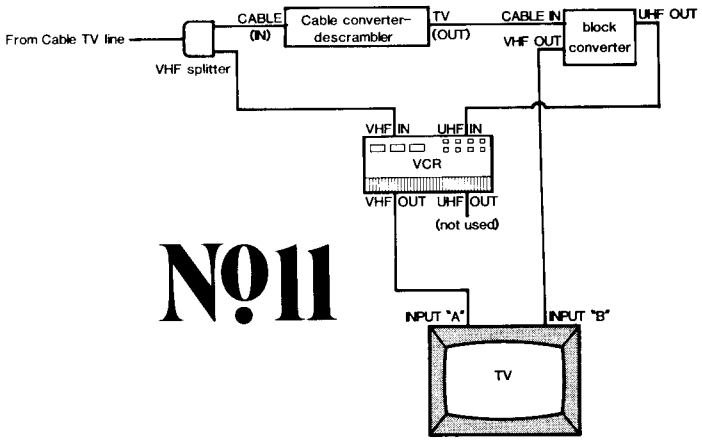
Assuming there is an r-f output, use connection No. 12. A program on any video component can be watched or recorded on every TV receiver in your home on the up-converted uhf equivalent of its vhf output channel, leaving the remote controls on your video equipment unimpaired. Be sure the distribution splitter will pass uhf (many CATV splitters won't); and don't attempt to use a combined uhf/vhf amplifier in this setup. No uhf/vhf amplifier can handle more than about 7 vhf channels. The thirty or so adjacent channels on your cable system can drive such an amplifier into gross distortion and give you a pretty bum picture.



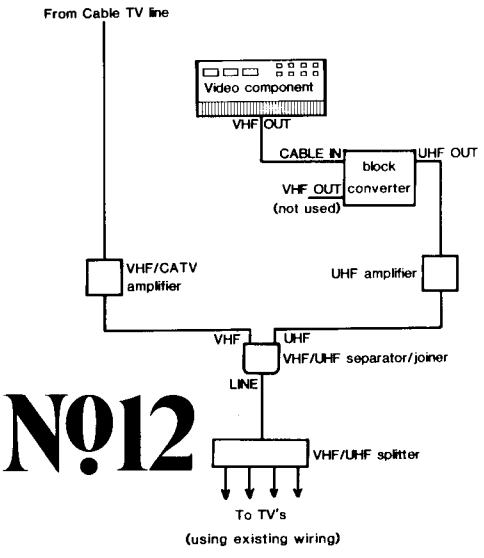
№10

Conclusion. As effective as a block converter can be, it is not always the video panacea that one might hope for. Some things can impair its operation, from defects in a cable system to subtle oversights on the user's part. For example, there could be a weak signal at the input of the converter that might require use of a CATV amplifier, a grainy or snowy picture on a few channels that requires tuning higher in the band to avoid spurious images, co-channel interference from a uhf channel that requires re-tuning of the converter's local oscillator, distorted pictures as a result of too high a signal that requires insertion of an r-f attenuator, and other causes and effects. In most cases these problems will not occur, however.

More importantly, VCR owners have an opportunity to enjoy a host of advantages, from obtaining more channels to watching one channel while recording another one, by following the guidelines presented here. Most VCR instruction manuals ignore the fact that there are cable-TV connections to be made, and even when they do, the common setup presented does not make it possible to watch a channel while recording another one, which is achievable without a block converter, though remote-control facilities and reception of extra channels are not garnered. ◇



№11



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