Upgrading your marine DIRECTV system
You’ve earned some leisure time on your yacht. Or maybe, you’re in charge of a larger vessel and you have a responsibility to make sure your guests are entertained. Either way, you’ve probably put in an expensive satellite system some time in the last ten years, and you’d like to make sure that it’s there for you for the next ten years. That’s why it’s important to look at the upgrades you’ll need to keep the TV signal coming as you sail along.
Upgrading to HD

Until recently, shipboard systems have been standard-definition only. At first, it was impossible to provide quality HD on a moving vessel and for a long time it was just too expensive. HD systems have come down in price somewhat... and while they’re still not cheap it is possible to put in a quality system for under $20,000. That’s a lot for a small craft but for a really large one, it’s all part of the budgeted improvements.

The top of the line here is KVH’s HD7 domed dish. It can lock onto all three major DIRECTV satellites while in motion, and while satellite service isn’t guaranteed in the choppiest seas, it does an excellent job on the open water. It’s available in a DIRECTV-only configuration or a Tri-Americas configuration that lets you get programming from other countries as well. If you do opt for the Tri-Americas system you will also need to get satellite receivers and an account for every country. Unfortunately Solid Signal can only sell US DIRECTV equipment because the FCC bans importation of other countries’ equipment.

Note: The KVH HD7 is a SWM-only dish and cannot be used with older multiswitches at all. It also requires its own upgrade kit for 32 receivers instead of using external multiswitches. The HD7 should be used as part of a full refit rather than an upgrade.

Changing the Infrastructure

Most vessels outfitted in the 2000s use large Spaun multiswitches. These were the gold standard at the time for commercial installations, but Spaun has slowly but surely reduced its presence in the US, and their products are not compatible with the latest generation of DIRECTV receivers. Luckily, DIRECTV’s SWM distribution system is truly professional grade and ready for even the toughest environment.

When looking at the equipment closet, you need to first decide if you are going to add more capacity or replace existing capacity. If your older receivers aren’t compatible with the SWM system you may need to replace one part of the closet at a time. DIRECTV makes this easy by allowing you to split the signal in order to feed both old and new distribution.
Because you may be splitting the signal to feed both old and new distribution systems, you may want to use an amplifier to compensate for the loss created by the splitters. Amplifiers should be used sparingly and you should only amplify a signal if you find that it could fall below the the suggested input window for the multiswitches (generally -45dBm.) If you are getting -35dBm on a sunny day, an amplifier will probably help you on a rainy one. Overamplifying is just as bad as underamplifying. In most conditions, no amplifier is necessary, but long runs from the dish to the equipment closet, paired with poor weather, sometimes make an amplifier a good idea. Test the signal before making a choice.

We recommend Sonora's LA144R-T amplifier or TAMP_6 amplifier for this purpose, even if you have a standard definition dish. DIRECTV commercial distribution is all built around a 4-wire system, and putting in 4-wire equipment during this stage will only benefit you later. There are two-line amplifiers that may be used as well but the cost difference is not that large.

The LA144R-T is a general-purpose, set it and forget it amplifier that puts out an auto-gain-controlled, steady signal with up to 14dB of amplification. The TAMP_6 has controls for amplification level and slope compensation that could come in handy with long runs and help you get the perfect level at the multiswitch.
We recommend Sonora’s **4SATPL-T polarity locker** for all land-based commercial installations, as it provides stable signals down the line that only contain one of the four possible combinations of polarity, voltage, and tone. It may not be strictly necessary for a marine installation since most marine dishes use their own power supplies and aren’t dependent on a polarity locker. However, putting one in place during the installation can help you be 100% sure that all the lines are properly connected, since a polarity-locked line that’s hooked up incorrectly will be an obvious problem during testing. There are some potential benefits to a polarity locker as well, so if your budget permits, it’s not a bad idea.

Because the polarity locker is also designed to provide power to the dish, check with your dish’s manufacturer to make sure that it can accommodate up to 20 volts coming into the unit. Most dishes are designed to be powered this way and it is generally not a problem. If your dish is not designed to get DC voltage from the satellite lines, use DC blocks to take the voltage off the line.

If you are leaving your existing multiswitches in place, you’ll need splitters to send the signal to both old and new systems. You cannot cascade a new system off an existing one. Generally you will need a **two-port Skywalker splitter** for every incoming cable (you’ll need either two or four.) You can also use **four-port splitters** if needed, but we do not recommend using four-port splitters to “future-proof” your system as they are easy enough to switch out and the four-port splitter has more loss than the two-port model. With the proper equipment it is possible to feed 256 receivers from a set of 4-port splitters, so there is generally no need to use taps in a marine installation, which would otherwise be needed if you needed more capacity than that.
DIRECTV’s SWM system uses two multiswitches for commercial use, and your choice of multiswitch really depends on the size of your installation. A relatively small installation can make do with a smaller multiswitch, but once you exceed 16 receivers you really need to be looking into something more commercial in nature.

**SWM16 multiswitch**

The SWM-16 Multiswitch can drive 16 receivers, or a combination of receivers and DVRs that doesn’t exceed 16 tuners (a standard DVR counts as 2 tuners, while a Genie DVR counts as 5.) It is inexpensive and reliable, but is designed primarily for residential use. For industrial use, the SWM16 multiswitch should be powered by a [PS242000A power supply](#) located in the same closet as the multiswitch, as opposed to the PI29Z multiswitch used for residential use. This will cut down on excess heat.

**SWM32 multiswitch**

The SWM32 multiswitch is designed for industrial use and can feed up to 32 receivers, or a combination of receivers and DVRs that doesn’t exceed 32 tuners. It has an output level 5dB higher than a SWM16 so it is better for long runs or for using older cable. Two SWM32s can be cascaded (no more than two) for a total of 64 tuners from one drop.

Both SWM16 and SWM32 multiswitches use 8 tuners per port; in other words each output supports 8 tuners, so some balancing may be necessary to make sure the system works properly.
**OTHER CONSIDERATIONS**

## Distribution

Unlike older multiswitches, SWM systems can use splitters that can be located anywhere in the run. It may be helpful to run a single line to a common area and split the cable from there, rather than running lines from every room to the closet. However, if you already have existing cabling, splitters can be used within the closet itself.

It is imperative that the proper splitters be used in order to accommodate the specific upstream and downstream frequency needs of SWM distribution. The **MSPLIT2**, **MSPLIT4**, and **MSPLIT8** splitters are designed for SWM distribution and are perfect for this use. Splitters may be cascaded if particular care is used to avoid excessive losses and keep the signal level higher than -55dBm at the receiver.

SWM distribution tends to have a slightly shorter maximum run than the distribution systems used in past years. In general 250 cable-feet is a good rule of thumb for planning purposes; the use of smaller splitters and the extra power from the SWM32 can extend runs to 300 feet. Beyond this point, you can use the **Sonora LA141R-T amplifier** to increase the distance, but since this amplifier does not increase the power of the return path that SWM distribution needs, this provides a maximum, one-time boost of up to 150 feet. Multiple amplifiers cannot be used on the same line. Also, using an amplifier can cause problems with whole-home (DIRECTV’s system for sharing recorded programs from receiver to receiver) so they should be avoided with DVRs that are intended to share programs to other rooms.

## Measurement

A good satellite meter is critical to any successful installation, and a professional should never depend on the signal meters built in to a DIRECTV receiver. Inexpensive signal finders do not work with SWM distribution, so it’s best to get the meter you’ll need.

**Solid Signal’s SatLookLite** is an inexpensive, quality meter that will help you determine signal levels. Because aiming is done automatically, this meter will give you the most critical measurement -- signal level on the 101 satellite by setting the meter to SWM 101.

For more intense measurements including cable quality tests and deep diagnosis, you’ll need **DIRECTV’s AIM meter**. This is the choice of professionals and gives you every possible test you’ll need to know what’s going on including comprehensive testing of every satellite and transponder. Both meters can also be used to test signal levels on non-SWM systems with a high degree of accuracy.
INSTALLATION

Installation starts with putting the polarity locker in place (if necessary) and testing for the need for an amplifier. If you are keeping your existing distribution in place or putting in more than one multiswitch, you'll need to put splitters in line to prepare for the new equipment.

After checking the signal levels at the new multiswitch, connect the lines from the splitters (or straight from the polarity locker) to the multiswitch (or switches.) It is imperative that the lines from each splitter go into the same port on every multiswitch. In other words, the 13V output from the polarity locker MUST feed the 13V input on every multiswitch. If the lines are crossed at this point you will have signal blackouts throughout the entire system.

If you are using a SWM16 multiswitch, consider using uncompressed compression connectors as “standoffs” to separate the multiswitch from the wall and provide greater heat dissipation. Also note that the SWM-16 should not be cascaded so you must either feed multiple SWM-16s straight from the splitter or start with SWM-32s.

If you are using a SWM32 multiswitch, note that the inputs actually run from right to left on the top of the multiswitch. They are clearly labeled but it’s easy to make a mistake. A second SWM32 can be cascaded from the first but you cannot cascade beyond that. When you power up the SWM32, the front lights should show green for ports that are connected. A flashing red indicates low levels (or no levels) and a solid red indicates levels are too high. Use amplifiers or attenuators as necessary to balance the signal.

The SWM16’s power supply should connect to the PWR port, unlike in residential installations where the power can run into the SWM1 port. Note also that the SWM32 is provided with a screw-on connector for power; there is a second input for a push-on connector which can be used for a redundant **SWM-PI power supply**.

DIRECTV's standards call for jumpers to be no shorter than 24” to reduce potential loss due to reflection. While there is some question as to whether or not this is a real issue, it’s best to err on the side of caution and keep jumpers 24” - 36” in length.

Remember that no more than 8 tuners can be fed from a single SWM output port so plan accordingly.

Of course, all installs will vary. The next page shows 32 receivers (each with a single tuner, no DVRs) working side by side with an existing installation. Placement of the optional polarity locker and amplifier is shown although not every installation will require it. A second SWM32 module can be added to the first for an additional 32 single-tuner receivers but you may not cascade a third multiswitch.
TYPICAL MARINE INSTALL

Actual installation may vary. Contact Signal Connect for personalized installation advice.

Existing DIRECTV Distribution

Polarity locker & Amplifier
(if needed)
Check signal levels before adding

Maximum 8 receivers
(8 tuners)
per output port

DIRECTV 4x8 Channel SWM
(SWM-32)

Second multiswitch
(if needed)

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**FINAL NOTES**

**Receivers**

If your plan calls for using existing receivers, be aware that the DIRECTV D12 and R16 are the only standard-definition products that work with SWM distribution. If your receivers are older, they will need to be replaced in order to work with SWM distribution.

When migrating existing receivers, it will be necessary to change the satellite setup to SWM by going into satellite setup ([MENU], Parental, Fav’s and Setup, System Setup, Satellite on SD receivers.) After you set the multiswitch type to SWM, exit and go back in to make sure that the setting “stuck” as sometimes it does not. The dish type should not change.

All of DIRECTV’s high-definition receivers, models H20 and later and DVRs HR20 and later are compatible with SWM distribution. Since older HD receivers do not receive the HD signals that DIRECTV has used since 2008, it’s not likely that you will find an incompatible HD receiver. A note that if your existing installation uses H20 receivers, they should be replaced if they haven't already failed, as the model was not as reliable as later models.

If you do install new HD receivers, be aware that the current model (H25) does run very hot so even though it is small and power-efficient, take care to allow plenty of ventilation space. H25 receivers can be mounted to a wall or the back of a TV with industrial Velcro, or with the basic H25 mount or commercial H25 mount. Also be sure to mount the external power supply where it is easily accessible as it is the part most likely to fail under stress.

One last tip...

Because you’ll likely be underway when something fails, it’s a good idea to have extra EPS10 power supplies and a completely staged and ready receiver on hand. The multiswitches themselves are not likely to fail during everyday use, but having a spare SWM16 multiswitch on hand gives you a quick way to restore service to at least 16 rooms economically.

Once your installation is complete, you’ll be ready for the next generation of DIRECTV services, whatever that will be, and should be all set for years to come.
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