RM Italy HLA 305V Plus 160 – 10 Meter Amplifier

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Operating with 5 W or less RF power output (QRP) can be fun and rewarding. When conditions are good, the majority of stations heard can be worked. When the band conditions change for the worse, QRP operation is more challenging and sometimes frustrating. Personally, I like to finish a contact with a proper goodbye rather than simply fading into the noise. Having more RF power out to the antenna using a linear RF power amplifier would be handy in such cases.

Historically, just about all commercially built power amplifiers needed 60 to 100 W to achieve a specified power output of 600 W or more. For the QRP enthusiast, building one at home has always been an option, as seen in *QST*'s Homebrew Challenge II (May 2010, pp 30 – 31).

Recently, a few commercially built power amplifiers suitable for QRP power input have appeared on the market. RM Italy's HLA 305V is such an amplifier that provides a lot of power output with a little power input.

Overview

The RM Italy HLA 305V is a no-tune, 160 through 10 meter solid state amplifier that uses four MRF455 power transistors in a class AB configuration. The amplifier can switch bands automatically or manually. In automatic mode, the amplifier's built-in frequency counter triggers the selection of the appropriate band pass filter. A 5 to 10 W transmitter will create 200 to 250 W output.

Bottom Line

The RM Italy HLA 305 makes many watts from just a few watts, with ease and style. Sitck with the low power (200 W) setting for the cleanest signal.

Out of the Box

The amplifier is rather flat — not very high, not too wide, but nearly 18 inches deep (including protrusions). Cooling fins protrude from the top and sides of the deep royal blue metallic case. On the review unit, a "Plus" version, there are two 5 inch diameter cooling fans located on top to draw heat away from the cooling fins. (The standard HLA 305V does not include the fans.) The front panel has a knob for automatic/manual band changing, along with a min-

Table 2
RM Italy, HLA 305V, serial number 030315
FCC ID Number: 2ACTRHLA305V

Manufacturer's Specifications	Measured in ARRL Lab
Frequency range: All amateur bands in the range of 1.5 to 29.7 MHz.	160, 80, 60, 40, 30, 20, 17, 15, 12, 10 meters.
Power requirements: 13 V dc ±2 V dc, 34 A max.	25 – 35 A typical at 13.8 V dc.
Power output: 200 W, 250 W (HI).	As specified, except 204 W (HI, 28 MHz).
Driving power required: 10 W typical, 15 W max.	3.3 – 14.4 W (typical).
Spurious and harmonic suppression: Not specified.	Typically 57 – 70 dB, except 43 dB at 5.3 MHz. Meets FCC requirements.
Amplifier intermodulation distortion (IMD): Not specified.	14 MHz, 3rd/5th/7th/9th: 200 W: ?40/-40/-50/-63 dB HI setting: -29/-40/-47/-55 dB
TR switching time: Not specified.	Amplifier key to RF output, 3 ms; un-key to RF power off, 4 ms.
Size (HWD): 3.5 × 9.5 × 17.4 inches (including protrusions). Weight, 9.8 lbs.	
Price: $700.	

iscule ¼ × 1½ inch LCD that shows final amplifier temperature in Celsius, the band selected, and the band switching method.

The display also is used for setup in the menu mode, which is activated by pressing the SET button, a momentary contact microswitch accessed via a 1 mm hole. A thin, non-metallic prod must be used to press this switch (I used a wooden toothpick). In SET mode, the user can change the display backlight level and display contrast, adjust the SSB delay, and enable the internal RF sensed transmit/receive (TR) switch.

To the right of the SET hole are three rocker switches labeled SSB ON/OFF, HI (power output), and POWER ON/OFF. The rear panel has SO-239 connectors for the transceiver and antenna connections, a phono jack for TR switching, and a dc power receptacle. The HLA 305V comes with the mating dc power plug only (no cable), and a manual, written in both English and Italian.

Setup

Since only a power plug is supplied, I had to make up a cable for the power supply. RM Italy specifies 34 A maximum at 13 V dc (±2 V) to properly power the amplifier. For automotive installations, the manual calls for a properly fused dc power cord of at least #7 AWG.

For test purposes in the Lab and for on-air use at home, I only needed three feet of power cord to reach my 50 A dc power supply. An online calculator indicated the power cord needed to be at least #10 AWG for the short length for a 13.8 V, a 34 A load, and 2% loss in the cable.[2] Fusing was my next concern, as the manual doesn't mention fusing requirements with a dc power supply. A quick look at the manual's barely legible schematic diagram shows that internal fusing is present.

Some, but not many, QRP transceivers provide for amplifier TR control. The most common method of keying an amplifier is closing the amplifier's TR jack (also called the PTT line) by shorting it to ground. The HLA 305V can be keyed this way, but it also has an RF sensing switch at the RF input, enabled from the SET menu. My transceivers do not provide a PTT line since, so I was glad to see this function.

During RF sensed operation, the amplifier remains keyed for a short duration of time after transmission stops, dependent on the SSB DELAY menu setting I found a delay of 200 ms to 500 ms suitable for both CW and SSB operation. Other choices include 50, 100, 1000, and 1500 ms. Full break-in (QSK) CW operation is not available with this amplifier. The delay is enabled by pressing the front panel SSB switch. When using the PTT key line, the SSB switch and RF sensing can be left off.

Band changes are automatic with the knob set to AUTO. Once the amplifier is powered on, sending a CW dit or two, or speaking a syllable or two into the microphone provides enough information for the frequency counter to switch the amplifier to the correct band.

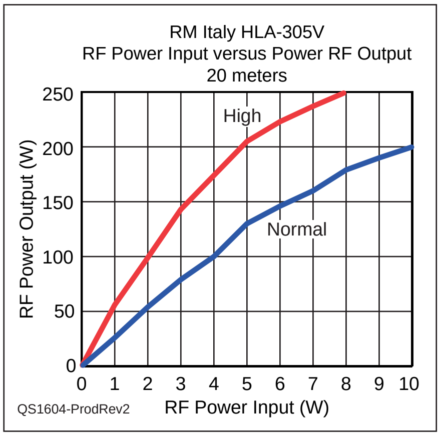

Figure 2 — RF power output versus RF power input on 20 meters as measured at the ARRL Laboratory.

Lab Testing

Many radio amateurs are concerned with the output quality of their transmitters and amplifiers. If not properly designed, amplifier IMD (intermodulation distortion) can make the transmitted signal splatter. Without adequate band pass filtering, harmonics and other spurious emissions can be transmitted along with the fundamental signal. At the ARRL Laboratory, I measured fairly low amplifier IMD products in low power (200 W) mode and acceptable IMD in high power (250 W) mode. The HLA 305V's band pass filtering provides good harmonic and spurious suppression, except on 60 meters, where suppression was at the 43 dB limit.

Current consumption measured between 25 and 35 A at maximum specified power output, depending on the band chosen. The manual includes detailed amplification curves for each band, including the amount of gain the amplifier provides. Figure 2 shows power input versus power output on 20 meters as measured in the ARRL Lab. After several periods of amplifying at full power, the fans sped up, but were fairly quiet, while the heat sink remained reasonably cool.

The RM Italy HLA 305V will shut down if the input power exceeds 15 W, or if high SWR is present. If such a problem occurs, a somewhat squeaky, mouse like alarm sounds and the amplifier stops amplifying. This happened to me a few times in the Lab

Figure 3 — Some of the author's QRP transceivers used with the RM Italy HLA 305 RF amplifier.

during the power output tests and when I had the wrong antenna hooked up at home.

The alarm will also sound and amplification stops if amplification is attempted while transmitting between 26 and 28 MHz. Every RF power amplifier we review in *QST* magazine that amplifies below 144 MHz must be certificated per FCC Rules, Part 97. Though this amplifier may look similar to non-certificated amplifiers, intended for use in other radio services, the HLA 305V is designed *and certificated* for the Amateur Radio Service and has an FCC ID number.

Excitement

With Lab testing completed, I brought the HLA 305V home. This amplifier is ideal for those who own a multiband, multimode, QRP HF transceiver. I don't have such a transceiver, though I do own a handful of single or dual band QRP transceivers, most with 1 to 3.5 W power output, as shown in Figure 3. With great anticipation, I connected the amplifier to my 50 A power supply and measured the power output into a dummy load with each transceiver/HLA 305V combination. I'm pleased to have the opportunity to share my results with you.

For CW, I first tried my mighty 40 meter MFJ Cub with its 1.6 W of power. With the amplifier set to HI, I measured more than 100 W output! I usually send between 20 and 30 WPM on CW. Listening off-air to my radiated signal indicated no clipping of the first dit. Next, I tried two Wilderness SST CW transceivers, a 30 meter and 20 meter version. Combined with the HLA 305V, power output was again more than 100 W.

For SSB mode, I have a Hendricks BitX17A for 17 meters and a YouKits TJ2B for 40 and 20 meters. The BitX17A, at about 9 W, drove the amplifier to nearly 250 W, while the TJ2B, with about 2 W, drove the amplifier to 100 W RF output.

For AM mode, I tried my DZ Kits HT-7, a 40 meter, 1 W AM handheld, with the result of 40 W of carrier sent to the dummy load. Last but not least, for nostalgia sake I brought out my Heathkit HW-19 (10 meter lunchbox) for excitement. With its one big watt of carrier output at 29 MHz, I drove the amplifier to 20 W of carrier output.

Though I had expected such results after lab testing, I couldn't help being amused that my itty bitty QRP boxes could be amplified to power output levels that were equal to, or exceeded the power output of most HF transceivers.

On the Air

I made my first contact using the HLA 305V with the HT-7 on 7.290 MHz AM at mid-day. W8GPA in Jackson, Ohio, blasted out of the HT-7's speaker as he called CQ. Even though a minor solar storm that was underway, John heard me on my first try and a long QSO ensued. Nothing much else was heard on any of my other QRP transceivers that day, so I gave up.

A few days later, during an early evening, I made more contacts on 40 meters, this time, using CW with my MFJ Cub. I've made DX QRP contacts on 40 meters before with the Cub, but it's challenging using my inverted L antenna. With the HLA 305/Cub combo, I was able to make contact with everyone I heard calling CQ — even weak stations. The YouKits TJ2B/HLA 305V combo worked effectively as well in SSB mode on both 40 and 20 meters, using my elevated vertical antenna.

Considerations

For those who wish to have an operating station setup that's very small, the amplifier can be placed out of sight, under a desk, or in the next room. With the HLA 305V, a multiband, multimode QRP transceiver, however small, can pack as big a punch as much larger and more expensive transceivers. There is, however, an added cost. In addition to the price of the amplifier, you must have a suitable power supply and power cord.

For a mobile installation, you will need to supply a heavy, well fused power cord. You must also make sure the mobile antenna system can handle the increased high power. RF safety should be considered when installing an RF amplifier in an automobile. On the higher HF bands, RF exposure levels can be exceeded.[3]

HF mobile antennas have high voltages, so the user must ensure no one comes in

See the Digital Edition of *QST* for a video overview of the RM Italy HLA 305V Plus 160 – 10 meter amplifier.

contact with the antenna while transmitting. I once visited a local ham, Al Koepke, K1JCL, who had a solid state, high power amplifier in his van. His antenna system consisted of a high power automatic antenna tuner and an 8 foot stainless steel whip, tuned to 80 meters. When speaking into the microphone in AM mode, his voice boomed directly from the blue corona sphere formed at the tip of the antenna.

I enjoyed my experience with the RM Italy HLA 305V. It does what it's supposed to do: amplify RF, with a reasonably clean signal. Given the difference in third-order IMD products, I'd recommend operating the amplifier in low power (200 W) mode for a cleaner signal. The operator at the other end will never hear the difference between 200 and 250 W.

Although I enjoy operating my QRP radios, I found this amplifier very handy to have in line when the band drops, so I have the opportunity to be heard saying "73" at the end of a long and enjoyable contact.

US distributor: RM Italy Store (US), 39120 Argonaut Way, #333, Fremont CA 94538; **www.rmitaly.us.**

Notes

[2]**www.solar-wind.co.uk/cable-sizing-DC-cables.html**

[3]You can learn more about RF safety at **www.arrl.org/rf-exposure.**