

The Four Speeds



Figure 1. 1978-79 Muncie cast-iron maincase and extension housing



Figure 2. Muncie M20 broadcast code S6 stamped on upper front passenger side of the transmission's maincase. Photo is rotated 180° to show it upright.



Figure 3. B/W M20 broadcast code ZU stamped on the lower half driver side of the transmission's maincase.



Figure 4. B/W M21 broadcast code ZW stamped on the lower half driver side of the transmission's maincase.

Why this title that sounds like a movie title from the 1970s? The point is to underscore a discreet fact that three four-speeds were used for installation when manual transmission was called out on the dealer order during the 1978 model year. The significance is that for decades, published sources gave the impression that 3,385 four-speeds of two varieties were installed in the 46,776 Corvettes built, and this pushes the myth that only 200 1978 Limited-Edition Pace Cars were equipped with the L82 M21 power team. This belief has caused mis-speculation about the rarity of this option, but with study of original four-speed cars, build sheets and observation, the full story can be told.

This article describes the three four speeds installed in 1978 Corvettes and reveals the findings of a study of 1978 production and build documents. The discussion will include the use of Regular Production Options (RPOs) and show how some were used on production documents (orders and retail labels) while others were used exclusively on build documents (manifests). Finally, the article will show broadcast codes captured from low-mileage four-speeds cars that reconcile with codes on build sheets.

Ordering a 4-Speed in 1978

The 1970s witnessed an increase in convenience options including automatic transmissions as orders for automatics increased and demand for four-speeds decreased. By 1978, only 17 percent of Corvettes specified a four-speed in contrast to 52 percent in 1970. Of the 46,776 Corvettes built in 1978, 38,614 left the St Louis assembly plant with an automatic and 8,162 Corvettes left with a 4-speed. *The Black Book* reports 3,385 M21 close-ratio four-speed installations and that translates to 4,777 equipped with a wide-ratio four-speed option.

Corvette standard equipment in 1978 was an L48 350/185 HP engine with manual transmission (along with leather interior and t-tops). When L48 was ordered, the economical cast-iron Muncie (formerly Saginaw) was installed. When the buyer upgraded to L82 350/220 with standard equipment, a Borg/Warner M20 manual transmission was included at a cost of \$525.00. The Borg/Warner M21 close-ratio 4-speed could be ordered, but only when L82 was specified. There was no additional cost for the M21. Either engine could be ordered with the no-cost M38 automatic transmission. But you won't find references to M20 or M38 on dealer order forms from 1978, window stickers, dealer invoices or published sources, such as the popular *The Black Book*.

GM tags some RPOs as a MERCHANDISING OPTION ONLY – DO NOT CATALOG. This practice can be traced back to 1978 and its suspected use dates to the late '60s. An RPO labeled as a merchandising option suggests its use is limited to production for the purpose of ordering and sales but not used in build documents. The study of 1978 production and build documents reveals that RPO MM4 was used in production documents (dealer order form, window stickers) for ordering a 4-speed but not used in build documents. Conversely, M20 was used in build documents (AIM and build sheets) but not in production documents when calling out a 4-speed part.

of 1978

MM4 was introduced in 1978 as a merchandising option for two M20 4-speeds. It was listed on the Pace Car dealer order form, in the check-off option list and specified in the Power Team Section for either L48 or L82. The dealer order was a multi-part form with copies distributed to the zone office, central office and the assembly plant. The order was entered into the computer by the assembly plant and the manifest (build sheet) would call out the correct broadcast code stamped/stenciled part number.

Once the dealer confirmed the order, zone proceeded with order confirmation directing the factory to build a Corvette. A Corvette was not built until a confirmation had been issued which established that the vehicle to be built belonged to the dealer entered into the system and linked to this build order.

Computers were programmed (recall those IBM cards with square holes) so that when engine RPO was specified with a 4-speed, it called out M20 and printed the correct broadcast code on the manifest (build sheet). The manifest was then distributed to the assembly plant to build a vehicle. A chassis line worker would check the transmission box on the manifest, see the 4-speed broadcast code, pull a part with same code and install it. This survey of 1978 Corvette documents shows consistent use of each RPO by motor application and by document type.

Broadcast codes on those build sheets studied reconcile with stamps or code stencils on 4-speeds. The L48 4-speed power team called out the S6 code (Figure 2) while an L82 power team with standard 4-speed called out ZU (Figure 3) for the Borg Warner (BW) wide-ratio transmission. Broadcast code ZW (Figure 4) was called out when the optional M21 close-ratio 4-speed was ordered.

The documents that relate to the Muncie 4-speed shown in Figure 1 are used as an example to illustrate this paper trail. The dealer wrote M20 on the order form and specified the L48 engine when ordering this Corvette with base equipment. When order confirmation came back from the plant, it printed the RPO as MM4. The window sticker also lists MM4 but the build sheet documents M20.

Interesting enough, the *1978 Assembly Instruction Manual* (AIM) (another production record), documents the installation of three 4-speed transmissions, an M20 for L48 and M20 or M21 with L82. The AIM pages show the installation of linkage for both transmission types (Borg Warner or Muncie) and details linkage adjustments. Table 1 summarizes 1978 four-speed transmission data.

Muncie 4-Speed: M20

The 1978 Muncie 4-speed is not the Muncie your mother knew, Rather its heritage stems from the Saginaw economy four-speed used during the 1960s and early '70s. It was introduced in 1978 due to the EPA fuel-economy standards and as an additional GM measure to reduce cost. It also saw service on 1979 Corvettes through mid-year. Construction is cast iron in contrast to the Muncies built in the 1960s that were assembled with aluminum cases. Tooling was transferred from the Saginaw plant to the Muncie plant in the early 1970s and, while still called a Muncie, produc-



Figure 5. Muncie side cover shows three shift shafts



Figure 6. Muncie side cover shows location of reverse shift shaft and assembly date code pad.



Figure 7. Muncie double-strike date code, assembled at the Muncie plant June 1, 1978



Figure 8. Borg Warner assembly date code pad: Cast-iron cover to the left and pad showing both assembly date code and VIN derivative 18S902324. Fourth digit confirms this M21 was installed in a Pace Car.

tion was short-lived. It was used throughout Chevrolet production lines for lower performance applications, but by 1980 had become a vestige of the '70s. Figure 1 is a Muncie installed in a 2136-mile 1978 L48 M20 Silver Anniversary model.

The 1978-79 Muncie is a 2.85:1 wide-ratio manual transmission and used for L48 (350/175, 185, 195HP) applications. The higher ratio was intended to give lower-powered Corvettes some nice punch. This Muncie is a cast-iron case with a 7-bolt cast-iron cover. (Figure 5) The cover is distinguished from a B/W cover by the location of the reverse shift lever shaft. (Figure 6) The reverse shaft protrudes from the Muncie cover (along with 1st & 2nd, 3rd & 4th), while the reverse shaft is located in the extension housing on B/W cases.

The assembly date code is stamped on a boss located on the left side (driver's side) of the maincase and to the rear of the sidecover and below it. (see Figure 6) The format is R 8 H 01 where R= Muncie plant, 8= Model year, H= Month (June), and 01= Day of the week

Figure 7 shows the assembly date code pad for this 1978 Muncie. Note the double-strike date code. This 4-speed was assembled at the Muncie plant June 1, 1978. The assembly date of this Corvette places it in the third week of June.

Borg/Warner Super T10 4-Speed M20

The Borg/Warner 4-speed is a low wide-ratio manual transmission with a first gear ratio of 2.64:1 and limited to L82 standard applications in 1978. The Borg-Warner M20 sports an aluminum heavy-duty case, both maincase and extension housing, with a 9-bolt cast-iron cover. It's a side-loaded transmission with side-lever shift linkage and the cover has a curved bottom. Two shift-lever shafts extend through the cover in contrast to the Muncie, which has three shafts through the cover. This B/W saw service from 1974 through 1981 though its RPO code changed along with other minor changes after the 1978 model year.

The assembly date code is stamped on a boss located on the left side (driver's side) of the maincase and to the top, rear of the sidecover. (See Figure 8) The format is WC2982 where W=Warner plant, C=Month (March), 29= Day of the month, 8=Model year (1978), 2=Shift.

Both M20 and M21 used the same assembly date code format. Figure 9 shows the pad for an M21 assembled at the Warner plant March 29, 1978.

Borg/Warner Super T10 4-Speed M21

The Borg/Warner M21 in 1978 is a close-ratio manual transmission with a first gear ratio of 2.43:1. The M21 was introduced in 1974 but limited to L82 applications in 1978. It uses the same aluminum heavy-duty case as the M20, both maincase and extension housing, with a 9-bolt cast iron cover. It's a side-loaded transmission with side-lever shift linkage. The cover has a curved bottom and two shift-lever shafts extend through the cover. Its last year of service in the Corvette was 1979.

Both B/W M20 and B/W M21 used the same date code format. Figure 9 shows the assembly date code pad for an M21 assembled at the Warner plant March 29, 1978.

Borg Warner also produced the Super T10 for drag racers and called it the Power Brute, but these can be distinguished from original PRODUCTION equipment due to the use of a 904 nodular iron case. Some of these made it into GM production, but all Corvette applications through 1981 used the aluminum maincase with the 903-part number. (See Table 2)

Summary

When the 1978-79 Corvette Technical Information Manual & Judging Guide was published in 1996, awareness of three 4-speed options in 1978 was not known. The Transmission & Shift Linkage part of the Chassis Section assigns 3 points to the transmission and shift linkage for Flight judging. But the narrative section lacks the clarity of what elements of originality are being assessed in judging. Is the judge determining whether it's



Figure 9. Borg Warner date code WC2982, assembled at the Warner plant March 29, 1978, second shift.

M21 installed on 1978 Corvette with build date H05 (April 5, 1978)

an automatic or manual transmission? Or is the judge assessing manual transmission type?

A recommendation is that the narrative include sufficient detail and that it address the elements of originality, whose clarity also has evolved since the 1978-79 manual was published. In the context of configuration, completeness, finish, date and installation, the narrative should guide the judge and restorer with descriptions that will differentiate 4-speed installations.

When the power team is an L48 with 4-speed, the chassis judge should expect to see iron with light rust on the

transmission in contrast to L82 applications in which the case is all aluminum. All side covers are cast iron, but the Muncie is a 7-bolt with three shafts protruding through the cover. The B/W side cover is a 9-bolt with only two shafts protruding through the cover. The date codes would not be considered in Flight judging but could be an additional element for Star/Bowtie judging and as a guide for restorers. Finally, mention should be included that the L48 M20 4-speed is a Muncie, while L82 4-speeds are Borg Warner Super T10s.

Table 1
Four Speed Transmission Data Summary

Engine RPO	Dealer RPO	Manifest RPO	Ratio	Broadcast Code
L48	MM4	M20	2.85:1	S6
L82	MM4	M20	2.64:1	ZU
L82	M21	M21	2.43:1	ZW

Table 2
Transmission Housing Part Numbers

Part Description	Muncie	B/W M20	B/W M21
Maincase	3925656	1304 065 903	1304 065 903
Extension Housing	Unknown	13.04.066.901	13.04.066.901
Sidecover	Unknown	13-04-097-901	13-04-097-901

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