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Essential Off-road RC Racer's Guide

Dave B Stevens

Aldritch

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Chapter 1

Introduction

Foreword – Bruno Coelho

I've raced many classes with my dad, off-road and on-road. I wouldn't be where I am today without him. For more than ten years, all my support came from my family. They believed in me and helped me to get where I am today.

In 2014 I TQ'd and came 2nd at the Euros in Spain. Xray invited me to go to the Touring Car World Championship in Florida, all expenses paid. However, I had no holidays at my job and couldn't go. My dad encouraged me to quit my job and, following a good performance at the worlds, I became a full-time pro driver for Xray. I've worked with them ever since. Being part of a team is fantastic for sharing experiences and setups. I encourage new drivers to make friends with other drivers who use the same chassis and share their ideas and experiences. This will help to make you a better driver.

There is no substitute for practice and hard work. Before I travelled to my first world championship, I practised from 7 a.m. to 11 p.m. for two weeks.

Everyone needs support of one kind or another. I hope that this book provides you with support by providing ideas and knowledge to take your racing to the next level.

Bruno Coelho

- ✓ *2 x 4WD IFMAR World Champion*
- ✓ *Touring Car IFMAR World Champion*
- ✓ *4WD European Champion.*
- ✓ *1/8 European Champion*
- ✓ *European Nitro Touring Champion*

Author's note:

One of the best all-round drivers in the world, Bruno is one of the very few to have achieved world titles in both off-road and on-road. He is the current world champion for both 4WD off-road (2019) and touring car (2018) [not held in 2020 due to COVID-19]. Bruno sells the RC products he uses at br1rc.com. He was not paid to support this book.

Foreword – Billy Easton

I won the IFMAR 2WD World Championship in 2003 in Clearwater, Florida. It's ironic I now live in Florida and regularly race not far from Clearwater. It's possible that subconsciously I just love Florida dirt!

Since then, I've spent more than ten years designing Serpent's off-road vehicles, including 1/10 and 1/8 scale, electric and nitro. I still love to race, but now I race to make my designs better and to help our customers with new products.

Winning a race is awesome, but knowing I did a great job on a product and helped others to win is an even greater reward. Helping racers is one of the reasons I wanted to support this book.

When we start a completely new design, we purchase all the current cars on the market to see what works and what can be improved. There are only so many ways to approach RC car design, but we always come up with new and innovative features. We model a lot of alternatives using Pro-E CAD software, Solid Works for bodies, Gear Trax for the drivetrain, MathCAD and other software for any additional calculations.

Whether it's to make the car easier to work on or to enhance performance, we're always looking to improve and provide cars that are at the top of their class.

Billy Easton

- ✓ 2WD IFMAR World Champion
- ✓ 2WD Palmetto Classic winner
- ✓ 1/8 IFMAR World Championship A-finalist
- ✓ 1/8 Silver State Champion
- ✓ 1/8 Force Spring Series winner
- ✓ 3 x ROAR 1/10 Gas Truck National Champion (back-to-back)

Author's note:

Billy Easton competes at the top level across many off-road classes. He works full-time for Serpent RC (www.serpent.com) as their lead designer of off-road vehicles and therefore brings a unique perspective. He was not paid to support this book.

Foreword – Ray Munday

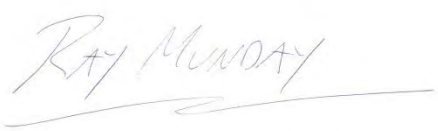
When Dave first approached me to contribute to this book, I felt honoured to be involved in a project like this.

There are a lot of textbooks out there, but in my experience, they are either too theoretical and hard work to read or too generic with incorrect explanations.

Over the years, I have created a series of "Tech Talks" designed to go through the basics of vehicle dynamics, demystify the way to go about driving, and how and why to change setup with less guesswork. Many of these Tech Talks are included in this book, and I hope they assist you in bridging the gap between theory and practice in RC cars.

I hope you enjoy this book and it helps you with your racing.

Have fun at the track!



Ray Munday

- ✓ *4WD Australian Champion*
- ✓ *2WD Australian Champion*
- ✓ *29 x State Champion*
- ✓ *Top 30 at the Worlds*
- ✓ *Reedy Race of Champions A-main Finalist*
- ✓ 4 x Keilor Invitational Winner

Author's note:

With titles spanning three decades, Ray is one of the most successful off-road drivers in Australia. He is also a mechanical engineer, having worked on full-scale race cars for many years. He has a talent for explaining complex topics in simple terms. You can ask Ray questions via his Facebook page @AskRayMunday. He was not paid to support this book.

Author's Preface

In 2007, my 11-year-old son, Aaron, bought an RC car on eBay. As soon as I saw it I had to have one for myself, and Aaron and I spent most weekends at the track from then on.

There is a lot of information on the web about setting up RC cars. However, it is often hard to find, incomplete, brand-specific, out of date or on a forum where the discussion lacks the context to make it truly useful.

I wrote this book to create a comprehensive manual that racers can follow to improve their lap times, regardless of their skill level or the car they drive. I spent 30 years as a business consultant, and part of my skill set is to extract technical experience from experts in the field, pull in relevant information from multiple sources, and present it in an easy to apply "how-to" format.

About the Author

This is the third book in Dave's Essential RC series which has sold in 29 countries. Following the success of his first RC book *Essential 1/12th and F1 RC Racer's Guide* released in 2019, Dave released *Essential Touring Car RC Racer's Guide* in 2020.

In 2013 he set a Guinness World Record for "the longest distance covered by a battery-operated remote-controlled car"; a record he held for three years.

In 2012 Dave launched www.RCformula1.com. In the early years, it was the only dedicated RC F1 website and it is still the most read, with nearly 8 million page views as of late 2021.

Dave is a former president of the Templestowe Flat Track Racers RC club and a former board member of the Victorian On Road Tracks Executive Committee.

He also writes fiction and lives in Melbourne, Australia with his wife and sons.

Connect with Dave via: Facebook facebook.com/DaveBStevens.Author
Web www.DaveBStevens.com

Introduction

Every weekend, you will find off-road racing at club tracks throughout the world. Some drivers are racing with their friends to have fun, while others are trying to win at club level or a local competition. Most countries have regional racing, nationally organised competitions and, of course, there are world championships.

The 2WD and 4WD Modified Electric Off-road buggy classes have been International Federation of Model Auto Racing (IFMAR) World Championship classes since 1987.

A fantastic range of off-road classes are raced at local clubs including 2WD and 4WD Buggies, Vintage, Stadium Truck, Short Course Truck, 1/8 Buggies and Truggies, and others. A range of motors are also available in 1/10 scale, from the sedate 21.5 turn to the super quick Modified/open motors like the 6.5 turn. No matter your level of skill, and how fast you want to go, off-road has a class to suit!

Whether you are a complete beginner or an experienced racer looking for an edge over your competition, this book was designed to provide the answers you're looking for. It provides a complete, step-by-step reference to these fantastic vehicles.

In-depth information is included on off-road electric vehicles, focusing on:

- 1/10 scale two-wheel drive (2WD) buggies
- 1/10 scale four-wheel drive (4WD) buggies
- 1/8 scale four-wheel drive (4WD) buggies

Short Course Trucks (2WD and 4WD), Stadium Trucks (2WD) and 1/8 scale Truggies are referred to as needed and also have their own sections.

Buggies and trucks are both referred to as cars throughout this book.

4WD cars are fantastic for beginners as they are relatively easy to drive. 2WD cars are less expensive and easier to build.

Whether 2WD or 4WD, it is very achievable to have a car that has sufficient rear end grip and still has enough steering to turn tight corners under almost all track conditions. This guide provides you with the information to set up your car to be easy and fun to drive fast.

How To Use This Book

Appendix B – Glossary, starting on page *296*, defines core technical terms referred to in this book.

The Process of Driving Faster, beginning on page *23,* covers setup theory, a driving tutorial and how to apply this theory to any track.

If you are a beginner, your next step is to check out *Appendix C – Beginner's Guide*, on page *301*. If you're not sure what all the parts of the car are called, there are diagrams on page *105*.

Jumping techniques and the fastest way to jump, starts on page *48*.

The Track, beginning on page *65*, covers mapping the track, walking the track and putting together all the cornering and jumping techniques covered previously, using an example track.

Tyres are a complex area and we cover everything you need to know, beginning on page *76*.

Car Setup Reference, starting on page *104*, covers the A–Z of setup settings from Ackermann to Wings and everything in between. I've also labelled each setting option as Basic, Intermediate or Advanced.

Tweak, starting on page *201*, covers how to ensure all your tyres touch the ground with equal pressure and what happens if they don't. It also describes how to identify the cause.

Trucks (Short Course Trucks, Stadium Trucks and Monster Trucks) have their own section, beginning on page *208*.

The *1/8 Scale* Buggies and Truggies chapter starts on page *218*.

Case Studies, starting on page *224*, describes actual race meetings, how pro drivers approached their setup, what changes they made, why and the results.

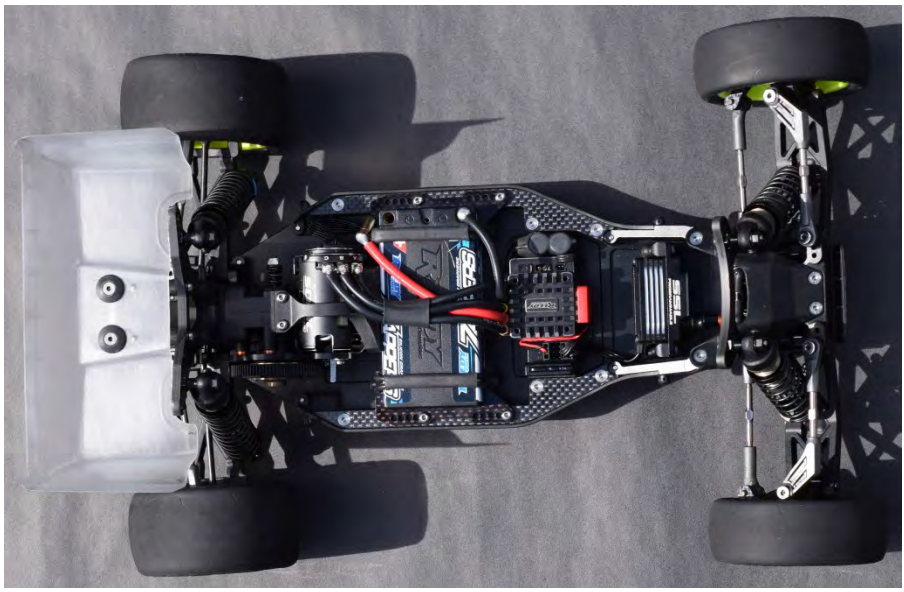
Appendix D – Checklists, on page *310*, covers all the common problems and situations you might encounter. Car is spinning out? Wanders on the straight? Doesn't have enough steering? We've got you covered.

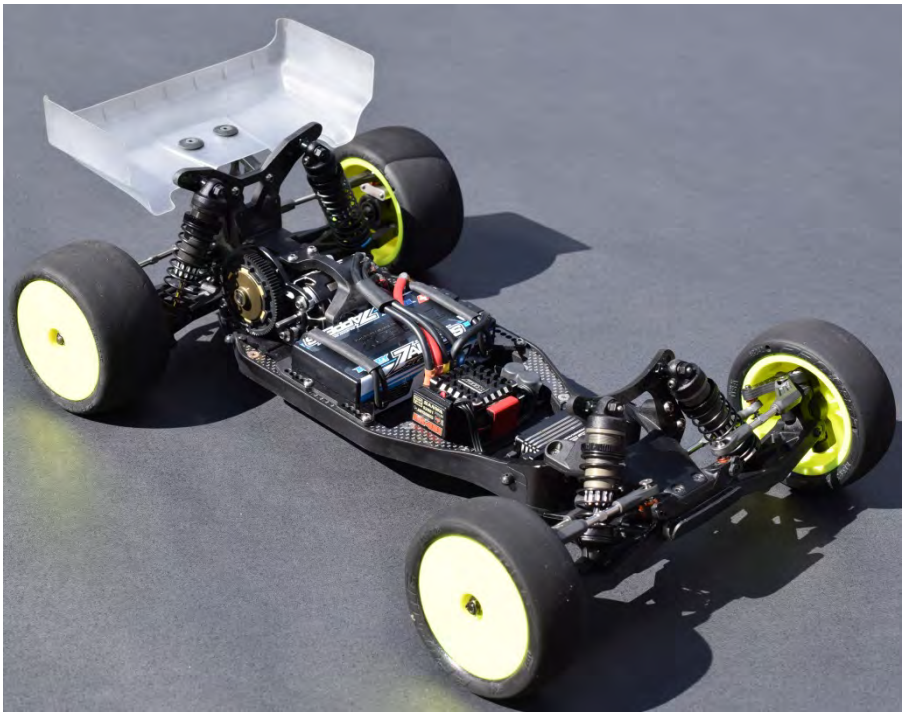
This book is available as an eBook for ease of reference at the track. The eBook is available at a discount for those who have purchased the physical book (page *295*).

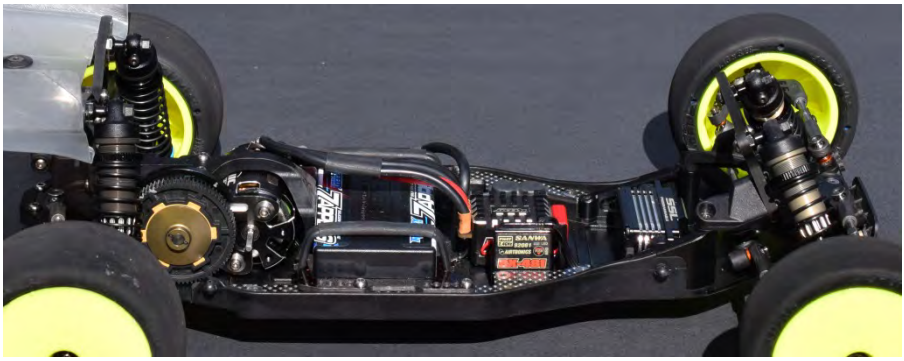
The Vehicles

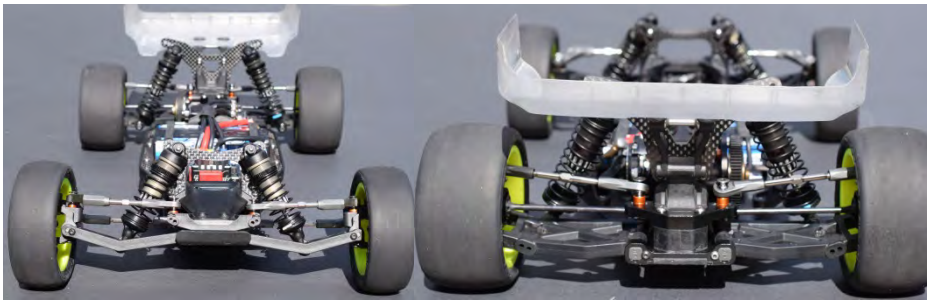
This book covers all 1/10 and 1/8 scale off-road electric vehicles with a particular focus on buggies.

2WD Buggy (Billy Easton's Serpent SRX2 Gen3 Dirt)

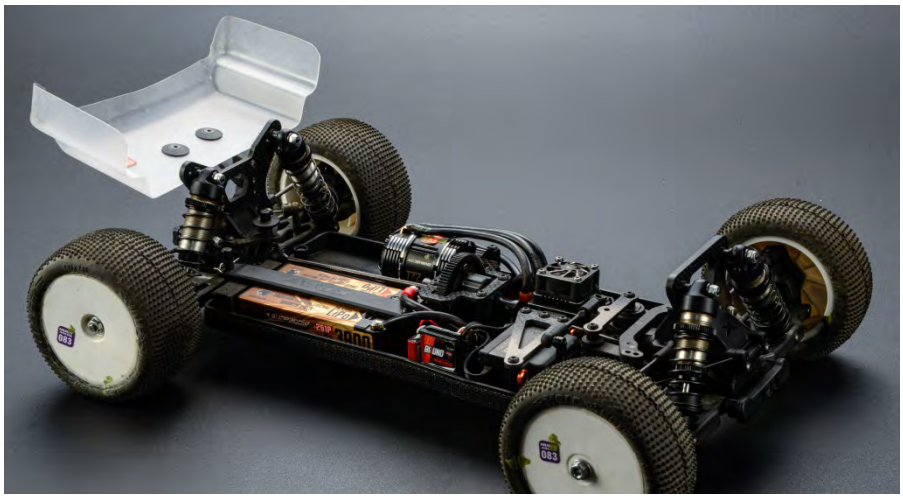


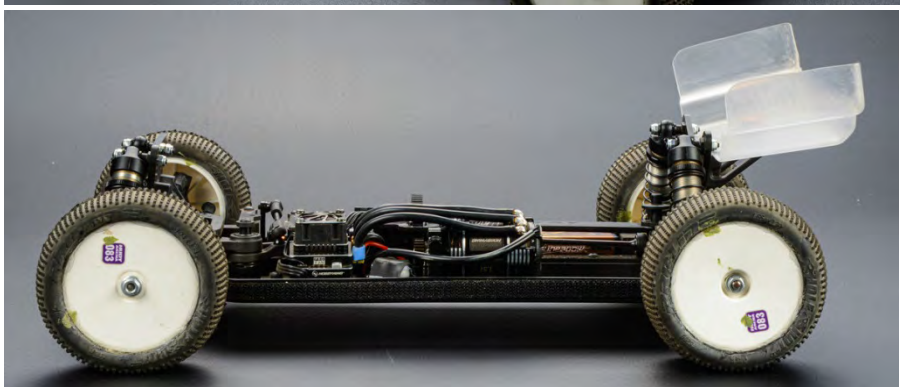


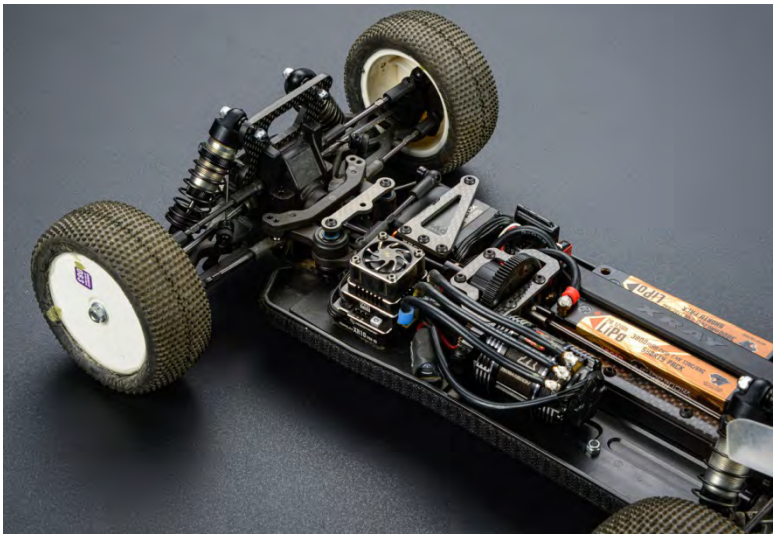


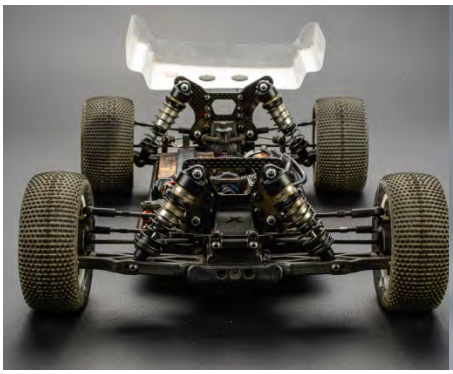


4WD Buggy (Bruno Coelho's World Champion Xray XB4 '20)



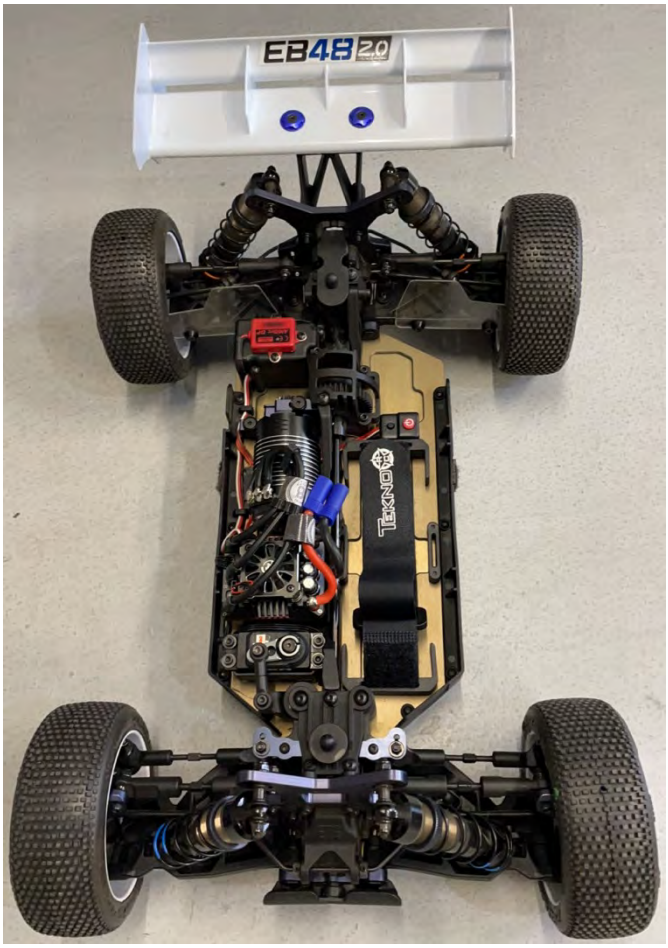






1/8 Scale 4WD Buggy

In this book, whenever a 1/8 buggy setup option is different from the main text it is also specified. 1/8 Scale has its own chapter beginning on page *218*.



Trucks (2WD/4WD)

In this book, whenever a truck setup option is different to the main text it is also specified. This primarily relates to tyres and bodies. Trucks have their own sections as follows:

- Short Course Trucks (SCT) on page *209*.
- Stadium Trucks on page *215*.
- Monster Trucks on page *215*.

Chapter 2

The Process of Driving Faster

Introduction

Being able to drive faster on a given track is a process that involves the following steps:

1. Determine a base setup for the track.
2. Map the Racing Line for the track.
3. Practice the Racing Line for the track.
4. Tune your car's setup so you can drive it as quickly as you are able and as close to the Racing Line as possible.
5. Practice the Racing Line for the track until qualifying starts.

Setup Theory

A car's handling is determined by the contact patch of the tyre on the racing surface. In a full-size production car, that area is about the same as a size 10 shoe. In an RC car, it might be the size of your fingernail or smaller.

How the tyres interact with the track determines how the car corners, accelerates and brakes, so tyre choice is the most important factor in car handling. However, at many large race meetings a control tyre is used, meaning everyone has the same brand and compound of tyre. Therefore the advantage will go to the driver who sets up their car so that these tyres provide the right amount of grip at the right time.

Ignoring other factors for the moment, the easier the car is to drive, the faster you will be able to drive it. Changing the car's setup will make the car easier to drive near its performance limit. This should allow you to drive it faster.

In this book we explain what each setting is, why it changes the behaviour of the car, how to make each change and the result you should expect.

Make small changes one at a time and measure the result based on what you were trying to achieve (refer to Mapping the Track on page *66*). Note whether the car felt better or worse and any impact on lap times. If the car does not feel better, then undo the change.

We say small changes because adding a 0.5mm shim or changing a setting by 0.5° may make a noticeable difference, and if you skip to a 2mm shim or 1.5° change, then you may miss the sweet spot. You can also go too far, which may cause the opposite of what you're trying to achieve. Small incremental changes are best.

We recommend that you keep track of your setup changes and record which setups work best at different tracks under various conditions.

A car that "feels" faster is not necessarily turning faster lap times. Use a stopwatch or timing system to check if it really is quicker and not just easier to drive.

For the car to respond correctly to setup changes, it must be in good working order. In other words: the car is not tweaked (page *201*), the suspension is free, dampers (page *126*) and differential (page *141*) are correctly built, there are no broken binding or loose parts, and the car has proper weight balance left-to-right (page *192*).

Many setup adjustments interact with other settings. For example, changing the ride height will also change the droop. These interactions are explained under the relevant headings.

Finetuning the setup will make the car easier to drive near its performance limit. This should allow you to drive it faster.

Start with a base setup, make changes so that the car drives the lines you want (see The Racing Line on page *28*), then stiffen the car up as much as practical while making sure it is still as easy for you to drive as possible. As you gain experience, you will be able to shortcut this process.

Use our After Race Checklist on page *310* to identify problems before the next run.