OPERATION GUIDE FOR THE BEAT THE RACETRACK CALCULATOR*

The Beat the Racetrack Calculator* ROM module inserted in your Hewlett Packard HP41 series calculator allows you to employ the Dr. Z betting system in a very easy and fast manner. It incorporates most of the ideas presented in the book, Beat the Racetrack*, including much of Tables 16.1 to 16.4, corrections for differing track paybacks, and accounts for coupled entries. With minimal data inputs the calculator will determine the expected return on a dollar bet, and if that value is high enough the optimal amount to bet will be displayed. The calculation of the optimal amount to bet is dependent upon six factors: 1) your betting wealth; 2) the track payback; 3) whether or not the horse is a coupled entry; 4) the win odds of the horse; 5) the expected return on a dollar bet, i.e., the degree to which the horse is underbet; and 6) the degree to which your bet will lower the odds, i.e., the size of betting pools.

While the calculator is very easy to use, a certain amount of practice is necessary to become adept at its operation. This handbook discusses the features of the calculator and has several examples to illustrate its use at the track. This handbook is by no means a substitute for the book, Beat the Racetrack, since all of the issues mentioned here are covered in more depth in the book. Also there are many additional examples in Beat the Racetrack that can be used to practice operating the calculator.

Getting Set Up

The ROM module is compatible with the HP41C, HP41CV, and the HP41CX calculators and is to be inserted in any of the four ports at the top end of the calculator. CAUTION: Remember to turn the calculator off before inserting or removing the ROM module.

While up to four modules can be in the ports simultaneously, it is suggested that when you use the Beat the Racetrack Calculator* ROM module you always place it in port position 1--this will give it priority over any other module. Port position 1 is the port nearest the ALPHA button at the top of the calculator.

---

* By William T. Ziemba, Ph.D and Donald B. Hausch, Harcourt, Brace and Jovanovich Publishers, October, 1984 in hardback.

The Overlay

The overlay provided fits over the calculator face and indicates the seven buttons that have been assigned special tasks. You will observe that they are TRACK PAYBACK and WEALTH in the upper left hand corner, PLACE, SHOW and COUPLED ENTRY? (YES/NO) in the upper right hand corner, and DATA in the lower right hand corner. The only buttons you need consider are these and the numeric buttons.

Initialization

Once you have placed the overlay on the calculator and set the ROM module in port position 1, you are ready to begin. Simply press the ON button and BEAT THE RACETRACK will be scrolled across the display screen. At this point the prompting for data inputs will start.

The first input you will be prompted for is your track's payback proportion--you will observe TRACK PAYBK? on the display screen. Refer to Table 1 of track payback proportions for various states in the U.S. and provinces in Canada for these values. You may wish to consult your local jockey club in case they have been recently changed in your state or province.

Example: First punch 0.85 and then press the DATA button for the 85% track payback in California.

Next the calculator will prompt you for the size of your betting wealth which is the amount you have taken to the track. You will observe WEALTH? on the display screen.

Example: If your betting wealth is $500 then punch 500 and then press the DATA button.

These are the two data inputs that can be entered before the public's betting on the race starts. The rest of the data must be entered during the betting period of the race.

Example 1: During the Betting Period

The basic idea of the Dr. Z betting system is to identify horses that the public has underbet to place and show and then determine the optimal amount to bet. This means looking for the horse that has the least relative amount bet to place or show compared to its relative amount bet to win. To illustrate this idea consider the following toteboard with 3 minutes to post-time.

Odds	5-2	7	11	3	50	5-2	9-2	
Horse	1	2	3	4	5	6	7	Total
Win	12102	4987	3507	10422	822	10991	7288	50119
Place	5871	2944	1702	5513	603	4977	4493	26103
Show	2402	1827	1365	4101	312	3820	3297	17124

TABLE 1: CURRENT TRACK PAYBACKS IN THE U.S. AND CANADA

State	Track Payback Proportion	State	Track Payback Proportion
Arizona	0.82	Nebraska	0.85
Arkansas	0.84	New Hampshire (Harness)	0.81
California	0.85		
Harness & Fair Track	0.8325	New Jersey	0.83
Colorado	0.83	New Mexico	0.8125
Florida	0.824	New York	0.83
Harness	0.81	Harness	0.83
Quarter Horse	0.82	Ohio	0.825
Idaho	0.83	Oregon	0.84
Illinois	0.83	Pennsylvania	0.83
Kentucky	0.85	South Dakota	0.8175
Harness	0.82	Washington	0.84
Quarter Horse	0.83	West Virginia	0.8275
Louisiana	0.83		
Maryland	0.85	Province	
Fair Tracks	0.84	Alberta	0.849
Steeplechase	0.82	British Columbia	0.842
Massachusetts	0.81	Manitoba	0.824
Michigan	0.8375	Ontario	0.852
Montana	0.80	Saskatchewan	0.781

Source: The Daily Racing Form. Consult your local Jockey Club for changes in these rates at your local track.

First look at the show bets. The show pool is about a third the win pool: 17,124/50,119, so you would like to find a horse where relatively much less is bet to show. For horses #2 to #7 the ratios between show bet and win bet are all over one-third. For example, horse #2 has $\frac{\text{SHOW BET}}{\text{WIN BET}} = \frac{1,827}{4,907}$, which is larger than 1/3. So you can disregard them. Horse #1, however, looks promising. It has $\frac{\text{SHOW BET}}{\text{WIN BET}} = \frac{2,402}{12,102} = .198$ which is less than $\frac{\text{SHOW POOL}}{\text{WIN POOL}} = \frac{17,124}{50,119} = .342$. Therefore, you will need to check with the calculator whether or not to make a Dr. Z system bet on horse #1.

Now look at the place bets. The place pool is about half the win pool: 26,103/50,119, so you need to find a horse where relatively much less is bet to place. None of the horses, however, has a place bet to win bet ratio that is much less than one-half. The lowest ratio is horse #6. It has $\frac{\text{PLACE BET}}{\text{WIN BET}} = \frac{4,977}{10,991} = .453$, not nearly low enough, compared to $\frac{\text{PLACE POOL}}{\text{WIN POOL}} = \frac{26,103}{50,119} = .521$, to consider as a possible bet. Consequently, forget about making a place bet and concentrate on the show bet on horse #1. (Don't worry, the skill of looking at a toteboard and quickly pinpointing where the best possible bet is will come with practice!)

Let us continue with the calculator now that you've input the track payback (.85), input your betting wealth ($500), and have determined that a show bet on horse #1 looks promising. You should now see PLACE/SHOW? on the display screen; since you are considering a show bet, press the SHOW button. Now the calculator asks if your horse is a coupled entry by displaying COUPLED ENT? Since it is not, press the NO button. (Recall that two or more horses are "coupled" if they are racing for the same owner or trainer. In the case of betting on a "field", i.e., where there are more horses than the toteboard can accommodate, then press YES to the COUPLED ENT? question as well.) If the horse you are considering betting on is a single entry horse, then answer NO to the COUPLED ENT? prompt even if there is a coupled entry in the race. You only answer YES if your horse is a coupled entry. Finally, the calculator will prompt for the figures on the toteboard. They are, in order:

WIN BET?	Punch 12102 then press the DATA button
WIN POOL?	Punch 50119 then press the DATA button
SHOW BET?	Punch 2402 then press the DATA button
SHOW POOL?	Punch 17124 then press the DATA button

The calculator will beep and print EXS = 1.24 indicating the expected return on a dollar bet to show on horse #1 is 1.24; that is, you should expect to make 24% profit on average betting on horse #1. Then the calculator will beep again and print SBET = 64 indicating that the optimal show bet is $64.

With practice this whole procedure can be accomplished in about 30 seconds. Suppose the toteboard has been updated and now it is 2 minutes till post-time. Since your track's payback and your wealth are entered already, simply press the SHOW button to check whether the show bet on horse #1 is still a good bet. Suppose the updated toteboard is as follows:

Odds	2	7	10	3	50	5-2	5	
Horse	1	2	3	4	5	6	7	Total
Win	14222	6013	4117	12008	919	12492	8134	57905
Place	6698	3383	1974	6212	704	6016	5097	30084
Show	2749	2087	1499	4714	350	4343	3531	19273

A quick scan of the place bets will indicate there are still no good place bets since the ratio $\frac{\text{PLACE POOL}}{\text{WIN POOL}}$ is approximately one-half while none of the horses has $\frac{\text{PLACE BET}}{\text{WIN BET}}$ much less than one-half. Now look at the show bets--horse #1 still looks promising ($\frac{2,749}{14,222} = .193$ which is much less than $\frac{19,273}{57,905} = .333$) while none of the other horses appear to be good bets. Now you need to enter the data from the toteboard to let the calculator determine whether the bet is still good. After having pressed SHOW again to restart the input sequence the calculator asks COUPLED ENT? Press NO again and the calculator will prompt for the new toteboard figures.

WIN BET?	Punch 14222 then press the DATA button
WIN POOL?	Punch 57905 then press the DATA button
SHOW BET?	Punch 2749 then press the DATA button
SHOW POOL?	Punch 19273 then press the DATA button

The calculator will beep and print EXS = 1.24 indicating the expected return on a dollar bet to show on horse #1 is still 1.24. Then the calculator will beep again and print SBET = 68 indicating that the optimal show bet is $68. Note that the expected return here and earlier were both 1.24, but the optimal show bet is now larger ($68 versus $64). This is for two reasons: 1) the win odds on horse #1 have dropped slightly so that he is more of a favorite; and 2) the show pool has grown slightly so the effect of your bet on the odds is somewhat less.

It will now be slightly more than one minute to post-time. At this point you must decide to make your wager now or to wait for a new flash of the toteboard. The tradeoff on waiting is between better information about the final figures and the risk of being shutout at the betting windows. Let's suppose you decide to see one more flash of the toteboard because, 1) the horses have still not entered the starting gate so probably the race will be delayed a minute or so, and 2) the lineup at the windows is very short. At one minute to post-time the toteboard is as follows.

Odds	2	7	10	3	40	5-2	5	
Horse	1	2	3	4	5	6	7	Total
Win	16332	6809	4727	13343	1302	14415	9309	66237
Place	7798	3844	2504	7097	921	7038	5614	34816
Show	3372	2492	1703	5816	426	5004	4088	22901

Again we can observe that there are no promising place bets (the $\frac{\text{PLACE POOL}}{\text{WIN POOL}}$ is still about one-half while no horse has a $\frac{\text{PLACE BET}}{\text{WIN BET}}$ much less than one-half). In the show bets, however, horse #1 has remained promising ($\frac{3,372}{16,332}$ = .206 which is much less than $\frac{22,901}{66,237}$ = .346). At this point you will enter the new data. After pressing SHOW to indicate a show bet, the calculator asks COUPLED ENT? to which you will press NO. Then the prompting for the data is as follows:

WIN BET?   Punch 16332 then press the DATA button

WIN POOL?   Punch 66237 then press the DATA button

SHOW BET?   Punch 3372 then press the DATA button

SHOW POOL?   Punch 22901 then press the DATA button

Now the calculator will print EXS = 1.23 and then SBET = 63. This means the expected return on a dollar bet to show on horse #1 is 1.23 and the optimal bet is $63.

This example is fairly typical of what you will observe at the track. There will be "promising" bets in several of the races, most commonly to show, and usually on one of the favorites. The attractiveness of the bet will vary somewhat as the toteboard is updated, but typically the change in the final few minutes is not great.

One important and useful hint is to ignore horses whose probability of winning is less than 0.10. Since these longshots are traditionally overbet the return does not justify the risk. In fact if the probability is less than 0.10 the Beat the Racetrack Calculator® will always flash a suggested bet of $0. These horses to ignore can be identified by seeing which horses have a $\frac{\text{WIN BET}}{\text{WIN POOL}}$ ratio

less than 0.10. For the last toteboard in Example 1 horses 3 and 5 can be
ignored leaving you to concentrate on the other horses. A win probability of
0.10 corresponds closely to odds of 7-1 or 8-1 depending on the track payback
proportion. Hence ignore horses going off at odds of 8-1 or greater. This can
save you time while scanning the toteboard for good bets.

Correcting Data Inputs

Let's go back to the third toteboard in the earlier section (one minute
before post-time) and see how we can make corrections on our data after it has
been entered.

A)   Suppose at some point during the data entry you realize that the track
payback is .86 instead of the .85 you entered earlier. Then simply stop
your data entry* and press the TRACK PAYBACK button. You will observe
TRACK PAYBK? on the screen, so punch .86 and press the DATA button. You
will then be prompted for WEALTH?, PLACE/SHOW?, etc. You need to re-enter
these quantities even if they were entered earlier.

The calculator will only allow you to enter track paybacks between .50
and 1.00. In all other cases the calculator will signal you are out of the
bounds of reasonable paybacks, i.e., it presumes you have made a mistake,
and asks you to input another track payback.

B)   Suppose you wish to change the betting wealth level that you inputed
earlier. For example, after wins and losses it's a good idea to update
your wealth to your actual betting fortune. Then simply press the WEALTH
button whereupon the calculator will prompt you with WEALTH? Punch out
your new betting wealth level and press the DATA button. You will then be
prompted for data entry for place and show betting. Note that when you
change your betting wealth in this manner you do not have to re-enter the
track payback while if you change the track payback you must re-enter your
wealth.

Wealth levels that are below zero are presumed to be errors and
consequently you will be asked to input another wealth level.

C)   Suppose that a new toteboard is flashed while you are in the middle of
entering data off of the old toteboard. Obviously you will have to start

---

* You can stop at any point of your data entry except when you are being
prompted for a YES or a NO on COUPLED ENT? In that case you must answer YES
or NO and then correct whichever figure you wish.

TABLE 3: PARTIAL LIST OF EVENT DAYS THAT WARRANT A 1.10 EXPECTED VALUE CUTOFF

The Breeder's Cup Series of Races; in 1984 at Hollywood Park, Inglewood,
    California
Derby Day, Churchill Downs, Louisville, Kentucky
Preakness Day, Pimlico Racetrack, Baltimore, Maryland
Belmont Stakes Day, Belmont Park, New York

Individual races with a purse of $100,000 or more such as the:

Location	Race
Ak-Sar-Ben, Omaha, Nebraska	Cornhusker Handicap
Aqueduct, New York	Kelso Handicap
Arlington Racetrack, Chicago, Illinois	Budweiser Million
Atlantic City, New Jersey	Jersey Derby
Bay Meadows, California	Bay Meadows Derby
Bowie, Maryland	John B. Campbell Handicapp
Calder, Florida	La Preyoyante Handicap
Centennial, Colorado	Gold Rush Futurity
Churchill Downs, Kentucky	Kentucky Oaks
Del Mar, California	Del Mar Futurity
Delaware Park	Delaware Handicap
Detroit, Michigan	Michigan Mile Handicap
Evangeline Downs, Louisiana	Jean Lafayette Futurity Stakes
Exhibition Park, Vancouver, British Columbia	B.C. Derby
Fairgrounds, Louisiana	Louisiana Derby
Finger Lakes, New York	New York Breeders Futurity
Fort Erie, Ohio	Niagra Stakes Handicap
Golden Gate Fields, Albany, California	California Derby
Gulfstream Park, Florida	Florida Derby
Hawthorne, Illinois	Hawthorne Gold Cup Handicap
Hialeah Park, Florida	Flamingo Stakes
Keeneland, Kentucky	Blue Grass Stakes
Keystone, Pennsylvania	Pennsylvania Derby
La Mesa, New Mexico	Land of Enchantment Futurity
Latonia, Kentucky	Spiral Stakes
Laurel, Maryland	Laurel Futurity
Longacres, Renton, Washington	Longacres Derby
Meadowlands, New Jersey	Gardenia Stakes
Monmouth, New Jersey	Haskell Invitational Handicap
Northlands, Edmonton, Alberta	Canadian Derby
Oaklawn Park, Little Rock, Arkansas	Arkansas Derby
River Downs, Ohio	Cradle Stakes
Ruidoso, New Mexico	Norgor Futurity
Santa Anita, Arcadia, Califonia	Oak Tree Handicap
Saratoga Racetrack, New York	Whitney Handicap
Sportsman's Park, Illinois	Sixty Soles Handicap
Sportsman's Park, Illinois	National Jockey Club Handicap
Suffolk Downs, Massachusetts	Massachusetts Handicap
Thistletown, Ohio	Ohio Derby
Turf Paradise, Arizona	Arizona Paradise Futurity
Woodbine, Toronto, Ontario	Queen's Plate

which is less than .468, and $\frac{\text{SHOW BET}}{\text{WIN BET}} = \frac{5,821}{33,902} = .172$ which is less than .246.
So it looks like there is a possibility of two good bets. However, <u>it is</u>
<u>important to understand that the calculator presumes you are going to make only</u>
<u>one bet in a race.</u> If there are two possible bets and you use the calculator to
determine its suggested bet size on the first one and then use it again to
determine its suggested bet size on the second one, then it is not proper to bet
those two amounts on the two horses. If you do so, in some situations you will
be overbetting, while in other situations you may be underbetting due to gains
from diversification. What you can do though is to use the calculator to check
which bet is the best and then wager the suggested amount on that one best bet.
Using these two possible bets the procedure is:

1) Turn on the calculator, see BEAT THE RACETRACK scrolled across the
   screen, and wait for the prompts.

2) Answer the prompts for the first possible bet

TRACK PAYBK?	Punch .84 and press the DATA button.
WEALTH?	Punch 1000 and press the DATA button.
PLACE/SHOW?	Press PLACE.
COUPLED ENT?	Press YES.
WIN BET?	Punch 33902 and press the DATA button.
WIN POOL?	Punch 102557 and press the DATA button.
PLACE BET?	Punch 11987 and press the DATA button.
PLACE POOL?	Punch 48033 and press the DATA button.

The calculator prints EXP = 1.15 and then PBET = 89. If you were at
a track with a 1.14 cutoff this would be a good bet. Let's check the
show bet on horse #1 as well though.

3) Since you do not want to change the track payback or your wealth just
   press the SHOW button to start the prompts for the next set of data.
   After pressing SHOW answer the following prompts.

COUPLED ENT?	Press YES.
WIN BET?	Punch 33902 and press the DATA button.
WIN POOL?	Punch 102557 and press the DATA button.
SHOW BET?	Punch 5821 and press the DATA button.
SHOW POOL?	Punch 25247 and press the DATA button.

The calculator prints EXS = 1.20 and then SBET = 144.

Since the show bet has the higher expected value (1.20 for show versus 1.15 for place) it is the suggested bet and the optimal bet size is $144.*

The purposes of this example were: 1) to illustrate the ease of accounting for coupled entries with the Beat the Racetrack Calculator*; and 2) to suggest you concentrate on only the best bet in each race, if there are more than one good bet then try and identify the best one in terms of maximum expected value and wager its suggested amount.

Minus Pools

By law, tracks must always pay a minimum amount on any winning bet. This is generally $2.10 for a $2 bet, although some states, such as Kentucky, pay $2.20 as their minimum. A minus pool occurs when the return to the bettors, after the track take has been calculated in, is less than this minimum. Such a pool can occur when a horse (or a coupled entry) looks unbeatable. If the public's bet on this one possibility is so large then the track must forego some of its profit or actually lose money in order to pay the $2.10. Often when such a situation appears likely the track management will disallow certain betting to avoid a minus pool, but this is certainly not always the case. The problem with minus pools is that they can cause the Beat the Racetrack Calculator* to overestimate the true expected return on a bet and the true optimal bet. This section will show you how to identify a possible minus pool and demonstrate the problem of interpreting the output from the calculator. Suppose the toteboard is as follows:

Odds	14	50	1-4	5	70	8	20	
Horse	1	2	3	4	5	6	7	Total
Win	16206	4388	197241	42106	3241	27892	10148	301222
Place	6702	2549	92317	20062	1920	18717	6105	148372
Show	3117	1204	82472	6148	824	7987	2541	104293

Horse #3 is the big favorite going off at 1-4 odds. Horse #3 also has 79% of the show pool bet on him to show. Suppose horse #3 is in-the-money and the track payback is 85%, then after the track pays back the show bettors on the #3 horse there is only 6% (85%-79%) of the show pool to pay back the show bettors on the other two horses who finished in-the-money, let alone pay any profits.

---

* Accounting for multiple bets is discussed in Chapter 16 of Beat the Racetrack. It is suggested, however, that you just concentrate on the best bet in a race since it is sufficient work to keep track of one bet and good multiple bets are not very common.

Clearly there will be a minus pool if horse #3 finishes in-the-money. From the win odds it is possible to calculate horse #3's probability of being in-the-money.* It is 0.97. Therefore 97% of the time all the show payoffs will be $2.10. If horse #3 does not finish in-the-money then, of course, the show payoffs will be very large but this is an unlikely event. THE BOTTOM LINE IS THAT YOU SHOULD NOT BET TO SHOW IN THIS RACE ON ANY HORSE. Now let's see what the calculator would say. By the ratio comparison horse #4 looks very good and plugging its data in the calculator indicates EXS = 1.49 and SBET = 81 when wealth is $500. That EXS = 1.49 is a smokescreen though. The likely occurence of a minus pool is not being properly considered. Consequently the $81 bet is too large. Indeed we recommend no bet at all.

Chapter fifteen of Beat the Racetrack goes into more detail on dealing with minus pools, but good advise. is: IN A POSSIBLE MINUS POOL DO NOT BET TO PLACE OR SHOW ON ANY HORSE. Remember that to identify these possible minus pools just watch for cases where one horse has a very large proportion of the place or show pool bet on it.

The Kelly Criterion and Fractional Kelly Betting

The investment rule which the Beat the Racetrack Calculator® utilizes and we advocate in Beat the Racetrack is the Kelly criterion. Specifically, the Kelly criterion is to invest so that the long-run rate of growth of your betting fortune is the highest possible. Chapter 5 of Beat the Racetrack discusses the Kelly criterion in detail and shows how it outperforms other betting strategies in many respect such as growth and reaching specified goals. Since the Kelly criterion is based on growth, however, it is riskier than some other possible betting systems. Those who wish to lower this risk (and also the corresponding growth rate) can simply use a fractional-Kelly betting system. There will be no change in the way you decide whether to bet or not. However, the amount bet should be decreased. For example, if the Kelly optimal bet is $100 and your preferred fraction is .6 then you bet $60. Professional blackjack teams use fractional-Kelly strategies of from .2 to .8. This is advisable since their edge is about 2%, and the risks of losing are quite high. In our Dr. Z system bets, the edge is considerable higher, at least 14%. It is our opinion that use

---

* In Beat the Racetrack, see Chapter Four on the Harville formulas and Chapter Fifteen on how to use those formulas to calculate the probability of a horse showing.

of the ordinary Kelly criterion over a fractional-Kelly betting system is preferrable.

Hints for Successful Betting at the Racetrack[*]

We recommend the following procedure for determining and placing Dr. Z system bets.

Situate yourself so that you have a clear view of the toteboard mutuels and are in a position to be able to place a bet near the end of the betting period. Most tracks have two or more toteboards. The one that is best to use is often the one farthest away from the finish line. Check to see how long the lines are in a few races so that you can judge how late you can wait before betting and risking getting shut out. The line may be shorter in the clubhouse. If you are with a friend, one of you can be watching the toteboard and the other holding a place in the betting-window lineup.

Start looking for possible Dr. Z system bets four to six minutes before post-time or even earlier. Use the Beat the Racetrack Calculator• to see how good a promising bet really is before you bet. Recheck it when you are ready to bet. Do not bet any sooner than necessary. It is a good idea to watch where the horses are because at many tracks betting stops when they enter the starting gate and this may be a minute or more after the official post-time.

We recommend that you do not bet in any of the following situtation:

1. On days when the track is not fast. This especially means heavy, sloppy, or muddy tracks, but also includes tracks listed as in fair or good condition. Horses' performances are extremely variable on such tracks.

2. When there is a minus pool and some horse or horses are bet so heavily to place or show that the payoff on all horses will be $2.10 if this horse or any of the entry horses are in the money. Minus pools and exceptions to this rule are discussed in detail in Chapter Fifteen of Beat the Racetrack.

3. When the horse in question is going off at odds of 8-1 or greater. Since these long shots are traditionally overbet, the possible payoff that you might get is not sufficient to justify the risk involved.

4. When the horse in question is a Silky Sullivan-type runner. These are horses whose records indicate that they are late chargers who come from far off the pace and either win the race or finish out of the money. You can recognize

---

[*] The material in this section is adapted from Beat the Racetrack where it is more fully developed with many detailed examples.

these horses by consulting the past performances. If a horse has run that kind of race in its last 10 outings, don't bet it to place or show.

5. When the expected return per dollar bet is less than 1.14 for the top tracks and 1.18 for other tracks. The tracks with sufficiently large betting pools and superior horses to warrant the 1.14 expected-value cutoff are listed in Table 2. We recommend a 1.10 cutoff for extremely high quality horses running in the very best races such as those indicated in Table 3. For expected values less than 1.10 the Beat the Racetrack Calculator® will automatically indicate a zero bet.

We recommend that you display caution in the following circumstances:

1. It may be advisable not to bet on horses coming off a long layoff. A particularly dangerous situation is the standout who, for example, last year won six of eight starts and was second in the other two races. He has not run this year. Now it is August and he is made a prohibitive favorite in a long race, all on the basis of his past record and some excellent recent workouts at short distances. There is a good chance this horse will die in the stretch and finish out of the money. In general you have to use some judgment in these long-layoff situations. If you want to be cautious, do not bet on any horse that has not run in the last two to three months.

2. You should be cautious betting on first-time starters. Super workouts are no substitute for actual racing experience. Bet on them only if the conditions seem ideal otherwise and the odds are excellent.

3. We argued in Beat the Racetrack that the win odds generated by the crowd can be used with the Harville formulas to generate good predictors of a horse's chances of finishing second or third, so we bet when the expected payoff was large in comparison with fair odds. This was done without reference to the horses' and jockeys' actual records. There is no doubt, however, that a person feels more comfortable when the bet is on a horse that is frequently in the money, at today's distance, running against similar quality horses, and with his regular jockey—ideally one of the top jockeys at the current meet. When the situation is not so comfortable as all that, you may wish to lower your bet. On average, this caution should provide you with the greater security you wish and only slightly less growth in your betting fortune.

Finally the Beat the Racetrack Calculator® assumes you are the only one at your track using the Dr. Z system. Chapter 17 of Beat the Racetrack discusses how many people can be using the Dr. Z system before they start betting against

one another. Some comments and advice are: 1) When the bet is good and the track mutuels are large it will take quite a few Dr. Z system bettors to make the market efficient; 2) A few very big bettors can certainly do the others in, so you must keep an eye out for them; 3) If you think such bettors are at your track, simply watch the toteboard and not bet or bet modestly. If the bet has an expected value of 1.20 with two minutes to post time and it's 1.00 at post time, your worst fears are realized; 4) Don't despair, take a few weeks holiday then try it again, the big bettors may have gone away; 5) Remember, at tracks with small mutuel pools the effect of large bettors will be even greater. At such tracks, however, there are proportionally fewer people betting and any Dr. Z system bettor wagers less as well, since his bets will influence the odds; 6) Experience with inefficiencies in other areas, such as blackjack and options markets, shows that it takes quite a while before the inefficiency is wiped out, the same will probably be true here; and 7) People are greedy and like to brag. That will not change! Sooner or later, they will go back to their old bets and you will be able to apply the Dr. Z system successfully again, even if the market does become efficient temporarily.

<center>GOOD LUCK!</center>

Handicapping and the Beat the Racetrack Calculator*

The basis of the Dr. Z system is that the public, in aggregate, is very good at determining a horse's "true" win odds. For example, horses with 20% of the win pool bet on them by the public tend to win about 20% of the time. To actually determine better odds than the public does is NOT an easy task but there are many expert handicappers who, through considerable work, are up to the challenge. If you are such a handicapper can you use the Beat the Racetrack Calculator? The answer is yes and, in fact, it's very easy to incorporate your handicapping with the calculator. NOTE, HOWEVER, THAT WE MAKE NO CLAIM THAT YOU WILL MAKE PROFITS IN EXCESS OF THOSE IN THE USUAL DR. Z SYSTEM OR EVEN ANY PROFITS AT ALL. Profits will depend upon whether or not your self-generated odds are really better than those formed by the public that we have shown in Beat the Racetrack are very accurate on average. The first step is to, through your handicapping skill, determine a morning line. A typical morning line is an

---

* This section is intended for EXPERT handicappers ONLY. For normal application of the Dr. Z system you do not need to read this section.

odds morning line but here you should calculate a probability morning line. Each horse will be given a probability of winning and the sum of the probabilities will be one. You should have your probabilities finalized several minutes before the end of betting--this will allow you to observe the parade to post if that is employed in your handicapping. Now ignore the win bets posted on the toteboard and consider only the place and show bets on the toteboard while thinking of your probability line as the public's win bets. Let's go back to example 1 to see how we do this in practice. Suppose the probability line you have determined for the race is

Horse	1	2	3	4	5	6	7	Total
Probability	.20	.12	.05	.18	.05	.30	.10	1.00

That is, you think that horse #6 at 5-2 has a 40% chance of winning whereas horse #1 at 2-1 has only a 25% change of winning. At one minute to post-time the actual toteboard is:

Odds	2	7	10	3	40	5-2	5	
Horse	1	2	3	4	5	6	7	Total
Win	16332	6809	4727	13343	1302	14415	9309	66237
Place	7798	3844	2504	7097	921	7038	5614	34816
Show	3372	2492	1703	5816	426	5004	4088	22901

With your set of probabilities you should pretend that the toteboard is really:

Horse	1	2	3	4	5	6	7	Total
Win	.20	.12	.05	.18	.05	.30	.10	1
Place	7798	3844	2504	7097	921	7038	5614	34816
Show	3372	2492	1703	5816	426	5004	4088	22901

It is easy to convert these probabilities to odds using the formulas:
$q_i = \dfrac{Q}{O_i + 1}$, in which case $O_i = \dfrac{Q - q_i}{q_i}$, where q_i is the probability that i wins, Q is the track payback and O_i is the odds on i. When rounded down to standard toteboard odds values we can then compare your odds to those set by the public. In this case they are:

Horse	1	2	3	4	5	6	7
Your Odds	3	6	16	7-2	16	9-5	7
Public's Odds	2	7	10	3	40	5-2	5

The comparison reveals that you feel the public has overbet horses 1, 3, 4, and 7 and has underbet horses 2, 5, and 6.

The show bet on horse #1 no longer appears to be a good show bet, a quick check with the calculator indicates the expected value is only 1.11 (with a track payback of 0.85). To check the other horses for the possibility of a good bet first of all disregard horses 3, and 5, since they have win probabilities less than 0.10. Recall that if you did enter their

data the calculator would always indicate a $0 bet. To check the remaining horses, an easy test is to divide each horse's place (or show) bet by the place (or show) pool and see if that ratio is significantly less than the horse's probability of winning. (This really amounts to the same ratio comparison suggested in examples 1 and 2.) For place the only good ratio is with horse #6 ($\frac{7,038}{34,816}$ = .202 which is much less than .30). For show the only good ratio is again horse #6 ($\frac{5,004}{22,901}$ = .219 which is considerable less than .30). Now that you have identified these two possible bets use the calculator to check if either has an expected value which exceeds your cutoff, let's say it's 1.18. Turn on the calculator and wait for the prompts.

TRACK PAYBK? Punch .85 and press the DATA button.

WEALTH? Punch 500 and press the DATA button.

PLACE/SHOW? Press the PLACE button to check the place bet first.

COUPLED ENT? Press NO.

WIN BET? Punch .3 and press the DATA button.

WIN POOL? Punch 1 and press the DATA button.

PLACE BET? Punch 7038 and press the DATA button.

PLACE POOL? Punch 34816 and press the DATA button.

The calculator will display EXP = 1.19 and then PBET = 62, so the place bet's expected value is above the cutoff of 1.18.

Now check the show bet by pressing SHOW and answering the following prompts:

COUPLED ENT? Press NO.

WIN BET? Punch .3 and press the DATA button.

WIN POOL? Punch 1 and press the DATA button.

SHOW BET? Punch 5004 and press the DATA button.

SHOW POOL? Punch 22901 and press the DATA button.

The calculator will display EXS = 1.11 and then SBET = 31. Since the expected value is below the cutoff value of 1.18 you should not make a show bet.

This analysis indicates the place bet on horse #6 is a good bet and the suggested bet size is $62.