

KARTROL EX-56

REMOTE KART ENGINE CONTROL

"PUTS KART CONTROL BACK IN THE HANDS OF THE TRACK OPERATOR"

COMPREHENSIVE
INSTALLATION
&
OPERATION MANUAL

March, 1994

Kartrol EX-56 Installation & Operation Manual (March 1994)

INTRODUCTION

The **Kartrol EX-56** is a *state of the art* remote kart engine control system that

1. uses no batteries
2. uses no additional charging system
3. uses no mechanical hookups to install, adjust or maintain on kart

This system is specifically designed to work with single cylinder Honda kart engines such as Models GX140 and GX160 but may work with others.

It uses a *state of the art* solid state encoded transmitter/receiver system in conjunction with a fully electronic engine speed limiter to provide control for individual karts, groups of karts, all karts, or pit entry control, at will.

The system consists of a main control console complete with low voltage power supply and antenna, one engine control unit for each kart and a range adjustable pit control unit complete with main console plug. You must provide a two-wire cable (at least 18 gauge) to attach between the main console and pit control unit, wire connectors (suitable for low voltage pit control wire), electrical tape, nylon wire wrap ties (or suitable straps or pouch to attach engine control unit to karts) and a support for the pit control antenna (to be strung completely across the track at a height of approximately 5 to 6 feet). Light metal or wood posts and quarter-inch nylon or poly rope will work well. (In many cases the pit control antenna has been installed in the track rather than above it. This can prove to be most satisfactory but must be dealt with on an individual installation basis.)

This system is not intended to alter or replace any kart manufacturer's, track designer's, or related equipment manufacturer's safe operating procedures and guidelines.

It cannot be stressed enough that track operating procedures should be such that sudden partial or total removal of this system from track operations not result in an unsafe situation.

The Kartrol EX-56 system is intended to enhance, not replace, safe operating procedures.

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INSTALLATION QUICK CHECKLIST

The following is an installation quick checklist for the Kartrol EX-56 engine control system. It is intended as a quick reference to check final installation details. It is by no means exhaustive in detail and should be used only after carefully reading and performing the installation steps contained in the following pages of this manual.

ENGINE CONTROLS

1. Flywheel/coil air gap set the same on all engines (.006" to .008" ideal).
2. All engine controls securely mounted in the same location on all karts.
3. Wiring harness securely plugged into engine.
4. Good electrical contact on ground wire from wiring harness to engine (i.e. no paint under wire eye).
5. Wiring harness securely fastened to frame and excess wire coiled up and fastened.

MAIN CONSOLE

1. Main console located in area of easy access, good visibility, protection from weather and tampering, and close to 110v. power supply.
2. Power supply plugged into standard outlet and into socket on back of console.
3. Antenna securely connected (**antenna must be fully extended if telescoping style is used**)
4. When unit is turned on, red light above "on" button is lit.
5. Control "beeps" when control buttons are depressed.

PIT CONTROL

Ideal pit control location determined through testing on track before final installation.

1. Pit control module securely mounted and protected from physical damage.
2. Wire connections made between pit control module and plug on back of main console.
3. Plug engaged on back of main console (or power supplied to pit control from light or timer system through low voltage power supply adaptor).
4. Red light on main console above pit control "on" button lights when button is depressed.
5. Red light on pit control module lights when pit control on main console is turned on.
6. Pit control antenna wire is securely attached to pit control module.

7. Pit control antenna wire is located **ACROSS** track either overhead or in "saw cut" in track, with mark at center of antenna at center of lane being controlled.
8. Range control on pit control is set for "optimal operating envelope" without signal crossing over to other lanes.

Note: Pit control antenna cable is a special double braid coaxial cable and cannot normally be replaced or modified using common coaxial cable.

GENERAL

It is important that all karts be individually tested in all facets of the system's operation to ensure consistency of system performance at all track positions.

It is also very important that the system be checked regularly to ensure it is functioning properly (just as you would any other component on the kart, such as steering or brakes)

We hope that this system helps provide you with many seasons of trouble free, profitable operation.

If you have any questions or specific requirements, please do not hesitate to contact your sales outlet or the manufacturer.

ENGINE CONTROL UNIT INSTALLATION

The installation of the engine control is a very simple, straightforward procedure, but a few basic points must be considered.

1. The engine control module contains a radio receiver which must have an antenna. This antenna is located in the lead wire along with the electrical hookup wires. Because of this, it is important that the length of this wire not be altered. If the cable is too long the excess must be coiled and fastened in a convenient location. If the lead wire becomes damaged along its length it must be returned to the factory for replacement. The lead wire should not be run inside metal conduits or the kart frame rails as this will affect antenna performance (the cable may be run alongside and attached to the frame rails without serious negative effects).

Each engine control module has a number assigned to it and marked in a printed square on the front of the box. This number should correspond to the number on the kart body.

2. The engine control box should be located as far away from the engine as is practical and should be located where it will be least exposed to heat, water, or direct impact. It is not important to have easy access to "the box" once it is installed as it requires no maintenance or servicing (the steering column support pillar or internal frame side rails are practical installation points). It is not a good idea to attach the box or lead wire to the body in any way as this may cause problems when bodies are removed for kart maintenance.

Whenever possible the box should be mounted with the seam running vertically to allow any water that may get inside to drain out more easily.

If a pressure washer is used on karts it is recommended that a plastic bag (with a wrap tie where the wire protrudes) be placed on the receiver box before mounting.

3. It is not usually critical how the wires are run along the frame rails and the excess coiled up as long as the cable is securely fastened (using nylon ties at least every 6 inches is recommended) to prevent damage due to vibration, direct impact, or contact with body, linkages, etc. It is, however, critical that all karts in the fleet have the engine control mounted in exactly the same manner on each kart and the excess wire coiled up in exactly the same way in each case. This is important so that all karts will respond to the signal from the main console or the pit control with the same sensitivity.

As a general rule, the higher the engine control box is located on the kart and the farther away from the motor, the more sensitive the control will be.

4. If the engine control is to be fastened directly to the frame rail with nylon wrap ties it is recommended that a piece of rubber (from an old inner tube) or a thin layer of closed cell foam be placed between the box and frame rail to reduce vibration. It is important to ensure the engine control is mounted securely. Nylon ties should be run in such a way that the box cannot slip out.

5. The electrical hookup is designed to plug directly into the stock Honda kill switch wire. Simply unplug the Honda kill switch at the connector beside the switch and plug the two Honda connectors into the male and female plugs attached to the **Kartrol** harness. If a loose connector is found, simply squeeze down the female socket plug with a pair of pliers while it is unplugged (re-plug and check until a snug fit is achieved). The third connection is a wire eye type connector which is to be securely fastened to a good ground directly on the engine or engine housing. If the surface under the mounting bolt is painted it should be sanded down and cleaned to achieve good electrical contact (valve cover bolts, fan shroud bolts, engine mounting bolts, etc. are all suitable).
6. **In order to have consistent operation of all kart controls, in some cases it may be necessary to set the coil to flywheel air gap. Best performance occurs when the gap is set at the lower end of the Honda specs. (.008 to .018 inches) (gaps as low as .006 to .008 inches are ideal). A standard matchbook cover works well in place of a feeler gauge). It is, however, more critical that all karts be set to the same spec. so that all karts perform the same.**

This adjustment may not be necessary at all, so it is recommended that you try out the complete system before performing this operation. If considerable difference in sensitivity of karts is detected (especially related to pit control) this procedure will have to be performed. The setting procedure is outlined in the Honda service manual if you are unfamiliar with it.
7. It is recommended that only one kart be outfitted with an engine control unit initially until main console installation and testing have been performed.
8. Before proceeding, check that the entire harness is secure and will not get damaged or rubbed by the body or linkages. Remember, if the harness gets damaged, the unit will not work. Since the antenna is in the harness, nicks and cuts in the harness may reduce the sensitivity and range, or if the antenna contacts the frame it may stop the unit from responding at all. If the power wire contacts the frame it will shut off the engine.
9. Proceed to main console installation.

MAIN CONSOLE INSTALLATION

The Kartrol EX-56 main console is designed to be durable and weather resistant but it is still a piece of electronic equipment and reasonable care and consideration should be given in locating it to protect it as much as is practical (it is water resistant but it is not waterproof!)

When deciding on a location for the main console, several factors should be considered:

- (a) Easy accessibility to track operating staff
- (b) Protection from tampering by patrons
- (c) Availability of 110V 60 cycle single phase AC power supply (standard electrical outlet)
- (d) Maximum visibility of track

- (e) Proximity to heavy electrical interference (main switching panels, transformers, large motors, etc.)
- (f) Distance of main console from location of pit control transmitter/antenna assembly (the closer the better due to shorter wire connecting the two)

Once a suitable location is decided upon after considering the above factors, you just have to simply attach the antenna by locating it on its mount on top of the control console, push down and turn down until the locking pins engage. It may be necessary to squeeze the base of the antenna while turning in order to get the inner connector to move.

If a telescoping antenna is used, fully extend the antenna (flexible antennas cannot be extended) and plug the AC adaptor into the main console and a standard 110v outlet. You are now ready to start testing the basic system.

SYSTEM TESTING

1. Press the power button on the main console.
The red light above the "on" button should light.
2. Press any numbered button on the console.
A beep should be heard each time a button is pressed.
Buttons should be pressed for at least one second to ensure contact is made.
It is important to press only one button at one time because if two buttons are pressed simultaneously the karts will not accept the signal.
4. Press all four green reset buttons, one at a time.
5. Start the kart engine in the normal manner.
6. Press the green reset button on the main console in the row that contains the number corresponding to the number on the engine control unit. (This should ensure that the engine control unit is disengaged.)

ENGINE CONTROL ENGAGEMENT TEST (E.C.E.T.)

With the kart engine running hold the brake and depress the accelerator lightly (be careful when standing around the kart when the accelerator is depressed; area around and in front of the kart should be clear).

The engine speed should increase slightly and then stop increasing. At this point the engine exhaust sound will become rougher and speed will fluctuate slightly but will not increase normally. (This is referred to as "chugging.")

If accelerator is released the engine should return to normal idle.

If "chugging" does not occur this indicates that the engine control unit is not engaged.

7. Press the button on the console corresponding to the number on the engine control unit. Perform the E.C.E.T. Engine should "chug."
 8. Press the green reset button for the appropriate row of numbers. Perform the E.C.E.T. Engine should run smoothly and try to accelerate normally.
 9. Press the red stop button on the main console in the row containing the number corresponding to the number on the receiver unit. Perform the E.C.E.T. Engine should "chug."
 10. Press green reset button on the row containing the number corresponding to the number on the engine control module. Perform the E.C.E.T. Engine should run smoothly and try to accelerate normally.
 11. Take the kart to the farthest point on the track from the main console unit and repeat Steps 6 through 10.
 12. If all is working correctly, move the kart to any potential "dead spots" on the track (i.e. tunnels, under bridges, behind walls, out of line of sight, near large electrical loads, etc.) Repeat Steps 6 through 10 at each one of these points.
 13.
 - (a) If all is working correctly, go for a ride while having someone "shut you down" at various locations on the track. This will give you a "feel" for how the system affects the kart (i.e. how far it coasts, how it resets, what happens on hills, etc.)
 - (b) If "dead spots" are found, there are usually three possible causes:
 - (1) Location of main console unit may not be suitable

Try moving the main console unit temporarily a few feet in either direction or raise it slightly higher in elevation, or both.
 - (2) Location of antenna or engine control causing reduced sensitivity

Try relocating lead-in wire or engine control box on kart (various possibilities may be tried).
 - (3) Incorrect coil air gap as described in engine control installation.
- In the unlikely event that none of these solutions work, a call to the sales outlet for technical assistance will be required.
14. At this point, if all is working correctly, proceed to install engine control units on all karts (ensuring that all installations are as identical as is practical).
 15. Each kart should be driven around the track and stopped and reset both by unit number and group stop button at various locations on the track to ensure proper operation. If any karts do not behave as the majority the problem is likely related to coil air gap as discussed earlier.
 16. If all is working correctly proceed to installing pit control.

PIT CONTROL INSTALLATION

The pit control is a low voltage device normally powered by the main console or a suitable high to low voltage power supply adaptor. It should never be hooked directly to 110 Volt or higher "wall current."

The pit control module consists of a "main box", an antenna wire and a plug for the main console. This device is a low range solid state transmitter with adjustable range control.

Note: If pit control is to be activated by light or timer system, rather than the main console, through the use of a separate low voltage power supply adaptor, the pit control will no longer be activated by the main console.

While testing karts on your specific track you can determine how far a kart will coast when "shut down" while travelling at full speed. This coasting distance should be considered when deciding where to mount the pit control. Each track and installation as well as kart style and manufacturer is different so some experimentation may be necessary when locating the pit control transmitter and antenna.

The main object is to ensure the karts have slowed down enough before reaching the pit area to be safe but not so far that large amounts of time will be lost "bringing karts in."

The pit system will work best if it is located as far as possible from another lane of the track. This will allow the control to operate a highest possible range without crossing over to other lanes.

In most installations you will find that the pit control signal reaches the kart for a greater distance past the antenna than the distance before reaching the antenna. You must keep this in mind when locating the pit control so that you are not "shutting down" karts that are parked in the pit area, with the pit control. Normally a distance of 1 to 5 feet before the pit control antenna and 10 to 15 feet past the antenna provides a good "operating envelope." This distance is set with the range control on the pit control box (you should decide for your own track's safety procedure how large the "envelope" should be. Also, it is not recommended that karts be stopped at a point where they are climbing a hill as they may stop and roll back or not be able to continue.) It should be noted that as the range control is increased the signal being generated to both sides of the lane being controlled is also being increased. On tight or small tracks this could result in "cross-laneing" of the signal or, in extreme cases, complete track "shutdown" from pit control signals. If only some of the karts seem to be affected by cross-laneing, the flywheel air gap must be set as discussed earlier.

*** Units that do not shut down on pit control when most others do, likely require the air gap be adjusted (Honda spec. is .008 to .018 inches but a closer air gap of .006 to .008 inches is ideal).**

Once consideration has been given to these factors a potential pit control antenna site should be decided on for testing. The pit control and its antenna is powered by low voltage, so electric shock hazard is not a critical factor in determining location.

On tracks with tight radius corners or where pit control installation may be close to another traffic lane, the

pit control box should be located on the "inside" of the track or against the close lane as some control signal may "spill off" the end of the antenna wire farthest away from the pit control box.

It should be noted that running the antenna wire along existing metal structures (such as traffic control light mounts, cables, bridge supports, etc.) is not recommended as these structures may act like "antenna amplifiers" and cause the pit control signal to radiate uncontrolled over the entire track area (if you wish to try these locations, they may work in your particular installation, feel free to do so as it won't damage the control).

Ideally, a piece of quarter-inch nylon or poly rope stretched across the track at a height of 5 to 6 feet above and attached to wooden posts will work best (when setting the height above the track, the rope should be as low as possible without the patrons being able to sit up in the moving kart and grab it. Some locations have used flags or streamers to hide the rope as well). It is recommended that the wooden posts for mounting the pit control antenna initially be set up in a temporary fashion so that they can be easily moved for testing or changes in installation. Once the posts are set up and the rope strung across the track, the antenna wire may be installed.

The pit control antenna wire consists of a piece of coaxial cable with a twist-lock connector on one end and a piece of smaller diameter wire approximately 9 feet long on the other end. This small diameter wire is the actual antenna for the pit control. At approximately the half-way point of this antenna you will find a mark. This mark should be located above the center of the track lane being controlled.

Note: The coaxial portion of this cable is a special double braid design and cannot normally be replaced with standard coaxial cable.

Temporarily fasten this center point to the rope with electrical tape. Proceed to pull the hanging ends of the wire snug and fasten it as straight as possible at several points along the rope (final attachment of the antenna to the rope may be completed later using a combination of electrical tape and nylon wrap ties).

It is not critical if the track is wider than the antenna wire. The antenna supplied will normally work for tracks up to at least 25 feet wide (if your track is considerably wider, please contact your sales outlet for further information).

After the antenna wire is mounted it may be attached to the connector on top of the pit control box.

The pit control box may be fastened to the wooden posts with nylon wrap ties in a similar fashion to the kart receiver units.

Now, a two-wire (minimum 18 gauge) cable must be run from the main control console to the pit control module (this is a low voltage wire but the installation should be able to withstand the weather without cracking up or shorting).

Note: On installations where the pit control is to be activated by the light system or timer the power wire must be run from the pit control to a low voltage power supply adaptor at the high voltage controlled power source.

As a matter of good workmanship the correct polarity should be observed when attaching this wire to both pit control module and console plug (i.e. black wire to black wire and white wire to white wire) but is not critical as it will work either way.

Fasten the wires at the pit control module first. Ideally, these connections should be soldered and covered with heat shrink tubing, but Marr or crimp type insulated connectors and a wrapping of electrical tape will work.

Now proceed to the main console plug (or low voltage power supply adaptor). Attach the wires at the main console plug to the two-wire cable in a similar fashion to the pit module end.

Plug the plug into the socket on the back of the main control console. You are now ready to test the pit control system.

PIT CONTROL TESTING

1. Turn on the main control console.
The red light above the "on" button should be on.
2. Press the pit control "on" button.
The red light above the pit control "on" should light. If, when you turn on the pit control, the light above the main console power on button goes out and no lights are on, you have incorrectly wired the pit control module or there is a short circuit in the wire leading from the main control console to the pit control module. Double check the lead wire for short circuits.

Note: If timer or light activation is used to operate the pit control, your pit control system will have to be activated by that control for testing purposes as the pit control "on" button will not be functional.

The Kartrol EX-56 main control console has a built-in protection circuit that automatically shuts down the while system if there is a problem in the pit control wiring.

3. With the pit control system turned on, check to see if the red light is on, on the post-mounted pit control module (check this carefully as it may be hard to see in direct sunlight).

If the red light is on, shut off the pit control system at the main console (or by alternate control).

The red light on both the console and the pit control module should go out.

If the light is on, on the main console, but not on the pit control module, check the pit control plug on the back of the main console and the wiring between the console and the module.

4. Turn the range control knob on the pit control module all the way down to its lowest setting (counter clockwise).
5. Take a kart with the engine control module properly mounted and park it on the track (with the motor running at an idle) about 10 feet before the pit control antenna.
6. Turn on the pit control system at the main console. (The light on the pit control module

should be on.) Perform the Engine Control Engagement Test (E.C.E.T. as described in the testing section on page 5).

If the engine does not "chug" with the pit control turned on, slowly roll the kart forward towards the pit control antenna, with the motor running, perform E.C.E.T. until the engine "chugs." This is the beginning of your "envelope".

If the engine "chugs" at the 10 foot point, back the kart up in 5-foot increments. At each stop push the green reset button on the main control console corresponding to the test kart being used. If the engine "chugs" while performing E.C.E.T. immediately after pressing the reset button, continue to back up until it does not. This will be the beginning of the envelope.

If the pit control range is turned all the way down and this part of the envelope is getting too large for your installation, it may be necessary to try relocating the engine control or wiring harness on the test kart to reduce its sensitivity. If relocating the engine control solves the problem, all engine control boxes and harnesses will have to be located in the same fashion (assuming the flywheel air gap is the same on all karts).

If this does not work, contact your sales outlet for further technical assistance.

7. If the point where the engine "chugs" is not too far before the antenna to suit your installation but may be too close, this is good!

Now proceed to roll the kart forward past the pit control antenna. Once past the antenna at least 5 feet with the pit control system turned on, stop at 5-foot intervals and press the corresponding reset button until you find the point where the engine does not "chug" when performing the E.C.E.T. This is the other side of your envelope.

If this envelope is too small, this is good! If this envelope is too large, then you may have to relocate the wiring harness or engine control box on the karts as previously mentioned. (If this doesn't work on the test kart, contact your sales outlet for further technical assistance.)

8. With the pit control system turned on, take the test kart for a ride around the track to ensure that the pit control is only activating karts in the desired area. Take special note of areas on the track where you may come close to the pit control antenna while on another lane. Also take note when passing through the pit control envelope (at full speed) to see how far the kart coasts, how it behaves on hills if any are present, and how high the speed is as you approach the pit area.

Also, try travelling through the pit control area at low speed, taking note of kart performance.

9. If no cross-laneing of the pit control signal is occurring anywhere on the track and you are happy with the level of control achieved, you may proceed to permanently mount the pit control module and antenna.
10. If you feel that the location of the envelope is unsuitable, you may want to move the antenna at this point, or, if the envelope is too small you may simply want to turn up the

range control to expand the envelope. As you turn up the range control the possibility of cross-laneing of the signal will increase and should be watched for in the test rides.

If cross-laneing becomes a problem before the envelope is suitable, contact your sales outlet for technical assistance.

Ideally, you want the largest possible envelope. Just turn up the range control until cross-laneing occurs then turn it down approximately 1/8 to 1/6 of a turn.

11. Now proceed to test all karts watching for both areas of control by pit control, for cross-laneing and for "misses" of certain karts by the pit control. You may find you have to turn the range up or down slightly so that all karts are controlled adequately. If a wide variation is found between karts in the pit control mode the flywheel air gap must be set on all karts or on the few that vary widely.
12. It should be noted that the envelope will change slightly with the person in the kart as opposed to pushing an empty kart around the track when doing initial setup. This is normal and you may want to adjust slightly for this. Once the pit control range has been set up properly there should be no reason to change it in the future.
13. If all is working properly you are now ready to set up safe operating guidelines for the use of the **Kartrol EX-56** system on your track.
14. **If you feel that mounting the pit control antenna wire overhead is not acceptable, there may be alternatives. In many instances the antenna may be located in a "saw cut" in the track surface.**

If you wish to pursue this type of installation (which has worked successfully in many applications) please contact your sales outlet, as specific technical assistance and considerations may be required to suit your individual application.

OPERATING & SAFETY CONSIDERATIONS

It must be stressed that the Kartrol EX-56 system was developed to aid in gaining control of track situations and not replace or eliminate standard or specific track operating guidelines or procedures. Due to the varying nature and designs of karts and tracks alike it would be impossible to set out a standard set of operating guidelines for a track whether or not the Kartrol Ex-56 system is used.

It is therefore recommended that you draw upon the skill and experience of people such as kart manufacturers, track designers, track insurers, governing bodies, and other track owners, to name a few, when developing your own operating guidelines.

With respect to aspects specifically related to the **Kartrol EX-56** operating guidelines, the following suggestions are offered for your consideration but by no means do they represent an exhaustive list:

1. The karts must be adequately slowed by the time the pit area is approached.
2. The staff should be trained in all aspects of the operation of the system so they will understand the operational effects and limitations.
3. Good staff communication must be maintained so that confusion or lack of attention to the system does not occur. (Ideally, specific individuals should be assigned responsibility for its operation at all times.)
4. The system should be checked regularly to ensure it is functioning properly (just as you would do with any other component on the kart such as steering or brakes).
5. On tracks with hills and blind spots it is important to understand what happens to the kart as a result of using the system when the karts are in these areas (i.e. sudden stops, rolling back down hills, inability to restart when stopped on a hill, etc.)
6. In a situation where one individual in a "pack" of karts is causing problems it may be possible to correct the situation by merely shutting down the individual for a few seconds at a time until he drops back out of the pack.
7. It is a personal decision whether or not to let the customers know they can be controlled if the rules are not followed but, in general, it is felt that tactful and discreet use of the system without specifically informing the customer of its use can result in a very safe operating facility without causing confrontation. (It is important that the system be used judiciously so that customers get good value for their money and not have their ride spoiled by "trigger happy" operators.)
8. Procedures for care and storage of the main control console and its related components should be in place to ensure long term trouble-free operation of this *state of the art* electronic kart control system.
9. **Track operating procedures should be such that a sudden complete or partial failure of this system to operate not result in an unsafe situation. If this is not possible, this system should not be employed at your facility.**

KARTROL EX-56 PORTABLE HAND HELD CONTROL UNIT

1. **OPERATION**

The **Kartrol EX-56** Hand Held control unit is a low range solid state control device with integral rechargeable battery pack and, and adjustable range control.

It is capable of engaging or disengaging the **Kartrol EX-56** engine control system (on any go-kart equipped with the system) at close range.

When the red stop button is depressed, all go-kart receivers within its operating range will be engaged. When the green reset button is depressed, all go-kart receivers within its operating range will be disengaged. (It is important not to depress both red and green buttons at the same time as this may result in no control signal being generated.)

2. **RANGE CONTROL**

The range control knob on the left side of the control unit will control the effective range of the hand held control from several inches to several feet. Turning the knob clockwise will increase the control's operating range. Depending on local conditions and specific kart receiver installation, the hand held control unit may be effective for several hundred feet so it is important that tests be done at each specific installation to determine the optimal range setting for your particular situation.

The majority of the signal is emitted from the bottom of the control unit (flat part directly opposite the control buttons. This is the area that the control normally rests on when placed on the table.)

Because of this, there is a limited amount of "aim" that can be taken with the signal being emitted (it is important to note, however, that precise aim is not possible and some signal will be emitted in all directions).

3. **RECHARGING**

The hand held control unit comes with a battery recharger that plugs directly into the socket on the face of the unit.

Under normal continual use, the battery charge should last several days. It is important, for battery longevity, to not charge the battery until it is necessary. This is normally indicated by the "beep" sound becoming noticeably quieter or possibly a noticeable drop in the control's effective range. When placed on charge, the charger should be left on overnight (10 to 12 hours).

SPECIAL NOTE

The Kartrol EX-56 hand held control unit is intended to be a low range portable control device and is not intended to replace the main console unit!

If you have any questions or problems with your hand held control device, please don't hesitate to contact your sales outlet for assistance.

KARTROL EX-56 MINI CONSOLE

1. **DESCRIPTION**

The **Kartrol EX-56** mini console is a full power control console for the **Kartrol EX-56** engine control system. It is ideally suited to be used as an additional emergency all-stop/all-reset track control in conjunction with a regular full individual kart control main console at remote or additional locations for increased safety. The mini console will provide only all-stop or all-reset functions. It does not possess individual kart selective control capability.

The mini console may also be suitable as a main control console for small tracks or slick tracks or similar installations where individual kart control capability is not required or desired. (Note: This console will not power the pit control as with the regular main console so if a pit control is to be used, consideration will have to be given as to a power supply and control for it.)

2. **INSTALLATION**

The mini console uses the same power supply and antenna as the regular main console and these are plugged in and attached in the conventional manner. This console can be located in any suitable location on the track that provides the visibility required to allow for safe track operation and has power available to it.

On tracks where more than one console is being used it may be desirable to provide for communication between individual console operators (i.e. walkie-talkie or intercoms).

3. **OPERATION**

The mini console has three buttons on it:

- 1) the yellow "all-crawl" button
- 2) the red "all-stop" button
- 3) the green "all-reset" button

1) The "all-crawl" button is currently disabled in units being shipped from the factory as it is intended for use only with the soon to be available two speed engine control unit.

(If the track wishes to upgrade to the two speed system in the future it is a simple matter at the factory to engage this control with a minimum of effort.)

2) The red "all-stop" button performs the same function as the red stop button at the end of each row on the regular main console, except that it will activate all kart engine controls within its range no matter which code number (similar to the hand held control unit).

The power output of this console is similar to that of the regular main console and could "override" the signal from the main console depending on proximity to the engine control being activated.

(This is why good communication between console operators and good operating procedures must be stressed when more than one console is used.)

- 3) The green "all-reset" button performs the same function as the green reset button at the end of each row on the regular main console except that it will disengage all kart engine controls within its range no matter which code number (similar to the hand held control).

Note: It is important that the button for any desired command be held down for one to two seconds to ensure that all code numbers have been signalled. As with all the controls, it is important that only one button be pressed at a time to ensure a "good signal."

Special Note: The Kartrol EX-56 mini console is internally equipped with switches so that groups of karts as shown on the main console can be disabled by group (or row).

This feature is ideal for facilities with more than one track within the transmitter operating range. Please contact your sales outlet to discuss individual requirements relating to this feature.

FINAL COMMENTS

We would like to take this opportunity to thank you for choosing the **Kartrol EX-56** system and wish you many seasons of safe, trouble-free and profitable operations. We assure you that we will stand behind this product!

If you have any problems, questions, or ideas for improvements or additions to the system, we encourage you to call and discuss them with us.

If you have "custom" applications that require additions and options to the system such as:

- (a) pit control power supply to allow pit control to be activated by existing traffic control lights or timers
- (b) "custom tuned" speed settings for engine control module
- (c) automatic pit exit mounted reset
- (d) remote switching of pit control

Please feel free to contact us with your needs and we will try to satisfy them. It's what we do!

WARRANTY

The **Kartrol EX-56** Control System is warranted by the manufacturer against all defects in materials and workmanship as follows:

1. First 90 days from date of purchase.

Full replacement or repair by the manufacturer at no charge to the customer (shipping, handling, duty, taxes where applicable, are not included).

2. Second 90 days (91 to 180 days) from date of purchase.

Repair or replacement of defective item at manufacturer's discretion to a maximum of \$100.00 U.S. per item (whichever is lower) cost to the customer.

Date of warranty applies to date of official notification of component failure to the distributor.

This warranty covers specifically only components of the **Kartrol EX-56** Kart Control System and does not cover any consequential loss or damage resulting from failure of a system component.

All U.S. warranty claims are to be made directly to the U.S. distributor. Items for warranty are to be shipped to the distributor prepaid (including any applicable taxes and duties) only after prior authorization. Proof of purchase date will be required.

This warranty does not cover any damage caused by neglect, impact, improper installation, physical abuse, or tampering. This warranty is void if any seals are damaged or broken and is not valid where prohibited.

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