



RADIO CONTROL UNITS

ED

TRADE MARK

*Instruction
Manual*

BLACK ARROW /1 RECEIVER P.2

BLACK PRINCE TRANSMITTER P.5

BLACK PRINCE 4/6/8 TRANSMITTER P.6

BLACK ARROW 4/6/8 RECEIVER P.8

BLACK KNIGHT TRANSMITTER P.10

SERVO P.11

COMPONENTS P.12

PRICE

1/3

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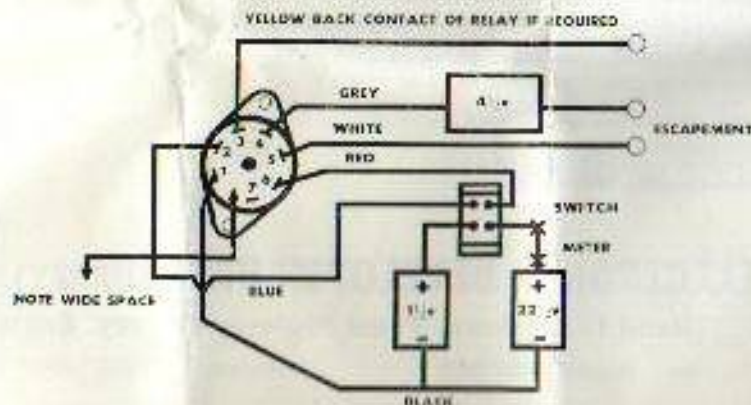
BLACK ARROW/1 SINGLE CHANNEL TONE RECEIVER



INTRODUCTION

The E.D. "BLACK ARROW"/1 Single Channel Tone Receiver, has been produced to give absolute reliability. Tuning is elementary and once adjusted will remain so, a single tuning is the only adjustment required.

This Receiver operates from 22½ volts H.T. and 1½ volts L.T. and has a completely redesigned relay incorporated, which requires no adjustment whatsoever, also temperature stabilized will operate perfectly between 30 and 130 degrees. The Receiver is extremely light, weighing only 3 ozs., and yet is very robust. The recommended Transmitter to use in conjunction with this receiver is the "BLACK PRINCE"/1 Tone Transmitter.



INSTALLATION AND WIRING

Connect the socket switch and batteries as shown, making sure that you get a neat and well soldered installation. Use thin flex and follow the standard colour code.

TUNING

When you have completed your battery circuit, thoroughly check again, because the valve could be damaged if incorrect connections have been made, unwind aerial, and insert receiver plug into battery socket. Switch on Transmitter and carefully tune slug until relay operates. **DO NOT strain or force** the tuning slug, use a correctly fitting insulated trimming tool, such as a filed down knitting needle. There are a number of ways of tuning, with or without a motor.

TUNING WITH A METER

Insert meter into position shown, switch on current and meter will read approx. 1.5 ma. fluctuating slightly, switch on transmitter, press modulator and tune for maximum rise, this will be approx. 5 ma. It will be noted that the tuning is very flat, this must now be adjusted at range, and the best way to do this is with the Transmitter aerial **not extended**. Get a friend to walk away from you, about 30 yards, press the transmitter and re-tune again for maximum rise, then get him to walk as far as possible, aerial still retracted to a point where the signal is no longer obtainable, just before this point is reached will be the distance you require to tune for maximum range.

The slug must not vibrate as it will become loose, therefore you may secure it by a very small amount of Balsa cement placed between the coil lip and the slug. **DO NOT** use a large amount of cement, but just enough for a seal which may be easily removed. Once this is tuned, no further tuning will be required, just a check before beginning a day's flying or boating.

TUNING WITHOUT A METER

As above, but instead of using a meter as an indicator, use your actuator.

RANGE

Ample range is obtainable from this Receiver, long range checking with extended aerial is unnecessary, provided you obtain 300 yards on the ground, this is more than is required.

INSTALLATION

Make sure that your receiver is well protected, a sponge rubber pad inserted at the front of the receiver will take frontal shocks, and blocks either side will eliminate damage in the event of a piloting error. Aerial must be kept taut, also fit snap fasteners to your battery connections, so that they may be easily replaced.

BATTERIES

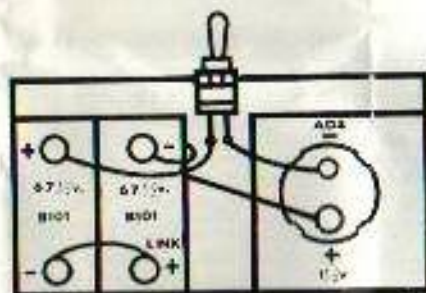
Use the largest capacity batteries that can be carried, as if you use extremely small batteries, frequent changes and unreliable working is the result.

RECOMMENDED BATTERIES

Light weight	B.122 H.T. and U.12 L.T.
Normal	B.110 H.T. and 2 U.12 in parallel or U.10.
Boats	B.115 H.T. and D.18.

SPECIFICATION

Idling current ..	1.5 ma.	Valve (Hivac) ..	XFY.34
Carrier on ..	1.0 ma.	Weight	3 ozs.
Tone on ..	6.0 ma.	Size	2½" x 1½" x 1½"



BATTERY INSTALLATION

BLACK PRINCE/I TRANSMITTER.

STANDARD OR CRYSTAL CONTROLLED BLACK PRINCE SINGLE CHANNEL TONE TRANSMITTER



INTRODUCTION

This tone transmitter is the ideal beginners unit, and may be used with any receiver operating on a tone of 300 to 600 cycles per second. The Transmitter is normally supplied as a companion to the Black Arrow Receiver/I. Housed in a neat black anodised aluminium case, and fitted with detachable telescopic aerial, battery warning indicator, and a light acting push switch which supplies the modulation. This Transmitter is capable of delivering high power with minimum battery consumption, and with normal use, batteries will last approx. five months.

INSTALLATION

Unscrew the 4 PK. screws, which secure the battery compartment lid. Install batteries as shown and refit lid. Carefully pass aerial through the rubber grommet, to assist you may moisten the aerial slightly, screw in clockwise, but do not force or over-tighten. The transmitter is now ready for operation, switch on, neon will glow, this serves as a dual purpose indicator, first as against leaving it switched on, and secondly as a battery voltage indicator. As the battery tends to run down, the lamp will gradually dim, until finally when they reach 80 volts the neon will remain out, by this time the batteries are of no further use and must be renewed. The push button supplies the modulation. It must be remembered that when the transmitter is switched on, a carrier is being radiated.

SPECIFICATION

Size	5½" long. 6½" wide. 3¼" deep.
H.T. Consumption	Carrier 10 ma. Mod. 12 ma.
L.T. Consumption	75 ma.
Weight	Complete 5 lbs. Less batteries 2¼ lbs.
Batteries	2 Ever Ready B.101. 1 Ever Ready AD.4
Valves	Carrier DL.94. Modulation DK.96.

See Battery Installation Diagram on page 4.

STANDARD OR CRYSTAL CONTROLLED BLACK PRINCE 4/6/8 TRANSMITTER



INTRODUCTION

This entirely new transmitter has been produced after many months of exhausting flying tests. The standard transmitter is the first of a new series, and may be supplied up to 8 channels or as a single channel tone or carrier transmitter. All these are in identical cabinets, and are hand held, using a 5' detachable telescopic aerial. Self-biased switches are fitted and are easily accessible by both hands. Many unique features have been incorporated.

Complete tone stabilization due to ferroxcube pot cores. Each potentiometer will only cover 100 cycles, and having set up the transmitter will operate without further adjustment. Battery consumption has been cut to a minimum, and many months of use are assured. A correctly balanced weight distribution makes perfect

handing. A detachable compartment enables batteries to be inserted without in any way disturbing the transmitter.

SPECIFICATION

Size	9 1/2" long. 6 1/2" wide. 3 1/2" deep.
Weight	Complete 5 lbs. Less batteries 2 1/2 lbs.
Consumption	H.T.—Carrier 10 ma. H.T.—Mod. 12 ma. L.T.—75 ma.
Batteries	2 Ever Ready B 101. 1 Ever Ready AD4.

TRANSMITTER INSTALLATION

Remove the 4 Phillips screws at the base of the transmitter cabinet, detach lid and install batteries. Sketch A. Replace lid and install aerial, insert through the rubber grommet and screw in. **do not over-tighten**, and when you wish to remove aerial, make sure that it is completely unscrewed before trying to withdraw. The transmitter is now ready for use.

TRANSMITTER (setting up)

The best procedure for setting the potentiometers to the reed bank. Start by tuning each potentiometer to its lowest frequency, then gradually increase the frequency until the reed is just beginning to vibrate, then tune it very slightly higher, just enough to note a change in frequency, this is the optimum point of operation. **DO NOT** start at the low end and tune for max. vibration.

Sketch B shows which potentiometers are operated by their appropriate switches. No. 1 being the short reed and No. 8 the longest reed in that order.

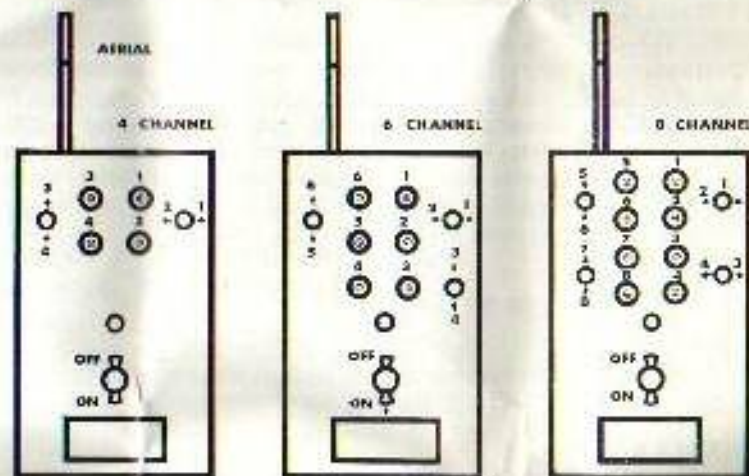
Normal method of setting is as follows:—

6 Channel	4 Channel	8 Channel
No. 1 Right rudder.	No. 1 Right rudder.	No. 1 Right rudder.
No. 2 Left rudder.	No. 2 Left rudder.	No. 2 Left rudder.
No. 3 & 4 engine control.	No. 3 Engine control.	No. 3 Right aileron.
No. 5 For up elevator.	No. 4 Engine control.	No. 4 Left aileron.
No. 6 For down elevator.		No. 5 Down elevator.
		No. 6 Up elevator.
		No. 7 & 8 Engine control.

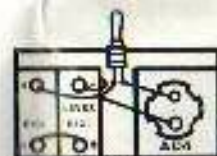
BLACK PRINCE/8

SIMULTANEOUS CRYSTAL CONTROLLED

The Black Prince/8 Transmitter is capable of operating two surfaces at the same time. This means that any of the four right hand switch positions may be used together with any of the four left hand switch positions.



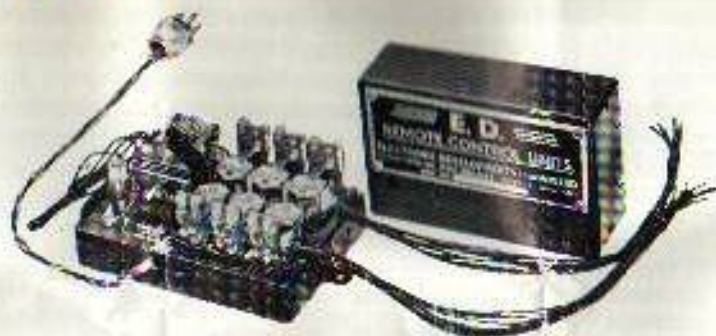
SKETCH B



SKETCH A



BLACK ARROW 4/6/8 RECEIVER



INTRODUCTION

The receiver is completely revolutionized with a new and absolutely reliable relay and a super sensitive reed unit, capable of operating with an input of only 2 volts R.M.S. Using the new high gain Mullard Transistors, Transformer, coupled and temperature stabilized, developing 20 volts R.M.S. into the reed unit. Both reed unit and relays are fitted with fixed contacts, no adjustment being required. A low voltage supply of 30 volts for H.T. and 1½ volts L.T. at extremely low consumption resulting that quite small batteries may be used. The complete receiver is mounted in virtually a crash-proof container.

BLACK ARROW/8 RECEIVER SIMULTANEOUS CONTROL

The Black Arrow Receiver is identical to the normal range of Multi-channel receivers except that the receiver houses 8 relays.

INSTALLATION

As BLACK ARROW/4/6 Channels.

RECEIVER INSTALLATION

Connect the socket switch and batteries as shown making sure that you get a neat, compact and well soldered installation. Use thin flex and follow with standard colour code.

TUNING

When the battery circuit has been completed, check again to make sure that your wiring circuit is correct, if mistakes are made it is possible to damage the receiver. Unwind aerial and insert plug into battery socket.

This receiver may be tuned a number of different ways, you may insert phones in series with H.T. line, or a 5 ma. meter in same place, also without using either of these methods, but by just noting your actuator or servo operating. When the receiver is plugged in, you may hear a slight tinkling noise, this is normal.

TUNING WITH METER

Insert meter into position shown, switch on current and the meter will read approx. 1.5 ma., fluctuating slightly, switch on transmitter, do not press a switch, because the transmitter will emit a carrier without operating the switch. Now with a carefully filed knitting needle, tune slug for dip, when this has been found, press transmitter modulator switch, and you will see a rise on your meter to approx. 5 ma. Get a friend to walk away from you with transmitters (aerial retracted), about 30 yards, then operate the transmitter, retune again for maximum rise, then get him to walk as far away as possible (aerial still retracted) to a point where the signal is no longer obtainable, just before this point is reached will be the distance you require to tune for maximum range. The slug must not vibrate as it will become loose, this may be secured by the use of a small amount of Balsa cement placed between the coil lip and a small portion of the slug. **Do not** use a large amount of this cement, but only just enough to produce a seal which may be easily removed. Once this has been set no further tuning is required. Just a simple check before beginning a day's flying or boating.

REED UNIT.

This requires no attention as it is already factory set, and will operate without cleaning, due to its self-wiping action.

RELAYS.

These also require no attention, they are fitted with permanent contacts and will remain set for thousands of operations.

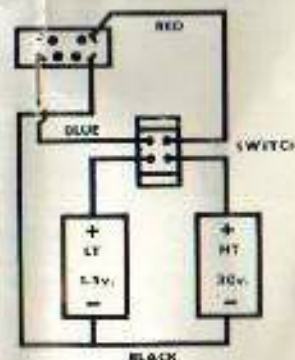
RELAY AND SERVO INSTALLATION

All relays are wired ready to attach to your servo units, each set of relay wires are clearly colour coded and numbered — **BLACK** for Armature, **GREEN** for make contact, and **BLUE** for the back contact. A complete wiring circuit using the E.D. Multi-channel Servo Unit is given.

SPECIFICATION

	Working current, 1.5 ma. Carrier, 1.0 ma. Tone, 5.0 ma.
Weight	8 ozs.
Size	3½" long, 2½" wide, 1½" deep.
Transistors	C.C.75.
Batteries	H.T.—Ever Ready, 30 volts. L.T.—Ever Ready U.10 or 2-U.12 wired in parallel.
Valve	XYF.34.

RECEIVING WIRING CIRCUIT



STANDARD OR CRYSTAL CONTROLLED BLACK KNIGHT SINGLE CHANNEL CARRIER RECEIVER

INTRODUCTION

The "Black Knight" Transmitter is designed for carrier operation only. Supplied in a neat Black anodised, hand held cabinet, complete with 5' telescopic aerial and neon battery voltage indicator. High power and yet economical battery consumption has been obtained by clever circuitry, correctly balanced weight distribution makes for perfect handling. A simple light acting push button supplies the carrier.



INSTALLATION

Unscrew the 4 Pk. screws from the case of cabinet and remove battery compartment lid. Install batteries as shown and refit lid, then carefully screw aerial through the rubber grommet, but do **not** over-tighten. Switch on and press carrier button, and the neon will glow. This serves as a voltage indicator because the lamp will dim when the batteries age, and finally go out when the voltage is less than 80 volts, by this time the batteries are of no further use.

SPECIFICATION

Size	9½" long. 6½" wide. 3¼" deep.
Consumption	H.T.—12 ma. L.T.—50 ma.
Weight	Complete 5 lbs. Less Batteries 2½ lbs.
Batteries	2 Ever Ready B.101. 1 Ever Ready AD.4.
Valve	CL.94.

E.D. MULTI-CHANNEL SERVO UNIT

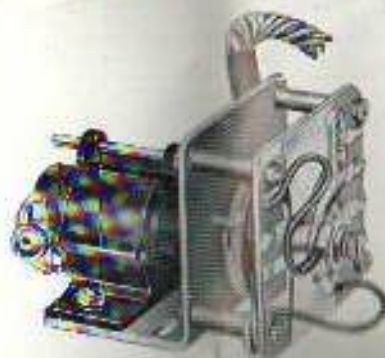
Type P.C./3

INTRODUCTION

The E.D. P.C. /3 Multi-Channel Servo is a robust powerful motor driven unit, designed for use with reed equipment. Built round a printed switching circuit, suitably plated as a safeguard against wear. This servo may be used for rubber operation, elevators, ailerons, sails, etc. Provision is made for adjustable trim, and may be wired for self-centring or progressive operation. Spaced take-off holes are inserted so the throw may be adjusted. This servo as with other E.D. Products was fully flight tested, and perfect control was obtained with many thousands of operations.

SPECIFICATION

Supply voltage 1 to 4½ volts, pull 2 lbs. consumption 250 ma. Mounting, any position, self-centring. Weight 2½ ozs.

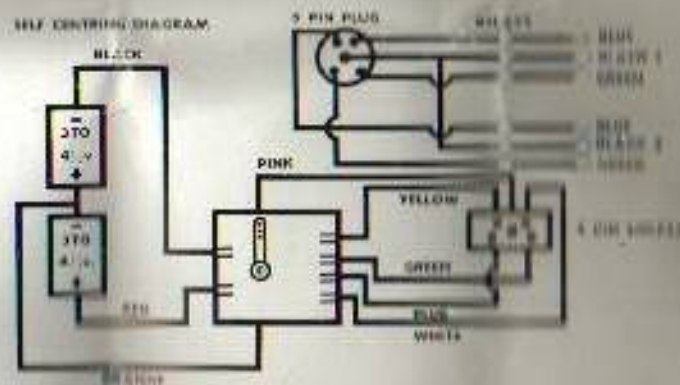


WIRING INSTRUCTIONS

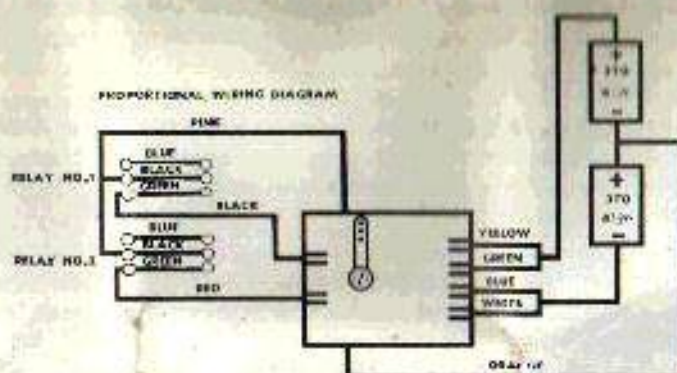
WHITE	Back Contact Relay No. 1
PINK	Common Arm
GREEN	Make Contact Relay No. 1.
YELLOW	Back Contact Relay No. 2.
BLUE	Make Contact Relay No. 2.
ORANGE	Common Battery.
BLACK	Negative
RED	Positive

WARNING

Do not Connect Battery Direct to Motor Terminals



PROPORTIONAL WIRING DIAGRAM

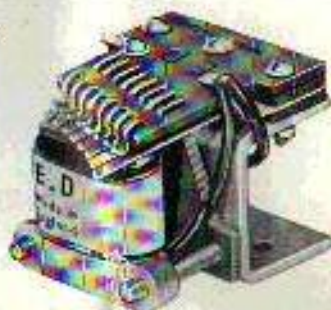


YELLOW — GREEN Link together. Connect to Battery Positive.
 BLUE — WHITE Link together. Connect to Battery Negative.
 BLACK Make Contact Relay No. 1. PINK Common Armatures.
 RED Make Contact Relay No. 2. ORANGE Common Battery.
 Back Contacts of Relays not used.

E.D.8 REED UNIT "OCTAVE"

This entirely new reed unit has been designed to meet the exacting standards demanded by Radio Control enthusiasts, a compact sturdy, but light unit, suitable rodium plated, and solid silver self-wiping contacts. A built up laminated core using an extremely high flux magnet, produces remarkable sensitivity.

The contacts are factory set and require no further adjustment. A logarithmic curve of the reed fingers, has resulted in perfect frequency separation. Many hundreds of thousands of faultless operations have been recorded.



SPECIFICATION

Frequency	260, 300, 340, 370, 400, 430, 460, 490.
Sensitivity	2 volts R.M.S.
Coil resistance	4,000 ohms.
Recommended input	16 volts A.C.
Weight	1 1/2 ozs.
Size	1" x 1 1/4" x 1 1/2"

THE "BLEED" RELAY

This robust relay is fitted to all E.D. equipment, and is a fine piece of engineering equipment, it is factory adjusted and will not require re-adjustment throughout its service. Many hundreds of thousands of faultless operations are guaranteed.

SPECIFICATION

Coil resistance	4,000 ohms.
Current	10 ma.
Pull in	2.5 ma.
Fall out	1.5 ma.

