

AM 819-034-01



組立説明書
ASSEMBLY MANUAL

ダイポールアンテナ
3.5/3.8MHz
2 - Band Dipole Antenna

CD78

1st Edition 1981-9
Change 3 1996-5

クリエート・デザイン株式会社
Creative Design Corp.

1. GENERAL

Low-loss (high-Q) loading coils and capacity hats are used to reduce its physical length to only 42~45% that of a full-sized dipole, with virtually no effect on performance (its power radiation efficiency is within -2 dB that of a full sized dipole.)

For low VSWR, the model BS81C band-switching unit is provided standard for selecting between 5-channels; on the 3.5 MHz and two on the 3.8 MHz band. It consists of loading coils, matching coils, relays, and a balun rated for high power. The channel-switching controller is supplied as a kit, and requires a 12V DC power supply and 6-core cable (run from the controller to the BS81C band-switching unit on the antenna). For VSWR no greater than 2, channel bandwidth is about 40 kHz on both the 3.5 MHz band and 3.8 MHz band. High-quality materials and good mechanical design practices are used. The element is made of extruded aluminum pipe, tapered in order to reduce weight and wind loading.

2. SPECIFICATION

	CD78 (CD78-5)
Channel Center Frequencies	3.50, 3.53, 3.56, 3.75, 3.8 MHz
Gain	0 dBi
Impedance	50Ω
VSWR (Channel Center Point)	Less Than 1.3
Power Rating CW/SSB	1.5/2 kW (3/5 kW)
Element Length	About 17 m (18 m)
Weight	12 kg (13 kg)
Mast Diameter	ϕ 48~61 mm
Withstands Wind Velocity	35 m/s

Note: Parenthesized figures denote CD78-5.

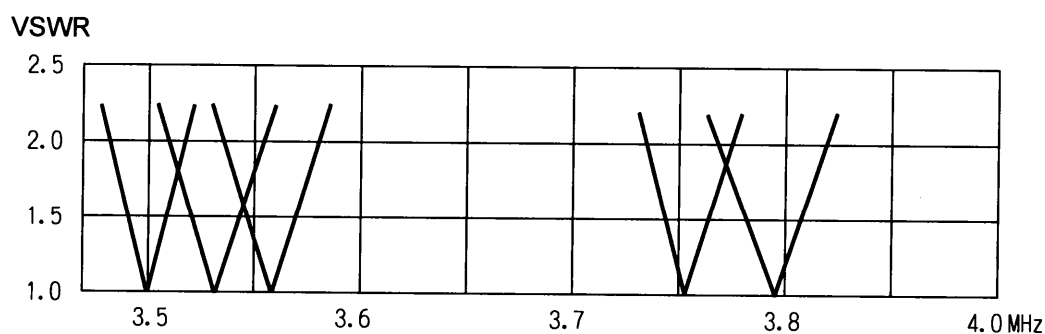


Figure 1-1. VSWR Curve, CD78

3. EQUIPMENTS SUPPLIED, EQUIPMENTS REQUIRED BUT NOT SUPPLIED

All the parts corresponding to the drawings contained in this manual required for the assembly for this CD78 is supplied complete. For the details of the parts in the complete breakdown, refer to the parts list in Fig. 6. Prepare tools and instruments required for assembly, installation and operation of this antenna. Standard items to be required are as follows.

- 1) 50Ω Coaxial Cable: At sufficient length with an adaptable connector attached in the end.
- 2) 6-Core Control Cable: VCTF Type Vinyl Cord, Core Thickness 0.3Sq mm./When in 100m
- 3) Assembly Tools: Spanner Wrench, Screw Driver, A Measure, Solder Gun etc.
- 4) Installation Tools: Safety Belt, A Rope
- 5) Handy Tranciever: To Be Used When In Antenna Adjustment

4. PRINCIPALES AND OPERATION OF BS81/CD78

Typical operating frequencies in the 3.5 and 3.8 MHz bands are shown in Fig.1-2. A simplified electrical circuit of the CD78 is shown in Fig.1-3, 1-4. The dotted box at the bottom of Fig.5 represents the BS-81C 5-channel band-switching/coupler unit. This BS-81C supports operation on both 3.5 and 3.8 MHz bands by switching internal loading coils L1 (L1a) and L2 (L2a) using relays. Simplified equivalent circuits for each band are shown in Fig.1-4. A 12 V DC (0.2A) power supply (customer furnished) is required to operate BS-81.

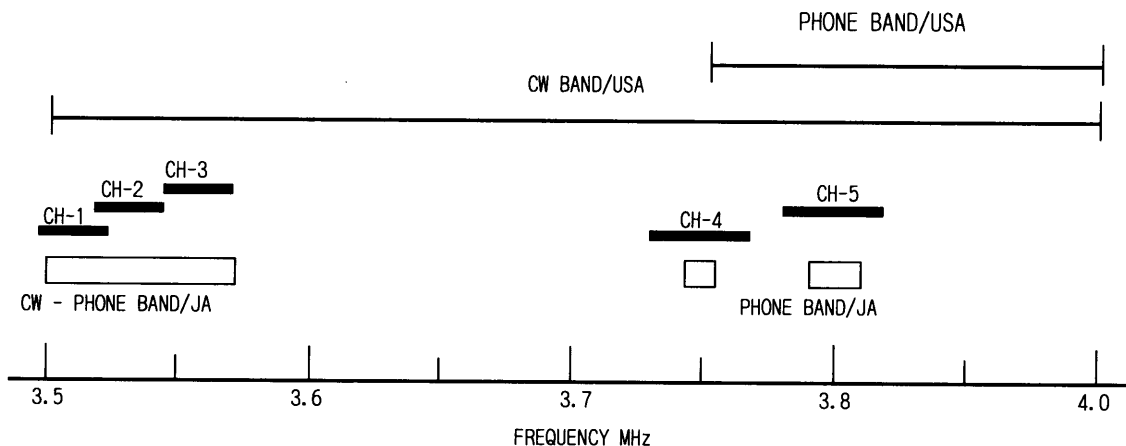


Figure 1-2. Frequency Band and Operational Channel

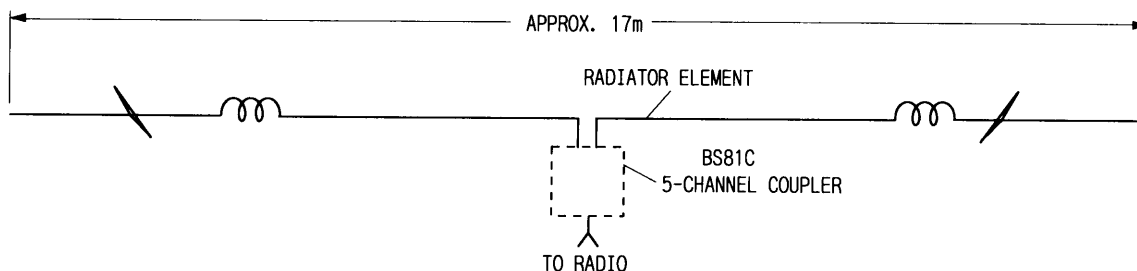


Figure 1-3. CD78, Simplified Circuit Diagram

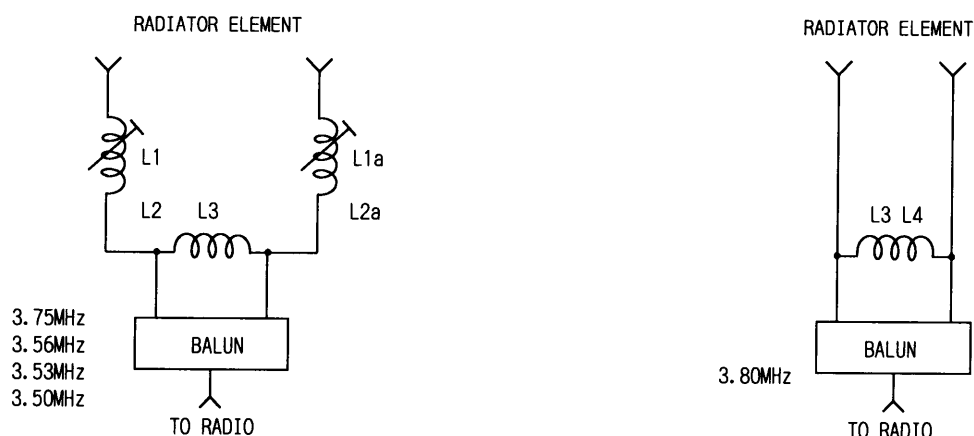


Figure 1-4. BS-81C/CD78, Simplified Circuit Diagram

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5. ASSEMBLY AND INSTALLATION

An one man-power is sufficient for completing assembly of this antenna as the structure of this antenna is simple, but working with two man-power is at least recommended for the installation and VSWR adjustment of this antenna. It is preferable to assemble the 5-channel switching controller unit (explained in below 4) prior to the installation.

- 1) Refer to the Fig. 2 and 3 for the assembly instruction of CD78. Mount P1 central tubing onto element bracket C1 with P6 insulator and P7 corona ring and securely fix them with U-bolt. (See Fig 3.)
- 2) Then assemble the rest of the element tubings top together with loading element LC80 in the middle of the element as shown in the Fig. 2.
- 3) When antenna element assembly is completed, hoist and mount it onto an antenna supporting mast and fix it with U-bolts together with BS81C(ATU) just beneath the feed section of antenna set. (Refer to note below.)
- 4) Since the attached controller unit for channel switching is provided kit form, assemble it with wirings by soldering them as referring to Fig. 6. ATU controller and the controller is to be connected with 6-conductor cable in which the same pin numbers shall surely be connected with each other. Refer to the Fig. 4-6. for proper connection. Wrong wiring will cause a malfunction of the band switching and damage the unit.

Note: In case stacking CD78 with an another beam antenna on the same mast, be sure to set antenna element of CD78 in parallel line with boom of another antenna in order to derive the maximum performance at minimum effecton and loss. If this is the case, matching adjustment of CD78 might become complicated though the antenna performance is not effected greatly.

VSWR ADJUSTMENT

After completing installation of CD78, use a reliable VSWR meter to measure VSWR. A 12V DC power supply is required for BS81C operation. It is preferable to measure VSWR at just below the ATU to obtain a accurate VSWR, and using handy transceivers placing at site near the ATU and at the site of a radio room is recommended as it let proceed a smooth antenna adjustment by communicating with each other during this adjustment work. Measure VSWR on each channel of each band individually. If the result of VSWR measurements are curved as shown in Fig.1-1, no additional adjustment is required. Never switch channels while transmitting. If VSWR is adversely affected by antenna installation conditions etc., retune it by adjusting the length of antenna element and coils inside the ATU in the following steps (Refer to Fig. 3):

- 1) Adjust the 3.8 MHz channel first. If the best-VSWR point is lower than 3.798 MHz, shorten antenna element P5. If the best-VSWR point is higher than 3.798 MHz, extend P5. The variation in center frequency with element length is about 4.5 kHz per 1 cm. If adjustment range is within 20kHz, only the insersion adustment of the tip element is good enough, in this case the shifting variation of frequency is 2.3kHz per 1cm per one side. Be sure to set resonant frequency $3,798\text{KHz} \pm 2\text{kHz}$. (For resonant frequency adjustment on 3.8MHz, no adjustment coil in the BS-81C is required as the coil of BS-81C has no effect on 3.8 MHz.) See Fig. 3.
- 2) Next, switch the channel to 3.56MHz and start measuring VSWR on this channel. If the best-VSWR point of this band is lower than 3.565 MHz, decrease inductance of loading coils L2, L2a inside BS-81C by expanding coil width if the best point is higher than 3.565 MHz. Do it reversely if the the resonant frequency is higher than 3.565MHz (by shrinking the coil width). If VSWR value on the best-point not apprantly low point, move L3 coil for obtaing lower VSWR value on the resonant point by either expanding or narrowing the coild width as this L3 is provided for impedance ajustment. If this is the case re-adjustment of L1 and L1a is required.

Note: Both coils should be adjusted by the same amount. See Fig. 1-5.

Normally the above adjustment is done properly, it makes other bands (3.50, 3.53, 3.75MHz) suitably be adjusted and amended accordingly. If resonant frequency on the CH-5 is not properly tune on 3,798kHz. the VSWR as shown in the below chart is not obtained. If this is the case, do the adjust again by turning it on the said frequency.

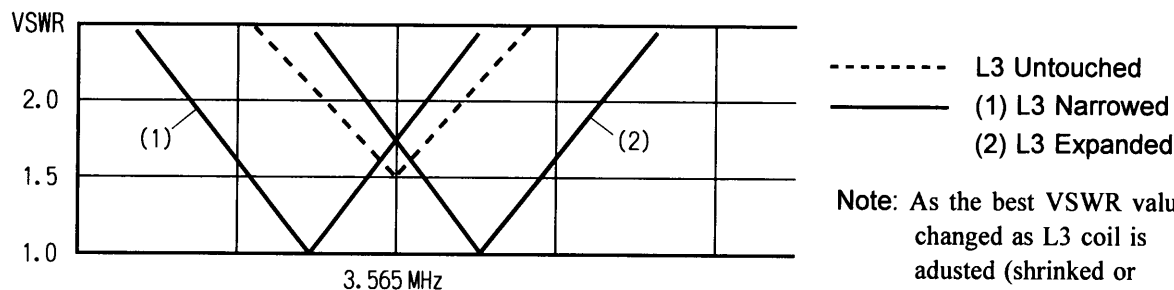
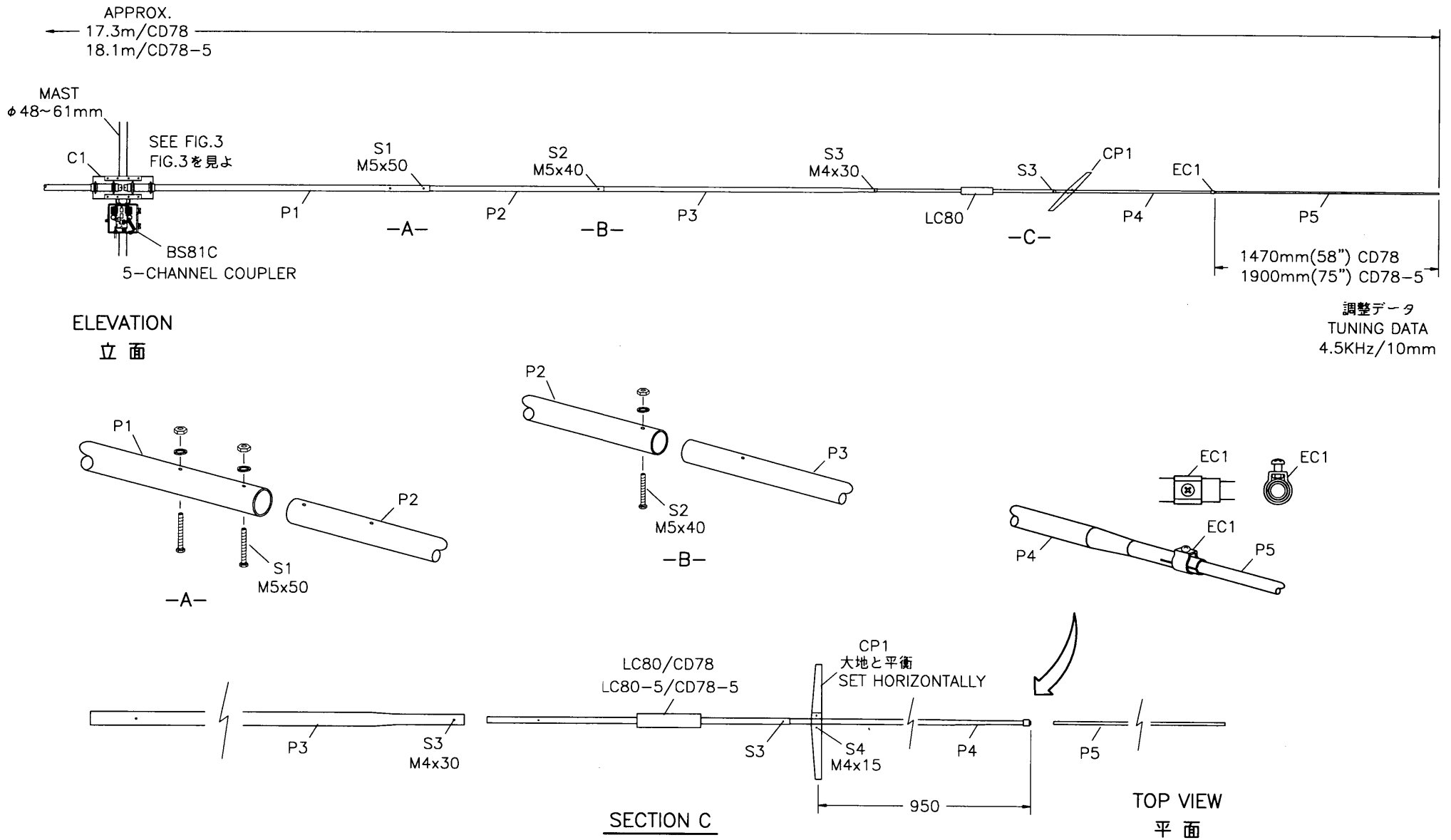


Figure 1-5. L3 Coil Adjustment and VSWR Value

CAUTION

- * Do not switch channels while transmitting. Be sure to stop transmitting while switching.
- * Transmitting on the wrong frequency switch cause damage to BS81C.
- * To avoid electrical shock, stop transmitting before adjusting coils, etc.
- * When working on the antenna or mast, be sure to wear a safety belt etc.



RADIATOR ELEMENT ASSEMBLY
 Figure 2. CD78, CD78-5. ラジエーターエレメントの組立

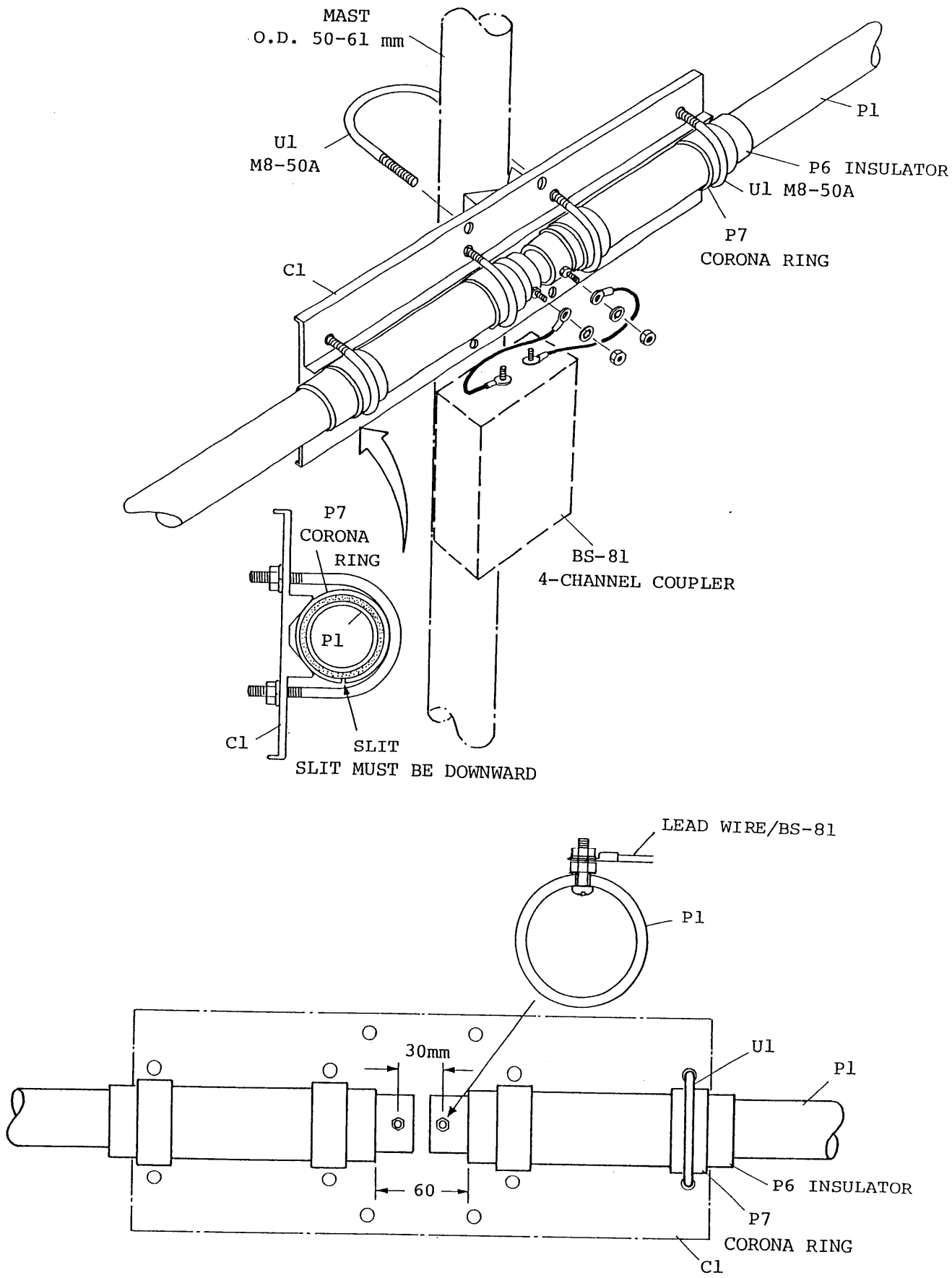
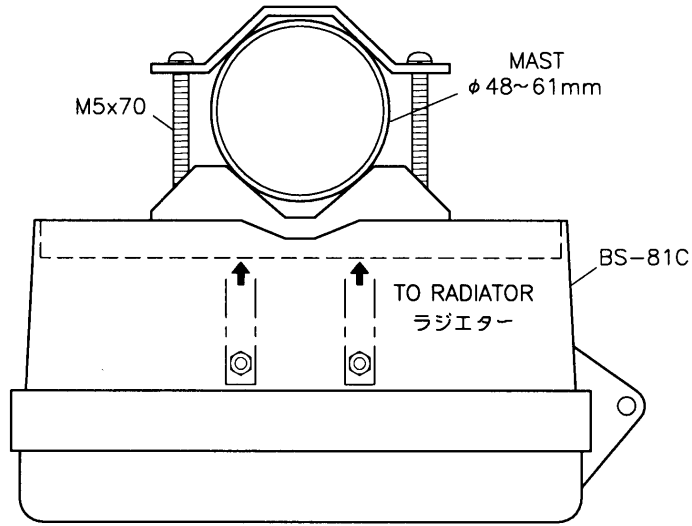


Figure-3, CD78, Feed Section Assembly



TOP VIEW

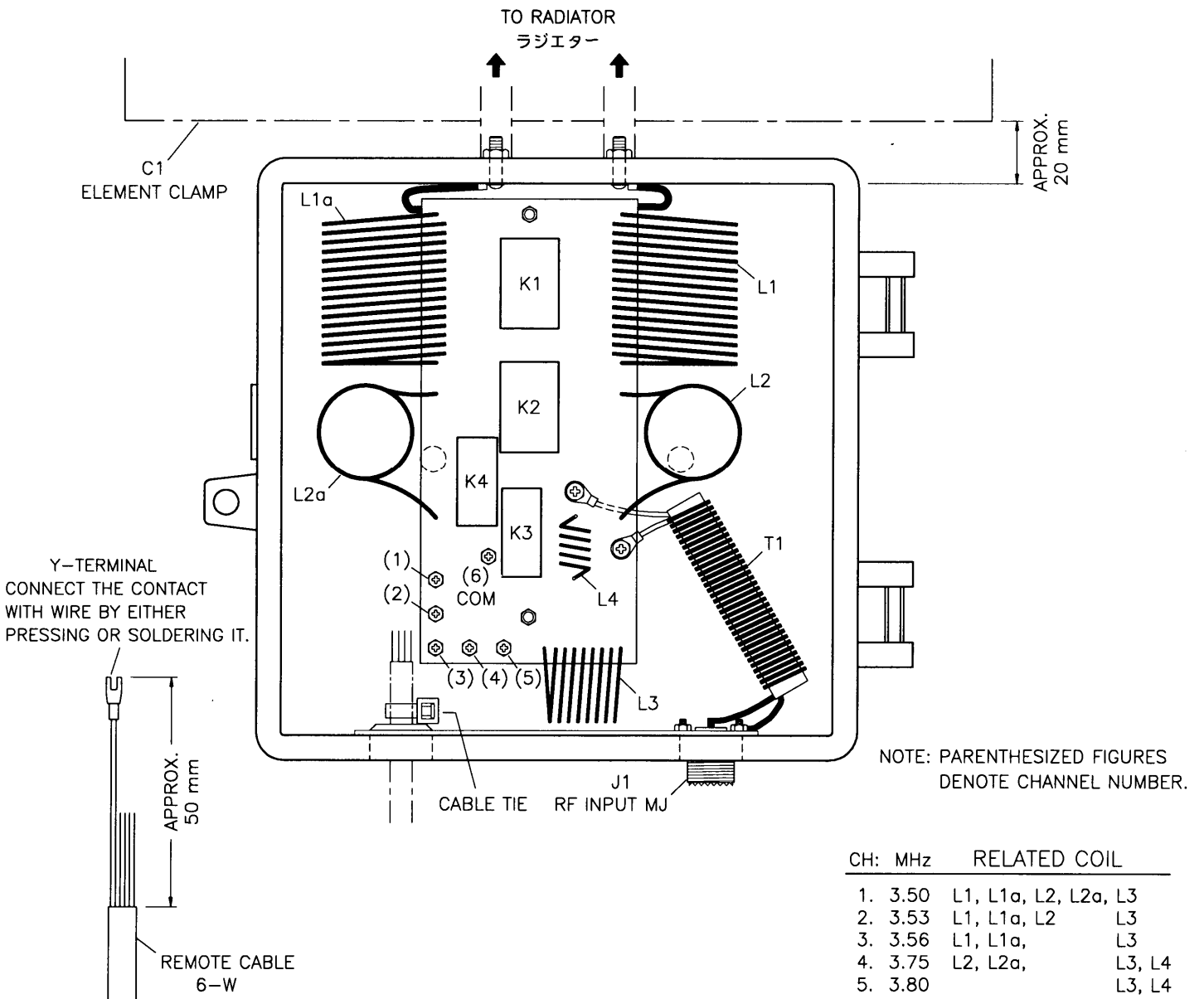
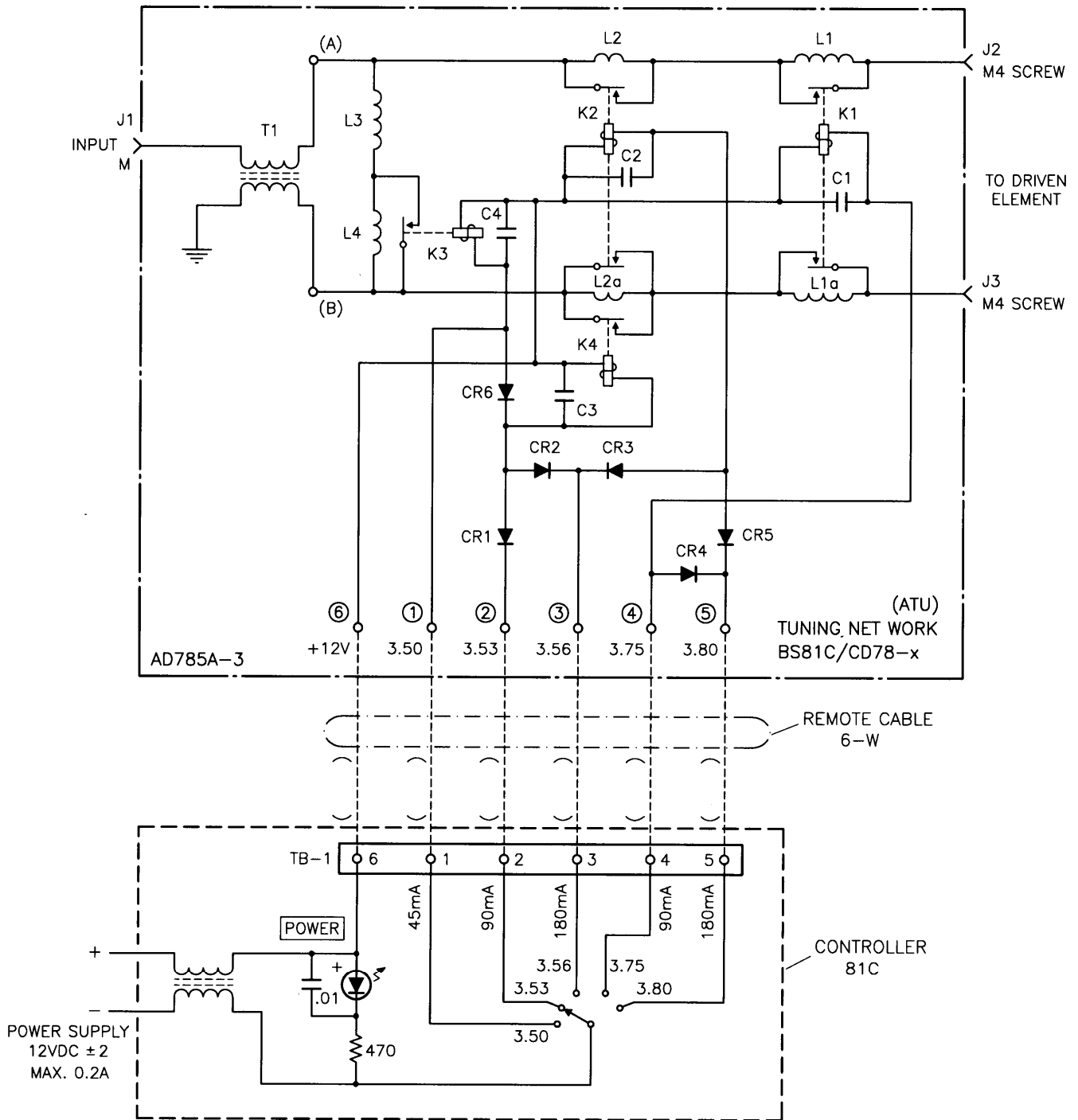


Figure-4, BS-81C, Installation and Parts Disposition.

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EACH CHANNEL AND RELAY, COIL OPERATION

RELAY, COIL	3.50	3.53	3.56	3.75	3.80
K1				○	○
K2			○		○
K3	○	○	○		
K4		○	○		
L1, L1a	○	○	○		
L2	○	○		○	
L2a	○			○	
L3	○	○	○	○	○
L4				○	○

NOTE: THESE CURRENT VALUES FOR EACH CHANNEL INDICATED IN THE CONTROLLER DRAWING ARE NOMINAL ONLY.

THE FIGURES MARKED WITH CIRCLE DENOTE CORRESPONDENCE RELAYS AND COILS FOR EACH CHANNEL.

5-CHANNEL TYPE : 3.50-3.53-3.56-3.75-3.80MHz

Figure 5. BS-81C/CD78-x Schematic Diagram.

CONTROLLER ASSEMBLY

5-CHANNEL COUPLER BS81C IS PROVIDED IN THE KIT FORM. FOLLOWING ILLUSTRATION IS STEREOSCOPING WIRING DIAGRAM MEANWHILE THE FIG.5 IS SCHEMATIC DIAGRAM. REFER TO THE PARTS LIST IN THE RIGHT. ASSEMBLE THE UNIT IN THE FOLLOWING STEPS:

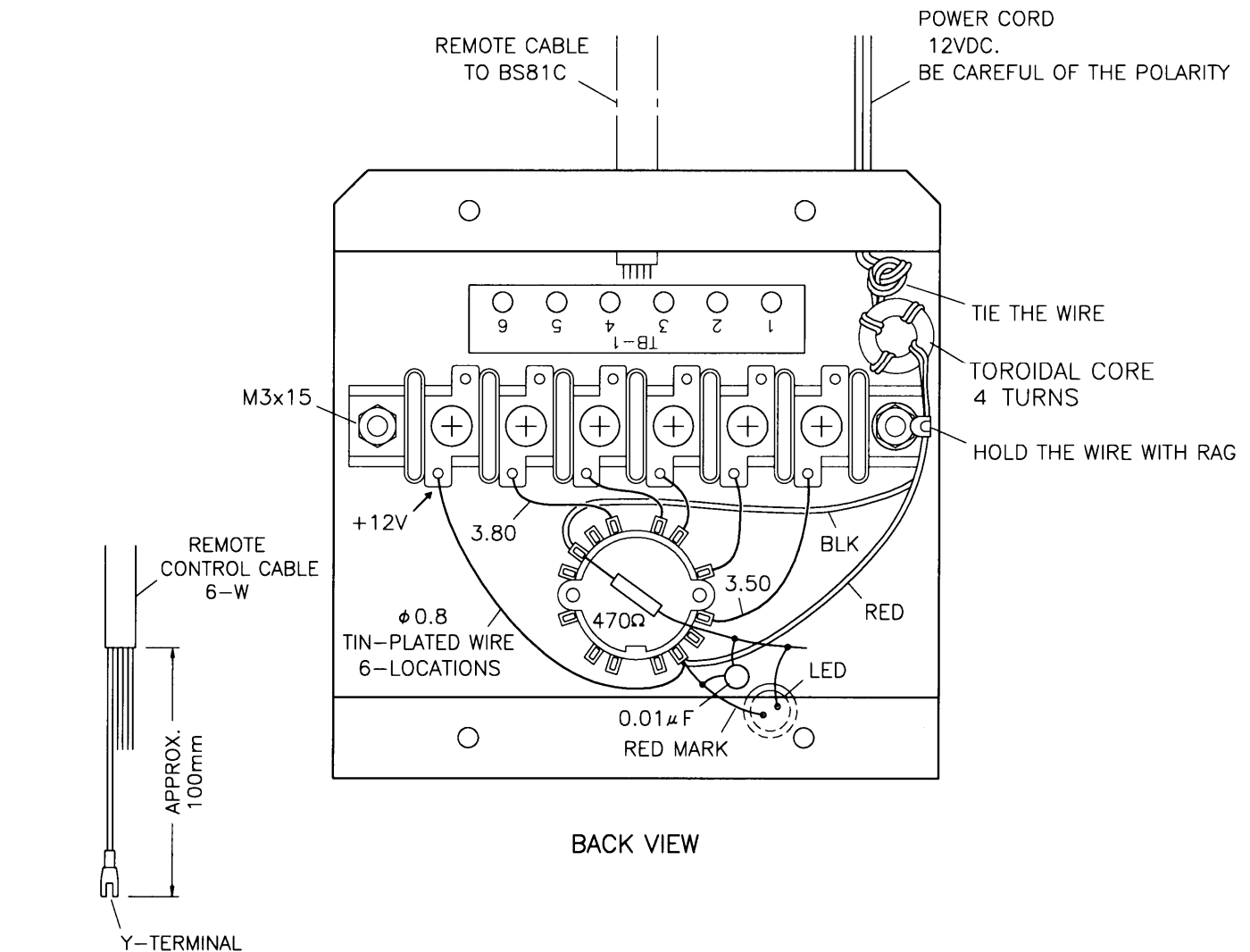
- 1) PRIORLY MOUNT ROTARY SWITCH TO THE SHASSIS, INSTALL TIN-PLATED WIRES AND RESISTOR ONTO THE ROTARY SWITCH AND SOLDER THEM.
- 2) INSTALL TERMINAL TO THE SHASSIS.
- 3) SOLDER THE REST OF WIRES.
- 4) ORIENT KNOB TO THE CHANNEL, THEN SECURELY FASTEN IT BY USING HEXAGONAL WRENCH.

CAUTION

- 1) BE CAREFUL FOR SOLDERING THE WIRES TO THE ROTARY SWITCH. DO NOT OVER HEAT THE PINS AS PLASTIC AROUND THE PINS ARE WEAK AGAINST THE HEAT.
- 2) BE CAREFUL OF THE POLARITY OF LED, RED MARKED LEAD WIRE IS POSITIVE (+) SIDE.

PARTS LIST

NO.	DESCRIPTION	QTY.
1.	SHASSIS	x 1
2.	ROTARY SWITCH	x 1
3.	TERMINAL	6P x 1
4.	RESISTOR	470 1/4W x 1
5.	CAPACITOR	0.01μF 50V x 1
6.	KNOB	φ 24 x 1
7.	TIN-PLATED WIRE	φ 0.8x200 x 1
8.	RED/BLK CORD	0.3mm ² x1.5m x 1
9.	SCREW	M3x15 W,SW,N. x 2
10.	RAG	3mm x 1
11.	HEXAGONAL WRENCH	4mm x 1
12.	Y-TERMINAL	1.25-YA53 x12
13.	TOROIDAL CORE	φ 14 x 1



SECURELY FASTEN THE CONTACT WITH WIRES BY PRESSING OR SOLDERING IT.

Figure 6. 81C, Controller Assembly.