No. : OM-E4248-UH

Date: November, 1982

FURUNO

OPERATOR'S MANUAL

A-D CONVERTER

MODEL AD-10

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

821120KY

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SPECIFICATIONS OF AD-10 A-D CONVERTER

General

A-D converter is a kind of gyrocompass repeater which indicates gyrocompass reading (i.e. ship's bearing) by numerical display, and converts gyro repeater signal into digital coded bearing data. The bearing data are sent to navigational equipment for use in computation.

Specifications

1. Input Signal : Gyro Repeater signal (Synchro or Step-by-step)
   (With simple change of jumper connection, various types of gyrocompass can be connected.)
2. Input Voltage : Synchro Type --- AC50V to 140V (rotor)
   AC20V to 140V (stator)
   50/60Hz or 400/500Hz
   Step-by-step --- DC30V to 100V
   (Power failure protector provided)
3. Power Consumption : Less than 9VA (synchro)
   Less than 9W (step-by-step)
4. Tracking Speed :

		360X	90X/180X	36X	180X
SYNCHRO	50Hz	13°/sec	32°/sec	80°/sec	
	60Hz	16°/sec	40°/sec	100°/sec	
	400Hz	130°/sec	260°/sec	660°/sec	
	500Hz	160°/sec	320°/sec	800°/sec	
STEP-BY-STEP					30°/sec

5. Bearing Display : 4 digit LED Display
   e.g. 1234 = 123 deg 40 min
6. Data output : Photo-coupler driver type (open collector), 4 digit BCD (16 Bit serial) code, MSB transmission order.
7. Output lines : Two output lines for radar north-up unit (RG-2/2A) and two other lines for satellite navigation system, doppler sonar current indicator or scanning sonar steady picture display.
8. Data Transmission Interval : Approx. 25 msec for radar north-up unit
   Approx. 200 msec for other equipments
9. Coating Color : Cabinet Cover --- 2.5GY5/1.5 Newtone No.5
   Front Panel ----- N3.0 Dark gray mat

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Installation Materials

No.	Name	Type	Q'ty
1	Crimp-on Lug	FV1.25 M3	24
2	Woodscrew	ø4.8 x 25	4
3	Flat Washer	For M5	4

Standard Spare Parts

No.	Name	Type	Q'ty
1	Fuse	F-7142 1A	4

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OPERATING INSTRUCTIONS

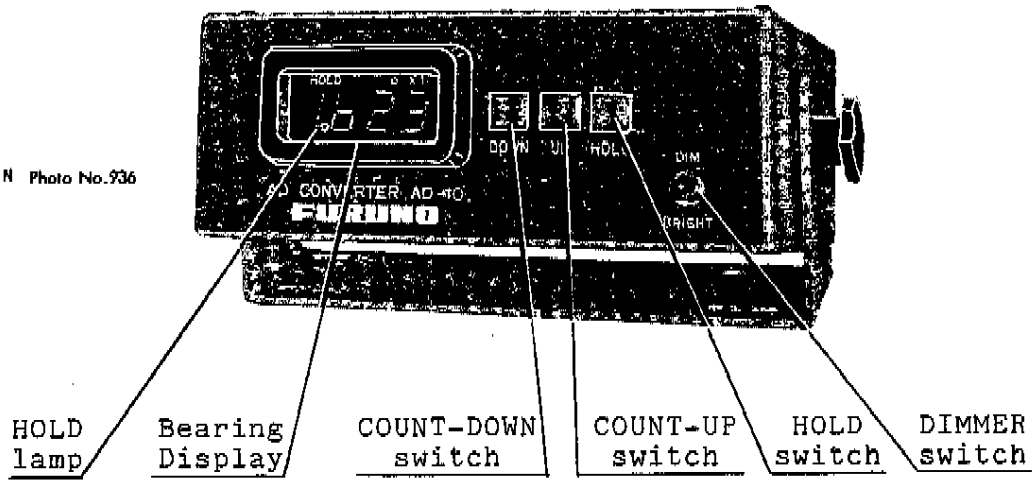

Fig. 1 Operating Controls on Front Panel

Initial Setting Procedure

After the gyrocompass reading has been stabilized, set up the A-D converter as follows. Once the initial setting has been done, resetting is not necessary unless the gyrocompass is turned off.

1) Confirm that the gyrocompass reading is stabilized and normal gyro repeater signal is applied.
2) Turn the DIMMER switch downward (BRIGHT). The brightness of the bearing display increases.
3) Depress the HOLD switch, and the HOLD lamp on the bearing display is lighted. The computing circuit is disconnected from the gyrocompass for easy setting-up.
4) Read the gyrocompass reading.
5) Depress the COUNT-DOWN or COUNT-UP switch continuously so as to approach the bearing display indication rapidly at the rate of 3.5 deg/sec to the compass reading. Then release it when the bearing display indicates approximate compass reading.
6) Depress intermittently the COUNT-DOWN or COUNT-UP switch until the bearing display indication coincides with the gyrocompass reading. The indication varies at the rate of 10min/flip.
7) Depress again the HOLD switch, and the HOLD lamp is turned off. The computing circuit is connected to the gyrocompass and the equipment is ready to operate normally.
8) To decrease the brightness on the bearing display, turn the DIMMER switch upward (DIM).
9) After the initial setting has been completed, do not touch the COUNT-DOWN and COUNT-UP switches otherwise the bearing may deviate.

Note: Quick turning of ship may cause bearing error on the A-D converter. When it occurs, correct it with COUNT-DOWN and COUNT-UP switches.

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MAINTENANCE

Replacement of Fuse

1) Take off the top cover by loosening 6 screws.
2) Take out A-D converter pcb 13P-5019 by loosening 4 screws and taking off the connector plugs.
3) Remove the fuse holder by pushing the part shown in Fig.2, then, replace the fuse element.

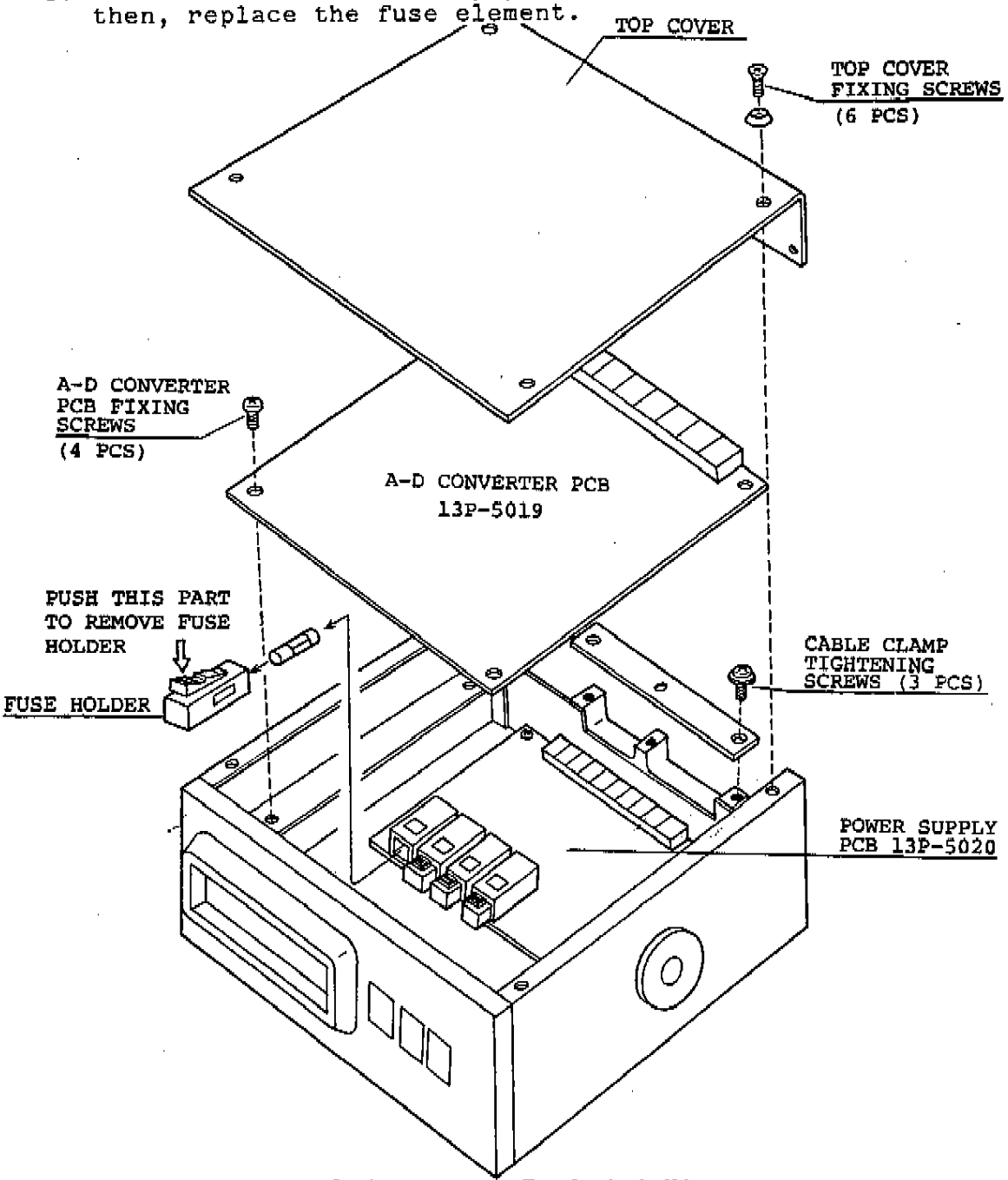

Fig. 2 A-D Converter Exploded View

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APPENDIX 1. INSTALLATION INSTRUCTIONS

1. Modifications at time of installation

Some modifications are required for A-D converter so as to be combined with different types of gyrocompass repeater signal. Check the following items for gyrocompass.

1) Type of repeater signal : AC synchro signal or DC step-by-step pulse?

2) If it is synchro type;

Primary Voltage (rotor)	: AC ___V
Secondary Voltage (stator)	: AC ___V
Frequency	: 50/60Hz or 400/500Hz?
Gear Ratio	: 360X, 180X, 90X or 36X?

3) If it is step-by-step type;

Repeater Driving Circuit	: DC on-off pulse with 4 output lines or Open-collector transistor drive system with 5 output lines?
Operating Voltage	: DC ___V
Gear Ratio	: 180X?
Com. line level with respect to other terminal's level	: Positive or negative?

The A-D converter is previously set up at the factory for the following specifications. If different specifications are required, reset the DIP switch on A-D converter pcb 13P-5019 and change jumper connection on that pcb and power supply pcb 13P-5020 referring to the instruction sticked on the inner face of the top cover and one mentioned below.

Setting at Factory

1) Synchro type repeater signal.
2) Primary and secondary voltages are higher than 60V
3) Frequency is 50Hz or 60Hz.
4) Gear Ratio is 90X.

Modification of Power Supply PCB 13P-5020

1) Select tap connection of transformer T2 depending on input voltage. See page AP1-3.
   * If the input voltage is higher than AC60V(DC70V), leave the jumper connection between (C) and (1). (Factory Setting)
   * If the input voltage is AC60V(DC70V) or lower than that, remove the jumper wire between (C) and (1), and connect a new jumper wire between (C) and (7).

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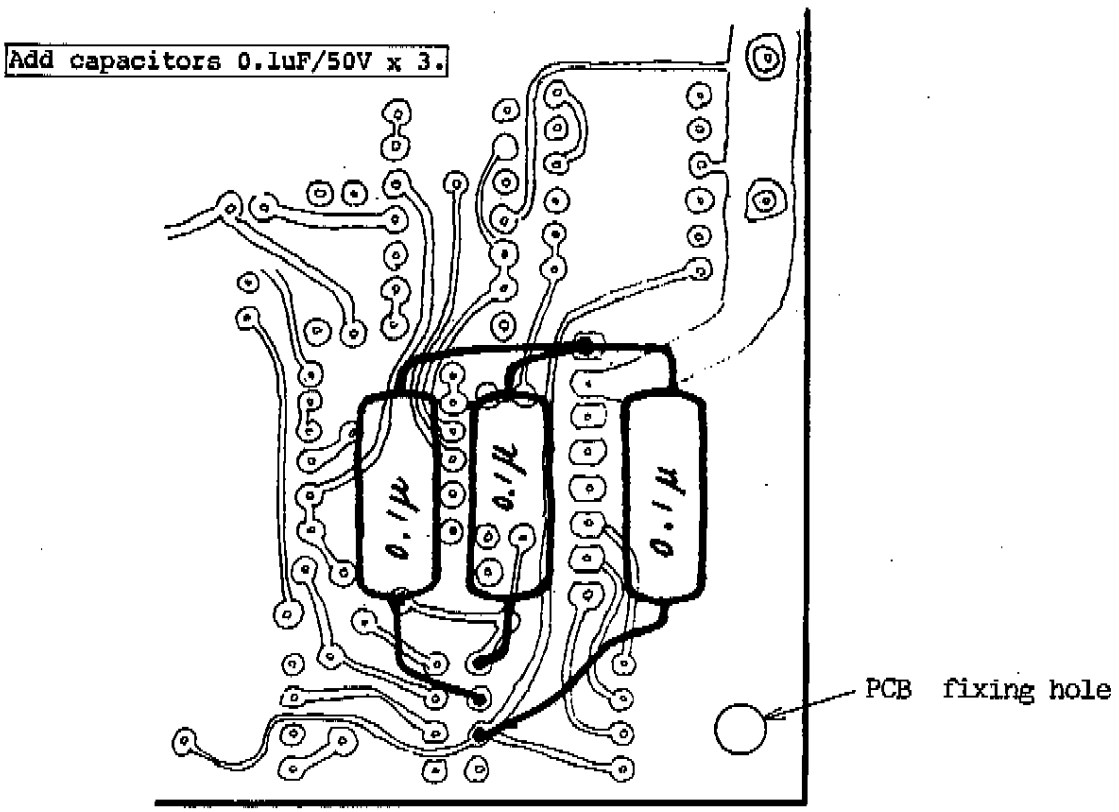

PCB. 13P-5019 (Soldering Side)

Note: (1) Care should be taken not to make unwanted shortcircuit between lead wires of capacitors and copper foils on PCB.

(2) Fix capacitors with adhesive not to come off due to vibration or so.

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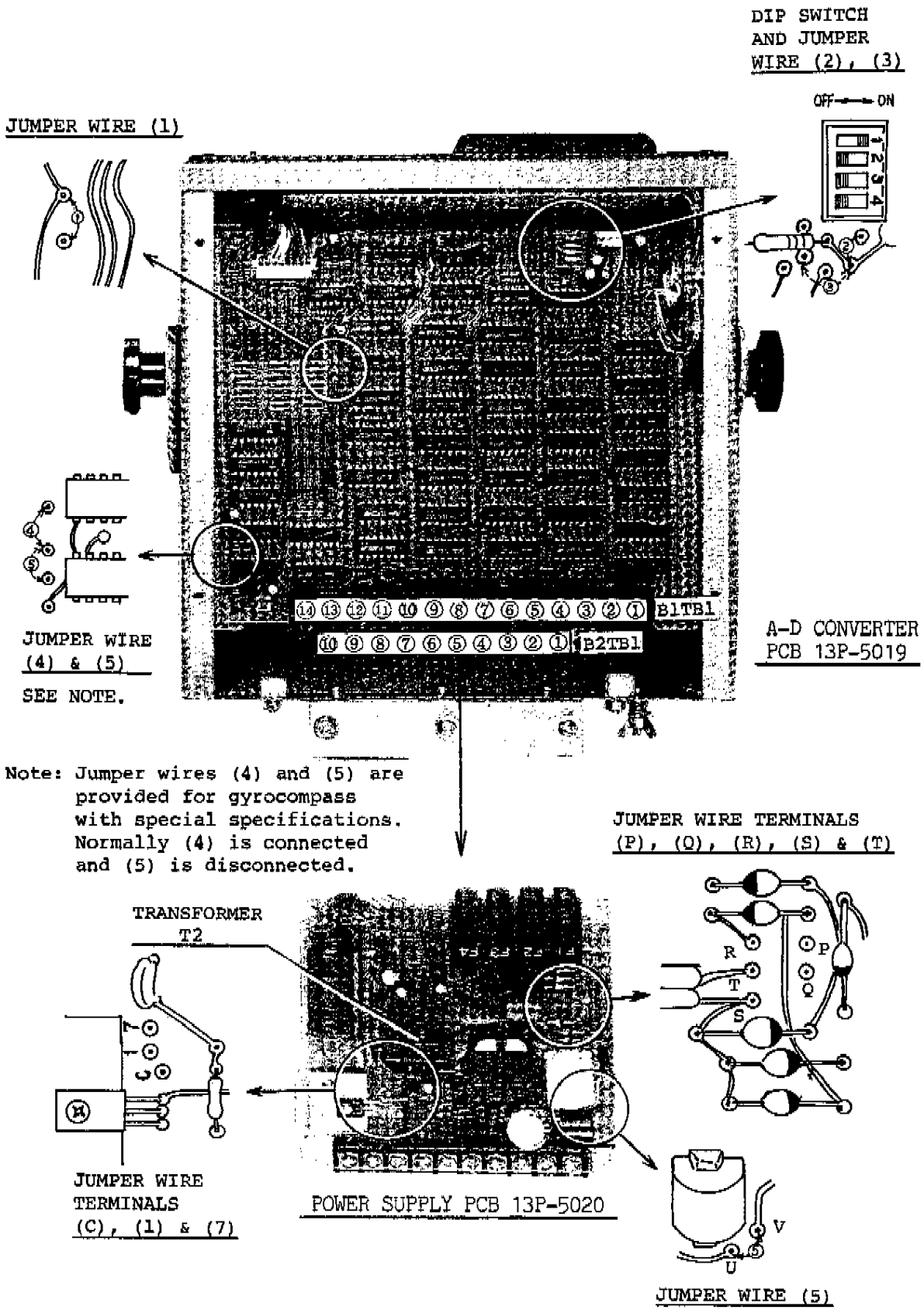
DIP SWITCH
AND JUMPER
WIRE (2), (3)
OFF ON
1 2 3 4
JUMPER WIRE (1)
B1TB1
B2TB1
A-D CONVERTER
PCB 13P-5019
JUMPER WIRE
(4) & (5)
SEE NOTE.
Note: Jumper wires (4) and (5) are
provided for gyrocompass
with special specifications.
Normally (4) is connected
and (5) is disconnected.
JUMPER WIRE TERMINALS
(P), (Q), (R), (S) & (T)
TRANSFORMER
T2
JUMPER WIRE
TERMINALS
(C), (1) & (7)
POWER SUPPLY PCB 13P-5020
JUMPER WIRE (5)

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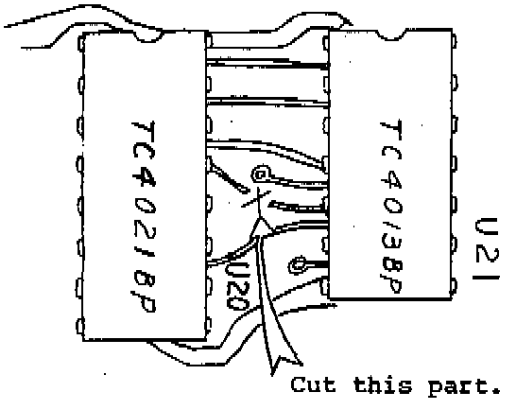
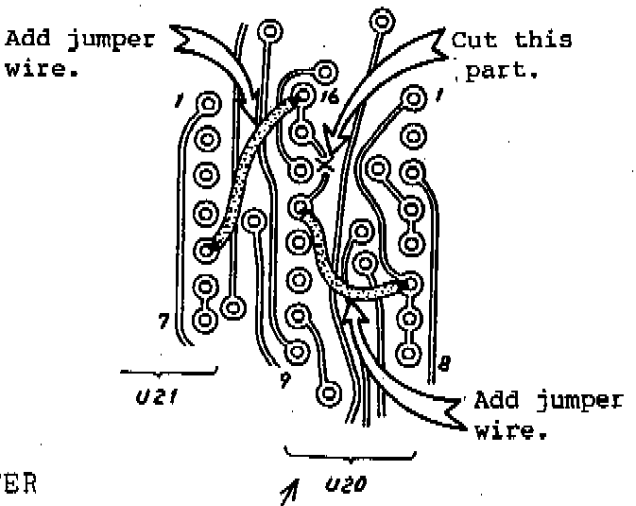
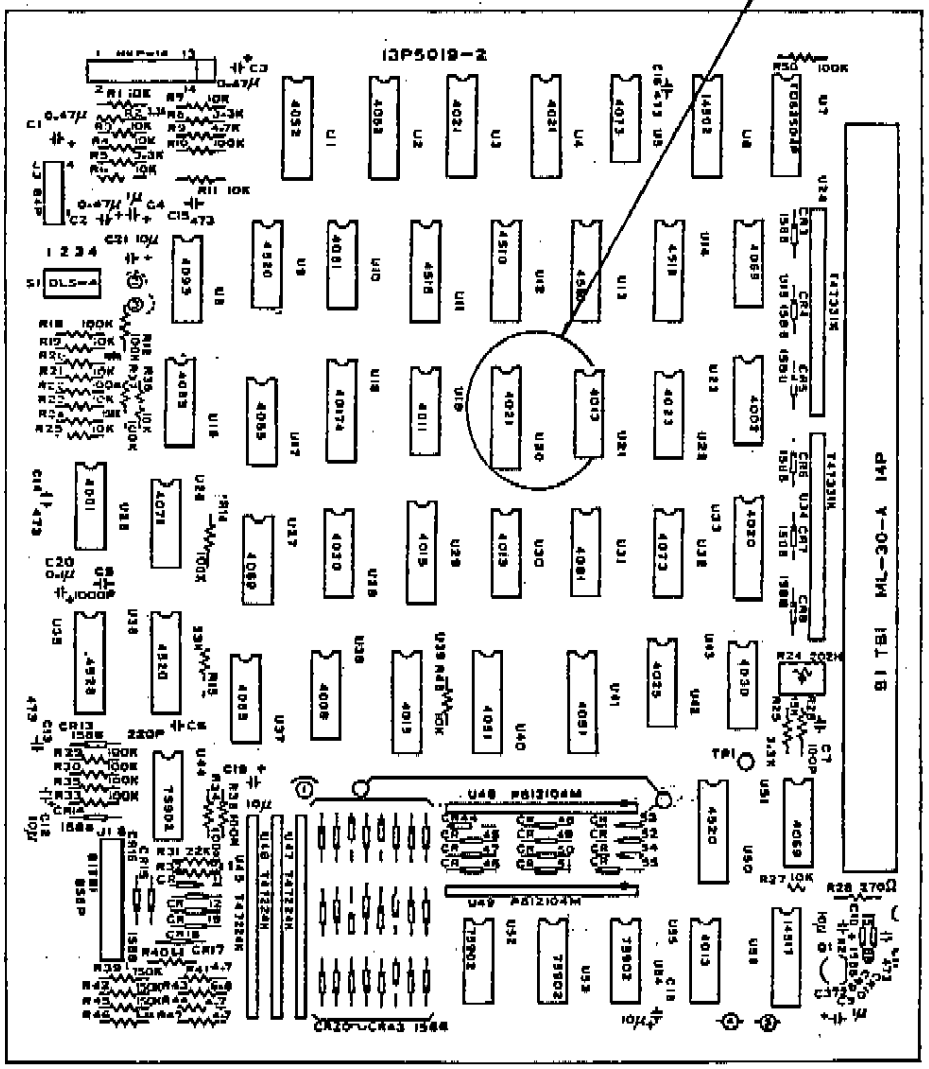
(Component side View)



(Wiring side view)



A-D CONVERTER
13P-5019



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2. Mounting

When siting the A-D converter, select a well ventilated waterproof place where the initial setting of the bearing can be made with observing gyrocompass reading. The bearing display of the A-D converter should not be in the direct path of bright sunshine or overhead lighting.

Cable length to the radar north-up unit, satellite navigation system, doppler sonar current indicator or scanning sonar steady picture display (Max. 10m) must be taken into account.

The A-D converter is supplied with a bracket for tabletop or overhead mounting. See outline drawing C4248-005 on page AP1-6.

1) Separate the bracket from the main body by loosening two bracket fixing knobs.
2) Install the bracket on the selected place by fixing it with four woodscrews (ø4.8 x 25) and washers supplied. For the overhead mounting, use hex. bolts, nuts and washers instead of woodscrews.
3) Mount the main body on the bracket.

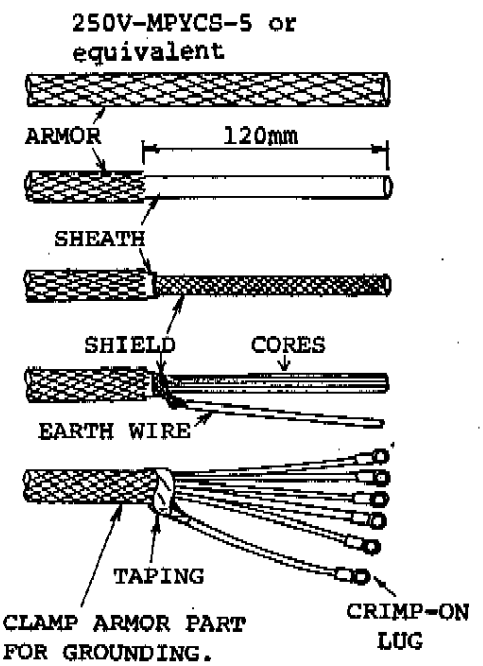
3. Wiring

For the connection between A-D converter and gyrocompass, 5C cable (250V-MPYCS-5 or equivalent) is required. For the connection between A-D converter and radar north-up unit, satellite navigation system, doppler sonar current indicator or scanning sonar steady picture display, CO-SPEVV-SB-C 0.2sq 5P or 10P cable is optionally supplied together with the latter equipment.
Connect the A-D converter to the gyrocompass and the navigational equipments referring to interconnection diagram C4248-007 on page AP1-7.

— Fabrication of 5C cable —

1) Cut the cable to the appropriate length.
2) Cut off the armor and sheath for approx. 120mm from the end of the cable.
3) Comb out the cores from the braided shield.
4) Cut the shield leaving 10mm and solder it with earth wire.
5) Dress the end of armor, sheath and shield with vinyl tape.
6) Fit crimp-on lugs on each end of the core and earth wire.

Note: Ground the armor thru the cable clamp.



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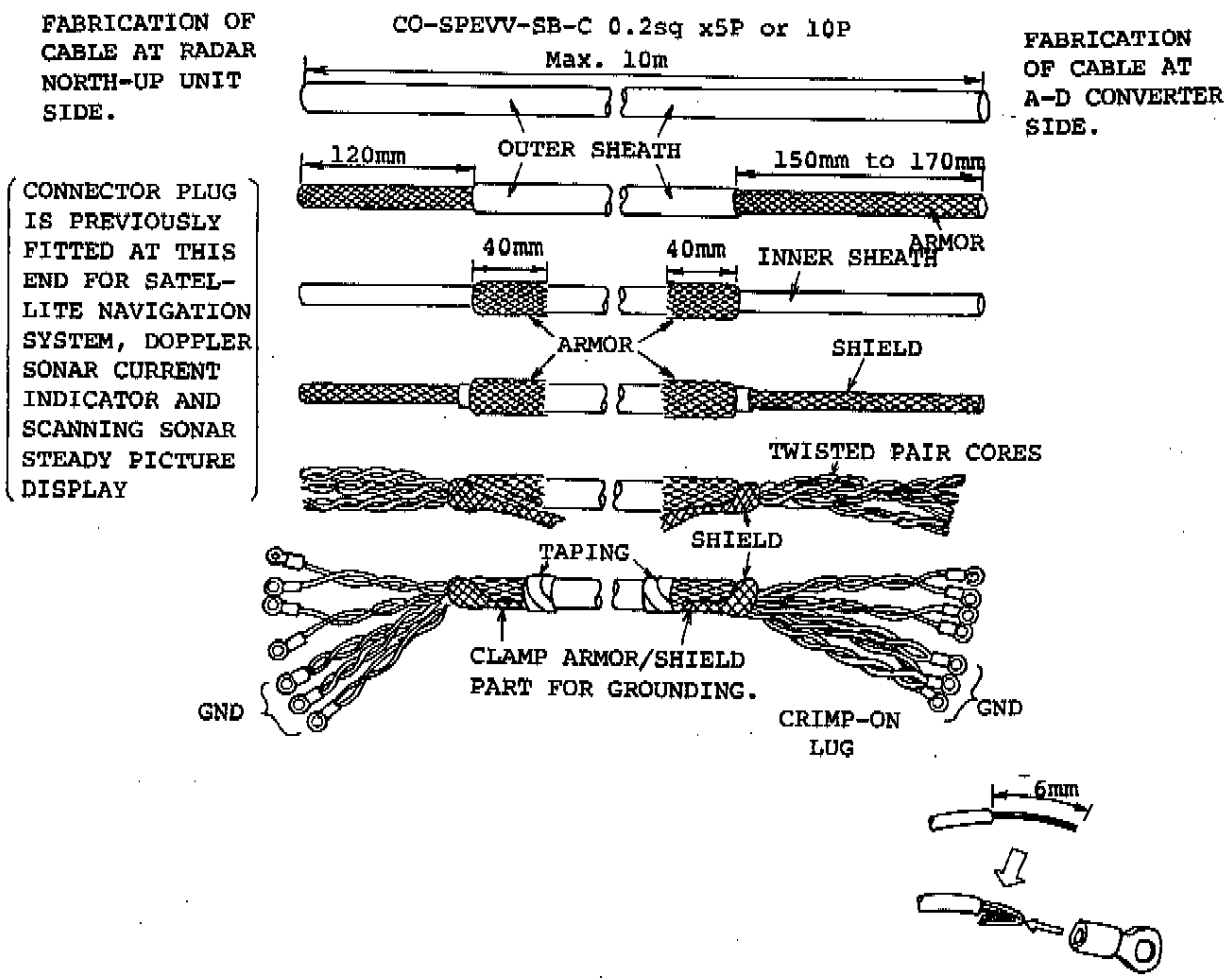
— Fabrication of CO-SPEVV-SB-C, 0.2sq. 5P or 10P Cable —

1) Cut the cable to the appropriate length
2) Remove vinyl sheath for the length shown in the drawing with care not to cut armor.
3) Cut the armor leaving 40mm long and fold back it over the sheath.
4) Remove inner sheath with care not to cut braided shield.
5) Comb out cores from the shield with care not to untwist each pair of cores.
6) Fold back the braided shield over the armor and cut it for the same length as armor remaining.
7) Dress the ends of armor and braided shield with vinyl tape.
8) Fit the crimp-on lugs on each end of cores as shown below.

Note: Ground the armor and shield through cable clamp.



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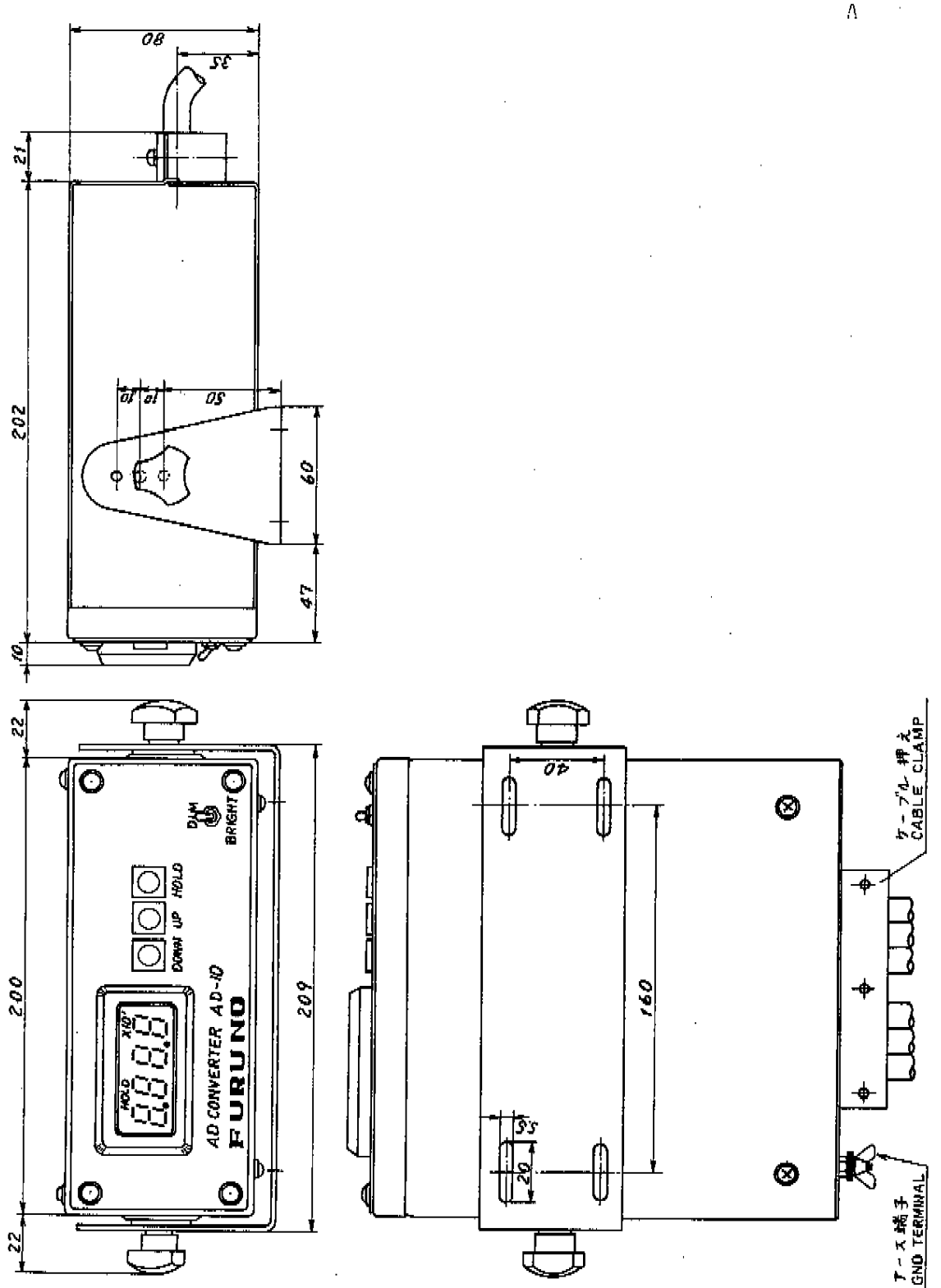
AP1-6



品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	MAY. 16. '80	三角法 THIRD ANGLE PROJECTION		名称 TITLE	A-D コンバータ寸法図
検図 CHECKED	MAY. 16. '80	尺度 SCALE	1/2.5	AD-10	A-D CONVERTER
製図 DRAWN	16. May. 80	重量 WEIGHT	2.5 kg	図番 DWG. NO.	C4248-005-B

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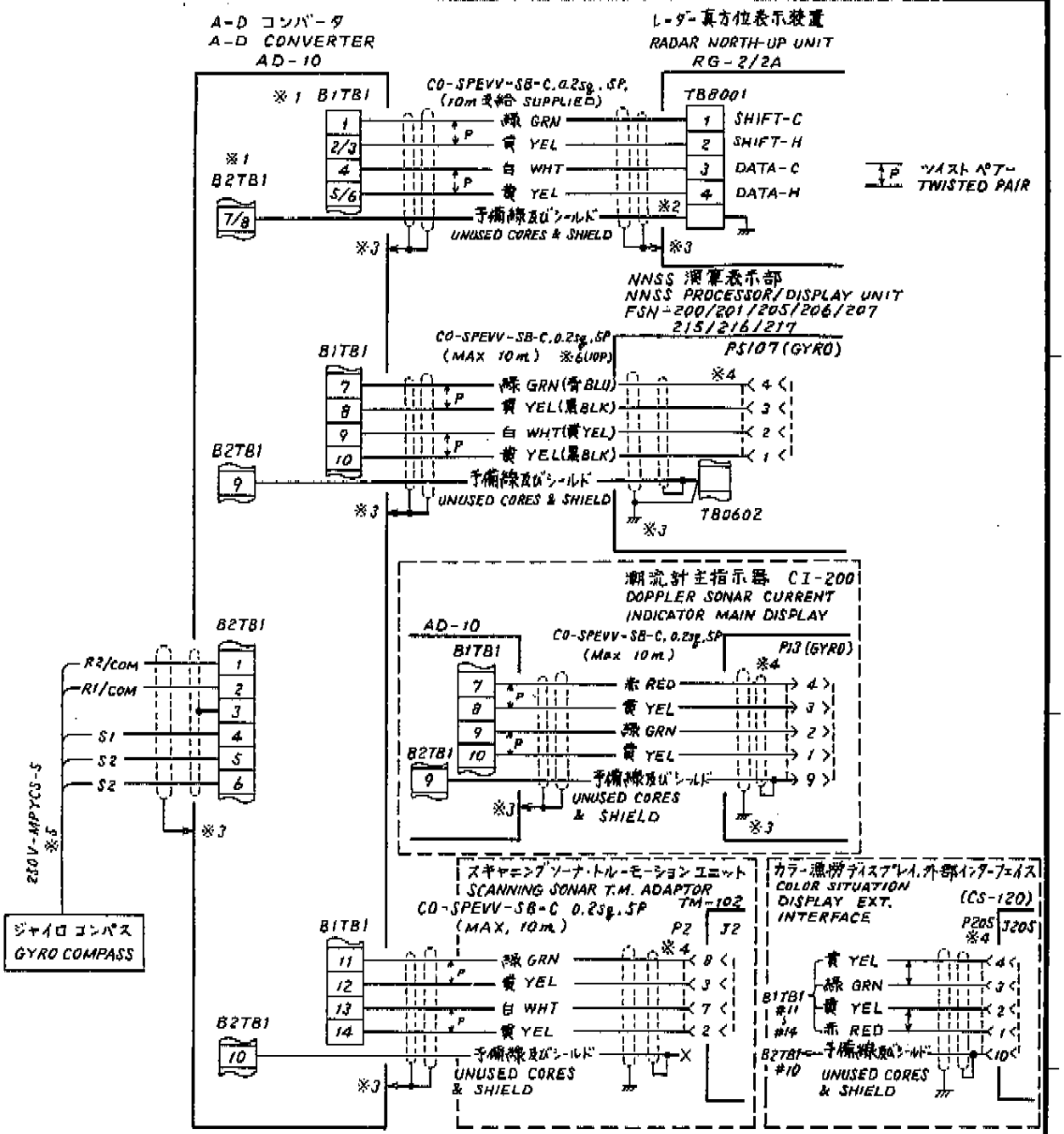
AP1-7



NOTE :

※1. NO.1 レーダーは、#1, #2, #4, #5, #7 に、NO.2 レーダーは #1, #3, #4, #6, #8 にそれぞれ接続。
NO.1 RADAR IS CONNECTED TO #1, #2, #4, #5, #7, AND NO.2 RADAR TO #1, #3, #4, #6, #8 RESPECTIVELY.

※2. 端子台止メネジでアースに落す。 GROUND THRU TERMINAL BOARD FIXING SCREWS.

※3. ケーブルクランプでアースに落す。 GROUND THRU CABLE CLAMP.

※4. 出荷時ケーブルにはコネクター取付済。 CONNECTOR PLUG PREVIOUSLY FITTED TO CABLE AT FACTORY.

※5. 造船所支給。 SHIPYARD SUPPLY.

※6. ( ) 内のカラーコードは IOP ケーブル使用の場合。 COLOR CODES IN ( ) ARE THOSE FOR IOP CABLE.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED		三角法 THIRD ANGLE PROJECTION		名称 TITLE	AD-10 A-Dコンバータ相互結線図 A-D CONVERTER
検図 CHECKED	DEC. 17. '80	尺度 SCALE	/		
製図 DRAWN	Aug. 22. '80 K.K.	重量 WEIGHT	kg	図番 DWG. NO.	C4248-007-C

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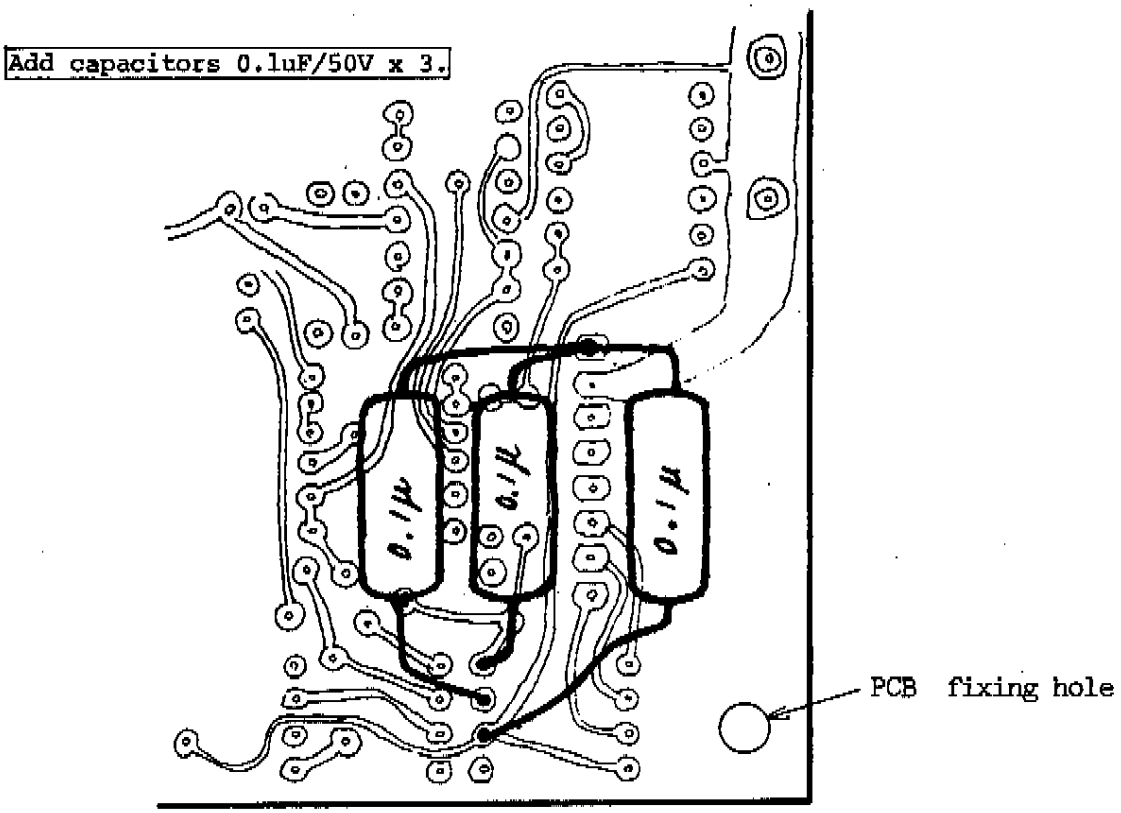
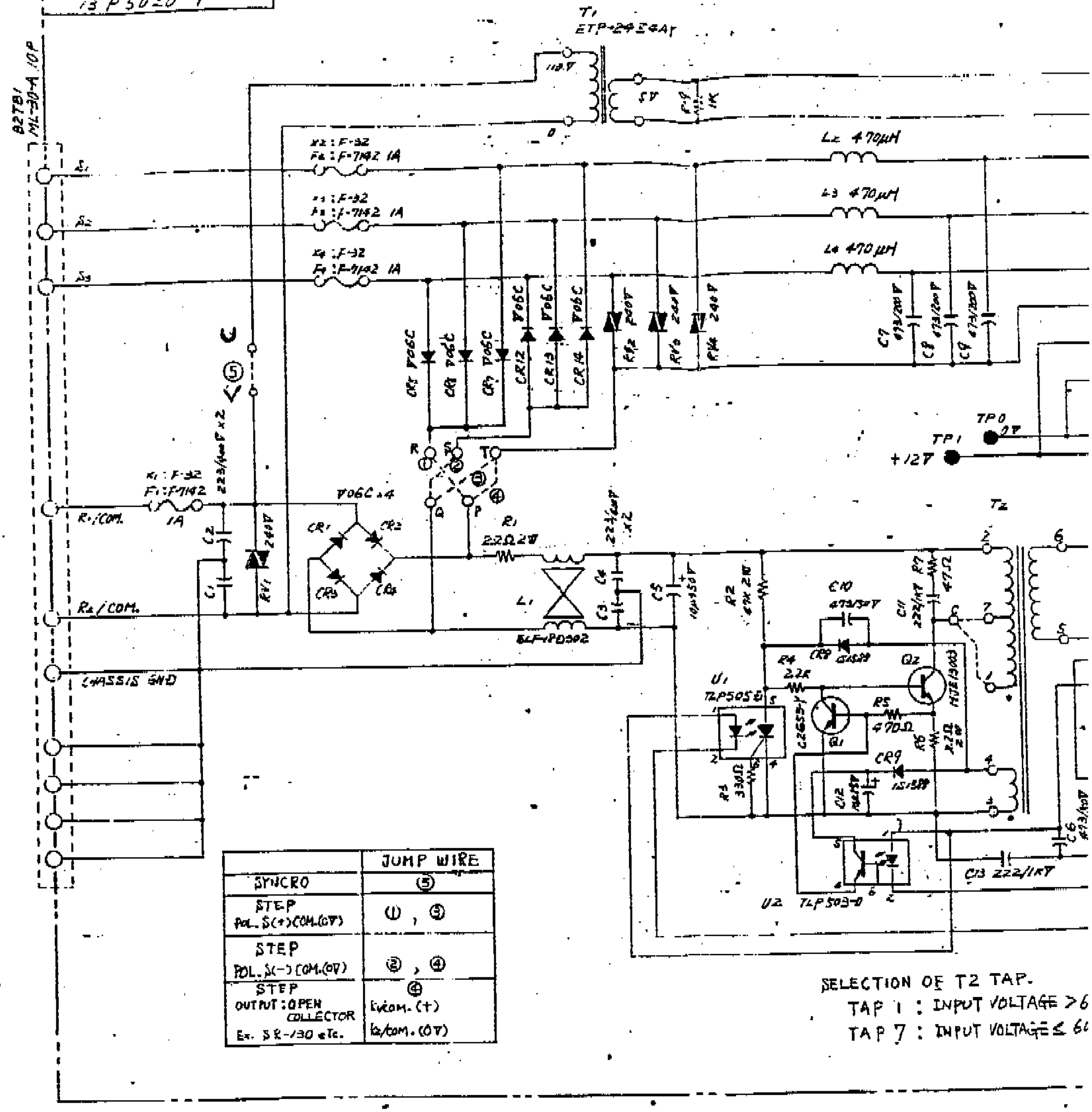


PCB. 13P-5019 (Soldering Side)

Note: (1) Care should be taken not to make unwanted shortcircuit between lead wires of capacitors and copper foils on PCB.

(2) Fix capacitors with adhesive not to come off due to vibration or so.

UNIT NO.	BLOCK NO.
1	2
13 P 5020-1	

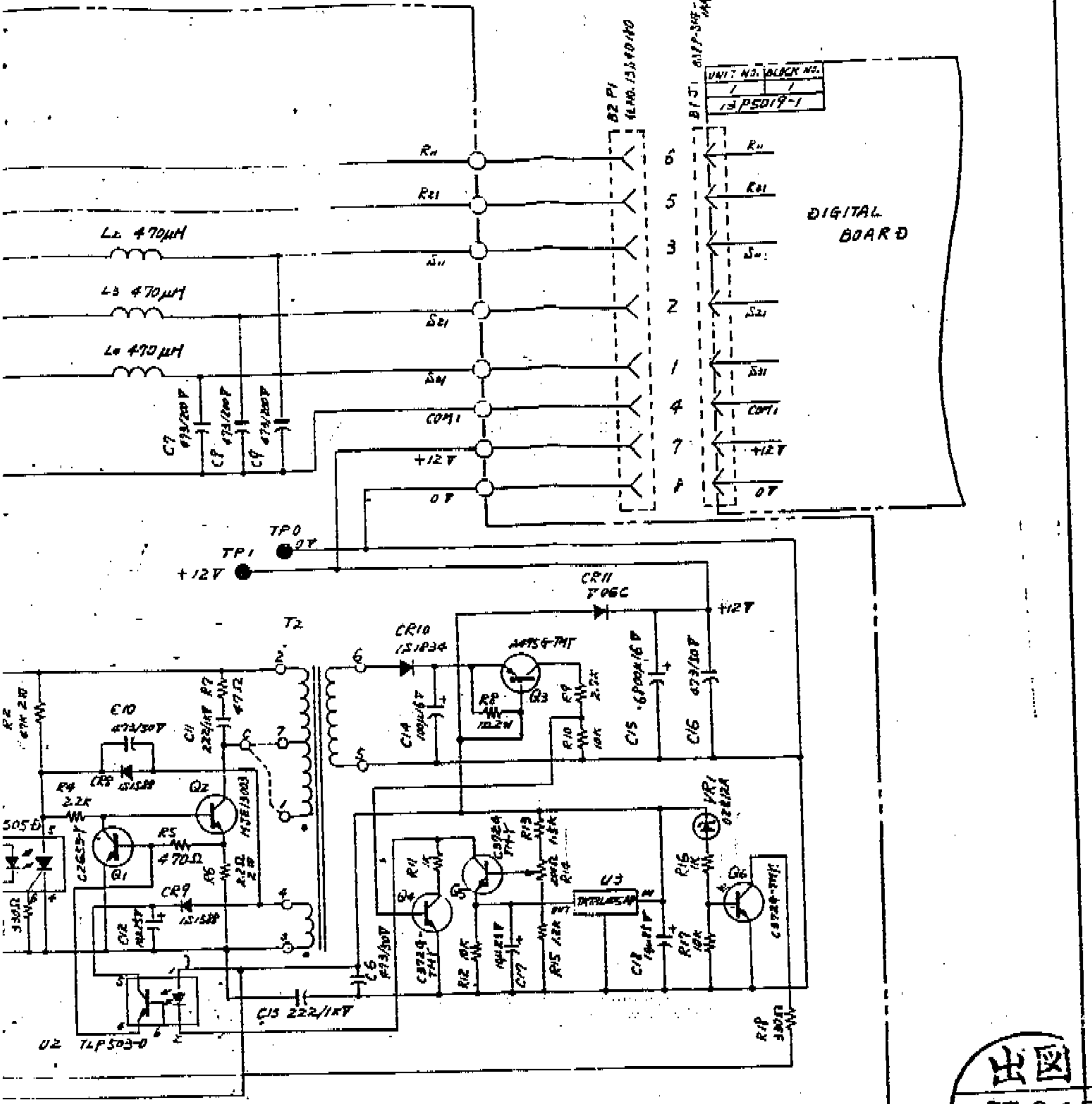


	JUMP WIRE
SYNCRO	⑤
STEP POL. S(+) COM.(0V)	①, ⑤
STEP POL. S(-) COM.(0V)	②, ④
STEP OUTPUT : OPEN COLLECTOR Ex. SR-130 etc.	④ Lv/com. (+) Lo/com. (0V)

SELECTION OF T2 TAP.

TAP 1 : INPUT VOLTAGE > 6

TAP 7 : INPUT VOLTAGE ≤ 6



SELECTION OF T2 TAP.
TAP 1 : INPUT VOLTAGE > 60V
TAP 7 : INPUT VOLTAGE ≤ 60V

品番	品名	材料	個数	図番/型名規格	摘要	
表面処理			主機種			
尺度		14 止	三角止	コード		
				名称		
設計	検図		製図	名称	AD CONVERTOR AD-10 電源部回路図	
				図番	13-005-1020-2	