

(1) **DIRECT POSITION.**—The DIRECT position connects the RF Tuner directly to the antenna, thus bypassing the Antenna Coupler's fixed elements. This position is used when the RF Tuner's main coil is sufficient for tuning the antenna with a SWR of 4:1 or better.

(2) **POSITION A.**—Position A places capacitor C3501 in series with the antenna. This position is used at frequencies where it is necessary to decrease the effective length of the antenna in order to achieve resonance.

(3) **POSITION B.**—In position B series capacitor C3501 and shunt capacitors C3502 and C3503 are placed in the circuit. This position places C3501 in series with the antenna and C3502 and C3503 in parallel with the antenna. This position is used when the net impedance is slightly inductive and it is necessary to insert additional capacitance into the circuit to allow for resonance. (Not used with a 35 foot whip antenna.)

(4) **POSITION C.**—Position C places L3502 in series with the antenna, and is used when it is necessary to increase the effective length of the antenna in order to achieve resonance.

(5) **POSITION D.**—Position D places L3501 in series with the antenna. L3501 having more turns than L3502, has an even greater effect upon increasing the effective length of the antenna than does L3502.

(6) **POSITION E.**—Position E places shunt capacitors C3502 and C3503 in parallel with the antenna. This position is used to decrease the impedance of the antenna, when the impedance is high. (Not used with a 35 foot whip antenna.)

c. SECTION 2, ANTENNA TRANSFER SECTION.

(1) Motor B3502 (figure 2-23) is a 115-volt, 60-cycle vibrating type motor, which controls the action of cams A (03555), B (03554), and C (03553), while at the same time controlling the position of the BYPASS switch S3512.

(2) The motor is controlled by relay K3501, which when energized by +24 vdc from the Control Monitor opens or closes the 110-vac path for the motor.

(3) Cam A is used to open the +24-vdc path for the DOWN relay circuit contained in the Control Monitor. This prevents the RF Tuner's sliding short from making a downward scan while the Antenna Coupler is in the BYPASS position.

(4) Cam B opens and closes switches S3509 and S3508 thus allowing or preventing the 110 vac to be applied to motor B3502, which determines the position of switch S3512.

(5) Cam C breaks the RF power at the transmitter during the TUNER IN and BYPASS switch operation.

(6) Switch S3512 places the RF Tuner in the TUNER IN or BYPASS position.

Figure 2-23 shows switch S3512 in the TUNER IN position. To place S3512 in the BYPASS position, the following sequence takes place:

+24 vdc is removed from relay K3501. With K3501 de-energized relay contact 1 is now connected to contact 4. Current path for motor B3502 is from connection B of receptacle J3507. With 110 vac being applied to the motor, the motor rotates, and cams A, B, and C rotate simultaneously in a clockwise direction. Switch S3512 also rotates—the action of the cams and switches are as follows: Cam A causes switch S3510 to be placed in the NC position thus breaking the +24 vdc DOWN relay circuit of the Control Monitor. Cam C rotates causing switch S3507 to open thus removing RF power from the transmitter.

Switch S3512 rotates placing the RF Tuner in the BYPASS position—Cam B rotates until the cutout position (1) reaches switch S3508—when this occurs S3508 is put in the NC position breaking the 110-vac path to the motor—thus stopping the motor.

When the cutout position (1) on Cam B reaches S3508, switch S3509 is put in the NC position; however, with the +24 vdc having been removed from relay K3501 (K3501 contact is in position 4), the 110-vac path for the motor is broken. When cam B reaches position (1) which stops the motor, cam A causes S3510 to remain in the NC position thus preventing the DOWN relay from operating. Cam C closes its respective switch (S3507) and RF power is again applied to the transmitter. Cam A will remain in the NC position until S3512 is again placed in the TUNER IN position by the action of the ANTENNA TRANSFER switch S207 on the Control Monitor.

8. DETAILED CIRCUIT ANALYSIS OF TRANSMITTER COUPLER CU-402/SRT.

a. GENERAL. — Transmitter Coupler CU-402/SRT provides a means for improving the impedance match between the output impedance of the transmitter and the 50-ohm characteristic impedance of the transmission line.

The nominal output impedance of certain transmitters is 50-ohms. However, these transmitters may have an actual output impedance which varies from this 50-ohms at different frequencies thus reducing the efficiency of the transmitter in question. (Maximum transfer of power occurs when the impedance of the source (transmitter) is equal to the impedance of the load (transmission line).) Therefore, by improving the impedance match between the transmitter and transmission line an increase in transmission efficiency is achieved.

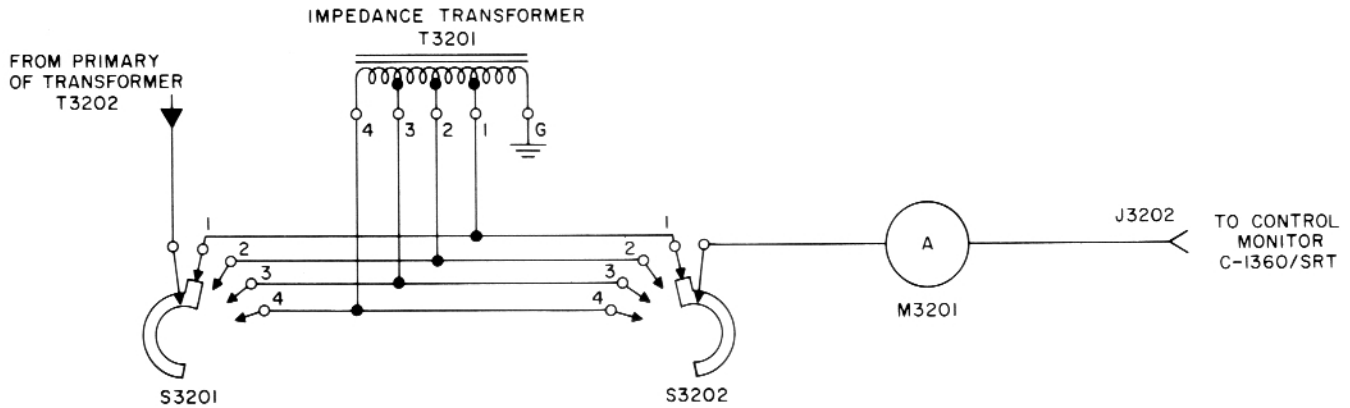


Figure 2-24. Transmitter Coupler CU-402/SRT, Impedance Transformer Section

Transmitter Coupler CU-402/SRT may be thought of as two separate circuits: 1) the SWR Monitor circuit and 2) the Impedance Transformer circuit.

b. SWR MONITOR CIRCUIT (Figure 7-56).— Operation of the Transmitter Coupler SWR Monitor is identical to that of the SWR Monitor contained in Control Monitor C-1360/SRT. The SWR Monitor section of the Transmitter Coupler is used only when the Transmitter Coupler is used with SRT transmitters. As the complete Antenna Tuning Group AN/SRA-18 is not used with the SRT transmitters the SWR circuit will not be discussed. For further information pertaining to the SWR circuit, refer to the appropriate SRT transmitter instruction book.

c. IMPEDANCE TRANSFORMER CIRCUIT (Figure 2-24).— Impedance transformer T3201 is an auto-transformer consisting of seven turns, with a tap at turns 3, 5, 6, and 7. The property of an auto-transformer is such that the ratio of primary impedance to secondary impedance is directly proportional to the square of the turns ratio. Transformer T3201 actually provides a number of turns ratios by use of different taps. The RF energy from the output of the transmitter is fed to the RF INPUT receptacle J3201 which in turn is con-

nected to one of the taps of the transformer T3201 through the contacts of the INPUT TAP switch, S3201. The output of transformer T3201, selected from one of the taps by the position of the OUTPUT TAP switch S3202, is then fed to RF ammeter M3201 and finally to the RF OUTPUT receptacle J3202. Both switches (S3201 and S3202) are then set for maximum power transfer which, in this case, is determined by the *maximum* current flowing on the line as shown on RF ammeter M3201. To determine if the transformer (T3201) is stepping *up* or stepping *down* the impedance, it is necessary to observe the settings of switches S3201 and S3202. Example: Transmitter connected to tap number 2—this corresponds to position 2 of switch S3201; transmission line connected to tap number 3—this corresponds to position 3 of switch S3202.

Transformer T3201 is now in the process of stepping *up* the transmitter's impedance to match the impedance of the transmission line. If switch S3201 setting is lower than the setting of switch S3202, the transformer is being used as a step-up transformer (see example above). If the setting of switch S3201 is higher than the setting of switch S3202, transformer T3201 is being used as a step-down transformer.

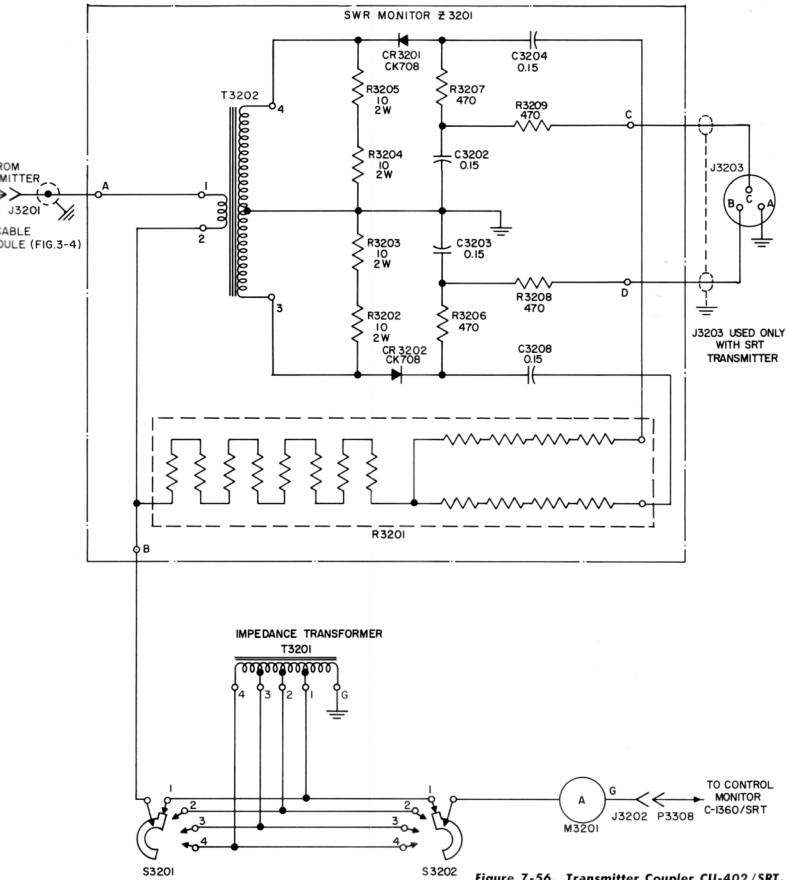


Figure 7-56. Transmitter Coupler CU-402/SRT, Schematic Diagram

TABLE 8-2. MAINTENANCE PARTS LIST (Continued)

REF DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
S301		SWITCH, SENSITIVE: spdt; 30 v DC, 125 or 250 v ac, 10 amp, phenolic body; 1-3/8 in. lg including terminals, 13/32 in. w, 7/8 in. h excluding terminal screw, o/a dim. excluding actuator; snap-action plunger type actuating mechanism; beryllium copper spring w/silver contacts; 0.016 in. max. differential movement, 3/64 in. max. pre-travel, 1/32 in. min. over-travel; 6 to 14 oz. operating force; 1 contact normally open, 1 contact normally closed; three no. 4-40 round head machine screw-type terminals w/lock washers; one 0.130 in. dia mtg hole, and one 0.120 in. dia mtg hole, diagonally mtd on 0.96 in. centers; winterized unit; used with JV-5 actuator; per spec MIL-S-6743; p/o S3513; Microswitch type V3-1; Hoffman part/dwg no. SDS-9	Internal Loading Position Switch
S302		SWITCH, SENSITIVE: same as S301	Homing Cam Switch
S303		SWITCH, SENSITIVE: same as S301	Top Limit Switch
S304		SWITCH, SENSITIVE: same as S301	Bottom Limit Switch
S305		SWITCH, THERMOSTATIC: spdt; snap action type; contacts set to open at 100°C, close at 95°C; 2-3/16 in. od, 13/16 in. w; four 5/32 in. dia mtg holes equally spaced on lobes of 2-13/16 in. dia; Spencer Thermo part no. C-4370-13; Hoffman part/dwg no. A2010773	Thermal Cutout Switch
S306		BLOWER-MOTOR, SWITCH ASSEMBLY: centrifugal type; special construction, spdt; Hoffman part/dwg no. D2010882	Blower and Protective Switch
S307	7	SWITCH: centrifugal type; special construction; Hoffman part/dwg no. C2010875	Governor Switch
S308	8	SWITCH, RF: special construction; Hoffman part/dwg no. D2011090	Transformer Switch
TB301		TERMINAL BOARD: barrier type; 14 terminals; thermosetting plastic material per MIL-P-14A; o/a dim.—6-1/8 in. lg, 1-1/8 in. w, 1/2 in. thk excluding terminals; four 0.175 in. dia mtg holes, two on ea end, 6-9/16 in. c to c on long, by 0.421 in. c to c w; terminals and screws brass, nickel plated; Jones part no. 14-141; Hoffman part/dwg no. TS-B3-14-P	Terminal Strip
TB302		TERMINAL BOARD: same as TB301	Terminal Strip
TB303		TERMINAL BOARD: barrier type; 4 terminals; thermosetting plastic material per MIL-P-14A; 3-5/8 in. lg, 7/8 in. w, 13/32 in. thk excluding terminals; four 0.160 in. dia mtg holes, two on ea end 1-7/8 in. c to c on long, by 5/16 in. c to c w; terminals and screws brass, nickel plated; Jones part no. 4-140; Hoffman part/dwg no. TS-B1-4-P	Terminal Strip
W301		WIRE, ELECTRICAL: 0.125 in. dia copper wire; silver plated; 19-7/8 in. lg; one end bent 30° 1-1/8 in.; threaded both ends no. 5-40 NC-2; Hoffman part/dwg no. A2010829	RF Feed Wire
W302		WIRE, ELECTRICAL: 0.125 in. copper wire; silver plated; 21-1/16 in. lg, bent to a hook shape one end; one end threaded no. 5-40 NC-2, 1/2 in. lg; Hoffman part/dwg no. A2010715	RF Cable Feed Wire
Z301		AUTO-TRANSFORMER, RF: special construction mu-metal tape toroidal core; 500 w max power; 6 turns of 0.0125 in. thk soft copper strip; tapped at 2 turns; Hoffman part/dwg no. B2011212	Impedance Transformer
3201 thru 3299 Series		COUPLER, TRANSMITTER: CU-402/SRT; 0.3 to 30 mc; improves the impedance between the transmitter output impedance and the characteristic impedance of the 50 ohm transmission line; c/o one impedance transformer, one sensing circuit current transformer, crystals, capacitors, resistors, two rotary switches, one antenna current meter, three receptacles—one rf input to transmitter, one rf output to antenna, one SWR output to control indicator unit; case data—aluminum material, Navy grey finish; o/a dim. including mounting bracket. 9-19/64 in. lg, 9-7/16 in. h, 7-11/16 in. w; mtg data—four shock mounts, 1-3/4 in. lg, 1-1/4 in. w, 25/32 in. h; two shock mounts mounted at base of front panel, 4-1/2 in. by 3/4 in. c to c; two shock mounts mounted at top rear of case, 4-1/2 in. by 3/4 in. c to c; shock mounts are attached to mounting bracket which is portable and mounted near or at the transmitter location; Hoffman part/dwg no. NL-901100-14	Located at or near rf transmitter, provides a means of improving rf impedance match between the transmitter's output impedance and the rf characteristic impedance of the 50 ohm transmission line
A3201		MOUNT, VIBRATION: 6 to 10 lb load rating; 1-3/4 in. lg, 1-1/4 in. w, 25/32 in. h; stainless steel center plate, natural rubber cushion; mounting plates each end w/0.141 in. dia holes spaced 1-13/32 in. c to c; Barry part no. 6550-10; Hoffman part/dwg no. SB310T	Shock Mount for Load Adjusting Unit
A3202		MOUNT, VIBRATION: same as A3201	Shock Mount for Load Adjusting Unit
A3203		MOUNT, VIBRATION: same as A3201	Shock Mount for Load Adjusting Unit
A3204		MOUNT, VIBRATION: same as A3201	Shock Mount for Load Adjusting Unit
C3201		CAPACITOR, FIXED, PAPER DIELECTRIC: 150,000 uuf ±20%; 100 vdcw; wax impregnated; one end grounded, both ends insulated; o/a dia. excluding wire leads, 13/16 in. lg, 0.400 in. dia; Sprague part no. 86P15401S3; Hoffman part/dwg no. C-S86P15401S3 (p/o Z3201)	DC Blocking Capacitor
C3202		CAPACITOR, FIXED, PAPER DIELECTRIC: same as C3201 (p/o Z3201)	DC Blocking Capacitor
C3203		CAPACITOR, FIXED, PAPER DIELECTRIC: same as C3201 (p/o Z3201)	DC Blocking Capacitor
C3204		CAPACITOR, FIXED, PAPER DIELECTRIC: same as C3201 (p/o Z3201)	DC Blocking Capacitor

TABLE 8-2. MAINTENANCE PARTS LIST (Continued)

REF DESIG.	NOTES	NAME AND DESCRIPTION	LOCATING FUNCTION
CR3201		CRYSTAL UNIT, RECTIFYING: diode-germanium crystal; 100 vdc restorer; 35 ma dc anode current, inverse current 0.15 ma at 50 v 70°C; shunt capacity 1.0 uuf; ambient temp -50°C +100°C; 0.400 in. lg, 0.175 in. dia; Raytheon part no. 1N68 (CK708); Hoffman part/dwg no. SDY-1 (p/o Z3201) (interchangeable with 1N38A)	Balancing Rectifier for Directional Coupler
CR3202		CRYSTAL UNIT, RECTIFYING: same as CR3201 (p/o Z3201)	Rectifier for Directional Coupler
E3201	4	SHIELD, ELECTRICAL CONNECTOR: cable clamp type; 1.047 in. dia, 29/32 in. lg; cable entry max. 7/16 in. dia; threaded 3/4-20 NEF; type AN-3057-6 per MIL-C-5015	Attached P3201 to J3203
E3202		KNOB: fluted; black thermosetting phenolic molding; brass, nickel plated insert, reamed for 1/4 in. shaft; 1-1/2 in. dia, less pointer, 7/8 in. w; two holes drilled 120° apart for 8-32 x 1/4 in. lg hex socket head screws; Molded Insulation part no. RE10F479C type B; Hoffman part/dwg no. NCP-20-1-13-2	Input Tap Knob
E3203		KNOB: same as E3202	Output Tap Knob
J3201		CONNECTOR, RECEPTACLE, ELECTRICAL: N type; teflon insulated; 52 ohms impedance; o/a dim.—1-1/8 in. lg, 1 in. w; flange mtd; type UG-58A/U per MIL-C-71A	RF Input from Transmitter
J3202		CONNECTOR, RECEPTACLE, ELECTRICAL: same as J3201	RF Output to Control Monitor
J3203		CONNECTOR, RECEPTACLE, ELECTRICAL: AN type; 3 female contacts; 29/32 in. lg, 1-3/16 in. w; flange mtd; type AN-3102A-14S-7S per MIL-C-5015	SWR Output to Control-Indicator Unit (Use only with SRT Transmitters)
M3201		AMMETER: range 0-5 amp; black marking and pointer, white background; 3-1/2 in. dia; Weston model no. 425; JAN type MR35W0005RLAA, per JAN-I-6	RF Current Ammeter
P3201	4	CONNECTOR, PLUG, ELECTRICAL: AN type; 3 male contacts; 1-21/32 in. lg, 1-1/8 in. dia; clamp mtd; threaded 3/4-20 NEF; type AN3106B-14S-7P per MIL-C-5015	From Control Indicator Unit to SRT Transmitter
R3201	8	RESISTOR ASSEMBLY: c/o terminal board; 1-5/8 in. lg, 1-1/4 in. wd, 1/16 in. thk; 8-510 ohm, $\pm 5\%$; 1/2 w, 8-1000 ohm, $\pm 5\%$; 1/2 w resistor, making total value 6080 ohms, $\pm 5\%$; 8 w; Hoffman part/dwg no. NL-961074-1 (p/o Z3201)	RF Voltage Divider
R3202		RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 5\%$, 2 w; RC42GF100J per MIL-R-11A (p/o Z3201)	Damping Resistor for T3202
R3203		RESISTOR, FIXED, COMPOSITION: same as R3202 (p/o Z3201)	Damping Resistor for T3202
R3204		RESISTOR, FIXED, COMPOSITION: same as R3202 (p/o Z3201)	Damping Resistor for T3202
R3205		RESISTOR, FIXED, COMPOSITION: same as R3202 (p/o Z3201)	Damping Resistor for T3202
R3206		RESISTOR, FIXED, COMPOSITION: 470 ohms, $\pm 5\%$, 1/2 w; type RC20GF471J per MIL-R-11A (p/o Z3201)	RF Voltage Divider
R3207		RESISTOR, FIXED, COMPOSITION: same as R3206 (p/o Z3201)	RF Voltage Divider
R3208		RESISTOR, FIXED, COMPOSITION: same as R3206 (p/o Z3201)	DC Voltage Divider
R3209		RESISTOR, FIXED, COMPOSITION: same as R3206 (p/o Z3201)	DC Voltage Divider
S3201		SWITCH, ROTARY: 1 pole, 4 positions; 1 section; non-shorting type; ceramic insulation material, silver alloy contacts; o/a dim.—2-13/16 in. lg, 1-7/8 in. w; Centralab no. JV900 (modified); Hoffman part/dwg no. NL-901124-2	Transformer Tap Positioning Switch
S3202		SWITCH, ROTARY: 1 pole, 4 positions; 1 section; non-shorting type; ceramic insulation material, silver alloy contacts; o/a dim.—2-3/16 in. lg, 1-7/8 in. w; Centralab no. JV900 (modified); Hoffman part/dwg no. NL-901590-2	Transformer Tap Positioning Switch
T3201		TRANSFORMER, RADIO FREQUENCY: c/o two toroidal cores; no. 1—1 in. id. by 1-29/32 in. od by 1/2 in. w, wound of 0.001 in. thick allegheny mumetal material; no. 2—2 in. id. by 3 in. od by 1/2 in. w, wound of 0.001 in. thk. allegheny mumetal material; hydrogen annealed after winding; core no. 1 wound and tested must result in open circuit impedances of no less than $80 \pm 10\% + j50$ at 3.0 mc, and $130 \pm 10\% + j80 \pm 10\%$ at 10.0 mc; core no. 2 wound and tested, must result in open circuit impedances of no less than $65 \pm 10\% + j45 \pm 10\%$ at 3.0 mc and $100 \pm 10\% + j75 \pm 10\%$ at 10.0 mc; Hoffman part/dwg no. NL-901601-14	Impedance Transformer
T3202		TRANSFORMER, RADIO FREQUENCY: c/o one toroidal core, 3/4 in. id. by 1-1/2 in. od by 3/8 in. w, wound of 0.001 in. thk mumetal, hydrogen annealed after winding; core wound and tested must result in open circuit impedance of no less than $70 \pm 10\% + j45 \pm 10\%$ at 3.0 mc and $110 \pm 10\% + j65 \pm 10\%$ at 10.0 mc; Hoffman part/dwg no. NL-961094-2	Sensing Circuit Current Transformer
Z3201		INDICATOR, STANDING WAVE RATIO: c/o C3201, C3202, C3203, C3204, CR3201, CR202, R3201, R3202, R3203, R3204, R3206, R3207, R3208, R3209, T3202; Hoffman part/dwg no. NL-961080-14	SWR Monitor
P3301	4	CONNECTOR, PLUG, ELECTRICAL: straight plug-cord connector; 30 female contacts; 3.344 in. lg, 2.219 in. dia; MIL type AN3106M-32-8S, MIL-C-5015	Cable Plug, Connects to J3502
P3302	4	CONNECTOR, PLUG, ELECTRICAL: straight plug-cord connector; 24 female contacts; 3.44 in. lg, 1.719 in. dia; MIL type AN3106M-24-28S, MIL-C-5015	Cable Plug, Connects to J3504