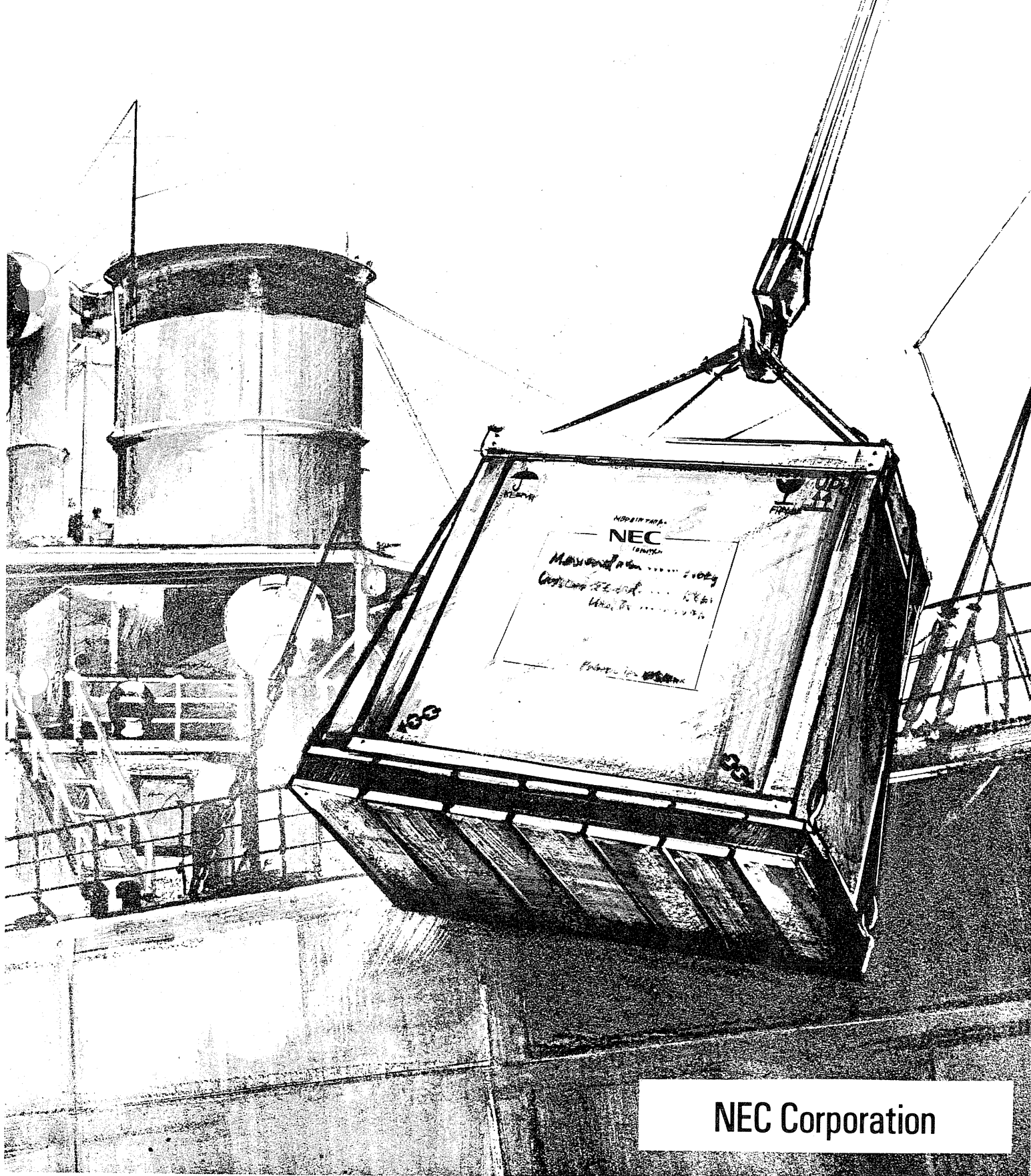


7.3KW UHF DIGITAL TV TRANSMITTER

DTU-70/7R3PQ

INSTRUCTION MANUAL VOL. I

NEC HANDLING MANUAL FOR PACKAGES OF BROADCASTING EQUIPMENT



NEC Corporation

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Introduction

Television and radio broadcasting equipment and related accessories and apparatuses are liable to be affected by vibrations, impacts, water and moisture and it is therefore necessary to handle them with utmost care. Needless to say, when these articles are packed, the best precautions are taken against external dangers such as vibrations, impacts, water, moisture and the like. But, there are limits to the precautionary measures that can be taken because of the characteristics of the materials, and economical considerations such as the costs of packing and transportation.

Therefore, if the packages are handled under abnormal conditions, such as exposing them to strong impacts or to the weather, the articles contained in the packages will become damaged, their performance and quality will deteriorate, and in some cases, they will become unusable.

In order to prevent such troubles, suitable handling methods will be described below for your information. It is strongly advised that you observe the instructions faithfully in handling the packages.

Outer appearance of various packages

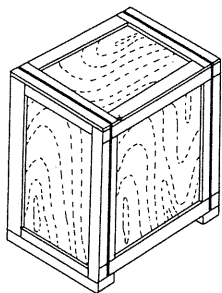


Fig. 1 Electron tube package

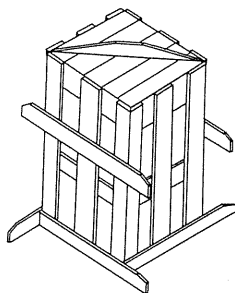


Fig. 2 Electron tube package

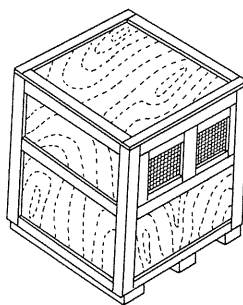


Fig. 3 Electron tube package

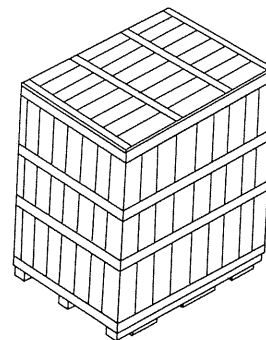


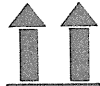
Fig. 4 Broadcasting equipment package

Package handling marks and their meaning

UP



UP

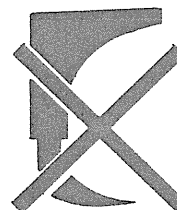


UP



Marks showing the top of packages.

USE NO HOOKS



Marks instructing not to use hooks.



FRAGILE



HANDLE WITH CARE

Marks showing that the goods are fragile and instructing to avoid shocks and impacts.

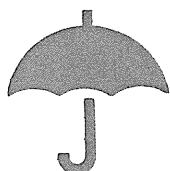
SLING HERE



SLING HERE



Marks showing positions for fixing rope when hoisting packages.

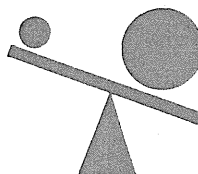


KEEP DRY

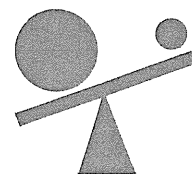


KEEP DRY

Marks instructing not to soak packages in water.



HEAVY WEIGHT
THIS END



HEAVY WEIGHT
THIS END

Marks showing the heavier side of a package when center of balance is located to one side.

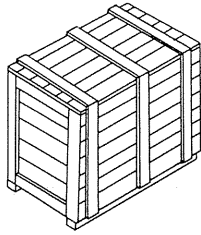
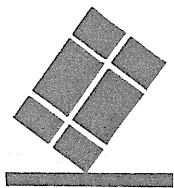


Fig. 5 Package for tables, racks other disassembled parts



NO TURN

Marks showing packages that topple easily and giving instructions to keep them upright in a stable condition.



CENTER OF BALANCE

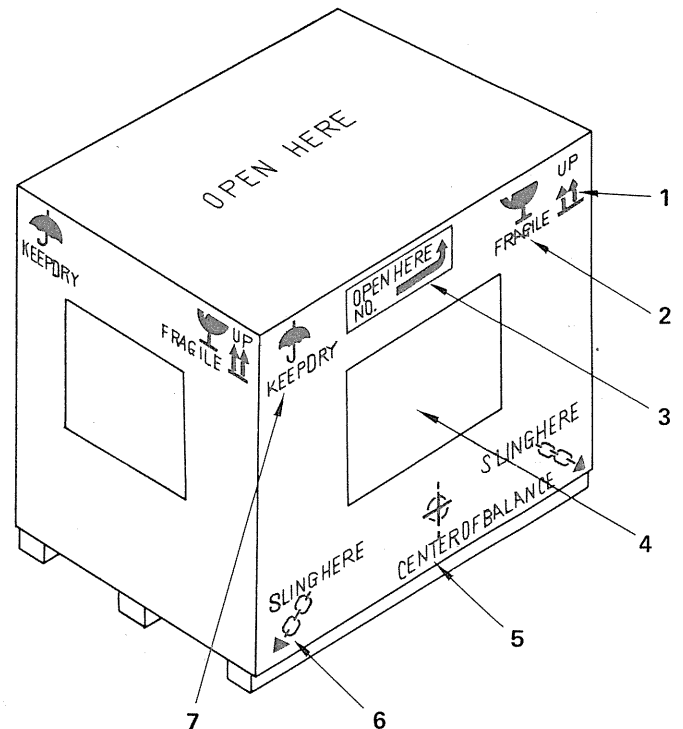
Marks showing the center of balance of packages.



OPEN HERE

Marks showing the position and order for opening packages.

Example



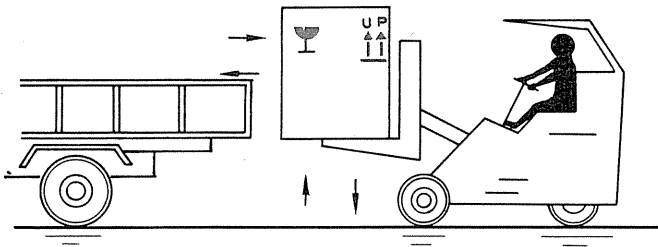
- (1) Mark showing the top of the package.
- (2) Mark showing that the goods contained are fragile.
- (3) Mark showing the position to start opening the package.
- (4) Name and place of addressee, total weight, volume, and name and place of sender shall be written here.
- (5) Mark showing the position of center of balance.
- (6) Mark showing the position where rope shall be fixed.
- (7) Mark instructing not to soak the package in water (instructing to keep the package dry).

Cautions for handling packages

Cautions for loading, unloading and transporting packages

■ Always handle the packages in the upright position (keeping the  marks on the container in the upper position). Never drop packages from heights over 50 cm (20 in) and never place them on their side or upside-down. (see Figs. 7~17)

Right way



Wrong way

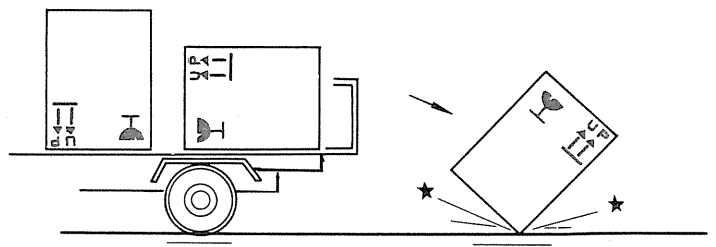


Fig. 7 The instruction of the  mark is faithfully observed. The package is carefully unloaded using a forklift.

Fig. 8 The instruction of the  mark is not observed and the package is unloaded roughly.

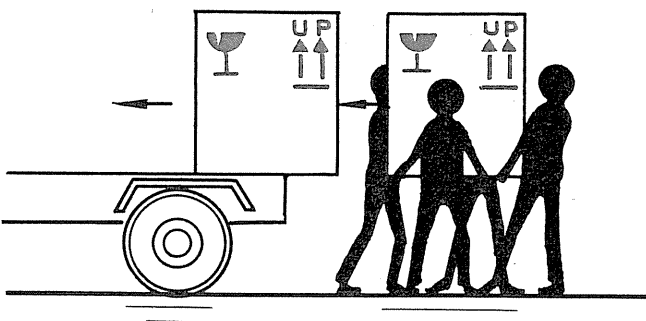
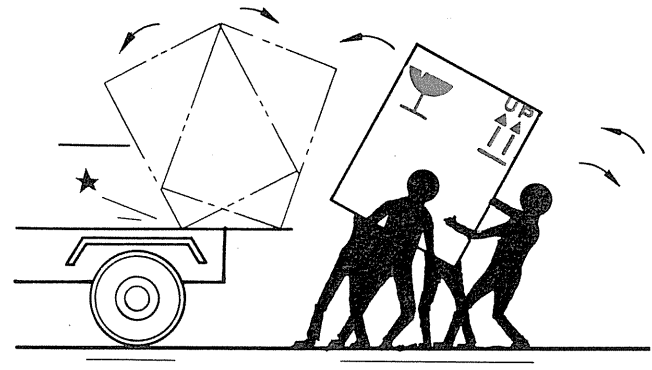


Fig. 9 Example of careful loading.

Fig. 10 Example of rough loading.

Right way

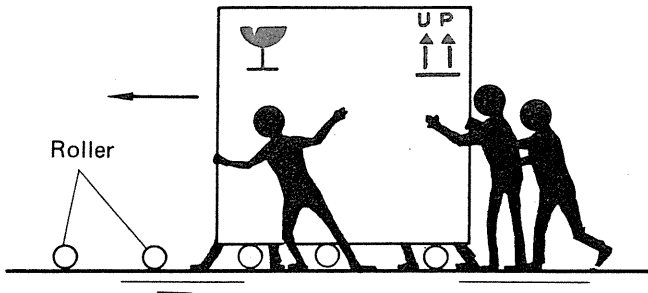


Fig. 11 The package is handled carefully by several workers using rollers.

Wrong way

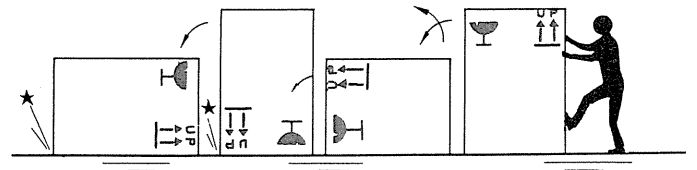


Fig. 12 The package is handled roughly.

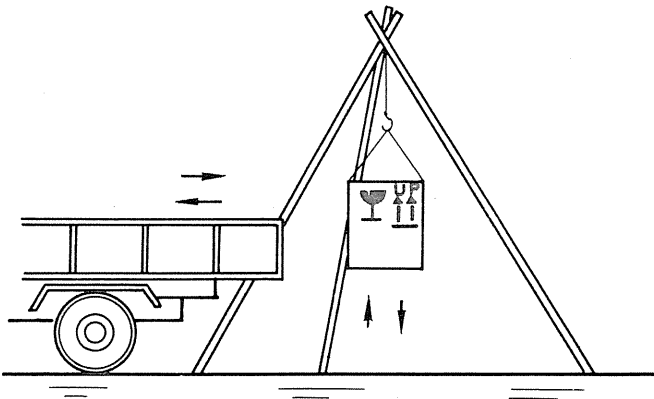


Fig. 13 The package is handled carefully observing the instruction of the  mark faithfully.

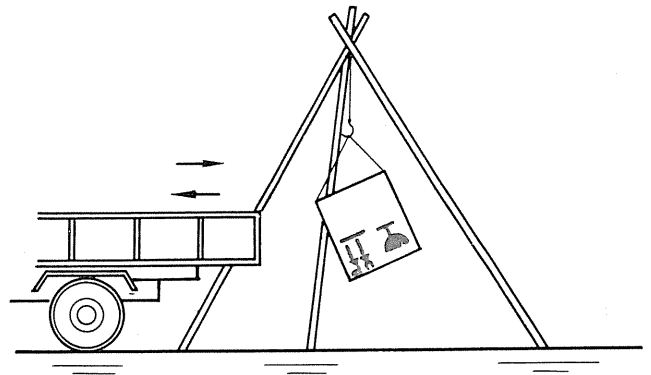


Fig. 14 The package is handled roughly without observing the instruction of the  mark.

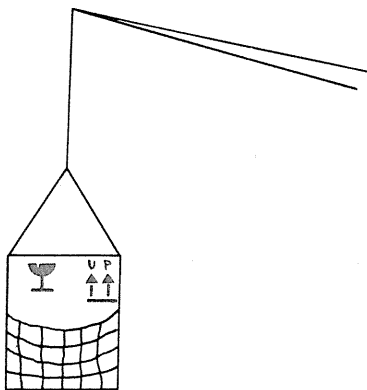


Fig. 15 The package is handled carefully observing the instruction of the  mark faithfully.

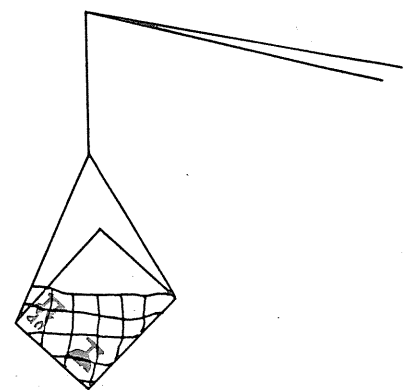


Fig. 16 The package is handled without observing the instruction of the  mark.

Cautions for handling packages (Continued)

■ Load and unload packages on trucks and freight cars according to the standards shown in Table 1. Never throw out small packages.

	Maximum handling weight	
	Ground – Truck rear body floor	Platform – Truck rear body floor
One worker	Less than 15 kg (33.3 lb)	Less than 20 kg (44.4 lb)
Two workers	16 - 20 kg (35.5 – 44.4 lb)	21 - 40 kg (46.6 – 88.8 lb)
Mechanical handling	Over 21 kg (46.6 lb)	Over 41 kg (91.1 lb)

Note: When manually handling packages weighing over 21 kg (46.6 lb) and 41 kg (91.1 lb) respectively, increase the number of workers accordingly.

When transporting packages in vehicles, be sure to tie them down with rope to prevent them from jumping or shifting. (see Fig. 17)

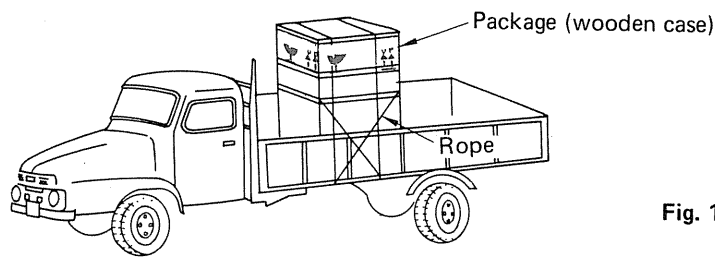


Fig. 17 Observing the  mark, the package is fixed securely to the body of the truck.

Load vacuum tube packages (especially spring supported packing cases), in places subject to the least vibrations and shocks (front part of trucks).

When transporting packages, cover them with waterproof sheets to protect them from rain, etc. (see Fig. 18).

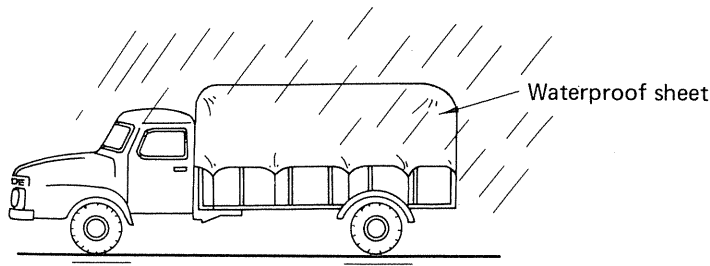


Fig. 18 Observing the instruction of KEEP DRY, the packages are covered with waterproof sheets.

Cautions for storing

- Store the packages in a building if at all possible. If there is danger of rain leaking into the building or floods, cover the packages with waterproof sheets and place them on a suitable platform which is about 10 cm higher than the anticipated flood water level (see Fig. 19).

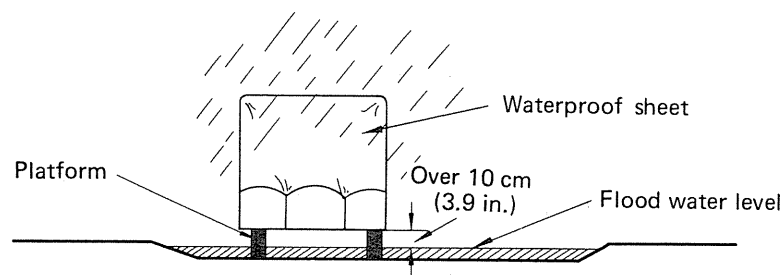


Fig. 19 Good storing conditions where the packages are covered with waterproof sheets and placed on a platform to protect them against floods.

- If packages are unavoidably stored outside the building, be sure to take the waterproof measures as mentioned above.

- When storing the package, try to avoid stacking them one upon the other as much as possible.

In case the packages must be stacked up due to the conditions of the storing place avoid piling them up in more than two layers.

Cautions for opening packages

- Open the packages slowly using the specified tools (drivers, wrenches, tinman's shears and bars) and in the order shown in Figs. 20 and 21.

Cautions for handling electron tube packages

- Handle the electron tube packages carefully according to the "Electron tube transportation manual" (Technical Data - 12).

Open the package in the following order. Figures in the drawing show the order for opening the package.

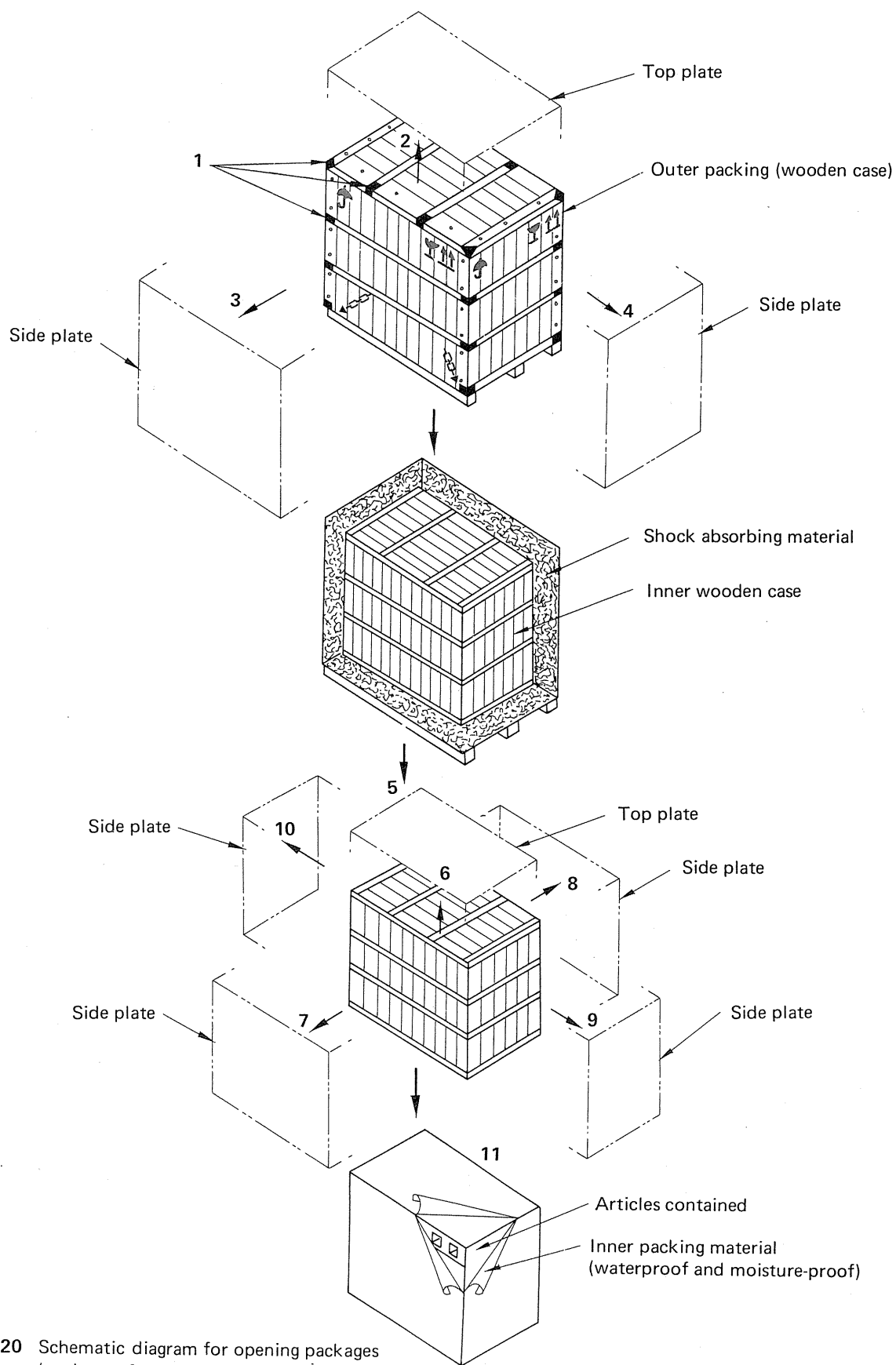


Fig. 20 Schematic diagram for opening packages (packages for main body, tables and racks)

Open the package in the order shown below. Figures in the drawing show the order for opening the package.

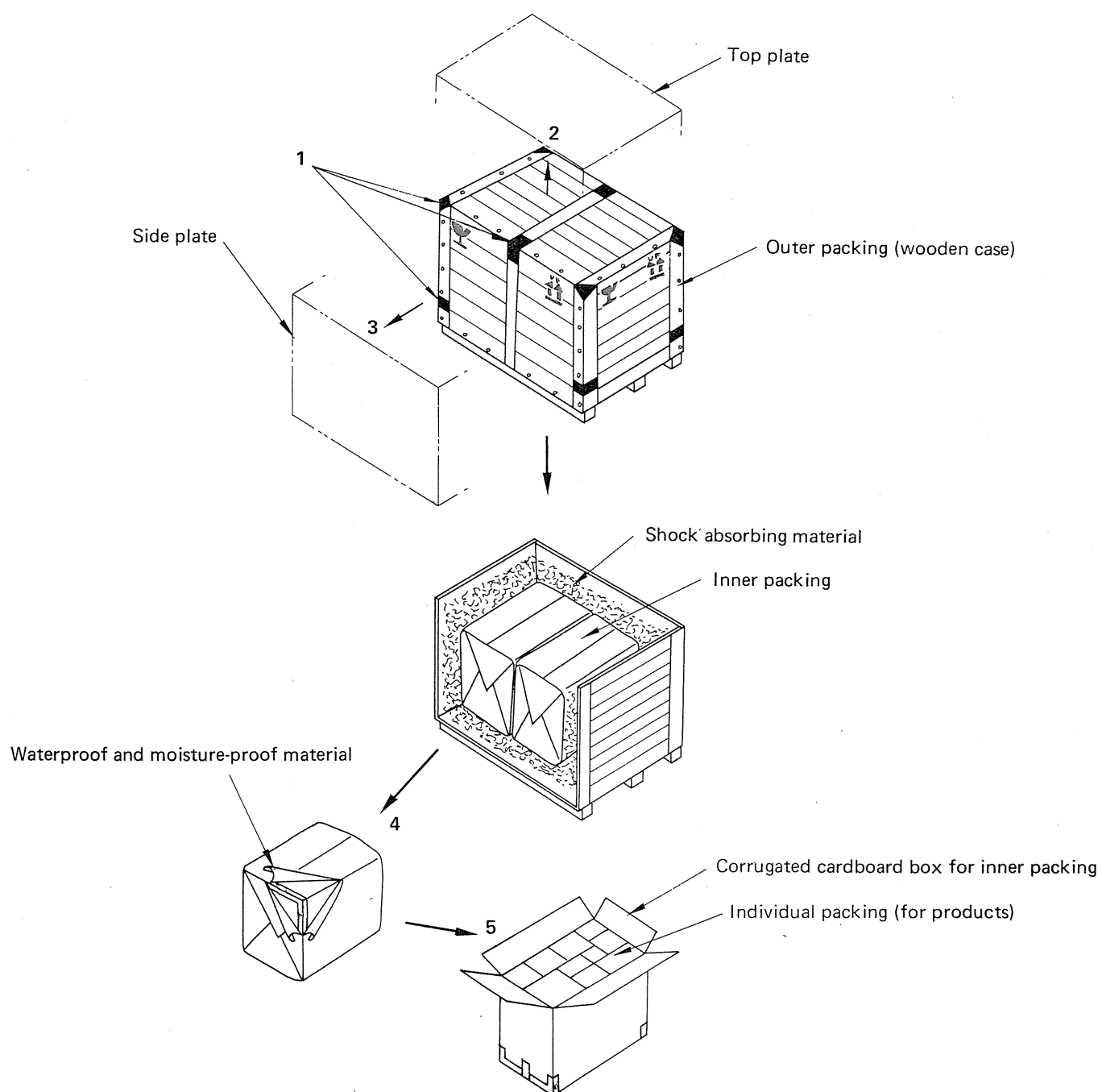


Fig. 21 Schematic diagram for opening packages (packages for accessories, disassembled parts and components)

INSTRUCTION MANUAL FOR DTU-70/7R3PQ 7.3KW UHF TV TRANSMITTER

..... HO2-344913-201

VOL. I

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- Indoor Coaxial Feeder	HO1-340761-204
- Liquid Cooling System	HO2-344778-201
- Pump Rack	HO2-344777-201
- Pump	HO2-340857-207
- Extension Cable Unit	HO2-344779-201

TABLE OF ABBREVIATION

	ABBREVIATION	NAME		ABBREVIATION	NAME
A.	A	Aural, Audio		CCIR	International Radio Consultative Committee
	AC	Alternating Current		CCW	Counter Clockwise
	ACB	Circuit Breaker		CIB (D)	Constant Impedance Band Pass (Diplexer)
	AD	AD Converter		CIN (D)	Constant Impedance Notch (Diplexer)
	ADJ	Adjust		CH	Channel
	AGC	Automatic Gain Control		CI	Continuous Signal Input
	ALM	Alarm		CLK	Clock
	AM	Amplitude Modulation		CN. CNO	Connector
	AMP	Amplifier		CO	Continuous Signal Output
	ANS	Answer		COAX	Coaxial
	ANT	Antenna		COM	Common
	APC	Automatic Phase Control		COMB	Combiner
	APL	Average Picture Level		COMP	Comparator
	ATT	Attenuator		CONT	Control
	AUTO	Automatic		CORR	Corrector
	AVE	Average		CPU	Central Processing Unit
B.	B, BL, BLW, BLOW	Blower		CR	Triac
	BA	Buffer Amplifier		CR	Thyristor
	BAL	Balance		CS	Coaxial Switch
	BEF	Band Elimination Filter		CT	Current Transformer
	BPF	Band Pass Filter			
C.	C	Capacitor			
	CAL	Calibration			

	ABBREVIATION	NAME		ABBREVIATION	NAME
D.	D	Diode		FB, F/B	Feed Back
	D, DIG	Digital		FC	Flat Cable
	DA	DA Converter		FIFO	First Input First Output
	DC	Direct Current		FIL	Filament
	DC	Directional Coupler		FIL	Filter
	DEMO	Demodulator		FIR	Finite impulse Response
	DET	Detector		FM	Frequency Modulation
	DEV	Deviation		FPA	Final Power Amplifier
	DG	Differential Gain		FREQ	Frequency
	DIA	Diameter			
	DIV	Divider	G.	G, GND	Ground
	DL	Delay Line		GDC	Graphic Display Controller
	DL, D/L	Dummy Load			
	DPA	Drive Power Amplifier	H.	HF	Harmonic Filter
	DS, D/S	Dual Sound		HT	High Tension
	DS	Diode Stack			
	DSB	Double Side Band	I.	IC	Integrated Circuit
	DSP	Digital Signal Processor		ICPM	Incidental Carrier Phase Modulator
	DP	Differential Phase			
	DVC	Digital Video Compensator		ID, I/D	Identity
E.				IF	Intermediate Frequency
	EL (D)	Electro Luminescent (Display)		I/F	Interface
	ENV	Envelope		IM	Intermodulation
	EQ	Equalizer		INT	Internal
	EX	Exciter		I/O	Input/Output
F.	EXT	External		IRT	Institut Fur Rundfunk Technix
			J.	J	Connector, Jack
	F	Fuse			
	F	Frequency			

	ABBREVIATION	NAME		ABBREVIATION	NAME
K.	K	Relay		NVRAM	Nonvolatile Random Access Memory
	K	Klystron			
L.	L	Coil	O.	OCXO	Oven Controlled Crystal Oscillator
	LED	Light Emitting Diode		OFS	Offset
	LD	Linear Detector		OL	Over Load
	LIN	Linear		OLR	Over Load Relay
	LO, LOC	Local		O/P	Output Power
	LPF	Low Pass Filter		OPE	Operation
	LT	Low Tension		OPF	Output Filter
	LUMI	Luminance		OSC	Oscillator
M.	M	Meter	P.	P	Connector, Plug
	MIX	Mixer		PA	Power Amplifier
	M-NET	A Kind of Scramble System		PAL	Phase Alternation by Line
	MOD	Modulator		PARA	Parallel
	MON	Monitor		PCB	Printed Circuit Board
	MONO	Monaural		PC	Photo Coupler
	MS	Magnet Switch		PI	Pulse Signal Input
	MS, M/S	Multi Sound		PCM	Pluse Code Modulation
	MPSC	Multi-protocol Serial Controller		PIE	Program Input Equipment
N.	NF	Notch Filter		PJ	Plug Jack
	NFB	Non-fuse Breaker		PLL	Phase Locked Loop
	NICAM	A Kind of Multi Sound System		PO	Pulse Signal Output
	NOR/INV	Normal Invert		POW	Power
	NTSC	Nation Television System Committee		PRE-EM	PRE-Emphasis
				PROC	Processor
				PS	Power Supply
				PWB	Printed Wire Board
				PWR	Power

	ABBREVIATION	NAME		ABBREVIATION	NAME
Q.	Q	Transistor		S. RFRM	Synchronized Waveform Reformed
R.	R	Resistor		ST	Stereo Phonic
	RAM	Random Access Memory		STL	Studio to Transmitter Link
	Rb	Rubidium		SW	Switch
	R/C	Remote Control		SYG	Synchronized Waveform Gate
	REF, REFL	Reflect		SYNC	Synchronize
	REF	Reference		SYNTHE	Synthesizer
	REGEN	Re-Generator			
	REM	Remote	T.	T	Transformer
	RES	Response		TB	Terminal Board
	RF	Radio Frequency		TCXO	Temperature Compensated Crystal Oscillator
	RL	Relay		TEMP	Temperature
	RN	Resistor Network		TDR	Timer, Time Delay Relay
	ROM	Read Only Memory		TH	Thermistor
	RT	Thermistor		T/L	Test Load
	RX	Receiver		TOCOM	A Kind of Scramble Sysrem
S.	S	Switch		TR	Transistor
	SA	Synchronized Waveform Added		TRS	Thermal Lead Switch
	SAW	Surface Acoustic Wave		TTL	Transistor Transistor Logic
	SC	Subcarrier		TX	Transmitter
	SCR	Silicon Controlled Rectifier			
	SECAM	Séquentiel Couleurs A Mémoire	U.	UHF	Ultra High Frequency
	SEL	Select		UNBAL, UBL	Unbalance
	SEP	Separator			
	SG	Signal Generator			
	SIG	Signal			

	ABBREVIATION	NAME		ABBREVIATION	NAME
V.	V	Visual, Video			
	VC	Variable Capacitor			
	VCXO	Voltage Controlled Crystal Oscillator			
	VDA	Video Distribution Amplifier			
	VFO	Variable Frequency Oscillator			
	VHF	Very High Frequency			
	VR	Variable Resistor			
	VSB	Vestigial Single Side Band			
	VSBF	Vestigial Single Side Band Filter			
	VSWR	Voltage Standing Wave Ratio			
W.	W	Wire			
	W	Circulator			
X.	X'tal	Crystal			
Y.	Y	Circulator			
Z.	Z	Divider/Combiner			
	Z	Directional Coupler			
	Z	Surge Absorber			
	ZNR	Surge Absorber			

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DTU-70 Series UHF DIGITAL TV TRANSMITTER

SECTION. 1 CAUTION AND SAFETY

1-1 General

This transmitter has capability of supplying energy up to 14.3kW (average) as high radio frequency signal and mishandling this transmitter may have, not only damage of any equipment associated with this transmitter, but also cause injury or death of person (people) in access to live parts. So any operator for this transmitter must read this instruction manual thoroughly before starting its operation and handle this transmitter's operation correctly.

1-2 Cautions for Use



WARNING

Expresses condition of a possible dangerous that has possibility of causing personal death or injury if not avoided.



HIGH VOLTAGE

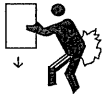
Supplied with 400V AC

- (1) Turn OFF all circuit breakers (ACBs) located on top of the front panel of the transmitter before removing its side covers for its maintenance work.
- (2) Turn OFF all circuit breakers (ACBs) for the transmitter, located at the distribution board of the transmitter station, before removing ACB panel mounted on top of the front panel of the transmitter.
- (3) Select "LOCAL" mode during maintenance work of the transmitter to avoid any transmitter control by remote control equipment/system, which could cause any dangerous situation for local maintenance people.



HIGH TEMPERATURE

- (1) Surface of cooling pipes and power combiner mounted on the back of UA5000QF TRPA unit could become with high temperature during its operation. Sufficient care should be taken in order to prevent access to these parts which may cause severe injury.



HEAVY WEIGH

- (1) The UA5000QF TRPA is heavy. At least, two people should work together to prevent any personal injury and/or shock of the unit by its accidental fall.



CAUTION

Expresses condition of a possible danger that has possibility of causing a minor or medium trouble if not avoided, and also expresses dangerous condition supposed to cause material defects only.

- (1) Be sure to mount the transmitter in vertical position without slant.
- (2) Do not step on top of the transmitter rack.
- (3) Do not step on cooling pipes nor put any articles on the pipes.
- (4) Do not work by wet hand.
- (5) Wipe water splashed on any part of the transmitter with a dry cloth.
- (6) When tightening or loosening any flange of water pipes, be sure to use two pipe wrenches. Otherwise, water pipes may deform or twist.
- (7) When pulling out PA from transmitter rack, be sure to:
 - (a) disconnect input cable of the PA and keep it away not to get any damage during PA replacement work,
 - (b) turn off the AC breaker of the PA located at rear side of the rack and
 - (c) close inlet/outlet valves for the PA located at rear side of the rack.
- (8) Do not disconnect two or more PAs while the transmitter is in operation.

- (9) Be sure to mount the PA to come to the end position into the rack when mounting. Also be sure to check if any other PAs mounted on the rack are not disconnected by shock during mounting work of the PA.
- (10) Take carefully while mounting/dismounting any unit of the transmitter (exciter, TX control, etc.) so that the cables located at rear space of the unit are not caught up with.
- (11) Do not operate the transmitter with external interlock terminal which is just strapped. Unexpected accident could be occurred in such a case.
- (12) When any PA which was used will be stored to any storage or shipped back to any repair center, be sure to drain cooling water completely inside of the PA by using FOOT PUMP attached as a part of accessories.



Disposing of your used NEC product

In the European Union

EU-wide legislation as implemented in each Member State requires that used electric/electronic products with the mark (left) carried must be disposed separately from normal household wastes. This requirement includes transmitter and its electrical accessories, such as interface-connectors.

When you dispose of such products, please follow the agreements made by you and NEC. This mark carried on electrical/electronic products only applies to the current Member States of European Union

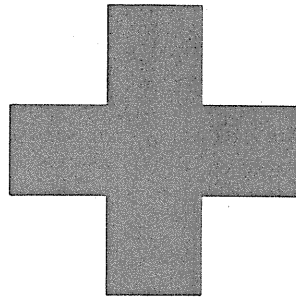
Outside the European Union

If you wish to dispose of used electrical/electronic products outside of European Union, please contact your local authority and ask for the right approach of its disposal.

FIRST AID

in the operation of this equipment

DEATH ON CONTACT



HIGH VOLTAGE
is used in the operation of this equipment.

CAUTION

1. This equipment utilizes a high voltage, and prudent caution must be taken in accessing to it.
 2. At the outset of adjustment for installation, the earth terminals must be connected with an earthing conductor.
 3. At the start of the installation adjustment, check the direction of rotation of the blower.
-

SAFETY NOTICE

1. SECURITY

Even how the radio engineers who are concerned in maintenance of broadcasting apparatus, receive many warnings or recommendations for the security, there is no limitation as regards the sufficient security.

To emit electric waves from the present broadcaster, very high electric potential consisting of direct current high voltage, voice frequency voltage and high frequency voltage, which overlap mutually, is given to the grounding side of the voltage that is supplied to the anode circuit of transmitter valve. Additionally, in the intermediate power amplification circuits, a high potential of which degree depends on each circuit, is given. Because of this, the total amount of the potential energy which these high voltage circuits constantly possess during the broadcaster is in operation, is, as has been known, utterly sufficient to take our lives away to the heaven by a touch. The reason for this depends upon the unfortunate fact that the human body can be a good path for electric energy. In consequence, we can say that our work accompanies dangerousness always, and it is essential to sufficiently forewarn each other for the security of engineers themselves during their works, as well as to previously know the remedies against the potential occurrence of any accidents.

Based upon these reasons, this one chapter is arranged for the security.

2. Cautions in handling the transmitter while a transmitter is adjusted or maintained, it is desirable to keep in mind the below mentioned items.

- (1) Always wear thick cotton gloves or rubber gloves on both hands. Wear socks and rubber sole shoes.
- (2) Wear working clothes, and cover the body as much as possible even in the hot weather. Do not take off the clothes. Do not wear sandals or clogs.
- (3) Night work is more dangerous because of drowsiness and fatigue. A person who is sick, has worries or has not slept well the night before is advised not to attend high voltage equipment.

(4) Do not repair or adjust the transmitter by himself.

(5) In case of the inspection of the transmitter interior, the high tension circuit shall be grounded by an earth bar only after confirming that the high tension power voltmeter indicates the zero point.

(6) In no circumstances or for no reasons whatsoever, the function of the door switch shall be nullified.

(7) Before the power is turned on, all the people who are not concerned must be away from the equipment, and any possibility of danger must be double-checked. Then call out, "Is it all-right to switch the power on?" Only after getting the answer, such as, "all-right", the switch shall be turned on.

(8) Should an electric shock accident occur, cut off all the power instantly to commence rescue.

(9) Even if the shock is slight, the victim becomes very nervous. Therefore, it is necessary to put him to a rest appropriately until such a mental shock disappears.

3. SUBJECTIVE SYMPTOM IN ELECTRIC SHOCK

Regarding the state of body in a case that you receive an electric shock and the remedies against it provided you are still conscious, its subjective symptom and also some easy methods of self-rescue will be described.

(1) In an electric shock, you feel it utterly unpleasant even if it is due to a low voltage of around 250 V. It is followed by a long-time palpitation and an unsolvable anger, then the loss of will to continue the operation in most cases. At the parts through which an electric current entered or went out, black or white burn is left as scar. The physical suffering is usually due to the impression of burn, and this recovers within several days through a medical treatment by adaptive medicines.

- (2) In a case that you received a relatively high-voltage electric shock, it causes an extremely strong suffering. The suffering is due to other causes but not to the trauma by the burn. For an example, in a case of an electric shock by a high voltage that is used for the present broadcaster, the following symptom is observed; around the part through which an electric current entered, and the part through which it went out, e.g., it entered from a right arm and went out from a right foot, the sensory nerves of breast muscles through which electric passes, and of the whole of the right arm and the right leg are so paralyzed as if any intense blow of very hard substance were given to the parts.

Simultaneously, the motor nerves of breast are also paralyzed, and the respiration may sometimes stop temporarily. What can we do provided one of ourselves is in such the state? The temporal paralysis of respiration nerves by the electric shock can be naturally removed in the course of time, otherwise one must experience suffocation till it recovers. Thus, if any co-worker executes the artificial respiration, one can get well, while in a case of absence of other people, one must try to become capable of respiration as much as possible by giving a physical force to the paralyzed breast, for example, by striking and pressing the breast to the wall, desk or floor from the back. This is, therefore, an execution of artificial respiration by ourselves in straitened circumstances. During this we must encourage our own spirit and endure this painful state of suffocation, firmly believing that the present paralysis is of merely temporal short period of time.

Shortly after the self-artificial respiration, one becomes able to slightly move the arm and gradually becomes able to move the breast muscles as well. Since the heart has been weakened, after the recovery of respiration, it is essential to have a rest sufficiently.

- (3) Whether our lives can be rescued or not, depends on not only the degree of electrical intensity but also on individual. It is

thought that there is any difference between individuals, e.g., even when an adaptive remedy was taken, one shows a high resistance against the shock and an immediate healing, while another has less resistance and is led to ill result.

In addition to the individual condition, provided one who is much resistive to a shock in an ordinary state, is in such a state of, as examples, hunger, insufficient sleep or excessive labor, he becomes weak temporarily. Thus, it is necessary to take good care of ourselves everyday to minimize such the possible ill conditions.

4. FIRSTAID TREATMENT FOR ELECTRIC SHOCK

Some firstaid treatments which may be well consultable, will be introduced here.

First aid for an electric shock.

Here are some typical first aid treatments.

- (1) Artificial respiration (by Nielsen's method).

Artificial respiration is performed at respiratory standstill, so as to supply the circulating blood with oxygen by artificially sending the air into the lungs, and thereby stimulate the central nerve system, and restore spontaneous respirations. It is not, however, effective in the presence of cardiac arrest (when cardiac massage is needed). On the other hand, even if the victim is unconscious, if he continues to make respirations, no artificial respiration is needed.

PREPARATION FOR ARTIFICIAL RESPIRATION

If the victim is lying in the supine position (on the back), turn the victim into the prone position (into the posture lying on the back) by the following procedure:

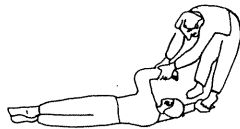
- a) The operator of artificial respiration keeps on one knee on the side to which he intends to turn the victim, and flings up the arm of the victim on his side (e.g., right arm) (Fig. 1).



(Fig. 1)

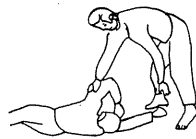
- b) The operator grasps the other arm (left arm) of the victim by the wrist, and pulls the arm while walking in the direction of the victim's head, so as to raise the victim's body half way (Fig. 2).

(Fig. 2)



- c) The operator then grasps the victim's arm by the forearm instead of by the wrist, and pulls the arm hard rightwards while applying the back of the victim's hand that is dangling, to the victim's jaw: the victim can be easily changed into the prone position (into the posture lying on the abdomen) (Fig. 3).

(Fig. 3)



- d) The operator releases the victim's arm, grasps the victim's right hand, and inserts it beneath the victim's left arm so that the back of the right hand will be beneath the left arm: the victim is in the prone position (on the abdomen), with his jaw on the hands (Figs. 4 and 5).



(Fig. 4)

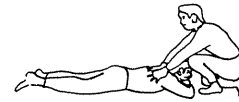


(Fig. 5)

HOW TO PERFORM ARTIFICIAL RESPIRATION

- a) The operator places his hands on the victim in such a way that the bases of his hands will be on the line which connects the lower part of one of the victim's arms with that of the other. Ensure that the operator opens his fingers and thoroughly stretches his arms. Perform this action while calling "one" (Fig. 6).

(Fig. 6)



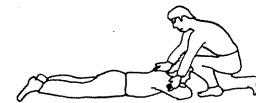
- b) While calling "two", he gently raises his waist until his arms are vertical (Fig. 7).

(Fig. 7)



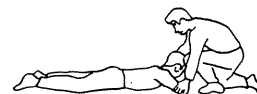
- c) While calling "three", he draws his body slightly backwards, and releases his hands from the victim. At this time, ensure that the thumbs are released first, and the small fingers last (Fig. 8).

(Fig. 8)



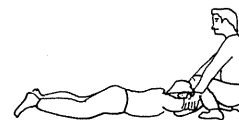
- d) In the next place, while calling "one", the operator applies his hands to that part of the victim's upper arms which is closer to the elbow (Fig. 9).

(Fig. 9)



- e) While calling "two", he sways his body slightly backwards, so as to raise the victim's arms as if slightly drawing the victim's elbow in the operator's backward direction (Fig. 10).

(Fig. 10)



Repeat this series of actions at a rate of 10 to 12 times a minute, namely, one series of actions in about five seconds. Ensure not to

raise or pull the victim's arms backward so hard that victim's head will move. Stop raising or pulling the arms when the operator has felt resistance, and the thorax (breast) is enlarged wide enough.

HOW TO SHIFT

The operators of artificial respiration can shift in the following way:
In order to synchronize the rhythm of the operator in operation, the operator who is going to take over him should be positioned abreast with him, place his hands on the ground, and repeat the said series of actions several times, by synchronizing with the rhythm of the operator at operation, while calling "one, two, three" by heart. The operator in operation will call "next" instead of "one" at about the time when he thinks the operator who will take over him must have acquired the rhythm, and after having completed a series of actions while calling "two, three", and "one, two, three", he quickly moves away from the victim.

The operator who is taking over quickly gets into the operator's position from the lateral side, places his hands on the victim while calling "one", and continues artificial respiration at the same rhythm at which the predecessor has been making it.

CAUTION TO BE TAKEN AT PERFORMING ARTIFICIAL RESPIRATION

- a) Keep the victim warm by wrapping with a blanket, etc.
 - b) Open the mouth of the victim, to remove any foreign materials such as dentures, chewing gum, tobacco, etc.,
 - c) Even when the victim has restored spontaneous respirations thanks to artificial respiration, keep him at rest for 8 to 24 hours, and ensure that he receives medical care.
- (2) **Respiratory resuscitation.**
Respiratory resuscitation is such a method of resuscitation that the operator blows his expired air into the victim's lungs through the mouth or the nose, so as to resuscitate the victim, and is the most excellent of all techniques of artificial respiration.

HOW TO PERFORM RESPIRATORY RESUSCITATION

- a) The operator inserts a material which is as thick as a brick, underneath the shoulders of the victim, so as to extend the victim's throat sufficiently by raising his jaw (Fig. 1).
- b) The operator holds the victim's nose with one hand, opens the victim's mouth slightly by pressing the jaw with the other hand, fits his mouth to the victim's tightly, and blows the expired air in (if the operator does not like to fit his mouth directly to the victim's, place a handkerchief or a towel on the victim's mouth, and blow the air) (Figs. 2 and 3).
- c) Blow the expired air at a rate of 10 to 12 times a minute.
- d) When the victim's chest is inflated, and the operator has felt resistance, he then stops blowing the air in any longer, and releases the mouth immediately so as to cause the victim to expire the air.



(Fig. 1)



(Fig. 2)



(Fig. 3)

CAUTIONS TO BE TAKEN AT RESPIRATORY RESUSCITATION

- a) Open the victim's airway wide enough.
- b) Prevent leakage of the air (the expired air to be blown in).
- c) Blow the expired air in adequately according to the inflation of the victim's chest. When the operator has felt resistance to blowing the air in, release the mouth immediately so as to cause the victim to expire the air.
- d) Blow the air in at 3 second intervals the first ten times, and at five second intervals subsequently.

- e) When the operator has released the mouth, listen to the expired air sound.
- f) If the expired air cannot be well blown in, the victim's chest does not inflate sufficiently, and the expired air sound is not audible despite that the airway is open, blow the air in via the victim's nose.

(3) Closed chest massage

(external cardiac massage).

The closed chest massage (hereinafter referred to as "cardiac massage") is performed in parallel with the respiratory resuscitation without fail, in the presence of cardiac standstill. The respiratory resuscitation should be performed at a rate of once every three seconds the first ten times.

That is, when the air is blown in over one second, the mouth is released, and no air is blown in for the following two seconds while the operator is calling "two, three". Repeat this cycle five times, and while performing it another five times, the operator releases his hand which has held the victim's jaw, and palpates the carotid artery of the victim, to check whether the artery is throbbing or not. If it is not throbbing, immediately open the victim's eyelids to check if the pupil is wide open or not.

Perform the above-mentioned checkings while the operator is performing the respiratory resuscitation ten times in the first thirty seconds. Perform the respiratory resuscitation at a rate of once every three seconds the first ten times, and at a rate of once every three seconds the first ten times, and at a rate of once every 5 seconds thereafter. If the heart beating is arrested, perform the cardiac massage in the meantime. In other words, the operator of cardiac massage performs the massage at a rate of once every one second, and the operator of respiratory resuscitation blows the expired air in once every five times of cardiac massage.

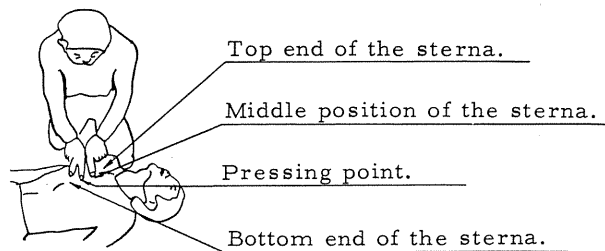
Perform the artificial respiration and cardiac massage by two operators as described in the foregoing.

HOW TO PERFORM CARDIAC MASSAGE

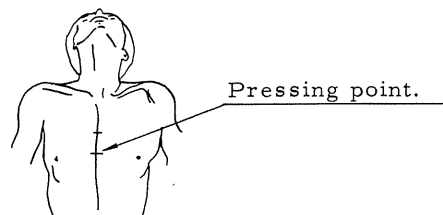
- (1) Decision of the place where the operator places his hands.
 - a) Measure the distance between the top end and the bottom end of the sterna (Fig. 1).
 - b) Find the middle (1/2) position (Fig. 2).
 - c) Find the middle (1/2) position of the bottom half distance (the part indicated with the index finger of the right in the figure).
 - d) Assume the arrowed (→) part in the figure as the position of the ventricle.



(Fig. 1)

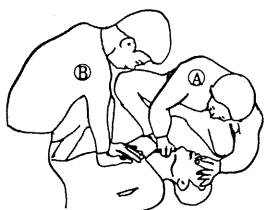


(Fig. 2)



- (2) How to perform (by two operators).
 - a) One operator kneels on his right knee, and takes a posture with the waist lifted, and applies the palm base of his right hand to the "pressing point" (Fig. 3).

- b) The operator stretches the elbow of the right arm so that the right shoulder will be right over the wrist.
- c) He then places the palm base of the left hand over the back base of the right hand, and stretches the left arm straight. Operator B presses the heart down five times (at a rate of once every one second) (over a distance of 2.5 to 5 cm). Operator A blows the breath in once while operator B presses the heart five times, and Operator B palpates the carotid artery of the asphyxial victim while Operator B is performing the cardiac massage, so as to check whether Operator B is performing it in the right way or not. And he gives advices to Operator B in respect of the way of pressing.



(Fig. 3)

- (3) How to perform (by one operator).
 - a) The operator first performs the respiratory resuscitation five times at a rate of once every three seconds, and in the meantime, checks for cardiac arrest.
 - b) The operator places the palm bases of his hands at the pressing point, stretches the arms straight, and presses the heart vertically downwards. Repeat the pressing 15 times, at a rate of once every one second, and then perform the respiratory resuscitation twice. Repeat this cycle (Fig. 4).



CAUTIONS TO BE TAKEN

It should be born in mind that, in performing the cardiac massage effectively, it is inevitable to more or less damage the sterna and ribs. If the operator is worried about the possible damage to the sterna and ribs, he can never perform the effective cardiac massage. On the other hand, the operator should master the technique thoroughly so as not to cause unnecessary damages.

(4) Restoratives.

INHALING STIMULANTS

In case an ammonia-containing aromatic agent is used for inhalation, the applicant should ensure by himself how close it can be brought to the nostrils, and then apply it for only such a short duration as 1 to 2 seconds every minute while exercising care so as not to bring the drug closer to the nostrils of the victim beyond the range determined by himself.

LIQUID STIMULANTS

When the victim has restored consciousness, give him a cup of water or hot coffee or tea containing half a tablespoonful of an ammonia aromatic agent as a stimulant. Do not give any liquid to an unconscious victim in any circumstances.

NEC

HTD-E-3561 3rd

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SECTION. 2 GENERAL INFORMATION

2-1 Scope

This instruction manual contains information for your operation and maintenance of DTU-70 series UHF Digital TV transmitter including its cooling equipment, pump rack and heat exchanger unit.

Information of each unit mounted into the transmitter rack should be referred to instruction manual of each unit. See section.7 of VOL.I, "UNITS AND" PANELS".

2-2 General

The DTU-70 series is NEC's latest UHF DIGITAL TV transmitter used for Digital TV broadcasting.

The major features are as follows.

(1) Channel-Free Transmitters

The component units of this transmitter such as synthesizer, up converter and power amplifier (PA) unit are applicable to use in entire UHF band. Thus, this series can be used for all the channels in the UHF band without replacement of any components part.

(2) Voltage control in the amplifier to improve power efficiency

Voltage control for LD-MOS power transistors in power amplifier via TX control allows to optimize transmitter's efficiency. This voltage control significantly improves its efficiency, especially when a transmitter is operated at reduced output power.

(3) High-Efficiency and easily handling Cooling System

The liquid cooling system features a jet liquid cooling system which provides an extremely high-efficiency liquid flow, and employs a hybrid closed circuit that takes advantage of both open and closed circuits. Compared with the conventional closed circuit, our circuit has the following advantages:

- Easy coolant feed.
- Easy air purge from cooling pipes.
- Dusts that strainers or filters cannot remove will precipitate at the bottom of the tank and can easily be removed.

(4) Compact Size

Its compact size contributes effective use of space of transmitter room. Pump rack can be mounted into transmitter rack in case of transmitter model which has up to 5 PA units.

(5) High Reliability

This transmitter series incorporates functions to monitor status of each unit so that operator can easily recognize transmitter condition and find any alarms quickly to prevent any serious problems and assure continuation of its stable operation.

(6) Excellent Maintenance Function

Adaptive Digital Corrector (ADC) updates correction coefficients automatically and keeps the best signal qualities of a transmitter. With the adaptive function, routine maintenance activities are greatly reduced.

(7) Ease of Operation and user-friendly monitoring

This transmitter is equipped with 40 x 2 characters LCD (or optional color LCD) for showing its operating and alarm status for you so as to be perceptible at a glance.

The TX control unit features a built-in web server and SNMP agent. By connecting transmitter with your local area network, status of your transmitter can be monitored and controlled from your remote PC with standard web browser. Control and monitor of your transmitter are also available from your SNMP manager.

Wide variety of electronic circuit design for the transmitter have been incorporated in order to improve its operational flexibility and life expectancy of its Power Amplifier (PA) unit.

2-3 Coding System

The coding system of the DTU-70/** is as follows.

Digital TV Transmitters (UHF Band) : DTU-70/ a a a b c d

a a a : Output Power

2R5	: 2.5kW
3R7	: 3.7kW
4R9	: 4.9kW
6R1	: 6.1kW
7R3	: 7.3kW
8R5	: 8.5kW
9R7	: 9.7kW
10R9	: 10.9kW
12R0	: 12.0kW
14R3	: 14.3kW
16R5	: 16.5kW
19R0	: 19.0kW
21R0	: 21.0kW
23R5	: 23.5kW

b : Configuration

- S : Single Transmitter
- P : Single Transmitter with Dual Drive, Multiple PAs and Dual Cooling
- PE : Single Transmitter with Dual Drive, Single PA and Single Cooling
- W : Dual Transmitter in Parallel Operation

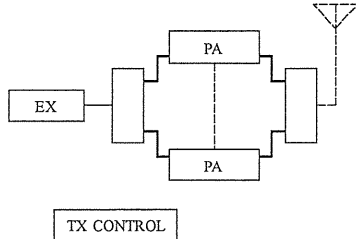
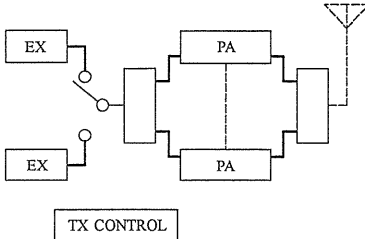
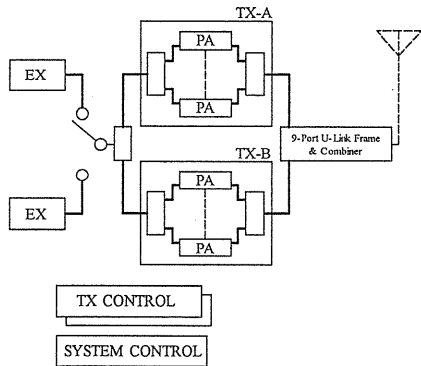
c : Cooling Type

- Q : Liquid cooling
- QF : Built-in liquid cooling (up to five Power Amplifiers)

d : Option

- B : Built-in band-pass filter

Table 2-1 System Configuration of TV Transmitter

TX TYPE	S type	P type	W type
	Single Transmitter (Single Exciter, Single Cooling)	Single Transmitter with Redundancy (Dual Exciter, Dual Cooling)	Dual Transmitter in Parallel Operation
OUTLINE DIAGRAM			 <p>Main/Stand-by exciters are switched automatically in case of trouble on main exciter.</p>
EXCITER OPERATION SYSTEM	1 set : Single Operation	2 sets : Passive Reserve Operation	2 sets : Passive Reserve Operation
COOLING SYSTEM	Single Operation	Passive Reserve Operation	Each transmitter has a cooling system with single operation

2-4 Principal Characteristics

Table 2-2

RF output power	:	2.5kW / 3.7kW / 4.9kW / 6.1kW / 7.3kW / 8.5kW / 9.7kW / 10.9kW / 12.0kW / 14.3kW / 16.5kW / 19.0kW / 21.0kW / 23.5kW	
Frequency range	:	UHF Band IV or V (470-862MHz)	
Frequency stability	:	$\pm 1.0 \times 10^{-7}$ over a period of 1 year with internal reference	
Power supply			
Voltage	:	380 / 400 / 415V, 3-phases, 4-wires	
Voltage stability	:	+10%, -15%	
Frequency stability	:	$\pm 2\%$	
Power consumption	:	Approx. * kVA	
Dimension		Up to 14.3kW	Over 16.5kW
Width	:	615mm	1230mm
Height	:	2000mm	2000mm
Depth	:	1200mm	1200mm
Ambient requirement			
Temperature range	:	Transmitter room: 0°C to +45°C, Outside : -30°C to 40°C	
		Transmitter specifications are guaranteed	
Relative humidity	:	90% maximum without condense	
Altitude	:	As determined by your site location	

NOTE : * See Factory Test Data of your transmitter.

2-5 Composition

It's recommended that operational personnel becomes familiar with various components their names used on this transmitter from functional and physical points of view. This recommendation will assist you its proper operation and maintenance.

2-5-1 Functional Composition

See Table 2-3 for your understanding which and how many unit each transmitter type consists of into the following four sections of this transmitter.

Table 2-3

	Exciter Section		Power Amplifier Section			Control and Monitor Section		Cooling Equipment Section	
	DM Series EXCITER	HPC-1606 Exciter Switch	UA5000QF Power Amplifier	Divider	Combiner	HPC-1605 TX Control	Color LCD Display (Optional)	Pump Rack (Single Pump type)	Heat Exchanger (No-redundant fan type)
S Type									
DTU-70/2R5SQ(F)	1	-	2	1	1	1	(1)	1	1
DTU-70/3R7SQ(F)			3						
DTU-70/4R9SQ(F)			4						
DTU-70/6R1SQ(F)			5						
DTU-70/7R3SQ			6						
DTU-70/8R5SQ			7						
DTU-70/9R7SQ			8						
DTU-70/10R9SQ			9						
DTU-70/12R0SQ			10						
DTU-70/14R3SQ			12						
DTU-70/16R5SQ			14	3	3				
DTU-70/19R0SQ			16						
DTU-70/21R0SQ			18						
DTU-70/23R5SQ			20						

Table 2-3 (continued)

	Exciter Section		Power Amplifier Section			Control and Monitor Section		Cooling Equipment Section	
	DM Series EXCITER	HPC-1606 Exciter Switch	UA5000QF Power Amplifier	Divider	Combiner	HPC-1605 TX Control	Color LCD Display (Optional)	Pump Rack (Dual Pump type)	Heat Exchanger (Redundant fan type)
P Type									
DTU-70/2R5PQ(F)	1	1	2	1	1	1	(1)	1	1
DTU-70/3R7PQ(F)			3						
DTU-70/4R9PQ(F)			4						
DTU-70/6R1PQ(F)			5						
DTU-70/7R3PQ			6						
DTU-70/8R5PQ			7						
DTU-70/9R7PQ			8						
DTU-70/10R9PQ			9						
DTU-70/12R0PQ			10						
DTU-70/14R3PQ			12						
DTU-70/16R5PQ			14	3	3				
DTU-70/19R0PQ			16						
DTU-70/21R0PQ			18						
DTU-70/23R5PQ			20						

2-5-2 Physical Composition

Outside view of typical DTU-70 series transmitter are shown in Fig.2-1 and Fig.2-2. The DTU-70 Transmitter up to 14.3kW is mounted in one rack which accommodates exciters, PAs, and control unit.

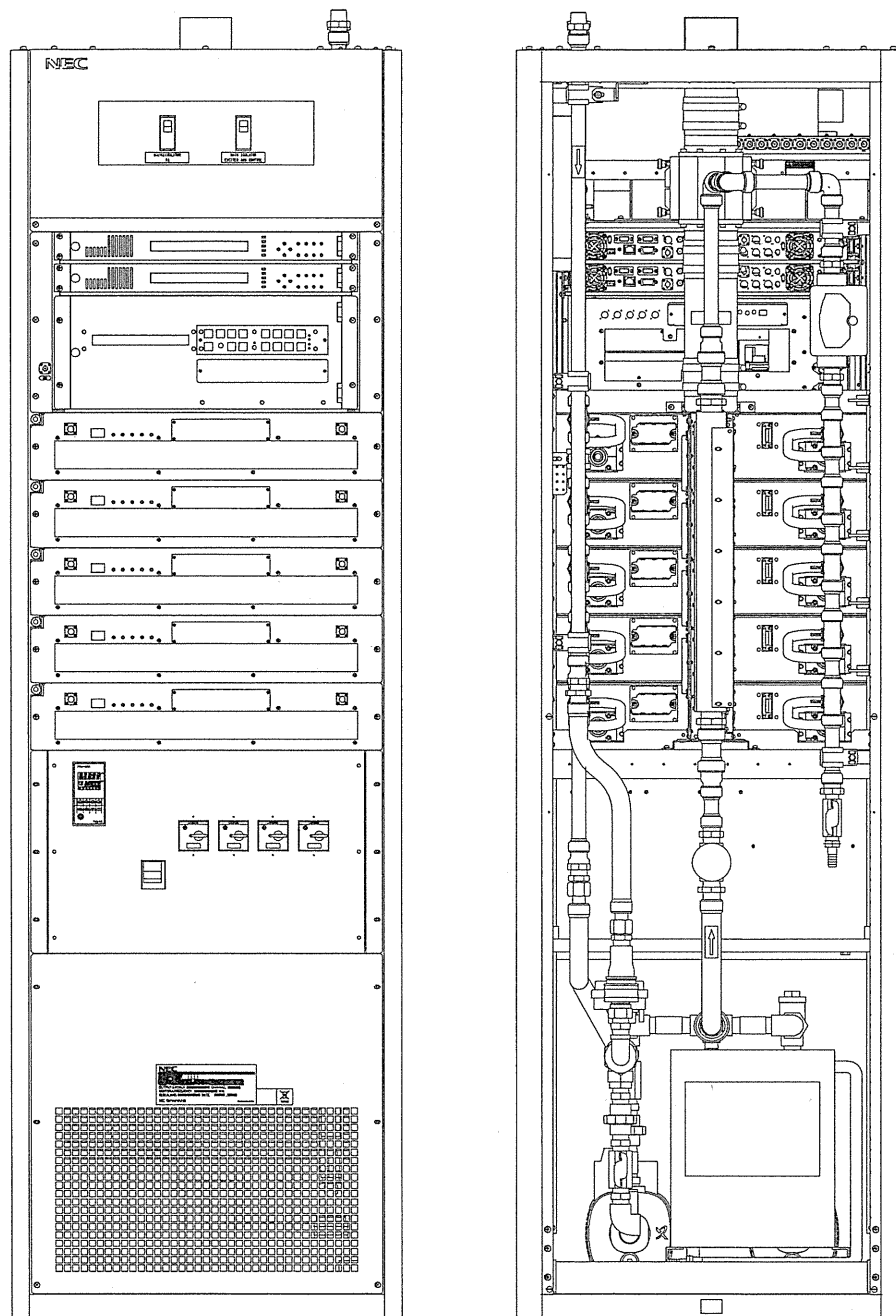


Fig. 2-1 Front and rear view of DTU-70/6R1PQ with built-in cooling system

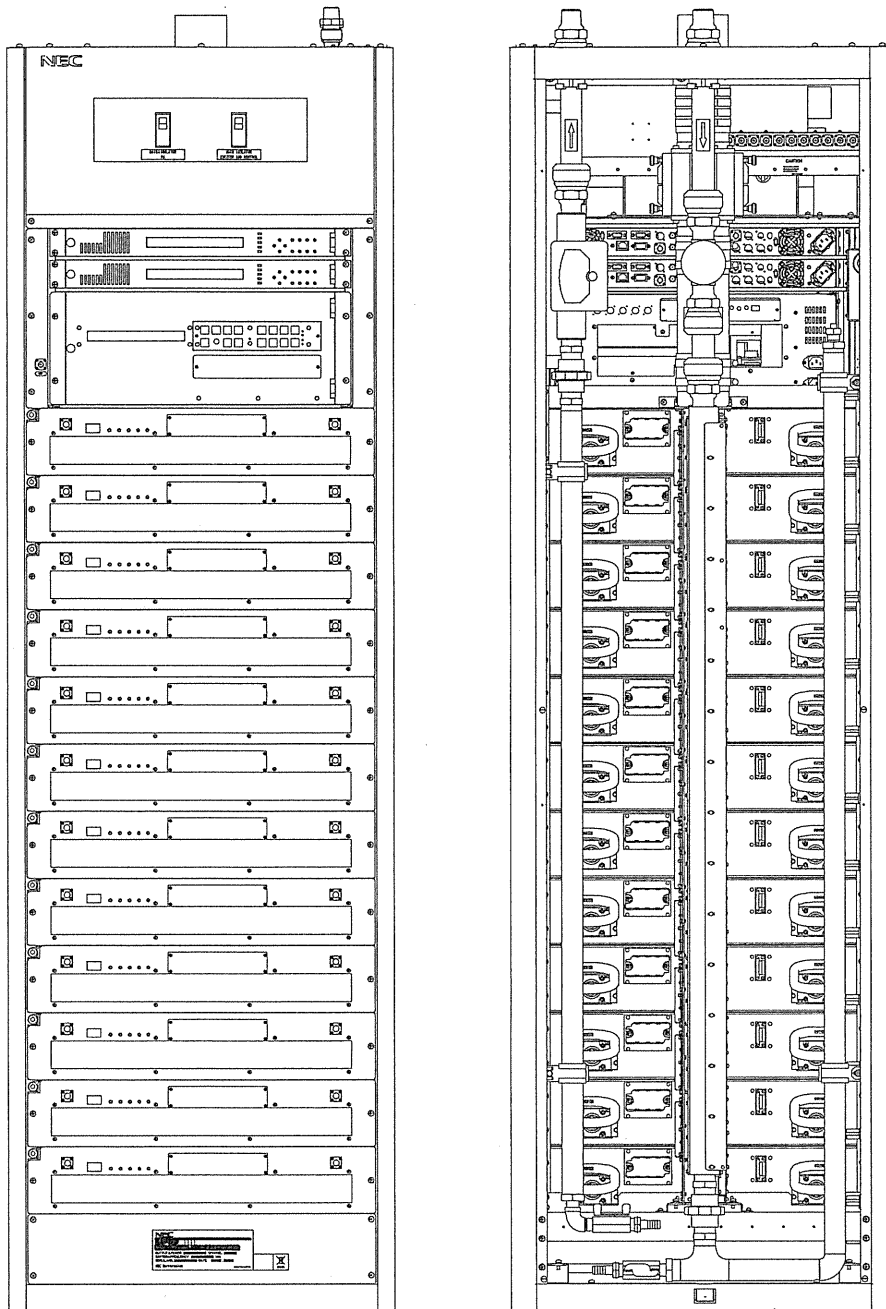


Fig. 2-2 Front and rear view of DTU-70/14R3PQ

SECTION. 3 FUNCTIONAL DESCRIPTION

This section furnishes the operator with sufficient information pertaining to the functions of the DTU-70 series by reference to the circuit sections introduced in 2-5, as well as to the block diagram of Fig. 3-1.

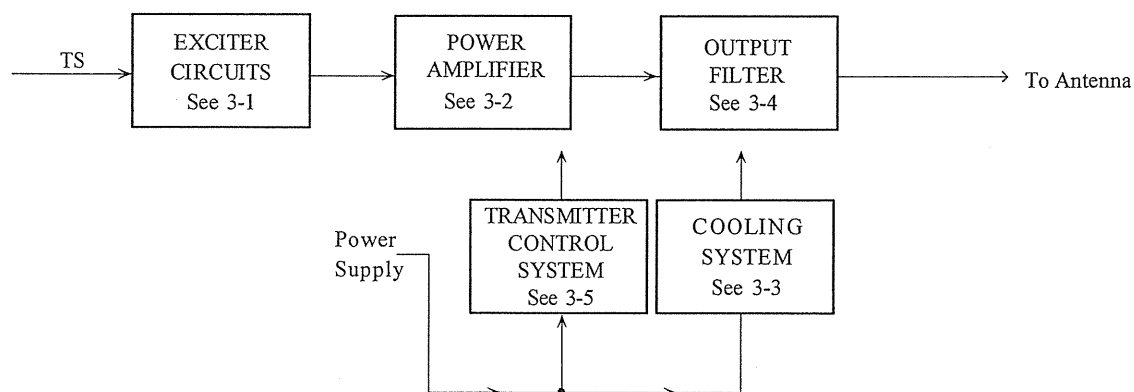


Fig. 3-1 Simplified block diagram of digital transmitter

3-1 Exciter Section

DM-3000D ISDB-T Exciter is designed for ISDB-T digital TV transmitter system and it has most of digital transmitter's essential functions like OFDM modulation, frequency up-conversion, linearity correction and etc. OFDM modulation function is complied with ISDB-T standard (ARIB STD B31)

3-1-1 Characteristics

Table 3-1 lists the electrical characteristics of DM-3000D Exciter.

Table 3-1 Electrical Characteristics of Exciter

Function	Characteristics
TS Input (ASI IN)	
Signal Type	DVB-ASI, ARIB STD-B31
Connector Type	BNC-J (75 Ω)
RF Output (RF OUT) Level	+10dBm max
Frequency	UHF:470~862MHz
Connector Type	BNC-J (50 Ω)
FSYNC Input Level	0.8Vp-p
Connector Type	BNC-J (75 Ω)
System Clock Input (CLK IN) Signal Type	10MHz or 512/63 MHz (selectable), sine wave
Input Level	0dBm (10MHz), 0.8Vp-p (512/63MHz)
Connector Type	BNC-J (50 Ω)
RF Feedback Input (RF FB IN) Level	+3dBm to +10dBm
Connector Type	BNC-J (50 Ω)
RF Reference Input (10M IN)	
Signal Type / Level	10MHz (sine wave) / - 3dBm to +3dBm
Connector Type	BNC-J (50 Ω)

1PPS Input Type / Level	1Hz pulse / TTL
Connector Type	BNC-J (50 Ω)
Power Supply Voltage	90 ~ 250V AC, Single phase
Power Consumption	100W maximum
Dimensions	480mm (width) $\times$ 44mm (height) $\times$ 520mm
Weight	Approx. 8.0kg

3-2 Power Amplifier Section

3-2-1 UA5000QF Power Amplifier

The UA5000QF PA is a wideband, high power transistorized and water-cooled RF amplifier for DTU-70 series.

The maximum output power of this amplifier is 1350W average, and the unit gain is approximately 77.3dB. The gain can continuously be varied by input variable attenuator (LEVEL ADJ).

Table 3-2 Electrical characteristics of UA5000QF PA

Item	Description
Circuitry	
Transistor	19
The number of cascade transistor stage	3
External configuration	
Dimension	504(W) × 105 (H) × 762 (D) (*Include Front Panel)
Weight	Approx. 36.5kg (*Include Front Panel)
Input connector	BNC-J, front
Output connector	WX-39D plug-in, rear
Power supply connector	Plug, rear
Control connector	Plug, rear
Current checking	Plug, rear
Type of unit	Front-operated plug-in type
Cooling system	Jet water cooling & Cold plate cooling
Protective devices	
Excessive input level protection	+2dB
High temperature protection	• Automatic output interruption at preset temp.
Load impedance variation coverage	• Non-abnormal operation in short-time open or short circuit.
RF power output	1350W, average
RF power input	25μW, average
Gain	77.3dB
Power supply voltage	380/400/415V AC, 3 phases
DC Power	142A 45V (built in main body)
Channel coverage	470 ~ 862MHz
Frequency response	Better than ±0.5dB, within any channel band
Gain stability	Better than ±0.5dB
Power consumption	Approx. 6,000W

3-3 Cooling Section

This transmitter system is cooled with liquid coolant fed from pump rack. The coolants which flows into the transmitter rack are branched to cool down absorb resistors of power combiner and Power Amplifiers (PA). Then, it's combined again into one route and discharged from the transmitter rack.

For details, refer to the Instruction Manual of Pump Rack (HO2-344777-2**), liquid cooling system (HO2-344778-2**) in section 6 of Vol. I and heat balance diagram in section 1, General, of Vol. II.

The cooling system explained below is in passive reserve. Stand-by pump can be replaced any time during operation. Heat, which is generated by PAs (power transistors and switching power supply unit) and absorbs resistors while power combiner is in unbalanced operation, is removed from liquid coolant by an external heat exchanger.

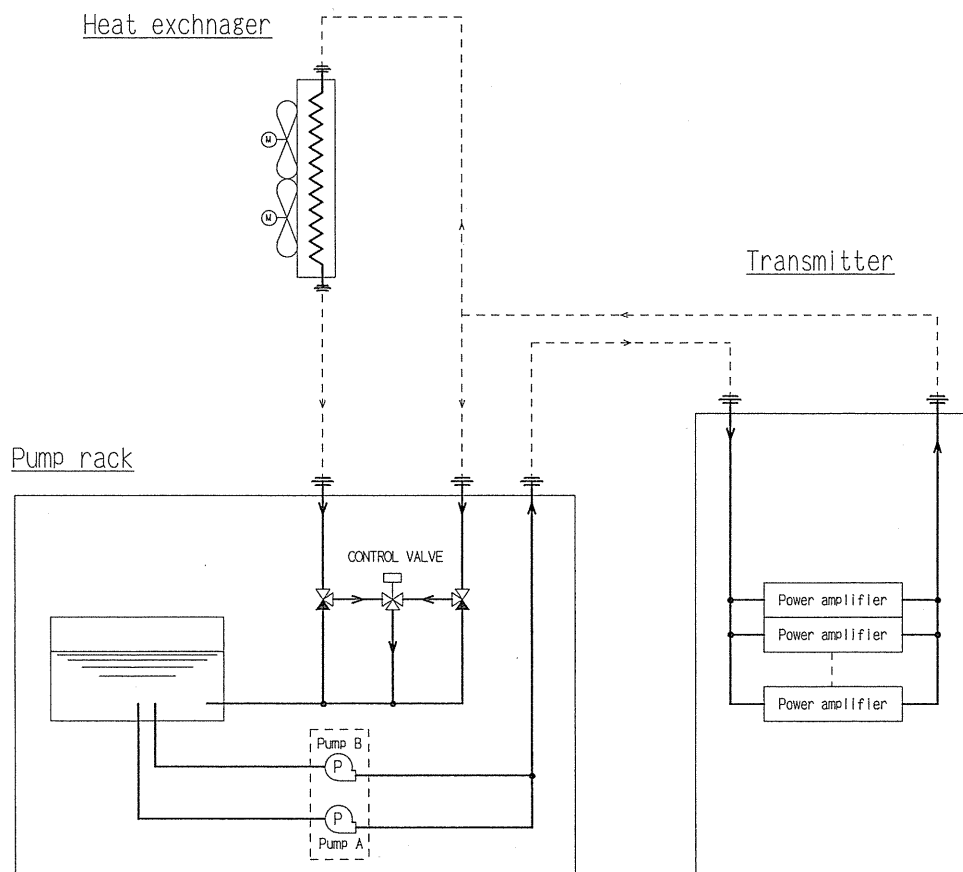


Fig.3-2 Block diagram of cooling system in passive reserve

3-4 Output Filter Section

This section consists of the harmonic filter and low pass filter (optional) to suppress RF harmonics and spurious signals generated by power amplifier section. Also this harmonic filter consisted of $\lambda/4$ short circuit is used to protect transmitter against lightning.

Table 3-3 Attenuation characteristics of harmonic signals

Filter Size	Attenuation[dB]					
	2fc※		3fc	4fc	5fc	6fc
	940-1000MHz	1000-1724MHz	1410-2586MHz	2586-3448MHz	3448-4310MHz	4310-4500MHz
NAX-77D	62	56	41	37	33	32
NAX-39D	56	50	35	31	27	26

※ The attenuation is specified at the band of $2fc \pm 8\text{MHz}$.