

Completion of the remote controlled system

**Aug 19, 2016
Joe Aoki
JJ3PRT**

別宅シャック構築

Completion of the mountain shack

■別宅シャック目的 Objectives of the mountain shack

1. 全バンドでパイルに打ち勝つ

To beat the pile ups in each band

2. 全バンドのビーム化

To operate each band with a beam antenna

3. リモート運用システムの構築

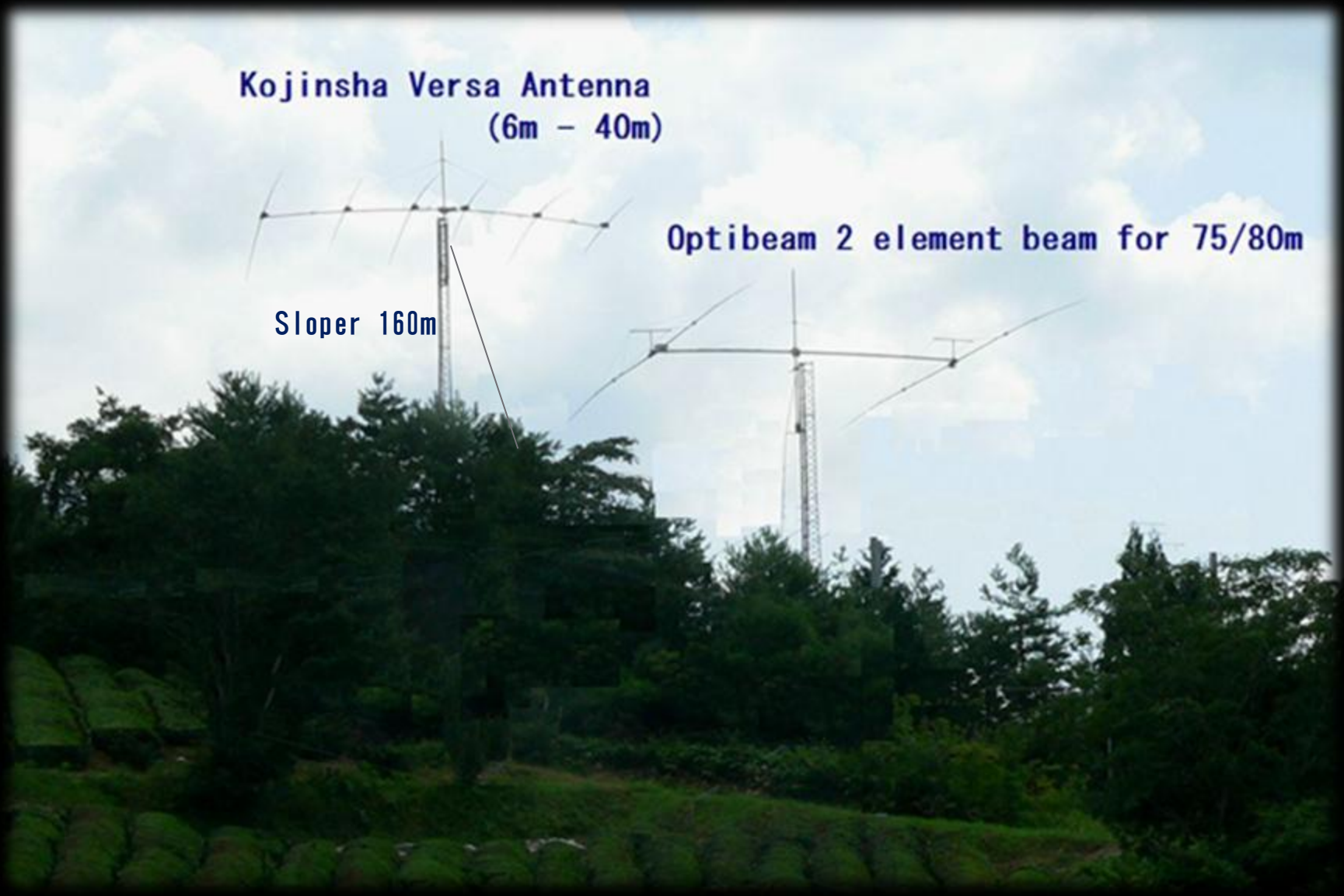
To complete the remote controlled operation system

■ 現行アンテナシステム Current Antenna system

Kojinsha Versa Antenna
(6m - 40m)

Optibeam 2 element beam for 75/80m

Sloper 160m



■ 1.To Beat the pile ups in each band どのバンドでもパイルに勝つ

結果 Results

- Did not miss any rare DXpedition stations
- Good results on 40m - 10m. A first or second call is good enough. But unsatisfied result on 6m, 80m and 160m
→ **Need more improvement**
- Beverage antenna for 80m and 160m helps a lot improve the receiving ability **ビバレッジアンテナの効果抜群**
- Almost no noise situation helps me a lot work very weak stations that standard JA stations can't copy.
ノイズなしの環境は非常に弱い局でも了解できる

■ 2. To operate each band with a beam antenna

結果 Results

- Installed a 2 element beam for 80m in July 2016



課題 New assignment

- 4SQ for 160m



I would have a beam antenna for each Band.

■ 3. To complete the remote controlled operation system

結果 Results

- **2014年11月にリモートシステム完成。**
Completed the remote controlled operation system in November 2014.
- **QSOの99%がリモートによる。**
99% of the QSO are done by the remote operation.



Two engineers are working on the remote control units.

DX on 160m

■ 160mDXのポイント Important points for 160m DX

1. 出力 **Power**
2. 送信アンテナ **Transmitting antenna**
3. 受信アンテナ **Receiving Antenna**
4. ロケーション **Location**

■ 1. 出力 Power

- 最低 1KWは必要 **At least 1KW is needed.**

■ 2. 送信アンテナ Transmitting Antennas for 160m

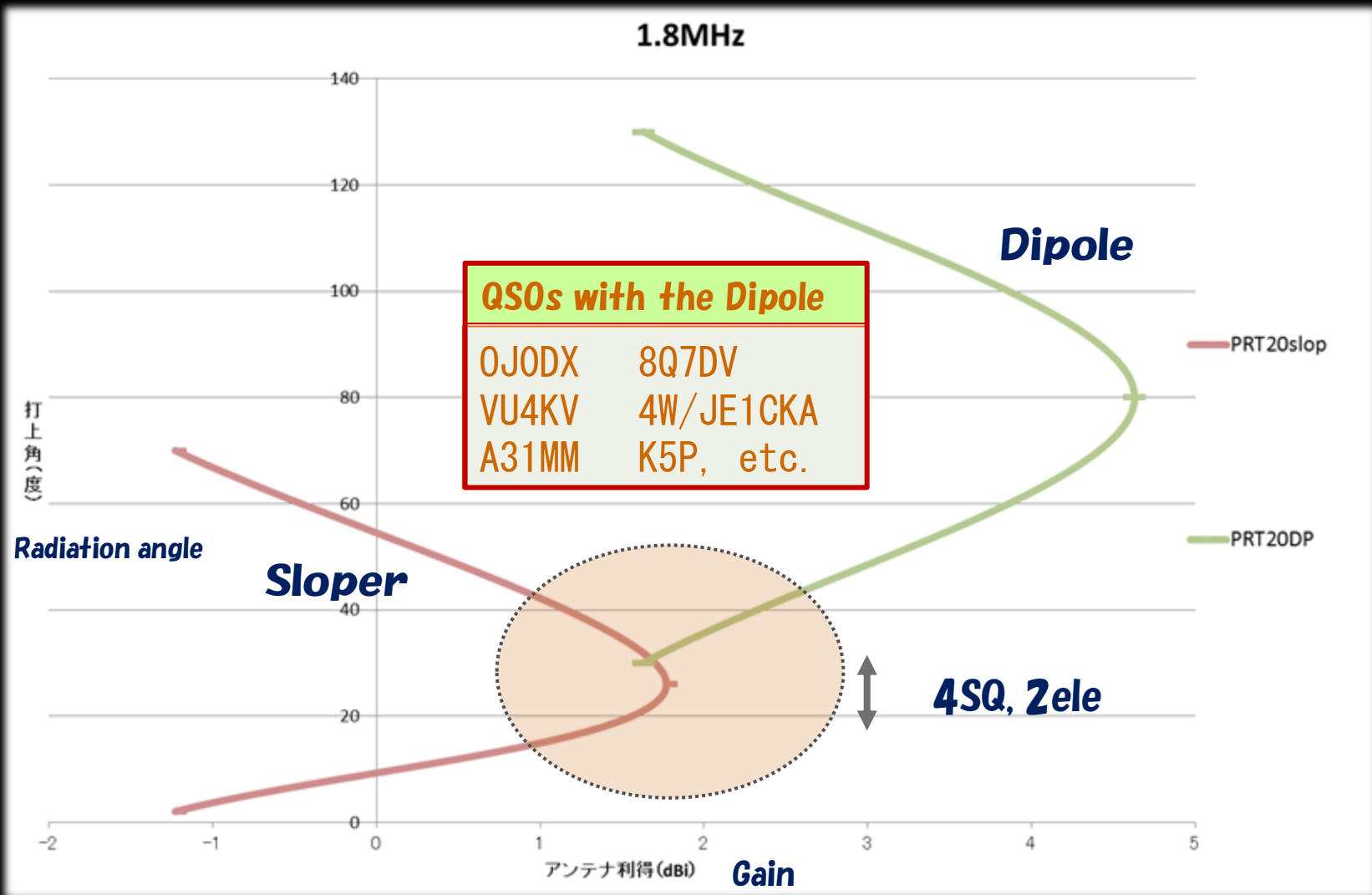
1. Sloper

2. Full size Dipole

You could choose the antenna depending on the band condition.

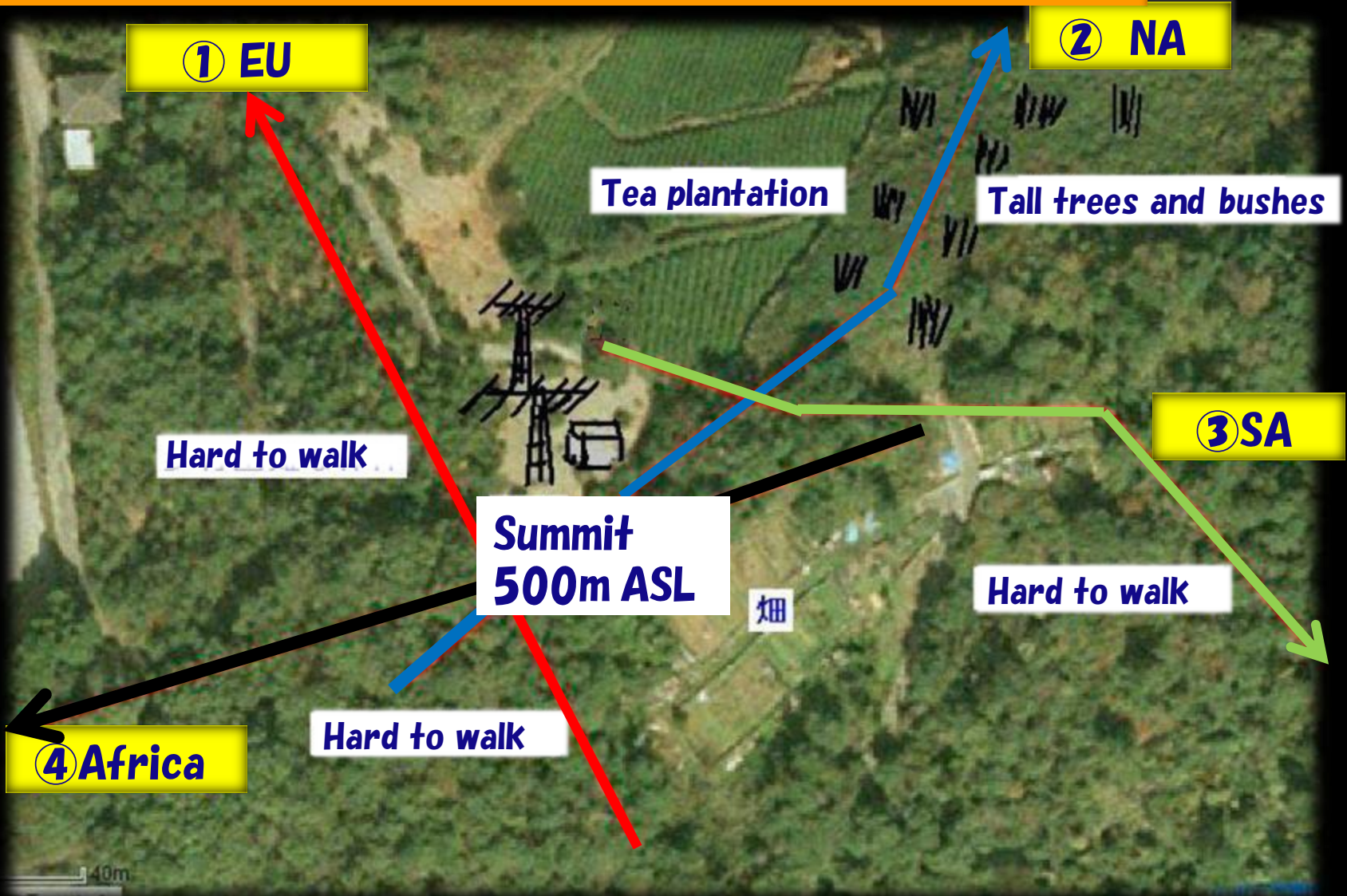


■ 送信アンテナ Transmitting Antennas for 160m 2



■ 3. 受信アンテナ Receiving Antennas for 160m 1

Four Beverage Antennas (each 160 meters long)



自作プリアンプ付アンテナ切換機

Home made Antenna Direction Switch with a pre-amplifier



EP2A on 160m

Big difference between ON and OFF



■ ロケーション Location

Good location is vital.

JJ3PRT



JR40ZR



JA1LZR



JA2IVK



***Completion of the remote
controlled operation system***

Objectives of the remote controlled system

1. 安価で高品質なリモート High quality remote operation with reasonable cost

- ・フリーソフトの活用 To use free software
- ・必要な機器の自作 To develop hardware by ourselves

2. どこでもリモート Available anywhere remote control system

Home



Outside



Mobile



3. 避雷 Lighting Protective Device

- ・Dangerous without a protective device
(ヘッドライトなしで闇夜を暴走する様なもの)
Hot Rod Driving at dark night without headlight



■Background of the remote controlled system

下記課題解決 To solve the following issues

1. 別宅シャックまで片道1時間の距離。運用したい時に運用できない
One hour drive sometimes prevents us from working DX. Cannot work when we want to work
2. 冬場は雪のため別宅シャックまで行けないこともある
Sometimes too much snow to go there in winter.
3. 冬場はローバンド運用のため、朝3時半に起きて別宅シャックに行く必要あり。(別宅シャック到着5時半)
Have to get up at 3:30 a.m., for the low band operation.
4. 設備共用者はDXのためにわざわざ遠い別宅シャックまで来る必要がある。(最長2.5時間)
One member comes to the shack after driving 2.5 hours.




Remote controlled operation system

リモートシャックの
システム概要

コントロールする側 (Home)

コントロールされる側 (Mountain Shack)

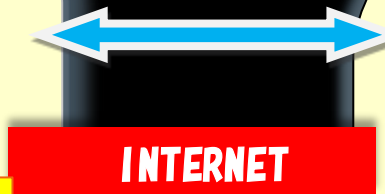
Fiber Optic Cable 1Gb



**Teamviewer
Skype**

Free Software

Screen ----- Teamviewer
Voice ----- Skype (VoIP)



送受信 **Fiber Optic Cable 300Mb**



**Teamviewer
Skype
FT2000RC
Logger32 (CW)
MMTTY
BGARTC**

Free Software



RTC-59 **FT2000** **HL2500**
Emoto1300 **4 Security Cameras**



Lightning Protective Device



Transformer **Antenna Cable Protective Device**



コントロールする側 (Outside)



**Teamviewer (For PC, Android)
Skype**

**The licensees must get to the
transmission site within 3 hours.**

Remote Operation Equipment and the software

Easy to set up
Remote system

- Transceiver, Linear Amp (FT2000, HL-2500FX) **FT2000RC**
- Rotator (Emoto 1300 + RTC-59) **BGARTC**
- Antenna Switch (8 antennas by Ameritron) **Home made software**
- 80m/75m Switch **Home made software**
- IP camera **TeamViewer, Tervis software**
- PC Power control (IP Switch) **Router, IP9258**
- Beverage antennas switch **Home made software**
- Antenna Cable detaching and attaching device **Home made software**
- Power control **Home made software**

Lightning
Protection

Remote screen (PC at my home)

The image displays a PC desktop environment with several windows open, primarily related to remote controlling a Yaesu FT-2000RC radio. The main window is the FT2000RC software, which shows a virtual representation of the radio's control panel with various knobs, buttons, and digital displays. A yellow box highlights the text "FT2000RC" in the top right corner of this window. To the left, a window titled "BGARTC" shows a world map with a blue line indicating a path or connection, and a status indicator "接続中" (connected). Below the BGARTC window, a window titled "HL2500画面" is partially visible. In the bottom left, a window titled "CW Machine - Software" shows a "Logger32" interface with a table of call signs and frequencies. To the right of the CW Machine window, a window titled "J33PRT RADIO SHACK" shows a "専用ソフト" (special software) interface with various control buttons and a world map. The desktop background shows icons for Skype, RTTY, and other applications. The taskbar at the bottom includes the Start button, several application icons, and the system tray showing the time as 15:44 on 2016/08/01.

FT2000RC

BGARTC

HL2500画面

Logger32

専用ソフト

Call Sign	Frequency	Color	Other
PRT	599TU	Red	ENN
FGJ	599TU	Orange	AGN
AYQ	599TU	Green	599TU

15:44
2016/08/01

control screen(made by JR2HLY)

The software was made just for this purpose.

JJ3PRT RADIO SHACK CONTROL

FILE TOOL VER DATE 2014/10/08 TIME 5:27 TEMP 17.4 °C

ANTENNA SELECT

ANT1 ANT2 ANT3 ANT4
ANT5 ANT6 ANT7 ANT8

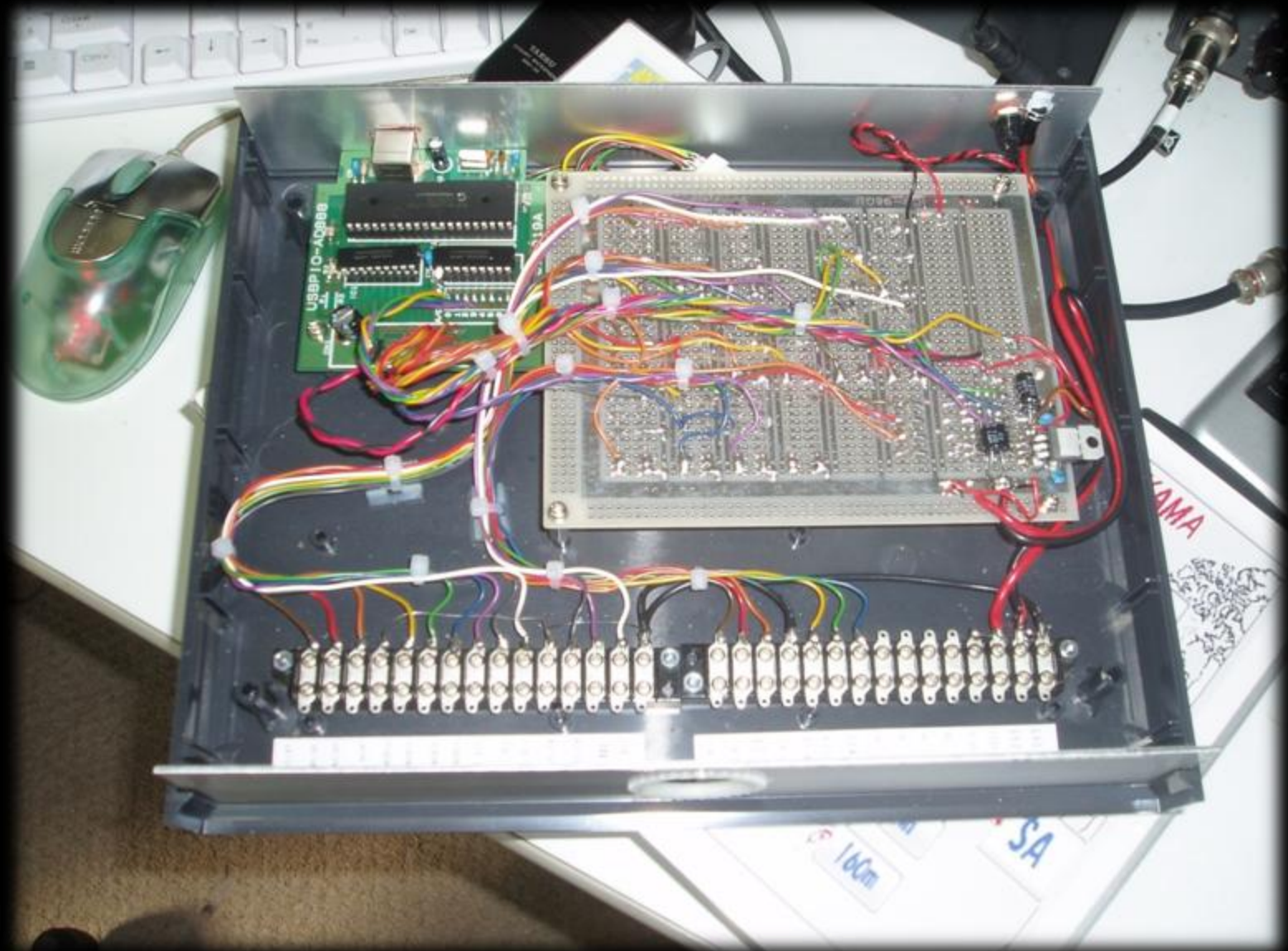
POWER CONTROL

1次電源 ANTENNA DP ANT AUX
ON ON 80m ON
STOP
OFF OFF 75m OFF

JJ3PRT UDAYAMA BEVERAGE ANTENNA

EU NA AF SA
PRE AMP 80m 160m
PASS

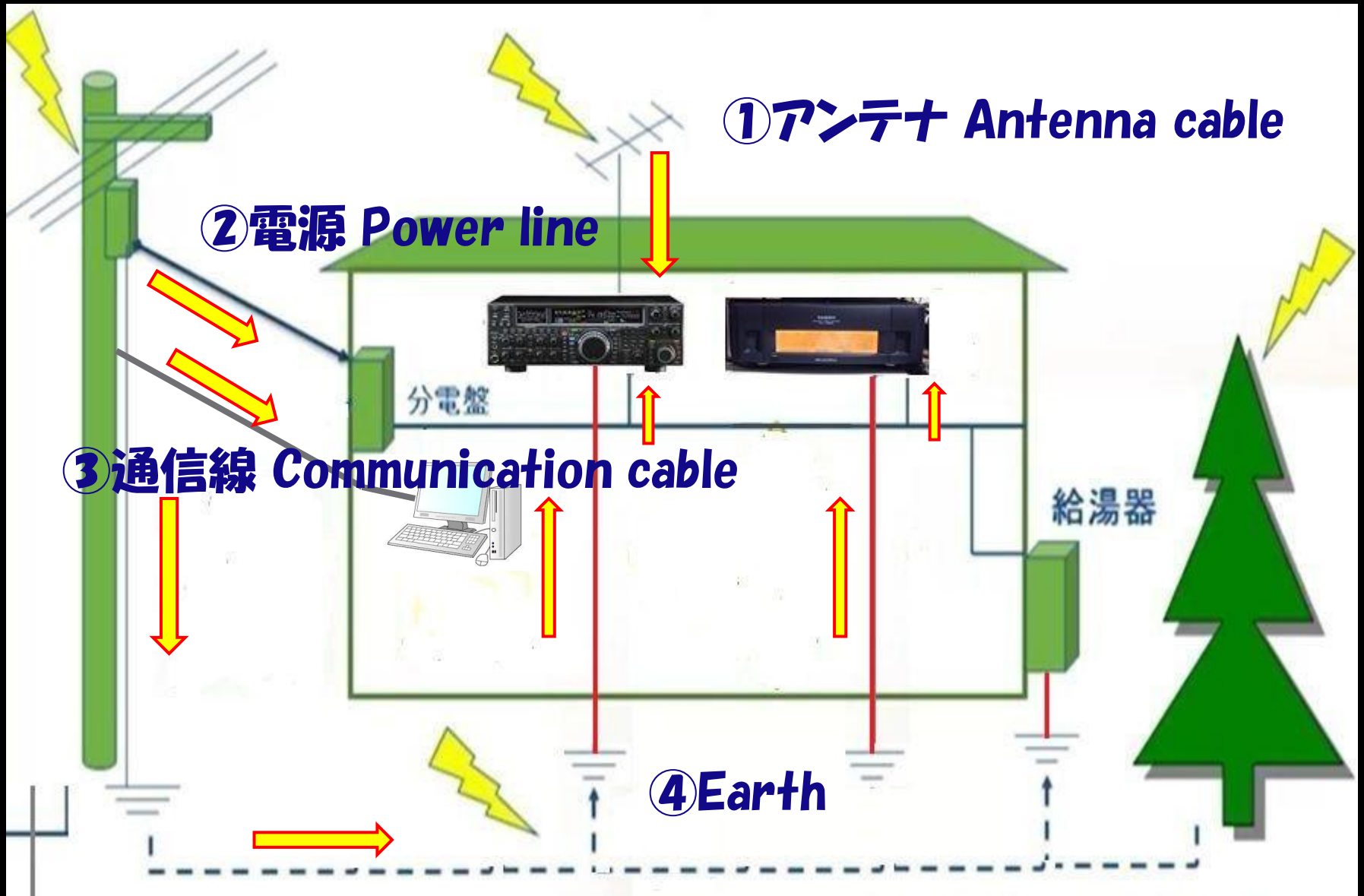
■ Inside of the control box (made by JR2HLY)



避雷システム

***Lightning Protective
System***

雷の侵入経路 Lightning entering paths

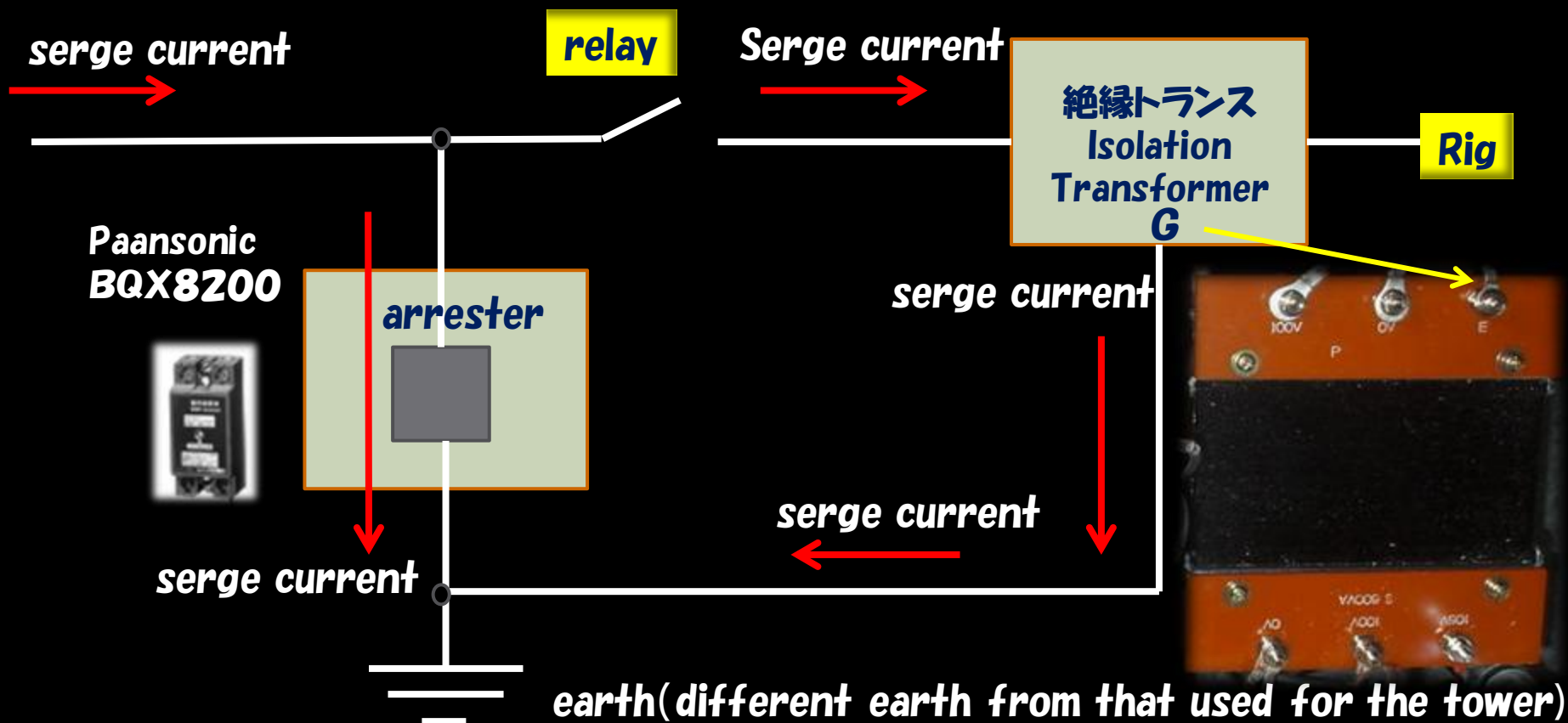


■ 避雷システム Lightning Protective System

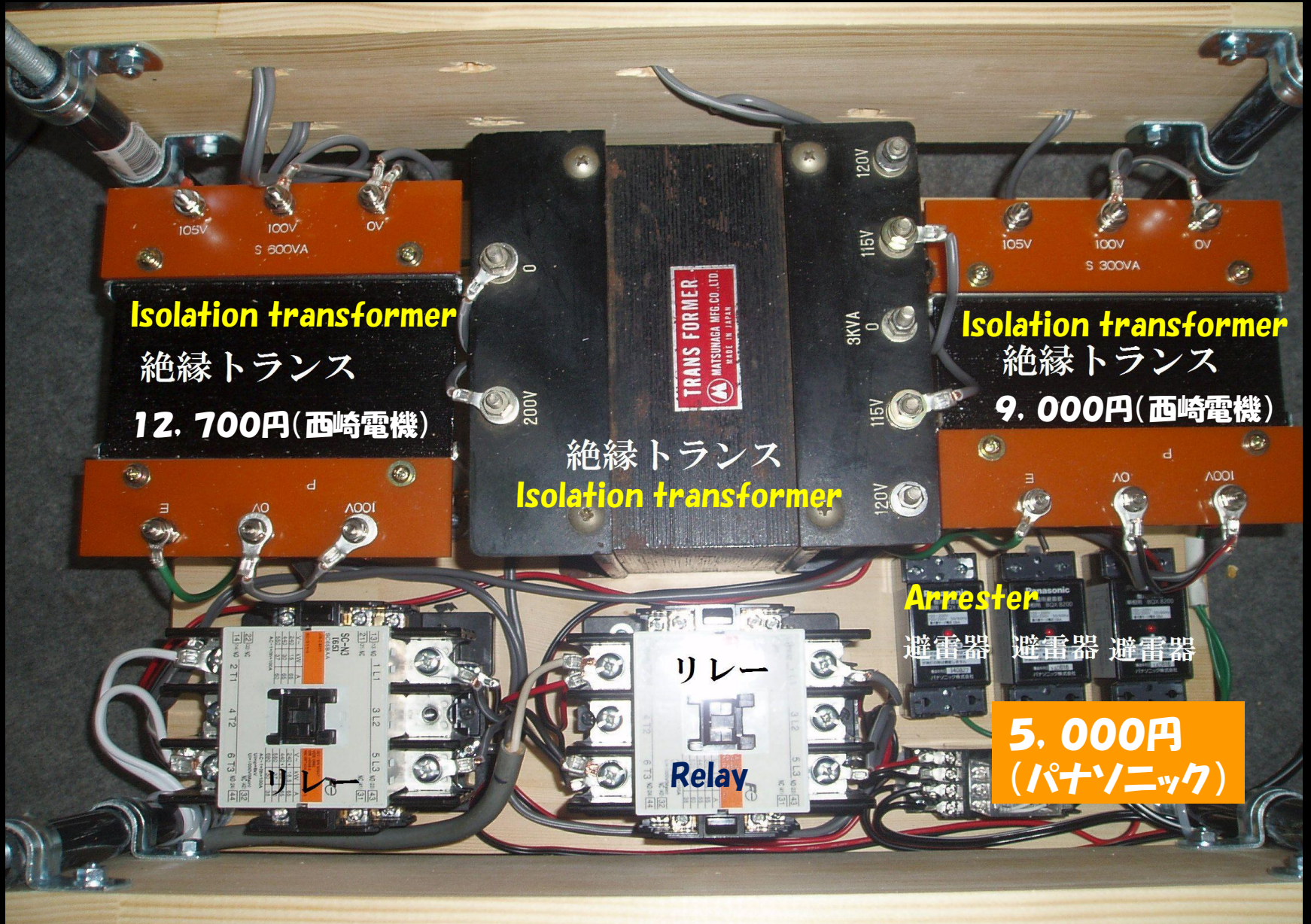
1. 避雷電源装置
Power Line Protective Device
2. 避雷器付きアンテナ切換スイッチ
Antenna Switch with arresters
3. 同軸コネクタ一切離し装置
Coax cable detaching and attaching device
4. リグ・リニアのアース
Earthing between rigs and the earth

■耐雷電源 (JA3FGJ設計) Power Line Protective Device

- The surge current can be blocked by the arrester, the isolation transformer and the relay.
- An arrester works up to 10kA current.
- The isolation transformer decreases the surge current to 1/1000.



■耐雷電源システム (JA3FGJ製作) Power Line Protective Device



Isolation transformer

絶縁トランス

12,700円(西崎電機)

絶縁トランス
Isolation transformer

Isolation transformer

絶縁トランス

9,000円(西崎電機)

Arrester

避雷器 避雷器 避雷器

5,000円
(パナソニック)

リレー

Relay

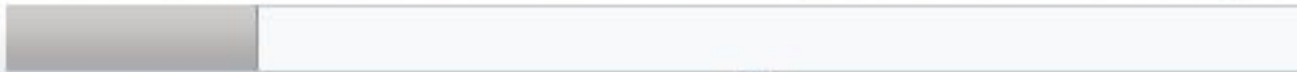
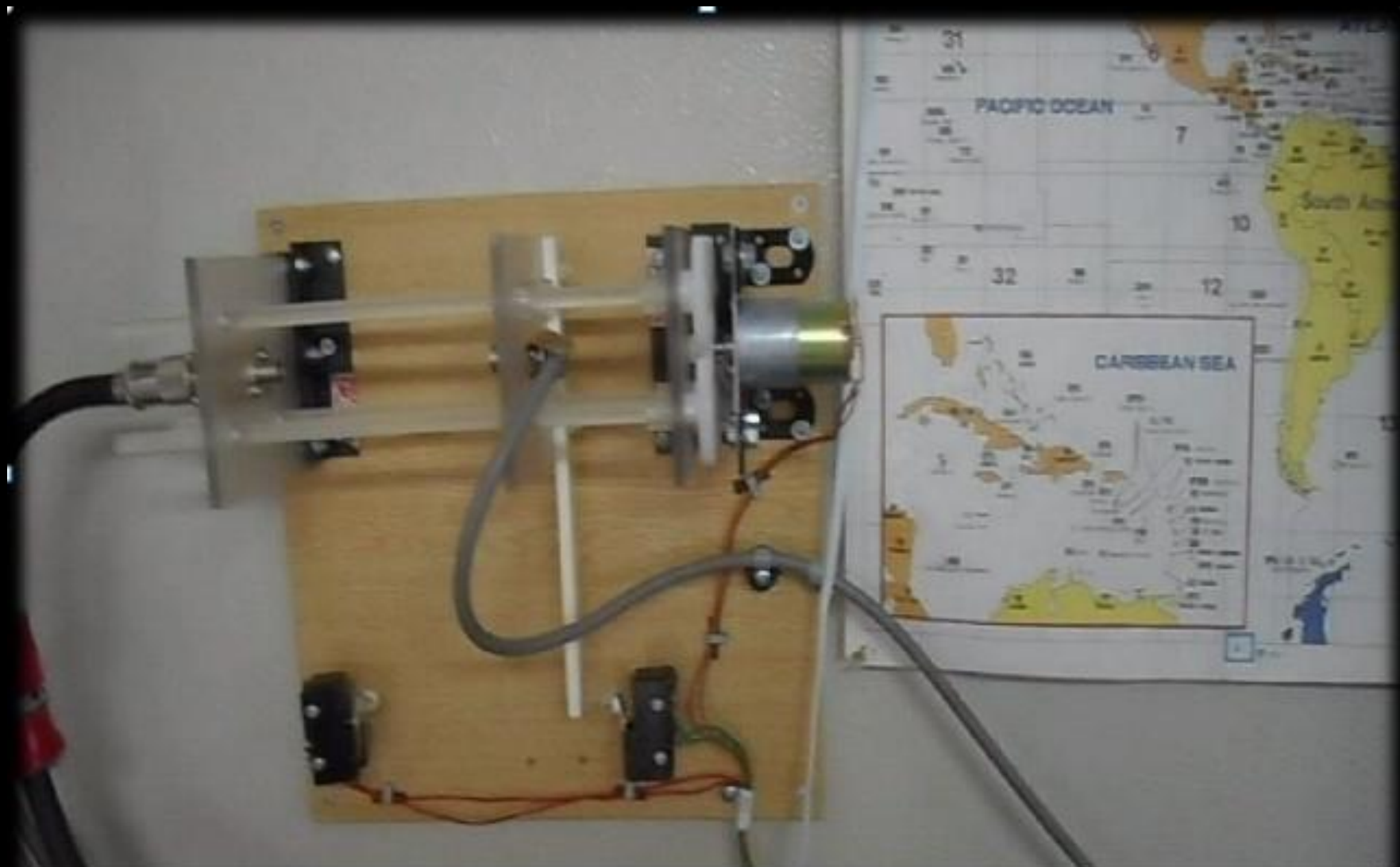
■アンテナスイッチ

Antenna Switch with arresters

- ・ガス入りサージアレスター *serge arrestor with gas*
- ・1万Aまで対応 *up to 10kA current*

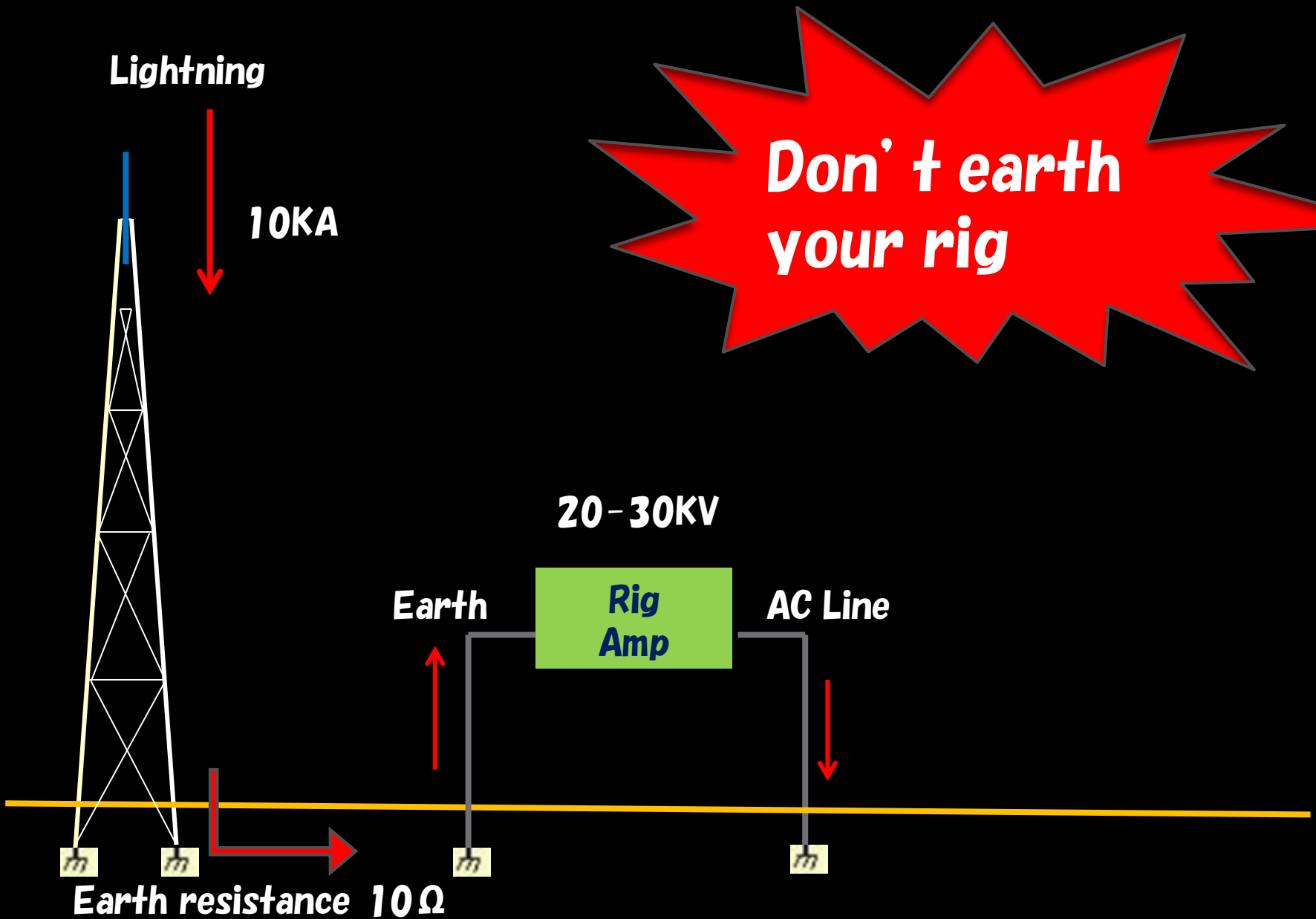


■同軸ケーブル切離機 Lightning Protective Device 3



00:09.94





Security System

■ To protect the shack from burglars

- Someone cut the cable and the wire of the beverage antennas for 5 times.
- 3 times just a week before V00EK and FT4JA DXpeditions began.



3 security cameras are working outside of the shack now.

■ Raccoon in the land

2016-05-05 19:49:02

WebCam2

■ A dirty old man in the land trying to do a number 1

Don't do a number 1 here.

JJ3PRTWebCamera3

2016-06-15 16:25:37



実際の運用

Actual Operation

■ VoIP Comparison

VoIP comparison

Voice over Internet Protocol

	Coding Method コーディング方式	Width 帯域 (bps)	Packet # パケット数	Latency 遅延	Result 評価
A company	G711	64k	300	200ms	Excellent
B company	Speex	2k-44k		1000-1500ms	Not so good
C company	NA	NA	NA	2000ms	Not so good
D company	SILK	28k-128k	100-250	100ms-500ms	Very Good

Remote control device comparison

	A company	B company	Home Made
VoIP	Built in Good	Buil in Not good	Skype Good
Router set up	by hand	automatic	automatic
DNS	needed	not needed	automatic
CW	Yes	Yes	Yes (Logger32)
RTTY	Yes	No	Yes(MMTY)
Mobility	so so	Yes (only PC)	Yes
Smart Phone	Yes	Yes	Yes
Rotator	Yes	?	Yes(RTC59+BGARTC)
Camera	Yes	Yes	Yes
Price	200k yen	70-450k yen	10k yen

- **A company does not require any PCs for the remote operation. But expensive.** すべて可能だが、高い
- **B company's device is too expensive and has a bad latency problem.** 性能の割には高く、遅延問題あり
- **You can complete the remote system with anywhere available software with reasonable price.** 自作システムは1万円で製作可能。

■ リモート局比較 Remote station comparison

	VPN	Software	VoIP	Lightning Protection
JA1	no	RRC1258	RRC1258	no
JA2	teamviewer	RRC1258	RRC1258	no once
JA2	Chrome Remote	RS-BA1	RS-BA1	relay 5 times
JA3	teamviewer	RS-BA1	skype	to detach and to attach cable
JA3	no	RRC1258	RRC1258	no once
JA3	no	Kenwood	skype	earth the cable
JA3	VPN	Yaesu RCC3000	skype	arrestor
JA4	VPN	Kenwood	skype	relay, UPS with protection
JA4	teamviewer	RS-BA1	BA-1, skype	no

- **1 / 3はPCをつながずリモート運用。** **1 / 3 operates remote not through PC.**
- **VoIPはRRC1258かskypeがほとんど。** **Almost of all VoIP are RRC1258 or skype.**
- **本格的な避雷対策実施局は1局のみ。** **Only one station has a lightning protective device.**

■ Rare DX stations I worked on 160m with the remote

2014

8Q7DV, E51NOU, EA6BF, **EI3KI**, EW1DO, **MDOCCE**, W1AW/KH8,
V31YN, V63DX, V73MW, VK9NT, VK9XSP, VU4KV, YJ00U, ZL7X

2015

3D2RJ, 3W3MD, 406Z, A65CA, E51MQT, E6GG, EA5BM, EA5KA,
EX8M, FW5JJ, G3R00, GM3YTS, **OJODX**, T2GC, UA2FT, V6WW,
VK9WA, **ZA/YU7CM**, **ZD8W**

2016

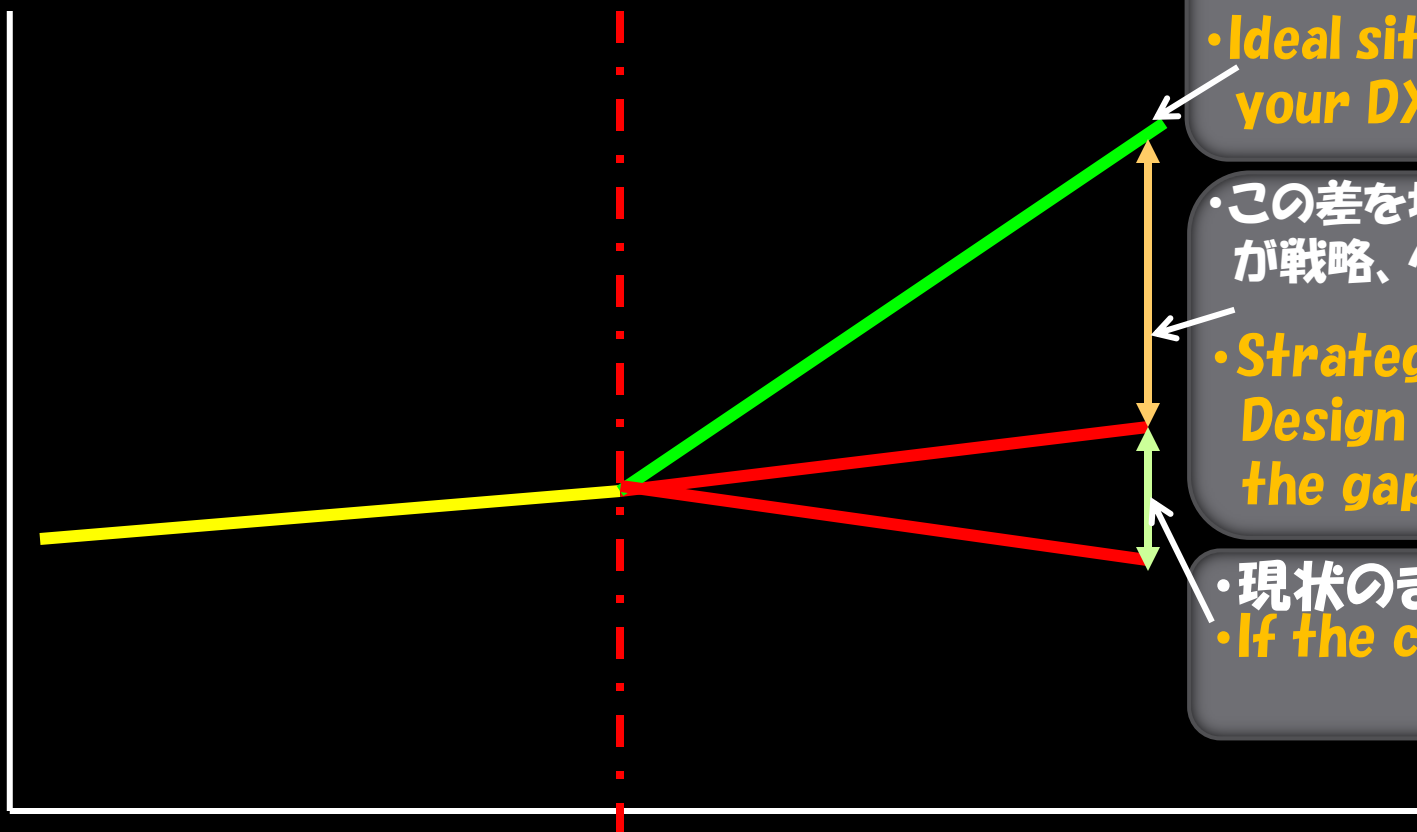
4K6F0, 4W/DJ2EH, 4W/JE1CKA, 9H1XT, A31MM, A35T, **C92CC**,
ET7L, **FT4JA**, TA3D, **VK0EK**

DX戦略

DX Strategy

DX戦略構築 Make your DX strategy clearly

Result(結果)



・DXのあるべき姿

・Ideal situation that your DX should be

・この差を埋める方法が戦略、グランドデザイン

・Strategy or Ground Design to bridge the gap

・現状のまま推移

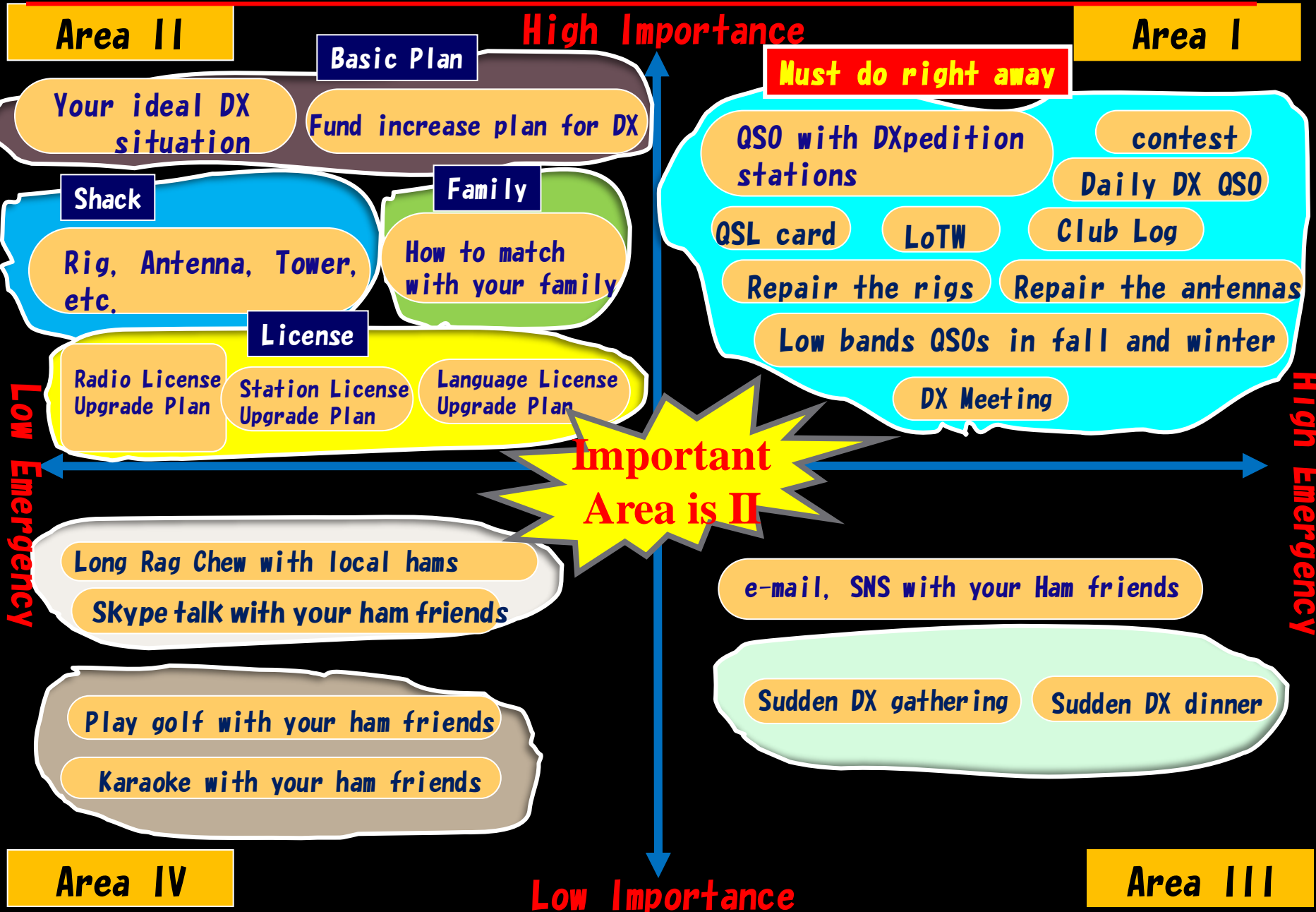
・If the current way continued,

Now(現在)



Time(時間の経過)

DXのPPM分析 (Product Portfolio Management for DX)



■ Don't expect a game winning grand slam all the time

DXers Dangers

**Start to rush in the bottom
of the 9th**

**Impossible to hit a grand
slam in the bottom of
ninth every time**

- 早く準備する。 **No sense of deadline**
- QSOできなくて焦っても遅い。
Danger (abnormality) is not foreseen before something wrong happens
- いつやるの、今でしょう。 **No more "in the Nick of time", If not now, when?**

■衆知を集める(一人で悩まない) Joint development

The number of the part used for weapons during war

1871	Franco-Prussian war	Gun	N	X	10
1904	Russo-Japanese war	Machine gun	N	X	10^2
1914	World war I	Fighter plane	N	X	10^4
1941	World war II	Bomber (B29)	N	X	10^6
1965	Vietnam war	Apollo Space ship	N	X	10^6 4 million
1990	Gulf war	Space shuttle	N	X	10^6 2.5 million

使用される部品数が級数的に増えている。

The number of the part increased with series.

■共同開発の時代 Joint development age

最近の発明に発明者の名前がない A few individual inventors

前世紀の個人の偉大な発明 Great invention in 20th century

1938	Nylon	Carothers
1939	Transistor	Shockley
1985	Blue LED	Akasaka

最近の発明 Recent development

Atomic bomb, TV, Space shuttle
IC, LSI, i-Phone, Fuel cell,
iPS cell

**Developed by
projects**

iPS Cell — — — Greatest invention in 21st century after
Shockley

Induced Pluripotent Stem cell

人工多能性幹細胞

Joint development age

■山のシャックの役割 Everyone's role at mountain shack

IT **JR2XXX, JA3XXX, JA3XXX**

Software **JR2XXX, JH3DXXX, JJ3XXX**

Hardware **JA3XXX, JR2XXX, JA3XXX**

Construction **JA3XXX, JA3XXX, JE3XXX, JJ3XXX, JJ3XXX**



Carrying woods just cut

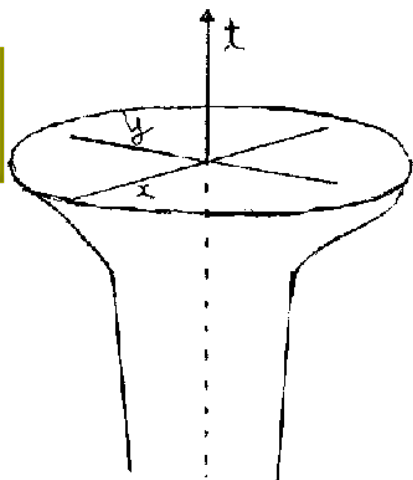


Welding a pipe to the mast

赤字はプロの職業家。(電気工事士、ソフトウェアエンジニア、工事現場監督)
Callsigns with red letters mean they are professional.
(electrical engineer, software engineer, construction superintendent)

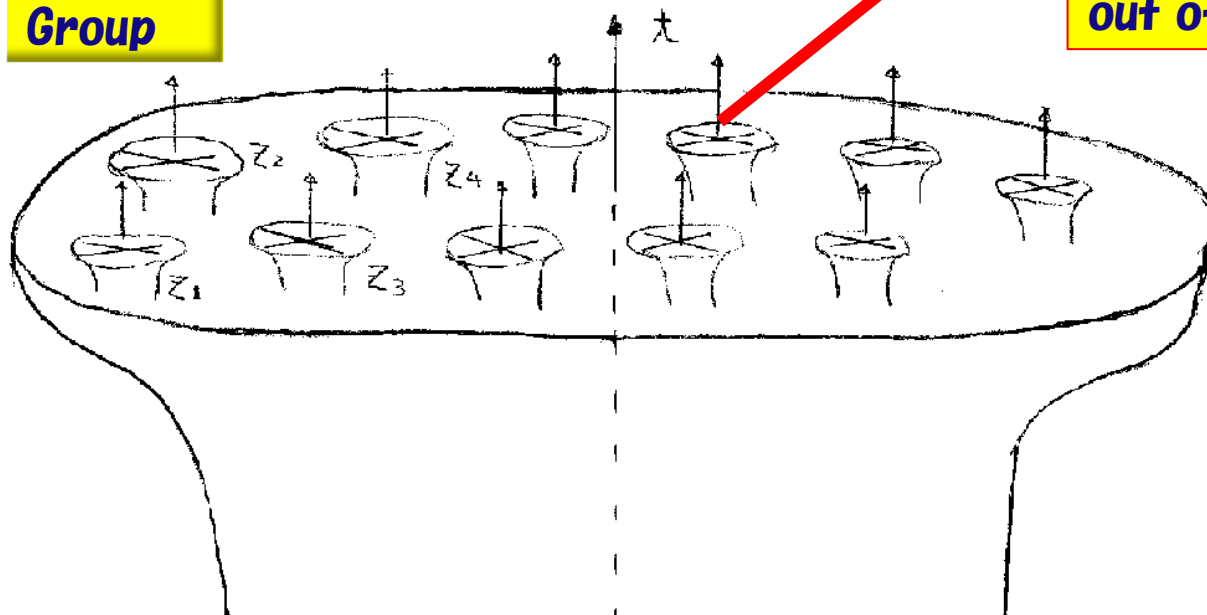
■個人の経験とグループ経験の相関関係

個人
Individual



$$\int \left(\frac{dx}{dt} + \frac{dy}{dt} \right) = z$$

グループ
Group



発想とは常識から
飛び出すこと
A good idea doesn't come
out of common sense

$$\sum (z_1 + z_2 + \dots) \\ = \text{常識} \\ \text{common sense}$$

-Conservative Design 保守的な設計

-Existing Hardware 現存する部材・技術



安全を優先し、無茶な冒険はしない。それでも事故は起きた

Accidents happened despite the non-adventurous action



Fin