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**Concept Testing:
A Key to Successful
Product Development**

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Abstract

Concept testing is a research tool used to assess the market viability of a new product idea prior to incurring the development expense of actually fabricating a product. This paper examines the current literature on concept testing to establish its importance with respect to new product success. The New Zealand mobile radio manufacturer Tait Electronics is used to illustrate how the technique has been applied in this country.

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1. INTRODUCTION

New Zealand's economy is reportedly in a growth phase. The National Government has set a goal of 5% growth in GDP per annum (NZ National Party, 1993), in order to attain a sufficient standard of living for all New Zealanders. One of the keys to that growth, they say, is to continually "create new products and services for which the world will pay a premium."

Porter (Crocombe, Enright and Porter, 1991) tells us that while we have "been innovative in some areas (especially agricultural production), few New Zealand firms employ proprietary technology and even fewer have been innovative marketers. Innovation, in its widest sense, is at the heart of competitive advantage." However he does acknowledge that New Zealanders as a whole are an innovative people. Examples of NZ innovations include the Hamilton jet, Linc software, electric fencing, kiwifruit, and even bungee jumping. What we need to do, says Porter, is unleash this potential throughout the economy. Our ability to get better at the innovation process - to drive new products from idea to market faster and with fewer mistakes - will be a critical factor in achieving the required economic growth.

1.1 The New Product Process

New product development systems vary greatly from one company to another. Some may have quite formal and detailed procedures while others follow sketchy, intuitive, and largely informal systems.

Those companies that do follow more formalised procedures are probably using a derivative of the most widely accepted product development model. This particular model was created by Booz, Allen, and Hamilton in 1968 and modified in 1982 after a study of 700 companies in the United States (Booz, et al. 1982). The model consists of seven steps:

1. exploration (idea generation);
2. screening (elimination of obviously unsuitable ideas);
3. concept testing (exposure of the idea to potential customers);
4. business analysis (profit potential);
5. development (conversion of the idea into an actual product);

- 6.test marketing (sales to a limited part of the market to assess the product itself as well as the rest of the marketing mix); and
- 7.commercialisation (full scale distribution).

The BAH model appears in many marketing texts (Kotler (1984), Hisrich & Peters (1991), Crawford (1991), Urban & Hauser (1993), McColl-Kennedy et al. (1994), Stanton et al. (1991)).

1.2 Impact on Success

But does following the seven steps of the New Product Process (NPP) actually increase the chances of success for new products? The evidence suggests overwhelmingly that it does. Cooper and Kleinschmidt (1990), Booz, Allen, and Hamilton (1982), and de Brentani (1986), have all published studies on the correlates of success for new products. All but one of the studies identified that an organisation's use of the New Product Process is a key factor in determining success.

Cooper and Kleinschmidt (1993) investigated factors responsible for success from 103 new product projects in one industry (the chemical industry). The products included both 'winners' and 'losers' and came from countries all over the world. They concluded that six factors were critical to success:

- 1.a quality NPP is pivotal - one that builds in key activities by design and ensures they are executed in a proficient manner;
- 2.early project and product definition is vital;
- 3.a strong team leader with an accountable multidisciplinary team is a key factor;
- 4.irrespective of the source of the new product idea, it should be further refined with customer input;
- 5.launch elements (customer service, technical support, sales force quality, and product availability) are important ingredients for success. (By contrast, advertising and promotion elements made little difference to success for these industrial products);
- 6.an international orientation pays off.

1.3 What's the Reality?

Firstly, success rates are not good. Booz, Allen, and Hamilton (1982) reported that of the 700 consumer and industrial firms studied, on average only one out of seven new product ideas generated succeeded. "Success" is defined as meeting the company's original profit objectives, and "new product" is defined as new to the company (as opposed to new to the market). Figures for Australia suggest only 40% of all new products launched, succeed (Schwartz, 1987).

Secondly, managerial practice does not follow the prescribed theory. Cooper and Kleinschmidt (1993) found that the proportion of projects that included all of the NPP activities was alarmingly low (Table 1). Feldman and Page (1984) revealed similar findings in their study of the electronics industry in the United States.

Table 1
% New Product Projects Undertaking
Each Activity in the New Product Process

Activity	% Projects Undertaking
1. Idea generation	Not measured
2. Screening	88
3. Concept testing/detailed market study	43
4. Business analysis	62
5. Development	93
6. Test marketing	54
7. Commercialisation/market launch	81

Source: Cooper & Kleinschmidt (1993)

Crawford (1991) offers two significant reasons for this deviation. Firstly, firms skip steps because of either funding or time constraints. Secondly the field of marketing, and particularly new products management, is young, and many managers simply haven't been exposed to these relatively new management techniques.

2. CONCEPT TESTING

Concept testing is arguably the most important step in the New Product Process. Given that idea generation, development, and commercialisation are virtually mandatory, this leaves four steps that firms can choose to either omit or include.

Concept testing offers the advantages of actually providing much of the information required for the screening step as well as the business analysis step. It also contributes to at least three of the six critical success factors outlined by Cooper and Kleinschmidt (1993). These are; a quality NPP, early product definition, and refinement of the idea using customer input.

In addition, in the Tait Electronics case outlined below, it also provided the following additional benefits:

- 1.early company-wide support (inter divisional arguments over 'important' features, price, and specifications were noticeably reduced after results of the concept test were known);
- 2.a development focus (Engineering were able to focus on those features and specifications that were rated most highly);
- 3.a receptive market (the distribution network as well as certain market segments were 'primed' before launch, that is, awareness was increased as a result of the concept test, enabling the introduction phase to be significantly shortened).

In terms of cost, concept testing is relatively inexpensive compared to the costs of development, tooling, inventory, and launch. Furthermore, compared to the costs of developing and launching a potential "failure" the cost of concept testing is again relatively small.

2.1 Definition and Objectives

A product concept is an elaborated version of the initial product idea, expressed in meaningful consumer terms. A concept can be conveyed using words or illustrations, or both. In addition, a concept may be conveyed using either factual language or promotional

language. The literature tends to categorise these various concept forms into two groups - "core idea" concepts and "positioning" concepts (Page & Rosenbaum, 1992).

The principal objectives of concept testing include:

1. identification of poor concepts so they can be dropped;
2. estimation of the size of the potential market;
3. identification of the various market segments and their characteristics;
4. identification of potential improvements to the concept;
5. identification of appropriate positioning strategies (with respect to price, promotion, and distribution);
6. identification of potential cannibalization of existing products.

The fourth objective, that of identifying improvements to the concept, is one of the most important. In fact many of the articles referenced refer to concept testing as "concept development", because the enhancement aspect is just as valuable as the evaluation aspect.

Both Kelley (1993) and de Bono (1993) refer to the iterative nature of concept/product development. Ideally concept tests would be conducted at every stage of the NPP. Not only would each improved concept get re-evaluated, but the concept would also be exposed to the dynamics of the market as it evolves over time. This is particularly relevant for development cycles that span years rather than months. The reality of time and cost constraints however, often overrides this ideal.

2.2 Research Procedures

The most widely published techniques for concept testing are outlined below.

The Concept

The concept itself can be presented very simply, with just one or two sentences and no illustrations. At the other extreme it can involve pages of description, photographs, diagrams, and even 3 dimensional models. Concepts can be communicated verbally, in printed form, or using film or video. As stated previously, the language used may be factual or promotional. This usually depends

on whether the core idea only is being tested or the core idea together with its positioning strategy. If the positioning strategy is included, the concept will be presented complete with advertising, packaging, branding, etc.

For some concept tests the concept is broken down into a list of attributes. For example, Page and Rosenbaum (1992) presented their Sunbeam steam iron with the following list:

- 1.press a button on top of iron for a fine mist of water for spot dampening tough wrinkles;
- 2.iron is extremely light-weight for ease of handling and comfort;
- 3.can use tap water;
- 4.iron holds 8 ounces of water for over 30 minutes of normal steam ironing.

Sample selection

This often depends on who is actually involved in the purchase decision, and in some cases, particularly for industrial products, up to three levels of the distribution channel may be sampled. Some researchers select a judgement (non probability) sample and limit their concept tests to groups such as lead users (Tauber, 1975), or heavy users. However the most common type of sample appears to be a quota sample, where general guidelines make it more representative of the target group being studied, but because the sample is limited to a preset number of interviews due to cost restrictions, it is not a true probability sample.

Methodology

Personal interviews appear to be the most common way of surveying respondents (Crawford, 1991). However both mail and telephone surveys have been used (Crawford, 1991). Personal interviews are usually conducted individually but occasionally researchers use focus group situations.

The venue is normally the respondent's home or work place (for industrial products). Shopping malls, store simulations, and purpose built interview rooms are other lesser used venues (Schwartz, 1987).

Most concept tests involve evaluation of a single concept. However some tests provide a paired comparison with either a control concept, the respondent's currently preferred brand, or the market leader (Moore, 1982).

Questionnaire

The data gathered from a concept test typically fall into four categories (Dolan, 1993):

- 1.intended purchase measures
- 2.product diagnostics
- 3.attribute diagnostics
- 4.respondent profiling variables

Intended purchase measurement is usually based on the following five-point scale:

- 1.Definitely would buy
- 2.Probably would buy
- 3.Might or might not buy
4. Probably would not buy
- 5.Definitely would not buy

Other purchase measures used include volume and frequency. Occasionally a constant sum approach is used instead of the five-point scale. For this method, a number of points are distributed among a set of concepts to assess the relative attractiveness of each concept.

Product diagnostics obtain feedback on the concept's uniqueness, credibility, ability to solve the user's problem, and value for money.

Attribute diagnostics obtain feedback on which particular features or attributes are most important to the user. They also identify features that are redundant or that could be improved.

The respondent profiling data help to identify the demographic and socioeconomic characteristics of the target market, as well as possible market segments. Data on attitudes and current purchasing habits also help to predict future behaviour.

Analysis

Depending on the objectives of the researcher, a number of different analytical techniques can be used. If the objective is to identify relevant market segments, a cluster analysis can be carried out to group respondents according to their desired product attributes. To assess the size of the potential market, cross tabulations can be done with the "definitely would buy" group against variables such as "frequency of purchase".

If the researcher wants to establish which attributes were the most important in the overall assessment of the concept, multiple regression analysis can be used. Lesser used techniques include multiple discriminant analysis to identify the characteristics of various market segments, and multidimensional scaling to identify optimum positioning strategies.

Most concept tests would focus on the analysis of the result obtained from the five-point purchase intention question. A general rule of thumb for interpretation of these results (Dolan, 1993) is that a concept scoring greater than 80% favourable answers (definitely or probably will buy) should proceed to development. It is wise, however, to check industry and category 'norms' for previous concept tests and their outcomes. There may be considerable variation between product categories and industries (Schwartz, 1987). Another rule of thumb is that the eventual trial rate for a new product is usually equivalent to the 'top box' score (definitely would buy) for the concept (Dolan, 1993). Moore found the general feeling among companies who conduct concept tests is that the five-point intention-to-purchase scale can predict trial rates to within 20 percent, about 80 percent of the time (Moore, 1982).

2.3 Limitations of Concept Testing

There are a number of limitations. Not all concept tests predict success accurately. There are even concepts that have been dropped due to test results that would, in hindsight, probably have been successes.

Difficulty in identifying what's being measured

There are a number of variables involved in a concept test: the product idea itself, the form of presentation, the positioning strategy and the execution of the entire concept (language, graphics, etc.). Some authors argue that a concept test should be limited to the product idea itself (Stanton, et al. 1991), while others argue that this is not realistic and the concept in its entirety should be tested (Page & Rosenbaum, 1992). Some say that two tests need to be conducted, firstly the idea and secondly the idea together with its positioning elements.

Concept changes

There are often changes to the concept, and its positioning between the concept test and introduction. It is therefore difficult to know if the changes affected the final outcome for the product or not (Moore, 1982).

Environment changes

There are also often changes in the marketplace (new competitors, preferences, etc.) as well as in the legal or regulatory environment. These changes may also cause the introduction results to differ from the test result (Moore, 1982).

Adoption vs trial

Trial rates cannot be translated into adoption rates because adoption depends on satisfaction with the actual product, and a concept test cannot measure this (Tauber, 1972).

Executional difficulties are common

A product with a number of variants may have just one variant tested as the concept. Extrapolation of these results across all variants may be risky (Urban & Hauser, 1993). Also, products that can be sampled easily at the concept state (e.g. food

items) may incur problems if receiving a free sample is conditional upon giving a favourable response at the "intention to purchase" question (Lewis, 1984).

Highly innovative or sensory products

Products with a prime benefit that involves one of our senses (smell, touch, taste) are obviously very difficult to concept test (Crawford, 1991). In addition, products that are true innovations, involving technology that is difficult to visualise are also hard to test (e.g. Disc cameras, Xerox machines, Hair Mousse, ATMs) (Crawford, 1991).

3.TAIT ELECTRONICS - A CASE HISTORY

3.1 Background

Tait Electronics is a mobile radio manufacturer. With an annual turnover of approximately NZ\$80 million and a staff of around 500, it ranks in the top 150 companies in New Zealand. The company was formed in Christchurch in 1968 by Angus Tait, and now has six sales-based subsidiaries worldwide (USA, Australia, Germany, UK, Singapore, NZ).

In 1989 the company was largely reliant on its T500 mobile radio, whose sales had risen to account for around 60 per cent of the company's total unit sales. The product had been launched in 1985 and it was widely recognised that there was a limit to its competitive life.

However, the company's recent product development efforts had experienced a number of problems. A handheld mobile radio project was cancelled well after it had entered the Engineering development phase. An upmarket mobile radio had ended up with a far higher unit cost than planned for, and another mobile radio had been launched and almost immediately withdrawn because of technical difficulties.

Senior management at Tait Electronics employed four qualified marketing staff during 1988/89, including the author. For the first time in the company's history there was an opportunity to at least follow the New Product Process from idea generation through to commercialisation. Prior to this the development path had typically been idea generation, development, launch.

3.2 Idea Generation/Screening

The idea generation stage began in July 1989 with a brainstorming exercise in the factory building. Staff from every department were invited to attend one of the three sessions that were held. Overseas subsidiaries submitted their ideas in writing.

The Engineering department nominated one of their senior engineers to attend all of the sessions. This person later led the entire development project.

3.3 The Concept

A final concept was originally decided upon in March 1990 (seven months later) and as the time taken indicates, the path was by no means smooth, or conclusive. After a number of alternative names were considered the concept was finally called the T2000. It was decided to test the concept in Tait Electronic's three largest markets - New Zealand, Australia, and the United Kingdom. It was also decided that due to the size of the project and the need for confidentiality, a professional marketing research firm should be employed. Colmar Brunton was the successful contender.

3.4 Concept Testing Objectives

The objectives for the concept research were to determine:

- 1.level of interest in buying the product;
- 2.positive and negative perceptions of the product;
- 3.features likely to be used;
- 4.pricing perceptions; and
- 5.behavioural information (channels used, frequency of use, etc.).

3.5 Research Method

The sample was made up of 150 mobile radio users, 50 from each of the three markets. Respondents were the purchase decision-makers for their firm. These respondents were

supplied through Tait Electronics dealers, who endeavoured to keep the sample representative of the mobile radio market by balancing industry representation as well as brand usage.

The concept was presented to respondents in printed form with photographs and diagrams (Appendix 1). The concept folder was also accompanied by a 'mock-up' model. The model was a sophisticated one (more than one respondent attempted to turn it on). No positioning material was included. The concept was a 'core idea' type only.

Due to the complexity of mobile radio technology and the difficulty in translating technical features into user benefits, the concept itself became quite detailed and took considerable time and effort to prepare. However the research results indicated that this effort was worthwhile, with 88 percent of respondents stating that they did not find the concept information difficult to understand.

Interviewing was carried out by specialist business interviewers on a face-to-face basis using a standardised questionnaire (Appendix 2).

3.6 Results and Implications

The main results, as determined by the objectives, were very encouraging. They confirmed that the T2000 concept had great potential, and as discussed previously, helped to cement the project in place.

Purchase Interest

Table 2

Purchase Interest

	% Respondents
Extremely interested	7
Very interested	30
Quite interested	46
Neither	5
Quite uninterested	6
Very uninterested	2
Extremely uninterested	2
	<u>100</u>

The level of purchase interest was high, with 83 percent of respondents saying they were either quite, very, or extremely interested in the concept (above the 80 percent rule-of-thumb figure indicated by many authors as the minimum required to proceed with development). It is also high with respect to Colmar Brunton's other concept research 'norms', although they did not have other mobile radio category figures to compare these results with.

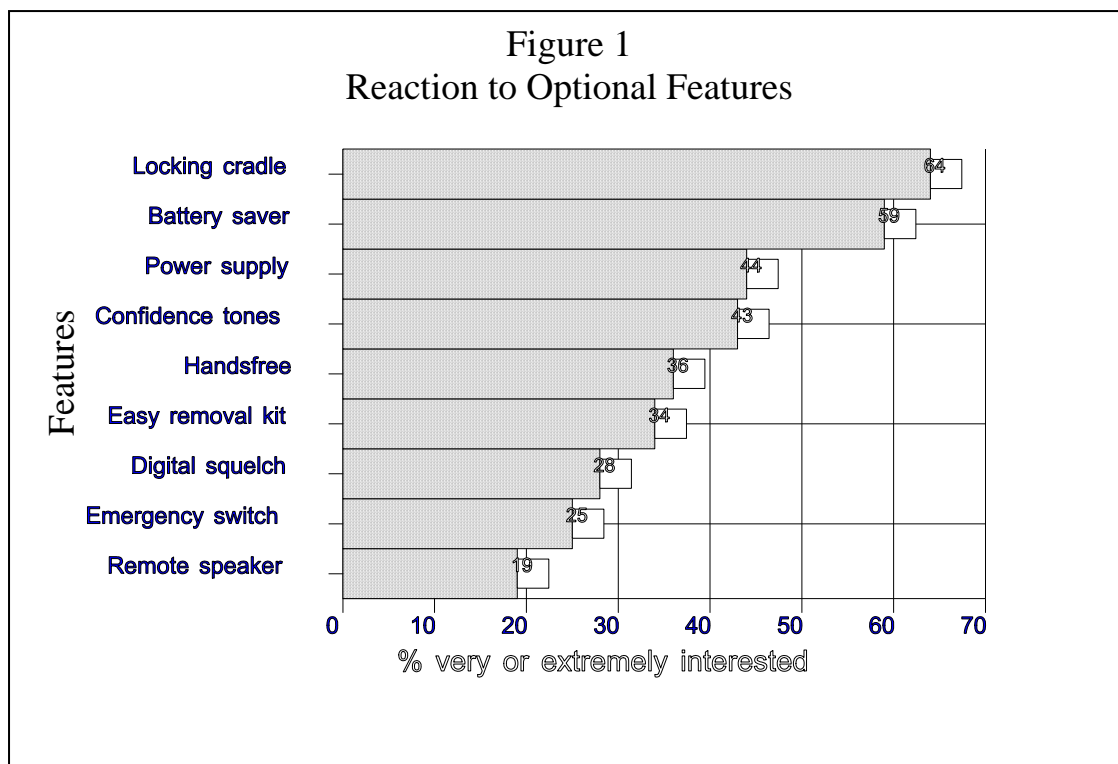
Positive and Negative Perceptions

There were two main freely mentioned advantages of the radio. These were the handsfree feature (37 percent of respondents) and its compact size (27 percent of respondents). When asked about negative perceptions or disadvantages, 61 percent of respondents did not mention any. The few dislikes that were mentioned were concerned with appearance, the number of features, and the perceived cost.

Features Likely to be Used

These questions helped the Engineering department to sort out which features should be included as standard, and which should be available as optional extras. They also helped the Engineering department to allocate their limited resources to those features considered to be highly desirable, leaving less desirable ones to be developed at a later date.

The following figure illustrates the desirability of each of the optional features presented.



Pricing Perceptions

Five related questions were used to ascertain respondents' perceptions of price. The first question was posed at the beginning of the interview and asked respondents their level of interest in purchase, assuming the radio's price was competitive with others that were available. The second question was also posed towards the beginning of the interview, after respondents had discussed their likes and dislikes. It asked respondents how much they would expect to pay for a radio like this. After this response the next question was, how much were they prepared to pay for a radio like this.

Table 3
Mean Price Responses

	Expect to Pay	Prepared to Pay
New Zealand	NZ\$809	NZ\$772
Australia	A\$1252	A\$1226
United Kingdom	£429	£443

As Table 3 illustrates, on average New Zealand and Australian respondents were not prepared to pay quite as much as the price they expected this radio would be. The British were actually prepared to pay slightly more than their expected price.

The last two questions on price were posed at the end of the interview. Here two prices were introduced, the first higher than the second, and purchase interest was ascertained again (NZ\$850 and NZ\$700 respectively). These questions proved that the company's perception of the radio's retail value was actually lower than the market's. For both suggested prices the level of purchase interest increased. Respondents who were extremely interested at an "assumed competitive price" went from 7 percent to 18 percent at the higher price and up to 30 percent at the lower price.

These results also suggest that due to the information absorbed through the interview (around 30 minutes) respondents' perceptions of the radio's value went up. This is indicated by the price New Zealand respondents, for example, were prepared to pay at the beginning of the interview (\$772) and the price at which 37 percent of them were either very or extremely interested in, at the end of the interview (\$850).

Behavioural Information

These results were largely centred around purchase volumes, purchase frequencies, brands held, and frequencies used. Although not as useful as the likes and dislikes information, it was still valuable for planning the types and quantities of different mobile radio variants.

There was one result in this section which caught the company out. A question on channel capacity was asked. Specifically, "About how many channels would your organisation require?" Eighty four percent of respondents indicated they would require four or less, with 69 percent indicating two or less. Thus the radio was designed with a capacity for only four channels. At launch the market feedback was very strongly in favour of greater than four channels and as a result a new 24 channel variant has been added. One possible explanation for this is that market requirements for channels have changed substantially in the two years since the research was

undertaken. Another explanation could be that given a choice, mobile radio users prefer radios with excess channel capacity ("just in case").

3.7 Success or Failure?

Eighteen months after launch the T2000 mobile radio is reportedly going from strength to strength (Angus Tait, pers. comm.). In terms of meeting the company's own objectives, it is valuable to compare projected sales volumes and margins in 1990 with those achieved today. The actual sales for the T2000 have exceeded projected volumes by an impressive 65 percent. Unit margins do not compare quite as well, being 20 percent lower than anticipated. This is probably a result of the increased competitiveness of the market place since 1990. However, the increase in unit volumes has meant that total profit is still close to the levels projected.

4. CONCLUSIONS

Concept testing is a key to successful product development, as both the literature and the Tait Electronics case history show. Provided that it is conducted with full knowledge of its limitations and using a method that is appropriate to the research objectives, concept testing can provide New Zealand firms with the ability to get new product ideas to market faster and with fewer mistakes. At present there appears to be no published information on the types and extent of concept testing carried out by New Zealand firms. In fact, there appears to be very little published on product development processes in general in New Zealand.

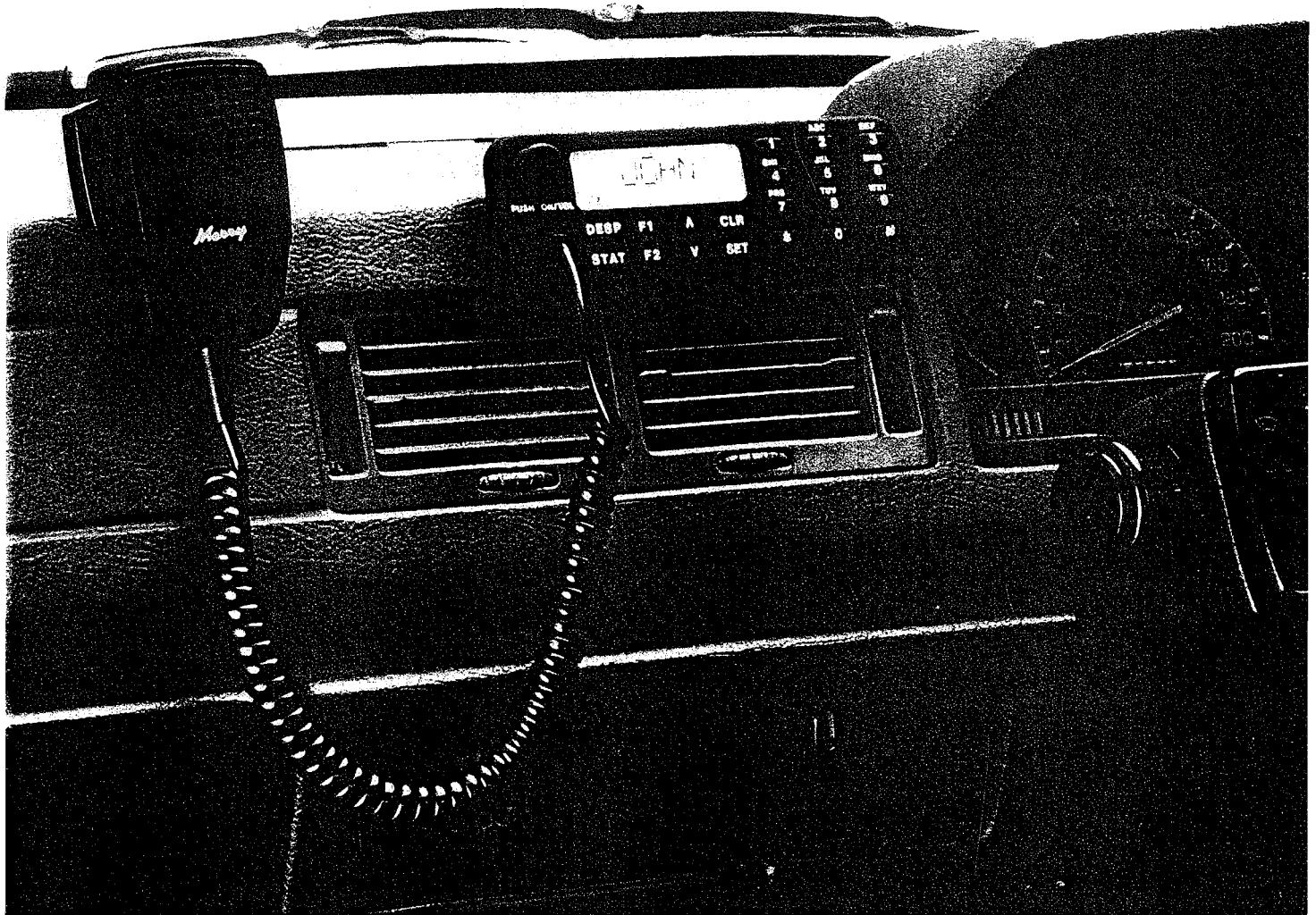
Opportunities for research in this area abound and it is the author's hope that these opportunities are taken up, particularly in light of the potential importance of product development to the country's continued economic growth.

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Appendix One
The Concept



TR MOBILE 2

General Description

This trunking mobile radio transceiver is very durable, constructed with diecast aluminium chassis and covers, yet lightweight and compact. It can be installed as a single unit or remotely mounted with just the control panel on the dashboard. The control panel has all the controls, a liquid crystal display (LCD) and an alphanumeric keypad on it. The product conforms to the U.K. Department of Trade and Industry trunking specifications MPT1327 and MPT1343 in Band III. It is available in five versions covering the common commercial bands from 66MHz VHF to 520MHz UHF.

Standard Features

1. **PC Programmable** - Changes can be made quickly and easily using a personal computer, via the microphone socket.
2. **Power** - 25 watts transmit output, programmable by PC. You can select the particular power capability you require.
3. **Wide Band Switching** - five versions of the radio cover the following frequency bands:
 1. VHF 66-88MHz
 2. VHF 136-174MHz
 3. Band III 175-225MHz
 4. UHF 400-470MHz
 5. UHF 450-520MHz

The very wide band coverage allows a greater choice of systems or networks, because extra versions of radios are not required and neither is retuning, when moving to another system within your band. For instance, only one version of the radio is required to cover Sub bands I, II and III within Band III.

4. **Rugged Cradle** - The radio slides into a strong metal cradle capable of withstanding extreme shock and vibration.
5. **Reverse Polarity Protection** - Protects the radio from accidental damage in cases where the vehicle battery is incorrectly connected.
6. **Audible Confidence Tones** - This feature provides positive feedback that you have pressed the right button with a tone sounding for each function. It also lets you know the outcome of initiating a call (e.g. ringing tone, engaged tone, party unavailable tone etc.)
7. **Full Dialling Capability** - The radio fully utilises practically all calling facilities available on the networks and systems, through use of a full alphanumeric keypad (e.g. access to telephone networks).

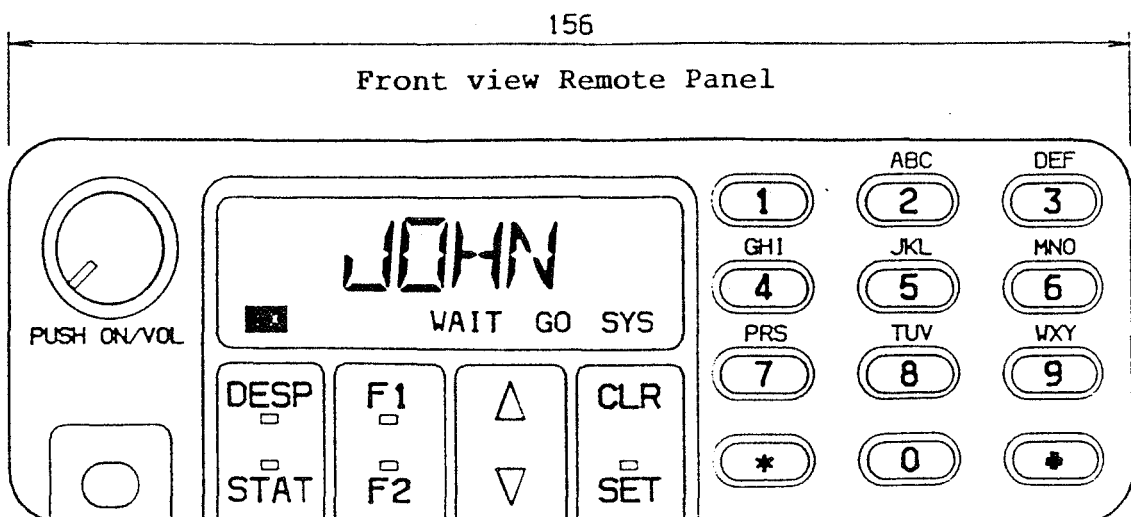
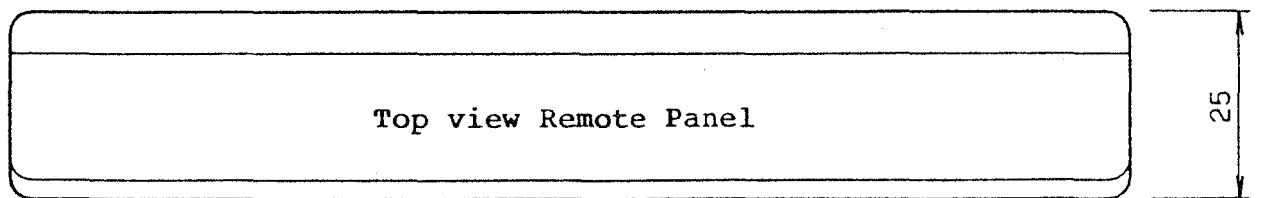
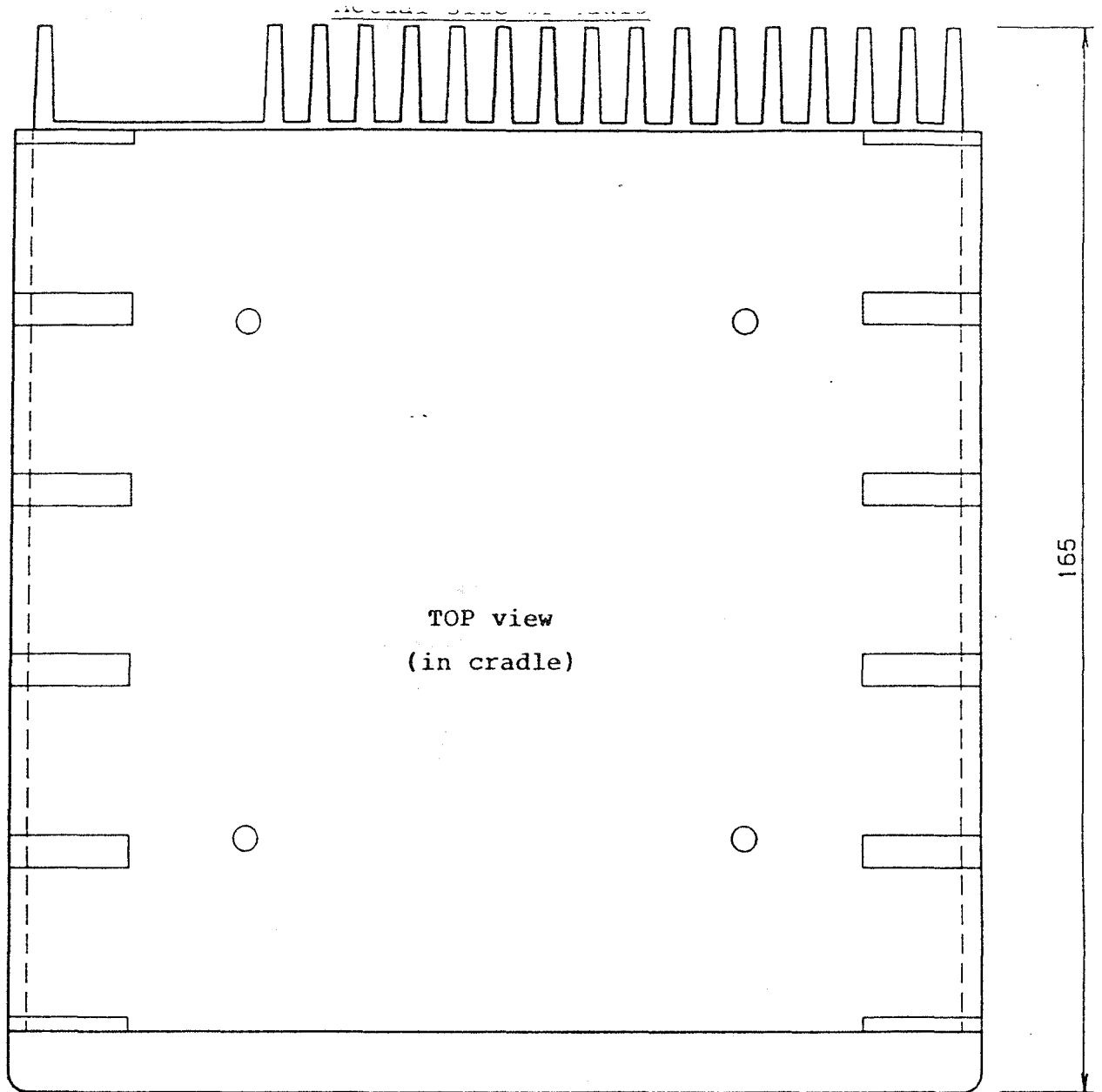
8. **One Touch Dialling** - The provision of a despatcher call button (DESP) means only one keystroke is required to call the despatcher or base. One touch dialling of other parties is also possible.
9. **Call Logging** - Up to 20 incoming calls can be logged by the radio. Thus if you are busy in traffic or out of your vehicle, you may scroll through these later and call back if you wish.
10. **Last Number Redial** - You may redial the last number you called, simply by pressing the microphone button (pressel).
11. **Call Timeout Warning** - The radio display automatically counts down the call time from the commencement of a call. Audible warning pips will occur 8 seconds before the call time-out.
12. **User Definable Setup** - Using the setup button (SET), you can scroll through a menu of user modifiable parameters (e.g. preset call numbers, tone levels, automatic logging of calls etc.)
13. **Programmable "Soft Keys"** - Two buttons (F1, F2) can be programmed to provide a number of functions (e.g. replacing a commonly used sequence of keystrokes).
14. **Automatic Number Identification** - For incoming calls, the callers number (or name if alphanumeric labels are used) will automatically be shown on the radio's display - thus you will always know the identity of your caller.
15. **Alphanumeric Addressing** - With the alphanumeric display and keypad available, up to 20 often called numbers can be programmed as names rather than number strings. Thus incoming calls can be displayed "BILL", "CAR-52", "HOME" etc. Similarly, calls can be made by simply dialling B-I-L-L-# for instance. Usually only the first, or the first and second letters need to be dialled. This not only reduces the number of keystrokes, it also eliminates the need to have a written list of names and their corresponding numbers in the vehicle.

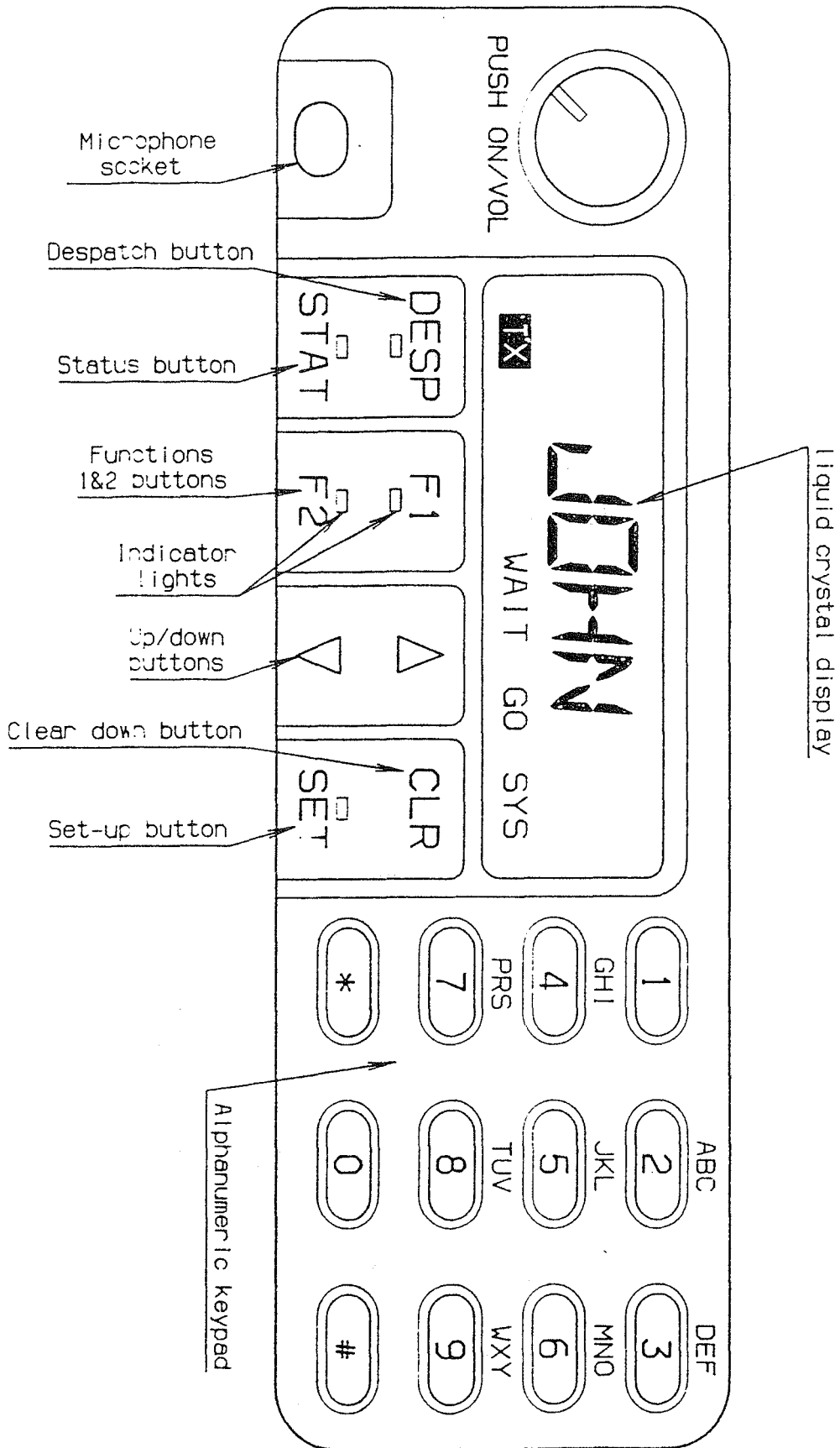
Optional Features

1. **Battery Saver** - This radio can detect whether the vehicle ignition switch is off, and if so, can partly shut down after a given period of time. In the event of the radio being inadvertently left on this saves the battery from draining.
2. **Car Stereo Suppression** - This option automatically silences car stereos, cellphones, or other audio equipment, when the radio is receiving or sending a message.
3. **Locking Cradle** - There is an optional locking cradle.
4. **Easy Removal Kit** - There is also an optional kit, that allows the radio to be fitted or removed without having to unplug any connections.
5. **Data Facility** - An optional RS232 port and internal modem are available for the connection of displays or printers.
6. **Handsfree** - This option allows you to speak without having to pick-up or hold a microphone. Either a voice activated or switch activated transmission is available.
7. **Emergency Switch** - This option allows you to send an emergency message, even when the radio is switched off. A remote switch is connected to the radio, together with a hidden microphone. While the emergency message is being sent the transmit indicator on the front panel will not illuminate.
8. **Despatcher Mode** - The radio is programmable as a despatcher radio with special call queuing functions. A matching desktop power supply is available.

Description of Buttons and Indicators

- * **Push on/vol** - Push to turn radio on. Push again to turn radio off. Turning knob clockwise increases received audio volume from radio loudspeaker.
- * **Despatcher (DESP) button** - Provides a one touch call to the despatcher.
- * **Status (STAT) button** - Your status (e.g. 2 or 'at lunch') may be displayed by pushing the STAT button after keying in the appropriate number.
- * **Function (F1/F2) buttons** - Programmable "soft keys" which can be used to replace a sequence of often used keystrokes.
- * **Up/down buttons** - Used to scroll through logged calls, set up parameters and the like.
- * **Clear (CLR) button** - Used to clear down calls or clear entries from the keypad/display.
- * **Setup (SET) button** - Used to enter setup mode where you may alter some of the radio's features (e.g. volume of confidence tones, automatic logging of calls etc.)
- * **Alphanumeric keypad** - Used for all forms of dialling e.g. single digit preset calls through to full length dialled numbers. The "#" button is used to initiate the call once a number is dialled.
- * **Eight character display** - The eight character display is used to show channel names, status messages and alphanumeric labels.
- * **System (SYS) available indicator** - This indicator appears when your radio is in range of your system or network.
- * **WAIT indicator** - The WAIT indicator appears when a call is being setup.
- * **GO indicator** - The GO indicator appears when your call has been set up. You may then begin talking.
- * **Transmit (Tx) indicator** - The Tx indicator appears when the radio is transmitting.





Appendix Two
The Questionnaire

INTERVIEWER'S NAME: _____ DAY AND DATE: _____

<u>CODE AREA</u>		<u>CODE RADIO TYPE</u>	
Auckland	01	FM1	1
Wellington	02	FM2	2
Sydney	03	TR1	3
Melbourne	04	TR2	4 <u>P3</u>
London	05	<u>CODE COUNTRY</u>	
Edinburgh	06	New Zealand	1
Other (SPECIFY) _____		Australia	2
	<u>P1</u>	United Kingdom	3 <u>P4</u>

CODE RESPONDENT TYPE

User Only	1
User/Decision Maker	2
User and Decision Maker (2 people)	3 <u>P2</u>

INTRODUCTION

This is a survey about mobile radios. I'm going to show you a description of a new mobile radio. (HAND RESPONDENT APPROPRIATE CONCEPT.) Please read it carefully. ALLOW RESPONDENT TIME TO READ CONCEPT IN FULL. RECORD ANY COMMENTS.

P5M

1A. IF FM1 OR TR1 USER ---> Q2, OTHERWISE (IF FM2 OR TR2 USER) SAY:
Now I would like to ask you some questions about your reactions to this radio.

IF FM2 USER ASK:

There are two types of installation shown in the folder. The remote control panel and the remote control microphone with the separate display. (REFER RESPONDENT TO PHOTOGRAPHS.) There is a third option available that is not shown in the folder, where the radio is mounted as a complete unit under the dashboard.

IF TR2 USER ASK:

There are two different types of installation for this radio. One is shown in the folder (REFER RESPONDENT TO PHOTOGRAPH) and the other type is where the radio is mounted as a complete unit under the dashboard.

B. For what reasons do you say that? ... For what other reasons? PROBE TO NO/CLARIFICATION.

P9M

C. REFER RESPONDENT BACK TO CONCEPT. ALLOW TIME FOR RESPONDENT TO FLICK THROUGH CONCEPT AGAIN, THEN ASK:

What are the main things you like about this mobile radio? ... What else do you like about it? PROBE TO NO/CLARIFICATION.

P10M

D. What are the main things you dislike about this mobile radio? ... What else do you dislike about it? PROBE TO NO/CLARIFICATION.

P11M

3A. Now imagine that this radio was fitted with all the standard features you have seen, but none of the optional features. About how much would your organisation expect to pay to purchase a mobile radio like this with the standard features?

WRITE IN: _____ P12

IF NECESSARY SAY:

By purchase we mean buying the radio rather than leasing it or using hire purchase.

IF DON'T KNOW ASK ANNUAL LEASE PRICE OR PROBE BEST ESTIMATE OF PURCHASE PRICE.

CODE PRICE TYPE:

Buy price 1
Annual lease price 2
Hire purchase 3
Other (SPECIFY) _____

_____ P13

B. And about how much would your organisation be prepared to pay to buy a mobile radio like this?

WRITE IN: _____ P14

IF DON'T KNOW ASK ANNUAL LEASE PRICE OR PROBE BEST ESTIMATE OF PURCHASE PRICE.

CODE PRICE TYPE:

Buy price 1
Annual lease price 2
Hire purchase 3
Other (SPECIFY) _____

_____ P15

C. Does your organisation usually ...

READ AND CODE ONE ONLY ...

... buy its mobile radios 1
... lease them 2
... put them on hire purchase 3
... or obtain them in some other way (SPECIFY)

_____ P16

4A. CARD B

REFER RESPONDENTS TO SCALE DIAGRAM AT END OF CONCEPT.

Looking at the size of this radio now. From this card please tell me how acceptable or unacceptable the size of the radio would be to your organisation.

CODE ONE ONLY.

Q5 <---

A. Perfectly acceptable 1

B. Quite acceptable 2

Q4B <---

C. Not really acceptable 3

D. Not at all acceptable 4

Don't know (TICK BOX) | | P17

B. For what reasons do you say that? PROBE CLARIFICATION.

_____ P18M

5. What frequency band does your organisation mostly use? REFER RESPONDENT TO BAND WIDTH IN FOLDER IF NECESSARY.
READ AND CODE EACH MENTIONED.

Would it be ...

- VHF - 66 - 88 MHz 01
- VHF - 136 - 174 MHz 02
- UHF - 400 - 470 MHz 03
- UHF - 450 - 520 MHz 04
- or Band Three (Band III) - 175 - 225 MHz 05
- Other (SPECIFY) _____

Don't know (TICK BOX) | | P19M

6. REFER RESPONDENT BACK TO STANDARD FEATURES IN FOLDER.
Now some questions about the standard features of this radio.

CARD C

Looking at the reverse polarity protection. From this card please tell me whether or not your organisation would find the reverse polarity protection useful. CODE ONE ONLY.

- A. Very useful 1
- B. Quite useful 2
- C. Not that useful 3
- D. Not at all useful 4

Don't know | | P20

7A. IF TR1 OR TR2 USER ---> Q8, OTHERWISE (FM1 OR FM2 USER) ASK:
Just thinking about the channel capacity, about how many channels would your organisation require?

WRITE IN NUMBER: _____ P21

IF DON'T KNOW, PROBE BEST ESTIMATE.

B. CARD D

Looking at the cloning feature now. From this card, how likely or unlikely would your organisation be to use cloning? CODE ONE ONLY.

- A. Would definitely use it 1
- B. Would probably use it 2
- C. Probably wouldn't use it 3
- D. Definitely wouldn't use it 4

Don't know | | P22

C. STILL CARD D

Looking at the scanning feature, how likely or unlikely would your organisation be to use scanning? **CODE ONE ONLY.**

- A. Would definitely use it 1
- B. Would probably use it 2
- C. Probably wouldn't use it 3
- D. Definitely wouldn't use it 4
- Don't know | | P23

D. CARD C AGAIN

Looking at the timeout facility, please tell me whether or not your organisation would find the timeout facility useful? **CODE ONE ONLY.**

- A. Very useful 1
- B. Quite useful 2
- C. Not that useful 3
- D. Not at all useful 4
- Don't know | | P24

8A. CARD B AGAIN

IF TR2 OR FM2 USER ---> Q9, OTHERWISE (IF TR1 OR FM1 USER) ASK:

Looking at the internal speaker now. How acceptable or unacceptable is the internal speaker facility to your organisation? **CODE ONE ONLY.**

- | | |
|----------|-------------------------------------|
| Q9 <--- | A. Perfectly acceptable 1 |
| | B. Quite acceptable 2 |
| Q8B <--- | C. Not really acceptable 3 |
| | D. Not at all acceptable 4 |
| | Don't know (TICK BOX) P25 |

B. For what reasons do you say that? **PROBE CLARIFICATION.**

P26M

9. CARD D AGAIN

IF TR1 OR FM1 USER ---> Q10, OTHERWISE (IF TR2 OR FM2 USER) ASK:

Looking at the alphanumeric addressing now. How likely or unlikely would your organisation be to use the alpha numeric addressing facility? **CODE ONE ONLY.**

- A. Would definitely use it 1
- B. Would probably use it 2
- C. Probably wouldn't use it 3
- D. Definitely wouldn't use it 4
- Don't know | | P27

10. CARD B AGAIN

IF FM1 OR FM2 USER ---> Q13. IF TR2 USER ---> Q12, OTHERWISE (TR1 USER) ASK:
Looking at the four call capacity now. From this card, how acceptable or unacceptable would it be to have just four call buttons plus the despatcher call button? CODE ONE ONLY.

- | | | |
|----------|----------------------------------|--------------------------|
| Q12 <--- | A. Perfectly acceptable 1 | |
| | B. Quite acceptable 2 | |
| Q11 <--- | C. Not really acceptable 3 | |
| | D. Not at all acceptable 4 | |
| | | Don't know P28 |

11. How many call buttons would your organisation require?
WRITE IN NUMBER (PROBE BEST ESTIMATE): _____ P29

12A. CARD C AGAIN

IF TR1 USER ---> Q13, OTHERWISE (TR2 USER) ASK:
What about the user definable setup. Please tell me whether or not your drivers would find the user definable setup useful? CODE ONE ONLY.

- A. Very useful 1
- B. Quite useful 2
- C. Not that useful 3
- D. Not at all useful 4
- Don't know | | P30

B. CARD D AGAIN

And the programmable soft keys. How likely or unlikely would your drivers be to use the two programmable function keys? CODE ONE ONLY.

- A. Would definitely use it 1
- B. Would probably use it 2
- C. Probably wouldn't use it 3
- D. Definitely wouldn't use it 4
- Don't know | | P31

13. Now I would like to ask you some questions about the optional features of this radio. REFER RESPONDENTS TO OPTIONAL FEATURES IN THE CONCEPT.

CARD A AGAIN

The battery saver is available for no extra cost. From this card, how interested or uninterested would your organisation be in the battery saver? CODE ONE ONLY.

- A. Extremely interested 1
- B. Very interested 2
- C. Quite interested 3
- D. Neither interested nor uninterested .. 4
- E. Quite uninterested 5
- F. Very uninterested 6
- G. Extremely uninterested 7
- Don't know | | P32

14A. STILL CARD A

If the car stereo suppression option cost NZ\$65/A\$90/UK£35 extra, how interested or uninterested would your organisation be in this feature? CODE ONE ONLY COL A.

B. STILL CARD A

If the car stereo suppression cost NZ\$35/A\$45/£17 extra, how interested or uninterested would your organisation be in this feature? CODE ONE ONLY COL B.

	P33	P34
	COL A	COL B
A. Extremely interested	1	1
B. Very interested	2	2
C. Quite interested	3	3
D. Neither interested nor uninterested	4	4
E. Quite uninterested	5	5
F. Very uninterested	6	6
G. Extremely uninterested	7	7
Don't know		

15A. STILL CARD A

The locking cradle is available at no extra cost. How interested or uninterested would your organisation be in the locking cradle? CODE ONE ONLY.

A. Extremely interested	1
B. Very interested	2
C. Quite interested	3
D. Neither interested nor uninterested ..	4
E. Quite uninterested	5
F. Very uninterested	6
G. Extremely uninterested	7
Don't know	P35

B. The optional easy removal kit, costs about NZ\$40/A\$50/ UK£20 extra. How interested or uninterested would your organisation be in the easy removal kit? CODE ONE ONLY.

A. Extremely interested	1
B. Very interested	2
C. Quite interested	3
D. Neither interested nor uninterested ..	4
E. Quite uninterested	5
F. Very uninterested	6
G. Extremely uninterested	7
Don't know	P36

16A. STILL CARD A

Looking at the data facility option. If this cost NZ\$135/A\$170/UK£70 extra, how interested or uninterested would your organisation be in the data facility option? CODE ONE ONLY COL A.

B. If the data facility option cost NZ\$65/A\$85/£35 extra, how interested or uninterested would your organisation be in it? CODE ONE ONLY COL B.

	P37	P38
	COL A	COL B
A. Extremely interested	1	1
B. Very interested	2	2
C. Quite interested	3	3
D. Neither interested nor uninterested	4	4
E. Quite uninterested	5	5
F. Very uninterested	6	6
G. Extremely uninterested	7	7
Don't know		

17. STILL CARD A

And the emergency switch option. The emergency switch will cost about NZ\$65/A\$87/UK£35 extra. How interested or uninterested would your organisation be in the emergency switch option? CODE ONE ONLY.

- A. Extremely interested 1
- B. Very interested 2
- C. Quite interested 3
- D. Neither interested nor uninterested .. 4
- E. Quite uninterested 5
- F. Very uninterested 6
- G. Extremely uninterested 7
- Don't know | | P39

18. STILL CARD A

And the handsfree option. This feature will cost about NZ\$65/A\$90/UK£35 extra. How interested or uninterested would your organisation be in the hands free option? CODE ONE ONLY.

- A. Extremely interested 1
- B. Very interested 2
- C. Quite interested 3
- D. Neither interested nor uninterested .. 4
- E. Quite uninterested 5
- F. Very uninterested 6
- G. Extremely uninterested 7
- Don't know | | P40

19A. STILL CARD A

IF TR1 OR TR2 USER ---> Q22, OTHERWISE: (IF FM1 OR FM2 USER) ASK:

Looking at the audible confidence tones. This is available at no extra cost. How interested or uninterested would your organisation be in the audible confidence tones option? CODE ONE ONLY.

- A. Extremely interested 1
- B. Very interested 2
- C. Quite interested 3
- D. Neither interested nor uninterested .. 4
- E. Quite uninterested 5
- F. Very uninterested 6
- G. Extremely uninterested 7
- Don't know | | P41

B. STILL CARD A

Looking at the despatcher/base radio option with the matching desk top power supply. The power supply will cost about NZ\$240/A\$310/UK£125 extra. How interested or uninterested would your organisation be in the power supply? CODE ONE ONLY.

- A. Extremely interested 1
- B. Very interested 2
- C. Quite interested 3
- D. Neither interested nor uninterested .. 4
- E. Quite uninterested 5
- F. Very uninterested 6
- G. Extremely uninterested 7
- Don't know | | P42

20A. STILL CARD A

Now the optional signalling features. One of these is digital coded squelch. This will cost about NZ\$30/A\$30/UK£14 extra. How interested or uninterested would your organisation be in this optional signalling feature? CODE ONE ONLY.

- A. Extremely interested 1
- B. Very interested 2
- C. Quite interested 3
- D. Neither interested nor uninterested .. 4
- E. Quite uninterested 5
- F. Very uninterested 6
- G. Extremely uninterested 7
- Don't know | | P43

B. STILL CARD A

Another optional signalling feature is five tone selective calling and automatic number identification (ANI). If this feature cost NZ\$150/A\$190/UK£80 extra, how interested or uninterested would your organisation be in it? CODE ONE ONLY COL A.

C. STILL CARD A

If the selective calling and ANI cost NZ\$100/A\$130/£55 extra, how interested or uninterested would your organisation be in it? CODE ONE ONLY COL B.

	P44	P45
	COL A	COL B
A. Extremely interested	1	1
B. Very interested	2	2
C. Quite interested	3	3
D. Neither interested nor uninterested	4	4
E. Quite uninterested	5	5
F. Very uninterested	6	6
G. Extremely uninterested	7	7
Don't know		

21. STILL CARD A

IF FM1 USER ---> Q22, OTHERWISE (IF FM2 USER) ASK:

Another optional signalling feature is DTMF dialling which is available for no extra cost. How interested or uninterested would your organisation be in DTMF dialling? CODE ONE ONLY.

A. Extremely interested	1
B. Very interested	2
C. Quite interested	3
D. Neither interested nor uninterested ..	4
E. Quite uninterested	5
F. Very uninterested	6
G. Extremely uninterested	7
Don't know	P46

22. STILL CARD A

IF FM2 OR TR2 USER ---> Q23, OTHERWISE (IF TR1 OR FM1 USER) ASK:

Now looking at the remote speaker option. This will cost about NZ\$40/A\$50/UK£20 extra. How interested or uninterested would your organisation be in the remote speaker option? CODE ONE ONLY.

A. Extremely interested	1
B. Very interested	2
C. Quite interested	3
D. Neither interested nor uninterested ..	4
E. Quite uninterested	5
F. Very uninterested	6
G. Extremely uninterested	7
Don't know	P47

23. Now some questions about the controls on this radio. REFER RESPONDENT TO DESCRIPTION OF BUTTONS AND INDICATORS.

A. Do you feel that the lettering on each button clearly tells you the function of each button?

Q24 <---	Yes	1
23B <---	Not Sure	2
	No	3

P48

B. Which buttons are not clearly labelled?

WRITE IN: _____

P49M

24A. CARD G

From this card, how easy or difficult do you feel this mobile radio would be to use? CODE ONE ONLY.

A. Very difficult	1
B. Quite difficult	2
C. Not very difficult	3
D. Not at all difficult	4
Don't know	P50

B. For what reasons do you say that? PROBE CLARIFICATION.

P51M

C. CARD B AGAIN

From this card, please tell me how acceptable or unacceptable the appearance of this radio is overall?

A. Perfectly acceptable	1
B. Quite acceptable	2
C. Not really acceptable	3
D. Not at all acceptable	4
Don't know (TICK BOX)	P52

25. Thinking about this radio overall now, what suggestions do you have for improvements that could be made to it? ... What other suggestions for improvement do you have? PROBE ONCE ONLY.

P53M

26A. CARD A AGAIN

PRICING GUIDE 1:

	NZ	AUS	UK
FM1	\$850	\$1,100	£400
FM2	\$950	\$1,200	£450
TR1	\$950	\$1,200	£450
TR2	\$1,100	\$1,400	£525

If this mobile radio, with all the standard features, cost (READ APPROPRIATE PRICE FROM ABOVE AND WRITE IN) _____, please tell me how interested or uninterested your organisation would be in buying it? CODE ONE ONLY IN COL A.

B. STILL CARD A

PRICING GUIDE 2:

	NZ	AUS	UK
FM1	\$700	\$900	£350
FM2	\$800	\$1,000	£400
TR1	\$800	\$1,000	£400
TR2	\$900	\$1,200	£475

And if this radio cost (READ PRICE FROM ABOVE AND WRITE IN) _____, how interested or uninterested would your organisation be in buying it? CODE ONE ONLY COL B.

	P54 COL A	P55 COL B
A. Extremely interested	1	1
B. Very interested	2	2
C. Quite interested	3	3
D. Neither interested nor uninterested	4	4
E. Quite uninterested	5	5
F. Very uninterested	6	6
G. Extremely uninterested	7	7
Don't know (TICK BOX)		

27. Which manufacturer do you think this mobile radio would come from?
WRITE IN NAME: _____

P56M

DON'T KNOW (TICK BOX) | |

28. CARD E

REMOVE CONCEPT AND ASK: Lastly, a few questions about your organisation. Using this card, please tell me when your organisation last bought a mobile radio. CODE ONE ONLY.

- A. In the last 12 months 1
 - B. 1 to 2 years ago 2
 - C. 3 to 5 years ago 3
 - D. 6 years ago or longer 4
 - Don't know (TICK BOX) P57
-

29. How many mobile radios does your organisation have at the moment?

WRITE IN: _____ P58

IF DON'T KNOW, PROBE BEST ESTIMATE

30.

CARD F - BRAND CARD

Which of these brands and models of radio does your organisation have the most of? CODE EACH MENTIONED.

AWA/Exicom	RT85	01
	Don't know model	02
ICOM	V200	03
	Don't know model	04
Kenwood	705/805	05
	710/810	06
	Don't know model	07
Key	KM225	08
	Don't know model	09
Marantz	GX2000	10
	Don't know model	11
Marconi	RC630	12
	Don't know model	13
Maxon	SMX	14
	Don't know model	15
Motorola	Micro	16
	Radius	17
	Syntrx	18
	Don't know model	19
Philips	FM91/92	20
	FM1100/1200	21
	MX295	22
	PRM80	23
	Don't know model	24
Plessey	MTR9000	25
	Don't know model	26
Pye	27
Tait	T162, T182, T196, T198, T199	28
	T500	29
	T700	30
	Don't know model	31
Storno	CQM6000.....	32
	Don't know model	33

Other (PLEASE SPECIFY) _____

Don't know brand (TICK BOX) | | P59M

31A. What does your organisation do?

WRITE IN: _____ P60

B. And what is your position or job title?

WRITE IN: _____ P61

32. SELF COMPLETION FORM

HAND RESPONDENT SELF COMPLETION FORM AND PEN.

This is a copy of the information in the folder you have just seen. So that we can make things clearer for people in the future, please go through the material again and put a cross in the margin to show which sections you feel were not easy to understand.

ENSURE RESPONDENT UNDERSTANDS HOW TO COMPLETE. WHEN COMPLETED ASK:

CARD G

Finally, using this card, please tell me how easy or difficult you feel the information was to understand overall. CODE ONE ONLY.

- A. Very difficult 1
- B. Quite difficult 2
- C. Not very difficult 3
- D. Not at all difficult 4
- Don't know | | P62

CLOSE:

That's the end of the survey, thank you very much for your time. If you have any questions please feel free to call my supervisor. (GIVE RESPONDENTS SUPERVISOR'S NAME AND PHONE NUMBER IF REQUESTED.)

FINISH TIME: _____

INTERVIEW DURATION (WRITE IN, 2 DIGITS): _____ P63

PHONE NUMBER (WRITE IN, DON'T ASK): _____

INTERVIEWERS SIGNATURE: SIGN HERE TO INDICATE THAT YOU HAVE COMPLETED AND CHECKED THE QUESTIONNAIRE ACCORDING TO INSTRUCTIONS: _____

AUDIT DETAILS: _____

ANALYSIS CHECK (SIGN): _____